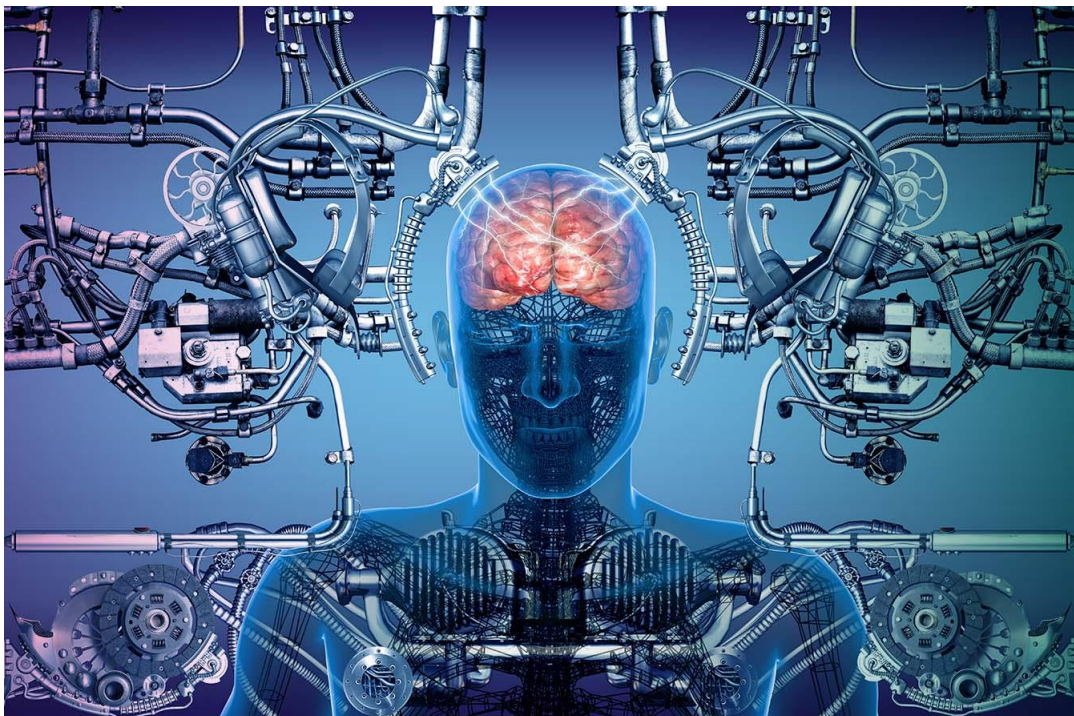


**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ТЕРНОПІЛЬСЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ
УНІВЕРСИТЕТ ІМЕНІ ІВАНА ПУЛЮЯ**

ENGLISH FOR FUTURE

Тлумачний словник термінів техніки і ІТ



Тернопіль - 2024

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Е 56

English for Future: Методичні рекомендації для самостійної роботи. Тлумачний словник термінів техніки і ІТ / уклад. : І.Р. Плавущька, Н.І. Пасічник, Г. І. Шайнер, О.В. Барабаш, І.С. Миськів, О.О. Білик, О.О. Пуга, О.М. Ванівська, З.Р. Подоляк, Р.Б. Преснер. Тернопіль : ТНТУ Івана Пулюя”, 2024. 122 с.

Тлумачний словник містить ключові терміни та поняття галузі техніки і ІТ, які тематично класифіковані і представлені у трьох розділах. Окремо винесено список тематичної літератури та Інтернет-ресурсів. Словник призначений для аудиторної, індивідуальної та самостійної роботи студентів факультету іноземних мов освітньої програми “Англійсько-український переклад”, а також для студентів технічних і комп’ютерних спеціальностей.

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від 11 квітня 2024 р.*

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ПЕРЕДМОВА

Тлумачний словник призначено для студентів факультету іноземних мов освітньої програми “Англійсько-український переклад”, а також студентів технічних спеціальностей, які вивчають комп’ютерні науки та інформаційні технології.

Головна мета тлумачного словника – поглиблене оволодіння фаховою англійською мовою у галузі інформаційних технологій та освоєння термінологічної лексики.

Тематичний словник складається з трьох тематичних розділів (English for Information Technology, English for Cybernetics, English for Digital Economy).

При роботі над словником було використано матеріали енциклопедичних словників, тлумачних словників з обчислювальної техніки, інформатики, словників комп’ютерних, Інтернет- та web-термінів. Терміни та поняття розміщені у словнику за алфавітним порядком, що дозволяє користувачам легко орієнтуватись у виборі потрібного матеріалу.

Тлумачний словник розрахований на викладачів, аспірантів, магістрів, студентів, програмістів, а також для усіх інших, хто має стосунок до галузі техніки та інформаційних технологій.

АНГЛІЙСЬКИЙ АЛФАВІТ

<i>Aa</i> Aa [eɪ]	<i>Nn</i> Nn [en]
<i>Bb</i> Bb [bi:]	<i>Oo</i> Oo [əv]
<i>Cc</i> Cc [si:]	<i>Pp</i> Pp [pi:]
<i>Dd</i> Dd [di:]	<i>Qq</i> Qq [kju:]
<i>Ee</i> Ee [i:]	<i>Rr</i> Rr [a:]
<i>Ff</i> Ff [ef]	<i>Ss</i> Ss [es]
<i>Gg</i> Gg [dʒi:]	<i>Tt</i> Tt [ti:]
<i>Hh</i> Hh [eɪ:tʃ]	<i>Uu</i> Uu [ju:]
<i>Ii</i> Ii [aɪ:]	<i>Vv</i> Vv [vi:]
<i>Jj</i> Jj [dʒeɪ]	<i>Ww</i> Ww [ˈdʌblju:]
<i>Kk</i> Kk [keɪ]	<i>Xx</i> Xx [eks]
<i>Ll</i> Ll [el]	<i>Yy</i> Yy [waɪ]
<i>Mm</i> Mm [em]	<i>Zz</i> Zz [zed]

ENGLISH FOR INFORMATION TECHNOLOGY



A

- **Access Time**

the time interval between the instance at which data is called from a storage device and the instance when delivery begins.

- **Algorithm**

a set of well-defined instructions for the solution of a problem in a finite number of steps.

- **Analog Computer**

a computer that operates on data which is in the form of continuous variable physical quantities.

- **Application Program**

a sequence of instructions written to solve a specific user problem.

- **Application Software**

a subclass of computer software that employs the capabilities of a computer directly to a task that the user wishes to perform.

- **Arithmetic Logic Unit (ALU)**

a part of the execution unit, a core component of all CPUs. ALUs are capable of calculating the results of a wide variety of basic arithmetical and logical computations.

- **Artificial Intelligence (AI)**

the ability of a computer running special software to act intelligently — perceiving new data, learning, drawing inferences, and solving problems. It allows computers to perform work that previously required human intervention.

- **Assembler**

a program that translates mnemonic statement into executable instruction.

- **Augmented Reality**

technology that enhances the real world through the use of sensory information (visual, audio, or otherwise) added to the actual view of the real world.

- **Automatic Data Processing (ADP)**

the collection, manipulation, and dissemination of data by electromechanical machines to attain specified objectives.

- **Auxiliary Memory**

also known as secondary memory that is not directly addressable by the CPU.

Bb

- **Back-End Processor**

a small CPU serving as an interface between a large CPU and a large data base stored on a direct-access storage device.

- **Backup**

a copy of a file or other item of data made in case the original is lost and damaged.

- **Bandwidth**

the maximum amount of data that can travel in a communication path in a given time, measured in bits per second (bps).

- **Bar Code**

a machine-readable representation of information in a visual format on a surface.

- **Batch File**

a text file that contains a sequence of commands for a computer operating system.

- **Batch Processing**

a method of processing data in which data items are collected and forwarded to the computer in a group.

- **Binary Coded Decimal (BCD)**

a coding system in which a 4 digit binary number represents each decimal digit from 0 to 9.

- **Biochip**

in theory, a chip whose circuits will be built from the proteins and enzymes of living matter such as E. coli bacteria.

- **Bit**

the most basic information unit used in computing and information theory.

- **Bit Cells**

the name for storage locations in semiconductors.

- **Blockchain**

a data structure containing records, called blocks, which are linked together in a cryptographically secure way.

- **Blocks**

also called blocked records; records grouped on magnetic tape or magnetic disk to reduce the number of interrecord gaps and more fully utilize the storage medium.

