



# **National Digital Health Mission (NDHM)**

*Draft Implementation Strategy*

**22<sup>nd</sup> March 2021**

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## Glossary of terms

<b>API</b>	Application Programming Interface
<b>EHR</b>	Electronic Health Record
<b>EMR</b>	Electronic Medical Record
<b>HIE</b>	Health Information Exchange
<b>HIP</b>	Health Information Provider
<b>HIU</b>	Health Information User
<b>ICMR</b>	Indian Council of Medical Research
<b>IndEA</b>	India Enterprise Architecture Framework
<b>KYC</b>	Know Your Customer
<b>MCI</b>	Medical Council of India
<b>MeitY</b>	Ministry of Electronics and Information Technology
<b>MoHFW</b>	Ministry of Health and Family Welfare
<b>NDHB</b>	National Digital Health Blueprint
<b>NDHM</b>	National Digital Health Mission
<b>NeGD</b>	National eGovernance Division
<b>NHA</b>	National Health Authority
<b>NHP</b>	National Health Policy
<b>PHR</b>	Personal Health Record
<b>RLS</b>	Record Locator Service
<b>POC</b>	Privacy Operations Centre
<b>SOC</b>	Security Operations Centre
<b>UHID</b>	Unique Health Identifier
<b>UIDAI</b>	Unique Identification Authority of India
<b>UTs</b>	Union Territory

## Disclaimer

The information contained in this document is being published to invite public and stakeholder opinion on the proposed NDHM implementation strategy in India. The purpose of this document is to provide interested stakeholders with information that may be useful to understand the proposed implementation plan for the roll-out of NDHM across India.

The information provided in this document is on a wide range of matters, some of which may depend upon the interpretation of the law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The NHA accepts no responsibility for the accuracy or otherwise of any interpretation or opinion on law expressed herein. The NHA, its employees and advisors, make no representation or warranty and shall have no liability to any person, under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, costs or expenses which may arise from or be incurred or suffered on account of anything contained in this document or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the document and any assessment, assumption, statement or information contained therein or deemed to form part of this Document.

## About NHA

### National Health Authority (NHA)



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" & has been entrusted with the role of designing strategy, building technological infrastructure and implementation of "National Digital Health Mission" to create a National Digital Health Eco-system. National Health Authority is the successor of the National Health Agency, which was functioning as a registered society since 23rd May 2018. NHA has been set-up to implement PM-JAY, as it is popularly known, at the national level. An attached office of the Ministry of Health and Family Welfare with full functional autonomy, NHA is governed by a Governing Board chaired by the Union Minister for Health and Family Welfare. It is headed by a Chief Executive Officer (CEO), an officer of the rank of Secretary to the Government of India, who manages its affairs. The CEO is the Ex-Office Member Secretary of the Governing Board. NHA is leading the implementation of the National Digital Health Mission (NDHM) in coordination with different ministries/departments of the Government of India, State Governments, and private sector/civil society organizations. Additional Chief Executive Officer (Addl. CEO) has been appointed as the "Mission Director" for National Digital Health Mission (NDHM).

## Introduction

### 1.1 ABOUT NDHM

**The National Digital Health Mission (NDHM) is a step in the right direction to revolutionize Indian Healthcare.**

The year 2020 was an impactful year globally, where countries and their health systems succumbed to the devastating impact of COVID 19. India also faced the impact of the pandemic. The launch of the NDHM is a welcome move during such a difficult and testing time. The mission is a historic event, as one of the game-changing policy initiatives launched in the 21st-century, which is set to revolutionize the efforts of the government in enhancing effective health service delivery and help realize its vision of providing health services and quality of care to every citizen. Based on the principles of health for all, inclusivity, accessibility, affordability, education, empowerment, wellness, portability, privacy, and security by design, the NDHM will act as the backbone necessary to create an integrated digital health ecosystem. It is expected to have far-reaching implications as an ambitious and humongous task of building state-of-the-art digital infrastructure in healthcare is initiated, and the foundations for a vibrant, open, and innovative ecosystem are laid.

### 1.2 BACKGROUND AND CONTEXT

These principles and objectives led to the **“Evolution of NDHM”**. Drawing upon the objectives of the Sustainable Development Goals of 2015, the foundation of NDHM was laid down in **2017, National Health Policy (NHP)** which outlined specific goals for the adoption of digital technologies, developing registries for facilities & providers, establishing a federated national health information architecture, metadata, data standards, and electronic health records. Soon after the NHP, in **2018 National Health Stack (NHS)**, a visionary digital framework, was announced which had a strong IT spine and deep understanding of the complex structures of the Indian healthcare system.



**Figure: Evolution of NDHM**

**In 2019, National Digital Health Blueprint (NDHB)** was released highlighting the implementation guidelines. It included specific details of the building blocks required to fulfill the vision of NHP, 2017. This blueprint was designed as a layered framework relating to digital health infrastructure, building blocks, standards & regulations, and an institutional framework for implementation.

Taking forward the NDHB, **the National Digital Health Mission (NDHM)** was launched by the Hon'ble Prime Minister on **15<sup>th</sup> August 2020**. NDHM focuses on the implementation of NDHB. It describes the broader context, rationale, scope, and implementation arrangements of a digital ecosystem for healthcare services across the country. The National Digital Health Mission will implement the digital building blocks required for healthcare and make them accessible as digital public goods for all.

To achieve this vision, the following key objectives will be achieved:

- Establish state-of-the-art digital health systems, and ensure secure exchange of core digital health data
- Establish registries including hospitals, clinical establishments, healthcare professionals, health workers, drugs and pharmacies
- Enforce adoption of open standards by NDHM stakeholders
- Create a system of continuous Health Records, based on international standards, which will be easily accessible to individuals, healthcare professionals and services providers, based on individual's consent
- Promote development of robust health application systems with a special focus on addressing the Sustainable Development Goals related to the health sector
- Adopt the best principles of cooperative federalism while working with the States and Union Territories for the realization of vision
- Encourage inclusion and active participation of healthcare institutions and professionals from the private sector in building NDHM

- Ensure national portability in the provision of health services
- Promote systems to aid health professionals in decision making
- Leverage health data analytics and medical research while ensuring complete adherence to privacy and consent rules under NDHM
- Help enhance governance at all levels leading to improvement in efficiency, effectiveness, and transparency of overall healthcare service delivery
- Leverage information systems existing in the health sector, by ensuring they conform to the defined standards and integrate with the proposed NDHM solution

### 1.3 NDHM GUIDING PRINCIPLES

The NDHM will be designed, developed, deployed and maintained by the Government in accordance with the guiding principles as laid out in NDHB. The NDHM guiding principles are as follows:

#### Business Principles

1. NDHM systems will be designed to be **inclusive** - Specialized systems will be designed to reach out to the “unconnected”, digitally illiterate, remote, hilly, and tribal areas.
2. NDHM will have a national footprint and will enable **seamless portability** across the country through a Health ID – Personal Health Identifier, with supporting blocks, including adoption of Health Information Standards will play a pivotal role in national portability.
3. The eco-system of NDHM will be built basis on the principle, “Think big, start small, scale fast” - NDHM will adopt a combination of strategies like taking a **minimalistic approach** for designing each building block, prioritizing and sequencing of the development/ launch of these blocks, and designing a technology architecture that can rapidly and agilely scale horizontally and vertically.

