The information system architecture in public health

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Learning Objectives

After this course, you will be able to

• explain the foundation of Health Information System in terms of the information system architecture in public health, structure and model.
Learning objectives

The concept of health systems strengthening is fundamental to the delivery of health services in the developing world. The WHO framework outlines six building blocks for health systems: governance, health financing, service delivery, human resources, commodities management, and health information systems. Through this course, students will master these concepts as they apply to the "re-emerging area" of PHI.
HEALTH INFORMATION SYSTEM

Any organized effort to systematically collect, maintain and disseminate data relevant to the performance of a health system or any of its component parts.
THE HEALTH METRICS NETWORK (HMN)

Launched: 2005
support countries & partners
improve global health
reinforcing systems collecting health-related information
evidence-based decision-making.
Fig 1. The HMN Framework

Components and Standards of a Health Information System
- HIS resources
- Indicators
- Data sources
- Data management
- Information products
- Dissemination and use

Strengthening Health Information Systems
- Principles
- Processes
  - Leadership, coordination and assessment
  - Priority-setting and planning
  - Implementation of health information system strengthening activities
- Tools

HMN Goal
Increase the availability, accessibility, quality and use of health information vital for decision-making at country and global levels.
WHY STRENGTHEN HEALTH INFORMATION SYSTEMS?

- Improving health – the reason for better health information
- Challenge of measuring health
- Poor performance of health information systems
- Drivers for change
- Global standards and harmonization of health information
- Same method to health information system development
INFORMATION ARCHITECTURE

Representation for a systematic, planned approach to building enterprise-wide information systems
INFORMATION ARCHITECTURE

For a specified public health enterprise, information architecture comprises:
- databases
- applications
- standards
- procedures
- information use
- confidentiality policies
- hardware
- software
- networks
BENEFITS OF AN INFORMATION ARCHITECTURE

- Provides a guiding plan across development projects.
- Promotes a component orientation to the development process, so that larger pieces of the system are built out of smaller units.
- Simplifies systems by decreasing redundancy of data entry and storage.
- Promotes efficiency and interoperability through the incorporation of standards.
- Promotes planning and clarifies business processes.
ARCHITECTURAL APPROACH TO HEALTH INFORMATION SYSTEM STRENGTHENING

- Describes and documents requirements and characteristics of a national HIS.
- Assists in communicating its benefits as a national HIS inclusive of all public health and disease programs to accelerate adoption.
- Platform for purposeful investments
- Improves health outcomes.
- Promote health system efficiency and effectiveness
ENTERPRISE ARCHITECTURE

Comprehensive description of all of the key elements and relationships that make up an organization.
Building Your Dream Home

- Electrician
- Framer
- Brick Layer
- Plumber
- Developer/Architect
- Painter
Building Your Public Health Information System

Programmer

Database Administrator

Informatician

Web Designer

Network Administrator

Security Specialist
Creating a Public Health Information System
The Informatician

- Understands ideas
- Envisions innovative scenarios
- Understands capabilities, opportunities, and limitations

Security
Data Standards
Policy
## Creating a Public Health Information System

<table>
<thead>
<tr>
<th>Creating a Public Health Information System</th>
<th>Public health official</th>
<th>Informatician</th>
<th>Information technology professional</th>
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<tbody>
<tr>
<td><strong>Step 1 — Vision and System Planning</strong></td>
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<tr>
<td>Envision solutions, opportunities, and application of information technology in public health</td>
<td>Broad knowledge of public health practice, proficiency in information technology, and capacity for innovation</td>
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<td><strong>Step 2 — Health Data Standards and Integration</strong></td>
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<td>Define and design health data standards and transformation (e.g., HL7, ICD, SNOMED) and health domain integration (e.g., ELR, EHR, CMS, HIE, surveillance, demographics, social media)</td>
<td>Expertise in health data standards, database design, and data linking and integration across health systems</td>
<td>Expertise in relational/SQL databases and unstructured data design and management</td>
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<tr>
<td>Design and implement databases, tables, columns, data formats, and keys for linking tables and data to support defined health data standards and integration</td>
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<td><strong>Step 3 — Data Privacy and Security</strong></td>
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<td>Define and implement health data privacy and HIPAA regulations</td>
<td>Knowledge of health data privacy</td>
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<td>Implement and enforce data, systems, and communication security</td>
<td>Understanding information technology security functions</td>
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<td><strong>Step 4 — Systems Design and Implementation</strong></td>
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<td>Define and design methods for public health functions, data elements, data flow, case definitions, and message mapping</td>
<td>Expertise in health systems and data interoperability</td>
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<tr>
<td>Implement information technology for defined functions, data elements, data flow, and case definitions</td>
<td>Expertise in managing information technology systems development</td>
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<td><strong>Step 5 — Visualization, Analysis, and Reporting of Health Data</strong></td>
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<td>Expertise in public health practice, business intelligence, decision making, and use of analytic software</td>
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CMS = Centers for Medicare and Medicaid Services; EHR = electronic health record; ELR = electronic laboratory record; HIE = health information exchange; HIPAA = Health Insurance Portability and Accountability Act; HL7 = Health Level 7; ICD = *International Classification of Diseases*; SNOMED = Systematized Nomenclature of Human Medicine; SQL = structured query language.
Step 1 — Vision and System Planning

- Hardware
- Software
- Communication Technology
Step 2 — Health Data Standards and Integration

Health data standards and integration are required when defining the data.

Step 3 — Data Privacy and Security

Data privacy and security must be identified, prescribed, and implemented throughout the data lifecycle.
Step 4 — Systems Design and Implementation

- Define or design methods for public health functions, data elements, data flow, case definitions, and message mapping
- Implement information technology for defined public health functions, data elements, data flow, case definition, and similar needs
Step 5 — Visualization, Analysis, and Reporting of Health Data

Visualization and implementation of the required analysis, reporting, and meaningful use of the data collected and managed by the system.
Informatics in Action — CDC’s FluView

A clear-cut way to share national influenza data was needed by

- the public health community,
- clinicians,
- scientists, and
- the general public
Informatics in Action — FluView

The Role of the Informatician in Public Health

- Plans, designs, and defines functional requirements for public health information systems
- Evaluates the application and impact of information systems in support of health goals
- Serves as a liaison between multidisciplinary teams
- Uses data standards to support interoperability of data between systems
- Ensures confidentiality, security, and integrity standards
- Is knowledgeable about health data standards, sources, and meaningful use of health data

Learning Objectives

During this course, you learned to

• explain the importance of informatics to the public health mission

• describe the role of the Informatician in public health practice

• differentiate between public health informatics and information technology
QUESTIONS?
Resources and Additional Reading


