

Perspectives on SNOMED CT Implementation in Indian Hospital Management Information Systems

(Proposal ID 201755)

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Outline

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3. CDAC HMIS Modules
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About CDAC

- An autonomous Research and Development organization under the Ministry of Electronics and Information Technology (MeitY), Government of India.
- Key focus areas:
 - High performance computing
 - Health Informatics
 - Cyber Security and Forensics
 - Professional Electronics & VLSI
 - Software Technologies and Services



Key Focus Areas of CDAC Noida

**Health
Informatics**

**Embedded
Systems**

**Speech and
Natural Language
Processing**

e-Governance

**Education and
Training**

Health Informatics Products/Solutions by CDAC



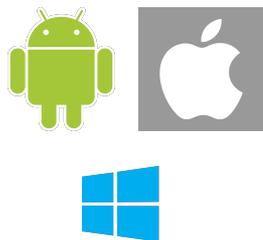
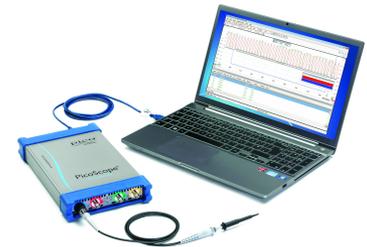
Hospital Management Information System

Drug Warehouse Management System



Blood Bank Management System

Medical Equipment Interfacing



Healthcare Mobile Applications

Electronic Health (Medical) Record Solutions

SNOMED CT
The global language of healthcare



CDAC HMIS Modules

Registration		
Emergency		
Out Patient Management	Stores Management System	
Pharmacy Management	Procurement & Purchase	
Billing	Central Sterile Services	
Investigation	Personnel Information System	
In Patient Management	Finance Management System	
Operation Theatre	Bio Med. Waste/House Keeping	
Patient Medical Records	Transport	
Diet Kitchen	Laundry	RTI
Blood Bank (with Biometric & Barcode)	Bio-Medical Engg. Dept. (BMED)	Health Portal Interface
Enquiry	Administrative Module	File Tracking System
User Management	Appointment & Roster Management	Library Mgt. System
Core Clinical Modules	Back Office & Support Modules	

