

# **Accelerating Digitisation in Healthcare Delivery**

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### Foreword

Digital technologies have become an integral part of our everyday lives. Over the past two decades, technology has transformed several sectors including banking, finance, agriculture, retail, travel, and more. More recently, the COVID-19 pandemic brought to light the need for a future-ready digital health system that can provide quality healthcare for all in an accessible, affordable and inclusive manner.

The historic launch of Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PMJAY) in 2018 and the Ayushman Bharat Digital Mission (ABDM) in 2021 is a testament to realising the Hon'ble Prime Minister's vision of providing the highest possible level of health and wellbeing for all. In the past four years, more than 14 crore Ayushman Cards have been created, over 28,000 hospitals have been empanelled and close to 3.65 crore hospital admissions have been authorised as a part of AB PMJAY. Similarly, ABDM has had an exceptional start with over 24 crore ABHA accounts created and 76 lakh digital health records linked so far with the ABHA.

Given the rapid evolution of technology and innovations in the health sector, this vision of an integrated health system can only be achieved with active participation of all stakeholders in the healthcare ecosystem. It is against this backdrop that the 'Accelerating Digitisation in Healthcare Delivery' roadmap provides an overview for the stakeholders in the ecosystem such as hospitals/clinics, laboratories, health tech players, pharmacies, insurance players and the citizens to play their role achieving the common goal of universal health coverage.

Digital health as a sector is expected to grow in leaps and bounds in the coming years, and this is an opportunity for all of us to double our efforts to become a global leader in providing affordable, quality healthcare for all. This Roadmap is a step towards achieving this goal and I invite all the stakeholders to align their vision towards accelerating digitisation in the healthcare sector and become a part of transforming India's healthcare delivery.

A handwritten signature in green ink, appearing to read 'मंसुख मांडविया' (Mansukh Mandaviya).

(Dr. Mansukh Mandaviya)

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## TABLE OF CONTENTS

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1. Introduction	5
2. Executive Summary	6
3. Objectives of the paper	9
4. India's Current Digital Ecosystem	10
4.1. Successful efforts of digitisation across various industries	10
4.2. Successful efforts of digitisation in the healthcare sector	13
4.3. Scaling up the digitisation of healthcare in India	14
5. Healthcare Landscape in India	15
5.1. Understanding the stakeholders in the ecosystem and their challenges	15
5.1.1. Citizens: Role & problems faced	15
5.1.2. Healthcare Providers: Role & problems faced	16
5.1.3. Payors: Role & problems faced	18
5.1.4. Policy Makers and Administrators: Role & problems faced	19
5.1.5. Health Tech Providers: Role & problems faced	20
5.2. Challenges to digitising the healthcare ecosystem	21
6. New Vision for India's Healthcare Ecosystem - Ayushman Bharat Digital Mission (ABDM)	24
6.1. Benefits to Stakeholders through Citizen Centric Healthcare under ABDM	28
6.2. Impact on Healthcare Ecosystem	30
6.2.1. Rise in awareness about health and wellness	30
6.2.2. Shift from Disease Centricity to Citizen Centricity	32
Shift from Provider driven to Citizen driven Model	32
Shift from Reactive healthcare to Preventive healthcare	33
6.3. Key Levers For Change	33
6.3.1. Technological Innovations	34
6.3.2. Regulatory Intervention	34

6.3.3. Behaviour Shift	34
6.3.4. Service Delivery Transformation	35
<b>7. Lever of Technological Innovation</b>	<b>35</b>
7.1. Health Information Exchange Consent Manager (HIE-CM)	36
7.2. Unified Health Interface (UHI)	37
7.3. HCX	40
<b>8. Lever of Regulatory Interventions</b>	<b>42</b>
<b>9. Lever of Behavioural Shift</b>	<b>44</b>
9.1. Financial Incentives for Healthcare Providers	44
9.2. <b>Promoting ease of use in digital health solutions</b>	46
9.3. IEC (Information, Education & Communication) Support	47
<b>10. Lever of Service Delivery Transformation</b>	<b>48</b>
11.1. Providing IT: Platform as a Service	49
11.2. Focusing on patient: User Centric Applications	50
11.3. Re-engineering care: Healthcare at Home	51
11.4. Supporting Decision Making: Data Processing and Analytics	51
<b>12. Digitisation Roadmap for Stakeholders</b>	<b>54</b>
12.1. Citizens	54
12.2. Healthcare Providers - Hospitals/Clinics	54
12.3. Labs/Diagnostics	55
12.4. Insurance Players	55
12.5. State Governments	55
12.6. Government Healthcare Programmes/Welfare Schemes	56
12.7. Policy Makers (Union Government)	56
12.8. Health Tech Players	56
12.9. Pharmacies	57
<b>13. Outcomes of digital healthcare delivery</b>	<b>58</b>
<b>Way Forward</b>	<b>60</b>

## 1. Introduction

With the tectonic shifts seen in the uptake of digital due to the COVID-19 pandemic, the health and wellness sector is ripe for digital disruption. While tele-consultations had been talked about for a good part of the past decade, this tectonic shift caused the emergence of tele-medicine for consultations and OPD in an unparalleled manner.

The trinity of JAM – Jandhan bank accounts, Aadhaar-based identity, and mobile phone connections, helped bring financial inclusion to crores of Indians, and resulted in propelling the adult bank account coverage from a mere 14% a decade ago to 82% today. Similarly, ABDM will help create a super-highway to seamlessly connect all stakeholders of the healthcare ecosystem digitally. Under the aegis of the Ministry of Health and Family Welfare, the National Health Authority (NHA) has been working steadily towards laying the foundation of this ecosystem in a consultative and collaborative manner.

We have designed this digital health ecosystem by keeping the citizens and healthcare professionals at the heart of it. This new ecosystem will allow healthcare professionals to gain access to patients beyond their physical vicinity for their OPDs. This will in turn also let the citizens access top notch healthcare from the convenience of their home, saving on unnecessary travel costs and waiting time. The beauty of ABDM's interoperability will let the providers and public use any app to connect with each other, just like you can call anyone today irrespective of what phone subscriber you both are using.

One of the foundation blocks of ABDM, verified and monitored registries of healthcare professionals and facilities will help increase the trust in the delivery of healthcare, both digitally and physically. With informational and educational campaigns, we will be able to help the public distinguish the qualified from the unqualified through these registries. Further, with all health records linked under an individual's ABHA number, the patient will be able to access their longitudinal health history anytime and anywhere, without worrying about carrying or losing their medical health records. Using public digital utilities like eSign, DigiLocker and the consent artefact, we have ensured privacy and consent by design for the public. With the due consent of the individual, healthcare professionals will receive a holistic view of one's medical history to come up with more informed medical observations. A current day example of this is the digital vaccination certificate generated by the CoWIN platform, accessible directly through our smartphone anytime anywhere..

With an open design, inclusivity and security at its core, ABDM is scalable and will provide a cohesive ecosystem for private sector innovation. However, for this digital health mission to be a true success, we will need all healthcare professionals, healthcare facilities, pharmacies, technology partners, government entities, and various other healthcare stakeholders to come together to provide access to a continuum of quality healthcare to all Indians.



## 2. Executive Summary

Healthcare in India is at an inflexion point. With rapid evolution in technology, India is at the cusp of revolutionising the healthcare sector. From enhancing the accessibility and efficiency of healthcare delivery to making healthcare services cost-effective, creating a digital health ecosystem can bring significant benefits to the society at large, and pave the way for universal health coverage in India in an efficient, accessible, inclusive, affordable, timely and safe manner.

It is against this backdrop that the National Health Policy (NHP), 2017 recognizes the critical role of technology in healthcare delivery. It advocates for the development of 'Digital Health Technology Ecosystem' where digital health tools will be built and deployed across the continuum of care. The policy also emphasises on healthcare services to be citizen-centric, accessible, universal, de-centralized and inclusive. The policy promotes the establishment of an integrated health information system that addresses the needs of all the stakeholders and improves transparency, efficiency and citizen experience. These goals can be achieved by embracing the technology driven solutions in the healthcare sector.

The National Digital Health Blueprint (NDHB) lays down the technological architecture along with the key building blocks for the evolution of the National Digital Health Ecosystem (NDHE). It sets out the principles and standards for effective establishment and management of digital health infrastructure and data. It promotes creation of Electronic Health Records (EHR) and seamless exchange of health data based on international standards. NDHB recognizes that the implementation of Blueprint has to be in a mission mode, the initiative is referred to as Ayushman Bharat Digital Mission (ABDM).

National Health Authority (NHA) is the apex body responsible for implementing India's flagship public health insurance/assurance scheme called "Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)" and has been entrusted with the role of designing strategy, building technological infrastructure and implementing ABDM to create a NDHE. NHA is leading the implementation for ABDM in coordination with different ministries/departments of the Government of India, State Governments, and private sector/civil society organisations.

The ABDM aims to develop the backbone necessary to support the integrated digital health infrastructure of the country. It seeks to bridge the existing gap among different stakeholders of the healthcare ecosystem through digital highways. The ABDM is based on the principle of federated architecture, which allows interoperability between independent and decentralised information systems, while enhancing the security and privacy of health data of citizens. Such interoperability shall be strictly compliant with the provisions relating to consent, and protection of health data.

To further this vision of creating a robust digital health ecosystem, the roadmap 'Accelerating Digitization in Healthcare Delivery' is prepared to identify the key

stakeholders in the healthcare sector and the challenges they are likely to face on their journey to digitization. The roadmap also recognizes the benefits of progressing towards digitization and the key outcomes that the healthcare ecosystem as a whole can attain. Thus, the roadmap essentially takes a holistic approach in laying down the critical requirements and the key goals to be achieved for the digitization of the country's healthcare ecosystem.

The various stakeholders in the healthcare sector are - citizen/individual; provider; health tech players; payor; and policy maker/administrator. The current fragmented healthcare ecosystem leads to issues and challenges for each of these stakeholder groups. The individual/citizen faces lack of continuum of care, awareness about providers, and poor care experience whereas the providers suffer from non-standardization of data sharing, lack of robust health information management system, absence of patients' medical history and absence of single patient identifier. Similarly, payors suffer from lacking awareness about products among citizens, low penetration, high turn-around time and cost for claim processing. The present healthcare system also poses a challenge to policy makers and administrators as they lack quality data for public health research & policy making and technical expertise to use emerging technologies. Thus they suffer from information asymmetry for their decision making affecting the healthcare sector at large. The health tech players which build innovative digital solutions face adoption challenges due to ecosystem inertia and limited network connectivity.

Being citizen-centric in its approach, ABDM envisions a system of healthcare delivery focusing on citizens at the core. Individuals are empowered with complete control over their health records in order to become an informed decision maker and play a proactive role in their healthcare journey. The citizen-centric model is built on several key principles namely, access, design, and participation. Such a model not only benefits the citizens, but is also fruitful to other stakeholders like provider, payor, policy maker within the healthcare ecosystem. It also encourages awareness about health and wellness, promotes a transition from disease centric model to a citizen centric model and builds a healthcare ecosystem where there is a paradigm shift from reactive healthcare to proactive healthcare.

Several key levers have also been identified in order to drive this change including technological innovation, regulatory intervention, behaviour shift and service delivery transformation. Unified Health Interface (UHI), Health Claims Exchange (HCX) and Health Information Exchange - Consent Manager (HIE-CM) together bring innovation to revolutionise the healthcare sector technologically. Regulatory interventions have also been identified and proposed in order to facilitate the adoption of digital platforms by the key stakeholders in the ecosystem. To aid the behaviour change towards adopting the new technologies, certain incentives and awareness activities have been provisioned for the stakeholders. The availability of 'ready to be deployed' digital

solutions which are citizen-centric and affordable will transform the way healthcare services are delivered in the ecosystem.

With the objective of realising the overall vision of ABDM, a detailed roadmap has been outlined for the key stakeholders within the healthcare ecosystem. The roadmap identifies core enablers for digitization and their benefits; and sets foundational targets and their associated milestones for the stakeholders within the healthcare ecosystem. Specific phase wise targets have also been laid down in order to ensure timely implementation of the set targets.

For healthcare providers, core enablers include the use of ABDM compliant Health Management Information System (HMIS), adoption of EMR systems across facilities, utilisation of digital tools such as e-hospital, telemedicine etc. These measures will enhance interoperability of health records, improve data records storage, and improve the quality of healthcare as a whole. Similarly, For labs/diagnostics, core enablers include creation of reports in standard formats and registration of labs in HFR, which would allow for ease in clinical information exchange between patients and healthcare providers.

For States, core enablers comprise of state specific digitization plan in convergence with ABDM inclusive of strategy and implementation plan, registration of all Healthcare facilities in HFR, comprehensive training, procurement of digital infrastructure etc. have been laid down. This will ensure comprehensive healthcare profile of citizens and family folders for enhanced care, creation and linkage of digital health records in standardised format, digitally equipped and trained healthcare professionals providing quality services to people and likewise. Similar enablers and their benefits have been identified for other key stakeholders like government healthcare programmes/welfare schemes, public and private insurance players, pharmacies and citizens.

Digitising healthcare will allow the healthcare ecosystem to be completely integrated where the health records will be interoperable among various health tech applications. It will facilitate seamless exchange and sharing of health information which will ensure reduced paperwork and workload for the healthcare professionals. The individual will be in control of his/her longitudinal medical history and will make informed decisions about availing healthcare services. The healthcare services will become accessible and affordable for a common citizen of the country as a result of overall competition and faster processing of health records. The UHI platform will make healthcare services accessible to the people by providing better discoverability and allowing competitive pricing. Overall, the digitization of the healthcare ecosystem will make availing healthcare services convenient and citizen centric.



### 3. Objectives of the paper

1. **Demonstrate strides made to the digital ecosystem and** multiple milestones in digitising healthcare contributing to a robust digital health infrastructure.
2. **Identify stakeholders and challenges that impede their effective adoption of digital health ecosystem**
3. **Establish the vision for an integrated digital health ecosystem in India**
4. **Outline a roadmap to achieve this vision for all the stakeholders in the health ecosystem**
5. Map the **expected outcomes of a digital healthcare ecosystem**, monitoring and evaluating them informs policymakers and implementers about the need for improvement and mid-course corrections.

## 4. India's Current Digital Ecosystem

*This section talks about the successful efforts with respect to digitisation in India across various industries. It is supported with key statistics showcasing the digital adoption rates in the country, and what makes India a lucrative destination for innovation and further digitisation. Further, it highlights the successful efforts of digitization in the healthcare sector, while touching upon the unique conditions within the ecosystem, therefore warranting a strategic roadmap for its successful digitization.*

“Digital” - what started as a buzzword across industries, is now an imperative for India. With highest monthly data consumption per smartphone in the world,<sup>1</sup> technology is already changing the way industries operate and deliver, and the way citizens consume. Many studies have indicated that the digital revolution will change the course of the Indian Economy. Owing to an inherent advantage in the form of a plethora of human resources skilled in Information & Technology (IT), a favourable demographic dividend, a moderately digitally literate population, and ever-increasing penetration of smartphones and internet connectivity, India is making a giant leap forward in digitising its economy.

### 4.1. Successful efforts of digitisation across various industries

The Jan Dhan-Aadhaar-Mobile (JAM) trinity has transformed India's financial services, jobs and skills, agriculture, retail and e-commerce, logistics and transportation, energy and healthcare. The remarkable success of achieving more than 93% Aadhaar saturation and integrating more than 314 Central Sector schemes for transferring benefits directly to the beneficiaries has put India at the forefront of digitization (Table 1).

