

Faculty Development Program for IIHMR Group of Institutions

Software Engineering Practitioner's (Academician) Approach - NDHM

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Mr. TK Pradeep Kumar presently working as Assistant Professor in Healthcare IT & also the Faculty In-charge for IT at IIHMR Bangalore.

He has 16 years of overall experience, teaching – 12 years & Industry – 5 years. Presently managing Networking (IT Infrastructure), Digital Marketing, Website Management, Email Management (G Suite & Microsoft 365) for the organization.

Interested in teaching Computer Networks (IT), Programming languages, RDBMS, Software engineering, Operations Management & Operations Research, HMIS, Health IT Standards (HL7 V2/FHIR V4).

Earlier worked as Assistant Professor, CSE Dept & also as an IT Manager, has managed Networking (IT Infrastructure), Website Management, Email Management (G Suite), PF Sense Firewall, Biometric, CCTV (Campus & Classroom), ISO & Placement Coordinator and Conducted online exam (BESCOM /GESCOM /XLRI /DRDO.. etc) in association with Organiser.

EXPERTISE (AREAS) : IT Management, Digital Marketing



Software Engineering Practitioner's (Academician) Approach - NDHM

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Contents for the discussion

- FAQ about Software Engineering
- SDLC & SDLC Types
- Waterfall Model
- Agile Methodology
- Requirements Collection to Implementation
- NDHM Building Blocks and Applications
- NDHM Architecture
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- Digi Doctor
- Health Facility Registration
- Building Blocks
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Frequently asked questions about software engineering

Question	Answer
What is software?	Computer programs and associated documentation. Software products may be developed for a particular customer or may be developed for a general market.
What are the attributes of good software?	Good software should deliver the required functionality and performance to the user and should be maintainable, dependable and usable.
What is software engineering?	Software engineering is an engineering discipline that is concerned with all aspects of software production.
What are the fundamental software engineering activities?	Software specification, software development, software validation and software evolution.



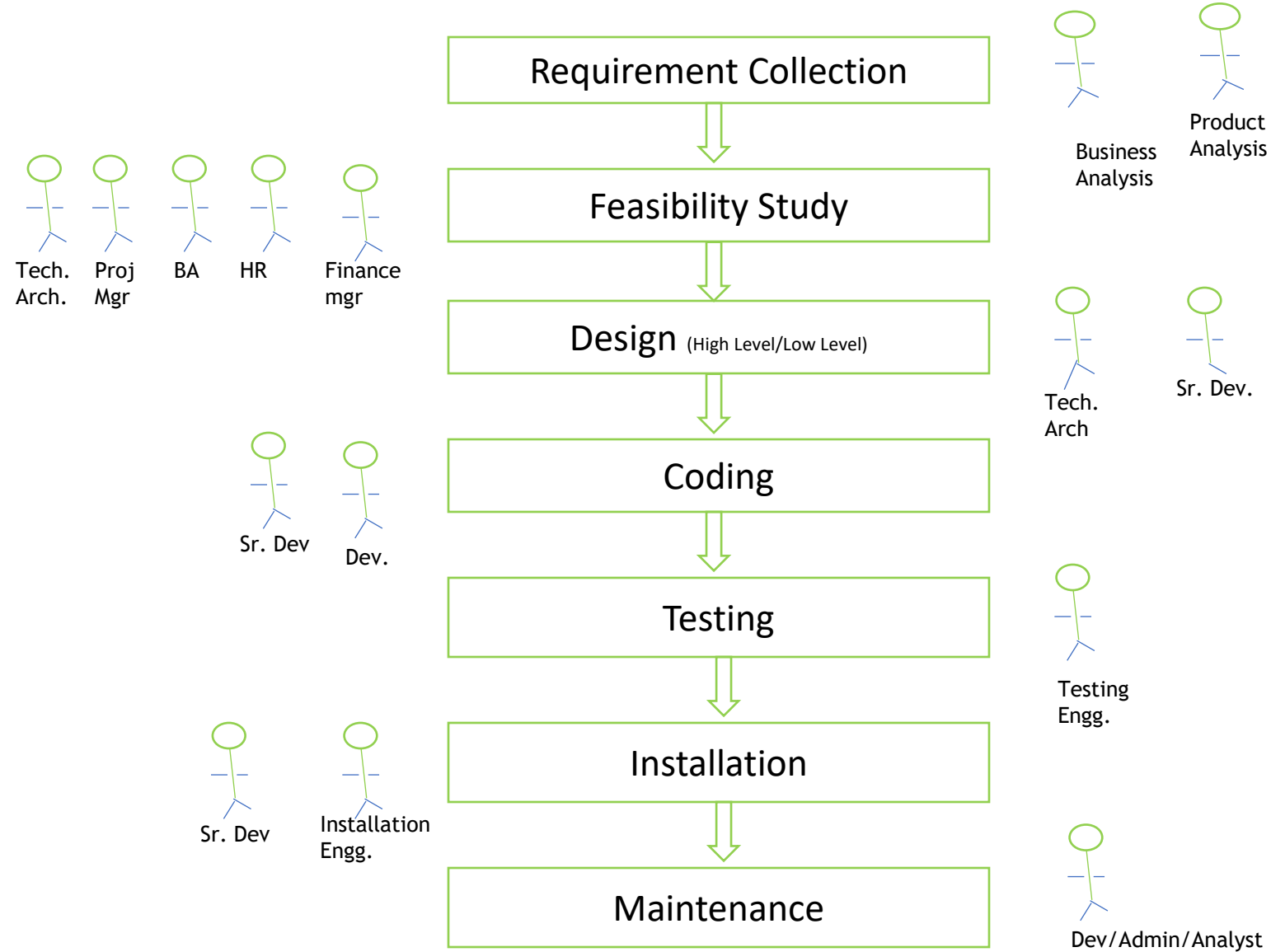
Software Development Life Cycle (SDLC)

- It is step by step procedure to develop the software.
- SDLC starts with the new concept and ends when the concept is over

SDLC - Types

- Waterfall Model
- Prototype Model
- V-Shaped SDLC Model
- Spiral SDLC Model
- Hybrid Model
- Derived Model
- **Agile Methodology – followed by NDHM**