- **Blog**

a discussion or informational site published on the world wide web.

- **Branch**

program logic used to bypass or alter the normal flow of execution.

- **Broad-Band Channels**

communication channels that can transmit data at rates of up to 120,000 bits per second; for example, laser beams and microwaves.

- **Browser**

a special software that enables users to read/view Web pages and jump from one Web page to another.

- **Bubble Memory**

a memory medium in which data is represented by magnetized spots (magnetic domains) resting on a thin film of semiconductor material.

- **Buffering**

the process of storing data in a memory device, allowing the devices to change the data rates, perform error checking and error retransmission.

- **Bug**

an error, flaw, failure, or fault in a computer program or system that produces an incorrect or unexpected result.

- **Bus**

a circuit that provides a communication path between two or more devices of a digital computer system.

- **Byte**

a unit of storage measurement in computers, regardless of the type of data being stored.

Cc

- **Cache Memory**

also known as a high-speed buffer; a working buffer or temporary area used in primary storage to help speed the execution of a program.

- **Cell**

a box in a spreadsheet, in which you can enter a single piece of data.

- **Central Processing Unit (CPU)**

generally called by its generic name 'Processor'. It is also known as the brain of computer. It performs the actual processing of data.

- **Chain**

the logical path linking records according to one common field.

- **Chain Printer**

an output device that has the character set engraved in type and assembled in a chain that revolves horizontally past all print positions; prints when a print hammer (one for each column of the paper) presses the paper against an inked ribbon that presses against the characters on the print chain.

- **Cloud Computing**

services provided over a network by a collection of remote servers.

- **Code**

to translate data into machine-readable form so they can be entered into the computer system.

- **Command Area**

the area at the bottom of some electronic spreadsheets that displays the available commands to the user.

- **Commercial Data Base**

a collection of information accessible over communication lines to paying subscribers; also called information service and information utility.

- **Communication Protocol**

a system of rules that allow two or more entities of a communications system to transmit information.

- **Compiler Program**

translator program for a high-level language such as FORTRAN or COBOL; translates source-program statements into machine-executable code; also called compiler.

- **Computer Ethics**

term referring to the standard of moral conduct in computer use; way in which the spirit of the law is applied to computer-related activities.

- **Computer Graphics**

visual presentations on a computer screen. Examples are photographs, drawings, line arts, graphs or other images.

- **Computer Literacy**

general knowledge about computers; includes some technical knowledge about hardware and software, the ability to use computers to solve problems, and awareness of how computers affect society.

- **Computer Network**

a system for communication among two or more computers.

- **Computer Worm**

a self-replicating computer program, similar to a computer virus.

- **Computer-Assisted Instruction (CAI)**

use of a computer to instruct or drill a student on an individual or small-group basis.

- **Control Unit**

the part of a CPU that directs its operation. The outputs of this unit control the activity of the rest of the device.

- **Cookie**

a packet of information that travels between a browser and the web server.

- **Crawler**

an Internet bot that systematically browse the world wide web, typically for the purpose of Web indexing. It is also called a Web spider.

- **Cryptography**

the conversion of data into a secret code for transmission over a public network.

- **Cybersecurity**

an umbrella term for all systems that protect data, networks and computer systems from intrusion and attacks, very often due to being connected to the Internet.

Dd

- **Data**

facts; the raw material of information.

- **Data Base**

collection of data that are commonly defined and consistently organized to fit the information needs of a wide variety of users in an organization.

- **Data Communication**

the electronic transmission of data from one site to another usually over communication channels such as telephone/telegraph lines or microwaves.

- **Data Processing**

converting data into information.

- **Data Redundancy**

a condition created within a database or data storage technology in which the same piece of data is held in two separate places.

- **Database Management System (DBMS)**

a collection of various programs that provides a systematic way to create, retrieve, update and manage data.

- **Debugging**

a methodical process of finding and reducing the number of bugs, or defects are known as debugging.

- **Degree**

the number of fields associated with the database table or relation.

- **Desk-Checking**

a method used in both system and application program debugging in which the sequence of operations is mentally traced to verify the correctness of the processing logic.

- **Desktop Publishing (DTP)**

combines a personal computer, page layout software and a printer to create publications on small economic scale.

- **Device Driver**

a computer program that enables another program, typically, an operating system to interact with a hardware device.

- **Dial-up Line**

a line through which communication established.

- **Digital Computer**

a computer that operates with numbers expressed directly as digits.

- **Direct Access**

method of processing in which data are submitted to the computer as they occur, and located, retrieved, and updated without reading all preceding data.

- **Direct Access**

the capability of the computer equipment to obtain data from a storage device.

- **Directory**

an entity in a file system which contains a group of files and other directories.

- **Display Unit**

a device with a screen that displays characters or graphics representing data in a computer memory.

- **Domain Name**

a unique name that identifies a particular Website and represents the name of the server where the Web pages reside.

- **Dots Per Inch (DPI)**

the measure of the resolution of a printer, scanner or monitor. It refers to the number of dots in one inch line.

- **Download**

the act of transmitting data from a remote computer on the Internet or other network to one's own computer.

- **Downtime** – the time a system is not working because of equipment problems.

- **Drag and Drop**

the action of clicking on a virtual object and dragging it to a different location or onto another virtual object.

- **DVD**

an optical disc storage media format that can be used for data storage including movies with high quality video and sound.

- **Dynamic RAM**

a type of random access memory which stores each bit of data in a separate capacitor.

Ee

- **EBCDIC**

(Extended Binary Coded Decimal Interchange Code) – an 8-bit character encoding used on IBM mainframe operating systems, like Z/OS, S/390, AS/400 and i5/OS.

- **E-Commerce**

a type of industry where buying and selling of products or services is conducted over electronic systems such as the Intranet and other computer network.

- **Edge Computing**

processing and storing data close to its creation. Typically used in industrial Internet of Things applications, both edge computing and “fog computing” are terms used synonymously.

- **Editing**

the process of changing information by inserting, deleting, replacing, rearranging and reformation.

- **Electronic Data Processing (EDP)**

a data processing through equipment that is predominantly electronic such as digital computer.

- **Electronic Funds Transfer (EFT)**

cashless method of managing money; accounts involved in a transaction are adjusted by electronic communication between computers.

- **Electronic Mail**

a method of composing, sending, storing and receiving messages over electronic communication systems.

- **Electronic Spreadsheet**

an electronic ledger sheet used to store and manipulate any type of numerical data.

- **Electrostatic Printer**

a nonimpact printer in which electromagnetic impulses and heat are used to affix characters to paper.

- **Electrothermal Printer**

a nonimpact printer that uses special heat-sensitive paper; characters are formed when heated rods in a matrix touch the paper.

- **Encryption**

the process of encoding messages (or information) in such a way that hackers cannot read it, but the authorised users can access it.

- **End User**

any individual who uses the information generated by a computer based system.

- **Entity**

something that has certain attributes or properties which may be assigned values.

- **Error Message**

information displayed when an unexpected condition occurs usually on a computer or other device.

- **Excel**

allows users to create spreadsheets much like paper ledgers that can perform automatic calculations.

- **Exe (.exe)**

a common filename extension denoting an executable file (a program) in the DOS, MS-Windows.

- **Execution Time**

the total time required to execute a program on a particular system.

- **Expansion Slot**

a socket on the motherboard that is used to insert an expansion card which provides additional features to a computer.

- **Expert System**

form of artificial intelligence software that imitates the same decision-making processes of experts on a specific field.

- **Extranet**

a technology that permits the users of one organisation's Intranet to enter portions of another organisation's Intranet in order to conduct business transactions or collaborate on joint projects.

Ff

- **Fax**

stands for 'Facsimile'. It is used to transmit a copy of a document electronically.

- **Fiber Optics**

a data transmission concept using laser pulses and cables made of tiny threads of glass that can transmit huge amounts of data at the speed of light.

- **Field**

the attribute of an entity in the table representation.

- **File**

a collection of information stored electronically and treated as a unit by a computer. Every file must have its own distinctive name.

- **File Allocation Table (FAT)**

the name of a computer file system architecture. The FAT file system is a legacy file system which is simple and robust.

- **File Handler**

a data-management application package capable of operating on only one file at a time.

- **File Manager**

an operating system utility that provides a user interface to work with file systems.

- **File Transfer Protocol (FTP)**

used to transfer files from one place to another on Internet.

- **Firewall**

a security system usually consisting of hardware and software that prevents unauthorised persons from accessing certain parts of a program database or network.