#### Technology Principles

1. All major legacy systems will be assessed for conformance to NDHB principles and leveraged to the extent feasible - Compliance of legacy systems to the Blueprint principles and **Agile IndEA principles** will be assessed through an appropriately designed assessment tool to evaluate the current conformance and effort required to integrate them with NDHM. Only those legacy systems that cross the bar will be allowed to operate within the eco-system. However, the useful data about healthcare providers, labs, patients available in the legacy applications will be leveraged and

utilized to the extent possible, leading to savings in time and effort in collecting such information again.

2. All the components, building blocks, registries, and artefacts of NDHM will be designed adopting a **minimalistic approach** - Easy, early, and collective adoption of the Blueprint by majority will be critical to its success. Hence every component of the Blueprint will be designed to be minimalistic.
3. NDHM will be developed by adopting **India Enterprise Architecture Framework (IndEA)** - The design of the building blocks of NDHM will adopt and conform to IndEA by default. All the design and development efforts will adopt the **Agile IndEA Framework notified by MeitY**.
4. All the building blocks and components of NDHM will conform to open standards, be interoperable and based on Open Source Software products and open source development - The policy on **Open Standards and Open Source Software**, notified by MeitY, Gol, will be adopted in designing of the building blocks and in all procurements. Interoperability will be inherent to all the building blocks.
5. **Federated Architecture** will be adopted in all aspects of NDHM - Only the identified Core Building Blocks will be developed and maintained centrally. All other building blocks will be designed to be operated in a federated model that factors regional, state-level and institution-level platforms and systems to function independently but in an interoperable manner.
6. NDHM will be an **Open API-based ecosystem** - All the building Blocks will be architected adopting the Open API Policy notified by MeitY, Gol and will share data as per standards as defined in NDHB. Security and Privacy will be built into the design and development of the APIs, which should be audited for security and privacy before deployment.
7. All the **registries and other master databases of NDHM** will be built as **Single Source of Truth** on different aspects and backed by strong data governance - Rigid validation processes will be applied to all mandatory 'fields', clear ownership and responsibilities will be defined for all core databases and strong, dedicated data governance structures will be established at the State and Central levels.

## 1.4 BUILDING BLOCKS - NDHB

As per the NDHB, a building block is a package of functionality defined to meet business needs. Building blocks operate with other building blocks, a good choice of building blocks will facilitate legacy system integration, improved interoperability, and flexibility in the creation of new systems and applications. Wherever interoperability is required, it is important that the interfaces to a building block are published and are reasonably stable. A building block is intentionally designed

to be cross-functional, allowing for its generic functionality to be applied in different contexts. Each building block shall have the following characteristics:

- Provide a standalone, useful, reusable and implementable capability in the health domain
- Cross-functional across the value chain by design
- Applicable to multiple use cases in healthcare
- Interoperable with other building blocks
- Use shared digital infrastructure (to the extent feasible)
- Standards-based
- Designed for scale

The business owner shall be responsible for defining the rules and policies essential to effectively manage the building block. Building Blocks shall interface with other building blocks using open APIs.

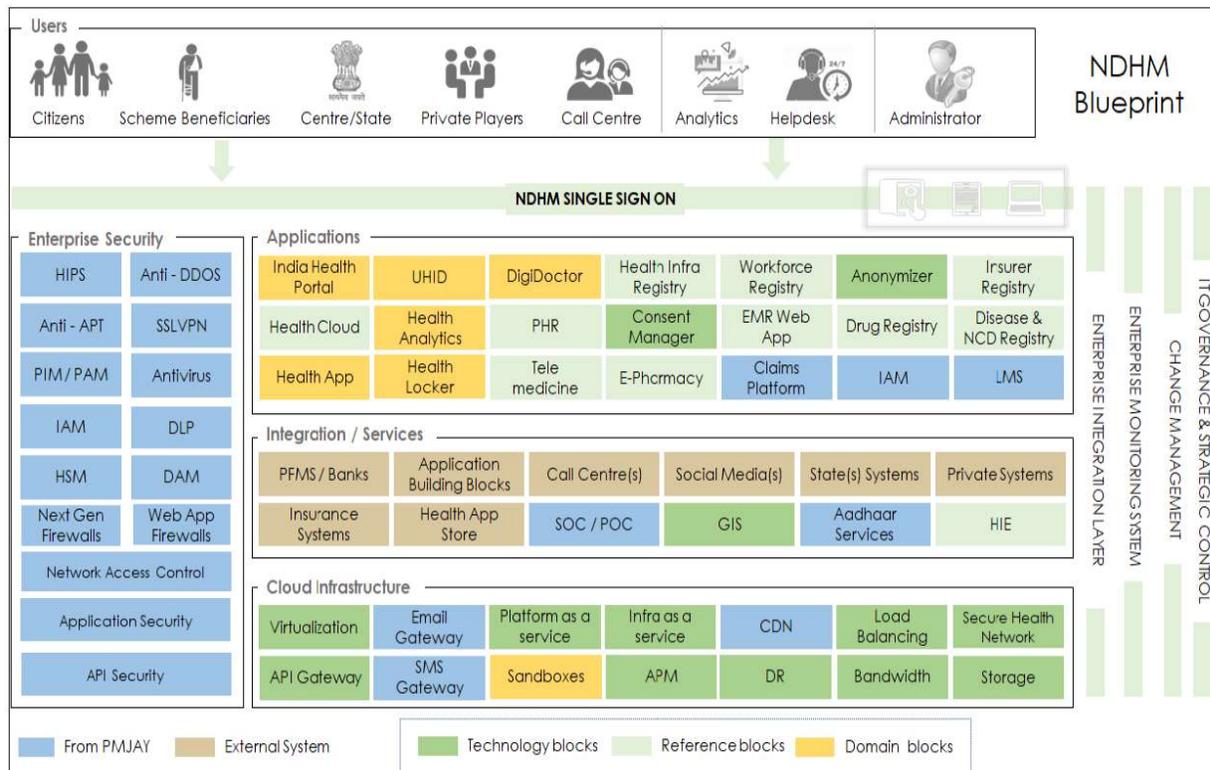


Figure: NDHM Blueprint

Based upon NDHM blueprint following building blocks have been designed to implement NDHM, the building blocks have been categorized in core and reference as follows:

**Core Building Blocks:** Application or components required by multiple applications and systems, where government sets the standards and has strategic control\* and monitoring.

