



The Foundations of Interoperability: Perspectives from the Nursing Informatics Community and IHE

HiMSS North America

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Presenters

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Objectives

- *Define interoperability*
- *Discuss the current state of standards organizations*
- *List benefits and challenges to interoperability*

Interoperability Definition

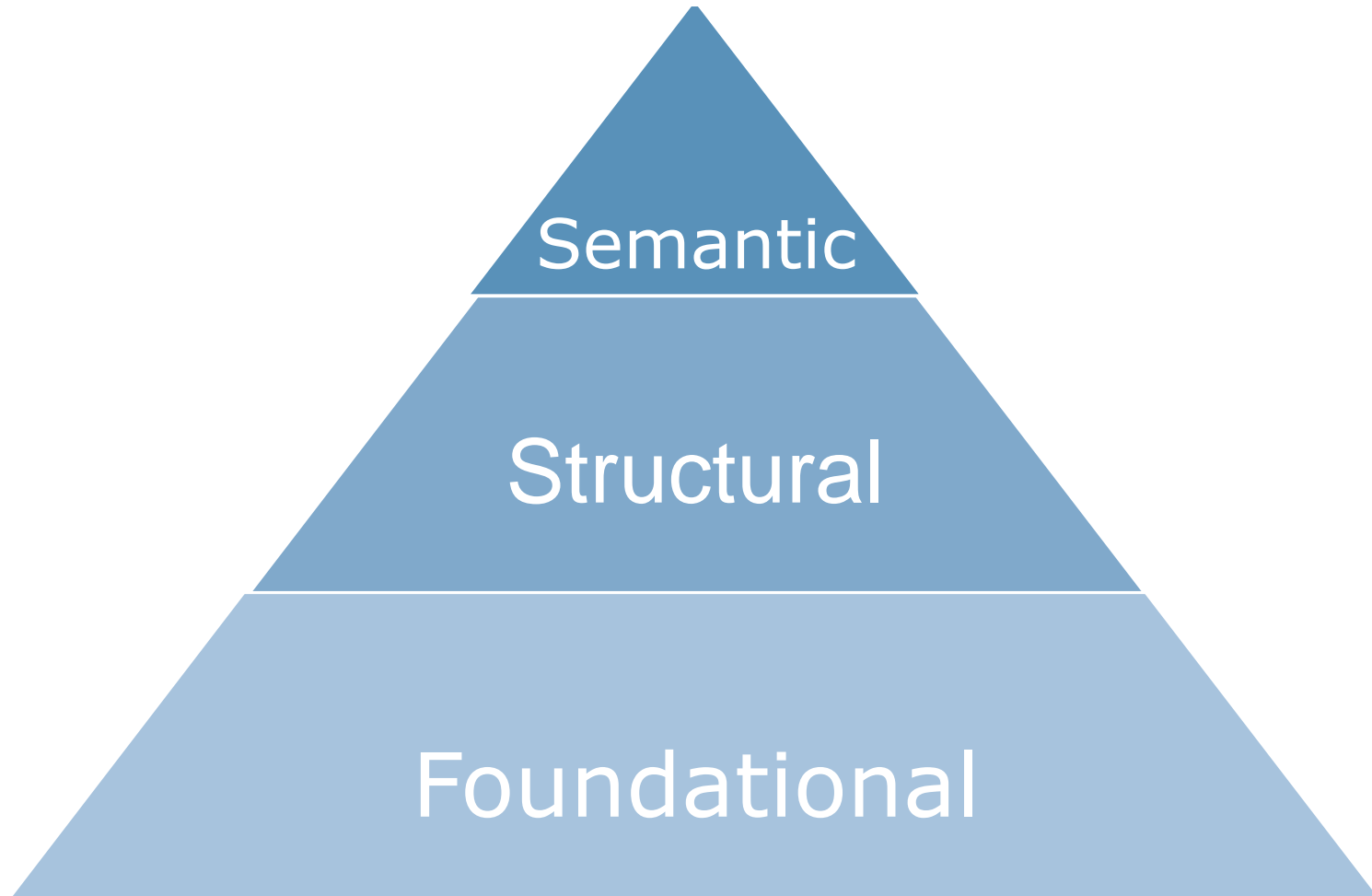
The ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities.

