Digital Public Infrastructure(DPI)

A Guidebook

Preface

Building the Digital Backbone:
A Playbook for Digital Public Infrastructure

In today's increasingly digital world, governments face a critical challenge: ensuring all citizens can access essential services securely and efficiently. Physical infrastructure, like roads and bridges, has long been recognized as a cornerstone of societal progress. Digital Public Infrastructure (DPI) is the digital equivalent, providing the essential building blocks for a robust digital ecosystem.

This playbook serves as a comprehensive guide for ministries, divisions, and departments to navigate the journey of DPI adoption. It unpacks the core principles of DPI, explores its benefits, and provides a step-by-step roadmap for planning, designing, building, and implementing DPI solutions.

Whether you're just starting your digital transformation journey or looking to optimize existing initiatives, this playbook equips you with the knowledge and tools to leverage DPI's transformative power. By fostering collaboration, inclusivity, and innovation, DPI can empower governments to deliver a brighter digital future for all citizens.

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Physical Infrastructure

Physical infrastructure is the backbone of a functioning society. It bridges the network of fundamental structures that enable a nation to grow. These structures can be broadly categorized into transportation, such as roads, bridges, railways, and airports that enable the movement of people and goods.

Efficient physical infrastructure is paramount for economic development, improved quality of life, and access to basic necessities. It underpins commerce, communication, and fosters business growth. Investment in infrastructure is crucial, but it should prioritize sustainability and cater to the specific needs of the community.

Digital Public Infrastructure.

Legos for for a Connected Society

Mirroring physical infrastructure like roads and bridges, Digital Public Infrastructure (DPI) provides a foundation of digital building blocks. This empowers governments to deliver secure and inclusive services efficiently at scale. DPI fosters a robust and interconnected digital network, ensuring seamless access to essential services. Unlike centralized systems, DPI thrives on a decentralized model, with various stakeholders collaboratively managing and evolving its components. These modular building blocks function through interoperable protocols, enabling a cohesive and transformative digital ecosystem.

The DPI approach works by using open tech standards & enabling policy to drive exponential change out of markets. It is based on 3 fundamental pillars:

- **Open Technology Standards & Building Blocks:** Open specifications & protocols or shared core platforms across digital ID, signatures, payments, data & credentialing, and discovery & transactions.
- **Governance:** Legal and institutional framework; Public programs to drive adoption; Ecosystem facilitation; Participatory governance
- **Market:** Public and private innovation; Competitive market players designing diverse solutions

Digital Public Infrastructure (DPI) avoids several pitfalls:

- Fragmented Digitization: DPI goes beyond siloed online services. It fosters interconnectedness, ensuring information flows seamlessly across platforms.
- Centralized Control: Unlike a centralized model, DPI operates as a cooperative network. Various entities contribute, similar to how a highway system functions with independent city maintenance.
- Monopolistic Governance: DPI embraces a multi-stakeholder approach. Public and private sectors collaborate, fostering innovation beyond a government-run system's limitations.
- Vendor Lock-in: Open standards are central to DPI. This ensures interoperability and avoids restricting users to a single provider.

Imagine a bustling marketplace. Instead of everyone having their own isolated stalls with unique currencies and identification checks, DPI creates a network of interconnected booths. Here's how it breaks down:

- **Decentralized:** There's no single ruler of the marketplace (centralization). Different vendors (governments, private companies) manage their booths (individual DPIs) that have evolved independently.
- **Building Blocks:** Each booth offers a specific service, like secure identity verification or digital payments. These services act as building blocks for the overall marketplace.
- **Collaboration is Key:** Although independent, the vendors need to work together. They establish common languages (interoperability specifications/protocols) that ensure everyone can interact seamlessly. Imagine everyone agreeing on a single currency and a universal ID card for the marketplace.
- **Transformation Through Connection:** By connecting these building blocks, the marketplace transforms. People can move freely, using the same ID and currency across different booths. This fosters innovation and efficiency, similar to how a well-connected physical marketplace thrives.

In essence, DPI isn't about creating a monolithic system, but rather a collaborative network where independent components work together for a smoother digital experience.

Just as we built roads, highways, and airports in the 20th century, we must now build a digital infrastructure that is open, accessible, and empowers everyone.

-Bill Gates

Bangladesh the DPI approach

IDX Stack, layers that constitute the DPI approach

Bangladesh's Smart Bangladesh Initiative:

Building an Inclusive Digital Future

Bangladesh's ambitious Smart Bangladesh vision prioritizes inclusive digital transformation (iDX) through its layered Digital Public Infrastructure (DPI). This approach leverages best practices from India Stack, Estonia's X-Road, and Singapore's Moments of Life to create a secure, accessible, and citizen-centric digital ecosystem.

Identity: Secure and Verifiable Foundation

The core of the DPI is a secure national digital ID, acting as the single source of truth for all interactions. This foundational layer, often built upon existing National Identity (NID) and Birth Registration (BRN) systems, is further enhanced with functional identities catering to specific online service needs (e.g., e-KYC, digital signatures). User control over data sharing with different services ensures privacy. Additionally, a digital locker provides secure storage for important documents, fostering convenience and efficiency.

Payments: Seamless and Interoperable

The DPI employs a layered approach to digital payments. A robust national network facilitates secure electronic fund transfers between financial institutions. Standardized protocols ensure seamless transactions across different payment methods within the DPI framework. Finally, seamless merchant integration empowers businesses to readily accept digital payments, promoting financial inclusion and economic growth.