Ex: Waterfall Model



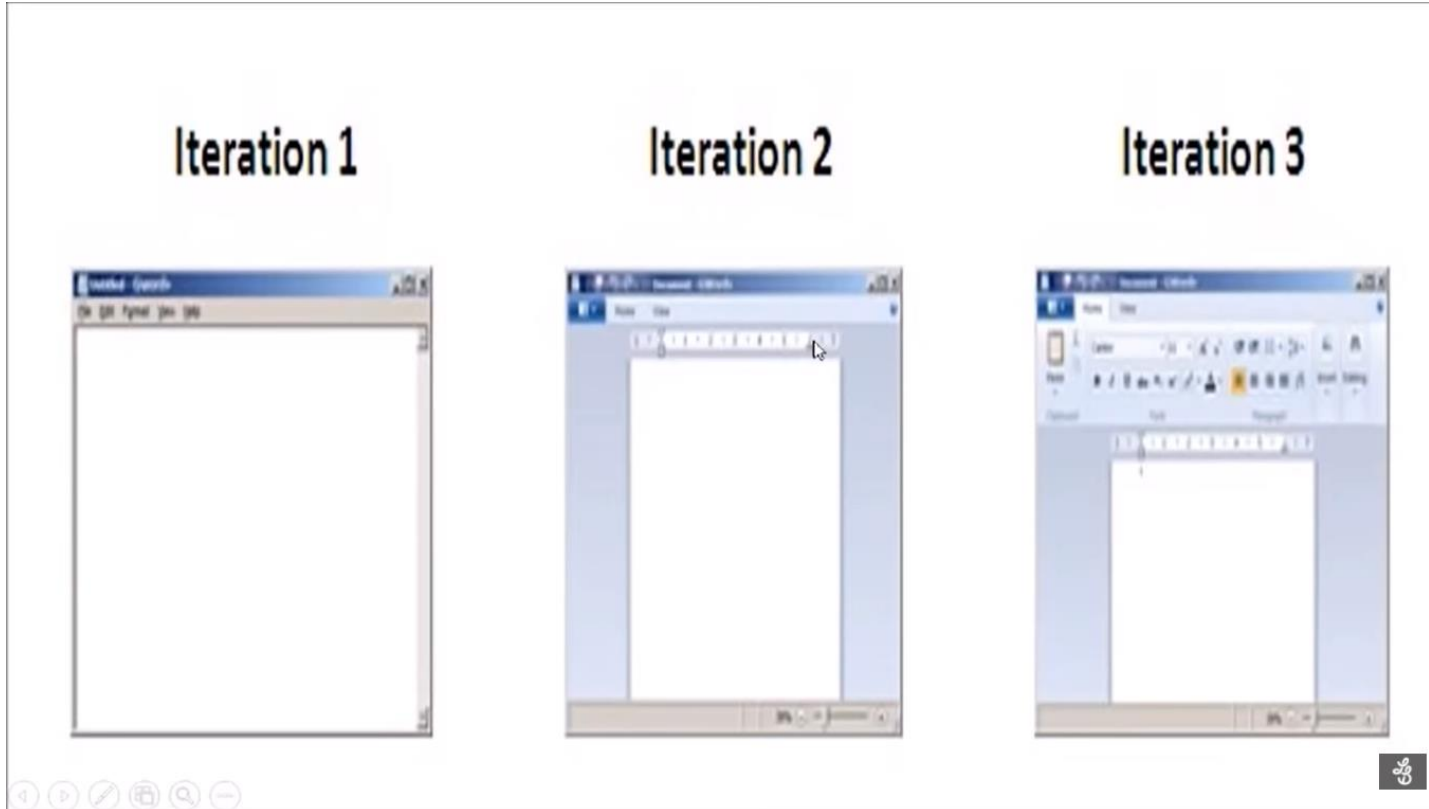


Why Agile - SDLC's

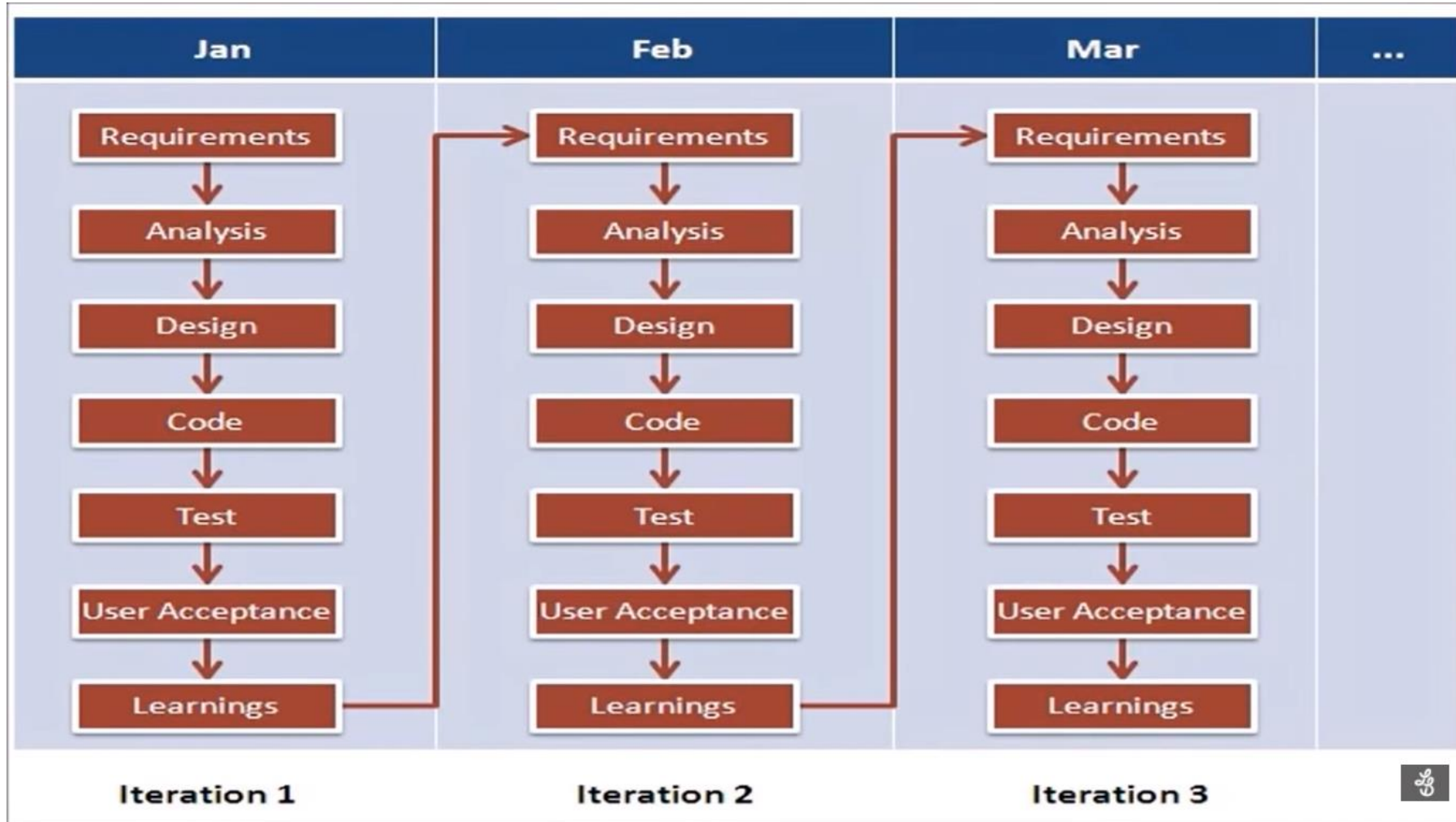
- **Speed up** or bypass one or more life cycle phases
- Usually **less formal** and reduced scope
- Used for time-**critical** applications
- **Cross Functional** team can make decision