HIMSS BOARD APRIL 5, 2013

Levels of Health Interoperability

- Structural
- Foundational
- Semantic

Levels of Health Interoperability



Foundational Interoperability

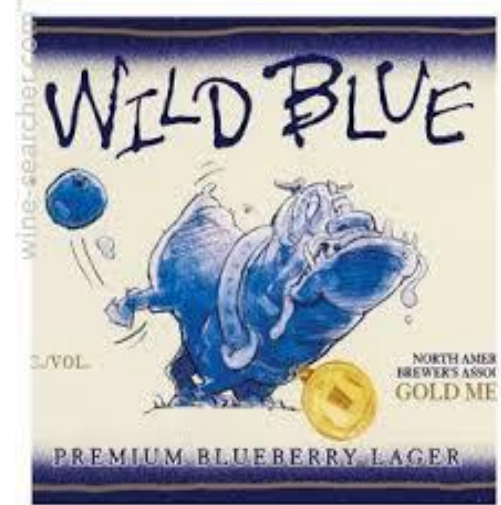
Allows data exchange from one information technology system to be received by another and does not require the ability for the receiving information technology system to interpret the data

Foundational Interoperability

No effects on distance



Foundational Interoperability

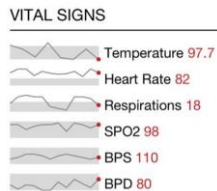
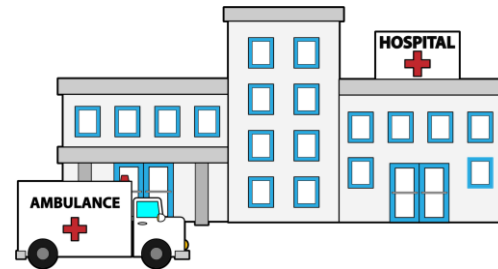


Structural Interoperability

An intermediate level that defines the structure or format of data exchange (i.e., the message format standards) where there is uniform movement of healthcare data from one system to another such that the clinical or operational purpose and meaning of the data is preserved and unaltered. Structural interoperability defines the syntax of the data exchange. It ensures that data exchanges between information technology systems can be interpreted at the data field level.