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<sup>1</sup> <https://www.ericsson.com/en/reports-and-papers/mobility-report/key-figures>

<b>Subject/Year</b>	<b>2014 (in Crore)</b>	<b>2022 (in Crore)</b>
<b>Smartphone Penetration (Users)</b>	15.6	75 <sup>2</sup>
<b>Internet Penetration (Users)</b>	25.15	83.37 <sup>3</sup>
<b>Government e-Market</b>	-	Rs 1 Lakh <sup>4</sup>
<b>Aadhaar Enrollment</b>	70	134.6 <sup>5</sup>
<b>Volume of Financial Transactions</b>	1004 (2016-17)	5554 (2020-21) <sup>6</sup>
<b>Number of UPI Transactions</b>	0.1 (2016 Launched)	4500 <sup>7</sup>

As illustrated in the table above, Indians have shown by adopting new age technologies like smartphones and internet at an astonishing rate. Digital technologies have the potential to aid in growth and development in an inclusive manner. The increase in smartphone usage from 15.6 crore to 75 crore in just eight years is a remarkable achievement. Furthermore, the government has already connected more than 1.80

<sup>2</sup> <https://blog.mygov.in/editorial/the-digital-india-transformation/>

<sup>3</sup> <https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1785452#:~:text=Jump%20in%20Internet%20and%20broadband%20penetration%3A&text=Internet%20connections%20jumped%20from%2025.15,r egistering%20a%20growth%20of%20231%25.&text=Broadband%20connections%20rose%20from%206.1,%2C%20growing%20by%20about%201200%25.>

<sup>4</sup> <https://gem.gov.in/>

<sup>5</sup> [https://uidai.gov.in/aadhaar\\_dashboard/](https://uidai.gov.in/aadhaar_dashboard/)

<sup>6</sup> <https://www.meity.gov.in/digidhan-mission>

<sup>7</sup> [https://www.business-standard.com/article/companies/upi-digital-payment-transaction-value-touches-rs-10-73-trillion-in-august-122090100412\\_1.html#:~:text=In%20FY22%2C%20UPI%20processed%20more,amounting%20to%20Rs%2041.03%20trillion.](https://www.business-standard.com/article/companies/upi-digital-payment-transaction-value-touches-rs-10-73-trillion-in-august-122090100412_1.html#:~:text=In%20FY22%2C%20UPI%20processed%20more,amounting%20to%20Rs%2041.03%20trillion.)

lakh Gram Panchayats through high speed optic fibre cables under BharatNet Scheme. BharatNet will act as an enabler in digitising health in our rural surroundings (Box 1).

#### **A Government Scheme to Provide Accessible Broadband Highways in Rural India**

'Bharat Net' is a government scheme to provide broadband connectivity to 2.5 lakh Gram Panchayats (GPs). In the project, the network infrastructure is established for accessible broadband highways on a non-discriminatory basis, to provide affordable broadband services to citizens and institutions in rural areas, in partnership with states and the private sector. This will boost the mission of Digital India and provide better connectivity and services to people in the remotest parts of the country. It is the largest rural broadband project in the world. The government approved the scheme in October 2011 and established Bharat Broadband Network Limited (BBNL).. The government has spent more than Rs. 25,412 crores between 2014-21..

**Overall achievements of the Bharat Net project:** As of 14 September 2022, a total of 5,84,787 Kms Optical Fibre Cable has been laid, connecting 1,87,245 GPs. Electronic education and electronic medicine have become vital in COVID-19 lockdown situations. Bharat Net has the potential to change the future of the rural economy in India. Furthermore, it can provide access to government services to citizens on their doorsteps.

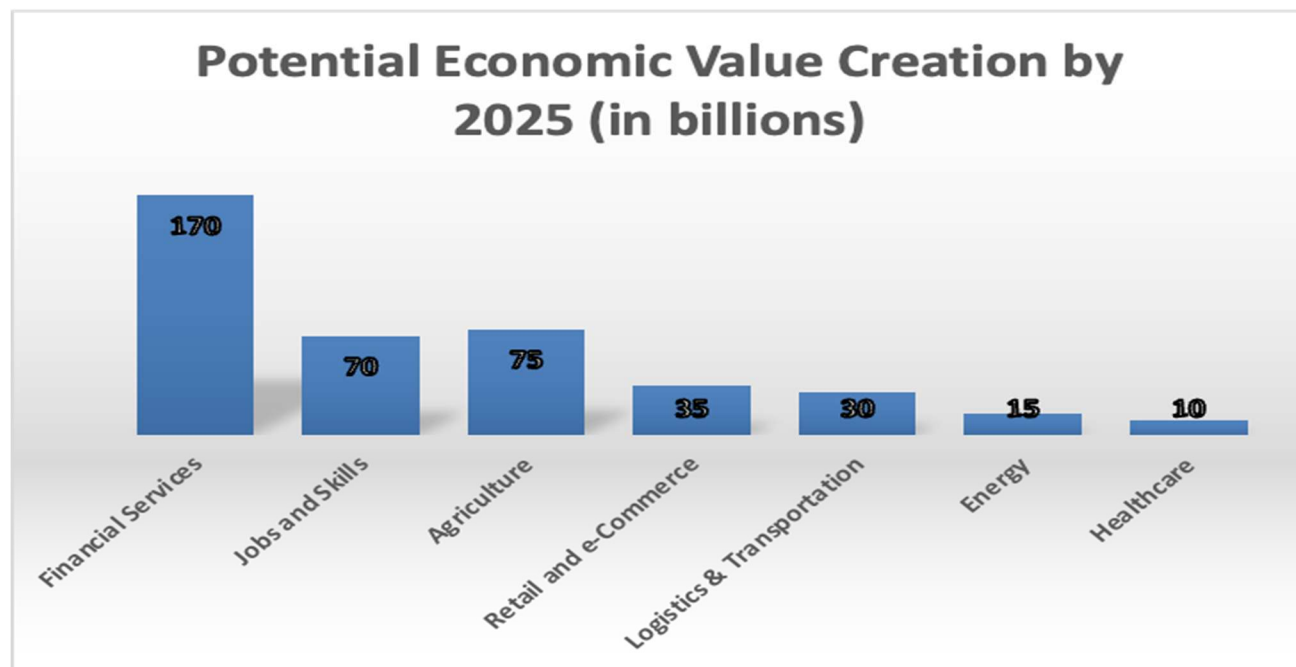
**Services offered by Bharat Net:** Bharat Net is the middle mile network from a Block to its GPs, which provides connectivity on a non-discriminatory basis to all Service Providers like Telecom Service Providers, Internet Service Providers, Multi Service Operators, Local Cable Operators, and Government agencies for extending their services from Block to GPs. It offers services in the form of **(a)** Point-to-Point (P2P) and Point-to-Multipoint (P2MP) bandwidth from Block to GPs using GPON technology; Commercial 'Fibre-to-the-Home (FTTH)' for providing high-speed broadband connections by service providers. **(b)** Dark fibres on the cable laid for Bharat Net. Focus is now on utilisation of the network created, including the provision of FTTH, Wi-Fi connectivity, and utilisation by Service Providers for providing high-speed internet to Government Agencies near GPs and access to digital information of government services. Bharat Net can be transformational in digitising rural health.

**(Source: [www.bbnl.nic.in](http://www.bbnl.nic.in))**

Technical infrastructure stacks have been widely accepted as a catalytic means to propel innovations and application development ecosystems for different sectors, the most prominent sector being financial services. The development of India Stack is one of the best success stories. India Stack is a digital public good which is a set of open APIs with an intention of scaling the use of data, identity and payments for financial growth and inclusion. India stack has not only helped in increasing financial inclusion in the country, but has also been truly instrumental in creating a digital revolution in the form of digital startup, e-sign.

Till 2019, healthcare remained one of the few sectors where digitisation leaps had not taken shape, with consumers and providers preferring traditional means of in-person (or offline) engagement for healthcare delivery. The CoVID-19 pandemic exposed the gaps in the healthcare ecosystem, and catapulted healthcare delivery to the path of unprecedented digitisation. It exponentially expanded the healthcare demand while disrupting the healthcare delivery with systems moving online to accommodate

contact less healthcare. In fact, a report published by McKinsey Global Institute<sup>8</sup> in 2019 predicts that the digital healthcare sector will grow to 10 billion by 2025 (Graph 1).



Source: McKinsey Global Institute, Digital India - technology to transform a connected nation

#### 4.2. Successful efforts of digitisation in the healthcare sector

A few success stories of path-breaking public digital solutions born out of the Covid-19 pandemic are the Covid Vaccine Intelligence Network (CoWIN) and the Aarogya Setu Applications. The CoWIN platform enabled vaccine registration of a billion people and administration of more than 1.78 billion Covid-19 vaccine doses. By ensuring coverage to over 80% of citizens, CoWIN has become one of the largest digital Health Information Providers (HIP) in the world. It has now been open sourced with over 50 countries showing interest in leveraging the technology in their vaccination drives.

While CoWIN is largely an effort by the government, Aarogya Setu is a testament to public sector, private sector, and academia coming together in the face of an exigency. Aarogya Setu was launched as a contact tracing, syndromic mapping and self-assessment mobile app by the Ministry of Electronics and Information Technology

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<https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/digital%20india%20technology%20to%20transform%20a%20connected%20nation/digital-india-technology-to-transform-a-connected-nation-full-report.pdf>



(MeitY) in collaboration with the private sector. The real time data provided by the application not only augmented the efficiency of front line healthcare workers but also aided other web and mobile applications through its open APIs. The application largely remains community and user driven with 15 crore downloads.

Telemedicine services had struggled to attract users before the pandemic, but 85% of clinicians used teleconsultation during the lockdown and 65% doctors indicated that they would continue to use telemedicine in the post-Covid world according to a Boston Consulting Group (BCG) report .<sup>9</sup> <sup>10</sup> Practo, a leading Healthtech Player, analysed almost 5 Cr transactions for a month period (Mar 1– May 31st 2020) and reported a 500% increase in online doctor consultations since March 2020. This shift from in-person doctor visits to telehealth solutions signals not only an increased adoption by the patients but also an increase in the number of digital solutions offered by the market. Innovation in development of technological solutions saw a rise in response to CoVID-19, but it is important to point out that the Indian Digital Healthcare story has been in the making for some time now.

### 4.3. Scaling up the digitisation of healthcare in India

With successes in terms of CoWIN, Aarogya Setu, and a generic boom in digitization through the proliferation of telemedicine and other such services, India is well on its way to revolutionize healthcare in the country by digitising the ecosystem. The moment could not be more opportune to capitalise on this existing momentum of digitisation for reaping the benefits from the ongoing digital wave while also achieving improved health outcomes.

However, it is imperative to acknowledge that the healthcare ecosystem in India, like many other developing countries worldwide, is complex and is characterised by a presence of multiple stakeholders, their unique positioning, and their inability to seamlessly interact with each other for collective public health outcomes. Adding the varied regional, cultural, intellectual, linguistic, and psychosocial fabric to this characterisation, India offers a rather unique healthcare landscape, which therefore demands a correspondingly unique and strategic roadmap to successfully digitise its healthcare ecosystem.

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<sup>9</sup> Leapfrogging to a digital healthcare system, FICCI and BCG Report

<sup>10</sup> <https://blog.practo.com/5-crore-indians-accessed-healthcare-online-in-the-last-three-months/>

## 5. Healthcare Landscape in India

*The section begins by outlining the various stakeholders in the healthcare landscape of India and the problems faced by the respective stakeholders vis-a-vis a holistic fulfilment of their healthcare objectives. It then highlights challenges to digitisation of the healthcare ecosystem as informed by the problems faced by these stakeholders.*

Traditionally, the government has been seen as the sole provider for public health services, while private players were understood as innovators and profit-maximizers. The differentiated responsibilities between stakeholders has resulted in divergence in the quality of healthcare delivery in the country. This became apparent when the Covid 19 pandemic exposed deep-rooted deficiencies in our health systems, which in-turn had implications on availability and accessibility of healthcare service to citizens. However, as technology advances in healthcare, the barriers to service delivery as a public good are weakening. The government is transitioning from a public service provider to a facilitator, as the public and private collaborate together to build the digital infrastructure for healthcare. Technology is just one prong for revolutionising healthcare, but it is actively driving the congruence of interest between the public and the private. The shift from traditional face-to-face patient care models are being redesigned to accommodate digital services such as telemedicine, AI supported triaging and clinical care, home monitoring etc. Digital health is likely to influence models of care and have a cascading impact on all stakeholders within the ecosystem.

### 5.1. Understanding the stakeholders in the ecosystem and their challenges

Given this background, there is a need for all stakeholders in the healthcare sector, including citizens, healthcare providers, payors, policy makers and administrators, and health tech providers, to reposition themselves in this digitally driven ecosystem to help drive the benefits of the digital health revolution to all.

#### 5.1.1. Citizens: Role & problems faced



**Citizen/Patient** - Patients/Citizens receive healthcare services/benefits from the healthcare providers and are the beneficiaries of payors.

#### **Problems faced by Citizens**

- **Lack of continuum of care** - Citizens do not have a comprehensive view of their own healthcare data in a single space, making it difficult for them to share health data with any provider to receive customised/value based care. Citizens may be suffering from multiple ailments but receive disparate treatment due to lack of data convergence.

- **Disparate modes of Health data** - Currently, citizens store their health data in various disparate modes. While some hospitals have physical health records, some recent health tech applications provide digital health records as well. Hence, depending on the services a citizen avails, they have their health records across offline and online modes, making it difficult to effectively share their historical health data with a future provider or self.
- **Lack of Provider Awareness** - There is a knowledge gap which puts care seekers at disadvantage as they lack knowledge about the services/doctors available to them. There is also limited knowledge about programs/provisions/options in the healthcare ecosystem, making it difficult for the beneficiaries to avail the services in an efficient and timely manner.
- **Poor Care Experience** - Citizens' experience of accessing and receiving healthcare service is plagued by many challenges including difficulty in provider identification, long commutes, long wait times, delayed diagnostics and reports, fragmented service, expensive treatment etc.

#### 5.1.2. Healthcare Providers: Role & problems faced



**Healthcare Providers** - Providers are primarily facilities/programs / professionals / pharmaceutical executives directly engaged in providing healthcare service delivery to a patient/beneficiary. Healthcare in the country is delivered broadly through two categories - Public (Government healthcare programmes and States) and Private (Players in the private sector).

##### **Problems faced by Healthcare Providers**

- **Absence of a single patient identifier** - Each programme/ institution offers a separate identifier to the citizen (Benefit ID/Patient ID), resulting in multiple identifiers for each individual. This makes it difficult to uniquely identify the citizens across the healthcare ecosystem, track their medical history and maintain continuum of care.
- **Siloed Data** - Health data across programmes/institutions is siloed, even for those with overlapping mandates. During a patient journey, data is generated at multiple instances such as at the diagnostic centre, at the pharmacist, at the insurance company, at a lab etc. Health data is also generated at a personal level in their wearable gadgets such as smart watches and bands. However, all of this data exists in digital silos due to

lack of interoperability and exchange mechanisms. Thus, making it virtually impossible to combine and collate data from multiple sources, resulting in duplication, redundancy, wastage, and delays.