Data: Secure, Private, and Efficient Management

Data management within the DPI prioritizes security, privacy, and efficiency. Standardized data governance ensures clear communication across the system. Secure data storage with strict access controls minimizes breaches. Users control what information is shared, empowering them to manage their privacy. Inspired by Estonia's X-Tree, a secure federated data exchange layer may be incorporated, allowing authorized entities to directly access and query data from its source within the DPI, minimizing data movement and enhancing security.

Services: Efficient and Accessible Delivery

The DPI prioritizes efficient and accessible service delivery through a layered approach. A robust core infrastructure layer provides the technical backbone, while service APIs and registries act as a central directory for service discovery and interaction. The key layer focuses on user-friendliness, offering various services like online government applications, healthcare scheduling, or social program enrollment. Inspired by Singapore's SovTech Stack, a federated API gateway concept might be implemented, where each government sector manages its own gateway for accessing specific services, fostering improved efficiency and scalability.

Access: Reaching Every Citizen

The DPI bridges the digital divide with a multi-channel approach. Users can access services online, semi-online, or offline, with options for low-bandwidth connections and various devices. This includes self-service options, assisted channels (calls, chatbots, in-person), and innovative methods like biometric authentication and community kiosks.

How can ministries, divisions, and departments

Plan, Engage, design, Adopt & Build and implement

the DPI approach

This document outlines a comprehensive framework for the development and implementation of a Digital Public Infrastructure (DPI) to address the challenges faced by Whole-of-Government (WoG) service delivery in Bangladesh.

Key Principles

The DPI Framework is rooted in the following core principles:

- **Inclusion**: The DPI fosters inclusive access with multilingual interfaces, accessibility features, and alternative methods for all.
- **Privacy**: The DPI prioritizes data privacy with robust security and Bangladeshi law-compliant data governance.
- **Co-creation**: Co-creation with government, citizens, and NGOs ensures the DPI addresses priority needs and fosters ownership.
- **Accountability**: Transparent DPI builds trust with clear accountability and regular reporting.

Framework Phases:

A Step-by-Step Approach

The DPI development lifecycle is envisioned as a continuous and iterative process, divided into five distinct phases:

1. **Plan**: Defining the Problem
2. **Engage**: Building Consensus and Collaboration
3. **Design**: Translating Vision into Action
4. **Adopt & Build:** Leverage existing, improve, share for all
5. **Implement:** Building and Refining the DPI

Plan phase

01. Frame the Problem Clearly

Effective problem-solving requires deep understanding (55 minutes on problems, 5 minutes on solutions) - like Einstein said.

As famously noted by Albert Einstein, "If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions." This underscores the critical importance of problem framing. It's not just about identifying the issue; it's about challenging assumptions, exploring diverse perspectives, and delving deeper to understand the root cause. By dissecting the problem's core, the stakeholders involved, and the desired outcomes, we gain a clear picture of what needs to be addressed. This in-depth understanding paves the way for the development of targeted and effective solutions.

02. Understand the existing ecosystem

Plant the right digital seeds for inclusive growth in a flourishing online environment.

In the digital world, trust blossoms from understanding. Just like a gardener wouldn't plant delicate flowers in harsh sunlight, digital initiatives need to consider the existing

"digital ecosystem" where they'll take root. This ecosystem is a vibrant tapestry woven from cultural norms, social structures, economic realities, and the current level of technology access. Imagine launching a mobile app in a community with limited internet connectivity or low digital literacy – it wouldn't flourish. By taking the time to understand these factors, initiatives can adapt and support existing efforts. This might involve working with local actors, aligning with government policies, or factoring in affordability of devices. A deep understanding of the digital ecosystem allows initiatives to be inclusive, fostering trust and ensuring everyone can benefit from the digital blooms. However, this ecosystem is constantly evolving, just like a garden. Regular analysis by "digital development practitioners" is crucial to ensure initiatives remain relevant and effective. By cultivating this understanding, we can create a thriving digital garden where everyone can blossom.

03. Stakeholder Mapping

Who's affected, who influences, who has a stake for holistic problem framing.

Problem framing starts by identifying the stakeholder ecosystem. This means pinpointing everyone affected by the issue, those who can influence it, and anyone with a stake in its resolution (as detailed in Annexure 1.1). We can utilize brainstorming, interviews, and research to uncover this web of stakeholders. The goal is to create a comprehensive list that captures diverse perspectives, ensuring everyone's working towards the right solution.

04. Policy Review

Identify policy gaps to ensure compliant and effective WoG solutions.

Existing policies can sometimes inadvertently hinder WoG solution effectiveness. A thorough policy review is necessary to identify limitations such as data sharing restrictions, privacy gaps, or lack of data format standardization. By pinpointing policy gaps related to the WoG problem, we can pave the way for solutions that are both feasible and compliant.

04. Data Ecosystem Review

Analyze data availability, governance (gaps & needs) to leverage data for effective WoG solutions.