\* Strategic Control: means owned/operated by the government or could be licensed to trusted third party.

**Reference Building blocks:** Frameworks or services or artefacts, that most stakeholders shall need to refer for designing, developing, and delivering their services, to be part of NDHE. These services are to be delivered by the eco-system and are areas where innovation is encouraged.

**Below is the list of Core and Reference Building Blocks:**

Core Building Blocks	Reference Building Blocks
<input type="checkbox"/> Health ID	<input type="checkbox"/> RLS (Record Locator Service )
<input type="checkbox"/> Health Facility Registry (HFR)	<input type="checkbox"/> Consent Manager
<input type="checkbox"/> Health Professionals Registry (HPR)	<input type="checkbox"/> EMR (Electronic Medical Record)
<input type="checkbox"/> SOC (Security Operation Centre)	<input type="checkbox"/> NDHM Health Record / PHR (Personal Health Record)
<input type="checkbox"/> POC (Privacy Operation Centre)	<input type="checkbox"/> HIE (Health Information Exchange)
<input type="checkbox"/> Standard API/ Master Data	<input type="checkbox"/> Health Locker
<input type="checkbox"/> Drug Registry	<input type="checkbox"/> Tele-Medicine
<input type="checkbox"/> Health Analytics	<input type="checkbox"/> Health App Store
<input type="checkbox"/> HDFR (Health Data Fiduciary Registry)	<input type="checkbox"/> Disease Registry
	<input type="checkbox"/> Anonymizer

**Infrastructure-** The set of additional building blocks which will act as facilitator and will support to core and reference block which is proposed to be developed.

**External Solutions-** The set of additional building blocks (solutions) which is expected to be developed by ecosystem participants using the open architecture developed by NDHM.

Infrastructure Building Blocks	External Solutions Building Blocks
<ul style="list-style-type: none"><li><input type="checkbox"/> Cloud Infrastructure</li><li><input type="checkbox"/> Network Security</li><li><input type="checkbox"/> Identity Access Management</li><li><input type="checkbox"/> Health Network connectivity</li><li><input type="checkbox"/> GIS/Visualization services</li><li><input type="checkbox"/> Access &amp; Delivery channels (Native India Health Portal)</li><li><input type="checkbox"/> Digital Infrastructure</li><li><input type="checkbox"/> IT infrastructure at the health facility</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Secure health networks</li><li><input type="checkbox"/> Wellness App</li><li><input type="checkbox"/> Offline Tools</li><li><input type="checkbox"/> ITSM</li><li><input type="checkbox"/> Social Media</li><li><input type="checkbox"/> Unified Health Communication Centre</li><li><input type="checkbox"/> Capacity Building</li><li><input type="checkbox"/> Change Management</li></ul>

**In the Pilot phase**, five building blocks have been conceptualized, designed, and implemented across 6 select Union Territories (UTs) as mentioned below:

- I. **Health ID.** It is used for the purposes of identifying individuals, authenticating them, and threading their health records (only with the informed and explicit consent of the individual) across multiple systems and stakeholders.



- II. **Digi Doctor / Healthcare Professional Registry:** The **Healthcare Professional Registry (HPR)** is a core building block and a verified dataset that aims to be a single, authoritative, digital source of healthcare professionals that can provide number of health care personnel that have either worked or are currently working at all tiers of government and private sector. It is a comprehensive registry of individuals engaged in the promotion, protection or improvement of population health. This includes both public and private sectors and different domains of health systems, such as curative and preventive care, nonpersonal public health interventions, disease prevention, health promotion services, research, management and support services.



III. **Health Facility Registry** is a repository of the health facilities in the country. It is centrally maintained, stored and facilitates exchange of standardized data of both public and private health facilities in the country. Health facilities can access their profile and update it periodically with specialties and services they offer. The registry also provides a secure common platform to the facilities to maintain all essential information.



Health Facility Registry (HFR)

IV. **NDHM Health Records / Personal Health Record (PHR)** is an electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual. The most salient feature of the PHR, and the one that distinguishes it from the EMR and EHR, is that the information it contains is under the control of the individual. The functions that are supported by a Personal Health Record (PHR) system are those that enable an individual to manage information about his or her healthcare. The principal users of these functions are expected to be individuals referenced as account holders; the patient or subject of care and healthcare providers will have access to certain functions to view, update or make corrections to their Personal Health Record.



NDHM  
Health Records

Every person who wishes to participate in the digital health ecosystem must start by getting a Health ID. Patients/ persons with smartphones are expected to self-enroll for the creation of a Health ID by downloading NDHM Health records/PHR application or on the official Health ID portal and subsequently citizens can use the NDHM Health records/PHR application to view their records and also manage their consents.

NDHM Health records/PHR app for the Pilot Phase is live on the google play store at the following URL:

[https://play.google.com/store/apps/details?id=in.ndhm.phr&hl=en\\_IN&qI=US](https://play.google.com/store/apps/details?id=in.ndhm.phr&hl=en_IN&qI=US)

V. **Electronic Medical Record (EMR) Web Application** is a reference building block and is a digital version of a patient's chart. It contains the patient's medical and treatment history from a SINGLE health facility. EMRs allows clinicians to track data over time, easily identify which patients are due for preventive screenings or checkups, check how their patients are doing on certain parameters—such as blood pressure readings or vaccinations, monitor and improve



Electronic Medical Records (EMR)

overall quality of care within the practice. The general approach is to create a web application which operates on a set of standards like the data construct, interoperability standards and standard medical terminologies. The EMR envisages to be the comprehensive view of the patients Health Information at a given facility.

