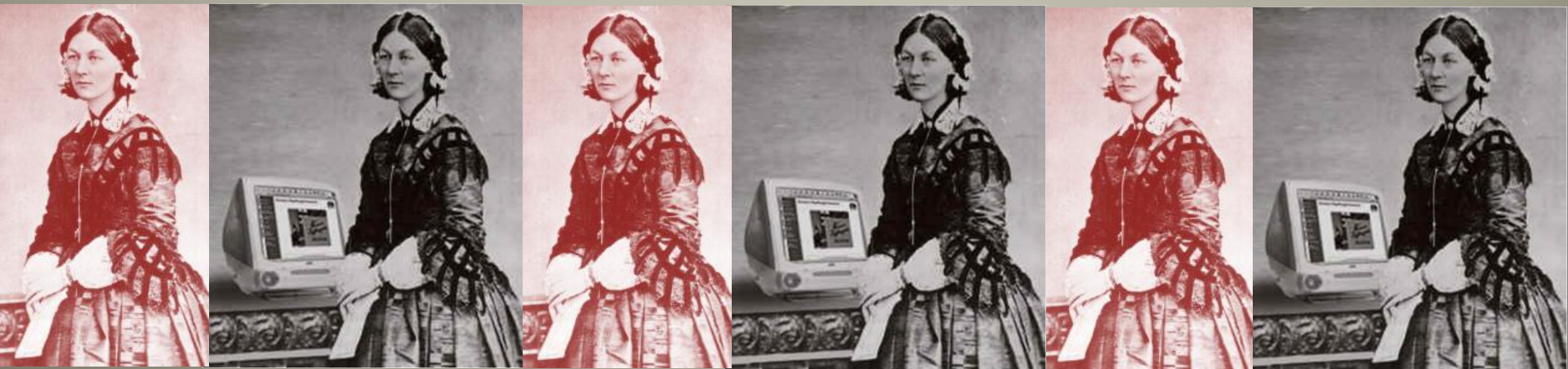# Informatics: History, Theory, Concepts and Competencies

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Objectives

- Review informatics history, definitions, theory and concepts as it relates to the healthcare environment and role of the professional nurse.

- Discuss the role of nurses as knowledge workers.

- Differentiate between computer literacy versus information literacy.

- Compare and contrast the informatics competencies for each level of nursing education.

What is Informatics?

- The term informatics was derived from the French term *informatique*, which means to refer to the computer milieu (Saba, 2001).

- Some trace this back to a Russian document published in 1968

- Europeans first coined the term in the 1980's

- Application to various disciplines

What is Informatics?

- **Information Science**

- **Information System**

- **Information Technology**

- **Information Management**

- **Informatics**

- discipline that studies information processing

- hardware and software

- general term for information processing with computers

- Process of turning data into information and knowledge

- combines the study of information processing and computers

What is Nursing Informatics?

Classic Definition

- Nursing Informatics is a combination of computer science, information science and nursing science designed to assist in the management and processing of nursing data, information, and knowledge to support the practice of nursing and the delivery of nursing care (Graves & Corcoran, 1989).

- Authors have different definitions and models of nursing informatics which continue to evolve

Nursing Informatics Defined

- Scholes and Barber (1980)
  - "… is the application of computer technology to all fields of nursing - nursing service, nurse education, and nursing research"

- McCormick & Saba (1996)
  - "Branch of informatics concerned with nurses use of computer technology & management of information that facilitates nursing practice and enhances nursing knowledge."

Nursing Informatics Defined

- "…integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge and wisdom into nursing practice. …facilitates the integration of data, information, knowledge and wisdom to support patients, nurses, and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology" (American Nurses Association [ANA] 2007, p. 1).