Ex: MS Word

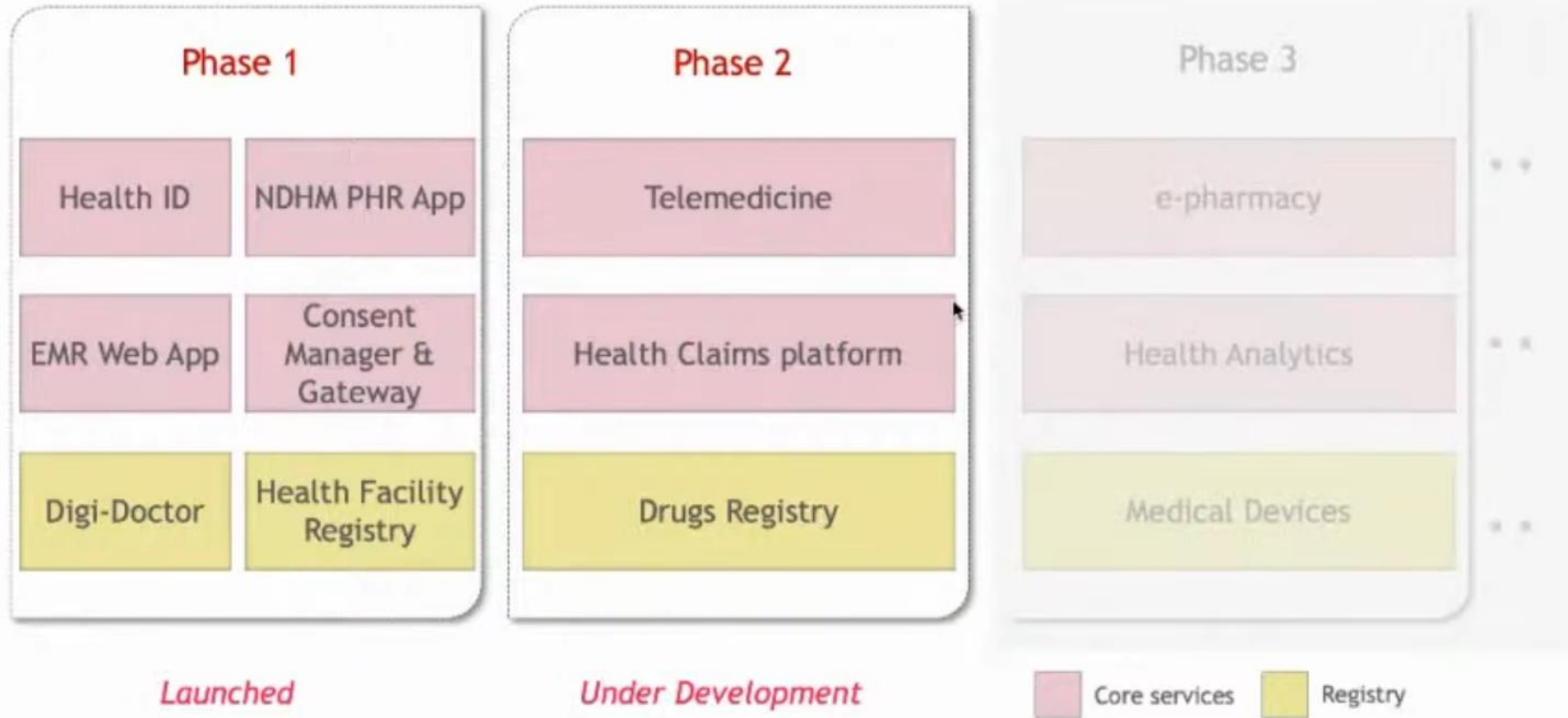


Calendar Wise





NDHM building blocks





Requirement Collection - > Implementation

Sustainable Development Goals

- Achieve Universal Health Coverage
- Democratized access
- Quality Healthcare



NHP

- Goal, Principles and Objectives
- Policy Thrust
- Health Technology Assessment
- Digital Health Technology Eco – System, etc

National Health Stack - July

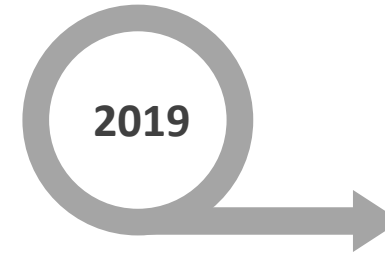
Strategy & Approach

Components

- India Stack
- Digital Health ID
- Federated PHR - FW
- NH Analytics – FW

Benefits

- Public
- Central & State Govt
- Insurance Providers



NDHB – Apr

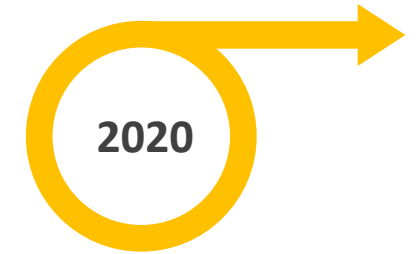
- Context & Scope
- Identification and Definition of BB
- Standards and Regulations
- Institutional Framework
- NDHM Action Plan

