

Informatics

Informatics is the study of computational systems.^{[1][2]} According to the ACM Europe Council and Informatics Europe, informatics is synonymous with computer science and computing as a profession,^[3] in which the central notion is transformation of information.^{[1][4]} In some cases, the term "informatics" may also be used with different meanings, e.g., in the context of social computing^[5] or library science.^[6]

Different meanings

United States	Germany	Russia	France	Italy	English transcription
<u>Computer science</u> , <u>Computing</u>	<i>Informatik</i>	<i>Информатика</i> (Latinized: <i>informatika</i>)	<i>Informatique</i>	<i>Informatica</i>	Informatics
<u>Theoretical computer science</u>	<i>Theoretische Informatik</i>	<i>Теоретическая информатика</i>	<i>Informatique théorique</i>	<i>Informatica teorica</i>	Theoretical informatics
<u>Computer engineering</u>	<i>Technische Informatik</i>	<i>Инженерная информатика</i>	<i>Ingénierie or génie informatique</i>	<i>Ingegneria informatica</i>	<u>Technical informatics</u>
<u>Neurocomputing</u> , <u>Neural computation</u>	<i>Neuroinformatik</i>	<i>Нейроинформатика</i>	<i>Neuro-informatique</i>	<i>Neuroinformatica</i>	<u>Neuroinformatics</u>
<u>Psychoinformatics</u>	<i>Psychoinformatik</i>	<i>Психоинформатика</i>	<i>Psychoinformatique</i>	<i>Psicoinformatica</i>	Psychoinformatics
<u>Bioinformatics</u>	<i>Bioinformatik</i>	<i>Биоинформатика</i>	<i>Bioinformatique</i>	<i>Bioinformatica</i>	Bioinformatics
<u>Hydroinformatics</u>	<i>Hydroinformatik</i>	<i>Гидроинформатика</i>	<i>Hydroinformatique</i>	<i>Idroinformatica</i>	Hydroinformatics
<u>Ecoinformatics</u>	<i>Ökoinformatik</i>	<i>Экоинформатика</i>	<i>Écoinformatique</i>	<i>Ecoinformatica</i>	Ecoinformatics
<u>Social informatics</u>	<i>Sozioinformatik</i>	<i>Социальная информатика</i>	<i>Socioinformatique</i>	<i>Socioinformatica</i>	Social informatics

In some countries, depending on local interpretations and contexts, the term "informatics" is used synonymously to mean information systems, information science, information theory, information engineering, information technology, information processing, or other theoretical or practical fields. In Germany, the term *informatics* closely corresponds to modern computer science. Accordingly, universities in continental Europe usually translate "informatics" as computer science, or sometimes information and computer science, although technical universities may translate it as computer science & engineering.^{[7][8]} In some countries, this term is associated with natural computation and neural computation.^{[1][9]}

In the United States, however, the term *informatics* is mostly used in context of data science, library science^[6] or its applications in healthcare (health informatics),^{[10][11]} where it first appeared in the US.

The University of Washington uses this term to refer to social computing.^[5]

The Government of Canada uses the term to refer to operational units offering network and computer services to the various departments.^[12]



Informatics Forum, completed in 2008. It houses researchers of the University of Edinburgh's School of Informatics.

Etymology

In 1956, the German informatician Karl Steinbuch and engineer Helmut Gröttrup coined the word *Informatik* when they developed the *Informatik-Anlage*^[13] for the *Quelle* mail-order management, one of the earliest commercial applications of data processing. In April 1957, Steinbuch published a paper called *Informatik: Automatische Informationsverarbeitung* ("Informatics: Automatic Information Processing").^[14] The morphology—*informat-ion* + *-ics*—uses "the accepted form for names of sciences, as conics, mathematics, linguistics, optics, or matters of practice, as economics, politics, tactics",^[15] and so, linguistically, the meaning extends easily to encompass both the science of information and the practice of information processing. The German word *Informatik* is usually translated to English as^[16] *computer science* by universities or *computer science & engineering* by technical universities (German equivalents for institutes of technology). Depending on the context, informatics is also translated into *computing*, *scientific computing* or *information and computer technology*. The *French* term *informatique* was coined in 1962 by Philippe Dreyfus.^[17] In the same month was also proposed independently by Walter F. Bauer (1924–2015) and associates who co-founded software company *Informatics Inc.* The term for the new discipline quickly spread throughout Europe, but it did not catch on in the United States. Over the years, many different definitions of informatics have been developed, most of them claim that the essence of informatics is one of these concepts: information processing, algorithms, computation, information, algorithmic processes, computational processes or computational systems.^{[18][1]}