Nursing Informatics History

- Florence Nightingale – First Nurse Informatician
- 1970's
  - El Camino Hospital (Mt View, CA), NIH, VA, DOD develop HIS
  - 1976 - First journal dedicated to medical informatics
- 1980's
  - 1982 - First NI conference at St. Agnes, Baltimore
  - 1989 - UMSON started first NI program
- 1990's
  - 1991 -Nancy Staggers first PhD in NI
  - 1992 -American Nurses Association (ANA) recognizes NI specialty
  - 1994 - ANA Scope & Standards of NI Practice

What's in a Name?

NURSING INFORMATICS

Health Informatics

Medical Informatics

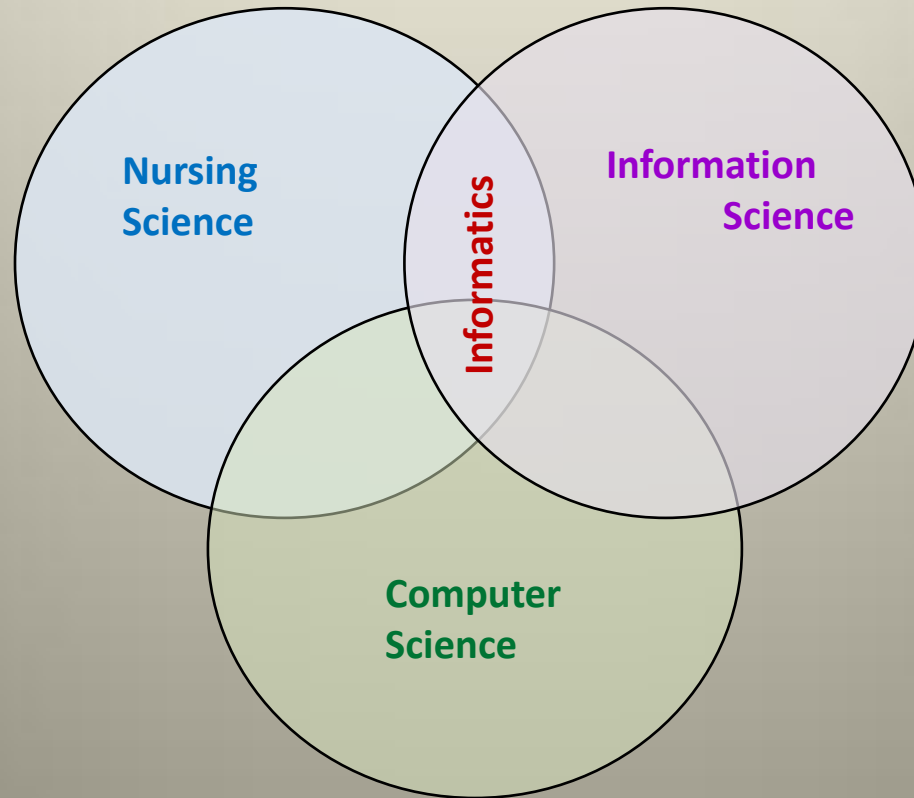Public Health Informatics

CLINICAL INFORMATICS
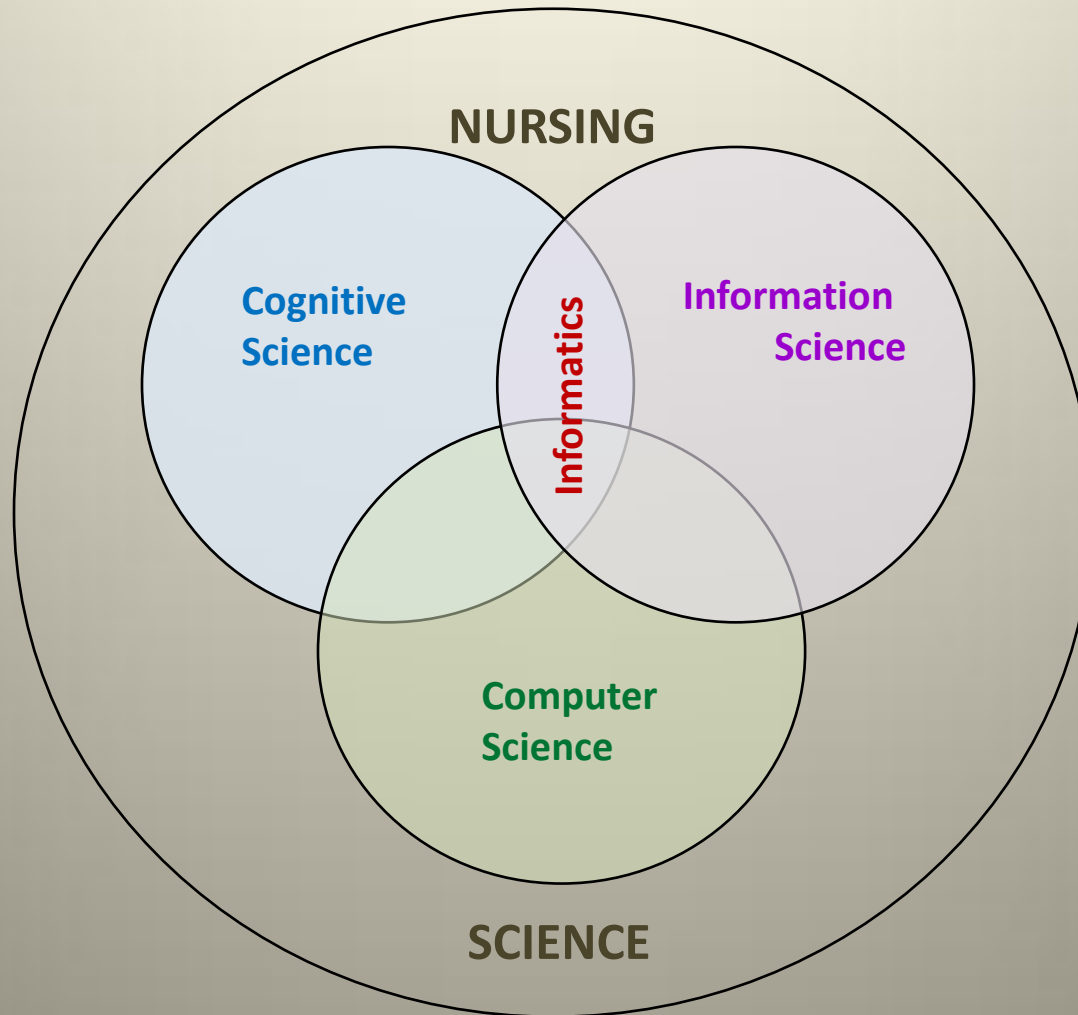
Biomedical Informatics

Consumer Informatics

Informatics Theory, Concepts and Frameworks
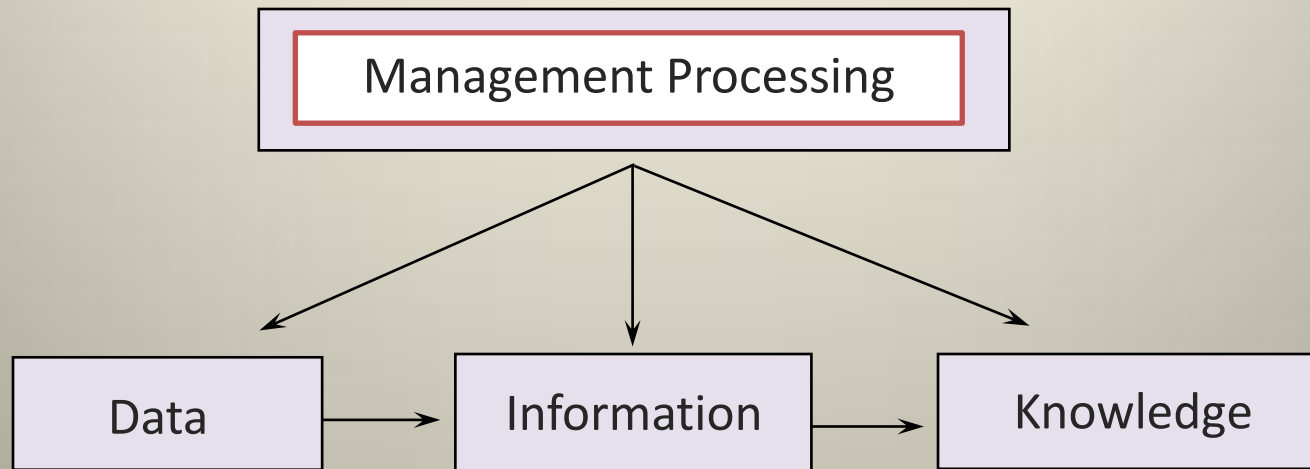
Graves and Corcoran (1989)