- **Low usage of suitable digital solutions-** In the traditional healthcare ecosystem, providers find it more comfortable to use pen and paper to create records. Those willing to switch to digital modes often do not have a robust health information management system. Data recording and storage happens through varied inefficient and fragmented systems, or sometimes manually. This results in creation of healthcare data that is unusable later, dirty, duplicate and broken.
- **Lack of Standardisation in Data Reporting/Sharing** - There is difficulty to build an interconnected system for providers due to absence of standardisation across data collecting, management, exchange and report. There is growing recognition among the public and private sector that all new digitization efforts must conform to prescribed standards such as LOINC, DICOM etc.. The government has adopted Systematised Nomenclature of Medicine (SNOMED) and is making it available free of cost to health systems across India. Among private players, hospital chains like the Apollo Group and Max Healthcare Group with advanced EHRs have reached Stage 6 of the Healthcare Information and Management Systems Society classification of EHR adoption. However, EHRs are not yet portable across these institutions, and most systems continue to struggle with physician compliance. In public health care, it is mostly restricted to aggregated data.
- **Procurement of Infrastructure** - Most providers today don't have efficient means to place indents, procure supplies seamlessly, efficient HMIS and data management and storage This process requires dedicated funds, dedicated resources to maintain and update, however mostly this is undertaken manually, on paper through registers, Providers usually find this as an administrative roadblock, an additional job burden and rely on fragmented or disconnected systems to maintain records which eventually is rendered inadequate and poor in quality
- **Limited knowledge of patient's medical history** - Due to lack of patients' longitudinal health history at a common place, it is difficult for providers to understand a patient's holistic health profile and deliver comprehensive evidence based care to patients. The provider can prescribe care based solely on the information provided by the citizen, which sometimes may not be sufficient. This leaves the provider with the inability to provide comprehensive evidence based care.

- **Data Reporting** - There is no clear mandate for data reporting at a centralised level across programmes/institutions. Without prescribing guidelines and policy to create a push for data sharing, providers do not have any clear mechanisms for data reporting with policy makers/researchers.

### 5.1.3. Payors: Role & problems faced



**Payor** - Payor, or payer, is a company that pays for an administered medical service. An insurance company is the most common type of payor. A payor is responsible for processing patient eligibility, enrolment, claims, and payment.

#### **Problems faced by Payors**

- **Low awareness and understanding about insurance** - Citizens have low awareness and face difficulty in understanding a product like health insurance, limiting its uptake. Insurance is perceived as a complex service due to limited knowledge and conversation among citizens. Citizens also are not aware of the various insurers in the market to avail services.
- **Lack of collaboration with health providers** – Network of doctors, health administrators, pharmaceutical companies and others are willing to contract with health insurers or aggregators but the challenge remains for enabling regulation to catalyse this opportunity.
- **Low penetration** - Penetration of insurance players in the market has remained low due to low awareness among citizens and complex procedures. The non-life insurance penetration in India in 2020-21 stood at 1%<sup>11</sup> compared to a global average of 4.1%. The non-life insurance density was only 19 USD compared to a world average of 449 USD. It is to be noticed that the penetration and density have not grown since 2017-18.
- **High turnaround time** - Claim processing requires a lot of paper-work. Moreover, the process is not standard across insurance providers. Industry experts report that it takes an average of 45 days between raising of claims to settlement, which results in high turnaround time for complete settlement.

<sup>11</sup> <https://www.irdai.gov.in/admincms/cms/uploadedfiles/annual%20reports/Annual%20Report%202020-21.pdf>

<sup>12</sup> [https://www.niti.gov.in/sites/default/files/2021-10/HealthInsurance-forIndiasMissingMiddle\\_28-10-2021.pdf](https://www.niti.gov.in/sites/default/files/2021-10/HealthInsurance-forIndiasMissingMiddle_28-10-2021.pdf)



- **Inequity in reach** – The rural-urban divide and the inequitable distribution of public-private health services predominates the health insurance landscape as the target of the payor is primarily the urban consumer who has the ability to pay. Expansion and bringing the lower and middle-income beneficiaries under the bracket of insurance, particularly digitised, is a long road ahead.
- **High processing cost** - The paper-work and manual processing leads to high claim processing costs. This makes coverage for OPD and many other services economically unviable.
- **Low coverage of OPD**- Insurers attest that the biggest barrier to offering comprehensive health insurance (covering cost of medicines, tests and consultations) in the OPD is the lack of data for pricing these covers. This is where risk sharing structures such as capitation can galvanise the market forward.
- **Linkage with unique health identifier for patients**- The current payor is burdened to ensure seamless and swift movement of insurance claims and facilitating cover for patients who currently do not have uniform health identifier as well as access to centralised health records. A unique health identifier can also address the lack of interoperability between the payors.

#### 5.1.4. Policy Makers and Administrators: Role & problems faced



**Policy Maker and Administrator** - Policy makers are entities/ institutions that are responsible for establishing frameworks, policy guidelines and governance models within which healthcare is provided to the citizens. Administrators are entities/institutions in charge of implementation of policies and programmes. In the country's federal structure, responsibility of healthcare delivery rests with the state government, while the Union government sets national health objectives and priorities, advocacy, developing standards and guidelines, and designing health policies and programmes having state level implications.

#### **Problems faced by Policy Makers and Administrators**

- **Absence of quality data** - Due to limited digitization, there is a lack of availability of quality public health data which can be effectively utilised for taking policy decisions, resource allocation and service delivery. The challenge is amplified by the absence of a uniform framework and tools for data aggregation and anonymization.
- **Information Asymmetry** - Most programs do not have a clear mechanism to

share programme specific data with policy makers and researchers, resulting in unclear or half-baked data with policy makers. Information asymmetry exists because there are no clear mandates for data sharing and reporting. Some programmes share, while some do not. And the shared data is often riddled with errors due to lack of standardisation across formats.

- **Lack of technical expertise in advanced and emerging technologies** - Understanding of emerging and advanced technologies is still yet to mature in the public healthcare ecosystem. This makes it harder for the policymakers to set base principles to define boundaries for the innovators to be mindful of while ensuring public safety in all regards.
- **Building consensus with stakeholders for adoption** - The healthcare ecosystem includes a diverse set of stakeholders with specific requirements and use cases. Onboarding stakeholders in the digital health ecosystem while protecting their interests and catering to their requirements becomes challenging.

#### 5.1.5. Health Tech Providers: Role & problems faced



#### **Health Tech Providers (Health technology and innovation partners/ecosystem)**

The health technology providers, start-ups and health innovators constantly build evolving digitally-enabled healthcare products, applications, which is an enabler for all other stakeholders in the ecosystem. It in turn enables service delivery to the end-users in a more structured and easily adaptable manner.

#### **Problems faced by Health Tech Providers**

- **Ecosystem inertia:** Healthcare providers are commonly more comfortable with physical modes of records creation and storage. As a result, health tech providers have a limited section of the market to work with currently and penetration of digital health solutions has not reached its full potential.
- **Lack of field force:** Over the past few years, some intuitive digital health solutions with good user experience have emerged in the market. However, the technology is not able to reach the end users because of lack of field support. Such field force is required to market and deliver the solutions and further provide on-ground support to users.
- **Limited connectivity:** Network connectivity is a critical piece of health IT infrastructure. Limited connectivity in several parts of the country acts as a barrier for adoption of digital solutions by healthcare providers and citizens because it affects operational efficiency and leads to poor user experience.

- **Low awareness among citizens:** Despite availability of digital health solutions in the market, their uptake remains low because of lack of awareness in citizens, especially in Tier 2, Tier 3 cities and rural areas. Even in metro cities, citizens are often not equipped with the right information and available choices for selection of a digital solution which is most suitable for their needs.
- **Financing:** While investments in the health tech sector have increased post Covid-19 pandemic, lack of capital and access to funds still remains a hurdle for health tech start-ups. Additionally, profitability has been a challenge, even for leading players. Cash burn has been common in this industry, given the race to scale, and steep discounts being offered to drive adoption.

## 5.2. Challenges to digitising the healthcare ecosystem

The problems experienced by each of the stakeholder groups discussed above both individually and collectively inform key challenges to digitising the healthcare ecosystem in India.

- **Large population with healthcare resource constraints, further complicated by their inequitable distribution**

The World Bank estimates that India has about 0.93 physicians for every 1000 people, whereas the corresponding world average estimate is 1.8 physicians per 1000 people.<sup>12</sup> Further, the rural-urban divide results in disproportionate availability of providers and consequently, poor service delivery. The vast majority of clinical interactions are not digitised; and in the few instances that they are, the data is not standardised, interoperable, or readily accessible to clinicians, researchers, and policy makers.<sup>13</sup> Additionally, the healthcare providers experience an inability to adequately and appropriately leverage the existing workforce's skills through digitisation of processes that drive down both administrative costs as well as human efforts and thereby optimise care quality.

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<sup>12</sup> <https://data.worldbank.org/indicator/SH.MED.PHYS.ZS>

<sup>13</sup> Kurian O. The Wire. Why It's a Challenge To Make Quick Sense of India's Health Data URL: <https://thewire.in/health/imr-mmr-data-nss-srs>

- **Disparate entities in the ecosystem, demanding patients to approach multiple players individually**

The continuum of care for a patient includes multiple touchpoints with various healthcare stakeholders. It begins with the first appointment with a doctor, followed by diagnostic tests at a laboratory. It is then marked by a visit to a pharmacy for purchasing the prescribed medication. In the event that the patient has availed or is eligible for insurance coverage, a whole new world of claims processing opens up with entities such as the insurance manager in the facility, the insurance executive from the respective firm or applicable government programme, third-party administrators, and so on. Each of these disparate entities need to be called upon individually and also multiple times, depending upon the severity of the patient's condition. Any attempt at the digitisation of the healthcare ecosystem is therefore contingent on the corresponding digitisation for this entire patient journey, including each of the nodes and sub nodes and their associated processes.

- **Largely scattered pen & paper health data, requiring skilled capacities for digitisation**

Each of the nodes and sub nodes in the care continuum are largely documented as and accounted for through pen and paper data even today. This heavy reliance on haphazard health data in the form of prescriptions, laboratory reports, medicine purchase invoices, insurance claims forms, and so on is mostly manual, and almost always only accessible through in-person visits to each of the source locations for the physical copies. Digitisation of these documents and paperwork, coupled with the volume in which they are created in every facility every single day, requires capacity building on the part of each of the participating stakeholder groups and their individual players - doctors, nurses, pathologists, radiologists, lab technicians, pharmacists, and insurance agents.

- **Inability to weigh short term costs against long term benefits of digitisation**

It is a rather interesting paradox - the existing lack of multi-nodal digitisation acts as a deterrent to begin the process for large-scale digitisation. Each player in the healthcare value chain cites the lack of digitisation in their preceding or subsequent node as a reason for their unwillingness to go digital. In the few instances where the players do demonstrate an interest to digitise their processes, the inefficient administrative paraphernalia such as the effort for procurement of the right digital software, high overhead costs of such procurement and budgetary approvals for the same, and, most importantly, the time taken for initial capacity building to learn how to use digital software, among other things, act as detriments to begin the process of digitisation.

- **'Reactive' approach to health management with low emphasis on prevention and promotion**

Healthcare in India is known to be reactive in nature - only at the stage of significant concerns is medical intervention solicited by patients. Such episodic, curative behaviour is driven by multiple factors - difficulty in access to service, knowledge asymmetry, personal biases, financial burdens etc. Due to this pattern of care-seeking upon incidence and not otherwise, there is a very limited demand from patients to have even a chronological and consolidated record of their health, let alone a digitised version of it. This lack of patient demand for digitised health records for preventive and promotive healthcare acts as a deterrent for providers to generate, maintain, and share digitised health records with patients in the absence of a mandate surrounding digitisation of records.



## 6. New Vision for India's Healthcare Ecosystem - Ayushman Bharat Digital Mission (ABDM)

*This section captures the advent of a new vision for India's healthcare ecosystem in the form of the Ayushman Bharat Digital Mission, which, by design, focuses on digitising healthcare through a citizen-centric model of healthcare delivery. First, it outlines the vision and journey of ABDM - what that means, key principles a citizen-centric model is built on; benefits of a citizen-centric model on all stakeholders in the ecosystem, impact on healthcare ecosystem which includes shift from a disease-centric model to a citizen-centric model. And concludes with what levers can drive this change.*

### Vision behind ABDM - digitising healthcare through a Citizen-Centric Model

#### **Objective**

Realising the need for expeditious digitisation of the healthcare sector in an increasingly digital world, the Government of India has set out to achieve a two-fold objective through the Ayushman Bharat Digital Mission (ABDM). First, it is designed to address the various problems being faced by the disparate and unconnected healthcare stakeholders in the country by offering them solutions to their own independently experienced problems as well as by offering a unifying platform enabling them to seamlessly interact with each other. Second, it is designed to overcome the collective challenges to digitisation by focusing on the creation of digital public goods through a citizen-centric model of healthcare.

#### **Genesis & Journey**

With this broader vision in mind, the Government of India laid the vision to provide quality healthcare by leveraging technology that is affordable and accessible to all through the National Health Policy in 2017. In 2018, NITI Aayog released the National Health Stack that envisaged the creation of common public goods for healthcare. Based on these recommendations, the National Digital Health Blueprint was launched in 2019 that outlined the architectural framework for a comprehensive, integrated, and nationwide digital health ecosystem.

Ayushman Bharat Digital Mission (earlier National Digital Health Mission) was launched by the Hon'ble Prime Minister in August 2020, with the vision laid down by the above-mentioned policies coupled with a resolve to effectively counter our current health challenges. ABDM aims to enable India's achievement of Sustainable Development Goal - 3 (ensure healthy lives and promote well-being for all at all ages) using digital public infrastructure for health. ABDM intends to develop the backbone necessary to support the integrated digital health infrastructure of the country by bridging the existing gap amongst different stakeholders of the Healthcare ecosystem through digital highways and open networks. Open networks and Open Protocols for digital health

services would enable interoperable connections over a nationwide, decentralised, open, secure and inclusive network. Enabling open access across diverse health service providers and patients can drastically expand demand-supply ecosystems.

Thus, ABDM aims to create open, interoperable, standards-based digital systems to support universal health coverage in an efficient, accessible, inclusive, affordable, timely and safe manner. The ecosystem is envisioned to provide a wide-range of data, information and infrastructure services, but at the same time ensuring the security, confidentiality and privacy of health-related personal information.

### Key Offerings of ABDM as Digital Public Goods

ABDM has rolled out a stack of Digital Public Goods (DPGs) to initiate and enable all stakeholders in the digital healthcare ecosystem.



**Ayushman Bharat Health Account (ABHA)** - To standardize the process of identification of an individual across healthcare providers, ABHA number will be used for the purposes of uniquely identifying persons. This will also aid in authenticating them, and threading their health records (only with the informed consent of the patient) across multiple systems and stakeholders.



**ABHA Application** - This application enables an individual to manage information about their personal health records (PHR). This includes viewing of a longitudinal record, consisting of all health data, lab reports, treatment details, discharge summaries across one or multiple health facilities on one platform.



**Healthcare Professional Registry (HPR)** - A comprehensive repository of all healthcare professionals involved in delivery of healthcare services across both modern and traditional systems of medicine. Enrolling in the Healthcare Professionals Registry will enable them to get connected to India's digital health ecosystem.



**Health Facility Registry** - A comprehensive repository of health facilities in the nation across different systems of medicine. Both public and private health facilities including hospitals, clinics, diagnostic laboratories and imaging centres, pharmacies, etc. Enrolling in the Health Facility Registry will enable them to get connected to India's digital health ecosystem.



**Drug Registry** - The Drug Registry is proposed to be a single, up-to-date repository of all the drugs present in the domestic market. It is the primary source of information for all other databases and lists and facilitates the exchange of standardised data across all systems of medicine, from allopathy to Ayurveda.

## Deep diving into a Citizen Centric Model

A Citizen Centric model envisions a healthcare system, focusing citizens at centre. The citizen is empowered with access to information, tools and services to be an informed decision maker of their healthcare journey. The citizen is able to identify their healthcare requirements based on recorded evidence, choose their preferred provider for care and engage in a long-term healthcare journey. This enables the citizen to play a proactive role in their healthcare journey. They are able to manage their health journey better - seek personalised preventive care, early identification of diseases, manage chronic diseases etc.

