



What is Biomedical and Health Informatics? (1/2)

What is Biomedical & Health Informatics?
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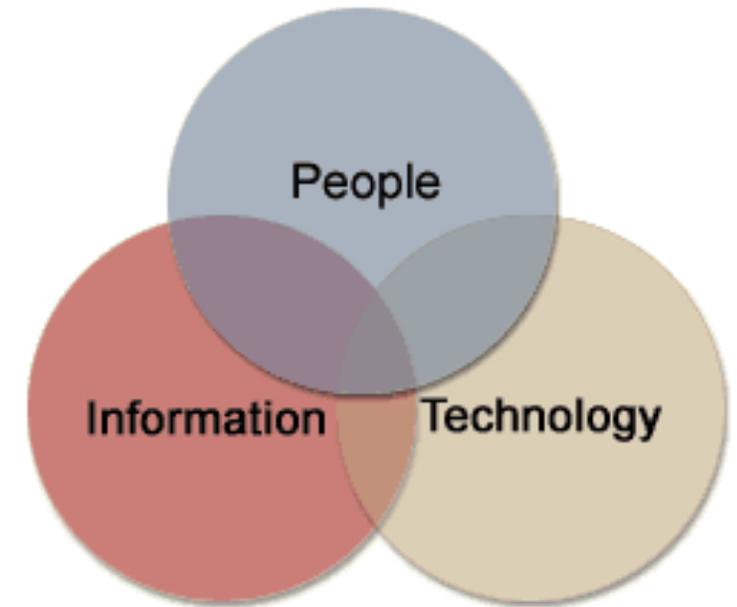
- I get asked this so often that I keep a Web site
 - <http://informatics.health/>
- And a blog
 - <https://informaticsprofessor.blogspot.com>
- I have also written articles and chapters about it
 - Medical informatics: improving healthcare through information (Hersh, 2002)
 - But there are barriers (Hersh, 2004)
 - Characterization of and changes in the profession (Hersh, 2006)
 - Many career opportunities as well (Hersh, 2008)
 - Reconciling definitions of terms (Hersh, 2009)
 - The informatics professional workforce (Hersh, 2010)
 - Clinical informatics (Hersh, 2020)
 - Textbook (Hersh, 2022)

Other views

- Early definition: “storage, acquisition, and use of information” (Greenes, 1990)
- Other (US) perspectives
 - “The science of information applied to biomedicine ... data plus meaning.” (Bernstam, 2010)
 - Paradigm shift in biomedicine from “individual brains to systems of brains” (Stead, 2010)
 - AMIA: “The interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving, decision making, motivated by efforts to improve human health” (Kulikowski, 2012)
- European and global perspectives (Haux, 2010; Hasman, 2011; Geissbuhler, 2011)

Let us start by defining “informatics”

- The discipline focused on the use of information, aided by technology, to improve individual health, healthcare, public health, and research in biomedicine and health (Hersh, 2022)
 - Is more about information than technology
- Sometimes defined as activity at the intersection of people, information, and technology
- The science of “sociotechnical systems” (Coiera, 2007)



(SUNY Buffalo)

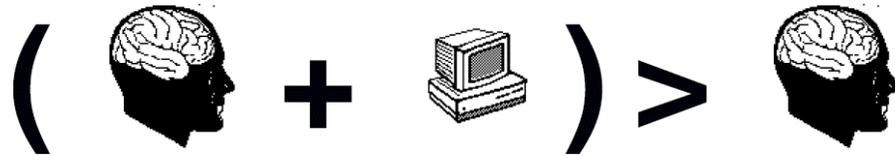
What informatics “is and isn’t” (Friedman, 2013)

- Is
 - Cross-training where basic informational sciences meet a biomedical application domain
 - Relentless pursuit of assisting people
 - Tower of achievement
 - Model formulation
 - System development
 - System implementation
 - Study of effects
- Isn’t
 - Scientists or clinicians tinkering with computers
 - Analysis of large data sets per se
 - Circumscribed roles related to deployment of electronic health records (*point of disagreement)
 - Profession of health information management
 - Anything done using a computer