NDHM – NHA – Overview - July

- Context
- Objectives of NDHM
- Implementation Arrangement

NDHM – NHA – Aug 2020

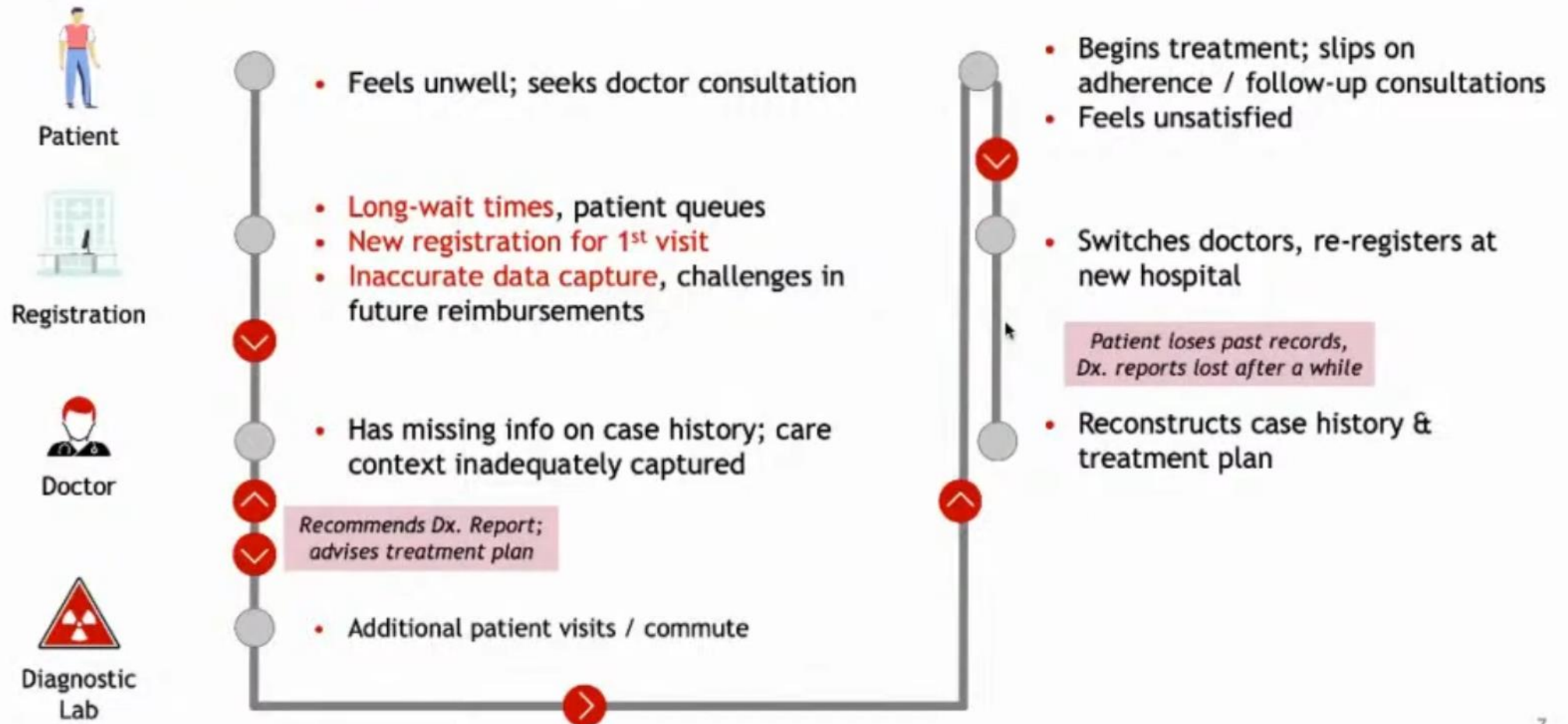
- NDHM Blocks
- Guidelines to HIP
- Guidelines to HRP, HIU, Health Locker
- NDHM Sandbox



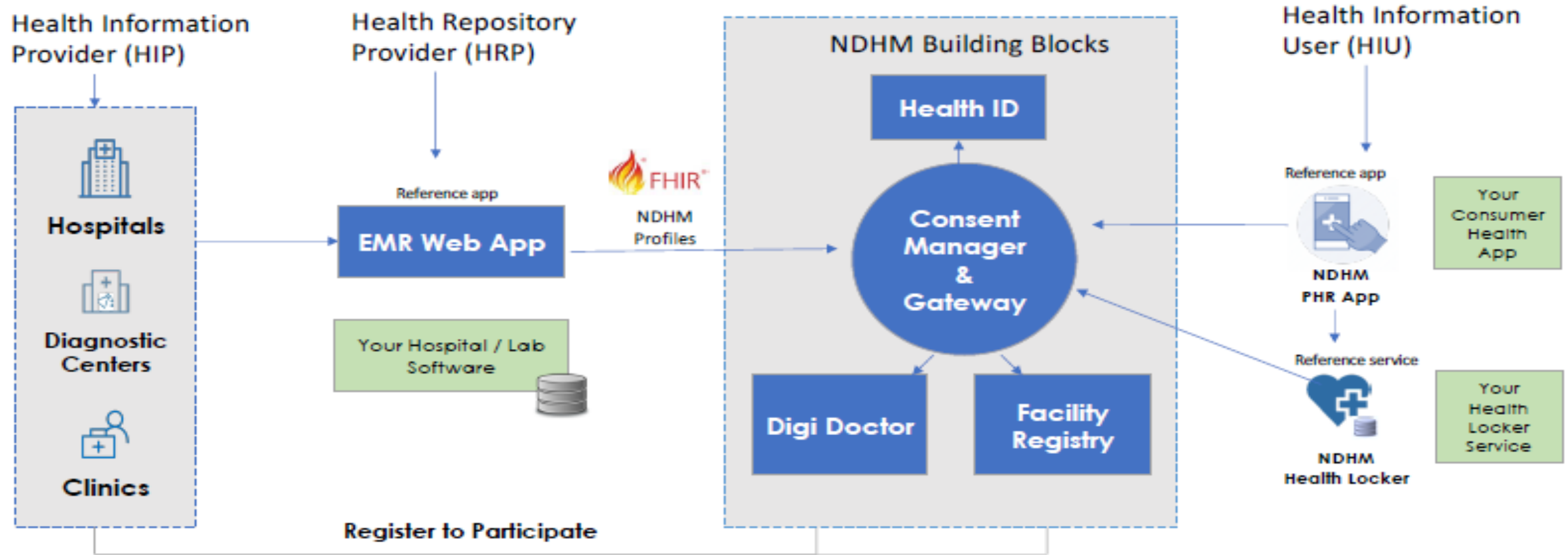
NH – National Health
FW – Framework
NDHB – National Digital Health Blueprint
BB – Building Blocks



Current State | Patient experience limited by inefficient registration processes & inefficient storage of treatment records



NDHM Building Blocks and Applications



All building blocks deployed in Production and in the NDHM Sandbox
 Sandbox is the environment for any party to integrate with the building blocks
 Reference applications are developed to demonstrate the capabilities of the building blocks. The market is expected to provide multiple options as part of the ecosystem
 Locker APIs and reference app will be published in early Oct 2020

Ref: <https://ndhm.gov.in/>



Definitions – HIP, HIU & HRP

Health Information Provider

Any healthcare provider who creates health information in the context of treating a patient and agrees to share the same digitally with the patient using the consent framework adopted by NDHM is called a Health Information Provider (HIP)

