CLINICAL INFORMATICS LITERACY

5000 Concepts That Every Informatician Should Know

Dean F. Sittig

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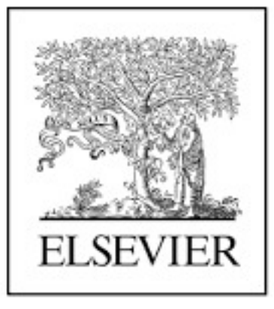
DEAN F. SITTIG, PHD

School of Biomedical Informatics
University of Texas, Houston, TX, United States



ACADEMIC PRESS

An imprint of Elsevier

Academic Press is an imprint of Elsevier
125 London Wall, London EC2Y 5AS, United Kingdom
525 B Street, Suite 1800, San Diego, CA 92101-4495, United States
50 Hampshire Street, 5th Floor, Cambridge, MA 02139, United States
The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, United Kingdom

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Library of Congress Cataloging-in-Publication Data
A catalog record for this book is available from the Library of Congress

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-0-12-803206-0

Publisher: Mica Haley
Acquisitions Editor: Rafael Teixeira
Editorial Project Manager: Mariana Kühl Leme
Production Project Manager: Chris Wortley
Designer: Victoria Pearson Esser

Typeset by TNQ Books and Journals

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ACKNOWLEDGMENTS

The following people were instrumental in helping me identify concepts to be included in this book: Emily Campbell, JoAnn Kaalaas-Sittig, Allison B. McCoy, and Daniel G. Miller, Adam Wright. In addition, I reviewed the glossaries from the following clinical informatics textbooks: Coeira's *Guide to Health Informatics, Third Edition*, Shortliffe and Cimino's *Biomedical Informatics: Computer Applications in Health Care and Biomedicine, Third Edition*, Rowland's *A Practitioner's Guide to Health Informatics in Australia.*

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ABOUT THIS BOOK

This book was modeled after Hirsch's book *Cultural Literacy: What Every American Needs to Know,* which contains over 5000 names, phrases, dates, and concepts that every American should know to consider themselves culturally literate. After reading this book, I decided that there must be at least 5000 concepts that every clinical informatician should know as well. This book represents my attempt to develop such a list.

What is Clinical Informatics?

Clinical informatics is the relatively new scientific field that focuses on the sociotechnical aspects of the use of information and information technology to study and improve the health of individuals and the organizational and technical systems that support them in that endeavor. While many have tried to prove that clinical informatics and the artifacts it creates can directly improve the health of individuals or the health of large populations of individuals, in my experience such improvements in health or health care are an indirect result of the work of clinical informaticians. Therefore, by definition, clinical informatics is a multidisciplinary field that requires widespread clinical and technical knowledge as well as the ability to work alongside expert-level clinicians, technologists, and healthcare administrators.

This book is designed to help those interested in the field of clinical informatics to understand the breadth of knowledge required to successfully participate in the design, development, implementation, use, and evaluation of the health information technology (HIT) required to transform the current complex adaptive healthcare system into a robust, reliable, efficient, and cost-effective HIT-enabled healthcare system. Such a transformation will require concerted effort on the part of many individuals who each bring unique knowledge, skills, and experience to bear on the myriad problems that must be identified, defined, explored, and overcome.

A Sociotechnical Approach to Clinical Informatics

As previously stated, clinical informatics is a sociotechnical field that is well-described by an eight-dimension sociotechnical model that Hardeep Singh, MD, MPH, and I developed to help clinicians, technologists, and researchers understand the

various sociotechnical aspects of the field and their complex interactions. The following sections (adapted from Sittig DF, Singh H. A new sociotechnical model for studying health information technology in complex adaptive healthcare systems. Quality & Safety in Health Care. 2010 Oct; 19 Suppl 3:i68–74. http://dx.doi.org/10.1136/qshc.2010.042085) describe each of these eight dimensions, first in terms of what is meant by each dimension and second, why each dimension is so important to understanding the complexity of the field. Included within each dimension are a few examples of the categories of concepts related to that dimension.

Hardware and Software Computing Infrastructure

This dimension of the model focuses solely on the hardware and software required to run the clinical informatics applications. The most visible part of this dimension is the computer, including the monitor, printer, and other data display devices along with the keyboard, mouse, and other data entry devices used to access clinical applications and medical or imaging devices. This dimension also includes the centralized (network-attached) data storage devices and all of the networking equipment required to allow applications or devices to retrieve and store patient data. Also included in this dimension is software at both the operating system and application levels. Finally, this dimension of the model subsumes all the machines, devices, and software required to keep the computing infrastructure functioning such as the high-capacity air conditioning system, the batteries that form the uninterruptible power supply (UPS) that provides short-term electrical power in the event of an electrical failure, and the diesel-powered backup generators that supply power during longer outages. In short, this dimension is purely technical; it is only composed of the physical devices and the software required keeping these devices running.

One of the key aspects of this dimension is that, for the most part, the end-users are not aware that most of this infrastructure exists until it fails. Therefore, everyone working in the field of clinical informatics must have at least a passing knowledge and understanding of the design, development, implementation, use, and monitoring of the equipment and methods used to keep the computer applications running. Likewise, since the entire computing industry continues to move forward with astonishing speed, clinical informaticians need to be aware of the latest developments and improvements in the hardware and software they are relying on. Often, what was virtually impossible several years ago, due to inadequate processing power (e.g., real-time

monitoring of all in-patients to identify potential cases of sepsis via a remote-hosted service), data storage capacity (i.e., real-time access to all patients complete history of imaging procedures, clinical notes and reports), or networking bandwidth (i.e., real-time broadcast of telemedicine-enabled clinical procedures around the world) can now be accomplished relatively, easily, and cheaply using commercially available off-the-shelf hardware and software. Therefore, readers interested in exploring the hardware aspects of this dimension more fully could turn to the computer hardware, architecture, or networking categories. Those interested more in the software side of this dimension could review the computational algorithm, application development, data structure, and data analysis categories.

Clinical Content

This dimension includes everything on the data–information–knowledge continuum that is stored in the computing system. For example, data such as structured and unstructured textual or numeric data and images that are either captured directly from imaging devices or scanned from paper-based sources; information such as online clinical reference resources that are available to clinicians at the point of care to help them remember or learn important clinical concepts; and knowledge such as clinical algorithms used to generate real-time clinical alerts or disease-specific, clinical documentation templates. Various clinical content elements can be used to configure certain software applications to meet clinical or administrative requirements. Examples include controlled vocabulary items that are selected from a list while ordering a medication or a diagnostic test, and the logic required to generate an alert for certain types of medication interactions. These elements may also describe certain clinical aspects of the patients' condition (e.g., laboratory test results, discharge summaries, or radiographic images). Other clinical content, such as demographic data and patient location, can be used to manage administrative aspects of a patient's care. These data can be entered (or created), read, modified, or deleted by authorized users and stored either on the local computer or on a network-attached device. Certain elements of the clinical content, such as those which inform clinical decision support (CDS) interventions, must be carefully managed and updated on a regular basis.

As the field of clinical informatics progresses, the importance of having access to accurate, up-to-date, clinical content cannot be overemphasized. The translation of this data, information, and knowledge into computer interpretable and usable forms is one of

the main challenges of the field of clinical informatics. Creation, maintenance, and utilization of this computer-based clinical content requires (1) knowledge of the way the computer algorithms and systems work, as well as, (2) a good understanding of the basic physiological, pathological, and anatomical information and knowledge required to care for patients, combined with an understanding of how clinical and administrative work is accomplished within the healthcare delivery system. These requirements help explain why approximately 30% of the concepts included in this book are from the basic biological and clinical sciences. It also explains why so many of the most successful clinical informaticians come from a clinical background (i.e., physicians, nurses, laboratory technicians, pharmacists, etc.). Finally, it means that those clinical informaticians from more technical backgrounds (e.g., computer science, engineering, statistics, information management, etc.) must learn as much about clinical science, medicine, and how the healthcare system works, as possible to be conversant with the clinicians and administrators that will be using the clinically focused systems that are developed. Therefore, those working on developing or using clinical content could review the categories describing: terminology, Unified Medical Language System vocabulary, clinical decision support, body system, disease, and clinical specialty.