- **Fixed Scanner**

an input device used to scan and read source data in bar-code form or in human-readable form.

- **Fixed-Length Records**

a record format in which a maximum number of character positions are assigned.

- **Flowcharts**

the means of visually representing the flow of data through an information processing system, the operations performed within the system and the sequence in which they are performed.

- **Flowlines**

the lines that connect flowchart symbols.

- **Foreign Key**

a field in a database table, which links it to another related table. Format To set margins, tabs, font or line spacing in layout of a document.

- **FORTRAN**

stands for formula translating system. The language was designed at IBM for scientific computing.

- **Freeware**

a form of software distribution where the author retains copyright of the software but makes the program available to others at no cost.

- **Front-End Processor**

a small CPU serving as an interface between a large CPU and peripheral devices.

- **Full-Duplex**

a type of communication channel through which data can be transmitted in both directions simultaneously.

- **Function Key**

a special key on a computer keyboard or a terminal devices keyboard that is used to perform specific functions. Many keyboards have function keys labelled from F1 to F12.

Gg

- **Garbage In Garbage Out (GIGO)**

pertains to the fact that most computer errors are not machine errors, they are data errors caused by incorrect input data.

- **Gateway**

a device that is used to joint together two networks having different base protocols.

- **Gigabyte (GB)**

a unit of information or computer storage equal to approximately one billion bytes.

- **Gigahertz (GHz)**

a measurement used to identify the speed of the central processing unit. One gigahertz is equal to 1 billion cycles per second.

- **Graphic Display Device**

a visual display device that projects output in the form of graphs and line drawings and accepts input from a keyboard or light pen.

- **Graphic Tablet**

an input device which is used to create images, etc.

- **Graphical User Interface (GUI)**

a method of interacting with a computer through a metaphor of direct manipulating of graphical images and widgets in addition to text.

- **Graphics Interchange Format (GIF)**

a simple file format for pictures and photographs, that are compressed so they can be sent quickly.

- **Graphics Software Package**

application software package designed to allow the user to display images on the display screen or printer.

- **Grid Chart**

a chart used in system analysis to summarize the relationships between the components of a system.

Hh

- **Hacker**

a computer criminal who penetrates and tempers with computer programs or systems.

- **Half-Duplex**

a type of communication channel through which data can be transmitted in both directions, but in only one direction at a time.

- **Hang**

to crash in such a way that the computer does not respond to input from the keyboard or mouse.

- **Hard Copy**

a printed copy of information from a computer.

- **Hard Disk**

a non-volatile data storage device that stores data on a magnetic surface layered onto disk platters.

- **Hardware**

the mechanical, magnetic, electronic and electrical components that comprises a computer system such as CPU, monitor, keyboard, mouse, etc.

- **High-Level Programming Language**

a programming language that is more user-friendly, to some extent platform-independent and abstract from low-level computer processor operations such as memory accesses.

- **Holler Plating**

placing the same word, phrase, or block of text in several documents.

- **Home Page**

a starting point or a doorway to the Website. It refers to the Web page that identifies a Website and contains the hyperlink to other Web pages in the Website.

- **Host Computer**

a computer that provides information or a service to other computers on the Internet. Every host computer has its own unique host name.

- **Hub**

a network device that connects multiple computers on a LAN, so that they can communicate with one another.

- **Hybrid Computer**

a computer made by taking the best features of the analog computer and digital computer.

- **Hyperlink**

an image or portion of text on a Web page that is linked to another Web page.

- **HyperText Markup Language**

stands for HTML. It is mainly used for designing websites.

- **HyperText Transfer Protocol (HTTP)**

an important protocol used on the world wide web for moving hypertext files across the Internet.

Ii

- **Icon**

a symbol (such as picture or a folder) that represents a certain function on your computer. When the user clicks on the icon, the appropriate function is executed.

- **Information**

the summarisation of data according to a certain pre-defined purpose.

- **Input**

in order to give instructions to a computer, the information has to be supplied to it.

- **Input/Output Management System**

a subsystem of the operating system that controls and coordinates the CPU while receiving input from channels, executing instructions of programs in storage, and regulating output.

- **Instant Messaging (IM)**

a chat program that lets people communicate over the Internet in real time.

- **Instruction**

a command or order given to a computer to perform a task.

- **Integrated Circuits**

multiple electronic components combined on a silicon chip.

- **Interactive Processing**

a data-processing method where the user enters input via a keyboard during processing.

- **Interblock Gap (IBG)**

a space on magnetic tape that facilitates processing; records are grouped together and then separated by interblock gaps.

- **Interface**

a device or program that helps a user to communicate with a computer.

- **Internet**

a vast computer network linking smaller computer networks worldwide.

- **Internet of Things (IoT)**

an idea of all objects in the world being uniquely identifiable, tracked, and connected to the Internet.

- **Internet Service Provider (ISP)**

a business organisation that offers users to access the Internet and related services.

- **Internet Surfing**

to search something on Internet is called Internet surfing.

- **Interpreter**

a program that converts and executes the source code into machine code line by line.

- **Interrecord Gap (IRG)**

a space that separates records stored on magnetic tape; allows the tape drive to regain speed during processing. Inverted list A list that has an index for every field in a file.

Jj

- **Java**

a programming language, used to create mobile applications, softwares, etc.

- **Javascript**

an object oriented programming language used to create interactive effects in a Web browser.

- **Joystick**

a computer peripheral or general control device consisting of a handheld stick that pivots about one end and transmits its angle in two or three dimensions to a computer

- **JPEG (Joint Photographic Experts Group)**

a commonly used method of lossy compression for digital photography.

Kk

- **Kernel**

the fundamental part of a program, such as an operating system, that resides in memory at all times.

- **Key**

the unique identifier or field of a record; used to sort records for processing or to locate specific records within a file.

- **Key Stroke**

the process of pressing button in keyboard.

- **Keyboard**

the standard input device attached to all computers. The layout of keyboard is just like the traditional typewriter of the type QWERTY.

- **Keypunch**

a keyboard device that punches holes in a card to represent data.

- **Key-to-Disk**

hardware designed to transfer data entered via a keyboard to magnetic (hard) disk.

- **Kilobyte (KB)**

a unit of information or computer storage equal to 1024 bytes.

L

- **LAN (Local Area Network)**

a network where the connected computers are geographically close together. They are either in the same building or within a smaller area.

- **Laptop**

a small, lightweight and portable batterypowered computers that can fit onto your lap. They each have a thin, flat and liquid crystal display screen.

- **Laser Printer**

a type of nonimpact printer that combines laser beams and electrophotographic technology to form images on paper.

- **Laser Storage System**

a secondary storage device using laser technology to encode data onto a metallic surface; most often used for mass storage.

- **Light Pen**

a light sensitive style for forming graphics by touching coordinates on a display screen, thereby seeming to draw directly on the screen.

- **Link**

a communication path between two nodes or channels.

- **Linked List**

a file using pointers to maintain the sequence of the records.

- **Links**

transmission channels that connect nodes.

- **LINUX**

an open source operating system, meaning that the source code of the operating system is freely available to the public.

- **List Processing (LISP)**

a high level programming language suitable for handling logical operations and non-numeric applications.

- **Log In**

the process by which an individual gains access to a computer system by identifying and authenticating themselves.

- **Log Off**

a process of withdrawal from function after performing program.

- **Loop**

program logic that causes a series of instructions to be executed repeatedly as long as specified conditions remain constant.

- **Low Level Language**

a assembly language which is used in computer. It was mostly used in first generation computers.

- **Machine Language**

the language of computer also called binary language. Instructions in this language are written as a sequence of 0's and 1's.

- **Machine Learning (ML)**

a branch of artificial intelligence focused on creating computer systems that accomplish tasks without explicit instructions.

- **Magnetic Disk**

a direct-access storage medium consisting of a metal platter coated on both sides with a magnetic recording material upon which data is stored in the form of magnetized spots.

- **Magnetic Domain**

a magnetized spot representing data in bubble memory.

- **Main Memory**

a volatile and speedy memory. It is divided into two parts RAM and ROM.

- **Mainframe**

a type of large, full-scale computer capable of supporting many peripherals.

- **Malware**

a software that disrupts normal computers functions or sends a users personal data without the user authorisation.

- **Mass Storage**

storage where large volumes of backup/data is stored.

- **Master File**

a file that contains all existing records organized according to the key field; updated by records in a transaction file.