In order to leverage data as a powerful tool for addressing Whole-of-Government

(WoG) challenges, a comprehensive data ecosystem review is essential. This review entails a two-pronged approach: **analyzing data availability and governance gaps, as well as identifying specific data needs.** The first aspect focuses on assessing the availability, structure, and location of relevant data within the ecosystem. This includes evaluating data governance practices, such as ownership, access controls, sharing mechanisms, and quality management processes. Identifying any gaps in these areas is crucial, as they can significantly hinder effective problem-solving. The second element involves pinpointing the specific data elements required to address the WoG challenge at hand. For instance, understanding income data might be necessary for enrollment purposes. By addressing both data availability and governance shortcomings, we can establish a robust data foundation for developing and implementing effective solutions. This systematic approach ensures that data serves as a valuable asset in tackling WoG challenges.

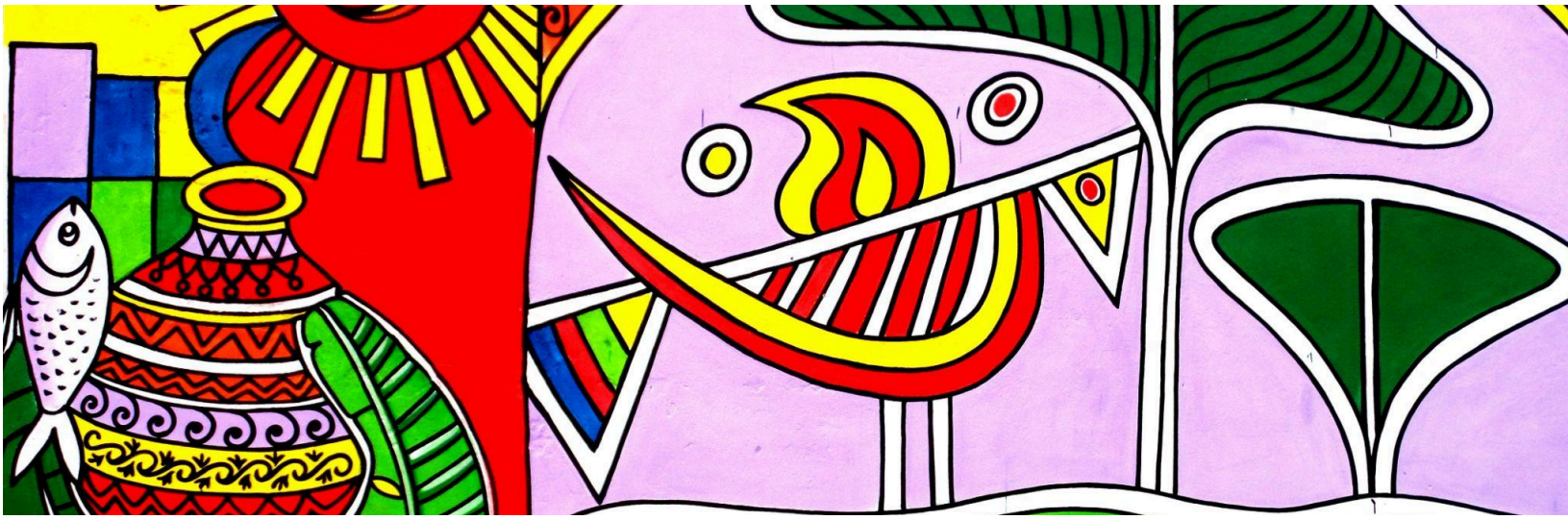
04. Learning from Others

Learn from global successes

This stage encourages us to learn from successes elsewhere. Gaining insights from successful models like Estonia's X-Road, UPI of India, and best practices in other countries/sectors (e.g., healthcare data exchanges) that tackled similar challenges can inform the development of our own solutions for WoG problems.

What will we get from this phase:

- Clearly Defined Problem
- Comprehensive Context Analysis
- Stakeholder Map
- Policy Review Report
- Data Ecosystem Assessment.
- Best Practices Collection



Engage position

01. Mapping the Landscape

Identify stakeholders (govt, NGOs, citizens, private sector) for WoG solutions.

The first step is meticulously mapping the digital ecosystem (detailed in Annexure 1.1). This comprehensive stakeholder map will encompass government agencies (national and local), NGOs working in Whole-of-Government (WoG) sectors, citizen representatives, and potential private sector partners who can contribute expertise or resources.

02. Building a Shared Vision

Co-create DPI vision with stakeholders, using data & global success stories for buy-in.

With a clear understanding of the stakeholders, we'll embark on crafting a shared vision for the DPI project. Interactive workshops will provide a platform for everyone to brainstorm and define the desired outcomes. Data-driven advocacy, showcasing the impact of service delivery gaps, will highlight the urgency and potential of a DPI solution. Success stories from other countries will further inspire confidence.

03. Weaving a Compelling Narrative

Captivate stakeholders with a vision of transformed lives, empowered citizens, and a brighter Bangladesh.

To cultivate enduring stakeholder support, a captivating narrative is essential. This narrative will focus on the transformative impact a DPI will have on Bangladeshi lives. Imagine: faster access to essential services, a more transparent government, and empowered citizens. We'll weave this vision together, ensuring the DPI is firmly rooted in the Bangladeshi context and addresses specific WoG challenges. The narrative will extend beyond immediate benefits, articulating how a robust DPI can contribute to Bangladesh's long-term development and economic prosperity, fostering a sense of shared purpose for a brighter future.