Human–Computer Interface

An interface enables unrelated entities, such as humans, to interact with the computer system and includes aspects of the computer system that users can see, touch, or hear. The hardware and software "operationalize" the user interface; provided these are functioning as designed, any problems with using the system are likely due to human–computer interaction (HCI) issues. The HCI is guided by a user interaction model created by the software designer and developer and hopefully agreed to by the user community. During early pilot testing of the application in the target clinical environment, both the user's workflow and the interface are likely to need revisions. This process of iterative refinement, wherein both the user and user interface may need to change, should culminate in a HCI model that matches the user's modified clinical workflow while enabling the computer to manage the required data safely and securely. For example, if a clinician wants to change the dose of a medication, the software requires the clinician to discontinue the old order and enter a new one, but the user interface should hide this complexity. This dimension also includes the ergonomic aspects of the interface. If users are forced to use a computer mouse while standing, they may have difficulty

controlling the pointer on the screen because they are moving the mouse using the large muscles of their shoulder rather than the smaller muscles in the forearm. Finally, the lack of a feature or function within the interface represents a potential problem with the interface, the clinical content that provides the selection options for the users, or with the software or hardware that implements the interface.

The HCI is one of the key dimensions of the sociotechnical model in that it is the main site at which the users, or social component of the model, interact with the technical or hardware, software, and clinical content. While many users complain about the user interface, the root of the problem may reside in another dimension of the sociotechnical model altogether. Working to understand how the various dimensions of the sociotechnical model interact, often through the user interface is another key challenge for clinical informaticians. Therefore, informaticians need to have a firm grasp of the concepts involved in designing, creating, configuring, maintaining, and evaluating the human–computer user interface. The following categories may prove useful: HCI and computer application.

People

This dimension represents the humans (e.g., software developers, system configuration and training personnel, clinicians, and patients) involved in all aspects of the design, development, implementation, and use of HIT. It also includes the ways that systems help users think and make them feel. Although user training is clearly an important component of the user portion of the model, it may not by itself overcome all user-related problems. Many "user" problems actually result from poor system design or errors in system development or configuration. In addition to the users of these systems, this dimension includes the people who design, develop, implement, and evaluate these systems. For instance, these people must have the proper knowledge, skills, and training required to develop applications that are safe, effective, and easy to use. This is the first aspect of the model that is purely on the social end of the sociotechnical spectrum.

In most cases, users will be clinicians or employees of the health system. However, with recent advances in patient-centered care and development of personal health record systems and "home monitoring" devices, patients are increasingly becoming important users of HIT. Patients and/or their caregivers may not possess the knowledge or skills to manage new health information technologies, and this is of specific concern as more care shifts to the patient's home.

The people dimension is critical for the successful application of clinical informatics' interventions within the modern day electronic health record (EHR)–enabled healthcare system. Failure to understand the roles, culture, knowledge, training, and emotional states of the people involved in building and using these complex systems will surely lead to failure of the project. Therefore, it is vitally important that clinical informaticians learn enough of the vocabulary of both the information technology professionals (i.e., technical terms in this book) responsible for building, implementing, and maintaining these systems as well as the clinical professionals (i.e., biomedical terms in this book) that will be using them. Specific categories related to this dimension include: people and organization.

Workflow and Communication

This is the first portion of the model that acknowledges that people often need to work cohesively with others in the healthcare system to accomplish patient care. This collaboration requires significant two-way communication. The workflow dimension accounts for the steps needed to ensure that each patient receives the care they need at the time they need it. Often, the clinical information system does not initially match the actual "clinical" workflow. In this case, either the workflow must be modified to adapt to the HIT, or the HIT system must change to match the various workflows identified.

This dimension highlights the importance of studying both the ways and means that humans use to communicate with each other as well as the way they carry out their work. The goal when developing new health information technology applications is to improve or facilitate communication between the key members of the healthcare system. Likewise, these new applications should make the existing workflows more efficient, safe, and effective. Failure to understand the current and future workflows of clinicians often results in failure to use the new technology as anticipated, which often show up as work-arounds. Key categories related to this dimension include: workflow, communication, and system implementation.

Internal Organizational Policies, Procedures, and Culture

The organization's internal structures, policies, and procedures affect every other dimension in our model. For example, the organization's leadership allocates the capital budgets that enable

the purchase of hardware and software, and internal policies influence whether and how offsite data backups are accomplished. The organizational leaders and committees who write and implement IT policies and procedures are responsible for overseeing all aspects of HIT system procurement, implementation, use, monitoring, and evaluation. A key aspect of any HIT project is to ensure that the software accurately represents and enforces, if applicable, organizational policies and procedures. Likewise, it is also necessary to ensure that the actual clinical workflow involved with operating these systems is consistent with existing policies and procedures. Finally, internal rules and regulations are often created in response to the external rules and regulations that form the basis of the next dimension of the model.

This dimension highlights the importance for all clinical informaticians to have at least a basic understanding of how the healthcare delivery system functions. For example, they need to know the different types of healthcare facilities that exist, how they are organized, how decisions within them are made, and which key stakeholders in the organization must be consulted before any decision that might affect the health information technology that is in place or being considered for widespread implementation is made. Therefore, readers interested in this dimension should review the management, medical billing, and medical facility categories.

External Rules, Regulations, and Pressures

This dimension accounts for the external forces that facilitate or place constraints on the design, development, implementation, use, and evaluation of HIT in the clinical setting. For example, the recent passage of the American Recovery and Reinvestment Act (ARRA) of 2009, which includes the Health Information Technology for Economic and Clinical Health (HITECH) Act, made available over $35 billion dollars for healthcare practitioners who became "meaningful users" of health IT. Thus, ARRA introduced the single largest financial incentive ever to facilitate EHR implementation. Meanwhile, a host of federal, state, and local regulations regulate the use of HIT. Examples include the 1996 Health Insurance Portability and Accountability Act (HIPAA), recent changes to the Stark Laws, and restrictions on secondary use of clinical data. Finally, there are three recent national developments that have the potential to affect the entire healthcare delivery system in the context of HIT. These include: (1) the initiative to develop the data and information exchange capacity to create a national health information network; (2) the open notes initiative to enable patients to

access copies of the clinical data via personal health records; and (3) government incentives to define and address clinical and IT workforce shortages.

Understanding the forces external to the actual healthcare organization, that is, implementing various health information technology interventions is critical to understanding why certain work is performed in a particular manner, or why certain workflows are not permitted. Often these rules and regulations place enormous pressure and constraints on healthcare organizations with seemingly little input from the healthcare workers themselves. Then these externally mandated constraints are in turn enforced by various health information technology tools and procedures often resulting in extreme user frustration. Failure to understand the root cause of these frustrations can lead informaticians to work on solutions that are not useful or even against the law. Readers curious about this dimension should review concepts in the categories of professional organization, government funding, government organization, health finance and insurance.

System Measurement and Monitoring

This dimension has largely been unaccounted for in previous models. We posit that the effects of HIT must be measured and monitored on a regular basis. An effective system measurement and monitoring program must address four key issues related to HIT features and functions. First is the issue of availability—the extent to which features and functions are available and ready for use. Measures of system availability include response times and percent uptime of the system. A second measurement objective is to determine how the various features and functions are being used by clinicians. For instance, one such measure is the rate at which clinicians override CDS warnings and alerts. Third, the effectiveness of the system on healthcare delivery and patient health should be monitored to ensure that anticipated outcomes are achieved. For example, the mean hemoglobin A1C (HbA1c) value for all diabetic patients in a practice may be measured before and after implementation of a system with advanced CDS features. Finally, in addition to measuring the expected outcomes of HIT implementation, it is also vital to identify and document unintended consequences that manifest themselves following use of these systems. For instance, it may be worthwhile to track practitioner efficiency before and after implementation of a new clinical charting application. In addition to measuring the use and effectiveness of HIT at the local level, we must develop the methods to measure and monitor these systems and assess

the quality of care resulting from their use on a state, regional, or even national level.