In a sharp contrast, traditionally, healthcare has functioned in a provider/disease-centric model. This results in largely episodic care for the patient. The provider with the limited information shared by the citizen, prescribes care. The citizen does not have access to the required information and tools to play an equal and a more informed role in their healthcare journey. In such cases, the provider becomes the driver of healthcare. Such healthcare delivery is reactive in nature, which is costly, intermittent, and does not contribute to improved healthcare outcomes in the long term.

A digital healthcare ecosystem provides the required features and functionalities of access to information and service, discoverability, affordability, record management and share, operational efficiency, self-tracking of preventive and chronic diseases to name a few.

A Citizen Centric model is built on a few key principles:

**Inclusivity:** Inclusivity is one of the fundamental principles on which the citizen centric model stands. ABDM is fundamentally premised on open, modular, and interoperable digital public goods. ABDM system is therefore platform agnostic, i.e., hospitals or labs or patients or doctors need not be on the same platform to be able to interact with each other for better health outcomes. All platforms are expected to be connected by the ABDM open network, enabling the creation and sharing of longitudinal health records by different ID systems across various service providers.

**Access:** Democratising access to services for citizens across platforms, and empowering all stakeholders with the relevant information for all to make informed decisions forms the basis of a citizen centric model. Patients have access to their personal health records, healthcare services available, etc. Based on the consent by citizens, providers have access to the medical history of a patient, researchers and policy makers have access to large sets of macro data to formulate policy, and payors have access to patient's data etc.

**Design:** The design of the model through digital infrastructures enables easy understanding and adoption of such a model by all stakeholders. An intuitive and interactive platform will enable a higher and continued uptake.

**Participation:** A citizen centric model will flourish when all stakeholders actively engage in the healthcare ecosystem, and become active participants. Driving engagement from each stakeholder to make informed choices in collaboration will drive the success of such a model, which cannot function in siloes.

### What will a citizen centric model enable for the healthcare ecosystem?



A patient, Rani Devi's health records are available across various health programs. All these programs presently exist in silos. On being ABDM compliant, these health programs will be easily linked as ABHA will become a common identifier and Rani Devi's health records can be easily accessible to health workers of these programs. Thus, being ABDM compliant will help bridge the existing gap among different stakeholders in the healthcare ecosystem.

The citizen centric view of healthcare under ABDM therefore enables a large segment of Indian users who do not have physical access to doctors to connect with them digitally - regardless of their location. A full and a partial mode of assistance to create ABHA has also been initiated at registered government healthcare facilities, especially for people who do not have access to smartphones. Not only that, for inclusion of people from remote and low resource areas, ABHA creation has been facilitated through a network of Common Service Centres (CSCs). It also allows the users to share

health information with their health service providers and receive prescriptions, lab reports and doctor notes digitally on their devices. The citizen centric model aims to not just digitize and standardize efforts for the ease of the citizen, but also for other stakeholders. For example, for providers, a citizen centric model helps with increased patient engagement, access to case based medical history to provide customized care, It is a collaborative care approach including all stakeholders. All stakeholders in the ecosystem (citizens, healthcare workers, administrative staff, researchers etc.) work in harmony to drive convergence in their efforts to deliver healthcare services to the citizens.

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**Citizen Centric Model will enable Organ donation** - another critical area, where a citizen centric model can contribute immensely. Currently, only about 0.01 percent<sup>14</sup> people in India donate their organs after death, a dismally low figure given the large potential to donate. Through a citizen centric healthcare model - citizens will have access to more sensitive and lifesaving information such as provisions and protocols for organ donation. At the same time, a healthcare professional will have easy access to longitudinal health history in cases of incapacitated patients, and aid in organ transplant. With access to the right information, at the right time - more citizens can sign up for organ donation, as well as more patients can receive the required transplant at the right time.

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## 6.1. Benefits to Stakeholders through Citizen Centric Healthcare under ABDM

<p><b>Citizens</b></p>	<ul style="list-style-type: none"> <li>● Citizens are <b>better informed</b> about their health data through access to comprehensive information about their own health records.</li> <li>● Citizens have <b>options to select</b> their preferred choice of provider and service with increased awareness about providers in the healthcare ecosystem, through the UHI network; through multiple media such as digital consultation, booking physical consultations, lab diagnostics services and even ambulance services.</li> <li>● Citizens can receive value based <b>continuum of care</b>, opposed to heavy volume of care, by sharing their comprehensive health records with the provider.</li> <li>● A digital ecosystem will offer differential pricing to customers by various providers, allowing citizens to <b>access services at lower cost, as well as enabling transparency in pricing</b></li> </ul>
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<sup>14</sup> <https://www.financialexpress.com/lifestyle/health/india-needs-more-organ-donations-as-only-0-01-indians-have-given-consent-to-donate-their-organs-after-death/2300173/>



	<ul style="list-style-type: none"> <li>● Citizens can build a <b>comprehensive digital health profile</b> by integrating their health and wellness records, from across providers and devices. They will not be required to carry physical copies/reports of their health</li> <li>● Control of their data including personal health records</li> <li>● Awareness and participation in organ donation, blood donation etc.</li> <li>● Transparency and faster delivery of information</li> </ul>
<p><b>Provider</b></p>	<ul style="list-style-type: none"> <li>● <b>Ease in identification</b> and verification of beneficiaries with a single identifier across healthcare ecosystem i.e. ABHA number</li> <li>● Holistic view of beneficiaries' healthcare profile to help early diagnosis, and provide effective and efficient <b>care based on evidence</b>.</li> <li>● <b>Interoperability</b> with other programmes through access to anonymized data from across all National Health Mission programmes for better delivery.</li> <li>● Simplified &amp; transparent patient referrals as well as timely referrals for beneficiaries due to <b>rationalised processes</b>.</li> <li>● Data driven allocation of personnel and capital leading to better outcomes and increased <b>operational efficiencies</b>.</li> <li>● Citizen centric view of providers in healthcare service and delivery, will be likely to be seen as <b>trusted and reliable partners</b> by citizens in the long term.</li> <li>● <b>Ease discoverability for healthcare providers and facilities</b> enhancing their viability to the patients and bridging the gap between the demand and the supply, through UHI gateway</li> <li>● UHI facilitates the <b>ease of doing business</b> to the healthcare service providers by granting them access to a large number of users through the medium of a common platform.</li> <li>● With special reference to pharmacies, UHI can assist in <b>faster inventory turnover</b>.</li> </ul>
<p><b>Payor</b></p>	<ul style="list-style-type: none"> <li>● ABHA number to <b>ease the identification and verification</b> process of the patient for insurance claims due to the unique identifier.</li> <li>● <b>Standardised claims processing</b> will allow for faster settlement of claims, as well as fraud prevention as opposed to every insurer having their own procedure.</li> <li>● A streamlined claims process will significantly <b>reduce costs and burden for providers</b>.</li> <li>● With more patients becoming active in their healthcare journey, there will be an <b>increased demand</b> for insurance in the market.</li> <li>● <b>Flexibility of payments</b> for Healthcare Service Providers Application and End Users Application (EUA) on methods of payments, on when</li> </ul>

	and how the payments are collected and settled across parties in a secure and transparent manner.
<b>Policy Maker and Administrator</b>	<ul style="list-style-type: none"> <li>● <b>Access to actionable insights from data</b> from various levels to forecast trends, identify patterns, predict epidemics/pandemics etc.</li> <li>● Ability to send <b>targeted behavioural change communication</b> and health education messages.</li> <li>● Get Access to <b>anonymized/aggregated datasets</b> across programs - for improved decision making and interventions.</li> <li>● <b>Effective real time monitoring of implementation work, with inputs from all health</b> program implementation results into efficiency and effectiveness.</li> </ul>
<b>Health Tech Players</b>	<ul style="list-style-type: none"> <li>● Providing them the initial push to health tech startups in the form of <b>easy discoverability and viability through UHI, also opening up new markets for the players</b></li> <li>● UHI also grants them <b>access to verified registries</b> and leverages a common public platform.</li> <li>● Increased Innovation and contribution to the healthcare sector.</li> <li>● UHI enables the users to have a seamless digital experience through any platform of their choice due to the benefit of Interoperability.</li> <li>● Instead of using and managing data through various digital applications, UHI establishes a hassle free mechanism for users to extract and use data as per their convenience and peculiar needs.</li> <li>● For the Health Tech and Start-up community, UHI has the benefit of becoming a one-stop shop for providing a range of services to multiple stakeholders like the patients, doctors and laboratories.</li> <li>● Becoming ABDM compliant, Health Tech and StartUps have the benefit of being considered as verified and winning the trust and confidence of the users.</li> </ul>

## 6.2. Impact on Healthcare Ecosystem

### 6.2.1. Rise in awareness about health and wellness

A citizen centric model converges with the needs of today's 'customer' and market. There has been a palpable shift in the way citizen's view their health after the onset of the pandemic, and a rise in chronic and non-communicable diseases due to increasingly sedentary lifestyles.

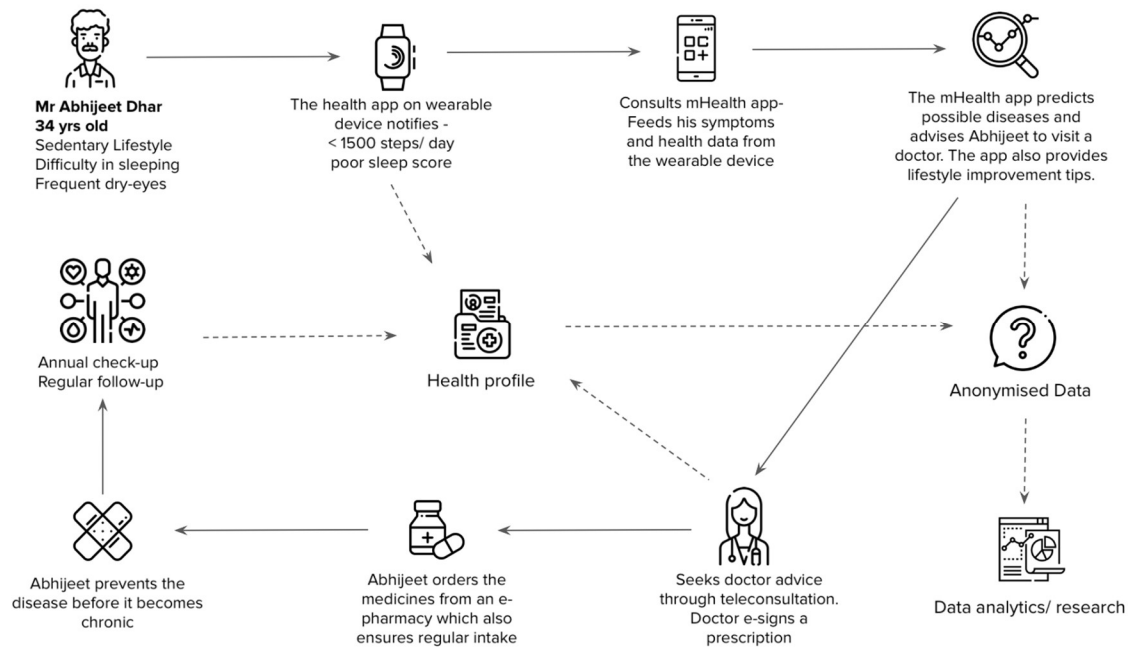
Citizens have started viewing their healthcare journey as a long term wellness journey, and not just as a series of healthcare episodes. As a result, they are increasingly seeking tools and platforms that support them in their journey towards a health oriented - wellness lifestyle.

Advent of technology in the healthcare space has revolutionised healthcare service and delivery, as the world has traditionally known. It is not limited to primary, secondary or tertiary care, but is now becoming an integral part of their daily lives. Citizens rely on easily accessible wearables/gadgets to track daily steps, heartbeat, pulse checks, oxygen levels among other things. Thus, the market for health tech, mhealth and other applications has seen a greater penetration over the last few years, with an upward trend.

The greater penetration of the smartphones has brought in a magnanimous change in the Healthcare ecosystem wherein the use of the health and wellness related services through their phones and wearables have grown exponentially. The rapid revolution of devices that track key vitals and monitor one's health has not only prompted innovation in the offered solutions but has also created a need to integrate traditional healthcare systems with mHealth and wearable ecosystems. mHealth is not just limited to mobile phones but supporting devices/wearables using IoT, such as smart watches, monitoring devices, bands etc. are powerful tools to track, measure and share health and wellness data for users.

As per the reports of the International Data Corporation (IDC), the watch market in India consisting of smartwatches as well as connected watches grew by 364.1 percent year-over-year (YoY) in 2021 to 12.2 million units, up from 2.63 million units in 2020. Moreover, in the fourth quarter, smartwatch vendors in the country shipped 4.9 million units, which tantamount to a 271.2 percent YoY growth. Many such health tech/wellness start-ups are pivoting their business models to combine healthcare and wellness, and best serve the needs of the citizens, and respond to the rising interest in both healthcare and wellness.

Being able to bring together all these siloed efforts in health and wellness, which are increasingly becoming synonymous, to best serve and empower the citizen. Providing the citizen with a comprehensive view to their entire health records to make evidence based decisions and seek desired care, will truly be a step towards a citizen centric model. This is a crucial opportunity to create an environment that encourages and supports health seeking behaviour among citizens.

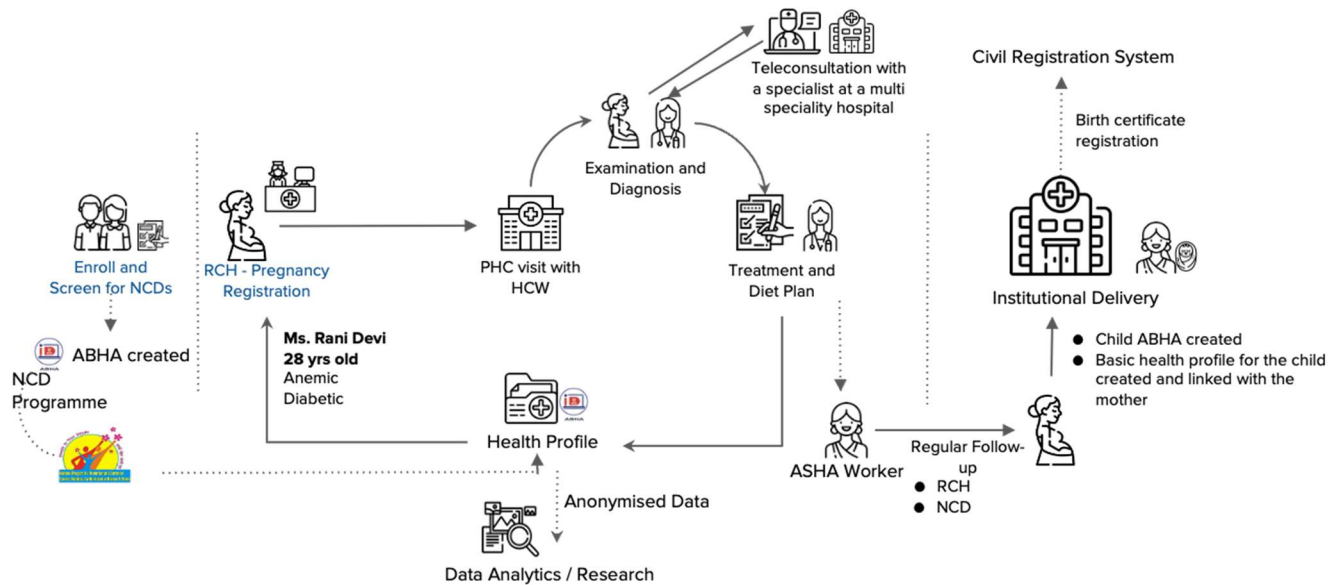


## 6.2.2. Shift from Disease Centricity to Citizen Centricity

A transition from a Disease Centric Model to a Citizen Centric model requires two key shifts:

### Shift from Provider driven to Citizen driven Model

Healthcare delivery today is determined by the provider. In case of Government Programs/States - it is about illness specific vertical health programs, like The National Tuberculosis Elimination Program, to actively identify citizens and deliver specific disease or symptom related services. And In case of a private provider - to supply episodic care based on the healthcare concern of the citizen, this is a more of a supply driven model. The health care program or the facility , private or public, becomes the focus.