What will we get from this phase:

- Stakeholder Map, Engagement Plans, Communication Channels
- Shared Vision Statement, Data-Driven Reports, Success Story Collection
- Citizen-Centric Narrative, Contextual Messaging, Long-Term Vision Doc

Design phase

01. Share, reuse, and improve

Build on what works, improve what works, and share so that others can do the same. Avoid innovation for the sake of innovation.

The world works better when we work together. Sharing, reusing, and improving existing ideas is the essence of collaboration. Imagine a world where organizations don't reinvent the wheel in every project. Instead, they share successful strategies, resources, and lessons learned. This not only avoids duplication of effort (and wasted resources!), but also allows for continuous improvement. Open documentation, open standards, and open source tools are all friends in this process. By collaborating and building on each other's work, we can create streamlined services, accelerate innovation, and ultimately, achieve a more equitable world. On the other hand, going it alone leads to wasted time, money, and talent. It stifles progress and can erode trust by placing unnecessary burdens on people. Let's work together, share, and build a better future, together.

03. Design with people

Good design starts and ends with people that will manage, use, and ideally benefit from a given digital initiative.

Designing successful digital initiatives requires putting people first. This means including those who will use and be impacted by the technology throughout the design process. Imagine co-creating a solution with the very people who will benefit from it! This isn't a one-time event; it's about ongoing engagement with all relevant stakeholders, from potential users to system administrators. To foster trust and adoption, initiatives should create opportunities for user innovation, establish clear feedback mechanisms, and embrace an agile approach that allows for continuous improvement. By working hand-in-hand with the people we serve, we can design digital solutions that truly empower and uplift communities.

04. Design for inclusion

Tech for All = Empowers everyone, bridging divides & fostering progress.

To ensure everyone benefits, digital initiatives must embrace inclusivity. This means considering a wide range of human diversities – language, ability, income, and more. Imagine a solution that works seamlessly for people with disabilities, those in remote areas, or with limited digital literacy. By using flexible design methods and addressing any unintended biases, we can create technology that uplifts entire communities, not just a select few. And let's not forget those who might not be online yet – can the initiative benefit them too? Ultimately, inclusive design ensures everyone has a chance to participate and progress in the digital world.

06. Establish people-first data practices

People-first data practices prioritize transparency, consent, and redressal while allowing people and communities to retain control of and derive value from their own data.

In the digital age, trust hinges on ethical data practices. A "people-first" approach prioritizes transparency, informed consent, and the ability for individuals to control their data. This means no more collecting data without a clear purpose or failing to give people a say in how it's used. Imagine a world where everyone understands what data is being collected, can choose to participate, and even benefit from it! Furthermore, data collection should focus on creating value for the people who

provide it, not just for organizations. Following established best practices and guidelines ensures responsible data collection. By empowering people with knowledge and control, we can safeguard them from potential harms and foster a data ecosystem built on trust and mutual benefit.

07. Create open and transparent practices

Effective digital initiatives establish confidence and good governance through measures that promote open innovation and collaboration.

Fostering a thriving digital ecosystem hinges on trust. To achieve this, we prioritize open governance and transparency. Imagine everyone feeling confident about how their data is handled and empowered to ask questions or raise concerns. This is achieved through clear communication, making public decisions and policies readily accessible, and establishing feedback mechanisms. Technically, we'll embrace open standards and open-source solutions whenever possible, further promoting openness and collaboration. By prioritizing transparency, we build trust - the cornerstone of encouraging participation in digital services and unlocking their full potential. Without trust, people may be hesitant to engage, hindering progress and the positive impact digital initiatives can bring.

08. Anticipate and mitigate harms

Harm is always possible when it comes to technology. To avoid negative outcomes, plan for the worst while working to create the best outcomes.

The digital landscape is a powerful tool, but it's not without its risks. To ensure technology uplifts everyone, we must actively plan to mitigate potential harms. This means anticipating unintended consequences, from exclusion based on disability to the misuse of AI. Imagine safeguarding against social injustice or digital divides while harnessing technology's potential. By proactively building safeguards that consider marginalized groups and the long-term impact of emerging technologies, we can ensure technology empowers everyone, not just a select few. A multifaceted approach that combines technical solutions, clear regulations, and social awareness is key to achieving this responsible innovation.

09. Prototyping experimental journey

Before building, test the user journey with prototypes and map citizen experiences to ensure a user-friendly DPI.

Before diving headfirst into building a complex DPI, we need to ensure it truly serves the people. That's where prototyping and experimental journeys come in! Prototyping involves creating mockups, like sketches or even role-playing scenarios, to see how users will interact with the DPI. Imagine getting real-world feedback on a simple paper prototype before building the entire system. Building on this, experimental journeys map out the complete experience a citizen would have using a government service through the DPI, like applying for a permit online or enrolling in a social program. By testing these journeys, we can identify any roadblocks and ensure the DPI is user-friendly and truly meets the needs of the Bangladeshi people.

10. Use evidence to improve outcomes

Evidence drives impact: continually gather, analyze and use feedback.

The secret sauce of a thriving DPI? Constant improvement! We won't just build it and walk away. Instead, we'll establish a feedback loop that continuously gathers information through various methods, both digital and traditional. Imagine analyzing user experiences, complaints, and suggestions to understand the real impact of the DPI on people's lives. This isn't just about counting clicks – it's about using feedback to identify areas for improvement and ensuring the DPI truly empowers Bangladeshi communities. By involving people in designing how we measure success, we can guarantee the metrics we track are relevant and lead to long-term positive outcomes for everyone.