As the percentage of the nation's gross domestic product that is spent on health care continues to increase, there is going to be even more scrutiny of the costs and effectiveness of the health care that is being delivered. The rapid adoption of health information technology is no exception. Informaticians must be ready to demonstrate that the systems they are putting into place are having a significant positive impact on the health of individuals in our country and the costs associated with keeping them healthy. To do this, informaticians need to be familiar with concepts in the categories of statistics, study design, and theory at the very least.

How to Use This Book…

This book is divided up into 80 categories. Each category contains from 10 to 200 concepts. Each category is preceded by a short description of the concepts included in that section.

This book has several different uses. The first is for self-assessment and improvement. In this mode, readers review the concepts within a particular category. I would recommend that readers with a technical background begin with the more biomedically oriented concepts. This will help ensure that they are capable of communicating more clearly with their clinical colleagues. They may also find it interesting to review some of the technical categories since many of the concepts are evolving rapidly and many new ones are being developed every day. Similarly, I would recommend that readers with a biomedical background begin with the more technically oriented concepts. As you read through the concepts, whenever you come across one that you are not familiar with, then you should go to Google and look it up. If you type *define: "depth-first search"*, for example, you will be shown a set of pages that attempt to define this concept. You should then try to use this concept in a conversation in the next few days.

The second type of user is one who is attempting to assess the breadth or depth of clinical informatics knowledge of a particular individual. This person may be an informatics student or a job candidate. In either case there are several options to consider. The first is to ask the person to define several terms that are either randomly or purposively chosen from one or more categories. This might take the form of randomly selecting 20 concepts from the book and asking a person to provide a short definition of each concept from memory. Alternatively, one could give the person the

same assignment as a take-home assignment and allow them to use the internet to help them define each concept. I would expect an advanced informatics student to be able to define approximately 80% of the concepts from memory.

An alternative would be to randomly select 5–10 categories and ask the student to list five example concepts that might be included in each category. A related assessment method would be to give the student a list of 50 randomly identified concepts along with the list of all categories from the book and ask the student to put each concept into the correct category.

Similarly, one could ask a student to compare and contrast two or more concepts within the same category, for example, the programming languages "Java" and "Fortran".

Finally, one could utilize the book as a study guide. For example, one could randomly select a page and begin reviewing concepts one after the other until you come across a concept that is unfamiliar to you. Then by all means look up all unknown concepts. If one were really ambitious, then one could make flash cards using 3"× 5" index cards or one of the new online resources such as Anki (http://ankisrs.net/).

CATEGORY DEFINITIONS

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Academic Degree

A qualification, usually determined by the successful completion of a prescribed course of study in higher education that often includes the passing of a comprehensive examination. Academic degrees are normally awarded by a college, university, or any number of professional schools such as medical, nursing, dental, osteopathic, pharmacy, and public health, for example. These institutions commonly offer degrees at various levels, typically including associate (most often a 2-year course of study is required), bachelor (4-year course of study), master (1–2 year course of study after the bachelor'), and doctorate (3–7 year course of study after bachelor's or master's degree).

Bachelor of Arts (BA)
Bachelor of Medicine (BM or MB)
Bachelor of Medicine, Bachelor of Surgery (MBBS or MBChB)
Bachelor of Science (BS)
Doctor of Education (EdD)
Doctor of Jurisprudence (JD)
Doctor of Medicine (MD)
Doctor of Naturopathy (ND)
Doctor of Nursing Practice (DNP)
Doctor of Nursing Science (DNS)
Doctor of Optometry (OD)
Doctor of Osteopathic Medicine (DO)
Doctor of Pharmacy (PharmD)
Doctor of Philosophy (PhD)
Doctor of Podiatric Medicine (DPM)
Doctor of Public Health (DPH)
Doctor of Science (DSc)
Master of Arts (MA)
Master of Business Administration (MBA)
Master of Dental Science (MScD)
Master of Health Administration (MHA)
Master of Nursing (MN)
Master of Public Health (MPH)
Master of Science (MS or MSc)
Master of Science in Dentistry (MSD)
Master of Science in Nursing (MSN or MScN)
Master of Science in Pharmacy (MPh or Mpharm or MScPh)
Master of Science in Social Work (MSW)
Master of Surgery (MS)
Medical Doctorate (MD)

Clinical Informatics Literacy. http://dx.doi.org/10.1016/B978-0-12-803206-0.00001-8

Anatomy

The branch of biomedical science concerned with the bodily structure of humans, animals, and other living organisms. Anatomy is often studied through dissection and separation of individual parts of the body. For an in-depth overview of human anatomy, see: http://www.innerbody.com/.

Afferent
Alveolus
Amygdala
Aneurysm
Anterior (ventral)
Anulus
Aorta
Arteries
Artery
Atrium
Axon
Biceps brachii
Blood
Bone marrow
Both eyes (OU)
Cardiac region
Cartilage
Caudal
Central
Cephalic
Cerebral
Cerebrovascular
Cervix
Coronal plane (frontal)
Cortex
Cranial nerves
Cranial region
Deltoid
Dendrite
Diaphragm
Dissect
Distal
Dorsal
Endosteum
Esophagus
External (superficial)
Gastrointestinal (GI) tract
Gluteus maximus

Hair
Heart
Hormones
Humeral
Inferior (caudad)
Innervate
Internal
Interstitial
Intestines
Intraperitoneal
Kidneys
Lateral
Latissimus dorsi
Left eye (OS)
Liver
Lung
Lymph node
Macroscopic
Medial
Membrane
Mouth (Os)
Muscles
Nails
Nerve
Pectoralis major
Periosteum
Peripheral
Placenta cord membranes
Plasma
Posterior (dorsal)
Proximal
Pylorus
Quadriceps femoris
Red blood cell (RBC)
Renal
Right eye (OD)
Right lower arm (RLA)
Right lower quadrant (RLQ)
Right upper quadrant (RUQ)
Sagittal plane
Septum
Serum
Sigmoid colon
Sketch
Skin

Stomach
Striated
Superior (cephalad)
Sweat
Syncytium
Trachea
Transverse plane (axial or cross section)
Triceps brachii
Unilateral
Veins
Vena cava
Ventral
Ventricle
Visceral
Vivisection
White blood cell (WBC)

Application Development

A field of study that includes the set of processes, procedures, and practices of developing software applications. Depending on the size, complexity, and criticality of the application to be developed, the process may involve the use of one or more programming languages, application development frameworks, testing methodologies, and one or more teams of software developers.

Agile software development
Capability Maturity Model (CMM)
Data modeling
Design effect
JavaScript Object Notation (JSOM)
Joint applications design (JAD)
Logical data model (LDM)
Logical schema
Productivity
Rapid application development (RAD)
Rapid prototyping
Requirements analysis
Software Engineering Institute Capability Maturity Model (SEI-CMM)
Software quality assurance (SQA)
Software risk analysis
Spiral software development
Subject-matter expert (SME)
Waterfall method

Artificial Intelligence

A subfield of computer science that focuses on the design, development, use and evaluation of computer-based systems, applications, and algorithms that mimic cognitive processes usually associated with human intelligence. The origins of the field of clinical informatics were in the field of artificial intelligence as researchers attempted to create computer systems that could diagnosis patients' medical conditions. In the late 1980s, after several large-scale, highly visible AI projects failed to meet overly optimistic expectations, federal and commercial funding for new AI project rapidly dried up. This lead to the so-called AI winter. During this period, many AI researchers turned to building much less ambitious "expert systems" that proved very successful. These expert systems were further simplified to what became basic clinical decision support functionality that was widely implemented directly in electronic health records to perform simple drug–drug interaction checks or generate health maintenance reminders. In the early 2000s, with advent of the "big-data" revolution, several AI-type diagnostic decision support systems began to reappear.