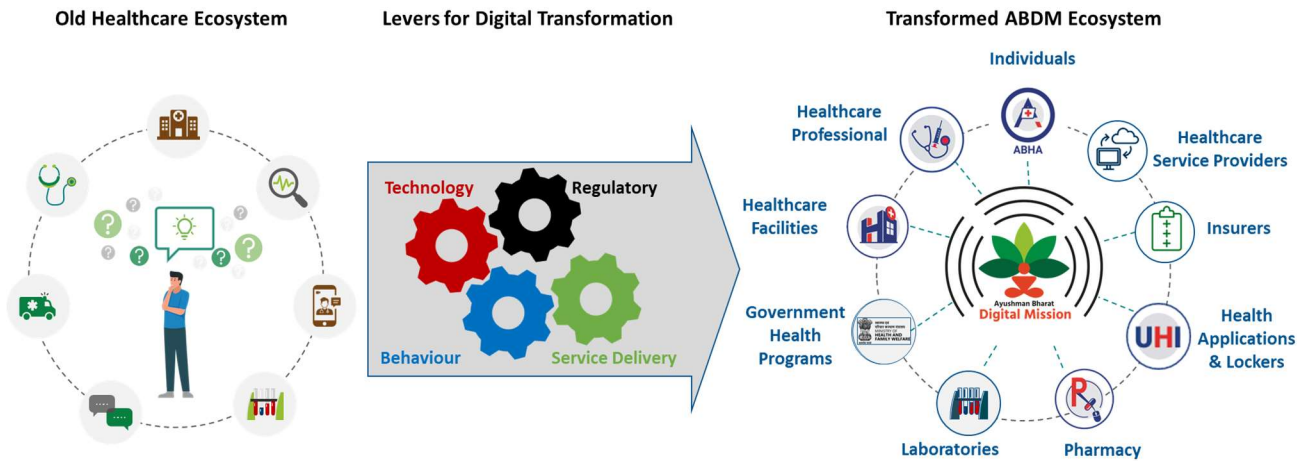
A Citizen Centric model shifts this focus to the citizen, prioritising their needs by giving them access to their own health records, and choice to seek targeted benefits/care from providers. The citizen is also able to identify any patterns through their longitudinal health data, and will have the ability to share data with a provider as desired to seek evidence-based care.

### Shift from Reactive healthcare to Preventive healthcare

Healthcare in India is known to be reactive in nature - only at the stage of significant concerns is medical intervention solicited by patients. Such episodic, curative behaviour is driven by multiple factors - difficulty in access to service, knowledge asymmetry, personal biases, financial burdens etc. A shift towards a model wherein the citizen has access to all information - regarding their own health with ease. The access to their comprehensive health records, discovery of services etc. will make them more aware and encourage them to engage in proactive and preventive healthcare seeking practice, thereby contributing to improved healthcare outcome in the long term, by mitigating any preventable and chronic diseases.

### 6.3. Key Levers For Change

*To realise the citizen centric vision under ABDM, the following section attempts to identify and expound on four key levers to accelerate the digitisation of healthcare. The four identified levers are Technological Innovation, Regulatory intervention, Behavioural Shift, and Service Delivery transformation.*



### 6.3.1. Technological Innovations

With citizen centricity in focus, technological innovations are helping drive digital transformation. Technology is linking all stakeholders in the ecosystem, enabling interoperability, transparency, improved access and healthcare delivery. Technological transformation needs to happen at multiple levels - data, infrastructure, application, building blocks level. Various stakeholders such as private players and payors are embracing parts of this transformation. However, such efforts are currently in siloes and need to be concerted so that everyone can benefit from the digital healthcare ecosystem.

### 6.3.2. Regulatory Intervention

Regulatory changes can help facilitate and even accelerate the journey towards a digital healthcare ecosystem. To drive action from stakeholders to move towards digital healthcare, regulatory transformations can create the right nudges. Interventions could be through modification of existing policies to accommodate digital healthcare, or bringing out new relevant regulation and guidelines around healthcare data management, data privacy, identification and verification of patients, documentation of healthcare professionals, service delivery, standards prescribed in the ecosystem, creation of digital health records, steps to be taken by national governing councils among many others.

### 6.3.3. Behaviour Shift

The success of a digital healthcare ecosystem relies heavily on the adoption by its stakeholders. A pro-active participatory ecosystem creates an environment which is reliable, credible and useful for all. Healthcare has traditionally worked on an offline model and is known to be relatively resistant to any change. Citizen centric model also



envisions an attitudinal shift from reactive, episodic care seeking behaviour to a proactive, preventive care. Enticing stakeholders to adopt new preferences, as a result, would involve bringing about a fundamental behavioural shift that would need to be carried out through awareness, incentivization and grievance redressal mechanisms.

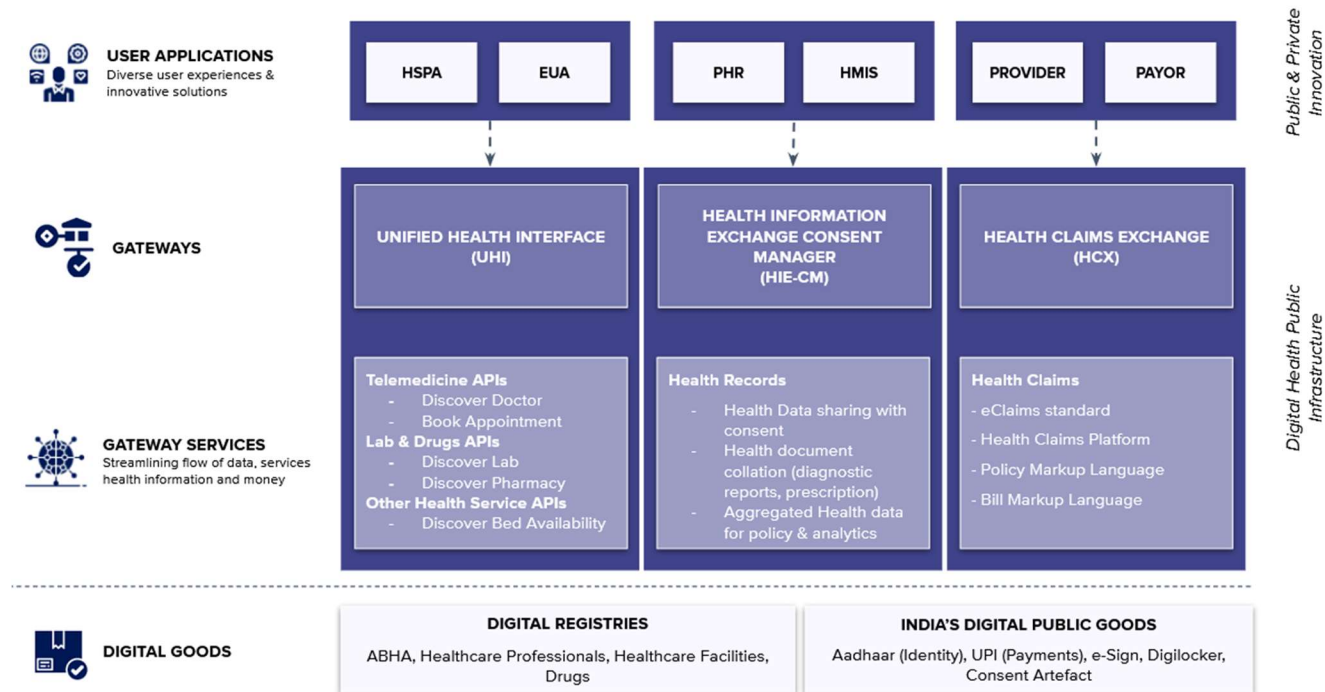
#### 6.3.4. Service Delivery Transformation

Augment the technical foundation through digitisation of healthcare and policy change with capacity building of Programmes/States and their front line workers, redefining standard protocols and 'digital by default' model of delivery. Enhanced interventions through evidence-based care, streamlined operations and processes, and aggregation of data to drive policy will aid in driving this transformation. Citizen centric models will revolutionise health care delivery as it can cater to customised, personalised requirements of individual patients. It opens up opportunities to broadcast individual focused, health service schedule reminders and important behaviour change communications, based on the integrated health data.

## 7. Lever of Technological Innovation

*Under ABDM, there are three gateways - Health Information Exchange Consent Manager (HIE-CM), Unified Health Interface (UHI) and Health Claims Exchange (HCX) that are poised to revolutionise the healthcare landscape of the country.*

ABDM has built the three gateways on the top of core digital registries namely, ABHA, HPR and HFR and the larger digital public goods such as Aadhaar, e-Sign, UPI etc of the country and interact with different stakeholders through use case specific applications. By enabling interoperability in a host of health services, the gateways drive public and private innovation and pave the way for citizen centric care.



## 7.1. Health Information Exchange Consent Manager (HIE-CM)

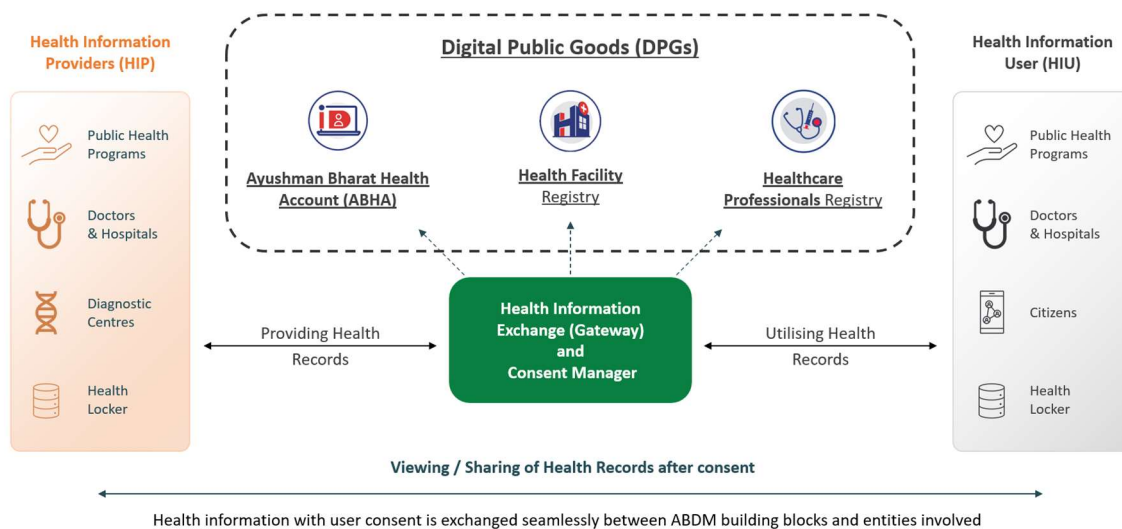
Access to personal health records (PHR) of an individual requires explicit consent from the individual. The Health Information Exchange - Consent manager is a gateway that interacts with an individual and obtains consent for any intended access to personal or health data.

The goal of the Health Information Exchange - Consent Manager (HIE-CM) is to ensure that an individual is in complete control of what data is collected, how/with whom it is shared and for what purpose, and how it is processed.

### What are the components of HIE-CM?

The HIE-CM stores links (care contexts) and consents for a PHR Address (User) and facilitates the transfer of data from Health Information Providers (HIP) to Health Information Users (HIU).

- **Health Information Providers (HIP):** Links the data with PHR Address at the HIE-CM. Shares the data on request.
- **Health Information Users (HIU):** Gets the data and views it with consent.
- **Health Repository Providers (HRP):** Holds health data on behalf of the HIP and integrates with ABDM APIs.
- **Health Lockers:** Stores a copy of patients health data from HIPs with the data owner for long term storage.



- **PHR Apps:** PHR apps allow users to view and share their profile, discover and link care contexts, manage requests and view longitudinal health records.



### What does HIE-CM enable?

The 'share profile' feature enables faster registrations at hospital counters driven by a UPI-fashioned QR code system. Hospital counters display a QR code, which the user scans through a PHR app and shares their profile details like name, gender, dob, address with the hospital HMIS. Alternatively, the HMIS reads the QR code on the user's ABHA card or authenticates the ABHA of the user to fetch profile details.

As HIUs, healthcare professionals have access to more nuanced patient information and the ability to make faster and better decisions for their patients.

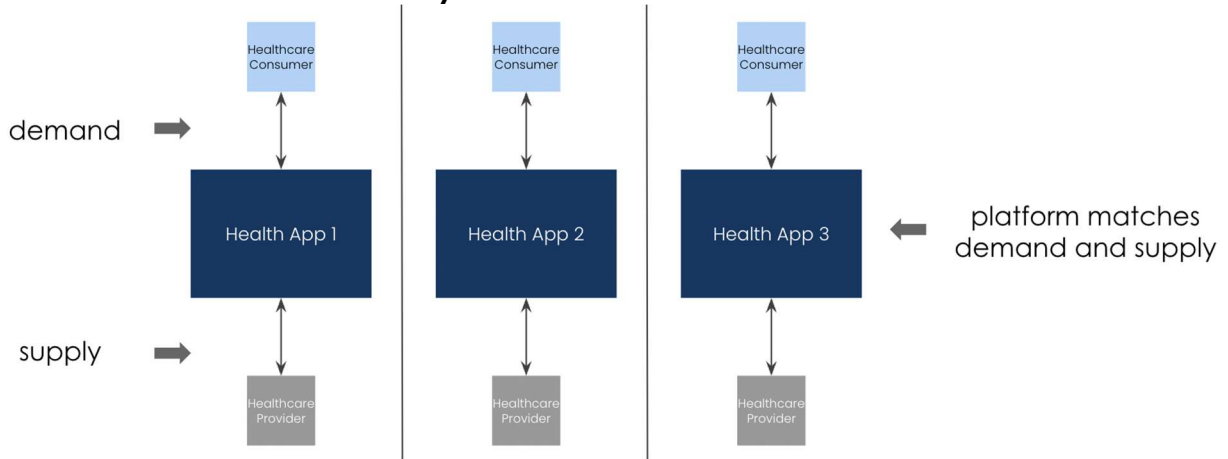
The adoption of health lockers, patient and healthcare professional side apps, allow HIPs to go paperless in their interactions with citizens.