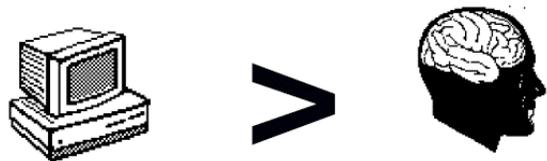
It has a “fundamental theorem” and a “golden rule”

Fundamental Theorem
(Friedman, 2009) – based on
“relentless pursuit of assisting
people”

Goal of informatics is



Goal is not



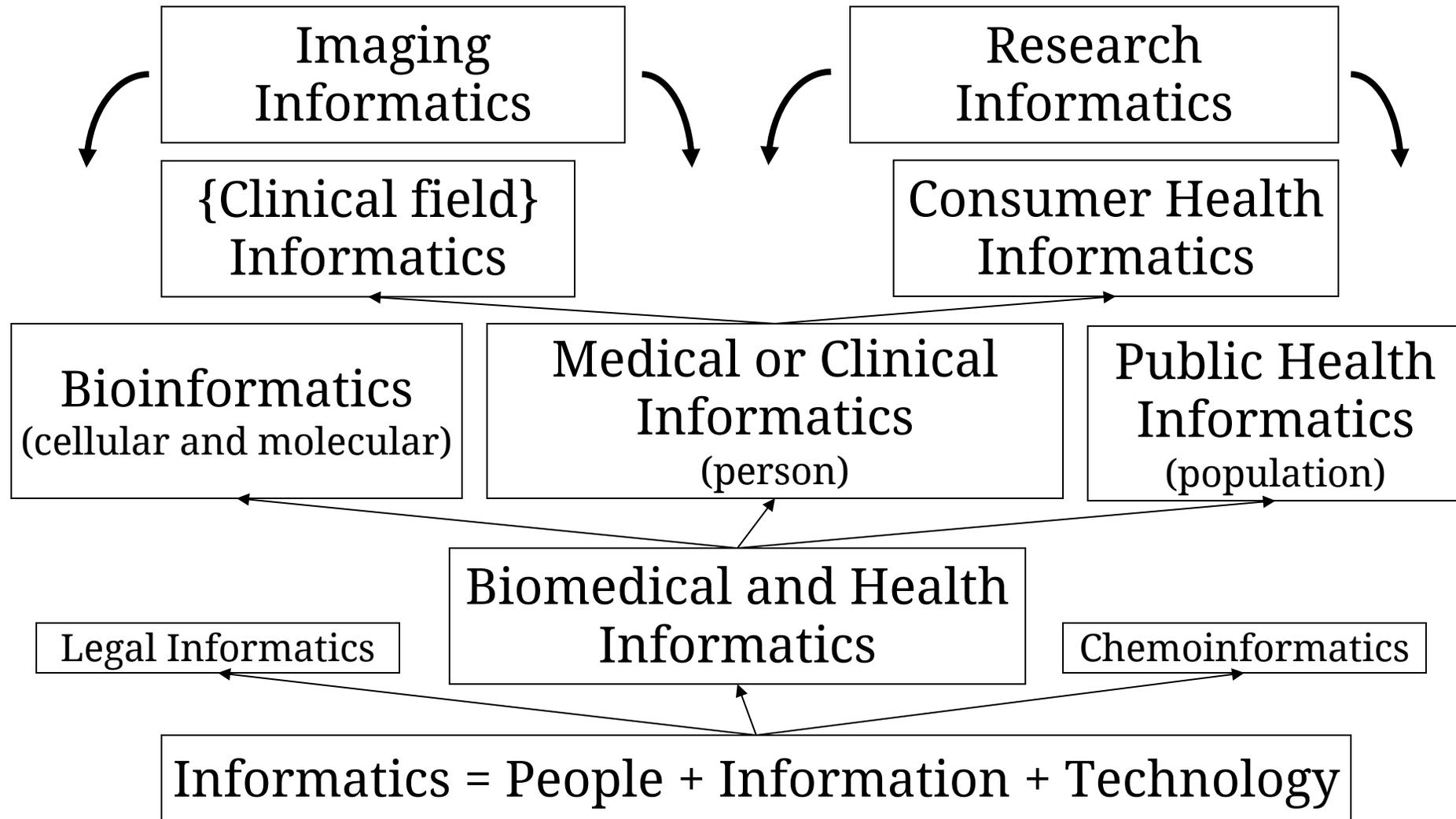
Golden Rule
(Kuperman, personal
communication,
2013):