Abduction
All source intelligence
Authoring system
Background question
Case-based reasoning (CBR)
Causal reasoning
Chance node
Conceptual knowledge
Connectionism
Consulting model
Consulting system
Critiquing model
Deduction
Evoking strength
Explicit
Facts
Factual knowledge
First principles, reasoning from
Foreground question
Frequency weight
HELP sector
Heuristic
Hypothetico-deductive approach
Immersive simulated environment
Implicit

Import number
Induction
Inference
Influence diagram
Integrative model
Knowledge-based system
Logical positivism
Model-based reasoning
Modus ponens (Latin for "mode that affirms")
Modus tollens (Latin for "mode that denies")
Overfitting
Problem solver
Problem space
Problem-solving method (PSM)
Prognostic scoring system
Proposition
Qualitative reasoning
Reasoning
Reasoning about time
Reminder systems
Representation
Rule interpreter
Secondary knowledge-based information
Situation action rules
Skeletal plans
Standard gamble
State diagram
Symbol
Treatment threshold probability
Truth maintenance

Body System

The human body's key systems are composed of collections of cells, tissues, and organs that work together for a common purpose. Each system performs a key role in helping the body to work effectively.

Cardiovascular system
Central nervous system (CNS)
Circulatory system
Digestive system
Endocrine system
Excretory system
Exocrine system
Immune system
Integumentary system
Lymphatic system
Muscular system
Nervous system
Olfactory system
Renal system
Reproductive system
Respiratory system
Skeletal system
Urinary system

Bone

Hard, dense, rigid, yet lightweight and strong, whitish, active, connective tissue that makes up the human skeleton, supports and protects the organs of the body, produces red and white blood cells, stores minerals, and enables mobility. Bones come in a wide variety of sizes and shapes and have a complex three-dimensional internal and external structure. The mineralized matrix of bone tissue has an organic component, mainly collagen, and an inorganic component of bone mineral made up of various salts. In the adult human there are 206 separate bones. The largest bone in the human body is the thighbone (femur) and the smallest is the stapes in the middle ear.

Carpals
Cervical ribs
Cervical vertebrae
Clavicle
Coccyx
Costae (ribs)
Cranial bones
Cranium
Femur
Fibula
Frontal bone
Humerus
Lacrimal bone
Lumbar vertebrae
Mandible (lower jaw)
Maxillae (upper jaw)
Metacarpals
Metatarsals
Nasal bones
Occipital bone
Palatine bone
Parietal bones
Patella (knee cap)
Pelvis
Phalanges
Radius
Sacrum
Scapula
Stapes
Sternum
Temporal bones
Thoracic vertebrae

Tibia (shin)
Ulna
Vertebrae
Vertebral column
Zygomatic bone

Chemistry

The branch of science that deals with the identification of the substances of which matter is composed. Chemists also investigate the properties of these substances and the ways in which they interact, combine, and change. Finally chemists study the use of these processes to form new substances. To find specific information about various facets of the field of chemistry, see: http://www.chemistryguide.org/.

0°C (freezing point of water)
32°F (freezing point of water)
100°C (boiling point of water)
212°F (boiling point of water)
Acid
Activation energy
Anion
Anode
Aqueous
Atmospheric air
Avogadro's number
Base
Buffer solution
Capacitance
Cation
Cofactor
Concentration
Conductance
Conductivity
Countercurrent
Diffusion coefficient
Electroneutrality
Electrolyte
Filter (for physical material)
Fluorescent
Flux
Half-life
Homogeneous
Isolated
Isotonic
Lyse
Medium
Modulator
Molality
Molarity
Noxious

Osmolarity
Partial pressure in a gas mixture
Permeability
pH
Potentiation
Preparation
Rate constant
Relative humidity
Resistance
Sink
Tonicity
Trace
Turbid
Turbulence
Vapor pressure
Wavelength

Clinical Decision Making

The cognitive process is used by clinicians to decide what is wrong with the patient, what should be done to remedy or alleviate the patient's problem, and when these interventions or procedures should be performed. Often there are many elements of uncertainty in the decision-making process. Therefore, clinicians must assess the probability that a particular patient is (or is not) suffering from a particular illness along with the potential harm that could occur if he or she is wrong. Wrong can be defined as either the patient has a treatable illness and he or she does not recognize it, or the patient is treated for a particular illness that he or she does not have.

Anchoring bias
Ascertainment bias
Assessment bias
Availability bias (or heuristic)
Bayesian approach
Bias
Clinical guideline
Clinical judgment
Cognitive bias
Cognitive heuristics
Concordant (test results)
Confirmation bias
Context
Decision analysis
Decision node
Decision tree
Expected utility
Expected value decision making
Indifference probability
Knowledge
Life expectancy
Pathognomonic
Prophylactic
Protocol (care plan)
Quality-adjusted life years (QALYs)
Recency bias
Referral bias
Reflective thinking
Risk attitude
Risk neutral
Shared decision-making
Summative decision

Test interpretation bias
Test referral bias
Utility
Withholding/withdrawing treatment

Clinical Decision Support

Clinical decision support (CDS) is a category of concepts and methods designed to provide patient-specific clinical information to a healthcare provider at the point of care. The goal of CDS is to improve the quality, safety, and reliability of the care provided while at the same time reducing its cost. CDS can take the form of many different types of interventions within an electronic health record. For example, order sets, condition-specific clinical displays, access to reference information, and clinical alerts are all types of CDS that have been designed and developed since the early 1960s. In addition, in the early days of the field of clinical informatics there was a concerted effort to develop diagnostic decision-support systems that would help clinicians create a differential diagnosis and eventually identify the patient's diagnosis. Although the systems were shown to be nearly as effective as expert clinicians, they fell out of favor in the late 1980s and early 1990s. More recently several companies have developed new products using similar techniques, and these applications are slowly gaining a following and have potential to offer high-quality advanced CDS regarding diagnoses to clinicians.

Action item
Action palette
Admission order sets
Alert acceptance rate
Alert fatigue
Alert message
Alert notification
Alert override rate
Alert salience
Alert trigger
Alerts
Antecedent
Antibiotic ordering support
ASBRU—clinical guideline representation language
Automated decision support
Automatic order termination
Backward chaining
Beer's criteria
Black box warnings
Care reminders
Careflow
Clinical content
Clinical content providers
Clinical decision support system (CDSS)

Clinical information online resources
Clinical pathway guideline (CPG)
Clinical Practice Guideline–Reference Architecture (CPG-RA)
Clinical prediction rule
Cognitive artifacts
Computer interpretation
Computer-interpretable guideline (CIG)
Condition-specific order sets
Condition-specific treatment protocol
Consequent
Consultation systems
Context-sensitive information retrieval
Context-sensitive user interface
Cookbook medicine
Critical lab value checking
Critiquing systems
Decision support opportunity map
Declarative knowledge
Default doses/pick lists
Departmental order sets
Description logic
Diagnostic support
Digital electronic Guideline Library framework (DeGeL)
Disease-specific order sets
Documentation aids
Drug/allergy interaction checking
Drug/condition interaction checking
Drug/drug interaction checking
Duplicate order checking
e-Mycin
EON
Evidence grading
Evoking criteria
Expression language
Five rights of clinical decision support
Formalism
Formulary checking
Forward chaining
Framingham equation
Free-text order parsing
Guideline
Guideline Elements Model (GEM)
Guideline Expression Language (GELLO)
Guideline Markup Tool (GMT)
Hard stop

High-risk state monitoring
IBM's Watson
Implication
Indication-based ordering
Interpret
Interpretation systems
Interruptive alert
Intrusive alert
IV/PO conversion
Knowledge acquisition
Knowledge base
Knowledge discovery
Knowledge engineering (KE)
Knowledge management (KM)
Knowledge modeling
Knowledge representation
Laboratory test interpretation
Look-alike/sound-alike medication warnings
Maximum daily dose checking
Maximum lifetime dose checking
Medical logic module (MLM)
Medication/laboratory test cost display
Medication dictionary
Medication dose adjustment
Medication order sentences
MediConsult
Modal alert
Monitoring systems
Nomogram
Noninterruptive alert
Nonintrusive alert
Nonmedication order sentences
Notify me when
Nutrition ordering tools
Order approvals
Order routing
Order sets
Patient-specific relevant data displays
Personal order sets
Plan of care alerts
Polypharmacy alerts
Preventive care reminders
Problem list management
Procedural knowledge
Procedure-specific order sets