11. (+1) Thinking

Small (+1) Improvements: Bite-sized changes to existing systems for a gradually evolving, user-friendly DPI.

Imagine transforming Bangladesh's digital landscape one step at a time. That's the power of Small, Incremental Improvements (+1) Thinking! This approach focuses on making small, achievable changes to existing systems. Think adding a digitally signed QR code to a paper certificate – a small tweak that leverages what's already there to create a more robust DPI. By taking these bite-sized steps, we can gradually integrate

different government services into the DPI, making it easier to use and more feasible to implement. This approach offers several advantages: it simplifies integration with existing infrastructure, allows for quick wins to keep stakeholders motivated, and minimizes risks by allowing for adjustments along the way. Most importantly, successful small improvements can be scaled up and replicated across different services. This makes Small, Incremental Improvements (+1) Thinking a perfect fit for the Bangladeshi context, where we can build a strong and user-friendly DPI on the foundation of existing digital infrastructure.

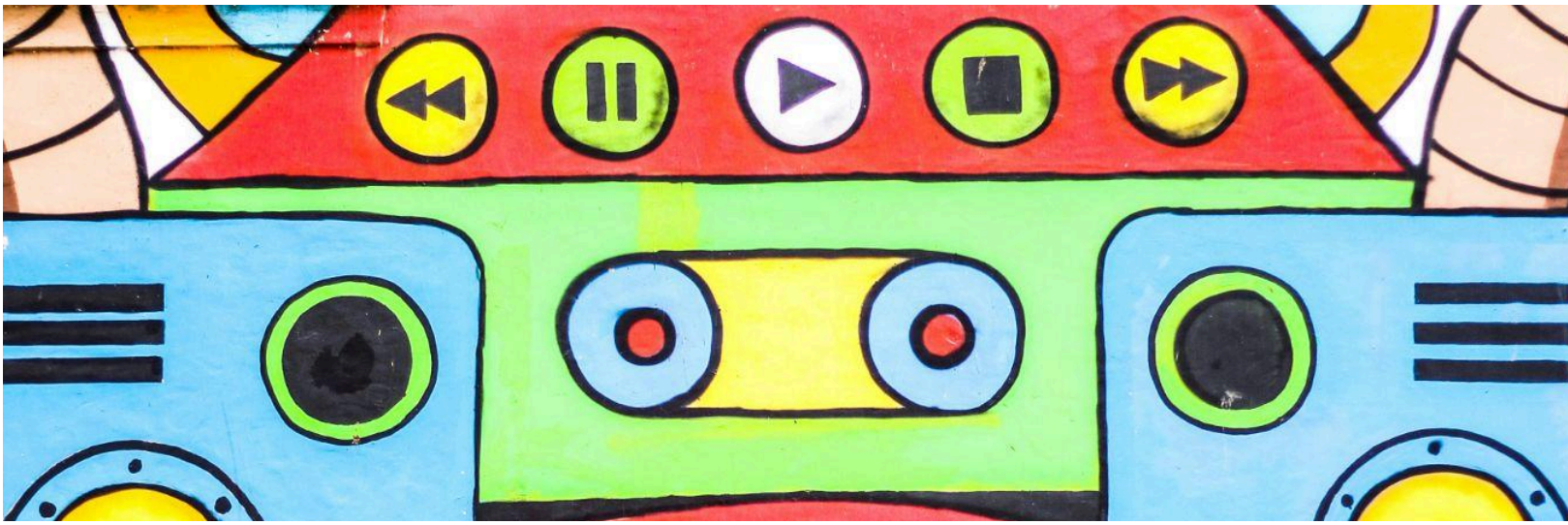
12. Open APIs and Sandboxes

Open APIs & Sandboxes: Empower developers to build on the DPI with open tools & safe testing environments.

The DPI shouldn't operate in isolation. To spark a vibrant community of creators, we'll embrace Open APIs and Sandboxes. Imagine APIs as building blocks – they'll give developers the tools to craft innovative applications that harness the DPI's potential. Think of them as ingredients for a delicious recipe – the more options available, the more possibilities for groundbreaking digital services! Sandboxes come in next, providing safe testing grounds for developers. Here, they can experiment and build their applications without risk, like a playground for their ideas before launch. By combining Open APIs and Sandboxes, we're essentially creating an engine for innovation. Developers can explore the DPI's potential, build new services, and ultimately contribute to a thriving digital ecosystem that empowers everyone in Bangladesh.

What will we get from this phase:

- BNDA Compliance Report (Standards).
- Targeted Building Block List (e.g., Identity Management).
- Leveraged Asset Inventory (Existing Digital Assets).
- Prototype and test result
- User-Centric Design considering Scalability, Sustainability, Innovation & Inclusion



Adopt & Built phase

01. Build Smart

The DPI prioritizes BNDA compliance, reusing existing assets, and open-source solutions for a cost-effective foundation.