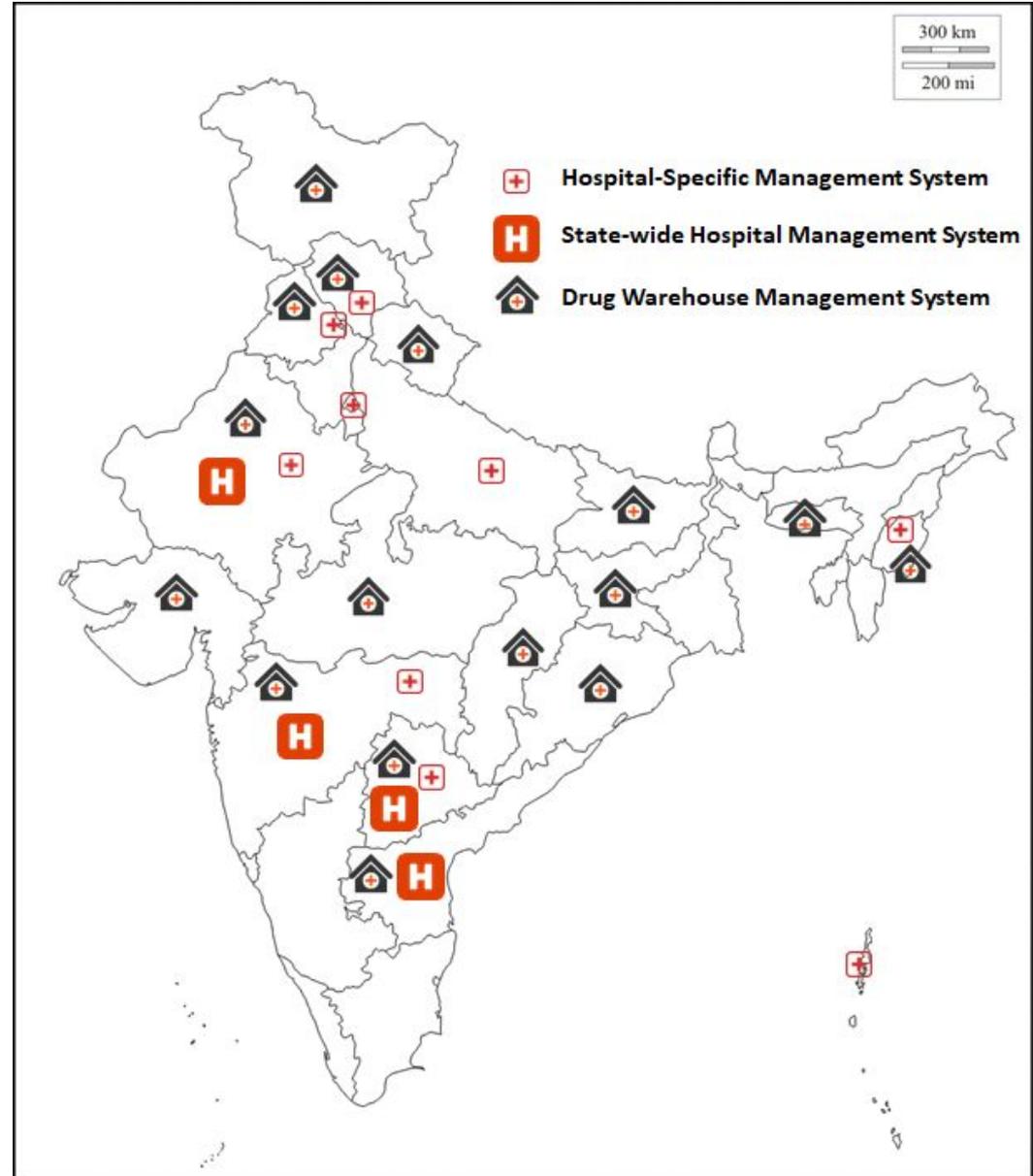
Tele-Consultancy

Citizen Portal

Mobile Apps

HMIS Deployments

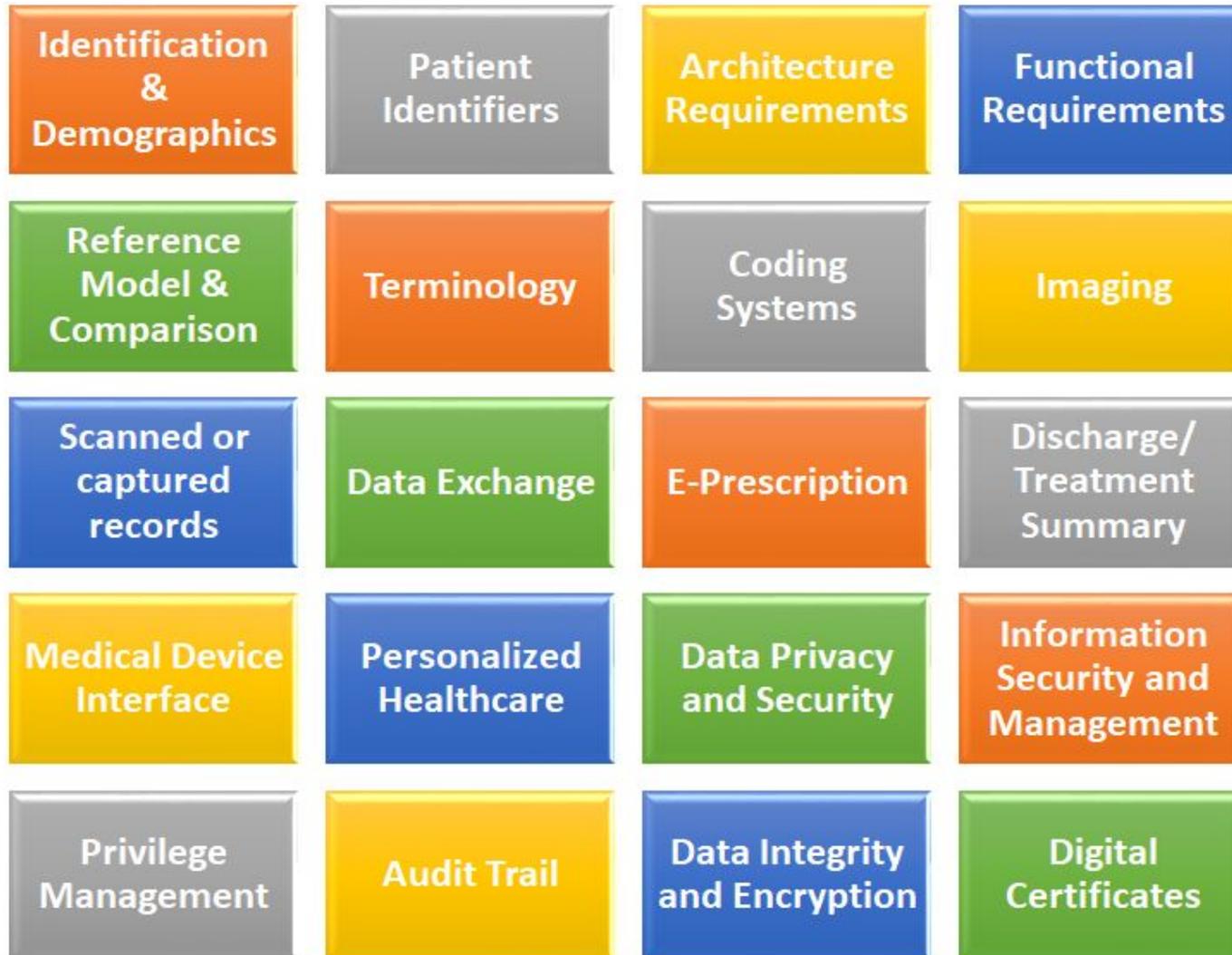
1. Hospital-Specific Management Information Systems (**eSushrut**)
2. State-wide Hospital Management Systems
3. Centralized Drug Warehouse Supply Chain Management Systems (**eAushadhi**)
4. Nation-wide Blood Bank Management System (**eRaktKosh**)
5. State-wide Medical Equipment Management System (**eUpkaran**)