“Never implement
unto others that
which you would not
implement unto
yourself”

My current preferred terminology

- *Biomedical and health informatics* (BMHI) is the field concerned with the optimal use of information, often aided by technology, to improve individual health, healthcare, public health, and biomedical research
 - Informatics applied in a more focused domain is {X} informatics, e.g., nursing, dental, pathology, primary care, etc.
 - Can be classified by “level” of domain but also has some overarching areas, e.g., imaging and research
- Practitioners of BMHI are usually called *informaticians* (sometimes *informaticists*)

It also has an “adjective problem”

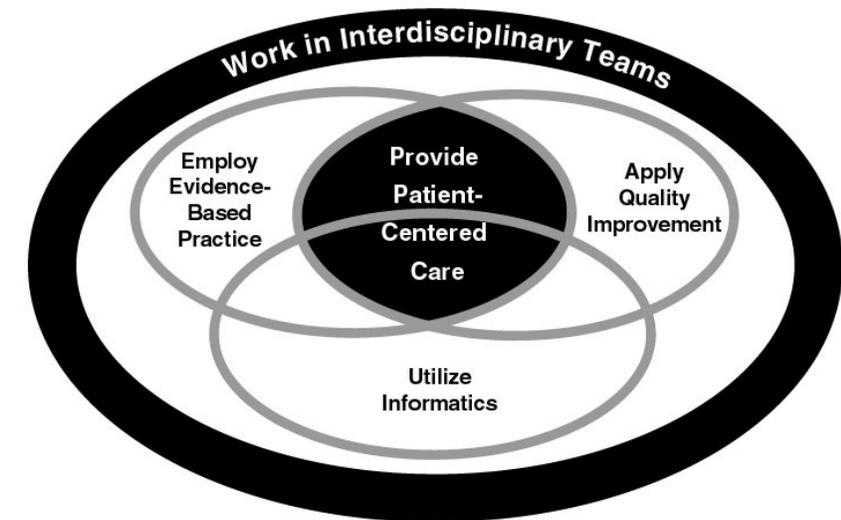


(Hersh, 2009; adapted from Shortliffe textbook)

Informatics now viewed as a core competency for health professionals

- According to Institute of Medicine report, the modern healthcare professional must have competency in informatics as part of larger goal to provide patient-centered care (Greiner, 2003)
- Informatics competency is not just computer literacy!
 - The “Google generation” does not necessarily have good information skills (Rowlands, 2008)
- Informatics is a core component of the “learning health system” (Friedman, 2010; Smith, 2012)

Overlap of Core Competencies for Health Professionals



Historical perspective of “informatics”

- Origin of term attributed to Dreyfus in 1962 (Fourman, 2002)
- Achieved widespread use in France (*informatique*), Russia, and later rest of Europe in 1960s to denote computing issues related to information use
- “Medical informatics” first used in 1974 (Collen, 1994)
 - More European history from Moehr (2004)
 - History of field documented by Collen (2015)
- At present, most significant use is in biomedical arena, but it is used by other domains, such as law, chemistry, social sciences, etc.

How is informatics distinguished from related terms?

- *Information technology* (IT) – computer and related technology
- *Computer science* is academic discipline that underlies IT (and other technologies)
- *Management information systems* is another field underlying IT (usually in business schools)
- *Health information technology* (HIT or health IT) – health-related application of IT

Other related terms – health information management (HIM)