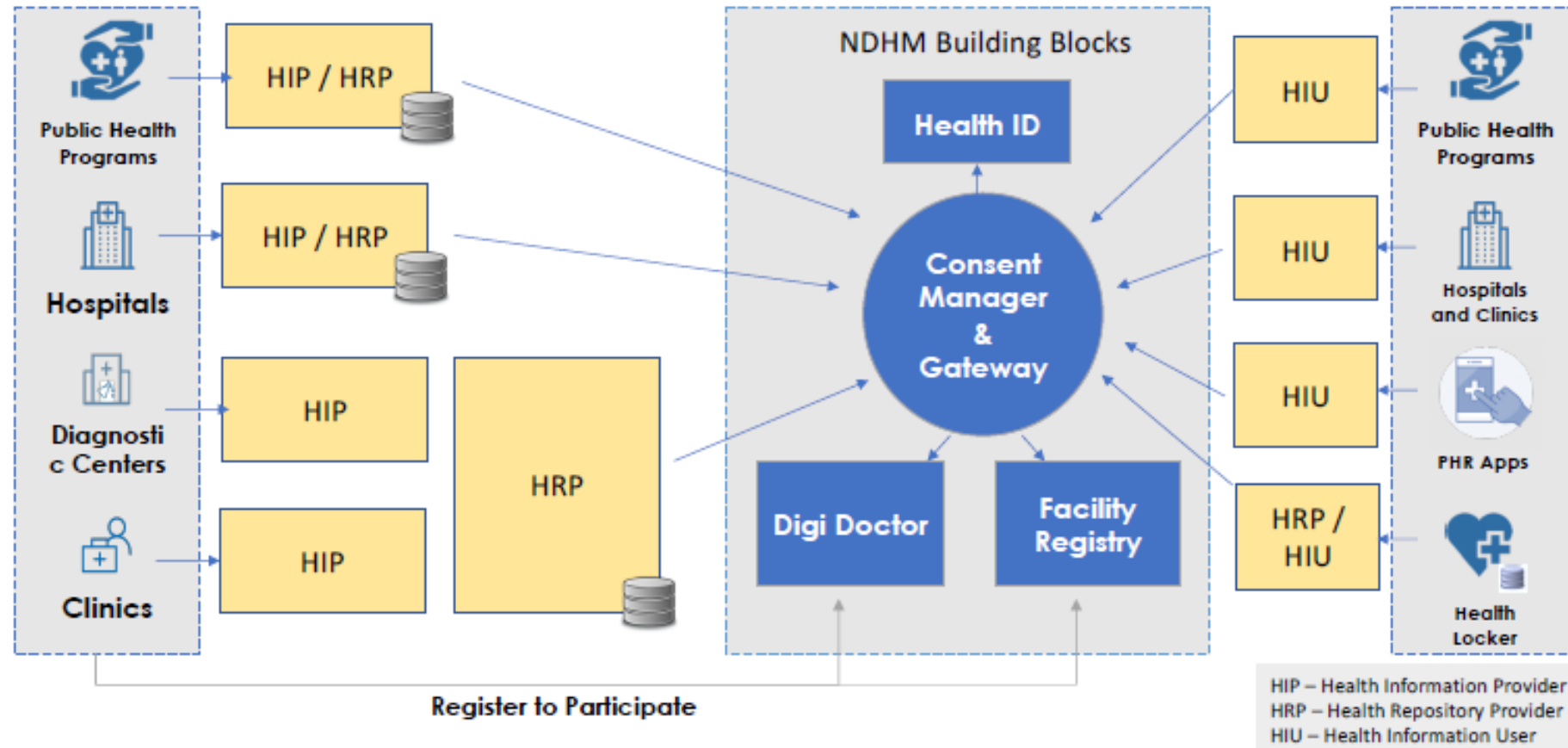
Health Repository Provider

Health repository providers are software service providers who offer NDHM compliant software and long-term record storage to hospitals, diagnostic centers and clinics.

Health Information User

Any entity that would like to access health records of a user is called a Health Information User.
This includes **hospitals / doctors** who would like to view medical history of patients, **mobile applications** that want to display health data to users including PHR applications, etc.

The NDHM Architecture



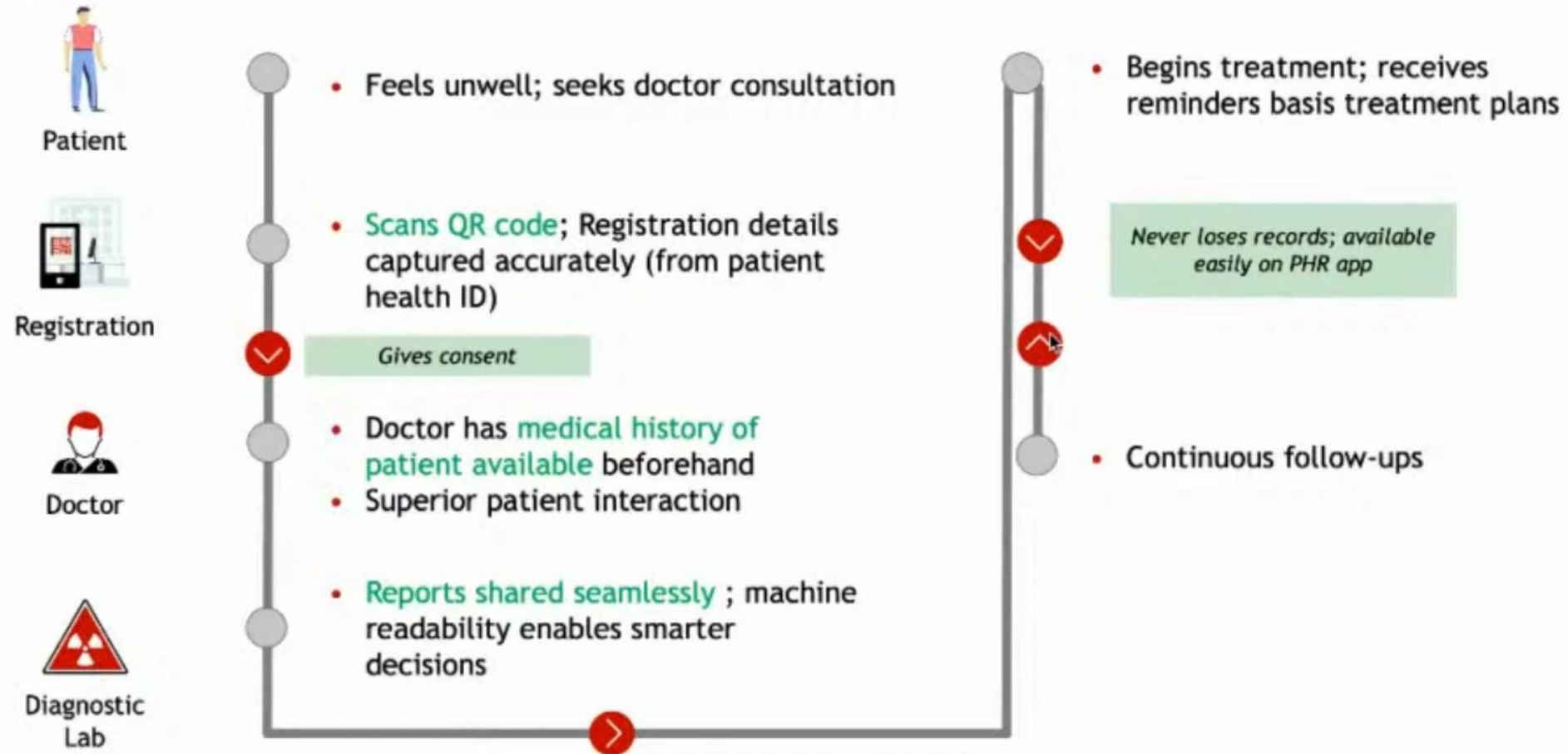
Ref: <https://ndhm.gov.in/>



Process - NDHM

- Patient walks up to a Hospital. He sees a Health ID QR code on the registration desk
- He/She pulls out his smartphone, launches his PHR app and scans the QR code
- The Hospital instantly gets accurate information about the Patient including Health ID, Name, Age, Gender, Mobile. – No waiting!!
- The Hospital sends a consent request to the patient requesting access to his medical history
- Patient chooses what data to share with the hospital and for how long the hospital can have access.
- When the patient walks into the doctor consulting room, the doctor has Patients full medical history open on his computer.
- After treatment, before the patient leaves the premises, the patient gets a notification that his medical reports are ready.
- The doctor's treatment plan and prescription show up on his mobile and he will never lose his medical history ever

Future State | Potential to redefine patient treatment through unique health ID, enabling longitudinal linkage of health records





Digital Systems



Electronic Medical Records (EMR)

An electronic version of the patients medical history, generated at a particular medical facility. Can be used for tracking data and generating alerts for impending visits, tests and screenings that can be scheduled subsequently.