Building a strong DPI requires a strategic approach. First, we'll ensure compliance with Bangladesh National Digital Architecture (BNDA) guidelines. This ensures everything works seamlessly together, data is well-governed, and security is top-notch. Next, we'll identify the core challenges faced by Whole-of-Government services. Then, we can choose the most relevant DPI building blocks, like Identity Management or Payment systems, to address those specific needs. But before building anything new, we'll prioritize leveraging existing digital assets in Bangladesh. Can we modify existing databases or certificates to become reusable DPI components? For any new development, let's explore high-quality open-source solutions to save time and money. If we do need to build in-house, we'll incorporate valuable lessons learned from successful open-source models. By following these steps, we can create a cost-effective and efficient DPI foundation.

02. Build for sustainability

Build for the long-term by intentionally addressing financial, operational, and ecological sustainability.

A successful DPI isn't just about the here and now, it's about building for the long haul. This means considering three key aspects of sustainability: financial, operational, and ecological. Imagine a solution that scales efficiently as needs grow, with a clear plan for ongoing costs and maintenance. We should also minimize the environmental impact, from hardware to software, while keeping an eye on future climate challenges. Ultimately, sustainable design ensures the DPI continues to empower people and communities for years to come, even if it means adapting or transitioning to new technologies as needed.

03. Efficient Execution with High Impact:

Small, empowered teams (ownership) + parallel development (minimize wait times) = faster, efficient DPI creation.

To ensure efficient development, the DPI will leverage two key strategies: small, focused teams and parallel phasing. Imagine a group of highly motivated individuals, each responsible for a specific component of the DPI. This fosters a strong sense of ownership and accountability, allowing them to make quick decisions and iterate rapidly. But we won't build things sequentially – parallel phasing allows us to work on different components concurrently. This minimizes wait times and keeps the overall development process streamlined, ultimately delivering a robust DPI faster.

04. Continuous Improvement Through User Feedback

Early Feedback Loop: Sandboxes & market testing (trials, hackathons) for continuous improvement & user-centric DPI.

Building a user-centric DPI requires getting feedback early and often. We'll leverage sandboxes for early bug detection and fixes, ensuring continuous improvement. But that's not all! We'll actively seek market feedback through methods like early user trials, API testing, and even hackathons. By incorporating this user voice throughout the development process, we can iteratively refine the DPI to ensure it truly meets the needs of the Bangladeshi people and fosters wider adoption.

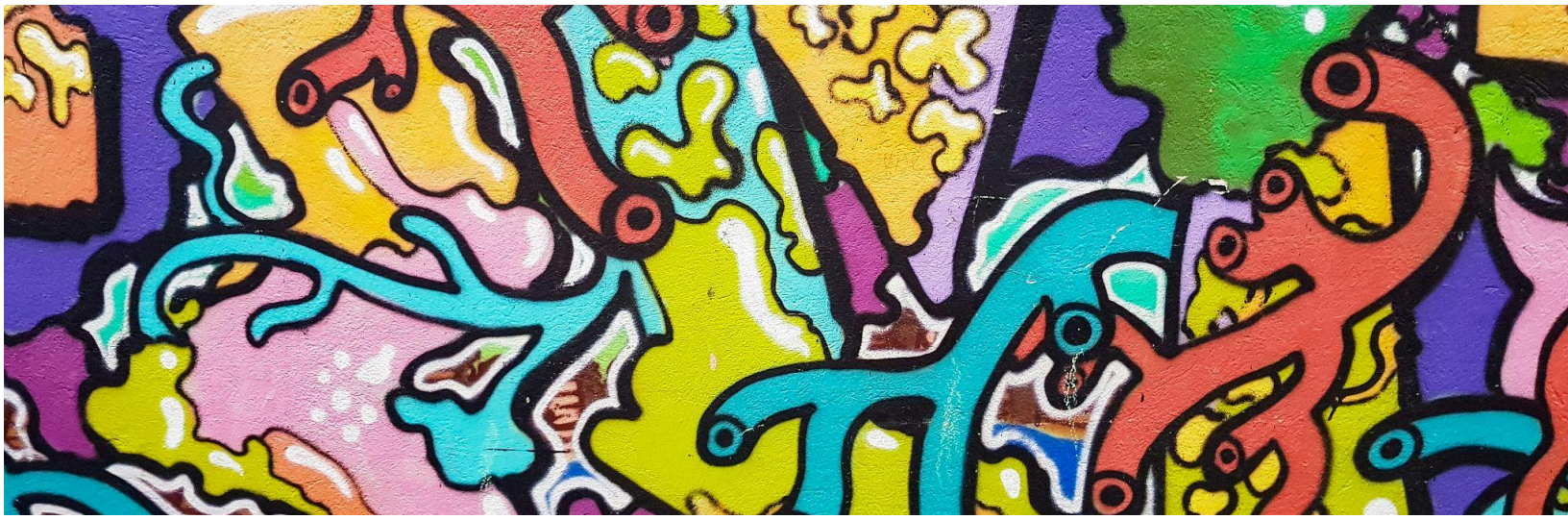
05. Building Momentum with User Engagement

User Journey Prototyping (WoG) + Prioritized Benefits ("Quick Wins") & Ecosystem Mobilization (NGOs/Private Sector) = User-Centric DPI Adoption.