Structural Interoperability

Defines the format and syntax of the data exchange



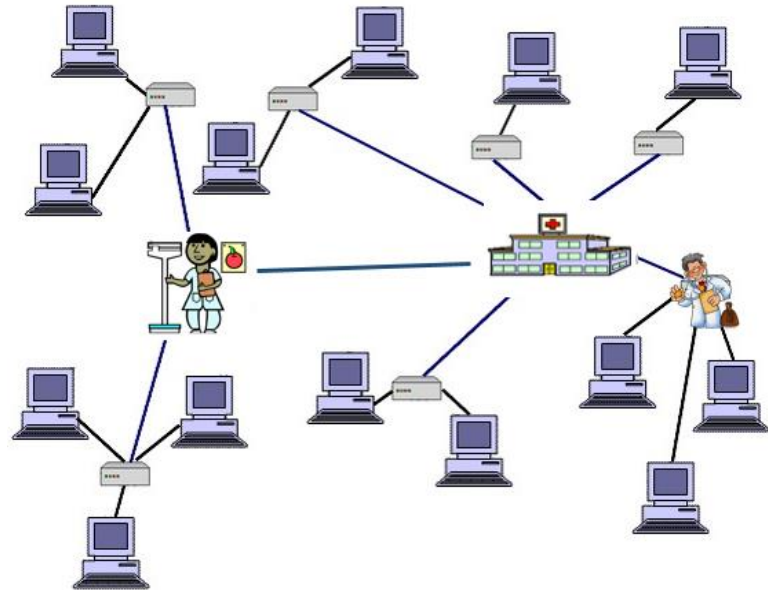
Semantic Interoperability

Provides interoperability at the highest level, which is the ability of two or more systems or elements to exchange information and to use the information that has been exchanged. Semantic interoperability takes advantage of both the structuring of the data exchange and the codification of the data including vocabulary so that the receiving information technology systems can interpret the data. This level of interoperability supports the electronic exchange of patient summary information among caregivers and other authorized parties via potentially disparate electronic health record (EHR) systems and other systems to improve quality, safety, efficiency, and efficacy of healthcare delivery.

Semantic Interoperability

Uses standardized vocabulary to ensure the exchange of data without ambiguity and errors

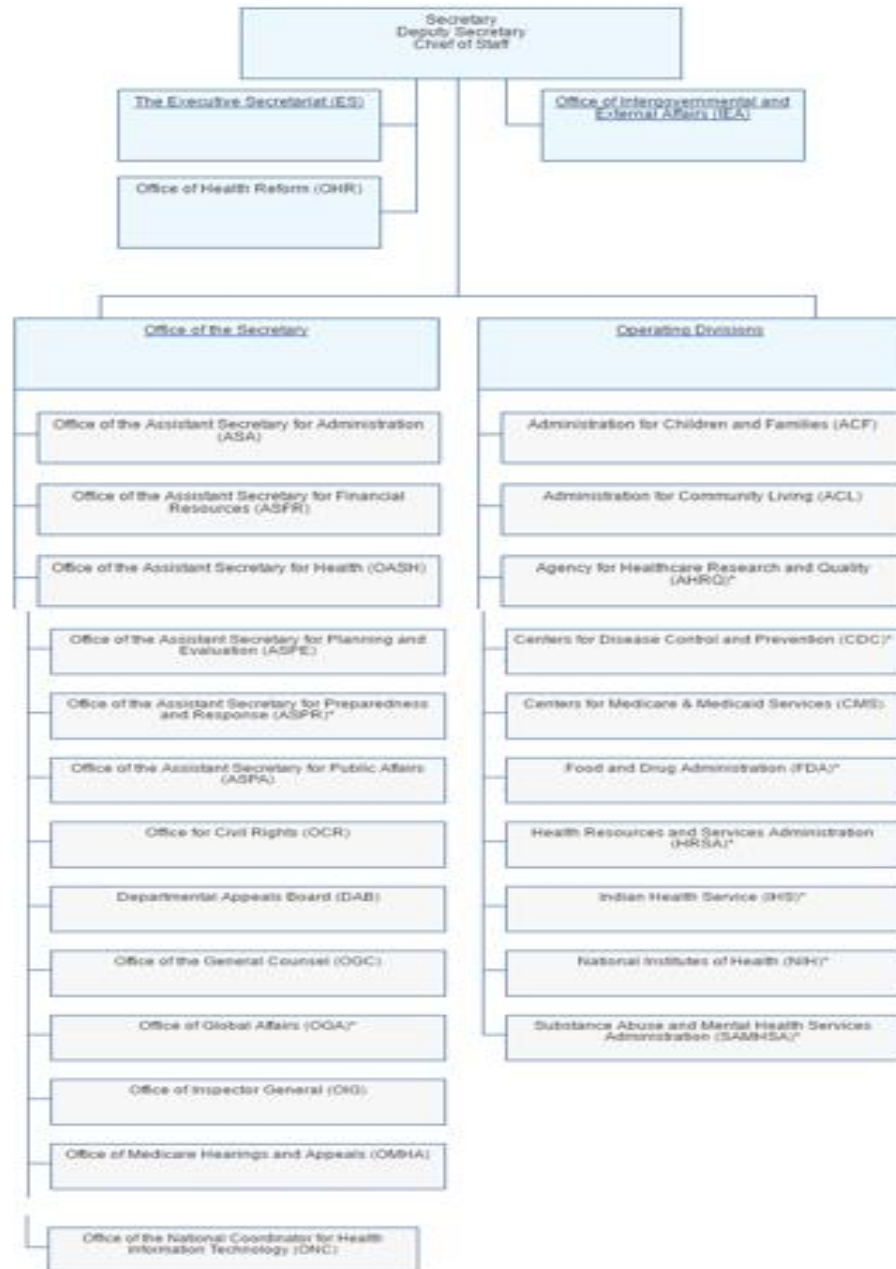
	SNOMED-CT
<i>Cyanotic</i>	3253007
<i>Skin-Blue</i>	3253007