- **Megabyte (MB)**

1 Megabyte is equal to 1048576 bytes, usually rounded off to one million bytes. It is also called a 'meg'.

- **Memory**

temporary storage for information, including applications and documents.

- **Memory Management/Memory Protection**

in a multiprogramming environment, the process of keeping the programs in primary storage separate from each other.

- **Menu Bar**

the horizontal strip across the top of an application's window. Each word on the strip has a context sensitive drop-down menu containing features and actions that are available for the application in use.

- **Merge**

combining two or more files into a single file.

- **Message Switching**

the task of a communications processor of receiving messages and routing them to appropriate destinations.

- **Microcomputer**

a microprocessor-based computer, consisting of an CPU, internal semiconductor memory, input and output sections and a system bus, all on one, or several monolithic IC chips inserted into one or several PC boards.

- **Microprocessor** – a complete Central Processing Unit (CPU) contained on a single silicon chip.

- **MIDI (Music Instrument Digital Interface)** allows a computer to store and replay a musical instrument's output.

- **Minicomputer**

a computer considered to be more capable than a microcomputer but less powerful than a mainframe.

- **Mnemonic**

a symbolic label or code remainder that assists the user in remembering a specific operation or command in assembly language.

- **Modem (Modulator/Demodulator)**

specific equipment that provides a means of communication between two computer systems over conventional telephone lines.

- **Modulation**

a technology used in modems to make data processing signals compatible with communication facilities.

- **Monitor**

the visual readout device of a computer system. A monitor can be in several forms; a Cathode Ray Tube (CRT), a Liquid Crystal Display (LCD), or a flat-panel, full-color display.

- **Mouse**

a desk-top input device that controls cursor movement, allowing the user to bypass the keyboard.

- **Multimedia**

software programs that combine text and graphics with sound, video and animation. A multimedia PC contains the hardware to support these capabilities.

- **Multiplexer**

a device that permits more than one I/O device to transmit data over the same communication channel.

- **Multitasking**

working simultaneously with several programs or interrelated tasks that share memories, codes, buffers and files.

- **Multithreading**

a facility available in an operating system that allows multiple functions from the same application packages.

Nn

- **Natural Language Processing (NLP)**

is a method used in artificial intelligence to process and derive meaning from the human language.

- **Network**

an interconnection of two or more than two computers.

- **Network Data Structure**

the data structure in which a primary data element may have many secondary elements and the secondary elements may have numerous primary elements.

- **Network Interface Card (NIC)**

a part of the computer that allows it to talk to other computers via a network protocol like TCP/IP.

- **Neural Network**

an artificial intelligence computing system modeled after the way that a human brain works. Neural networks use layers of interconnected nodes as artificial neurons to process data and solve a given problem.

- **Nibble**

sequence of four adjacent bits, or a half-byte. A hexadecimal or BCD coded digit can be represented by a nibble.

- **Node**

the endpoint of a network branch or the junction of two or more branches.

- **Non-Volatile Memory**

a memory where stored data remain undisturbed by the removal of electrical power.

- **Notebook**

a portable computer, that can fit into a briefcase. It is used as personal computer. It is also called laptop.

Oo

- **Object**

something that contains both the data and the application that operate on that data.

- **Odd Parity**

a method of coding in which an odd number of 1 bits is used to represent each character; facilitates error checking.

- **Office Automation**

integration of computer and communication technology with traditional office procedures to increase productivity and efficiency.

- **Offline**

the state in which a computer is temporarily or permanently unable to communicate with another computer.

- **Online**

the state of being connected to the networked computer system or the Internet.

- **Online Storage Symbol**

a symbol that indicates that the file is kept on an online external storage medium such as disk or tape.

- **Operand**

the part of an instruction that tells the computer where to find the data or equipment on which to operate.

- **Operating System**

a set of instructions that tells a computer on how to operate when it is turned ON. It sets up a filing system to store files and tells the computer how to display information on a video display.

- **Operation Code**

also known as op code; the part of an instruction that indicates what operation is to be performed.

- **Optical Disk**

also known as a laser disk; stores data as the presence or absence of a pit burned into the surface of the disk by a laser beam.

- **Optical-Character Recognition (OCR)**

a method of electronic scanning that reads numbers, letters, and other characters and then converts the optical images into appropriate electrical signals.

- **Optical-Mark Recognition (OMR)**

mark sensing; a method of electronic scanning that reads marks on a page and converts the optical images into appropriate electrical signals.

- **Output**

data that come out of a computer device.

Pp

- **Page**

in a virtual storage environment, the portion of a program that is kept in secondary storage and loaded into real storage only when needed during processing.

- **Page Frame**

in a virtual storage environment, one of the equal-sized physical areas into which primary storage is divided.

- **Parity Bit**

a bit added to detect incorrect transmission of data; it conducts internal checks to determine whether the correct number of bits are present.

- **Patch**

a small program that improves an existing piece of software or corrects an error in it.

- **Personal Computer (PC)**

a single-user computer containing a Central Processing Unit (CPU) and one or more memory circuits.

- **Piracy**

the illegal copying of software or other creative works.

- **Pixels**

an acronym derived from picture element. The smallest element (a dot) on a display screen.

- **Plotter**

an output device that converts data emitted from the CPU into graphic form; produces hard-copy output.

- **Plug-In**

a program that your browser uses to manipulate a downloaded file.

- **Pointer**

an additional field in a record that contains the address of the next record to be accessed.

- **Portrait**

a term that designates the position of conventional printing across the width of a page.

- **Post Office Protocol (POP)**

a protocol that specifies how a personal computer can connect to a mail server on the Internet and download E-mail.

- **Primary Key**

a key that uniquely identifies each tuple or row in a table.

- **Primary Memory/Storage**

also known as internal storage or main storage; the section of the computer that holds instructions, data, and intermediate and final results during processing.

- **Print Formatting**

the manner in which the word processor communicates with the printer to tell it how the text should be printed.

- **Printer**

a mechanical device for printing a computer's output on paper.

- **Process**

a collection of code, data and other system resources including at least one thread of execution that performs a data processing task.

- **Program**

a set of instructions to perform a specific task.

- **Programming Language**

a vocabulary and set of grammatical rules for instructing a computer to perform specific tasks.

- **Propagation Delay**

a time delay in a satellite communication system.

- **Protocol**

a set of rules that defines exactly how information is to be exchanged between two systems over Internet.

- **Pseudocode**

a short hand way of describing a computer program.

Qq

- **Quantum Computing**

a computer architecture based on quantum mechanics, the science of atomic structure and function.

- **Query**

a request for information from a database.

Rr

- **Random Access Memory (RAM)**

a volatile, semiconductor storage structure that accesses temporary data with a random or direct accessing method. Data in this memory can be read by the CPU directly.

- **Read Only Memory (ROM)**

a semiconductor memory whose data cannot be erased, or overwritten; it can only be accessed (read) for use by the CPU.

- **Real-Time**

descriptive of a system's capability to receive and process data, providing output fast enough to control the outcome of an activity.

- **Record**

a collection of all the information pertaining to a particular entity instance.

- **Register**

a temporary storage unit for quick, direct accessibility of a small amount of data for processing.

- **Remote Network**

a system where terminals are connected to the central computer by a communication channel.

- **Remote Server**

a network computer that allows a user on the network from a distant location to access information.

- **Retrieve**

to access previously stored data.

- **Router**

a network device that enables the network to reroute messages it receives that are intended for other networks. The network with the router receives the message and sends it on its way exactly as received.

- **Routing**

the process of choosing the best path throughout the LAN.

Ss

- **Scanner**

an electronic device that uses light-sensing equipment to scan paper images such as text, photos, illustrations and translate the images into signals that the computer can then store, modify, or distribute.

- **Screen Editor**

a word processing feature that allows the text on the entire screen to be edited.

- **Screen Formatting**

word-processing features that control the way in which text appears on the display screen.

- **Scrolling**

the process of moving a portion of a text file on to or off of the display screen; used to view portions of a document.

- **Search**

a feature of a program that permits the user to locate a word or set of characters throughout a file.

- **Search Engine**

software that makes it possible to look for and retrieve information on the Internet, particularly the Web. Some popular search engines are AltaVista, Google, HotBot, Yahoo!, Web Crawler and Lycos.

- **Sector**

a section of a recording track on a magnetic disk.

- **Sequential Access**

a class of data storage device that reads stored data in a sequence.

- **Server**

a computer that shares its resources and information with other computers on a network.