**Additionally, a Sandbox environment**, it is a framework that allows technologies or products to be tested in the contained environment in compliance with NDHM standards. This will help entities intending to be a part of NDHE to become a Health Information Provider or Health Information User or efficiently link with building blocks of NDHM. The environment allows both alpha as well as beta testing of the products.

**The other Building Blocks envisaged are:**

- VI. **Health Data Fiduciary Registry:** Data fiduciary” means any person, including the State, a company, any juristic entity or any individual who alone, or in conjunction with others, determines the purpose and means of processing of personal data. For the purpose of this Policy, data fiduciaries would include Health Information Providers and Health Information Users if such entities are determining the purpose and means of processing of personal data. Health data fiduciary registry will be meant to collate and develop a database containing details of all such entities in the National digital health ecosystem. The registry shall be bind by all rules and obligation mentioned in health data management policy, PDP bill and HIP HIU policy.
  
- VII. **Health Information Exchange (HIE):** All actors in the health ecosystem would in some way or the other be generating or accessing health information, using one or more access applications. The exchange of information needs to be enabled as real-time data exchange by implementation of Open APIs and other data exchange mechanisms. From a flow perspective, each access application, to submit or retrieve/ access any information from/ via the NDHM ecosystem, needs to be registered with the Health Information Exchange (HIE). The HIE would be responsible for authentication and authorization of all data exchange requests and, if authorized, for routing the request to the providing applications. The design of this component shall support implementation of multi-channel solutions by participating applications, to ensure cross channel capabilities and a seamless user experience and for enabling an open market ecosystem.

The purpose of a Health Information Exchange (HIE) shall be to enable the creation of an interoperable Health Record for each individual by connecting the information contained in various organizations across the entire continuum of care. Through the interoperability provided by the HIE, the same organizations that contributed health information shall access a longitudinal or community view of a patient’s health record resulting in improved quality and patient safety, reduced costs, and evidence-based care.

- VIII. **Consent Manager:** Health records are personal data for an individual and every access to each record requires consent of an individual. The electronic consent framework specifications notified by MeitY shall be used in all aspects relating to the information processing requirement. The goal of consent management framework and consent manager shall be to ensure that citizens /patient data is in complete control of what data is collected and how/whom it is shared and for what purpose and how it is processed. Consent shall be obtained at the primary source of its capture and retention, mostly at the facility level, before collection of data and before its processing and /or sharing. However, not all facilities may have the infrastructure and capacity to handle this task efficiently hence it is proposed to have “consent as a service” at state layer.
- IX. **Record Locator Service:** The Record Locator Service (RLS) shall provide the ability to identify where records are located based upon criteria such as a Person ID and/or record data type, as well as providing functionality for the ongoing maintenance of this location information
- X. **Anonymizer:** COTS product of anonymizer shall be used for anonymization services.
- XI. **APIs/ Master Data:** Building Blocks shall be implemented using workflows-based modules and must interface with other building blocks using open API’s.
- XII. **Drug Registry** is envisaged to help smoothen the inventory flow throughout the drug supply chain, improving the quality and patient trust (by reducing counterfeits) and ultimately enable patient-centric digitization (e.g. Clinical Decision Support System, telemedicine, etc.) by ensuring machine readability of prescribed drugs. It will improve patient care and increase digitization in the healthcare ecosystem. Initially, the goal is to comprehensively capture relevant & accurate details of all drugs sold in India (Drug Database).

- XIII. **Disease Registry:** A disease registry is a special database that contains information about people diagnosed with a specific type of disease. There are broadly classified into two types: Hospital based & Population based.  
Primary purpose of hospital-based registries is to contribute to patient care by providing readily accessible information on the patients, the treatment received and its results.
- XIV. **Health Locker** is a standards-based interoperability specification that can be implemented by multiple players to enable the creation of an Electronic Health Record ecosystem. When a medical record needs to be issued, only a reference link shall be shared with the locker ecosystem. Small clinics / hospitals are expected to subscribe to the authorized repository providers who can integrate with the Health Locker to be able to participate in this ecosystem. The health lockers would enable creation of a longitudinal health record from the various links it stores. The Health Locker system shall enable processing the requests for correction of health data and also for the citizen to exercise his/her 'right to be forgotten', i.e., the right to restrict or prevent continuing disclosure of personal data by a data fiduciary related to the data principal where such disclosure (a) has served the purpose for which it was made and is no longer necessary; or (b) was made on the basis of a consent which has since been withdrawn.
- XV. **Health Analytics** has the objective of providing decision support to the stakeholders by analyzing the aggregated anonymized data. The design shall ensure that analytics data is created / collected at source when the medical record is being prepared to be issued to the EHR. The benefit of having Health Analytics in NDHM will help in maintaining the quality. Health Analytics integrated with building blocks but not limited to EMR, HMIS, EHR, PHI/ UHI will provide better Quality of Care, Data Quality, Policy Support, Wellness, Public Health.
- XVI. **Tele-Medicine:** NDHM envisage to provide healthcare services in remote, inaccessible, "unconnected", hilly, and tribal areas through tele-medicine as doctor-population ratio is poor in these areas. Tele-medicine will offer patients to seek teleconsultation through any NDHM compatible applications of their own choice or in an assisted care setting such as Health and Wellness Centers (HWCs) across the country.

- XVII. **Health App Store** will be a platform like Google Play Store or Apple App Store where all the Core and Reference applications developed by the NDHM will be uploaded for stakeholders to download and use it to get themselves integrated into NDHE.
- XVIII. **Security Operations Centre (SOC):** SOC will be a core building block under NDHM with following objectives kept in consideration while designing a Security Operation center which is given as under:
- SOC to help in detecting, Analyze, respond to, report on, and prevent cyber security incidents
  - Prevent, detect, access, and respond to cybersecurity threats and assess as well as fulfill regulatory compliance set by all stakeholders in healthcare ecosystem
  - To monitor and detect any cyber-attack using advanced and integrated technologies
  - Centralized collection and correlation of log data and relevant applications and devices in the network and respond to anomalous behavior
  - Log data identification- intrusion detection system, firewalls, web applications, active directory servers, and anti virous software's
- XIX. **Privacy Operations Centre (POC):** A POC is a core building block with following objectives kept in consideration while designing a Privacy Operation center which is given as under:
- Establish a Privacy Operations Centre (POC) for NDHM 2.0 to help drive compliance on the privacy requirements. The POC will monitor all access to private data, review consent artefacts, audit services for privacy compliance, and evangelize the privacy principles
  - A framework shall be built for a privacy operations center which will enable the protection of personal information of Indian and Indian International citizen by enforcing effective consent management and ensuring non-repudiation. This framework shall be adopted for any type of data; however, the primary focus of this framework shall be to deal with individual's (data subject) healthcare data.
  - The Data might get shared between entities or with central authorities, however that kind of transfer might not be organized nor protected by privacy norms. At the same time, there are entities such as government departments (state or central), individuals, private organizations or even law enforcement agencies which can consume the data without the consent of the data subject. In fact, in current state,

such data consumption is not informed to data subject nor such transactions are recorded which has privacy consequences and violates the fundamental rights of the data subject.