Conceptual Model of Nursing Informatics

Turley (1996)

Conceptual Framework for Study of Nursing Knowledge

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┌─────────────────────────────┐
│  ┌───────────────────────┐  │
│  │ Management Processing │  │
│  └───────────────────────┘  │
└─────────────────────────────┘
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┌──────────┐   ┌──────────────┐   ┌──────────────┐
│   Data   │ ───► │ Information │ ───► │ Knowledge   │
└──────────┘   └──────────────┘   └──────────────┘

Graves & Corcoran (1989)

✓ **Data** are discrete, uninterpreted entities

✓ **Information** is interpreted, organized, and structured data

✓ **Knowledge** is information synthesized in such a way that it is possible to see relationships, formulate opinions, and make predictions

Examples of DIKW

- **Data** – one individuals vital signs - heart rate, respiration, temperature, and blood pressure

- **Information** - serial set of vital signs taken over time, placed into a context, and used for longitudinal comparisons

- **Knowledge** – recognition of a pattern and identification of interventions reflects information synthesis (knowledge) based on nursing knowledge and experience.

Graves and Corcoran (1989)

- **Nursing Data Issues**

  – "Whole person" difficult to describe/represent

  – Complexity of nursing phenomenon

    - Multidimensional

    - Temporal

    - Context dependencies

    - Categories hard to standardize

Graves and Corcoran (1989)

- **Nursing Information Issues**
  - Data modeling
    - Nursing languages and representations
  - System design
    - Capturing and storing nursing data dependent on design

Graves and Corcoran (1989)

- **Knowledge Issues**

  – Systems that support clinical inference require understanding of nursing decision-making

  – Problem solving is discipline and expertise specific

Information vs. Knowledge Management

- Good information management provides the right information at the right time to the right people.