- **Shareware**

a software that is not free but is available for a free trial period.

- **Simplex**

transmission of data in one direction only.

- **Simulation**

duplication of conditions likely to occur in a real-world situation when variables are changed.

- **Smart City**

an urban area that uses technology to provide high-tech services as well as more efficient services to the neighborhood.

- **Smart Device**

any computer-controlled electronic apparatus that is not a desktop, laptop or tablet computer, which are technically “intelligent” devices.

- **Smart Home**

a category of electronic devices that automate and interconnect tasks in a house.

- **Software Compatibility**

the ability to use programs written for one system on another system with little or no change.

- **Software**

the set of computer programs, procedures and associated documentation related to the effective operation

- **Source Code** (Source Program)

a set of computer instructions in hard-copy or stored form.

- **Source-Data Automation**

the use of special equipment to collect data at its point of origin.

- **Spam**

irrelevant or unsolicited messages sent over Internet, typically to large numbers of users, for the purpose of advertising, phishing, spreading malwares, etc.

- **Spatial Digitizer**

an input device that can graphically reconstruct a three-dimensional object on the computer display screen.

- **Spreadsheet**

software that allows one to calculate numbers in a format that is similar to pages in a conventional ledger.

- **Static RAM**

a type of RAM, that contains its contents only whenever current supply is ON.

- **Status Area**

A portion of an electronic spreadsheet that appears at the top of the display and shows the location of the cursor within the spreadsheet and what was entered into a particular cell of the spreadsheet.

- **Sub Program**

a particular part of a program that complete the special work.

- **Supercomputer**

the largest mainframe computer featuring exceptionally high speed operation while manipulating huge amounts of information.

- **Swapping**

in a virtual storage environment, the process of transferring a program section from virtual storage to real storage, and vice versa.

Tt

- **TCP/IP (Transmission Control Protocol/Internet Protocol)**

a large grouping of programs and standards that govern how information moves round the Internet.

- **Template**

a predefined set of formulas for use on an electronic spreadsheet.

- **Terabyte (TB)**

a trillion bytes. Actually, it is 2^{40} or 10095111627776 bytes.

- **Terminal**

a computer screen.

- **Text Editing**

the process of making changes to a document after the text has been entered into the computer.

- **Thrashing**

a situation in virtual storage in which little processing occurs in comparison to the amount of locating and swapping of pages or segments.

- **Time Sharing**

the allocation of computer resources in a time dependent fashion to run several programs simultaneously.

- **Top-Down Design**

a method of defining a solution from general to specific in terms of major functions to be performed, and further breaking down the major functions into subfunctions; the further the breakdown, the greater the detail.

- **Topology**

the structure of the network including physical connection such as wiring schemes and logical interactions between network devices.

- **Trackball**

input device that controls the position of the cursor on the screen.

- **Trailer Value**

a value used to control loop execution in which a unique item signals the computer to stop performing the loop.

- **Transaction File**

a file containing changes to be made to the master file.

- **Transistor**

an on/off switch connecting the data line to the capacitor; a type of circuitry characteristic of second-generation computers; smaller, faster, and more reliable than vacuum tubes but inferior to third-generation, large-scale integration.

- **Transponders**

small amplifiers located on satellites, which receive signals from the earth station and reflect them to the receiving stations.

Uu

- **Uniform Resource Locator (URL)**

the specific Internet address for a resource such as an individual or an organisation.

- **Unix**

an operating system developed by AT & T. It is a big push that it allows one server to serve many different end users at one time.

- **Upgrade**

the process of improving hardware and software functionality.

- **Upload**

the processes of transferring information from a computer to a Website (or other remote location on a network).

- **UPS (Universal Power Supply or Uninterruptible Power Supply)**

an electrical power supply that includes a battery to provide enough power to a computer during an outage to back-up data and properly shut down.

- **User**

a person who uses or operates something.

- **User-Friendly**

a software program that has been designed to easily direct the user through the operation or application of a program.

- **Utility Program**

a program within an operating system that performs a specialized function.

Vv

- **Validation**

the process of making sure that the forms and documents from a particular transaction are correct.

- **Variable**

a meaningful name assigned by the programmer to storage locations of which the values can change.

- **Variable-Length Records**

a record format in which the unused character spaces are eliminated from the record.

- **Verify**

to check the accuracy and completeness of data.

- **Vertical Software Integration**

the enhancement of a single software package. For example, adding a spelling checker to a word processing program.

- **Very-Large-Scale Integration (VLSI)**

further miniaturization of integrated circuits, offering even greater improvements in price, performance, and size of computers.

- **Video Conferencing**

a remote 'face-to-face chat', when two or more people using a webcam and an Internet telephone connection chat online. The webcam enables both live voice and video.

- **Virtual Reality (VR)**

a computer-generated artificial environment that allows a user to view, explore, and manipulate the environment.

- **Virtual Storage**

an extension of multiprogramming in which portions of programs not being used are kept in secondary storage until needed, giving the impression that primary storage is unlimited; contrast with real storage.

- **Virus**

a piece of computer code designed as a prank or malicious act to spread from one computer to another by attaching itself to other programs.

- **Visual Display Terminal**

a terminal capable of receiving output on a cathode-ray tube (CRT) and, with special provisions, is capable of transmitting data through a keyboard.

- **Voice Recognition System**

an input system that allows the user to “train” the computer to understand his or her voice and vocabulary. The user must follow only the patterns the computer is programmed to recognize; also called audio input.

- **Voice Response Unit**

a device through which the computer “speaks” by arranging half-second records of voice sounds or prerecorded words; also called audio output.

- **Voice-Grade Channel**

a communication channel that has a wider frequency range and can transmit data at a rate of forty-five to ninety bits per second; for example, a telegraph channel/

- **Volatile Memory**

a memory whose contents are irretrievably lost when power is removed. If data in RAM must be saved after power shutdown, back-up in non-volatile memory (magnetic disk, tape, or CD-R) is essential.

- **Volatility**

the frequency of changes made to a file during a certain period of time.

Ww

- **Wand Reader**

an input device used in reading source data represented in optical bar-code form or in human readable characters.

- **Website**

a collection of web pages or hyperlinked webpages which owned by an individual, company or organisation.

- **Wide Area Network (WAN)**

a telecommunication network or computer network that extends over a large geographical distance.

- **Window**

a portion of a computer display used in a graphical interface that enables users to select commands by pointing to illustrations or symbols with a mouse.

- **Word Processor**

a computer system or program for setting, editing, revising, correcting, storing and printing text.

- **Word Wrap**

a feature of a program that automatically positions text so that full words are positioned within declared margins.

- **Workgroup**

persons sharing files and data between themselves.

- **Workstation**

the work area and/or equipment used for computer operations, including Computer-Aided Design (CAD). The equipment generally consists of a monitor, keyboard, printer and/or plotter and other output devices.

- **World Wide Web ('WWW' or 'The Web')**

a network of servers on the Internet that use hypertext-linked databases and files. It was developed in 1989 by Tim Berners-Lee, a British computer scientist and is now the primary platform of the Internet.

Xx

- **X-Y Plotter**

a computer-driven printing mechanism that draws coordinate points in graph form.

Zz

- **ZIP (Zone Information Protocol)**

an application that allows for the compression of application files.

- **ZOOM**

the enlarging or reducing an image displayed on a computer process of proportionately monitor.

ENGLISH FOR CYBERNETICS



Aa

- **A fortiori analysis**

a method of treating uncertainty that stacks the cards against one alternative (often the one intuitively preferred) by resolving questions of uncertainty in favor of another alternative. If the initially preferred alternative is still preferable, one has a stronger case in its favor.

- **Adaptation**

a form of behavior is adaptive if it maintains the essential variables within physiological limits. For example, the amount of carbon dioxide in the blood is important in its effect on the blood's alkalinity. If the amount rises, the rate and depth of respiration are increased, and carbon dioxide is exhaled at an increased rate. If the amount falls, the reaction is reversed. By this means the alkalinity of the blood is kept within limits.

- **Algedonic loop**

a term used by Stafford Beer to describe the feedback an organism, organization or machine receives from the environment. The algedonic loop is the large feedback loop that goes outside the organism and, through reward or punishment, indicates the environment's response to the organism's behavior.