The DPI won't be a one-time build, but a constantly evolving platform that adapts to user needs. To ensure a smooth and intuitive experience, we'll create mockups and simulations (prototyping) that mimic how people will interact with key government services within the DPI. Imagine testing these prototypes early on to identify and fix any roadblocks in the user journey before launch. But that's not all! To generate excitement and momentum for broader adoption, we'll prioritize "quick wins." These are small improvements within the DPI that deliver immediate benefits to government agencies (WoGs). Think of them as early successes that showcase the DPI's value and build confidence. However, the DPI's success hinges on collaboration. We'll work alongside NGOs, the private sector, and all levels of government to promote and support this collaborative effort. By mobilizing the entire ecosystem, we can ensure the DPI becomes a powerful tool that empowers Bangladeshi citizens and fosters a thriving digital landscape.

What will we get from this phase:

- Team Structure
- Development Schedule
- Continuous Improvement
- User Engagement
- Mobilization Strategy



Implementation phase

Phased Implementation and Evidence-Based Refinement

01. Pilot Programs

Small-scale deployments for data-driven improvements & optimal DPI rollout.

The path to a successful DPI doesn't involve a giant leap. Instead, we'll take measured steps through Pilot Programs. Imagine launching the DPI with smaller groups of users first. This allows us to gather valuable data on how people interact with the platform and identify areas for improvement. By iteratively refining the DPI based on these pilot programs, we can ensure it functions optimally and delivers a seamless user experience when rolled out nationwide. Think of it as a testing ground for a nationwide success story!

02. Clearly Defined Stages

Pilot programs (targeted locations/services) with clear goals & metrics for measured DPI launch.

Establish well-defined phases for DPI rollout, starting with pilot programs in targeted locations or for specific government services. Each phase should have clear goals and success metrics to measure progress and identify areas for improvement.

03. Iterative Development

Data & user feedback drive iterative improvements for the next DPI implementation phase.

Following each pilot phase, conduct a thorough evaluation using data on user adoption, efficiency gains, and data quality. User feedback should also be incorporated. These insights are then used to iterate and refine the DPI solution before transitioning to the next phase of implementation.

04. Change Management Strategy

Data & user feedback drive iterative improvements for the next DPI implementation phase.

Develop a comprehensive change management strategy to address potential resistance or challenges during implementation. This strategy should involve clear communication plans, training programs, and support mechanisms to ensure a smooth transition for all stakeholders.

Fostering Innovation and Collaboration

05. Open APIs and Sandboxes

Empower developers to build on the DPI with open tools & safe testing environments.

Publishing open APIs empowers private developers to create innovative applications and services that leverage DPI's capabilities. Sandbox environments provide safe testing grounds for developers, accelerating innovation and building a robust digital ecosystem.

06. Data Standards

Publishing data standards creates a common digital language for the DPI, ensuring seamless user experience across government services.

Imagine a world where all government services within the DPI speak the same digital language. This is the power of publishing data standards! By establishing clear guidelines for how data is formatted and shared, we ensure consistency and interoperability across different applications and services. Think of it like creating a common vocabulary for the DPI. This eliminates confusion and streamlines the user experience for everyone. With consistent data standards, people won't have to worry about compatibility issues as they navigate different government services within the DPI. This ultimately leads to a smoother and more efficient experience for the Bangladeshi population.

07. Developer Engagement Programs

Foster collaboration & innovation for DPI-powered applications (hackathons, workshops).

Organize hackathons, workshops, and other events specifically designed to engage developers. These events provide opportunities for developers to learn about DPI capabilities, collaborate with government agencies, and build innovative applications that leverage the DPI ecosystem.

08. Incentive Programs

Motivate the private sector with grants/awards/tax breaks to develop DPI-powered solutions.

Consider establishing incentive programs to encourage private sector participation in developing DPI-powered applications and services. This could involve grants, awards, or tax breaks for companies that contribute to the growth and adoption of DPI solutions.

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10. Joint Innovation Teams

Government, tech & academia collaborate on DPI-powered solutions for national priorities.

Create joint innovation teams that bring together government agencies, technology companies, and academia. These teams can work collaboratively to identify emerging technologies and develop innovative solutions that address national priorities using DPI as the foundation.

Building Stakeholder Engagement

11. DPI Champions

Internal advocates (agencies) drive user participation & secure buy-in for successful adoption.

Dedicated champions within participating agencies serve as internal advocates. Their enthusiasm and understanding of DPI are crucial for promoting user participation, addressing concerns, and securing buy-in from all stakeholders, paving the way for successful large-scale adoption.

12. Widespread Communication

Regularly update public, agencies, businesses & NGOs on DPI progress and benefits (town halls, media, social media).

Regularly communicate the benefits and progress of DPI to the public, government agencies, businesses, and civil society organizations. Utilize various channels like town halls, media briefings, and social media campaigns to ensure transparency and garner support.

13. Collaborative Workshops

Co-creation Workshops: Govt, Private Sector & Citizens Design DPI Services.

Organize workshops that bring together government agencies, private sector representatives, and citizens to discuss challenges, brainstorm solutions, and co-create DPI services that effectively address the needs of the population.

13. Training and Capacity Building

Empowering stakeholders (govt, providers, citizens) for full ecosystem utilization.

Provide training programs for government officials, service providers, and citizens on how to effectively use and contribute to the DPI ecosystem. This fosters a sense of ownership and empowers stakeholders to leverage DPI's full potential.

14. Feedback Mechanisms

Continuous user input for ongoing improvement and user-centricity.

Establish clear mechanisms for stakeholders to provide feedback on the DPI solution. This feedback can be used to identify areas for improvement and ensure the DPI remains relevant and user-centric throughout its evolution.