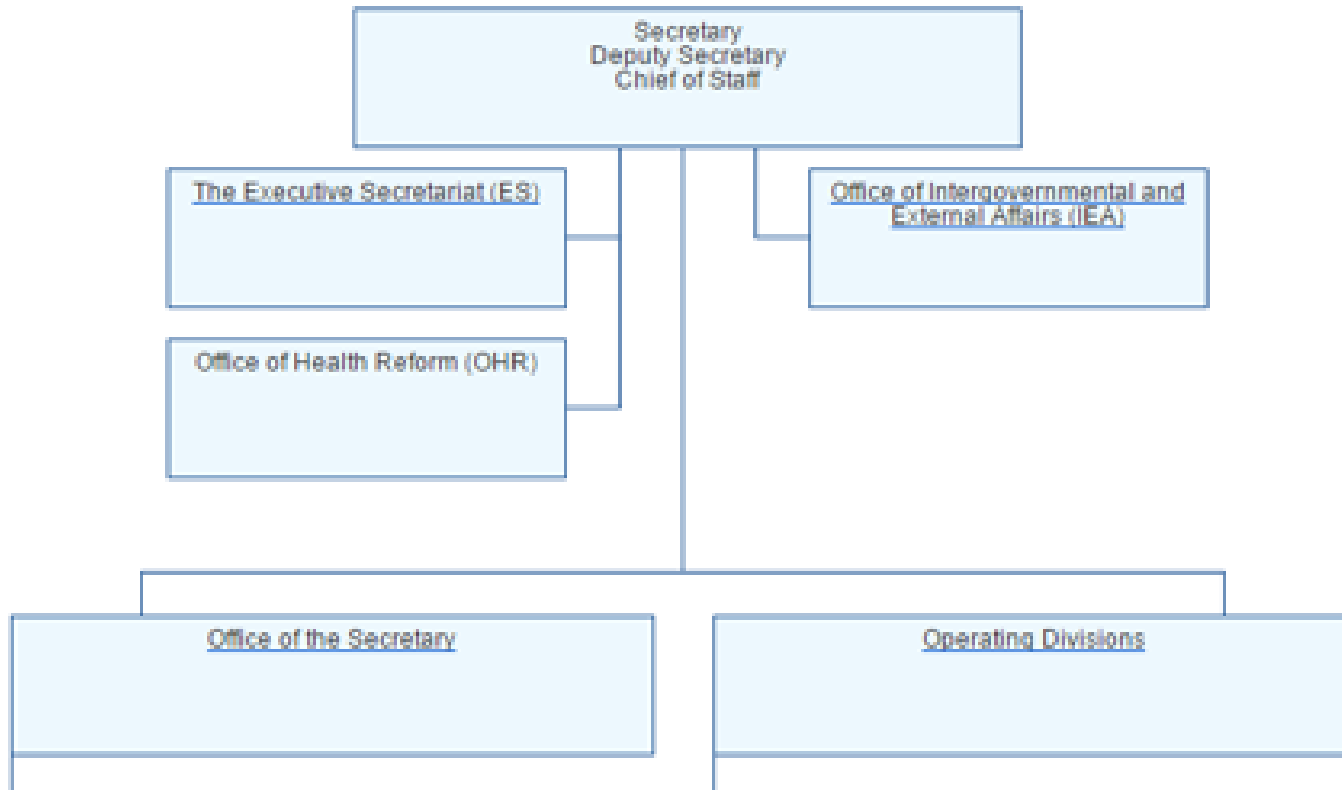
Interoperability U.S. Regulators

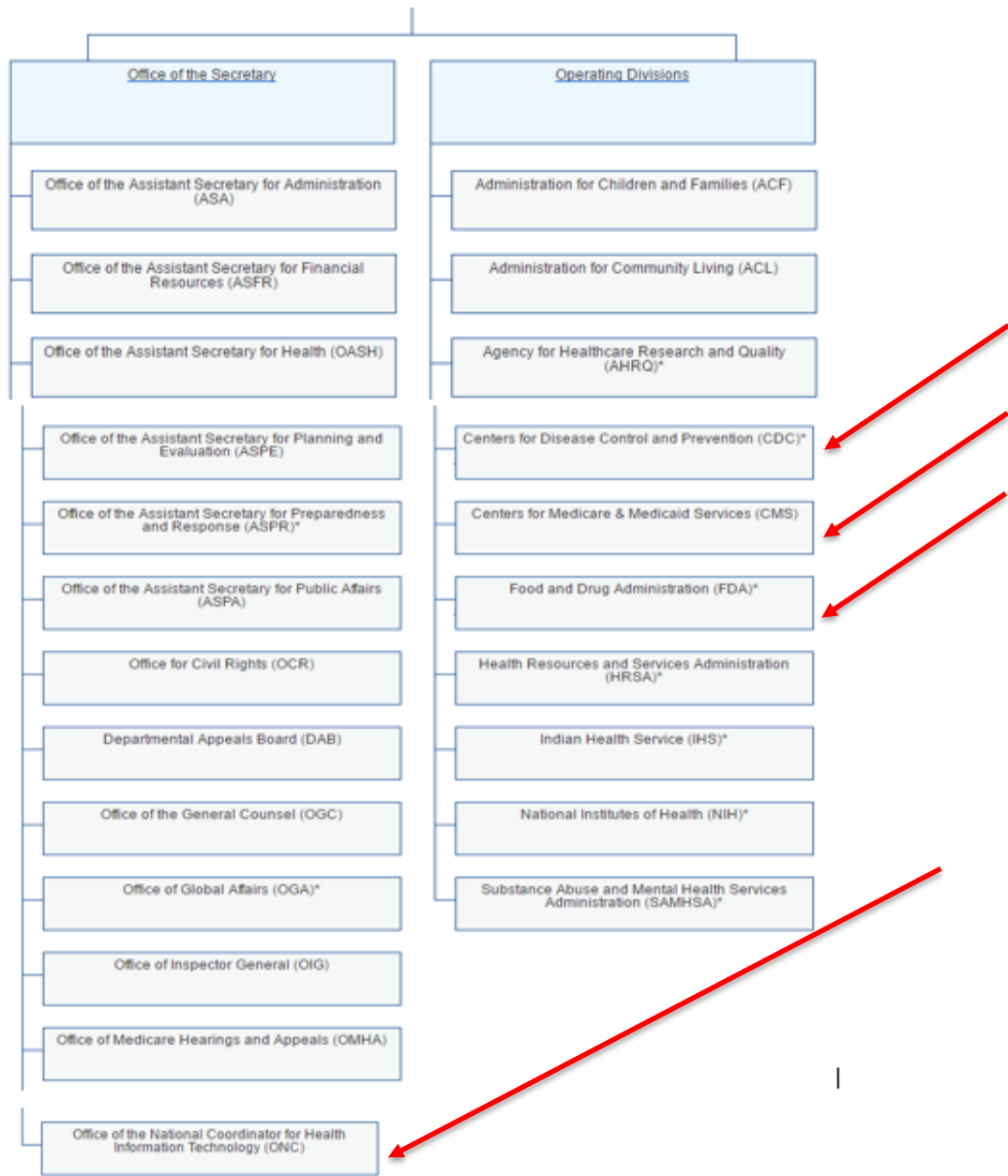
- Health and Human Services (HHS)
- Centers for Medicare and Medicaid Services (CMS)
- Centers for Disease Control and Prevention (CDC)
- Food and Drug Administration (FDA)
- Office of National Coordinator for Health Information Technology (ONC)
- National Library of Medicine (NLM)