FAQ →



Health ID

In order to provide a uniform standard for beneficiary identification a HealthID needs to be provided. The HealthID ensures mapping of user consent to generated medical records.

Create Health ID →



Digi Doctor

One of the key pillars supporting the NDHM framework, it is a comprehensive repository for doctors that has details pertaining to their qualification, specialisation and work experience.

Register →



Health Facility Registry (HFR)

It is a searchable, centrally managed, comprehensive repository of all health facilities, public and private, available in the country.

Register →



Personal Health Records (PHR)

A managed record of patient's information in electronic format, that is manageable and interoperable with various subsystems. It also provides a consolidated view of information from multiple sources and conforms to industry standards.

FAQ →



Health ID...Registration

Health ID – layout & features

Every person who wishes to participate in the digital health ecosystem must start by getting a Health ID.



Consent based access

Voluntary-Opt-In

Laxmikrant Srinivasan

Health ID : laxmi.srini@ndhm



Health ID Number : 43-3214-5497-4325

Date of Birth : 23/12/1994

Gender : Male

Mobile : 9975867781



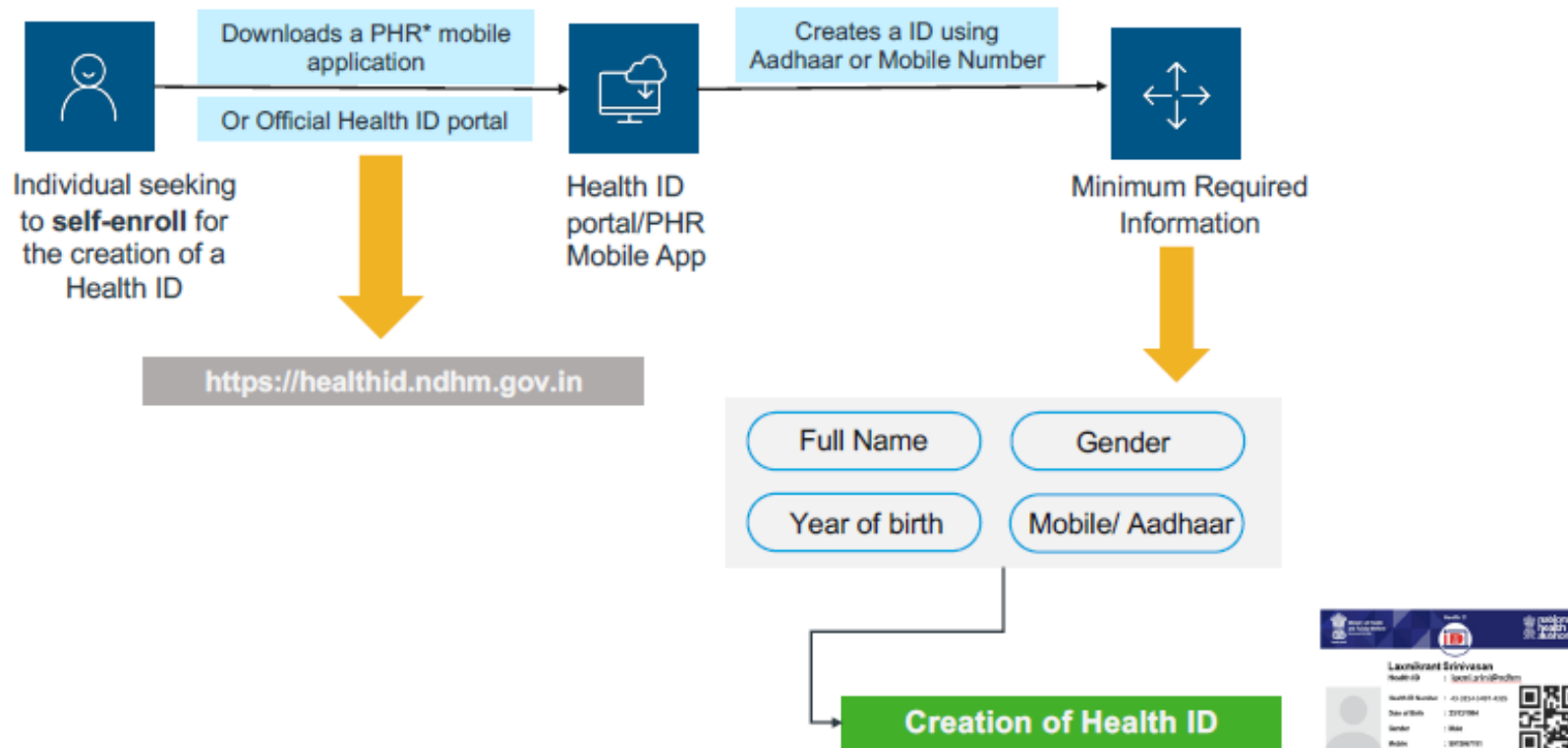
QR Code

Constituents of QR Code

Health ID Number	Health ID (user selected)	Name
Date of birth	Gender	Mobile number
Address of the patient		