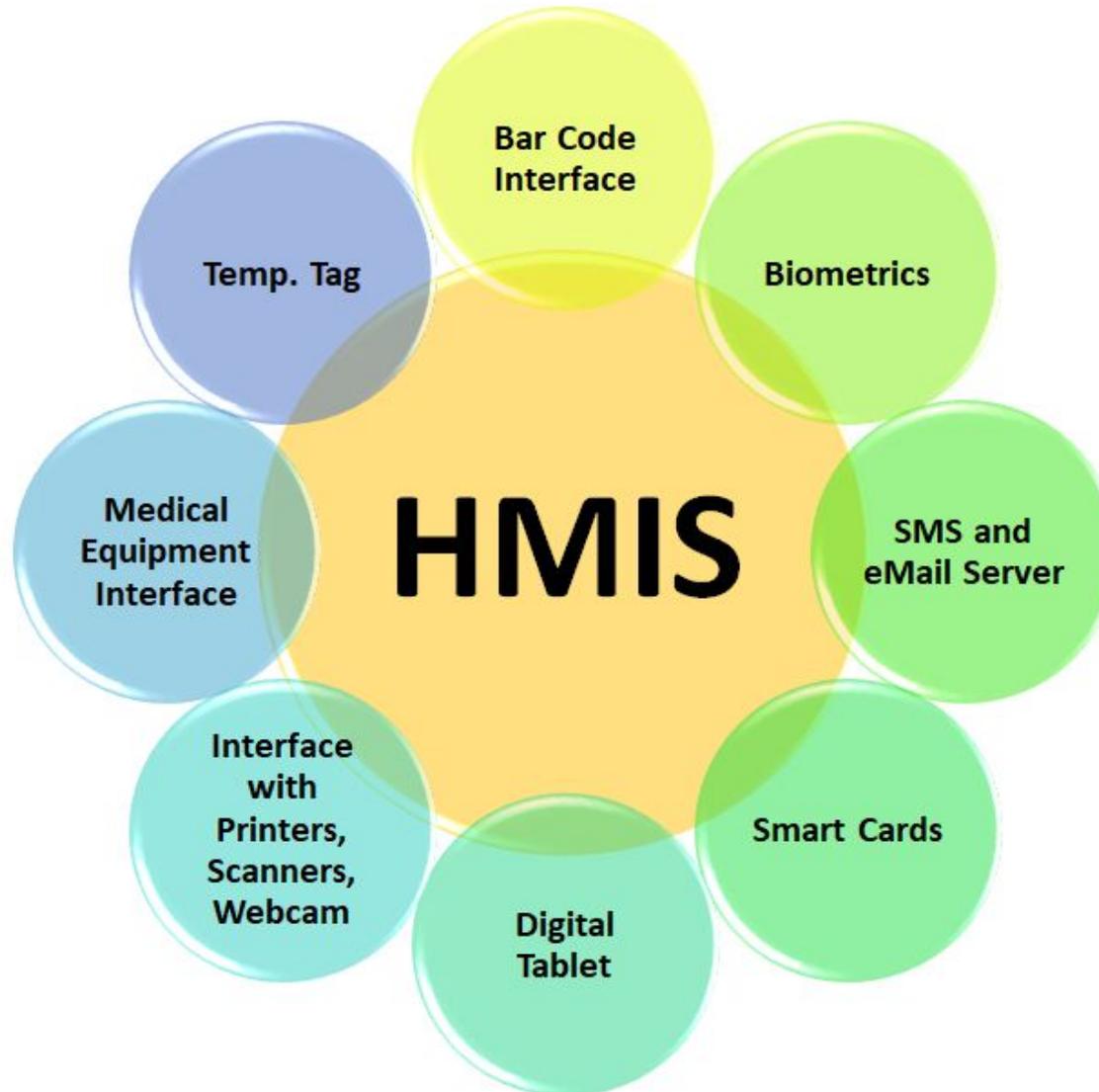
Government Initiatives for Healthcare Standards