- **Analog computer**

A computer that represents data in terms of physical measures or quantities and proceeds along a continuum constituted by its components. Analog computers are especially suited for the solution of complex non-linear equations and for the simulation of multi-dimensional, parallel and continuous processes. There is no restriction on the physical processes analog computers may utilize. Most common media are fluids and gases which can be made to vary in numerous DIMENSIONS. Compared with digital COMPUTERS, the programming of analog computers is time consuming and limited in scope.

- **Atomism**

A scientific doctrine which maintains that all complex systems are aggregates of smaller ones and that any whole can therefore be understood entirely from the knowledge of its parts. E.g., an atomistic social theory insists that all social institutions and events can be exhaustively explained in terms of the actions of individuals. A radical application of this doctrine suggests dividing a given phenomenon into smaller and smaller units until they are no longer divisible. The resulting atoms are the ultimate constituents of the phenomena in question and until one has identified these there is nothing to investigate.

- **Autocatalytic**

referring to something whose occurrence at one point increases the probability that it will occur again at another point. If a property of a system is autocatalytic, then such a system is, so far as that property is concerned, essentially unstable in its absence. (Ashby, 1956, p. 196) Examples: life on the planet Earth, guarantees of civil liberties in one nation among many, a product for which there is a demand.

- **Autopoietic machine**

a machine organized (defined as a unity) as a network of processes of production, transformation and destruction of components that produces the components which: i) through their interactions and transformations regenerate and realize the network of processes (relations) that produced them; and ii) constitute it as a concrete unity in the space in which they exist by specifying the topological domain of its realization as such a network.

Bb

- **Back channel communication**

communication which travels through informal rather than formal channels. Governments and players in bureaucracies use back channel or informal communication to test reactions while maintaining deniability.

- **Basin**

a subset and part of a partition of a system's states such that no state in one basin succeeds or is succeeded by states in another basin and any two state in one basin share at least one preceding state or successor. Inasmuch as behavior is defined as a sequence of states, the partition of a system's states into basins is also a partition of that system's possible behaviors, each defining a separately analysable behavior space or region thereof. Each basin may have one or more sets of equilibrium states. Ashby visualized a basin as a geographical area, fully surrounded by mountainous water sheds within which all rivers end up in one or more lakes.

- **Bifurcation**

a bifurcation is the appearance of an additional pattern of behavior or sequence of states for a system. Generally we have successive bifurcations where we increase the value of some characteristic parameter. One can think of a per-son traveling down a road. The farther the traveler goes, the more side streets or alternative routes appear. In a sense the bifurcation introduces history. To know the state of a system at any time implies a knowledge of the paths taken or not taken.

- **Black box method**

a strategy for investigating a complex object without knowledge or assumptions about its internal make-up, structure or parts. The method aims at either a formal description of the transformation rules linking inputs and outputs or the construction of a model exhibiting a behavior that approximates what is observable from the

outside of the "black box". Initially, the method codified the experiments an engineer would have to perform with a sealed piece of equipment in order to deduce what it does or how it could have been wired. The method is quite general, however. E.g., the linguist who can not utilize available knowledge of brain tissue for understanding linguistic production find himself in a similar situation. The resulting model of a black box is considered "grey" inasmuch as its structure is known, save for the knowledge of the internal make-up of that model's parts. The black box method applies to an extreme case. In practice an investigator may find and should utilize clues to the internal processes by non-experimental means. So, the engineer may conclude from the absence of a wire that a particular switch has nothing to do with a certain component just as the linguist may obtain insights about the use of language by being competent in that language himself. The isomorphism between the black box and its model, which the method aims to establish, does not imply structural correspondences between the two. One may be a mechanical device, a chemical process or human organ, the other may be a mathematical formula, an algorithm or electronic piece of equipment. However, the organization of such a model often leads to fruitful hypotheses concerning the structure of the black box.

Cc

- **Calculus**

a system of rules for the manipulation of characters as in the logical calculus or in the differential calculus. If the characters are SYMBOLs, a calculus provides the basis for the analysis of what the symbols represent collectively and individually. information theory is a calculus for analysing the amount of entropy in an observed system into various quantities of information exchanged within that system.

- **Causality**

a process linking two or more events or states of affairs so that one brings about or produces the other. One event is the cause of another if (a) the event occurs prior to the effect, (b) there is an invariant conjunction of the two events and (c) there is an underlying mechanism or physical structure attesting to the necessity of the conjunction. Since (c) is not always demonstrable in empirical data the requirement may be replaced by tests assuring that no third variable controls both or mediates between the two events. Without this weaker test, a cause may be termed spurious and genuine otherwise. Social events are rarely uni-causal phenomena and as deterministic as in the natural sciences. Causality in the social sciences therefore tends to be multi-causal and probabilistic. Philosophy of science has devoted much attention to the role of causality in scientific CONSTRUCTs. The theoretical importance of causal EXPLANATIONs is that one can apply them to explain what happened and predict what will happen. Their practical importance is that they lead one to produce or to prevent causally related events by direct or indirect intervention.

- **Channel capacity**

very similar to information processing capability; the number of messages per unit time handled by either a link or a node (system, element). The messages transmitted may be either similar or different. It is usually measured in bits per second.

- **Closed system**

an isolated system having no interaction with an environment. A system whose BEHAVIOR is entirely explainable from within, a system without input. Systems may be variously closed to matter/ENERGY, to information, and/or to organization. Systems closed to energy are autark, systems closed to information are independent, and systems closed to organization are autonomous. Biological organisms are largely closed to organization, the latter being specified by the dna at the point of inception. The output has nothing to do with whether a system is closed. Systems without output are non-knowable through observation from the outside.

- **Combinatorics**

That branch of mathematics concerned with the variety of combinations of elements that are possible within given constraints including the number of selections, permutations, arrangements, patterns, and organizations a system is capable of. Combinatorics is central to statistics and information theory.

- **Computer conferencing**

enables humans to conduct a conference even though widely scattered geographically, by communicating through a computer network. Each conferee has a MAILBOX--a reserved section of computer memory--to which messages may be sent by other conferees from their terminals. In addition to MESSAGES a computer conferencing system can include CONFERENCES and NOTEBOOKS. These are different ways of storing comments in computer memory and controlling who has access to the material.

- **Computing**

(from com-putare) literally, to reflect, to contemplate (putare) things in concert (com-). Any operation, not necessarily numerical, that transforms, modifies, rearranges or orders physical markers in a medium. The physical markers maybe objects or events in their own right as in the computations carried out by the human cell or they may be symbols and descriptions of events as in data processing by a man-made computer. The early (1936) concept of computing by a Turing Machine involved writing and erasing characters by specific rules on a theoretically infinite

tape. Examples are the simple permutation of the three letters A, B, C into C, A, B, the obliteration of the commas between them, yielding CAB, and the semantic transformation that changes CAB into TAXI, the recursive association of various adjectives before TAXI, etc. (von Foerster). Although computation by electronic computers is largely geared toward a desirable result computing does not imply a purpose.

- **Correspondence principle**

any new theory, whatever its character--or details--should reduce to the well-established theory to which it corresponds when the new theory is applied to the circumstances for which the less general theory is known to hold. This principle was first applied to the theory of atomic structure by Niels Bohr in 1923. (Weidner and Sells, 1960, p. 29) The principle can be applied to great advantage in relativity theory and in quantum mechanics. It can also be applied to the LAW OF REQUISITE variety, the principle of self-organization, and the more recent interpretations of the possibility of objectivity.

Dd

- **Data bank**

an organized and comprehensive collection of data, typically stored on Hollorith cards, magnetic tapes or disks and accessible for selective retrieval by a computer.

- **Digital computer**

a computer that stores data in terms of digits (numbers) and proceeds in discrete steps from one state to the next. The states of a digital computer typically involve binary digits which may take the form of the presence or absence of magnetic markers in a storage medium, on-off switches or relays. In digital computers, even letters, words and whole texts are represented digitally. Unlike analog computers, digital computers can only approximate a continuum by assigning large numbers of digits to a state description and by proceeding in arbitrarily small steps.

- **Domain**

generally a limited region or field marked by some specific property. In mathematics, it can have a somewhat more specialized meaning.

- **Dysfunction**

an attribute used by the structural-functional school of sociology to indicate a social action that does not enhance the adaptability of the social system in which it occurs. In contrast, a function enhances that adaptability.

Ee

- **Economy of scale**

relative saving realized when the size of a plant, enterprise, etc., is increased. For example, lower production cost of an automobile due to production of a large number of cars of the same type is due to economy of scale. There may also exist a DISECONOMY OF SCALE where the increased size contributes to an increase in unit cost.