### **Additional core and reference building blocks derived from NDHB:**

#### **Infrastructure Building Blocks:**

The set of additional infrastructure building blocks which will act as facilitator and will support to core and reference block which is proposed to be developed:

- I. **Cloud Infrastructure:** Cloud setup for providing space to registries and system of records.
- II. **Network Security:** Set of rules and configurations designed to protect the integrity, confidentiality and accessibility of Health networks, participating stakeholders and data using both software and hardware technologies.
- III. **Identity Access Management:** Health application must be able to verify the identity of a HIP/HIUs, allow them access to records that they have been authorized for.
- IV. **GIS/Visualization Services:** This will take data sets from the health analytics system and produce outputs that can be consumed by the application layers. The GIS services will help in regional/state level planning and monitoring of health services. As public good, it will be readily available to all (with due identification, authentication, and authorization).
- V. **Digital Infrastructure:** Provides a strong platform for establishing the building blocks of NDHM. The existing ability to digitally identify people, doctors, and health facilities, facilitate electronic signatures, ensure non repudiable contracts, make paperless payments, securely store digital records, and contact people provide opportunities to streamline healthcare information through digital management.
- VI. **Secure Health Networks:** Wherever access to sensitive or aggregated data is involved, secure connectivity will be used for apps having low latency, high bandwidth network systems will be specially designed.
- VII. **IT infrastructure at the health facility:** The basic infrastructure which is required to be defined that is essential to plug in ecosystem.
- VIII. **Access and delivery channel:** The web interfaces that would be linked to ecosystem to increase access to citizen and stakeholders.

### **External Solutions Building Blocks:**

The set of additional external solutions building blocks which will act as facilitator and will support to core and reference block which is proposed to be developed:

- IX. **Wellness App:** A wide range of Apps shall be built by open market, including Start-ups and existing Health IT companies of all scales besides Government organizations. The end user thus shall have the choice of selecting the app that suits their needs best.
- X. **Offline Tools:** tools use to build business continuity plan and process flow in absence of internet connectivity.
- XI. **Information technology support management:** A organization to support the IT related queries and problem tickets to be addressed within NDHM
- XII. **Social Media:** For emergency management, health awareness / education and community-based services like Blood / Organ Donations.
- XIII. **Unified Health Communication Centre:** The goal of the Unified Health Communication Centre shall be to provide a single point of contact to manage public health emergencies. The UHCC shall consists of a response team and shall also have the ability to constantly monitor disease surveillance and outbreak response. The large amounts of health data coming into the NDHB shall be used to monitor for various diseases working closely with the existing programs of MoHFW and the states. The UHCC consuming information from all other components (internal as well as external), will run analytics on that information and generate alerts and visualizations as required. It shall also deploy artificial intelligence and machine learning technologies.
- XIV. **Capacity Building:** NDHB proposes a fairly complex system that shall be realized through high quality expertise flowing into the Architecture, Design and Development phases, not merely with NDHM organization but across all stakeholder organizations, in a concerted and coordinated way. This shall require a carefully designed Capacity Building Plan to be undertaken widely.
- XV. **Change Management:** Signification changes would be called for in the existing processes and systems and in the mind-set of the people currently managing the same, a highly professional approach is needed in the area of Change Management.

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## Project Roll-out and Implementation Strategy

Pilot Phase - The pilot project was initiated by developing five building blocks. These NDHM building blocks have been developed and rolled-out in Union Territories (UTs) as a part of the pilot program. NDHM has initiated technological platforms and building capacities of the stakeholders in the selected Union Territories. The technological platforms and building capacities form the basis of the five building blocks namely i.e. Health ID, Health Professional Registry, Healthcare Facility Registry, NDHM Health records/PHR and Electronic Medical Record (EMR) Web Application. The strategy for implementation of NDHM shall be based on the following two approaches:

- Technology / Solution roll-out strategy
- Adoption Strategy

Development of the building blocks - A Managed Service Provider (MSP) will be on-boarded for transition, enhancement and development of the building blocks. After the completion of the enhancement of existing building blocks (rolled-out in pilot phase), development of other blocks will take place. Post that, complete solution will be implemented in UTs and State(s) wherever NDHM solutions has been initiated, there after the focus will be on development of other building blocks, which will be rolled-out across the nation.

### 2.1 TECHNOLOGY / SOLUTION ROLL-OUT STRATEGY

The Technology / Solution roll-out strategy shall include the following steps:

- On boarding of Managed Service Provider (MSP) and transition of existing building blocks and their development.
- Enhancement of existing building blocks by Managed Service Provider (MSP).
- Development of all remaining building blocks with integration to NDHM ecosystem and go live after acceptance.

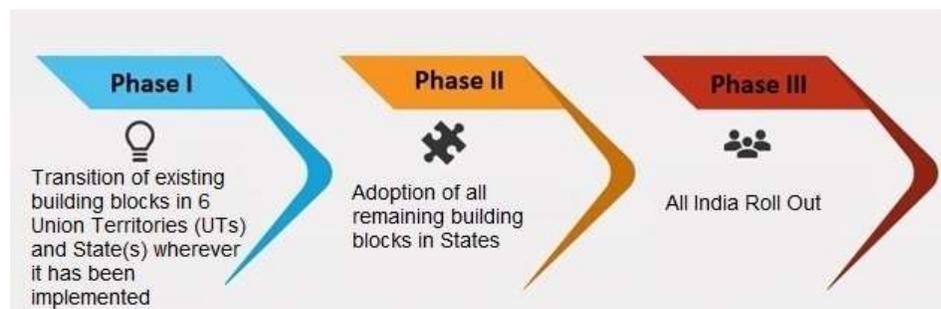
The on-boarded Managed Service Provider (MSP) shall transition the current five Building Blocks (Health ID, Digi-Doctor, Healthcare Facility Registry, NDHM Health records/PHR and Electronic Medical Record (EMR) Web Application) on to the technological platform being adopted for all the Building Blocks. Post completion of existing building blocks, MSP will further develop the other remaining building blocks. With the development completion, field testing of the product at the field level, will be initiated in select public and private institutions already onboarded in the NDHM ecosystem, as required. Building Blocks will be deployed only after requisite performance and security testing in compliance with the norms. The following steps shall be taken:

- **Transition/takeover of existing solution:** Enhancement of the existing solutions to be equipped with standards and technology and enable them to connect with other building blocks will be developed.
- **Development & roll out** of the remaining building block solutions such as HIE, RLS, Consent Manager, etc.
- **Establishment of** repository of standards, API's, metadata and data dictionaries.