- **Ministry of Health and Family Welfare (MoH&FW), Govt. of India**, recently released standards compliance guidelines for creation and maintenance of Electronic Health Records (EHR), 2016.
- Healthcare IT systems and service providers are required to **comply with EHR guidelines and standards.**
- The objective is to ensure **standardization in creation, maintenance and exchange of EHR** between systems.
- It is also intended to encourage best practices involving all vendors and stakeholders towards a comprehensive and robust public health infrastructure.

Thrust Areas of EHR Implementation Guidelines



HMIS: Systems and User Interfaces



HMIS: Standards Compliance Initiatives

ICD 10 /ICD O

LOINC

SNOMED CT

MDDS

HL7 –
Messaging
and CCD

ISO/ISO-TS

CIMS

DICOM

Leveraging SNOMED CT for HMIS

- Integration of SNOMED CT with CDAC HMIS was important for **compliance with EHR standards guidelines** released by MoH&FW, Govt of India.
- It would also help clinicians and users of the HMIS to perform data entry/view conformant to a **standardized clinical terms vocabulary**.
- Standardized data entry into HMIS repositories and databases would ensure **credibility and robustness of data** being amenable for decision systems and analytics in the future.
- The key objective was hence to provide a **seamless, simple and convenient interface for users** to interact with SNOMED CT via our HMIS.

Challenges in Implementing SNOMED CT

- SNOMED CT is an extensive clinical vocabulary and **selection of subsets** needed to be done which could be integrated with HMIS.
- **Integration points** needed to be identified in HMIS which could be replaced by SNOMED CT vocabulary.
- The **existing terminology in use needed to be mapped with SNOMED CT** terminology to ensure integrity of previous medical records.
- Handling **free-text entry** and interfacing the same with SNOMED CT.
- **Operational challenges** included trained manpower, optimizing data entry time for system user, user friendliness and convenience.

Resolutions Identified to Address Challenges

- Local Terminology Mapping
 - The **existing terminology in use needed to be mapped with SNOMED CT** terminology to ensure integrity of previous medical records.
 - Pre-defined Forms or Templates (Parameter and Radio/Combo options mapping)
- **Integration points** needed to be identified in HMIS which could be replaced by SNOMED CT vocabulary. These included summary-based Clinical Entries like Progress Notes, Discharge Notes, Instruction etc.
- Handling **free-text entries** and interfacing the same with SNOMED CT by providing an efficient term search-and-fill mechanism.
- **Operational challenges** were addressed by training manpower/ data entry operators at clinical desks to facilitate compliant data entry.