### 7.2. Unified Health Interface (UHI)

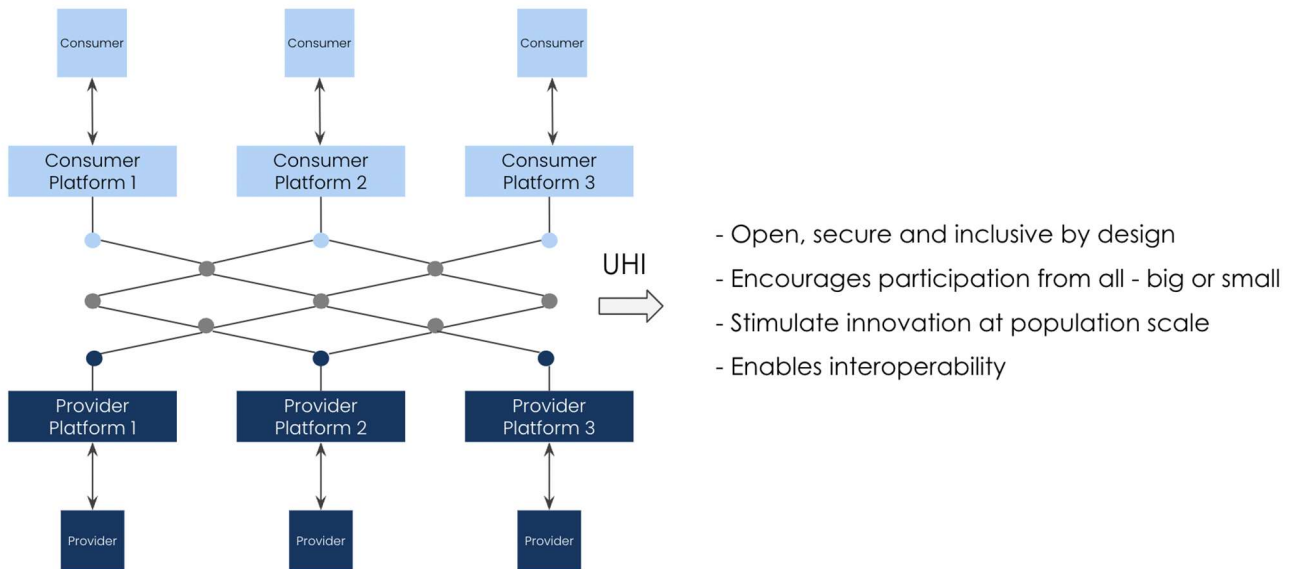
Siloed infrastructure makes it difficult for searching for services in a fragmented healthcare environment. To solve this problem, UHI is building an ecosystem to facilitate seamless communication among stakeholders on disparate platforms and exchange of health data with patient's consent. UHI is also designed as an open network to enable

the interoperable transactions in digital health services and is expected to play the same role in the health sector as UPI in payments. Through UHI enabled applications, patients can discover, book, conduct and pay for services offered by a variety of participating providers from any application of their choice. This is in stark contrast to the current mode of digital health service delivery, where patients and doctors must transact using a common application or platform.

**Current siloed healthcare ecosystem:**



**Interoperable healthcare ecosystem enabled by UHI:**



Any service transaction in UHI involves five entities:

- **User** is any patient seeking digital health services through UHI.
- **End user application (EUA)** is any application chosen by the user to access health services. EUAs can be of diverse forms like mobile apps, interactive voice response systems (IVRS), virtual assistants in English and local languages, etc.
- **Health Service Providers (HSPs)** are individual doctors, hospitals, labs, pharmacies, companies that aggregate health services, etc. They provide digital health services using Health Service Provider Applications (HSPA) that support UHI.
- **Health Service Provider Application (HSPA)** is any provider-facing application allowing health service providers to respond to EUA requests and fulfil digital health services. HSAs can be standalone providers or aggregators of services/businesses. Through an HSPA, a health professional can manage their services, calendars and payments.
- **UHI gateway** routes the initial service/provider discovery requests and responses involved in UHI transactions between HSAs and EUAs.

### **UHI Protocols in Action: An example**

The interoperability of digital health services is ensured by open protocols,<sup>15</sup> which ensure that interactions between users, healthcare service providers and the UHI gateway (API requests and responses) are standardised. This facilitates the delivery of healthcare services across different applications and platforms in a seamless manner. For example, consider a teleconsultation use case. A user searches for a doctor on any EUA of their choice using their ABHA Number → The EUA sends a request to the gateway → The gateway verifies the entity sending the request → Upon verification, the gateway broadcasts the search request to the registered HSAs → The relevant HSAs respond to the request with the HSP details → Upon verification, the gateway forwards the responses to the EUA → The EUA shows the list of search results with details for the user to choose.

### **How would UHI transform the Healthcare landscape?**

With UHI, India has the potential to radically change the way digital health services are delivered and accessed in India. UHI can enable end users/patients to access multiple digital health services from any platform of their choice, improving accessibility, quality and efficiency. UHI will act as a catalyst in creating a thriving digital healthcare services

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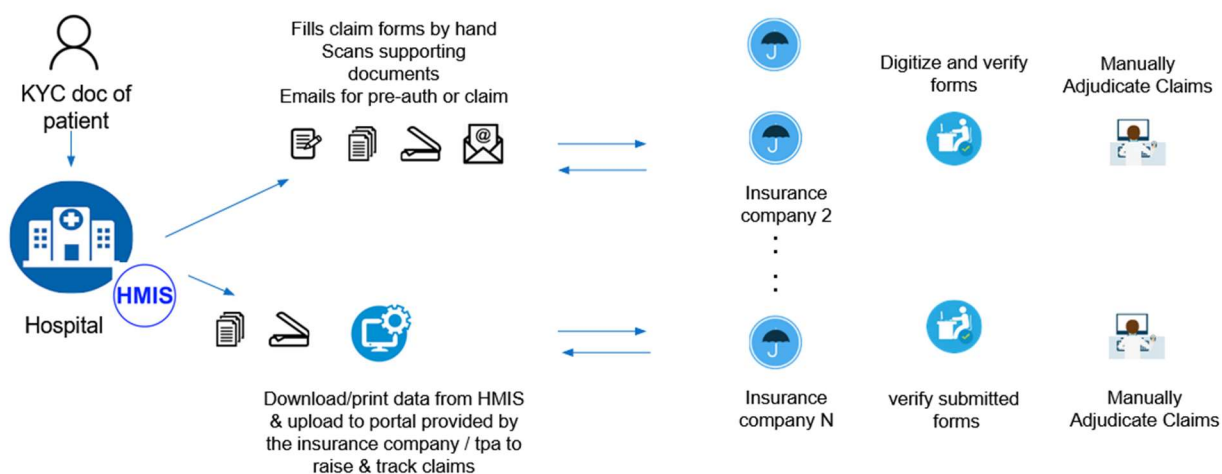
<sup>15</sup> Open Protocols are shared technical standards developed by open communities and adopted by every network participant.

ecosystem where innovators can develop novel solutions to expand the healthcare reach in India.

### 7.3. HCX

The existing claim-processing regime has multiple touchpoints and requires hospitals to deal with over 30+ insurers & third Party Administrators to process claims. This process is chaotic, slow, inefficient and costs over Rs 500 per claim as most of it is manually adjudicated. Moreover, tracking & reconciliation becomes challenging in this fragmented setup.

The Health Claim Exchange is envisioned as a digital 'Provider-Payer' partnership for seamless eClaim processing. This digital public good seeks to help claims processing information move across providers & payers. The implementation of HCX is expected to reduce cost per claim and provide better data on service-level agreements (SLAs) for various processes like time to pre-auth/discharge.



Health Claims Process Today

#### How will HCX work?

HCX enables interoperability in the health insurance ecosystem. The HCX platform is driven by common digital claim formats used by payers and providers, designed in compliance with International FHIR Standards and encouraged by the industry's own participants.

Once active, HCX will standardise a claim cycle in five steps:

- **Eligibility check** - HCX examines a patient's active insurance coverage and



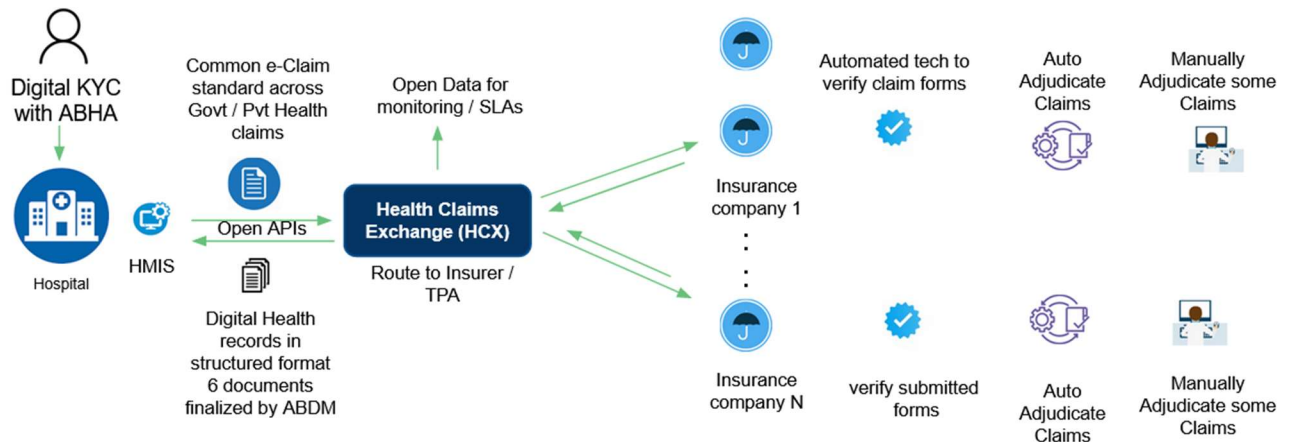
verifies the legitimacy of their claims. It ensures that the health facility has paid for the services provided and avoids claims rejection.

- **Raise preauthorization** - HCX assists in obtaining a provisional authorization in which the insurer simply informs the hospital/health service provider whether the claim is admissible or not.
- **Final Claim Submission** - HCX digitises the process of calculating the amount of reimbursement that the healthcare provider will receive after the insurance company settles all outstanding bills.
- **Claim Auto Adjudication** - HCX assists in reviewing, analysing, and comparing the benefit and coverage requirements of a received claim, whether it is settled or denied by the insurance provider.
- **Provider Payment Processing** - HCX offers payment services to healthcare facilities/healthcare providers that accept credit cards, debit cards, e-wallets, cash cards, bank transfers, UPI, and other forms of online payments.

The HCX platform leverages the ABDM building blocks and tries to create a common policy language that allows seamless transfer of information from healthcare provider (doctor/hospital) to the payer digitally

### **Benefits of HCX**

- **Digital and secure transfer of data** - By enabling consent-based digital transmission of data and information to the insurance payers by utilising other ABDM components, HCX transforms how patients interact with insurance providers and vice versa.
- **Improved turnaround time** - HCX will help to shorten claims processing time by digitising the claims data and information transfer process.
- **Better Service level agreement (SLA)** - HCX clarifies the services or products to be given under the insurance policy/claim by increasing the patient's (Payee's) knowledge of it.
- **Reduced cost per claim** - HCX will lower the handling cost of claim's components by going paperless and reducing the time required for the processing and administration of the insurance claim process.



Health Claims Process through HCX

### What digital services is HCX likely to provide?

- Coverage Eligibility: Allows users to assess policy eligibility while also improving policy understanding and awareness.
- Claim Status: Provides complete visibility of the claim through the system and allows seamless tracking of status of any claim on a single platform across payers.
- Smart Contracts: Allows payments transferred digitally, more quickly, and automatically upon claim approval to which payers have authorised.
- Provider Facility Info: Delivers validated information on the claim provider via ABDM building blocks, which payers can utilise to verify the claimed insurance.
- Policy Details: Allows easy sharing of policy details between the provider and the payer, reducing time during the claims process through the policy markup language of HCX.
- Digital Contract Management: Integrating and connecting with numerous SaaS platforms to digitise the entire claims process and move toward paperless contracts.

HCX gives an insurance model the potential to be viable and efficient through data and information, allowing policymakers, providers, and payers to better formulate policies and improve policy penetration. ABDM seeks to leapfrog India to Universal Health Coverage by tackling the various difficulties of the Health Insurance business through HCX.

## 8. Lever of Regulatory Interventions

The success of the mission to digitise healthcare in the country, is likely to be determined by the scale of its adoption. Greater the number of players - clinics, hospitals, labs, HMIS, citizens etc. integrating with ABDM, the faster the ecosystem can come together and reap benefits of digital healthcare. Large scale adoption to a new service/ecosystem, in a diverse country such as India can be challenging. This can be addressed by

ensuring the right tools, policies and incentives are in place, creating a conducive environment for stakeholders to adopt and embrace Digital Healthcare enabled by ABDM.

Designing and implementing policy incentives can create a strong overarching push for adoption. Such incentives may be focused on critical elements through the lever of regulatory interventions such as setting up the right policies, guidelines and nudges to bolster the adoption of Digital health. In order to move towards a citizen centric digital health ecosystem powered by ABDM, various existing laws and regulations regarding healthcare can be leveraged and, if need be, modified.

There are various laws/statutes which give legal right to a medical professional such as a doctor to practise, hospitals to provide healthcare service, nurses to provide nursing care etc. These laws are administered and monitored by various bodies/councils (such as the National Medical Council). Modifications in these regulations administered by these bodies/councils can help patients get the benefits of Digital health This includes:

- Government and private health facilities participating in public schemes or receiving public benefits must become part of the ABDM ecosystem at the earliest. This should include Hospitals empanelled under PMJAY.
- All health programmes/schemes/solutions of central and state governments should be ABDM enabled.
- Professionals offering telemedicine services should be registered in HPR for identification purposes during teleconsultation and they should also create EHR which are ABDM enabled.
- ABDM training should become part of Continuing Medical Education (CME) by incorporating in the overall requirement of training for healthcare professionals for renewal of their licences.
- Registered Clinical Establishments and Mental Health establishments must obtain facility ID under ABDM and store electronic health records using ABDM enabled system.
- Pharmacies must ensure creation of facility ID
- E-Pharmacies must generate ABHA of citizens and link prescriptions received from patients as a digital record in ABDM compliant systems.
- Laboratories must include HPID/facility ID in reports for Notifiable Diseases, which will help in wider and faster disease research and potentially drive laboratories to go digital for reducing the compliance burden.
- All insurance claims may be filed by facilities and processed by payers using the common interoperable platform, HCX
- All other government and private Healthcare facilities and healthcare professionals may be required to enrol themselves in the Health Facilities Registry (HFR) and Healthcare Professional Registry (HPR) respectively and maintain patient health records in systems which are ABDM enabled, This should be done

in a graded manner allowing time for all facilities and professions to be able to join the ABDM ecosystem with minimum friction.

Simultaneously, a new model legislation for promoting Digital health across the country, in line with the Clinical Establishment Act, may also be considered. This will ensure benefits of Digital health will be available in a transparent, efficient and secure manner to each resident of India. The model law can be further adopted by the states to implement unified digital health systems.

## 9. Lever of Behavioural Shift

Adoption of any innovation requires behavioural change from all stakeholders to embrace the new ecosystem and utilise its functionalities. All ecosystem players have a certain behavioural inertia when it comes to adopting new models of giving as well as receiving care. Therefore, ensuring ease in early adoption, and addressing the various behavioural challenges that may exist for providers is a critical step forward.

### 9.1. Financial Incentives for Healthcare Providers

One of the biggest barriers for ABDM adoption amongst providers can be the incurrance of cost in moving away from their existing working system, towards a ABDM enabled digital system. Provision of financial incentives to public and private players can provide a significant push for adoption and technology compliant behaviour. The capital as well as recurring cost of digitization such as good quality software, technical equipment, internet connectivity, and trained human resources may become a barrier in adoption of ABDM ecosystem by healthcare providers. This cost of digitization forms a very significant component of resistance to change for the healthcare practitioners and staff members working in healthcare facilities.

To promote adoption of the ABDM ecosystem by various health facilities, an incentive payment for the various players is planned to help drive all of them towards a service delivery transformation. Following financial benefits to the various players of the Digital health ecosystem that may be considered.

#### **Financial Incentives may be provided to healthcare facilities (clinics, hospitals and labs) for:**

- Every OPD transaction linked with an ABHA.
- Every Discharge card transaction linked to an ABHA.
- For every Diagnostic report transaction linked with ABHA/ABHA address by Lab/hospital/ facility (including radiological reports).