- **Design and notification of Framework** for value-added services, e.g. Tele-Medicine, EMR, etc.

## 2.2 ADOPTION ROLL-OUT STRATEGY

The adoption roll-out strategy shall be divided into 3 phases:



**Figure: Roll Out Plan Pictorial Diagram**

### **Phase I: Transition of existing building blocks in 6 Union Territories (UTs) and State(s) wherever it has been implemented**

The current five Building Blocks (Health ID, Digi-Doctor, Healthcare Facility Registry, NDHM Health records/PHR and Electronic Medical Record (EMR) Web Application) shall be transitioned by the Managed Service Provider (MSP).

- **Transition of existing building blocks** of the pilot phase shall be of:
  - i. Health ID
  - ii. Digi-Doctor
  - iii. Healthcare Facility Registry
  - iv. NDHM Health records
  - v. Electronic Medical Record (EMR) Web Application
- Implementation of the 5 building blocks to be completed, in the following UTs and State(s) wherever it has been initiated:
  - i. Andaman & Nicobar Islands
  - ii. Chandigarh
  - iii. Dadra & Nagar Haveli and Daman & Diu
  - iv. Lakshadweep
  - v. Ladakh
  - vi. Puducherry

Subsequently, the transition, enhancement, and additional building blocks will be initiated in a time-bound manner across the above mentioned UTs and State(s) wherever it has been implemented, and parallel emphasis shall be continued on the following core objective:

- a) Adoption of the platforms by stakeholders and users, e.g. voluntarily Health IDs creation for all individuals, and linking of health records in the NDHM Health records/PHR app. The NDHM Health records/PHR app is being called as “NDHM Health Records”, which is available on the Google Play store.
- b) The capacity building & empowerment of all willing healthcare stakeholders in the UTs and State(s) wherever it has been implemented will be taken care off to make sure there is maximum usage of the NDHM components.

## **Phase II - Adoption of all remaining building blocks in States:**

The NDHM Building Blocks already developed and rolled-out in Union Territories (UTs) and State(s) wherever it is implemented, will be expanded to other States. NDHM will facilitate implementation of technological platforms and capacity building of the stakeholders in these States.

States will have the flexibility to adopt their implementation approach based on factors such as their demographics, terrain, connectivity, infrastructure readiness, digital literacy, and thereafter integrate their public health service programs with NDHM to ensure ease of access for beneficiaries across States.

NDHM will expand work done in UTs and State(s) wherever it has been implemented as defined below.

- a) NDHM may have a dedicated team to work on the on boarding of States, and each State may identify team for rolling out and managing NDHM at the State level.
- b) Senior-level consultation may be done with the States, with a request to State Authorities for a dedicated team set-up for integration, on-boarding and roll-out of NDHM in the concerned State.
- c) States Authorities may assume primary leadership role in the implementation of NDHM in their States and NDHM may play a facilitatory role.
- d) A State-specific approach for roll-out may be proposed to be prepared, keeping in mind the context, needs, opportunities and constraints highlighted by the State. This may include implementation strategy and integration/roll-out timeline in the State.
- e) The State(s) will be free to choose the set of healthcare institutions and schemes that they intend to integrate in a phased manner. However, the overall period for complete on-boarding and roll-out may be pre-defined.
- f) Each State’s performance pertaining to on-boarding and usage may be monitored.
- g) NDHM may work extensively and assist the State Authorities, for specialists required for smooth implementation, team building, capacity building and enabling quicker, more efficient, and effective roll-out of the Mission.
- h) NDHM may encourage State Authorities to leverage State related health schemes to integrate with NDHM ecosystem (in addition to the Centrally Sponsored Schemes).

### **Phase III - All India Roll Out:**

The Phase III of implementation will largely be emphasized on the operation and maintenance (O&M) of the building blocks, while based upon stakeholders' feedback the implementation change request and enhancement in the applications may be considered.

However, the activity of capacity building of the respective stakeholders may be spread across phases, a structured approach for the purpose will be provided as explained in the training approach section.

## **2.3 INFORMATION, EDUCATION AND COMMUNICATION (IEC)**

To conduct IEC for NDHM solution, following steps are proposed to be taken for quick adoption of the National Digital Health Solution by various stakeholders:

1. To Conduct workshops with health facilities for creating awareness about NDHM solutions.
2. Alliance with NGOs and development partners who are part of healthcare programs to drive the awareness campaign as part of other health implementation program.
3. Awareness and Training workshops: Train ASHA & Angadwadi workers to create awareness as they cater to ground level beneficiaries under various programs.
4. Perform campaigns for Doctors, Health facility providers, nurses and other stakeholders etc. to inform launch of NDHM solution and its relevant effect on the stakeholders.
5. Promotion at public places, govt. and private hospitals to create awareness about NDHM solutions.

## **2.4 BENEFITS FOR STAKEHOLDERS**

The below mentioned benefits are designed to motivate and encourage healthcare providers/institutions to perform well and improve their outcomes. The benefits are designed to address business and social interest of respective stakeholders like healthcare facilities, professionals, regulators, insurance companies, State/UT governments, health tech companies, etc.

The below mentioned benefits are categorized based on the critical benefits which will be important in driving early adoption and other benefits which will require system maturity but would be essential as well. These benefits for the different stakeholders will come together to spiral a virtuous cycle.