U.S. Health and Human Services (HHS)



U.S. Health and Human Services (HHS)





Interoperability Standards

- **ONC** – Office of the National Coordinator for Healthcare Information Technology, <https://www.healthit.gov/>
- **HL7** – Healthcare Level Seven International, <http://www.hl7.org/>
- **ISO** – International Organization for Standardization, <https://www.iso.org/home.html>
- **DICOM** – Digital Imaging and Communication in Medicine, <http://dicom.nema.org/>
- **ASTM** – The American Society for Testing and Materials International, <https://www.astm.org/>
- **CDISC** – Clinical Data Interchange Standards Consortium, <https://www.cdisc.org/>

ONC (Office of the National Coordinator for Healthcare Information Technology)

A department of the HHS and part of the HITECH Act. They have initiatives underway to standardize:

- *meaning* through the use of standardized healthcare vocabularies,
- *structure* by leveraging standards in HL7,
- *transport* using secure email protocols,
- *security* through National Institute of Standards and Technology (NIST)-adopted encryption standards, and
- *services* through open, and accessible application programming interfaces (APIs).

HL7 (Health Level Seven)

- Develops international standards for interoperability and messaging
- Includes the Consolidated Clinical Document Architecture (C-CDA) and EHR functional model
- HL7 international standards sometimes must be modified to meet the "meaningful use" EHR Incentive Program or reimbursement systems criteria unique to the United States

ISO (International Organization for Standardization)

- Began in 1946
- World's largest independent, non-governmental developer of voluntary consensus standards with a membership of 162 countries
- Has many technical committees (TCs)
- ISO/TC 215 Health Informatics primarily develops voluntary standards in the field of information for healthcare delivery, disease prevention and wellness promotion, public health and surveillance, and clinical research to promote interoperability
- ISO 45001 Occupational Health and Safety Standard
- ISO 13485 Medical Devices Standard

DICOM (Digital Imaging and Communications in Medicine)

- First published in 1993
- Is *the* international standard for medical images and related information (ISO 12052)
- Defines the formats for medical images that can be exchanged with the data and quality necessary for clinical use
- Implemented in almost every radiology, cardiology imaging, and radiotherapy device (X-ray, CT, MRI, ultrasound, etc.), and increasingly in devices in other medical domains such as ophthalmology and dentistry

ASTM (American Society for Testing and Materials international)

- Founded in 1898, by Charles B. Dudley, Ph.D., a chemist with the Pennsylvania Railroad
- In 2001, changed its name to ASTM International
- A globally recognized leader in the development and delivery of voluntary consensus standards that are used around the world to improve product quality, enhance health and safety, strengthen market access and trade, and build consumer confidence

CDISC (Clinical Data Interchange Standards Consortium)

- Formed in 1997
- A global, non-profit data standards developer for clinical research and related areas of healthcare
- Informs patient care and safety through higher quality medical research from protocol through analysis and reporting of results

Common Terminologies

- Billing Terminologies:
 - ABC – Alternative Billing Codes
 - CPT – Current Procedural Terminology
 - CDT – Current Dental Terminology
 - HCPCS I – Healthcare Common Procedure Coding System Code Set Level I
 - HCPCS II – Healthcare Common Procedure Coding System Code Set Level II
 - **ICD-10-CM** - International Statistical Classification of Diseases and Related Health Problems, tenth revision, Clinical Modification
 - **ICD-10-PCS** - International Statistical Classification of Diseases and Related Health Problems, tenth revision, Procedure Coding System