- **Encoding**

the process of applying a suitable code to an original message in order to change its form into one which is more advantageous for transmission, storage, reading, etc. In cryptography, the task of enciphering is one of encoding a readable message into a form that unauthorized receivers cannot easily decipher. In human communication, the process of translating mental imagery into linguistic expressions is characterized as encoding just as is the process, embodied in a microphone, of converting acoustical signals into electrical impulses.

- **Error detecting code**

an encoding code which correctly identifies messages that contain transmission errors of up to a certain number per message without the ability to correct them. A code is error detecting only if the hamming distance between the messages sent exceeds the number of transmission errors per message.

Ff

- **Fail safe**

a property of a system in which failure is impossible.

- **First-order cybernetics**

the cybernetics of systems that are observed from the outside as opposed to the cybernetics of systems involving their observers (von Foerster). First-order cybernetics is concerned with circular causal processes, e.g., control, negative feedback, computing, adaptation.

- **Frequency**

the number of times a category of events, of objects or of individuals has been observed, the number of members in a class.

- **Function**

(1) Metaphor, that image which determines another image. (Rogers) (2) An association of a certain object(s) from one set with each object from another set (mathematics). (Rogers) (3) The normal or characteristic action of a system of entities, generally in time. (Iberall) (4) The variation of some magnitude that depends upon the variation of some other magnitude. (Iberall) (5) a notion that arises in the description made by the observer of the components of a machine or system in reference to an encompassing entity, which may be the whole machine or part of it and whose states constitute the goal that the changes in the components are to bring about. In mathematics, a relation between two or more variables so that the values of one are dependent on, determined by or correspond to values in the other variables, its arguments; a TRANSFORMATION whose range is uniquely specified by its domain. In algebra and set theory, functions are often called many-to-one mappings or images. In processes of communication, functions are found in equivocating codes. There is no presumption that a function must take numbers as arguments, nor that the correspondence be lawful. It can result from entirely arbitrary conventions. The structural-functional school of sociology sees the parts of a social system to

behave in such a way that they satisfy human and social needs and maintain one another and the totality. In this theory, regularly occurring acts that serve this purpose are called functions whereas those opposed to this are called dysfunctions.

Gg

- **Game**

a set of moves which are defined by a set of rules limiting what the players may do. A game may or may not be a simulation. A game does not necessarily involve a representation of events in a reference system.

- **Goal formulation**

the process of deciding what the next goal to be sought will be.

Hh

- **Hamming distance**

a measure of the difference between two messages, each consisting of a finite string of characters, expressed by the number of characters that need to be changed to obtain one from the other. E.g., 0101 and 0110 has a Hamming distance of two whereas "Butter" and "ladder" are four characters apart.

- **Heteropoiesis**

the space of human design.

- **Holism**

the process of focusing attention directly on the whole and its characteristics as a whole, without any recourse to consideration of its parts. A philosophical position claiming (a) that wholes cannot be taken apart and (b) that every apparent whole can be understood only in the context of the larger whole containing it. This belief is epitomized in the statement that "a whole is more than the sum of its parts". Although the position has merits, the infinite regression implied in the two-headed claim leads the wholist to believe in a hierarchical organization of the world. To understand anything requires him to explore larger and larger contexts, to seek refuge in increasingly universalistic kinds of understandings which renders him unable to simultaneously understand and cope with the particulars of a situation he started out with.

- **Homeostatic machines**

machines which display the condition of maintaining constant or within a limited range of values some of their variables.

Ii

- **Icon**

a sign that informs by its physical resemblance or similarity with features of its referent.

- **Impact**

impact is used in three different ways: (1) as synonymous with consequence; (2) to mean any consequence (beneficial or adverse) that reaches beyond the direct purpose of a given course of action, as in: "the impact of the new steel plant on employment opportunities in the region;" (3) as in (2), but the meaning restricted to adverse consequences, as in the impact of industrial growth on the ecological environment.

- **Incompleteness theorem**

Goedel's thesis initially about number theory but now found applicable to all formal systems that include the arithmetic of natural numbers: "any consistent axiomatic system does include propositions whose truth is undecidable within that system and its consistency is, hence, not provable within that system". The self-reference involved invokes the paradox: "a formal system of some complexity cannot be both consistent and decidable at the same time". The theorem rendered Frege, Russell and Whitehead's ideals of finding a few axioms of mathematics from which all and only true statements can be deduced non-achievable. It has profound implications for theories of human cognition, computational linguistics and limits artificial intelligence in particular.

- **Informatics**

a term designating the study of all information processing systems, artificial and natural, and the application of knowledge gained in such efforts to design and implement digital computers in society. In practice, informatik includes (the largely U.S.) computer science, the more application oriented efforts of management information systems, automation or production but also data processing including statistics for decision making. Because of its technological commitments, informatik

has de-emphasised the study of information flows and computation within organisms and largely ignored the organisational consequences of information flows, human communication and the use of computers in large social systems. Epistemological considerations which are characteristic in cybernetics are absent in informatik.

- **Information**

literally that which forms within, but more adequately: the equivalent of or the capacity of something to perform organizational work, the difference between two forms of organization or between two states of uncertainty before and after a message has been received, but also the degree to which one variable of a system depends on or is constrained by another. E.g., the dna carries genetic information inasmuch as it organizes or controls the orderly growth of a living organism. A message carries information inasmuch as it conveys something not already known. The answer to a question carries information to the extent it reduces the questioner's uncertainty. A telephone line carries information only when the signals sent correlate with those received. Since information is linked to certain changes, differences or dependencies, it is desirable to refer to theme and distinguish between information stored, information carried, information transmitted, information required, etc. Pure and unqualified information is an unwarranted abstraction. information theory measures the quantities of all of these kinds of information in terms of bits. The larger the uncertainty removed by a message, the stronger the correlation between the input and output of a communication channel, the more detailed particular instructions are the more information is transmitted.

- **Information environment**

the messages, symbols, meanings, that a person encounters in an average day through conversations with other persons and through the media. People inhabiting nearly the same physical environment can live in very different information environments. An example would be people working on a university campus or in an international organization.

- **Information system**

a system of functions concerning the acquisition and transfer of information, the carriers of which can be biological, personal, social or technical units. An information system is dedicated to a certain kind of information (topic), even if this may be a very broad one. It has always the purpose of providing information to a user or a group of users. In most cases a storage device is part of an information system.

- **Iteration**

a process for computing something by repeating a cycle of operations. Although circular and repetitive processes can be divergent, iteration should converge to the desired result, improving the approximation with increasing numbers of cycles.

Jj

- **Jump phenomena**

in many fields, there are surfaces of discontinuity on both sides of which the field phenomena change drastically. The change in conditions between the two sides is said to be described as a jump and represents jump phenomena.

Kk

- **Kluge**

something not designed as a whole but rather put together from available parts. The term is frequently used by engineers. Marvin Minsky has described the human brain as a kluge.

L

- **LAG**

Metaphorically, trailing behind. In development, some variables may change faster than others and if they are dependent on each other these temporal differences, called Lag, can cause structural stress within a system. E.g., in modern society, institutional developments tend to lag behind changes in technology causing many social problems from alienations to social inequalities and conflicts. In cybernetics, lag refers to the time for information to pass through one complete feedback loop. Lag makes regulation difficult. E.g., if the time for a gunner to obtain information about his target plus the time for his projectile to reach its destination is large, a hit is considerably more difficult than if that lag is small. A regulator's lead may compensate for the lag in a feedback loop.

- **Law of diminishing returns**

an economic principle asserting that the application of additional units of any one input (labor, land, capital) to fixed amounts of the other inputs yields successively smaller increments in the output of a system of production.

- **Law/legal regulations**

rules and regulations of general validity which are formally adopted and proclaimed by formal legislative or jurisdictional bodies (including case law).

- **Limit cycle**

in a linear system (such as a vibrating string of a pendulum), if the system is displaced (the string plucked), it will start to vibrate or oscillate. However, by the second law of thermodynamics the system will decay to rest. In a non-linear system, e.g., a watch, a human being, a working engine, supplied with a constant source of fuel or energy, it is possible to obtain configurations such that if the system has started vibrating, oscillating or running, it will continue if the cycle thus formed operates independent of the precise initial starting conditions, in spite of the fact that

the system is lossy and in spite of moderate disturbances that try to slow the process down or speed it up, then it is said to be a limit cycle.