- Knowledge management creates systems that enable organizations to tap into the knowledge, experiences, and creativity of their staff to improve their performance.
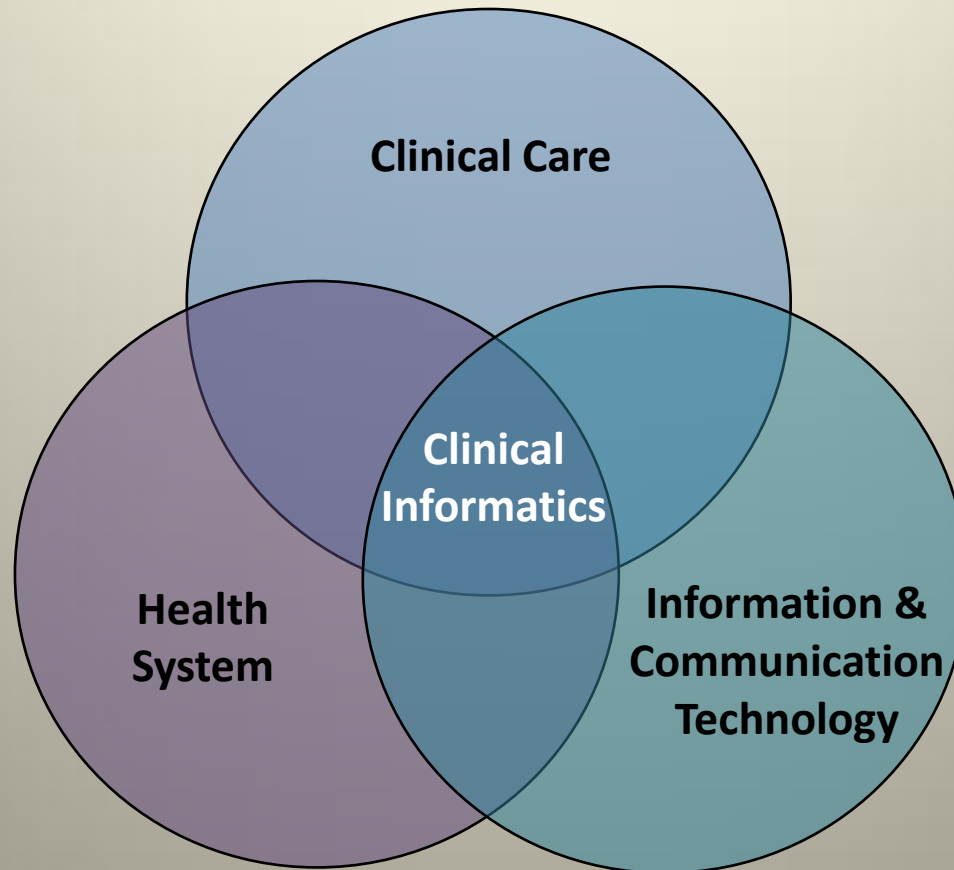
Knowledge to Wisdom

Wisdom added to model

Data→ Information→ Knowledge→ Wisdom

Difference between Knowledge and Wisdom
- Knowledge focuses on what is known
- Wisdom focuses on the appropriate application of that knowledge to human problems

Domains of Clinical Informatics

Reed & Overage et al. (2009). AMIA Board of
Directors, JAMIA 16(2).

Role of Nurse and Competencies

Informatics Benefits

- Support for work processes
- Improved records
- Decreased redundancy
- Increased convenience
- Improved data collection
- Prompts to improve documentation
- Improved safety with decision support
- Improved communication and access

Computer vs. Information Literacy

Computer Literacy

- Familiar with use of computer hardware and software to include:
  - Basic operating systems
  - Word processing
  - Spreadsheets
  - Databases
  - Presentation Graphics
  - E-mail

Information Literacy

- The ability to:
  - Identify information needed for a specific purpose
  - Locate pertinent information
  - Evaluate the information
  - Apply information correctly

Nurse as Knowledge Worker

- Nurse as knowledge worker
  - RNs roles in patient care:
    - Data gatherer
    - Information user
    - Knowledge user
    - Knowledge builder
- Information management in health care
  - Can support efforts of nurse and health care team in the care of patients
  - Good information is essential in caring for patients. Inaccurate data leads to medical errors.

Nurse as Knowledge Worker

- Nurses rely on their own knowledge, but need access other information in order to provide safer patient care.

- Technology supports EBP through access to information

- Nurses use data and information from multiple sources which is converted to knowledge.

- Nurse then acts upon this knowledge by initiating a plan of care, updating an existing one or maintaining status quo.

- Nurses detect patterns in data and information to create new knowledge

Informatics Competencies

Staggers et al. (2002)*

- Beginning nurse
- Experienced nurse
- Informatics nurse specialist (INS)
- Innovator nurse

ANA (2008)**

- Entry level
- Experienced nurse
- Informatics nurse
- Informatics nurse specialist (INS)

*Staggers, Gassert, and Curran (2002)
**Nursing Informatics, Scope and Standards of Practice* (ANA, 2008)

Nursing Informatics Today

Roles

- Chief Information Officer
- Project Manager
- Outcomes Manager
- Product Developer
- Analyst
- Consultant
- Educator
- Researcher
- Policy Development

Organizations

- International Medical Informatics Association
- American Medical Informatics Association
- Health Information Medical System Society
- American Nursing Informatics Association