Common Terminologies

- Nursing Terminologies:
 - CCC - Clinical Care Classification System
 - NANDA – North American Nursing Diagnosis Association International Taxonomy II
 - NIC – North American Intervention Classification
 - NOC – Nursing Outcome Classification
 - Omaha System
 - PNDS – Perioperative Nursing Data Set

Common Terminologies

- Other Terminologies:
 - LOINC – Logistical Observation Identifiers, Names and Codes
 - MEDCIN –
 - NDC – National Drug Code
 - RxNorm
 - SNODENT – Systematized Nomenclature of Dentistry
 - SNOMED-CT – Systematized Nomenclature of Medicine Clinical Terms
 - UMDNS – Universal Medical Device Nomenclature System

EHRs and Interoperability

- Commonly used standards and terminologies used in EHRs systems include:
 - HL7 CCR or CCD
 - DICOM
 - SNOMED-CT
 - LOINC
 - ICD-9-CM
 - ICD-10-CM/PCS
 - RxNorm
 - CPT
 - HL7 FHIR

Recommendations for Nursing

- Standardization of workforce data using Nursing Management Minimum Data Set (NMMDS)
 - Mapped to LOINC
- Standardization of assessments using LOINC
- Standardization of problems, procedures (interventions), and outcomes using SNOMED-CT
 - Most nursing terminologies mapped to SNOMED-CT

Promoters of Standards Development

- **ONC S&I Framework** – Office of National Coordinator Standards and Interoperability Framework
- **WEDI** – Workgroup for Electronic Data Interchange
- **AHIMA** – American Health Information Management Association
- **HIMSS** – Healthcare Information Management Systems Society
- **IHE** – Integrating the Healthcare Enterprise

Healthcare Information Management Systems Society (HIMSS)

- Formed in 1961 as the Hospital Management Systems Society (HMSS)
- Global leader to transform health and healthcare through the best use of information technology
- Leads efforts to optimize health engagements and care outcomes using information technology
- Collaborative Activities:
 - ANI – Alliance for Nursing Informatics
 - Center for Information Technology Leadership
 - Certification Commission for Health Information Technology
 - Congressional Luncheon Seminar Series
 - Connecting for Health
 - IHE

Nursing Knowledge: Big Data Initiative

- Annual conference coordinated through University of Minnesota School of Nursing: <https://www.nursing.umn.edu/centers/center-nursing-informatics/news-events/2017-nursing-knowledge-big-data-science-conference>
- Conference proceedings available for past conferences
- 2017 conference June 8-9 in Minneapolis

Organizations Supporting Interoperability

- Clinical Information Modeling Initiative (CIMI)
 - “Improve interoperability of healthcare systems through shared implementable clinical information models”
<http://opencimi.org/>”
- Health Services Platform Consortium (HSPC)
 - “Improve health by creating vibrant, open ecosystem of interoperable applications, knowledge, content, and services
<https://healthservices.atlassian.net/wiki/display/HSPC/Healthcare+Services+Platform+Consortium>”

Center for Medical Interoperability

- “501(c)(3) cooperative research and development lab founded by health systems to simplify and advance data sharing among medical technologies and systems. We provide a centralized, vendor-neutral approach to performing technical work that enables person-centered care, tests and certifies devices and systems, and promotes the adoption of scalable solutions”
- <http://medicalinteroperability.org/>