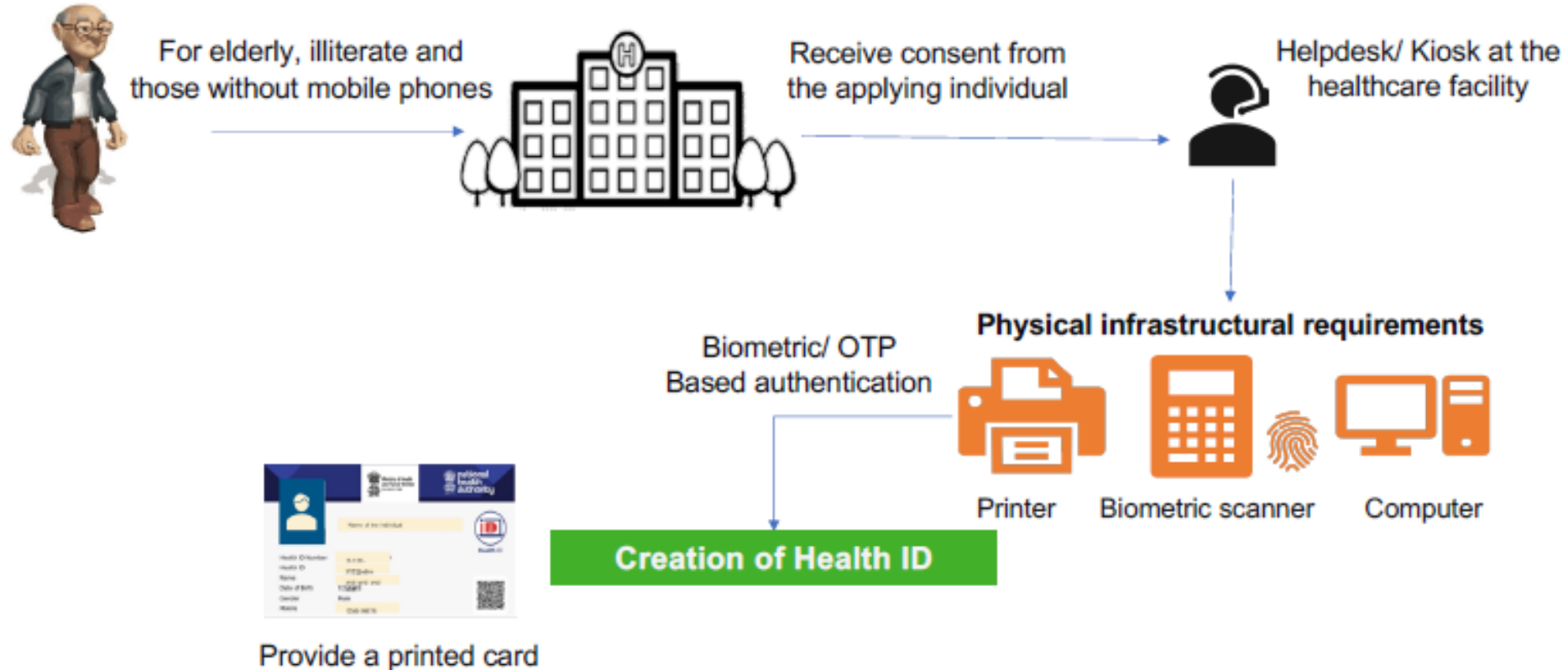


Self- Registration



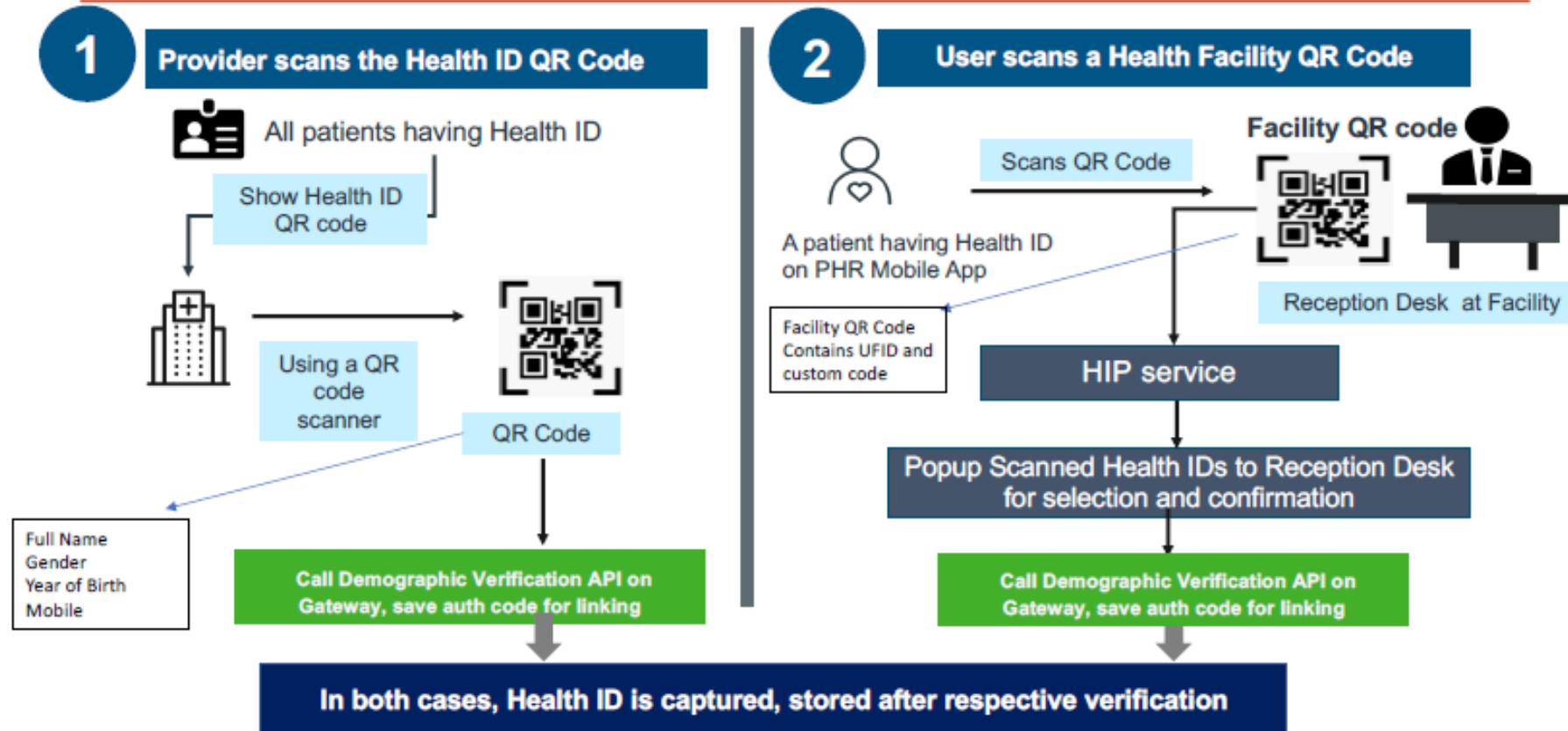
Ref: <https://ndhm.gov.in/>

Assisted Registration





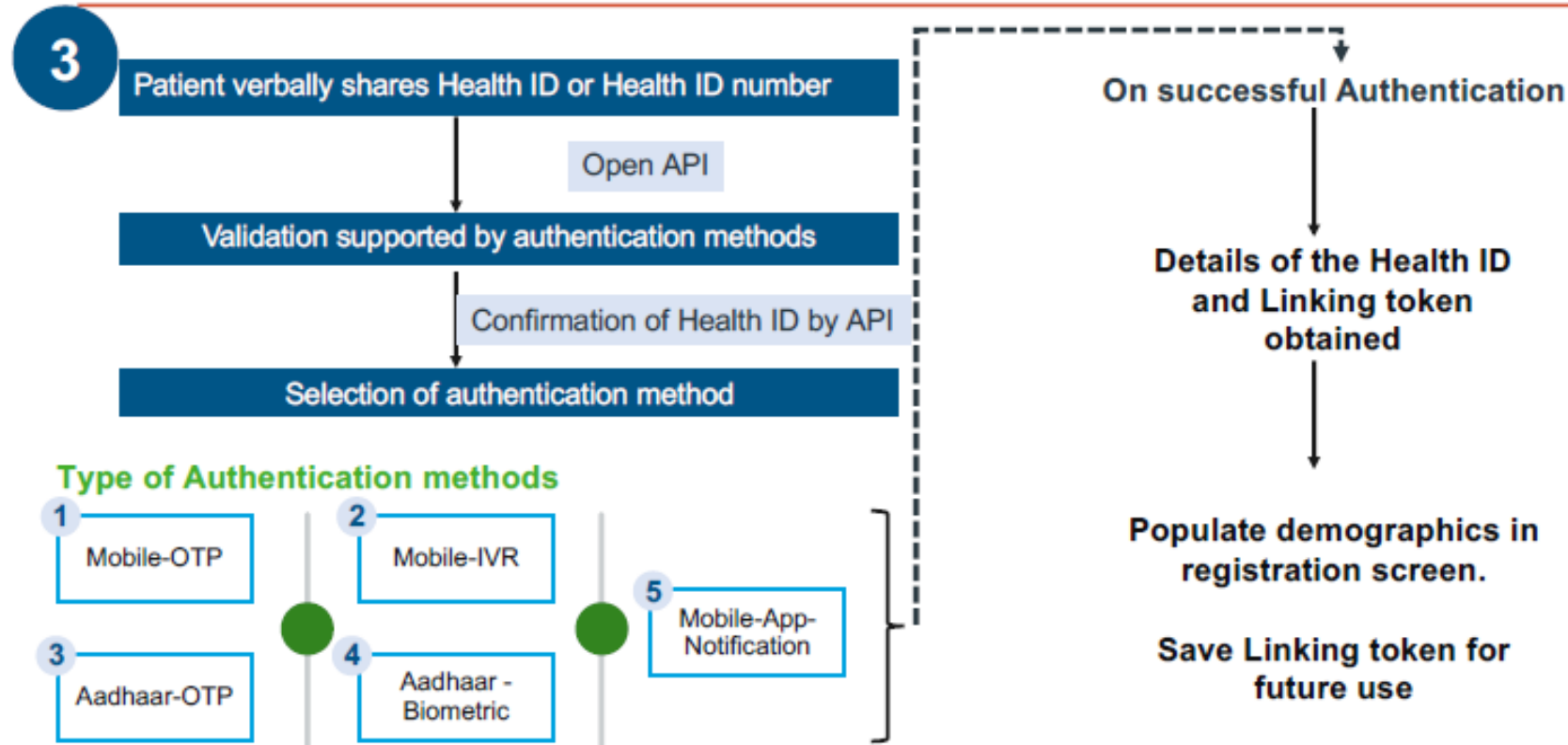
Health ID – Capture and Verify from QR codes



Ref: <https://ndhm.gov.in/>



Health ID – Capture and Verify



References:

- https://sandbox.ndhm.gov.in/docs/key_concepts
- https://sandbox.ndhm.gov.in/docs/build_hip
- <https://sandbox.ndhm.gov.in/swagger/ndhm-hip>

Who can enroll for DigiDoctor?

DigiDoctor is open to all doctors registered in India.



Generate DigiDoctor ID

Enroll/ Login using Aadhaar enabled DigiDoctor ID



Fill registration form

Enter registration details, educational qualifications and employment details



Submit & Respond to queries

Review and submit form for approval.

Join Now

Digi Doctor:

<https://doctor.ndhm.gov.in/en>



Find My Facility

State/UT*

District*

Pin code

Facility Name*

Facility Ownership*

Government
 Private
 Public-Private-Partnership

System of Medicine

Modern Medicine(Allopathy)	Dentistry	Physiotherapy	Ayurveda
Unani	Siddha	Sowa-Rigpa	Homeopathy

Facility Type

Search and Register

Who can enroll for Health Facility Registry ?

- Health Facility Registry is open to registration of all health facilities in India belonging to Modern Medicine (Allopathy), Dentistry, Physiotherapy, Ayurveda, Unani, Siddha, Homeopathy and Sowa-Rigpa systems of medicine.
- Certain facility details will be checked by the officials, and approval given before they are visible to the public.

Health Facility Registration

<https://facility.ndhm.gov.in>



Building Blocks

The Sandbox hosts of the following digital building blocks that are useful for anyone wanting to comply to the HIP, HRP and HIU guidelines

- 1. Health ID Service** - Create a Health ID, integrate your software with the Health ID APIs
- 2. Consent Manager and Gateway** - Register your software as a HIP or HIU and ensure you can correctly link records, process consent requests
- 3. Sandbox PHR Mobile Application for Android** - Use the application to manage your Health ID, view health records and manage consents