Resolution Adopted : Local Terminology Mapping

Chronic Disease Master>>Add

* Chronic Disease Name	Asthma
SNOMED-CT Compatible	Asthma

Save Clear

- Asthma
- Asthmatic
- FH: Asthma
- Asthma care
- H/O: asthma
- Mild asthma
- Wood asthma
- Acute asthma
- Flour asthma
- Mixed asthma

OPD Doctor Desk

OPD Doctor Desk

OPD Visited:2 Waiting:2 Attended:0
IPD Today Admitted:0 Discharged:0 Total:87
Casualty Visited:0 Waiting:0 Attended:0

Patient List Patient Dashboard One Page Prescription x Diagnosis x Visit Summary x

Consultation Inbox (10)
Visit Summary
Complaints
History
Examination
Drug Allergies
Chart Entry
Chart View

Visit Summary

Patient Detail

Name	Rahul Sharma	CR No.	281011700004835
Age / Gender	34 Yr / Male	Primary Category	General
Father Name	Vikas Sharma	Spouse Name	

Visit Detail

Reason of Visit	Fever;pain
* End Treatment	Pain
* Planned Visit Date	Painful
Progress Notes	Ear pain
	Eye pain
	Gum pain
	Hip pain
	Hot pain
	Jaw pain

Document Upload Patient Death Detail Patient Referral

E M R
Admission Ad
Blood/Compor
Request
Consent Inb
E Consultati
Estimate
Certificate
Request
P A C Reque
O T Reques
Patient
Attendant De

Resolution Adopted : Free-text Entries

OPD Doctor Desk

OPD Visited:2 Waiting:2 Attended:0
 IPD Today Admitted:0 Discharged:0 Total:87
 Casualty Visited:0 Waiting:0 Attended:0

OPD Doctor Desk

Patient List Patient Dashboard One Page Prescription x Diagnosis x Visit Summary x

EMR
 Admission Adv
 Blood/Compon
 Request
 Consent Inbo
 E Consultatio
 Estimate
 Certificate
 Request
 P A C Reque
 O T Reques
 Patient
 Attendant De

Consultation
 Inbox
 (10)
 Visit Summary
 Complaints
 History
 Examination
 Drug Allergies
 Chart Entry
 Chart View

Visit Summary

Patient Detail

Name Rahul Sharma	CR No. 281011700004835
Age / Gender 34 Yr / Male	Primary Category General
Father Name Vikas Sharma	Spouse Name

Visit Detail

Reason of Visit

* End Treatment YES NO

* Planned Visit Date SOS Days Scheduled Date

Progress Notes

Document Upload Patient Death Detail Patient Referral

Resolution Adopted : Configurable Forms

Template Parameter Master

Template Name **Personal History** Template Category **History**

Template Designer

Personal History

Smoking Yes No Alcoholic Yes No

Dietary Vegetarian Non-Vegetarian

History of Pet in Family

History of Contagious Exposure

History of I.V. Drugs Use

History of Blood Transfusion

Occupation

Factory Works

Hobbies

Cosmetic

Toiletries

Parameter Name Control Type

Row Number Column Number

Select Parent(s):