Challenges to Interoperability

Knowledge

- Informatics competency
- Faculty preparation
- Workforce knowledge

Practice

- Workflow design
- Documentation requirements
- Demonstrate value

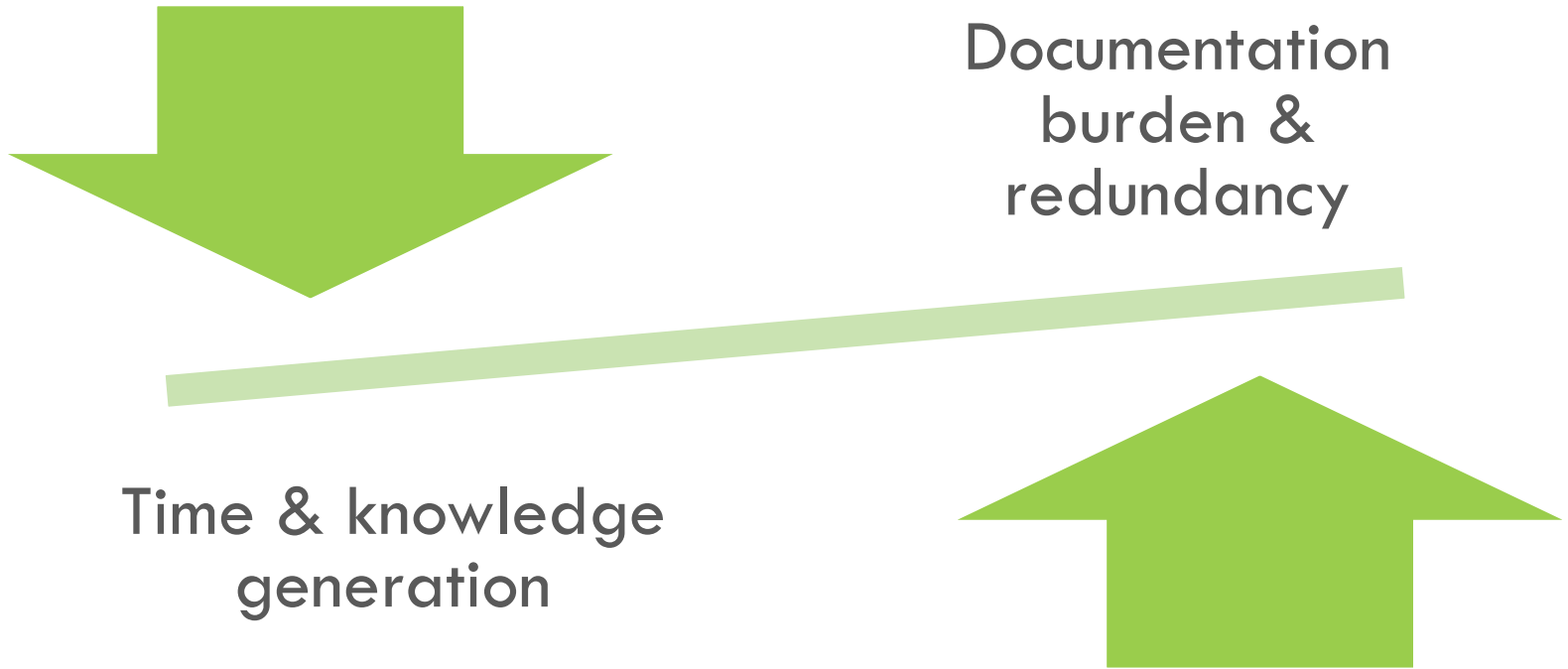
Policies/ Resources

- Engagement
- Resources for collaboration
- Financial incentives

Research

- Standards
- Mapping to standards
- Shared value sets

Benefits of Interoperability



In Conclusion

You're Invited

Solutions and How to Engage Within Interoperability: Perspectives from the Nursing Informatics Community and IHE Part 2

Tuesday, June 6 | 12:00pm CT

This webinar will explain the work of Integrating the Healthcare Enterprise (IHE) to facilitate Health IT interoperability. The presentation will include the history and current activities at IHE and discuss specific examples of challenges and opportunities to using IHE standards in health system settings and their applicability to nursing.

- Featuring:
 - **Catherine Ivory**, PhD, RNC-OB, RN-BC, Assistant Professor, Vanderbilt University School of Nursing
 - **Emma Jones**, RN, MSN - BC | Expert Business Analyst, Community Solutions, Allscripts

Questions

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