The earliest uses of the term *informatics* in the *United States* was during the 1950s with the beginning of computer use in *healthcare*.^[19] Early practitioners interested in the field soon learned that there were no formal education programs, and none emerged until the late 1960s. They introduced the term informatics only in the context of *archival science*, which is only a small part of informatics. Professional development, therefore, played a significant role in the development of health informatics.^[19] According to Imhoff et al., 2001, healthcare informatics is not only the application of computer technology to problems in healthcare, but covers all aspects of generation, handling, communication, storage, retrieval, management, analysis, discovery, and synthesis of data information and knowledge in the entire scope of healthcare. Furthermore, they stated that the primary goal of health informatics can be distinguished as follows: *To provide solutions for problems related to data, information, and knowledge processing. To study general principles of processing data information and knowledge in medicine and healthcare*.^{[20][21]} The term *health informatics* quickly spread throughout the United States in various forms such as *nursing informatics*, *public health informatics* or *medical informatics*. Analogous terms were later introduced for use of computers in various fields, such as *business informatics*, *forest informatics*, *legal informatics* etc. These fields still mainly use term informatics in context of library science.

Informatics as information processing science

In the early 1980s, K.A Nicholas published "Informatics: Ready for the Information Society" proposing a definition of Informatics as "the study and the practice of skills related to information, its collection, storage, retrieval, analysis and publication. In short; - Information Handling." It had been developed in the South Australian Education System at a grass roots level. <K.A Nicholas published "Informatics: Ready for the Information Society" 1983 - National Library of Australia>

In the early 1990s, K.K. Kolin proposed an interpretation of informatics as a fundamental science that studies information processes in nature, society, and technical systems.^[22]

A broad interpretation of *informatics*, as "the study of the structure, algorithms, behaviour, and interactions of natural and artificial computational systems," was introduced by the *University of Edinburgh* in 1994. This has led to the merger of the institutes of computer science, artificial intelligence and cognitive science into a single *School of Informatics* in 2002.^[23]

More than a dozen nearby universities joined Scottish Informatics and Computer Science Alliance. Some non-European universities have also adopted this definition (e.g. Kyoto University School of Informatics).

In 2003, Yingxu Wang popularized term cognitive informatics, described as follows:^[24]

Supplementary to matter and energy, information is the third essence for modeling the world. Cognitive informatics focuses on internal information processing mechanisms and the natural intelligence of the brain.

Informatics as a fundamental science of information in natural and artificial systems was proposed again in Russia in 2006.^[25]

In 2007, the influential book Decoding the Universe was published.

Former president of Association for Computing Machinery, Peter Denning wrote in 2007:^[26]

The old definition of computer science - the study of phenomena surrounding computers - is now obsolete. Computing is the study of natural and artificial information processes.

The 2008 Research Assessment Exercise, of the UK Funding Councils, includes a new, *Computer Science and Informatics*, unit of assessment (UoA),^[27] whose scope is described as follows:

The UoA includes the study of methods for acquiring, storing, processing, communicating and reasoning about information, and the role of interactivity in natural and artificial systems, through the implementation, organisation and use of computer hardware, software and other resources. The subjects are characterised by the rigorous application of analysis, experimentation and design.

In 2008, the construction of the Informatics Forum was completed. In 2018, the MIT Schwarzman College of Computing was established. Its construction is planned to be completed in 2021.

Informatics as information science

In the fields of geoinformatics or irrigation informatics, the term -informatics usually mean information science, in context related to library science. This was the first meaning of informatics introduced in Russia in 1966 by A.I. Mikhailov, R.S. Gilyarevskii, and A.I. Chernyi, which referred to a scientific discipline that studies the structure and properties of scientific information.^[22] In this context, the term was also used by the International Neuroinformatics Coordinating Facility. Some scientists use this term, however, to refer to the science of information processing, not data management.^[28]

In the English-speaking world, the term *informatics* was first widely used in the compound medical informatics, taken to include "the cognitive, information processing, and communication tasks of medical practice, education, and research, including information science and the technology to support these tasks".^[29] Many such compounds are now in use; they can be viewed as different areas of "*applied informatics*".

Informatics as computer science

In some countries such as Germany, Russia, France, and Italy, the term *informatics* in many contexts (but not always) can translate directly to *computer science*.^[30]