NDHM may benefit the following stakeholders:

### 1. Individual:



#### Critical Benefits

- Digi Health locker storage- data storage space for every citizen to store their health records.
- Exchange of health records between healthcare professionals and patients and even among multiple health facilities.
- Patients can store their health records in the NDHM Health records/PHR app using their Health ID.
- Discoverability of doctor/facility to an individual – Individual can be able to browse a healthcare professional based on the specialty/facility and vice-versa for seeking appointment.
- Health point (credits) may be provided to individuals which can be utilized to avail partnered health services with NDHM.

#### Other Benefits

- Health ID once integrated with other public programmes may allow the patient to seek benefits from such schemes.
- Teleconsultation between patients and healthcare professionals- access to list of doctors providing teleconsultation service with time slots on the basis of location/facility. A patient may be able to receive *e-prescription via SMS/notification*.

### 2. Healthcare Professionals:



#### Doctors

One of the biggest challenges faced by doctors is in license renewal, as well as NOC issuance. Further, many doctors after post-graduation get registered in another council, without taking NOC and transfer of existing registration. This leads to duplication of records across the ecosystem. Doctors/standalone clinics struggle for the number of patients, global standards, drug registries, disease registries. Access to patient records to help in making clinical decisions.

#### Critical Benefits

Adoption by doctors may involve: -

- **Improved verification process**
  - Online registration renewal

- NOC issuance
- CME credits tracking
- **Online Presence & Discoverability-** Ease of discovery, verified doctor profiles with doctor timings, presence on a national platform and seeding in search engine results.
- **Teleconsultations-** Access to more patients and easier follow ups via teleconsultation (subject to regulatory approval).
- **Digital Records Storage (through Digi-Locker integration)** – Doctors may pull/ store records for verification/display
  - Registration certificate
  - Degree
  - Healthcare Professional ID
- **Professional History** – Doctors may be able to display their professional work history/journey in their profiles instilling higher trust amongst individuals.
- Provision of star rating to healthcare professionals may be provided by patients.

#### Other Benefits

- **Provision of additional services and facilities to doctors** may be provided–
  - Verified data attributes to insurance agencies, enabling faster issuance of indemnity insurance.
  - Enabling doctors to be involved in Government programs and schemes, research studies as well as any other entity which requires access to verified doctors.
- **Value addition / Profile share features** – Doctors profile may be shareable using social media share options, provision of custom URL for each profile.
- **APIs for applications and partners** to enable faster onboarding of users from existing applications.
- **Recognition of doctors** when they contribute a substantial record in EMR application, a number of EMR records may be decided by NHA.

#### **Other Health Professionals (Nurses, etc.)**

Similar to doctors, other healthcare professionals may also get benefit from NDHM as follows :-

#### Critical Benefits

- **Improved verification process**
  - Online registration renewal
  - NOC issuance
- **Online Presence & Discoverability-** Any entity requiring the verification of credentials of health professionals.

### Other Benefits

- **Professional History** – This may enable faster verification during job applications.
- **APIs for applications and partners** may enable faster onboarding of users from existing applications.
- Digital Records Storage (through Digi-Locker integration).

### 3. Health Facilities:

 The challenges faced by providers usually revolve around multiple applications for license and certification to different entities, applications with insurance agencies / government programs and schemes empanelment, as well as accreditation. Solving this and benefiting the other major area of increasing footfall in the health facilities are important aspects.

### Critical Benefits

Adoption by health facilities may involve: -

- **Online Presence & Discoverability**- Ease of discovery, verified health facility profiles with location, timings, presence on a national platform and seeding in search engine results.
- **Teleconsultations**- Access to more patients and easier follow ups via teleconsultation (subject to regulatory approval).
- **Ease of doing business (Insurance, licensing and certification)** – Provision of a model where facilities may apply to/ empanel with insurance agencies, TPAs, licensing and certification bodies like PCPNDT, AERB, Bio-medical waste agencies, shop & establishment registration etc.
- **Empanelment with Government programs and schemes like AB PMJAY, CGHS, ECHS etc.** which leads to increase in the base that may avail services at the health facility.
- **Provision of Digital Health Records and Prescriptions** - The registry may enable provision of e-signed health records and digital prescriptions. This may aid citizens, doctors and facilities as longitudinal health history can prevent errors in treatment.
- Small hospitals and nursing home may be provided services such as e-pharmacy, tele-medicine, EMR applications etc. to digitize their services. Furthermore, NDHM may ask in return to treat individuals who fall under Below Poverty Line (BPL) category.

### Other Benefits

- **Value addition / Profile share features** – Facility profile may be shareable using social media share options, provision of custom URL for each profile.

- **Access to doctors** – Verified health facilities may be able to attract specialists and other doctors, especially in rural regions due to increased discoverability. Further, existing facilities may be able to make redundant capacity available for usage to verified health professionals/Facilities.
- **Access to research** – Verified health facilities may collaborate with pharmaceutical companies, clinical research organizations in due course through consented access.
- **APIs for applications and partners** may enable faster onboarding of users from existing applications.
- **Recognition to health facilities** if they are actively using the EMR for creating medical records.
- **Seeding of Facility ID**
  - in Government programs & schemes like AB PMJAY, NIN, NIKSHAY, CGHS, ECHS, ESIC.
  - during insurance empanelment and renewal – IRDAI.
  - Other agencies – like Bio-medical waste, AERB, PCPNDT.
  - Shop & Establishment / CEA registration and renewal.
  - All pharmacy invoices may have Facility ID / Healthcare Professional ID.
  - in any applications / results by research agencies,
  - during any update of application with MCA, as well as any other government authority,
- Health Analytics/Newsletter can be provided to stakeholders such as diagnostic labs, hospitals that could be useful to be up to date about the disease(s) etc. to strategize better business.
- NHA certificate can be provided to facilities adopting NDHM.

#### 4. Allied Private Entities:

##### Insurers and Third-Party Administrators



##### Critical Benefits

- The Health ID in subsequent phases may act as link between the TPAs and Providers for easy tracking of patient's health procedure to claim benefits from the TPA/Insurer.
- Digitized application in standardized machine-readable format, common, industry compliant/cross department acceptance.
- Strongly verified data leading to lower costs and processing time for verification.

### Other Benefits

- Ease in issuance of insurance to health professionals.
- Periodic update of information.
- Lower barrier to uptake leading to increased applications and stronger insurance networks.
- Linkages to other building blocks may help to expedite e-claims process.

### Health Tech Companies

#### Critical Benefits

- May be able to leverage the NDHE to innovate and provide new healthcare services to all stakeholders including individuals, healthcare professionals, providers, etc.
- Access to verified health professionals leading to easier onboarding.
- It may enable citizens to access various app which have been approved in NDHM leading to an increase userbase.