Prognostic tools
Quality metric
Question prototypes
Radiology ordering support
Reference links
Registry functions
Representation of time
Risk assessment tools
Risk calculator
Service-specific order sets
Single dose range checking
Standards-Based Sharable Active Guideline Environment (SAGE)
Standing orders
Subsequent or corollary orders
Syndromic surveillance
Synthesize
Systematic review
Tacit knowledge
Tallman Lettering
Task-network model (TNM)
Ticklers
Transfer order set
Transfusion support
Treatment planning
Triage tools
Trigger event
Virtual medical record (vMR)
Weight-based dosing

Clinical Disorder

A functional abnormality or disturbance in one or more parts of the human body. Clinical disorders can be categorized into mental disorders, physical disorders, genetic disorders, emotional and behavioral disorders, and functional disorders. The term disorder is often considered more value-neutral and less stigmatizing than the terms disease or illness, and therefore is often the preferred terminology. In mental health, the term mental disorder is used as a way of acknowledging the complex interaction of biological, social, and psychological factors in psychiatric conditions.

Abdominal and pelvic pain
Abdominal aortic aneurysm (AAA)
Abnormal uterine bleeding
Above the knee amputation (AKA)
Acute kidney injury (AKI)
Acute myocardial infarction (AMI)
Alcohol abuse (EtOH)
Alzheimer disease
Anemia
Anxiety
Aortic aneurysm
Aortic stenosis (AS)
Arteriosclerosis
Arthralgias
Atelectasis
Atherosclerosis
Atrial fibrillation (Afib)
Atrial septal defect (ASD)
Attention deficit hyperactivity disorder (ADHD)
Autism spectrum disorder (ASD)
Back pain
Below the knee amputation (BKA)
Benign neoplasms
Blind
Bone pain
Cardiovascular disease (CVD)
Cervical cancer
Chest pain
Chronic condition
Chronic disease
Chronic illness
Chronic kidney disease (CKD)
Chronic obstructive pulmonary disease (COPD)
Chronically ill

Cognitive impairment
Coma
Complicated pregnancy
Congenital anomalies
Congestive heart failure (CHF)
Constriction
Coronary artery disease (CAD)
Cough
Crying
Deafness
Deep vein thrombosis (DVT)
Delirium
Delirium tremens (DTs)
Dementia
Dependence
Depression
Developmental disability (DD)
Diabetes mellitus (DM)
Diabetic ketoacidosis (DKA)
Diarrhea
Dilation
Disability
Dysphagia
Dyspnea
Dysuria
Edema
Embolism
Embolus
End-stage renal disease (ESRD)
Erectile dysfunction (ED)
Etiology
Extremity pain
Facial flushing
Facial pain
Fatigue
Fever
Fixation
Flank pain
Frustration
Functionally disabled
Funny Looking Kid (FLK)
Gallbladder disorders
Genital skin lesion
Genital ulcer
Handicapped

Hard of Hearing (HOH)
Headache
Hearing loss
Heart failure (HF)
Hematuria
Hernia
Homebound
Homicide
Hydrops fetalis
Hypertension (HTN)
Hypotension, shock
Impairment
Indication infarct
Intrauterine hypoxia
Ischemia
Labile
Labor/Delivery complications
Learning disability (LD)
Leg pain
Lesion
Lethargy
Limp
Low back pain (LBP)
Lymphadenopathy
Malaise
Malignant
Malignant neoplasms
Memory loss
Mental health
Mental illness/impairment
Mentally retarded/developmentally disabled (MR/DD)
Minimally conscious state
Mitral regurgitation (MR)
Morbid
Muscle cramps
Myalgias
Myocardial infarction (MI)
Nausea
Neonatal hemorrhage
Numbness
Nutritional deficiencies
Obsessive compulsive disorder (OCD)
Occlusion
Oppositional defiant disorder (ODD)
Otalgia

Parkinson disease (PD)
Patent ductus arteriosus (PDA)
Patent foramen ovale (PFO)
Perinatal period
Permanent vegetative state (PVS)
Petechiae
Postpartum depression (PPD)
Pregnancy
Premature atrial contractions (PACs)
Proteinuria
Pruritus
Pulmonary embolism (PE)
Pulmonary hemorrhage
Rash, generalized
Red eye
Scrotal pain
Seizure
Senility
Sensory loss
Seriously emotionally disturbed
Short gestation
Shortness of breath (SOB)
Shoulder pain
Sinus tachycardia
ST elevation myocardial infarction (STEMI)
Suicide
Syncope
Tachypnea
Tinnitus
Torticollis
Transient
Transient ischemic attack (TIA)
Traumatic brain injury (TBI)
Tremor
Tumor
Turgid
Twitch
Vasoconstriction
Venous thromboembolism (VTE)
Ventricular septal defect (VSD)
Vomiting
Weakness
Weight loss

Clinical Procedure

A clinical procedure is a physical process intended to identify a problem or achieve a result in the care of patients with health problems. Clinical procedures can be used for various reasons including: identifying, measuring, diagnosing, treating, restoring structure or function of a specific patient symptom, condition, or specific physiological parameter.

Acupuncture
Advanced cardiac life support (ACLS)
Advanced life support (ALS)
Anesthesia
Angiogram (Angio)
Angiography
Animal-assisted therapy
Antivenom
Aortography
Apheresis
Arterial blood gas (ABG)
Arterial catheter (line)
Arterial pressure
Auscultation
Basic life support (BLS)
Blood test
Cancer immunotherapy
Cancer vaccine
Cardiac stress test
Cardioconversion
Cardiopulmonary resuscitation (CPR)
Cell therapy
Central venous catheter (line)
Central venous pressure (CVP)
Cerebral angiography
Chelation therapy
Chemotherapy
Cognitive behavioral therapy (CBT)
Cold compression therapy
Combination therapy
Computer-based monitoring
Coronary angiography
Coronary arteriography
Craniosacral therapy
Cytoluminescent therapy
Diagnostic bronchoscopy
Dislocation procedure

Drug therapy
Electrocardiography
Electroconvulsive therapy
Electrocorticography
Electroencephalography
Electromyography (EMG)
Electroneuronography
Electronystagmography
Electrooculography
Electrophoresis
Electroretinography
Electrotherapy
Endoluminal capsule monitoring
Enzyme replacement therapy
Epidural (extradural) block
Esophageal motility study
Evoked potential
Extracorporeal carbon dioxide removal (ECCO2R)
Extracorporeal membrane oxygenation (ECMO)
Facial rejuvenation
Fluid replacement therapy
Fluoride therapy
Fracture procedure
General anesthesia
Heat therapy
Hemodialysis
Hemofiltration
History and physical (H&P)
Hormonal therapy
Hormone replacement therapy
Hydrotherapy
Hyperbaric oxygen therapy
Immunization
Immunosuppressive therapy
In vitro fertilization (IVF)
Infusion
Inhalation therapy
Insulin potentiation therapy
Insulin shock therapy
Intramuscular (IM)
Intravenous therapy
Intubation
Invasive
Laboratory tests
Laser therapy

Life-sustaining treatment
Lithotomy
Lithotripsy
Lithotriptor
Local anesthesia
Low-dose chemotherapy
Lymphangiography
Magnetic resonance angiogram (MRA)
Magnetic therapy
Magnetoencephalography
Mechanical ventilation
Medical inspection (body features)
Monoclonal antibody therapy
Nebulization
Negative pressure wound therapy
Nicotine replacement therapy
Noninvasive
Noninvasive monitoring technique
Ophthalmoscopy
Opiate replacement therapy
Oral rehydration therapy
Otoscopy
Oxygen therapy
Palliative care
Palpation
Particle therapy
Patient monitoring
Percussion (medicine)
Perfuse
Phage therapy
Photodynamic therapy
Phototherapy
Physical exam (Px)
Physiotherapy
Plasmapheresis
Point-of-care testing
Politzerization
Posturography
Precordial thump
Prophylactic treatment
Proton therapy
Psychotherapy
Pulmonary angiography
Radiation therapy
Radiation therapy planning