Smoking

Location Colspan

Alignment Is Compulsory

Default Value Font Size Language

Child Presentation Presentation On

Default Presentation Gender

Printing Style

Parameter Value Parameter Name IF-THEN Bold Italic Underlined

Source Flag

Enter Options

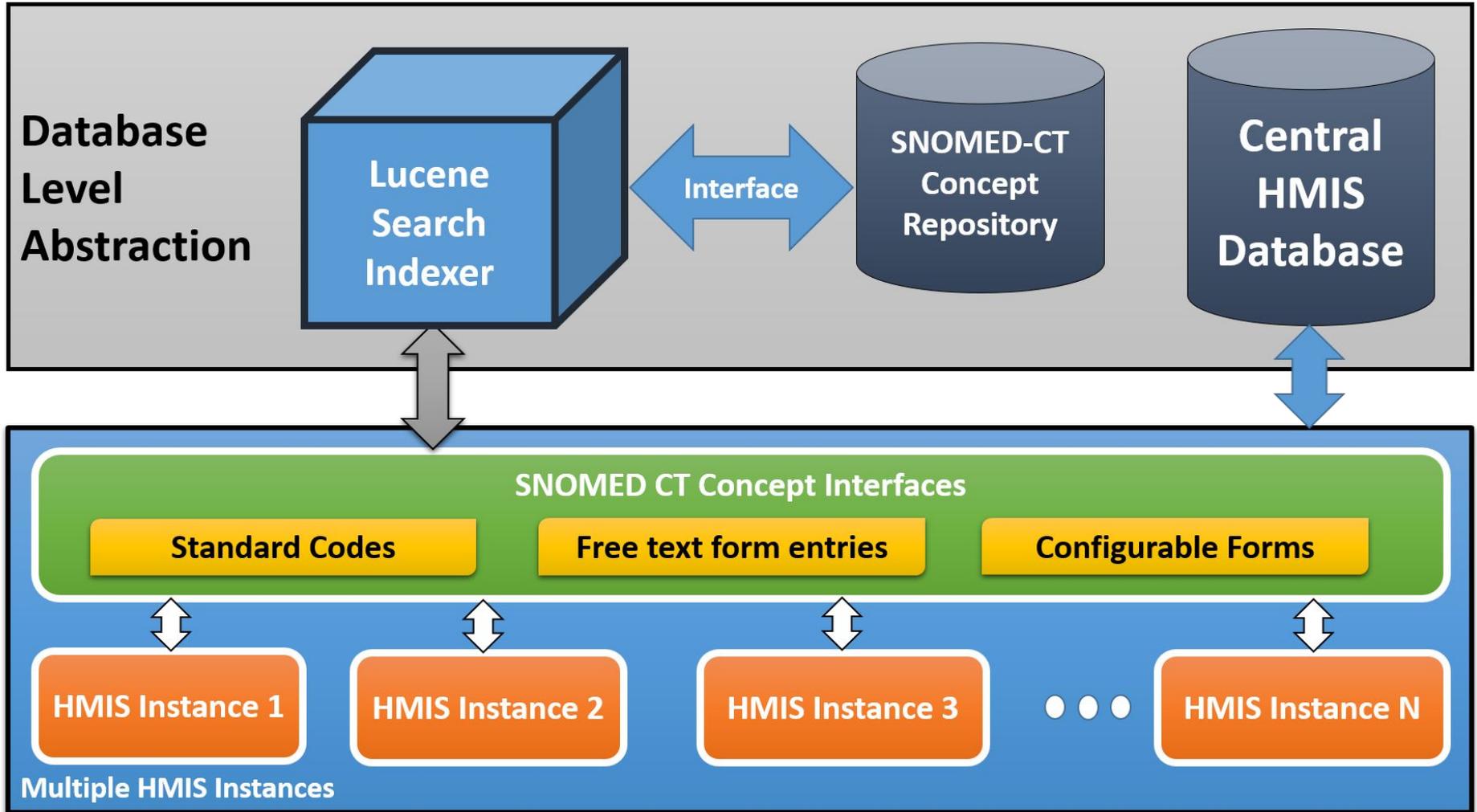
Value	Present	Text	Yes	1	+ -
Value	Present	Text	No	2	

Corresponding Formula

Dependent?

Reset

Architecture for SNOMED CT Implementation



Conclusions and Future Roadmap

- **SNOMED CT has been integrated with CDAC's Hospital Management Information System (HMIS)** at the following modalities:
 - Local terminology mapping
 - Free-text entry
 - Configurable forms
- This integration would help **enforce standardization of data acquired** by the HMIS, making it useful for analytics and decision support.
- Future work involves periodically **integrating future releases of SNOMED CT vocabularies** to provide better and comprehensive services.
- **Potential integration with language extensions** (when available) would also be of interest for the diverse linguistic landscape of India.