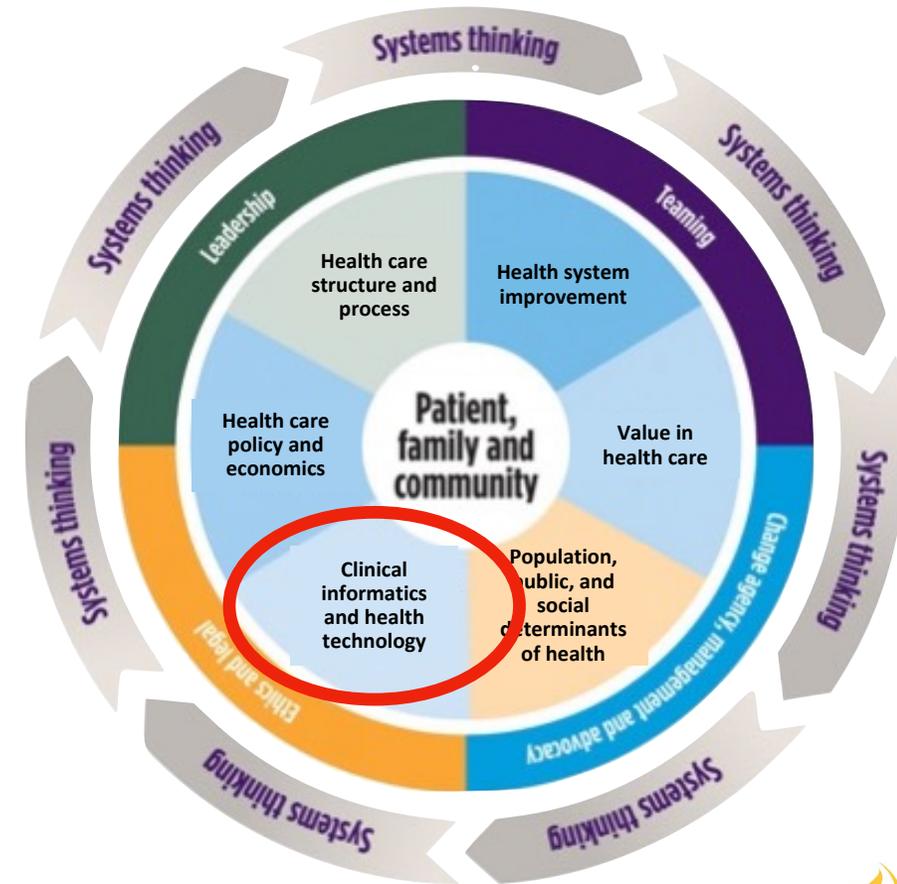
- Discipline historically focused on management of (paper) medical records (changing in current environment), with three main levels of practice
 - *Registered Health Information Administrator (RHIA)* – highest level, baccalaureate degree
 - *Registered Health Information Technologist (RHIT)* – associate degree
 - *Certified Coding Specialist (CCS)* – usually less than associate degree

Other related terms – digital health

- Broad term for digital, i.e., IT-related, aspects of health and healthcare (Rivas, 2018; Snowden, 2020; D’Anza, 2022; Abernethy, 2022) – emanates from
 - *Information and communications technology* (ICT) – same as IT with added emphasis on telecommunications
 - *eHealth* – use of ICT for health
 - *mHealth* – use of mobile devices for health
- Growing efforts in
 - United States – <https://www.fda.gov/medical-devices/digital-health-center-excellence>
 - Australia – <https://digitalhealth.org.au/>
 - Asia - <https://www.adb.org/publications/implementing-digital-health-pacific-guide>
- Related terms include
 - *Telemedicine* – provision of healthcare when participants separated by time and/or distance
 - *Telehealth* – pursuit of health when separated by time and/or distance

Other related terms – health systems science (HSS)

- A new science for medicine, different from basic and clinical sciences (Gonzalo, 2019)
 - Textbook (Skochelak, 2020) includes chapter on clinical informatics (Hersh, 2020)
- Growing incorporation into medical education (Borkan, 2021)



Other related terms

- *Evidence-based medicine* (EBM) – application of best scientific evidence in medical decision-making
- *Evidence-based practice* (EBP) – application of EBM in clinical practice
- *Information retrieval* (IR, also known as *search*) – field devoted to searching (mostly text, mostly knowledge-based information)
- *Clinical practice guidelines* (CPGs) – systematically developed statements to guide practitioner and patient decisions about appropriate healthcare