- For every insurance claims transaction linked with an ABHA/ABHA address filed by hospitals through HCX.

### **Cost Incentives for Digital solution (HMIS and LMIS) providers**

- For every ABHA/ABHA address linked transaction by clinics/hospitals/labs using ABDM compliant software.
- Making available easy to use and affordable software - Hospital Management Information System (HMIS) and Laboratory Management Information System (LMIS)

### **Schemes promoting Digital payments**

1. **Ministry of Petroleum and Natural Gas** - Incentivise petrol / diesel customers transacting at PSU petrol pumps by way of 0.75% discount when a customer uses Debit / Credit Cards, Mobile Wallets and Prepaid Loyalty Cards w.e.f. 13.12.2016, 00.00 hrs.
2. **Ministry of Electronics and Information Technology** -
  - a. Through a gazette notification on 27.12.17, MeitY **subsidized MDR charges on Debit Cards/BHIM UPI/AePS transactions of value less than or equal to Rs. 2000**. In the digital payments ecosystem, merchants play a very crucial role especially in a country like India where nearly 90% of merchants are from the unorganized sector in the form of small grocery stores, local outlets, etc. Besides, there are vendors, auto/taxi drivers etc., who constitute a large share of unorganized merchants. The transaction amount at each of these merchants is generally small. In order to promote digital transactions, the MDR on such transactions for the merchant will effectively become zero and hence they came on par with cash transactions.
  - b. **Incentive scheme for promotion of RuPay Debit cards and low-value BHIM-UPI transactions (P2M)**  
Under the scheme, the acquiring banks will be incentivised by the Government by way of paying percentage of value of RuPay Debit cards transactions (P2M) and low-value BHIM-UPI transactions (upto ₹ 2,000) (P2M), for a period of one year, w.e.f. April 01, 2021, at an estimated financial outlay of ₹ 1,300 crore.
3. **Niti Aayog's Lucky Grahak Yojana and the Digi-धन Vyapar Yojana (15**

Dec 2016) Give cash awards to consumers and merchants who utilize digital payment instruments for personal consumption expenditures.

a. **Lucky Grahak Yojana** [Consumers]:

- i. Daily reward of Rs 1000 to be given to 15,000 lucky Consumers for a period of 100 days;
- ii. Weekly prizes worth Rs 1 lakh, Rs 10,000 and Rs. 5000 for Consumers who use the alternate modes of digital Payments

This will include all forms of transactions viz. UPI, USSD, AEPS and RuPay Cards but will for the time being exclude transactions through Private Credit Cards and Digital Wallets.

b. **Digi-धन Vyapar Yojana**[ Merchants]:

- i. Prizes for Merchants for all digital transactions conducted at Merchant establishments
- ii. Weekly prizes worth Rs. 50,000, Rs 5,000 and Rs. 2,500

## 9.2. Promoting ease of use in digital health solutions

Hospital managers, doctors and other healthcare professionals may face difficulty in selecting appropriate HMIS/LMIS/digital health solutions due to lack of information. Therefore, NHA could develop a system of certification/accreditation as the product with minimal necessary features (Minimal Viable Product or MVP). It may also develop a system of rating/certification/accreditation so that all products can be assessed objectively and their information put up in the public domain for the benefit of users.

Commendation certificate may be given to initial few Healthcare facilities and practitioners who would undertake regular usage of ABDM compliant software and complete a defined number of transactions linked to an ABHA address. This will encourage different stakeholders to adopt and use digital solutions of ABDM on a large scale

- **Promoting affordable solutions**

Standalone clinics and small hospitals form a majority of the healthcare facilities in India. In order to digitise the healthcare ecosystem, it is of utmost importance that these facilities provide services digitally. In order to increase the adoption of digital health, solutions which are ABDM enabled such as HMIS are being made available at very low cost to the facilities.

- **Call Centre Support**

For better understanding and timely clarification of queries of the small healthcare providers who may not have the resources to have dedicated IT solution support, NHA could provide services of call centres. The respective solution providers will facilitate the training of the call centre workforce and may provide necessary SOPs to answer the queries so that the call centre is able to answer queries and support the healthcare providers.

- **Certified team of Digital Health Enablers**

NHA may develop a process for certification of a field team of Digital Health Enablers (DHEs) for supporting outreach and implementation of ABDM integrated digital health solutions. The DHEs can be in the form of local IT companies providing technical support (Digital Health Enabling Organizations) or individuals from Health related or technical backgrounds or Ayushman Mitras working for the PMJAY program (Digital Health Mitras). The process of identification and capacity building of these Digital Health Enablers would be done along with the different solution providers while NHA will develop a system for assessment and certification. NHA will also develop a method to measure the performance of these certified Digital Health Enablers and provide a performance-based incentive for Digital Health Mitras.

### 9.3. IEC (Information, Education & Communication) Support

Carrying out significant IEC activities for all stakeholders such as healthcare providers, insurers, citizens etc. regarding digital healthcare is extremely crucial. Generating awareness amongst stakeholders about the benefits of digital healthcare, with key focus on ABDM, will greatly help in driving adoption. This may be done by setting up IEC budgets for various public and private stakeholders to encourage and/or facilitate early adoption, which may be supported by NHA. Support regarding capacity building, change management and other activities may also be required for providers to fully integrate with ABDM. Additionally, healthcare facilities may display ABDM IEC material provided by NHA or state governments prominently at their entrance or in their lobby to drive awareness.

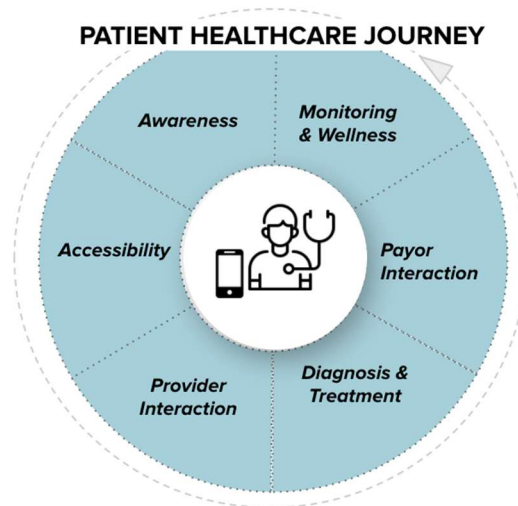


## 10. Lever of Service Delivery Transformation

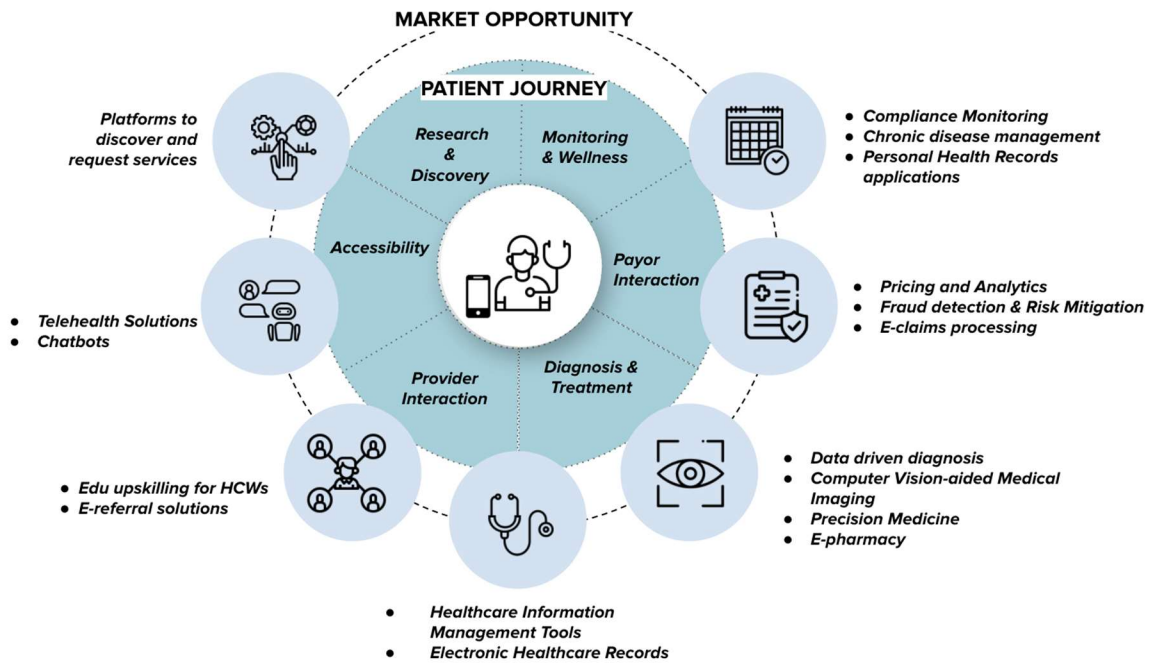
*With the vision of a patient centric healthcare ecosystem that is determined to provide healthcare for all, it is imperative to outline the healthcare journey of a patient. The section outlines the healthcare journey of a patient and identifies six checkpoints in the journey for interventions. Building on the identified checkpoints and need for interventions, the section then further explains the emerging business models in healthcare service delivery.*

### Patient Healthcare Journey

- 1) The journey starts with **awareness** of symptoms faced by the patient and **research** into available platforms/healthcare providers that provide remedial services.
- 2) This is followed by checking for **accessibility** of providers and solutions so that the patient can seek appropriate and timely service.
- 3) After booking a service, a patient interacts and engages with the **Provider**.
- 4) After careful consideration, the provider **diagnoses** the malady and **prescribes treatment**.
- 5) The patient pays for the treatment either through their own pocket or through a **payor (insurance provider)** who processes the claim and the patient goes back home.
- 6) The patient is then monitored for a stipulated time based on the treatment protocol, and then further segues into the patient initiated wellness journey.



With the goal to improve health outcomes for the patient, the six checkpoints identified in the patient journey provide the following grounds for innovation.



With the identified checkpoints and opportunities for innovations, following business models are fast emerging:

### 11.1. Providing IT: Platform as a Service

*Developing plug and play solutions that are easily integrable and interoperable*

The acceleration in digitization in the healthcare industry has created a large demand for HMIS/LMIS low cost solutions that can even be adopted by smaller healthcare providers. Availability of these solutions built with focus on interoperability and adherence to open standards will push for digitization of records and reduce administrative expenses and improve operational efficiency.

NHA has partnered with public and private players that are developing low cost-ABDM compliant HMIS solutions for clinics and small hospitals. These solutions have been developed in **SaaS model** and include - Plus 91, Bajaj Finserv, Raxa Health, ATHMA, Crelio Health, AlaCare, EkaCare, and Bahmni.



The traditional healthcare system fails to provide adequate and critical care to patients in tier 2, tier 3 cities and rural areas. It is natural that the lack of market incentive in these relatively low population density areas makes expansion of critical healthcare prohibitive. Rapid internet and mobile penetration has given us the opportunity to blur this healthcare divide. By leveraging IT solutions, several actors are employing **hub and spoke** models to expand healthcare services to remote areas.



“Medicines from the Sky” project, piloted by the Government of Telangana in collaboration with the World Economic Forum, allows facilities in remote areas (spoke) to order medicines through an app and get them delivered via drones from central facilities like district hospitals (hub).

## 11.2 Focusing on patient: User Centric Applications

*Developing easy to use applications for all*

Private players can now build their own PHR (personal health records) mobile and web applications that allow users to view, manage and share their health records. These apps can consume user data with appropriate consent. A PHR app could allow both patients and providers to move from an episodic care approach to a continuous care approach.



The increased penetration of smartphones has opened up opportunities for development of innovative citizen-facing-app based interventions. Logy.ai has introduced AI as a screening solution to identify cataracts with an accuracy of 92%. The innovation presents a simple chatbot on WhatsApp that allows users to upload their eye image, thus enabling rapid diagnosis even in rural areas.

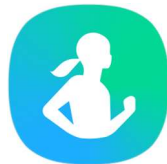
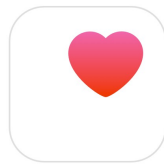
The structured data from these citizen-facing applications and healthcare providers can be analysed for development of new self-diagnosis tools, chronic-disease management and personalised care regimes.

One of the Atma Nirbhar App winner iMumz provides lifestyle resources for a holistic and healthy pregnancy in their 9 months program. iMumz use Machine Learning models to personalise their program and suggest right practices during pregnancy by analysing their vitals data.

### 11.3. Re-engineering care: Healthcare at Home

*Shift from traditional offline healthcare to digitally assisted care*

Wearables, mobile phones and in-home devices continuously capture user data and feed it into their algorithms to alert users and providers to act. Leveraging this, a diabetic patient could be prompted to have a snack to avoid a low blood sugar episode, a TB patient could be reminded to take their daily antibiotic doses and a pregnant woman can request for Iron Folic tablets through a digital pharmacy when the supply starts running low.



This model of **anytime, anywhere care & anywhere provision of resources**, is being deployed by players like Google Fit, Apple Health, Samsung Health, Huawei Health, etc to gather user vitals, heartbeat, respiratory rate, SpO<sub>2</sub>, etc to provide on-demand access and tailored services.

This model could also tap lateral partnership opportunities in holistic care. With appropriate permissions, data analysed by a health system could feed into a menu planning app and generate meal plans, recipes and a grocery shopping list optimised to a consumer's weekly health and fitness goals.

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**Case Study:** Startup Cardiac Design Labs has developed a five-in-one wearable device that monitors a patient's vitals akin to an Intensive Care Unit. The product records information like non electrode ECG, cuffless blood pressure, respiration rate, body temperature and blood oxygen saturation level.

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### 11.4. Supporting Decision Making: Data Processing and Analytics

*Improved decision making through machine backed data analysis*

Emerging Technologies in medicine such as Artificial Intelligence (AI) relies on large quantities of data to train machines to diagnose, predict, or perform a complex medical task. In this way, patient data is leveraged to support clinicians in decision-making, bringing to the fore patterns in this data that were not discernible to a single clinician's eyes. It's uses have been well documented: electronic health record (EHR) systems have

used machine learning algorithms to derive data from text<sup>16</sup> and undertake predictive analysis to warn clinicians about high-risk conditions and co-morbidities<sup>17</sup>. This is in addition to guiding drug discovery<sup>18</sup> and more topically, allowing population-analysis for pandemic preparedness and response measures<sup>19</sup>.

CHCs are the backbone of the healthcare system in rural India. Each CHC is required to have a surgeon, physician, gynaecologist, and paediatrician as specialists serving the rural population. However, they are plagued by a severe shortage of specialists. As per the RHS 2019-20, “as on 31st March, 2020, out of the sanctioned posts, 68.4% of Surgeons, 56.1% of obstetricians & gynaecologists, 66.8% of physicians and 63.1% of paediatricians are vacant.” Given the huge gap of specialists, the clarion call has never been louder for technology at scale to support health care delivery in the country. The response has been hopeful, both from technology and emerging technologies. For example, Niramai is an AI-based breast cancer screening device that uses a non-invasive, low-cost solution based on heat-mapping for early detection of breast cancer. Its proven ability to detect breast cancer up to five years earlier than a mammography, reduced reliance on trained technicians, and the prioritisation of privacy of users has allowed it to be a promising solution to a critical public health crisis.<sup>20</sup> Wadhvani AI's smart-phone based anthropometry technology enables front-line health workers to accurately report baby weight, solving for incongruencies in field reported data which is tied to insufficient focus on and incorrect interventions for malnutrition on the field.

GE's Critical Care Suite allows radiologists to respond critically: after patients with pneumothorax are scanned with a device using the Critical Care Suite, the device directly alerts radiologists towards critical action.<sup>21</sup>

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<sup>16</sup> Bush, Jonathan. “[How AI Is Taking the Scut Work Out of Health Care.](#)” Harvard Business Review, March 5, 2018.