- 4. Sandbox HIU application** to create consent requests for a Health ID
- 5. Sandbox DigiDoctor** and APIs to register and verify doctors
- 6. Sandbox Health Facility** Registry and APIs to register and verify facilities

https://sandbox.ndhm.gov.in/docs/building_blocks

How do I participate?



<https://sandbox.ndhm.gov.in/docs/participate>

What's next?

Once you have sent request, the support team will help you integrate your system into the sandbox environment. You can expect a notification from the support team once that is done.

After your system is integrated with the sandbox environment you can start testing your system.

Get started with understanding the [building blocks](#) and overall [architecture](#).



What is already available

<https://sandbox.ndhm.gov.in/docs/available>

- ▶ Building blocks
- ▶ Overview of FHR framework
- ▼ Implementer's guide
 - What is already available**
 - What resources can I use
 - Building HIP
 - Building HIU
 - Key concepts
 - Getting started with APIs
- ▶ Preparation of data and packaging
- ▼ How do I participate?
- ▼ Webinars
 - Postman Collection

VIU API.

Application name	API Base URL	Description
Health ID Service	To be updated	Health Account Service
HFR	To be updated	Health Facility Registry
DigiDoctor	To be updated	Doctor's Registry
HDCM	https://dev.ndhm.gov.in/cm	Consent-Manager
Gateway	https://dev.ndhm.gov.in/gateway	Gateway
HIU API	https://dev.ndhm.gov.in/hiu-api	Health information user
Example HIP	https://dev.ndhm.gov.in/hip	Health information provider
HIU Web Interface	https://dev.ndhm.gov.in/hiu	HIU Website
Developer Service API	https://dev.ndhm.gov.in/devservice	Developer self service APIs

All services above require you to pass Authorization Token or sorts for calling an API. Please refer to relevant API Documentations or developer



What resources can I avail and use?

- HIP Implementer's guide
- HIU Implementer's guide
- Preparing Health Data
- FHIR validator
- FHIR Client Libraries
- Encryption libraries

<https://sandbox.ndhm.gov.in/docs/resources>



https://sandbox.ndhm.gov.in/docs/test_health_repository



<https://forms.gle/kvFL6rw5qednRZrd6>



Thank you