Radiography
Regional anesthesia
Respiratory therapy (RT)
Rule out (RO)
Scintillography
Shock therapy
Speech therapy
Spinal anesthesia (subarachnoid block)
Stem cell treatments
Stool test
Subclavian catheter (line)
Subcutaneous (Sub-Q)
Symptomatic treatment
Targeted therapy
Thermography
Thrombosis prophylaxis
Topical anesthesia (surface)
Tracheal intubation
Transcutaneous electrical nerve stimulation (TENS)
Treatment (tx)
Universal precautions
Unsealed source radiotherapy
Vaccination
Vaginal birth after cesarean (VBAC)
Ventriculography
Virtual reality therapy
Vision therapy

Clinical Role

In a healthcare organization there are many different jobs that need to be done. Clinicians with different training and experience do these jobs by fulfilling a "role." These clinical jobs almost always involve contact with patients. For the most part, they usually require formal study and training after you have finished high school, college, and often medical, nursing, or pharmacy school. It is common for each of these "roles" to have slightly different data access rights or user privileges within an electronic health record [e.g., the ability to write and sign orders for medications is usually allowed only by clinicians with a medical degree (MD, DO) or advanced nursing certification].

Advice nurse
Allergist
Allied health personnel
Anesthesiologist
Attending physician
Biomedical informatician
Biomedical informaticist
Board certified
Cardiologist
Caregiver
Case manager
Certified nurse aide (CNA)
Certified registered nurse anesthetist (CRNA)
Chief executive officer (CEO)
Chief health informatics (information) officer (CHIO)
Chief information (informatics) officer (CIO)
Chief information security officer (CISO)
Chief medical informatics (information) officer (CMIO)
Chief nursing informatics (information) officer (CNIO)
Chief operating officer (COO)
Chief quality and informatics (information) officer
Clinical champion
Clinical informatician
Clinical informaticist
Clinical nurse specialist (CNS)
Clinical research informatician
Early adopter
EHR super user
End user
Expert witness
Fellow
Gastrointestinal (GI) specialist

Gatekeeper
General medical practitioner (GP)
General surgeon
Genital-urinary (GU) specialist
Geriatrician
Healthcare paraprofessional
Health data broker
Health data custodian
Health informatician
Health informaticist
Health personnel
Healthcare proxy
Help at the elbow
Home health aide
Hospitalist
House staff
Immunologist
Informatician/informaticist
Intern
Internist
Interprofessional teams
Interventional radiologist
Intravenous (IV) nurse
Licensed clinical social worker (LCSW)
Licensed practical nurse (LPN)
Licensed vocational nurse (LVN)
Medical assistant (MA)
Medical student
Medical technologist (MT(ASCP))
Medical technologist in molecular pathology (MP(ASCP))
Multidisciplinary teams
Neurologist
Neurosurgeon
Nurse
Nurse anesthetist
Nurse practitioner (NP)
Nursing student
Obstetrician/Gynecologist (OB/GYN)
Occupational therapist (OT)
Orderly
Orthopedist
Parents or relatives
Pharmacist
Pharmacy technician
Physical therapist (PT)

Physician assistant (PA)
Plastic surgeon
Podiatrist
Postgraduate year (PGY) 1–8
Primary care provider (PCP)
Private duty nursing
Provider
Pulmonologist
Registered dietician (RD)
Registered nurse (RN)
Registered pharmacist (RPh)
Research informatician
Resident
Respiratory therapist (RT)
Respite care
Service class provider
Service class user
Skilled care
Stakeholder
Support groups
Surgeon
Surrogate
Trauma surgeon
User training

Clinical Specialty

A clinical specialty is a name for a particular branch of medicine. After completing their medical school training, physicians or surgeons usually further their medical education in a specific specialty of medicine by completing a multiple year residency training program and sometimes an additional multiple year fellowship training program to become a medical specialist. In most cases there are additional tests or "board examinations" that these clinicians must pass before they are able to practice as a board-certified specialist in their chosen subfield of medicine or surgery.

Adolescent medicine
Allergy and immunology
Anesthesiology
Cardiology
Clinical and laboratory medicine
Colon and rectal surgery
Critical care medicine
Cytopathology
Dermatology
Diagnostic radiology
Digital radiology
Emergency medicine
Endocrinology
Family medicine
Family practice
Forensic pathology
Forensic psychiatry
Geriatrics
Gerontology
Gynecology (GYN)
Hematology
Hyperbaric medicine
Infectious diseases (ID)
Internal medicine (IM)
Medical genetics
Microbiology
Nephrology
Neurology
Nuclear medicine
Obstetrics (OB)
Oncology
Ophthalmology
Orthopedic surgery
Orthopedics

Otolaryngology
Pain medicine
Pathology
Pediatrics
Plastic surgery
Podiatry
Preventive medicine
Psychiatry
Pulmonary medicine
Radiation oncology
Radiology
Rehabilitation services
Rheumatology
Speech therapy
Sports medicine
Surgery
Thoracic surgery
Transfusion medicine
Urology
Vascular surgery

Clinical Syndrome

A clinical syndrome describes a patient state that consists of a constellation of several medical signs, symptoms, and/or other physical or emotional characteristics that often occur together. Some syndromes, such as Down syndrome, have only one cause; others, such as Parkinsonian syndrome, have multiple possible causes. In other cases, the cause of the syndrome is unknown.

Acquired immunodeficiency syndrome (AIDS)
Acute coronary syndrome (ACS)
Acute respiratory distress syndrome (ARDS)
Andersen syndrome
Down syndrome
Menopause
Premenstrual syndrome (PMS)
Severe acute respiratory syndrome (SARS)
Shock
Spell
Stockholm syndrome
Sudden infant death syndrome (SIDS)
Systemic inflammatory response syndrome (SIRS)
Tetralogy of Fallot
Vertigo
Wolf–Hirschhorn syndrome

Communication

The act or process of using mutually agreed upon words, sounds, pictures, gestures, or behaviors to convey an intended meaning (e.g., thoughts, feelings, findings, or ideas) from one group to another. There are numerous options or channels (e.g., visual, haptic, auditory, olfactory, electromagnetic, kinesics, or biochemical) in which this communication can occur. Human communication is unique and often open for numerous interpretations due to its extensive use of abstract language constructs involving words, signs, symbols, or sounds.

Acknowledgment
Asynchronous
Body of message
Channel
Channel capacity
Header of message
Isochronous
Listserve
Mailing list
Public area branch exchange
Public switching telephone network
Receiver
Sender
Signal-to-noise ratio
Situation, Background, Assessment and Recommendation (SBAR) technique
Social contagion
Social network
Spam
Spamming
Synchronous communication
Transaction set
Voicemail

Computational Algorithm

A computational algorithm (pronounced AL-go-rith-um) is an unambiguous set of steps, a procedure, or a formula a computer can use to perform a specific task or solve a problem. Algorithms can be expressed in any language, including natural languages such as English, French, or Spanish to advanced programming languages such as Perl, C++, or Java. A computer uses algorithms to solve specific problems. There can be many different algorithms to solve the same type of problem. The most "elegant" algorithms often have the fewest steps, execute the fastest, and use the least amount of computer memory.