## 5. Government and Regulators:



#### Critical Benefits

- Planning – With the data from Health ID generated, the government may plan and deliver several schemes and initiatives that cater to the people who may have opted to be part of NDHM
- Monitoring – The Government may access anonymized data to track disease prevalence or pandemics within the country
- Simplification / Digitization of process for resource planning, planning for new colleges, updated resource database across the country
- Program Implementation: May assist government programs and flagship schemes, resource deployment based on patient load and case burden etc.
- Updating existing databases such as program specific initiatives such as NIKSHAY, NRTS, ANMOL etc.
- Government may set up infrastructure, identify human resources requirement and plan accordingly

The stakeholder’s benefits as proposed above are interconnected, for example, an individual who has adopted NDHM will be having all their medical records and can share information to healthcare facilities and providers. Facilities and healthcare providers will be able to provide teleconsulting, e-prescriptions, etc. services to the patient and submit claims to the insurance companies. Insurance companies will be able to streamline claim process workflows, reduce TAT & cost.

## 2.5 TRAINING APPROACH

NDHM Building Blocks are expected to be user-friendly and simple to use so that citizens can access them without any extensive training. However, some minimum training will be required for healthcare professionals, administrators, and other such users to able to use the building blocks with ease.

The purpose of this section is to define the training and capacity building which may be implemented with **State Authorities**. A detailed training strategy and methodology program is proposed for training NDHM stakeholders. Following a Cascading Training Model, the expectation is to provide training to identified stakeholders and staff who shall be considered as master trainers. An appropriate training strategy coupled with tailormade training/course material shall be prepared for the identified master trainers. Necessary training manuals, system user manuals will be provided as part of the training material.

The section below outlines the training strategy that NDHM may adopt:

- **Training Strategy**

The training may be delivered in instructor-led workshops and conducted based on pre-approved business scenarios and use-cases. Trainers may also have hands-on experience with the new application.

### Training Types

The training program may be designed to be of the following types:

Type of Training	Description
Basic Training	<ul style="list-style-type: none"><li>• Introductory training may be regularly scheduled to address the announcements of new initiatives, mandates, guidelines.</li><li>• This may focus on the overall run-through of the basic elementary processes pertaining to the NDHM ecosystem. It may cover the elementary specifics and basic introduction of the respective building blocks to provide basic exposure to the users.</li></ul>
Advanced Training	<ul style="list-style-type: none"><li>• This program may detail out the advanced and detailed functionalities and use cases about the NDHM ecosystem. The advanced training may be extensive in terms of detailing and complexity of presented topics along with the expected audience</li></ul>

	<p>domain expertise to ensure the needed comprehension of the discussed material.</p> <ul style="list-style-type: none"> <li>• Workshops conducted to deliver specific knowledge to a group of audiences. These workshops could mainly target system training and act as an extension of basic training.</li> <li>• Batch capacity may be decided based on the venue as well as the stakeholder representation size that includes Hospitals, NHA Staff, State Health Agencies, etc.</li> </ul>
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Type of Training	Description
<b>Functional Training</b>	<ul style="list-style-type: none"> <li>• Functional specialists may be assigned to conduct functional training and share information pertaining to workflows and processes for end-users thereby ensuring that the users may use the NDHM building blocks efficiently, based on the functional role and responsibilities</li> <li>• Multi-level training courses may be developed to support the different backgrounds and capacities of NDHM participant trainees. The sessions will be provided in phases to <b><i>all relevant stakeholders.</i></b></li> </ul>
<b>Technical Training</b>	<ul style="list-style-type: none"> <li>• A team of subject matter experts may be responsible for delivering the NDHM Building Blocks technical training to enable the stakeholders including IT staff to perform the needed integrations for successful onboarding.</li> <li>• Technical training may be provided for the helpdesk &amp; other technical support groups</li> <li>• Multi-level training courses may be developed to support the different backgrounds and capacities of NDHM participant trainees. The sessions will be coded according to the level of current understanding and provided in phases <b><i>to relevant stakeholders.</i></b></li> </ul>

**Based on the mode of Training:**

Overall, the training focus may be on the following methodology:

- a) Problem-based– May cover end user’s problem specific contents.
- b) Competency-based – May cover detailed trainings on all competencies.

The capacity building program may be implemented in two modes viz.

Type of Training	Description
Face to Face Training	<ul style="list-style-type: none"> <li>• Onsite training is coordinated for larger facilities that may require a specialized training course for its staff and can host the training on-site.</li> <li>• Training material and prerequisites may be shared in case of coordinating for on-site training.</li> <li>• Prerequisites for on-site training include Number of staff, Site location, Type of training, Duration of training.</li> <li>• On-site training may be mainly utilized for targeted stakeholders that may have a significant contribution to the onboarding implementation.</li> </ul>
Online (Web-based learning)	<ul style="list-style-type: none"> <li>• Self-training through accessing the online provided user guides, training material, and training videos.</li> <li>• A web-based -computerized training may be provided where users can log in on the portal and avail self-study training. The latest updated materials may be published with the announcement of any new functionality, standard, regulation, coding, etc.</li> </ul>

### Content Management:

The e-learning modules may facilitate easy to understand and comprehensive descriptions with examples, step by step guidance of processes and services, voice (English and Hindi and further may be extended to regional languages if needed) to support learning, videos, infographic and hyperlinked details to other modules facilitating learning of current module that the stakeholder is referring.

- a) The platform may have the enterprise-class search ability i.e. to search across various content, pages, and courses
- b) The platform may have a discussion forum for users to ask questions, raise queries and share best practices.
- c) The platform may facilitate the ability to take surveys and polls for feedback and consultation.
- d) An inbuilt calendar may have links to assignments, activity due dates and upcoming events (training sessions), etc.
- e) The platform may have the ability to author courses/ content and assessments limited to selected restricted roles.
- f) It may also provide virtual sessions type of training, such as webinars.
- g) Creation of folders / sub-folders along with uploading and organizing of user-based content and assessments.
- h) Application/modules training prototype for hands-on training using dummy data

## Expectations

This strategy document is published to invite public and stakeholder opinion on the proposed NDHM implementation strategy in India.

All the inputs w.r.t. this document to be sent at [ndhm@nha.gov.in](mailto:ndhm@nha.gov.in) latest by 29<sup>th</sup> March, 2021.