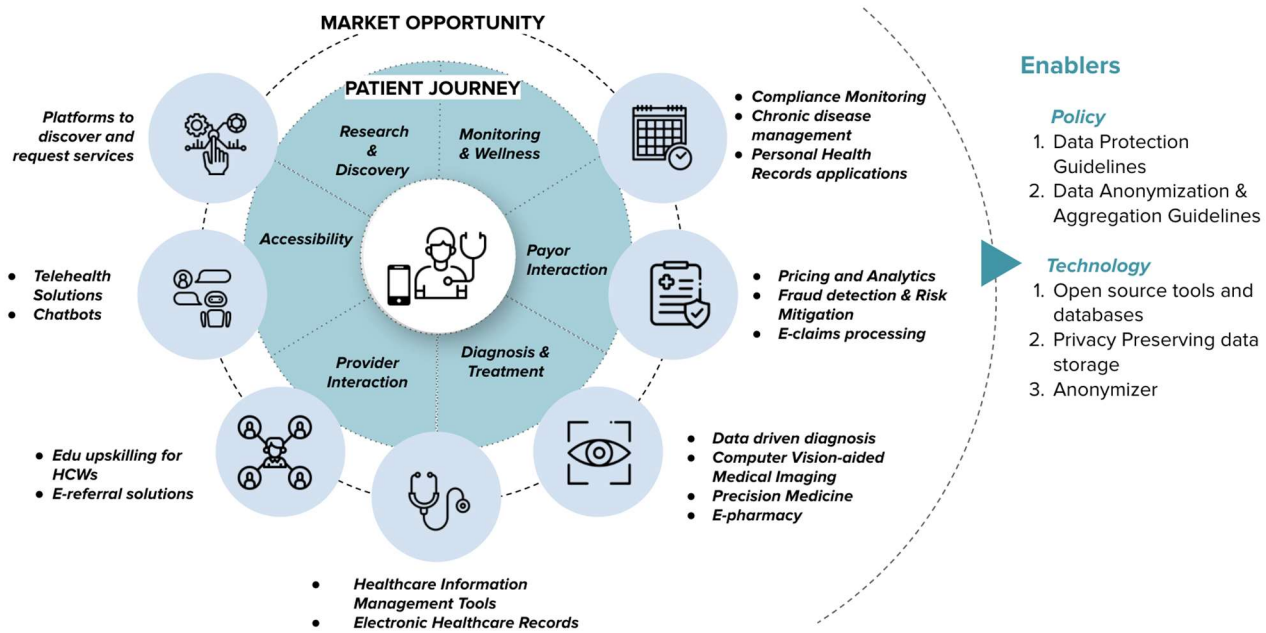
<sup>17</sup> Rajkomar, A., Oren, E., Chen, K. et al. [Scalable and accurate deep learning with electronic health records.](#) npj Digital Med 1, 18 (2018). <https://doi.org/10.1038/s41746-018-0029-1>

<sup>18</sup> Fleming, Nic. “How Artificial Intelligence Is Changing Drug Discovery Citation Metadata.” Nature (Vol. 557, Issue 7706), May 2018.

<sup>19</sup> Bora, Garima. “Qure.ai Can Detect Covid-19 Lung Infections in Less than a Minute, Help Triage Patients.” ET Online, April 30, 2020.

<sup>20</sup> Wadhvani Institute of Artificial Intelligence. “[AI-Powered Anthropometry.](#)”, n.d. Accessed May 14, 2020.

<sup>21</sup> “[FDA Clears GE Healthcare's Critical Care Suite Chest X-Ray AI.](#)” Imaging Technology News, September 12, 2019.



The evolving digital healthcare ecosystem offers new business opportunities and grounds for innovation for all. However, there are certain gaps that need to be plucked and the Government is stepping in through standardised registries (ABHA, HPR, HFR), protocols (UHI) and policy to accelerate this evolution.

## 12. Digitisation Roadmap for Stakeholders

To realise the overall vision, the following section attempts to outline a three phased roadmap for key stakeholders in the ecosystem. Considering that various stakeholders are at different points of their digital journey, appropriate enablers have been suggested for each, to enable them in realising benefits of the ABDM ecosystem. The roadmap comprises foundational targets for adoption, in a phased manner, along with benefits of digitisation. The targets for stakeholders are not necessarily sequential in nature and are parallel in nature.

### 12.1. Citizens

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>Onboarding of Citizens on to ABDM</b>	<ul style="list-style-type: none"> <li>- Creation of ABHA</li> <li>- Demand digital health services</li> </ul>	<ul style="list-style-type: none"> <li>- Maintain and share Longitudinal health records</li> <li>- Demand digital health services</li> </ul>	Demand digital health services

### 12.2. Healthcare Providers - Hospitals/Clinics

[Large hospital (more than 200 beds); Medium (50 - 200 beds); small (less than 50 beds) including Clinics, SC, HWC, PHC, CHC]

S.No	Target	Phase 1	Phase 2	Phase 3
1	<b>Provision of usage of ABHA number for all treatments</b>	Large Hospitals Medium Hospitals (Urban) Small Hospitals (Urban)	Medium Hospitals (Towns) Small Hospitals (Towns)	Small Hospitals (Rural)
2	<b>Creation and share of health records in digital formats via ABDM architecture for all treatments</b>	Large Hospitals Medium Hospitals (Urban) Small Hospitals (Urban)	Medium Hospitals (Towns) Small Hospitals (Towns)	Small Hospitals (Rural)
3	<b>Booking of services and enabling discoverability through UHI</b>	Large Hospitals Medium Hospitals (Urban) Small Hospitals (Urban)	Medium Hospitals (Towns) Small Hospitals (Towns)	Small Hospitals (Rural)
4	<b>Processing of health claims through HCX</b>	Large Hospitals	Medium Hospitals (Urban)	Medium Hospitals (others)



### 12.3. Labs/Diagnostics (Diagnostic chains > Hospital/Clinic labs > Standalone labs)

S.No	Targets	Phase 1	Phase 2	Phase 3
1	<b>Provision of usage of ABHA number for all registrations</b>	Diagnostic Chains Hospital/Clinic Labs Standalone Labs	Hospital/Clinic Labs Standalone Labs	Standalone Labs
2	<b>Booking of services and enabling discoverability through UHI</b>	Diagnostic Chains Hospital/Clinic Labs Standalone Labs	Hospital/Clinic Labs Standalone Labs	Standalone Labs
3	<b>Creation and share of health records in digital formats via ABDM architecture</b>	Diagnostic Chains Hospital/Clinic Labs Standalone Labs	Hospital/Clinic Labs Standalone Labs	Standalone Labs

### 12.4. Insurance Players

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>Provision of usage of ABHA number for all new policies</b>	Government Insurance Schemes Insurance Companies	Insurance Companies	
2.	<b>Use of HFR for Hospital Empanelment</b>	Government Insurance Schemes Insurance Companies	Government Insurance Schemes Insurance Companies	Insurance Companies
3.	<b>Integrate with HCX and electronic processing of claims via HCX</b>	Government Insurance Schemes Insurance Companies	Government Insurance Schemes Insurance Companies	Insurance Companies

### 12.5. State Governments

S.No.	Targets	Phase 1	Phase 2	Phase 3
1.	State government to drive adoption of digital health	State digitisation plan laying out Governance, Infrastructure , and Resources * Capacity Building of human resource in state	Basic healthcare profile of citizens/family profiles for creation and regular update of GHR * Capacity Building of human resource in state	Make available IT Infrastructure, open-source tools for consumption by low resource healthcare providers * Capacity Building of human resource in state

## 12.6. Government Healthcare Programmes/Welfare Schemes

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>Mandatory usage of ABHA for identification of all beneficiaries</b>	Central Govt. Programmes State Govt. Programmes	Central Govt. Programmes State Govt. Programmes	State Govt. Programmes
2.	<b>Creation and share of digital reports of all beneficiaries via the ABDM architecture for all health services</b>	Central Govt. Programmes State Govt. Programmes	Central Govt. Programmes State Govt. Programmes	State Govt. Programmes

## 12.7. Policy Makers (Union Government)

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>NHA to drive adoption through Policy Levers</b>	Financial Incentives Regulatory Levers	Financial Incentives Regulatory Levers	Regulatory Levers
2.	<b>Enhanced data gathering for healthcare insights</b>	Nudging integrators to adhere to FHIR Standards for structured clinical information exchange  Promoting exchange of data and metadata through ABDM architecture	Promoting exchange of data and metadata through ABDM architecture	Aggregated and Anonymized data for research purposes

## 12.8. Health Tech Players

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>Integration of digital health solution/product/devices with ABDM for creation and share of health records in digital formats</b>	Large Players Medium Players Small Players	Medium Players Small Players	Small Players
2.	<b>Technological and business model Innovations</b>	Large Players Medium Players Small Players	Large Players Medium Players Small Players	Large Players Medium Players Small Players






## 12.9 Pharmacies

(Pharmacy chains > Hospital/Clinic Pharmacy > Standalone Pharmacy)

S.No	Targets	Phase 1	Phase 2	Phase 3
1.	<b>Enabling discoverability of pharmacy and availability of drugs through UHI</b>	Pharmacy Chains Hospital/Clinic Pharmacy Standalone Pharmacy	Hospital/Clinic Pharmacy Standalone Pharmacy	Standalone Pharmacy
2.	<b>Ability to search for and identify a patient by their ABHA Number, and seek consent to view their prescription records.</b>	Pharmacy Chains Hospital/Clinic Pharmacy Standalone Pharmacy	Hospital/Clinic Pharmacy Standalone Pharmacy	Standalone Pharmacy
3.	<b>Upload Invoice against the prescription</b>	Pharmacy Chains Hospital/Clinic Pharmacy Standalone Pharmacy	Hospital/Clinic Pharmacy Standalone Pharmacy	Hospital/Clinic Pharmacy Standalone Pharmacy

### 13. Outcomes of digital healthcare delivery

Digitally driven healthcare delivery aims to create a seamless experience in the beneficiary's health-seeking journey as well as for supply side partners like the service provider, payor and health tech innovators. ABDM is envisioned to be the bridge between the central, state and private health services in the country. The immediate and long-term outcomes are dependent on the effective adoption of digital health initiatives by the stakeholders. The roadmap laid down in the previous section attempts to achieve the outcomes highlighted in the below section.

Outcomes	Description
 <p><b>Integrated ecosystem</b></p>	<ul style="list-style-type: none"> <li>● Interoperable data exchange across healthcare ecosystem</li> <li>● Citizen-centric health systems</li> <li>● Reduced operational workload on healthcare providers</li> </ul>
 <p><b>Informed decision making</b></p>	<ul style="list-style-type: none"> <li>● Actions and investment based on informed decisions</li> <li>● Interventions driven by comprehensive health history enabling continuum of care</li> <li>● Patients, providers and policy makers empowered to make health enabling choices</li> </ul>
 <p><b>Affordable healthcare</b></p>	<ul style="list-style-type: none"> <li>● Introduction of OPD Insurance and evolved Risk Sharing Structures thereby reducing out of pocket expenditure</li> <li>● Reduction in fraudulent transactions, unethical billing, double claims, and other healthcare insurance frauds</li> <li>● Shift from episodic care to preventive care resulting in lower future claims</li> <li>● Faster pay-outs enabled by e-claims processing</li> </ul>
 <p><b>Accessible services</b></p>	<ul style="list-style-type: none"> <li>● Enhanced provider discoverability. Competitive pricing will bring down the cost to patient</li> <li>● Specialised healthcare consultations available in remote and rural areas through teleconsultation</li> <li>● Integrated registries to support organ donation / blood donation</li> </ul>
 <p><b>Quality of care</b></p>	<ul style="list-style-type: none"> <li>● Access to longitudinal health records enabling improved diagnosis, treatment and continuum of care</li> <li>● Access to structured and clean data enabling software as medical devices aiding HPs in better and more efficient diagnosis</li> <li>● Verified and trusted healthcare professionals with international credibility</li> </ul>



## Foster innovation

- Competitive market leading to development of innovative, easy to use solutions that cater to user requirements
- Evolution of business models
- New opportunities for start-ups and employers

## Way Forward

*To transform the healthcare ecosystem of the country, health systems will have to adopt the new ways of delivering the health care. Universal Health Coverage is key to achieving the Sustainable Development Goals.*

The Ayushman Bharat Digital Mission represents a watershed moment in the journey towards Universal Health Coverage in India. The issuance of a unique ABHA is key to delivering more effective, intelligent, and efficient health interventions across the country. As the gateway to secure, citizen-centric Personal Health Records, the ABHA enables the democratisation of health data and helps erase disparities in outcomes while driving transparency, accountability and evidence-based decision making. Further, the ability to uniquely identify patients across interoperable systems presents myriad opportunities to the private sector, particularly insurers, to innovate (e.g., telemedicine, e-pharmacies, e-diagnostics) as well as operate more efficiently (e.g., paperless claims processing, reduced instances of fraud).

As the system matures, more immediate benefits for patients will emerge. The presence of an ABHA will erase friction in healthcare settings, streamlining the patient journey and bridging information gaps. The ability to reference a dynamic health history enables more informed diagnoses as well as the ability to monitor and course correct interventions with agility. Perhaps most significantly, the ABHA and its supporting ecosystem will return control of the personal health journey to the key actor - the patient. ABDM realises the opportunity at hand and has laid out principles and core blocks for building an open digital healthcare ecosystem that will shape India's digital healthcare journey. It is similar that the highway is ready where vehicles need to ply.

Developing a robust interconnected digital healthcare ecosystem will enable India to become a centre of digital excellence in healthcare globally. Along with establishing digital highways in healthcare delivery, the focus should be developing digital health records that are accepted globally and can be shared with disparate systems. A good starting point is to start by adherence to global data standards and laws governing data privacy and security. Covid vaccination certificate replaced the traditional paper cards and has gone on to become the digital health record with highest penetration. It is anchored on DIVOC which is a DPGA listed public good that enables countries to digitally orchestrate large scale vaccination and public health programs using open-source digital infrastructure.

To achieve the sustainable development goal of good health and well-being and close the equity gap, policymakers, governance bodies and institutions are heavily investing resources in digitization. It is evidently being incorporated in all national strategies, programs to improve the quality, cost and experience of care. Ayushman Bharat Digital Mission has also evolved over time, the rich learnings, experience and institutional

memory from implementation of the mission has enabled an in-depth understanding of technical requirements and grassroots level implementation challenges. These learnings must be effectively utilised to strategize and plan the future course of action in order to achieve the vision of an integrated digital health ecosystem in the nation.

A multi-faceted digital scheme of such magnitude requires participation of diverse stakeholders. The journey towards adoption requires a consensus-based approach. The learnings of every stakeholder must pave the way forward for digitisation of the health sector. A Joint Working group is to be formed which will drive the collective decision making over ABDM adoption. This group will constitute of representatives from Union Ministry of Health & Family Welfare, Union Ministry of Electronics and Information Technology, Union Ministry of Law and Justice, NITI Aayog, National Health Authority, National Medical Commission as well as representatives from some states, among others. The group will come up with the detailed plan for adoption for every stakeholder. The adoption document will act as a guidebook to digitization through ABDM for all the players. The group recommendation will provide the necessary impetus to the ecosystem to move towards a new paradigm with the required changes in the legal and regulatory framework.

The participation in ABDM from all the stakeholders in the healthcare ecosystem will ensure that the infrastructure created by ABDM is utilised to create multifold benefits for the entire healthcare ecosystem. ABDM will usher the entire healthcare ecosystem to become the service provider of 21st century India.

————— **END** —————