AdaBoost
Algorithm accuracy evaluation
Algorithm performance, space
Algorithm performance, time (big O)
Apriori algorithm
Artificial neural networks (ANN)
Association rule learning algorithm
Averaged one-dependence estimators (AODE)
Backpropagation
Basic Local Alignment and Search Technique (BLAST)
Bayesian algorithm
Bayesian belief network (BBN)
Binary search
Boosting
Bootstrapped aggregation (bagging)
Breadth-first search
Bubble sort
C4.5 and C5.0 (different versions of a powerful approach)
Chi-squared automatic interaction detection (CHAID)
Classification and regression tree (CART)
Collaborative filtering
Computational complexity
Conditional decision trees
Convolutional neural network (CNN)
Crowdsourcing
Cryptographic hashing functions
Data compression algorithm
Decision stump
Decision tree algorithm
Deep belief networks (DBN)
Deep learning algorithm
Deep Boltzmann machine (DBM)
Depth-first search

Dimensionality reduction algorithm
Eclat algorithm
Elastic Net
Ensemble algorithm
Evolutionary algorithm
Exhaustive search
Expectation maximization (EM)
Feature selection algorithm
Filtering algorithm
Finite-state machine
First-order predicate logic
Flexible discriminant analysis (FDA)
Fourier transform
Gaussian Naive Bayes
Generalized linear models
Genetic algorithms
Gradient boosted regression trees (GBRT)
Gradient boosting machines (GBM)
Hash function
Hierarchical clustering
Hopfield network
Huffman coding
Insertion sort
Instance-based algorithm
Iterative Dichotomiser 3 (ID3)
k-Means
k-Medians
k-Nearest Neighbor (kNN)
Learning vector quantization (LVQ)
Least absolute shrinkage and selection operator (LASSO)
Least-angle regression (LARS)
Lift
Linear discriminant analysis (LDA)
Linear regression
Locally estimated scatterplot smoothing (LOESS)
Locally weighted learning (LWL)
Lossless compression
Lossy compression
M5
Markov cycle
Markov model
Markov process
Merge sort
Mixture discriminant analysis (MDA)
Multidimensional scaling (MDS)

Multinomial Naive Bayes
Multivariate adaptive regression splines (MARS)
Naive Bayes
Neural network
NP hard
Numerical methods
Ordinary least squares regression (OLSR)
Partial least squares regression (PLSR)
Perceptron
Performance measures
Principal component analysis (PCA)
Principal component regression (PCR)
Probabilistic matching algorithm
Projection pursuit
Proxy calculations
Quadratic discriminant analysis (QDA)
Quick sort
Radial basis function network (RBFN)
Random forest
Recursive algorithms
Refinement
Regression algorithm
Regularization algorithm
Reinforcement learning
Ridge regression
Sammon mapping
Seasonal and Trend decomposition using Loess (STL decomposition)
Secure Hash Algorithm 1 (SHA-1)
Secure Hash Algorithm 2 (SHA-2)
Self-organizing map (SOM)
Semisupervised learning
Stacked auto-encoders
Stacked generalization (blending)
Stepwise regression
Supervised learning
Support vector machine (SVM)
t-Distributed Stochastic Neighbor Embedding (t-SNE)
Training data set
Transpose
Unsupervised learning
Verhoeff algorithm
Viterbi algorithm

Computer Application

An application is a computer program, or group of interacting programs, that perform a set of coordinated tasks to help the user. Applications run inside of the computer's operating system software. Applications designed for desktop or laptop computers are referred to as desktop applications. Applications built specifically for mobile computing platforms are often called apps.

AI-Rheum
Antibiotic Assistant Program
Armed Forces Health Longitudinal Technology Application (AHLTA)
Attending
Automated Medical Record (AMR)
Backwards compatibility
Bar Code Medication Administration (BCMA)
Behavioral Risk Factor Surveillance System (BRFSS)
Best-of-breed
Billing System
Biomed Central
Blue Button
Brigham & Women's Integrated Computing System (BICS)
Browser
Citation manager
Clinical data registry
Clinical data repository (CDR)
Clinical documentation
Clinical Image Access Service (CIAS)
Clinical information system (CIS)
Clinical Observation Access Service (COAS)
Clinical Trials Management System (CTMS)
ClinicalTrials.gov
Coaching expert system
Common Object Request Broker Architecture (CORBA)
Composite HealthCare System II (CHCS–DoD)
Computational propaganda
Computer-Assisted Patient Interviewing (CAPI)
Computer-Based Training (CBT)
Computer program
Computer-Stored Ambulatory Record System (COSTAR)
Computer-based Patient Record System (CPRS)
Computerized Patient Record (CPR)
Computerized Physician/provider Order Entry (CPOE)
Continuous speech recognition
Control system

Custom-designed system
Data acquisition
Data compression
Data processing
Data recording
Data transcription
Data transformation
Database management
Database management system (DBMS)
Debugger
Decision-support system
Departmental system
Disease registry
DxPlain
e-Consent
Electronic Health Record (EHR)
Electronic mail (e-mail)
Electronic medical record (EMR)
Electronic Medication Administration Record (eMAR)
Electronic nursing record
Electronic Patient Record (EPR)
Electronic Transmission of Perscription (ETP)
Enterprise Information System (EIS)
Enterprise Master Patient Index (EMPI)
Expert system
Fraud detection
Front-end application
General regular expression parser (GREP)
Geographic Information Systems (GIS)
Gmail
Graph database
Groupware
Guidance
Hadoop
Health Evaluation through Logical Programming (HELP)
Health Information Exchange (HIE)
Helper app
Homepage
Hospital Information System (HIS)
Iliad (Diagnostic Decision Support System)
Image recognition
Immunization registry
Inference engine
Information processing
Integrating Information from Bench to Bedside (I2b2)

Interactive Voice Response (IVR)
Interface engine
Internet Browser
Internist-1
Inventory management
Kaggle
Knowledge base system
LaTex
Longitudinal medical record
Management Information System (MIS)
Map reduce
Master Patient Index (MPI)
Master Provider File (MPF)
Medlars online (Medline)
MedlinePlus
MedWeaver
Metathesaurus
Mosaic browser
Mycin
Newsgroup
Niche vendor
Nursing information system
Object-oriented database
Oncocin
OPAL
Optical character recognition (OCR)
Order entry
Order entry system
Pathfinder
Patient care system
Patient portal
Patient tracking application
Patient-centered Access to Secure Systems Online (PCASSO)
Pediatric Early Warning Score (PEWS) system
Personal Health Record (PHR)
Personally controlled health management system
Personally controlled health record
Pharmacy information system
Picture Archiving and Communication (PACS)
Plugin
Point of care system
Practice management system
Problem-oriented Medical Record System (PROMIS)
PRODIGY
PROforma

Protégé
Prototype system
Provider profiling system
PubMed
Question answering programs
Quick Medical Record (QMR)
Recommendation engine
Red Cap
Relational Data Base Management System (RDBMS)
Relational database
Report Program Generator (RPG)
Results review
Rule-based expert system
Search engine
Search technology
Siri
Skype
Social media
Specialized registry
Speech recognition
Speech understanding
Spreadsheet
Statistical package
System programs
Technicon medical information system (TMIS)
The Medical Record (TMR)
Third-party
TRICARE Online
Turnkey system
Vaccine Adverse Event Reporting System (VAERS)
Value-added reseller (VAR)
Vista
Voice recognition
Web BLOB Service (WBS)
Web browser
Web catalog
Web crawler
Web-Based Training (WBT)
Wizorder
Word processor

Computer Architecture

A computer's architecture provides a framework for the rules that describe the capabilities, functionality, organization, and sometimes the methods of implementing various types of applications or computer systems.