DPI Tech Architecture Principles

How do we distinguish regular digitisation efforts from DPI?

The five technology architecture principles illustrate how DPI efforts can be architected to be distinct from traditional digitization efforts. When implemented, these technical principles help DPIs achieve societal outcomes such as inclusion, user choice, innovation, scale of delivery, speed of services, public trust, competition in markets, and others.

- **Interoperability** driven by open specifications
  Open standards in DPI ensure different components talk seamlessly, enabling citizen choice of services, wider access, and a competitive marketplace for innovative solutions – all while maintaining interoperability.

- **Minimalist, reusable building blocks** end-to-end solutions:
  Modular DPI building blocks minimize development costs, prioritize privacy, and enable private sector innovation through easy combination. This fosters user-centric solutions, financial sustainability, and future-proofs DPI for ongoing adaptation.

- **Diverse, inclusive innovation** market enablement by public-private solutions
  DPI thrives on a diverse innovation ecosystem, fostering user-centric solutions and inclusion. A wide range of participants (private sector, civil society) ensures a broader choice of services and builds resilience through multiple providers.

- **Federated & decentralized** letting data stay where it belongs
  A decentralized DPI empowers local entities (more autonomy) and fosters peer-to-peer interactions. This distribution strengthens cybersecurity, privacy, and resilience by avoiding reliance on a single system.

- **Security & privacy** by design
  DPI prioritizes security and privacy from the outset, building public trust and safeguarding users. This focus protects individuals from malicious actors and fosters a safe environment for digital interactions.

How can ministries, divisions, and departments

Locate their position

In the DPI journey

Bangladesh's Smart Bangladesh vision relies on a well-integrated Digital Public Infrastructure (DPI) across ministries. However, digital transformation is unique for each. A framework assessing DPI maturity considers three key areas:

	Stage 1 Digital assets not yet operating as DPI	**Stage 2** DPI in the early stage of maturity.	**Stage 3** DPI in later stages of maturity
Technology Must be minimalist, adaptable, reusable, scalable, and resilient	**Underutilized Digital Assets:** Existing digital assets lack reusability due to limited API access or offline verification, hindering their role in DPI. **Limited Reusability Platforms:** Government services (platforms, apps, certificates) have restricted functionality or APIs, impeding broader DPI integration. **Fragmented Silos:** Private networks operate independently, hindering data exchange and DPI Collaboration.	**Nascent DPI:** Existing deployments leverage open standards but lack widespread adoption or a robust developer ecosystem. **Limited Functionality DPI:** Rudimentary solutions like verifiable paper certificates exist, but lack advanced features like API access for broader integration.	**High scale interoperable networks** with multiple public and private participants leveraging open APIs, open **standards/specifications, or shared protocols:** Multi-modal access to the network via smartphone, feature phone, or no-phone (agent) **Digital credentials** with API-based access across multiple apps
Governance must protect public	**Low degree of formal governance:** Lack well-defined rules and procedures for the development and	**Frameworks:** Policies and regulations may not provide clear guidance on how a stakeholder should contribute to the DPI	**Participatory Community Governance:** Foster collaboration with citizens and relevant

interest,human rights, data security, and privacy as well as settle disputes and hold parties accountable	deployment of DPI components **Absence of necessary legal and regulatory oversight:** No strong legal frameworks in place to govern DPI use. **Few institutions with relevant mandates:** Limited number of organizations with the authority and expertise to address challenges.	journey. **Fragmented or Unclear Institutional Mandates:** Individual ministries, divisions, and departments might have overlapping or unclear responsibilities within the DPI ecosystem **Reactionary Policies or Absence of a Whole-of-Government Approach:** Decisions may be made in response to immediate needs rather than based on a long-term DPI strategy	stakeholders. This includes involvement in decision-making processes related to service delivery and infrastructure development within the DPI ecosystem. **Consultative Policy-Setting and Standard-Setting:** Development of clear and inclusive policies and technical standards that guide the responsible and effective use of technology within the DPI framework **Clear Frameworks for Dispute Resolution:** Well-defined mechanisms for resolving disputes arising from the use of DPI services. This ensures transparency, accountability, and trust within the ecosystem.
Local ecosystems (private and public) with innovation and market competition to empower user choice	**Significant barriers and high costs to entry** imply factors like complex technical requirements, lack of infrastructure access, or expensive fees, making it difficult and expensive for new businesses or individuals to participate in the DPI ecosystem.	**Moderate barriers** and costs to entry in the DPI ecosystem involve a learning curve, require specific equipment or training (at some cost), and have streamlined but still present technical requirements.	**Minimal barriers and costs to entry refers to easy access for new businesses or individuals.** This means minimal technical requirements, readily available resources or infrastructure, and minimal to no associated costs for participation.

Annexure

Stakeholder mapping

Stakeholder	Technology	Governance	Market Sustainability
Public: Regulates, provides funding for, innovates, and contributes to the wide-scale implementation of DPI			
Private: Provide funding, technology innovation, technology standards for usage, and intellectual resources for DPI development			
Development Actors: Promote best governance practices, facilitate collaboration, and provide offline intermediation for on-ground DPI adoption			
Resource Partners: provide grants for a fixed			

period of time, support the development of basic infrastructure, and promote private sector innovation			