Application program
Applications design
Architecture (computer, information)
Archival storage
Batchmode
Business logic layer
Central computing system
Centralized database
Client/server architecture
Complex Instruction Set Computing (CISC)
Computer architecture
Data layer
Distributed Component Object Model (DCOM)
Distributed data architecture
Dynamic Data Exchange (DDE)
Emergency Data Sets Framework (EDSF)
Federal Health Architecture (FHA)
Federated model
Health informatics Service Architecture (HISA)
Health information access layer (HIAL)
High-level process
Integrated versus interfaced
Java Database Connectivity (JDBC)
Lexicon query service (LQS)
Low-level process
Massive Parallel Processing (MPP)
Medicaid Information Technology Architecture
Middleware
Modular computer system
Multiprocessing
Multiuser system
National Information Infrastructure (NII)
Network-based hypermedia
Online Transaction Processing (OLTP)
Open system
Parallel processing
Patient Identification Services (PIDS)
Presentation layer
Reduced Instruction Set Computing (RISC)

Reference architecture
Reference Model for Open Distributed Processing
Regulated clinical research information model
Remote Job Entry (RJE)
Remote Procedure Calls (RPC)
Representational State Transfer (REST)
Scalability
Sequential Access Method (SAM)
Service-oriented Architecture (SOA)
Simple Object Access Protocol (SOAP)
Single user system
System
Systems aggregation
Systems integration
Terminal server
Terminate and Stay Resident (TSR)
Timesharing mode
Turing machine
User interface layer
von Neumann machine
Very Large Scale Integration (VLSI)
View schemas
Virtual Storage Access Method (VSAM)
Visual Basic Architecture (VBA)
Web Access to DICOM-persistent Objects (WADO)
Workflow engine
World Wide Web (WWW)

Computer Hardware

Computer hardware, often referred to as hardware when discussing computer-related topics, are the physical elements used to create a functional computer system, such as the microprocessor, memory, network, monitor, keyboard, data storage, all of which are tangible physical objects. By contrast, software is the set of instructions that can be stored and run by hardware to complete a task.

Analog computer
Application service provider (ASP)
Backup electrical generator
Cable
Cathode ray tube (CRT)
Central monitor
Central processing unit (CPU)
Client
Cloud computing
Compact disk (CD)
Compact disk read-only memory (CD-ROM)
Computer on Wheels (COW)
Computer system
Data bus
Deactivate
Digital computer
Digital subscribe line (DSL)
Digital video disk (DVD)
Direct-access storage device (DASD)
Display monitor
Distributed computing system
Dynamic random-access memory (DRAM)
Electronic Numerical Integrator and Computer (ENIAC)
Environment (computing)
Exam room computers
File server
Flash card
Flash memory
Floppy disk
Handheld device
Hard disk
High performance computing (HPC)
Hot site backup
Ink-jet printer
Integrated circuit (IC)
Laptop computer

Laser printer
Life cycle
Liquid crystal display (LCD)
Macintosh
Magnetic disk
Magnetic tape
Mainframe computer
Medical information bus (MIB)
Memory
Memory stick
Microchip
Modulator-demodulator (MODEM)
Netbook computer
Network protocol
Off-line device
Online device
Optical disc
Original equipment manufacturer (OEM)
Patient monitor
Personal computer (PC)
Personal digital assistant (PDA)
Physicians' workstation
Print server
Printer
Product
Random-access memory (RAM)
Raster scan display
Read-only memory (ROM)
Read-only backup
Reboot (computer)
Red electrical outlet/plug
Redundant array of independent (inexpensive) disks (RAID)
Scanning devices
Server
Smartphone
Star topology
Storage
Switch
System integration
System interface
Telemedicine technologies
Terminal
Terminal interface processor
Test system
Thick client

Thin client
Transmitter
Twisted-pair wires
Uninterruptible power supply (UPS)
Universal workstation
Variable memory
Video display terminal (VDT)
Virtual memory
Volatile memory
Warm site backup
Workstation
Workstation-on-wheels (WOW)
Write it once system
Write once read many (WORM)

Computer Networking

The use of computers and associated hardware to create a telecommunications network that can be used to facilitate the exchange of data, information, or services among individuals, groups, or institutions. Computer networks often differ in their transmission medium (e.g., copper wires, fiber optics, radio frequencies, or microwaves) used to carry their signals, communications protocols to organize network traffic, the network's size, topology, and organizational intent. In most cases, application-specific communications protocols are layered (i.e., carried as payload) over other more general communications protocols.

127.0.0.1 (localhost)
Advanced Research Project Agency Network (ARPANET)
Asymmetric digital subscriber line (ADSL)
Asynchronous Transfer Mode (ATM)
Backbone network
Bandwidth
Baud rate
Bit rate
Bits per second
Bluetooth
Broadband network
Broadband signal
Broadband transmission
Circuit switched network
Citrix
Coaxial cable
Communication protocol
Computer network
Cyberspace
Daisy chain networking
Dial tone multifrequency (DTMF)
Domain
Dynamic DNS (domain name service)
Ethernet
Fiber-optic cable
Frame relay
Gateway
Gigabit per second (Gbps)
Global system for mobile communications (GSM)
Hyperlink
Information super highway
Integrated Delivery System/Network (IDS) (IDN)
Internet
Internet relay chat (IRC)
Intranet

IP address
Latency
Local area network (LAN)
Megabit
Megabits per second (Mbps)
Microwave
Name authority
Name server
National Health Information Infrastructure (NHII)
National Health Information Network (NHIN)
Network
Network access provider
Network bridge
Network latency
Network node
Network operating system
Network router
Network services
Network stack
Network topology
Next-generation Internet
Node
Open Systems Interconnection (OSI) seven layer model
Packet
Packet-switched network
Peer-to-peer networking
Private branch exchange (PBX)
Proxy
Remote access
Remote presence health care
Router
Secure hypertext transfer protocol (SHTTP)
Store and forward
Subnet
System administration
Telecommunication
Telepresence
Token ring ethernet
Transmit (XMT)
Transmittal (XMTL)
Uniform resource identifier (URI)
Uniform resource locator (URL)
Uniform resource name
Wide area network (WAN)
Wi-Fi (Wireless Infrastructure)
WiFi Spectrum

Computer Programming

Computer programming (or just programming) is a process that leads from the initial formulation of a problem that the computer can help solve through the intricate process required to create an executable computer program. The programming process involves activities such as analysis of the problem or entire business, developing understanding of the tasks to be accomplished and the existing workflow, generating algorithms required to manipulate the data elements required to solve the problem, verification of requirements of the chosen algorithms including their appropriateness, correctness, computational resource consumption, and implementation of these algorithmic concepts (commonly referred to as coding) in the chosen programming language. The purpose of programming is to find a sequence of instructions that will automate performing a sequence of specific tasks or solving a given problem. The process of programming thus often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.

Active storage
Addition
Agile
Agile coach
Ajax
Alphabetic ordering
Analog-to-digital conversion (ADC)
Android
Applets
Application Programming Interface (API)
Apps
Assembler
Assembly code
Binary sort
Bit (short for binary digit)
Boot
Buffer
Buffer overflow
Burn down
Business logic
Closed loop control
Code
Code review
Coercion

Command
Compiler
Compiler optimization
Computed check
Computer bug
Computer-readable content
Concept modeling
Consistency check
Constraint-based programming
Construction
Daily standup
Data accessibility
Data architecture
Data capture
Data control structure
Data element
Data flow
Data flow diagram
Data independence
Data mediator
Data model
Data quarantining
Data set
Data storage
Data stream
Database
Database recovery
Debug
Delta check
Demonstration (demo)
Design by constraint
Division
Document Type Definition (DTD)
Dynamic programming
Entity, attribute, value (EAV)
Entity–Relationship diagram (ER or ERD)
Error trap
Exception handling
Extended Architecture Operation System (XA)
Floating point exception
Generalization
Global variable
Hash table
Hashing

Hierarchical database
Information Object
Information Object Class
Information Object Instance
Input
Integrated Development Environment (IDE)
Interpreter
Iteration
Iterative
Java 2 Platform, Enterprise Edition (J2EE)
Job
jQuery
Kernel
Late binding
Linux
Local variable
Machine code
Macro
Markup
Marshalling
Mathematical operations
Model View Controller (MVC)
Multiplicity
Multiprogramming
Node.js
Object
Object modeling
Object oriented programming (OOP)
Object-based approach
Object-oriented analysis
Object-oriented programming
Open loop control
Output
Page
Pattern check
Pointer-to-data
Product backlog
Product owner
Regular expression
Remote Method Invocation (RMI)
Requirements development process
Resource Definition Format (RDF)
ReST Protocol
Retrospective