- **Logarithm**

a function expressing any number by the exponent of a chosen base. E.g., with $512=2^{*9}$, the dual logarithm (to the base 2) of 512, written $\log_2 512$ equals 9. Logarithms are used in the quantitative definition of information and are fundamental to the algebraic properties which information theory codifies. Its base of 2 assures the interpretation of that at function in terms of the number of binary decisionS. Decimal logarithms have a base of 10 and natural logarithms a base of 2.71828.

Mm

- **Machine**

a unity in the physical space, defined by its organization, which connotes a non-animistic outlook, and whose dynamisms are apparent.

- **Management**

the process of governing a country or administering an enterprise including the development of corporate strategy and longrange planning on the top and the regulation, coordination and control of such activities as production, accounting, marketing, personnel, research and development in the middle, the supervised operations being performed below. One key to effective management is the adequate flow of information between and within strategic, functional and operational levels so as to allow for timely and appropriate decisions to be made. Management information systems constitute a technological solution to information flow problems. Another key is the form of control exercised through spelling out objectives providing incentive schemes for production as well as cooperation, etc.

- **Mechanical phenomenology**

the phenomenology generated by relations between processes realized through the properties of components.

Nn

- **Negentropy**

A non-recommendable near synonym for information. The term has created considerable confusion suggesting that information processes negate the second law of thermodynamics by producing order from chaos. The history of the confusion stems from the mere formal analogy between Boltzmann's thermodynamic expression for entropy $S = k \log W$ and the Shannon-Wiener expression for information $H = -\log_2 p$. The only motivation for the negative sign in the latter is that it yields positive information quantities (the logarithm of a probability is always negative). The probability p of an event and the thermodynamic value W including Boltzmann's constant k measure entirely different phenomena. A meaningful interpretation of negentropy is that it measures the complexity of a physical structure in which quantities of energy are invested, e.g., buildings, technical devices, organisms but also atomic reactor fuel, the infrastructure of a society. In this sense organisms may be said to become more complex by feeding not on energy but on negentropy (Schroedinger).

- **NET**

Adjective indicating the essence of a quantity, e.g., net income, the income from which all costs to generate it are subtracted, net population growth, a population's birth rate adjusted by its mortality, net energy, the energy extracted minus the energy consumed in the extraction process.

- **Noosphere**

A term modelled after atmosphere and biosphere signifying (a) the space occupied by the totality of information and human knowledge collectively available to man and (b) the processes operating in this space, e.g., combinatorial mating, classification, reproduction, simplification, selective decay.

Oo

- **Objective**

an objective is something that a decision maker seeks to accomplish or to obtain by means of his decision. A decision maker may have more than one objective (the MULTIPLE-OBJECTIVES case). An objective may be specified in a more or less general fashion, may be quantified or not quantified, and is usually part of a hierarchy of objectives. The term goal is sometimes used to denote a very general objective (at the top of the hierarchy) and TARGET is used to mean a very definite objective. Example: "The goal of allocating money to the municipality was to increase the quality of urban life. The immediate objectives were to improve public transportation and fire services. A 10% reduction of average travel time from home to work and a 70% decrease of average alarm-to-action time taken by the fire brigades were set forth as targets.

- **Operation**

a basic process that applies to an operand and yields a transform, e.g., the multiplication of two numbers, driving a nail with a hammer, baking. A transformation describes an operation, sometimes in terms of an algorithm.

- **Operationalization**

the specification of measurable empirical referents for abstract definitions, concepts, and hypotheses.

- **Optimization theory**

a mathematical technique for determining the most profitable or least disadvantageous choice out of a set of alternatives. Typically the set of alternatives is restricted by several constraints on the values of a number of variables and an objective function locates the optimum in the remaining set. The method is largely used in operations research and systems analysis, e.g., for optimal scheduling of production processes, for determining the best way for transporting a certain commodity.

- **Output**

any change produced in the surrounding by a system. A variable at the boundary of an organism or machine through which information exits. The products, results or the observable parts (*see* subsystem) of a system's behavior. The medium through which a system may exogenously control others. The record left behind by a system of its own behavior. An output could conceivably include all of a system's behaviors, but it becomes an informative concept only if some of its variables remain inaccessible to an observer or have no effect. E.g., a computer prints or displays only the final results of a lengthy computation thus invoking the distinction between output and internal (intermediate and inaccessible) variables. Human cognitive processes remain similarly hidden from view and are therefore distinct from the primary verbal, manual and gestural output of man. Here, output is the overt manifestation of human (including cognitive and hormonal) behavior.

Pp

- **Paradigm**

an outstandingly clear or typical example or archetype. (Webster's) (2) The total pattern of perceiving, conceptualizing, acting, validating, and valuing associated with a particular image of reality that prevails in a science or a branch of science. (Kuhn) (3) A theoretical model to explain a type of social behavior. (Dict. of Anthropology) The pattern underlying the process of constructing theories and explanations and thereby affecting the form of the body of knowledge within a social domain, e.g., within 18th century science. Paradigms carry their own source of justification and are therefore less obviously related to or challenged by empirical evidence. Kuhn describes the history of science as a succession of paradigms, transitions resulting not only from the emergence of empirical phenomena an existing paradigm is unable to explain but also from socio-political interests within the scientific community.

- **Paradox**

a tenet contrary to received opinion; a statement that is seemingly contradictory or opposed to common sense and yet perhaps is true; a self- contradictory statement that at first seems true; an argument that apparently derives self-contradictory conclusions by valid deduction from acceptable premises. (Webster's) A paradox is not the same as a contradiction. "The shirt is blue; the shirt is not blue," and "It is raining; it is not raining," are examples of contradictions. A paradox occurs when one makes an assumption and, following a logical argument, arrives at the converse. A paradox will always result when one formulates a set that contains itself.

- **Perfect information**

a characteristic of a situation in which all data relevant to a problem is known. Numbers are available for all variables necessary for a solution, through some of the numbers may be the result of estimates rather than measurements. Perfect in this context refers to completeness with no implied judgment about quality.

- **Physical space**

the space within which the phenomenology of autopoiesis of living systems takes place.

- **Polystable system**

a state-determined system that has partial, fluctuating, and temporary independencies within the whole. Its parts have a high proportion of equilibrial states. A polystable system can be richly joined, so that almost every variable is joined to almost every other, or it can be poorly joined. A polystable system midway between the two will show a somewhat confused picture. Subsystems will be formed with kaleidoscopic variety and will persist only for short times; some will be stable for a brief interval, only to be changed and to disintegrate. The number of stable variables will tend to climb as a few subsystems become stable, only to fall back by a larger or smaller amount as they become unstable. The oscillations will be large until all subsystems become stable at the same time. Then the system as a whole will remain stable.

Rr

- **Random**

attribute of a process that is entirely or largely governed by chance, e.g., a roulette wheel, dice, the brownian movement, but also the pattern on the screen of a television set receiving atmospheric noise only. Perfect randomness rarely exists in nature and is difficult to simulate. In practice, randomness is confined by particular parameters, e.g., a roulette wheel is expected to be random only within a range of numbers, not regarding how long the wheel takes to pick one, and it may even deviate from the ideal of uniform probabilities , e.g., when the roulette wheel is biased. The simulation of randomness by computers utilizes so-called pseudo random generators whose behavior is nearly impossible to predict without knowledge of the starting number and its algorithm.

- **Recursive system theory**

in a recursive organizational structure any viable system contains, and is contained in a viable system.

- **Reification**

treatment of an analytic or abstract relationship as though it were a concrete entity.

- **Responsibility**

accountability of an individual for decisions and behavior under his control by virtue of his public role, office, charge or duty and to the public which endowed him with that role, office, charge or duty. Responsibility is constitutionally embedded within an autonomous system, e.g., in the public.

- **ROM**

(Read Only Memory) A memory, particularly in small computers, from which information is recalled in the same (or the reverse) order in which it was entered, e.g., from the left to right, line by line like removing beads from a necklace or in terms of whole chips. Random access is not possible.

Ss

- **Safe fail**

a property of a system which can recover from failure.

- **Scientific method**

a sequence of procedures intended to produce agreement among a set of observers, for example: 1. Define a problem, 2. Gather pertinent data, 3. Form a working hypothesis or explanation, 4. Do experiments to test the hypothesis, 5. Interpret the results, 6. Draw a conclusion and modify the hypothesis as needed.

- **Sensitivity analysis**

a procedure to determine the sensitivity of the outcomes of an alternative to changes in its parameters (as opposed to changes in the environment); If a small change in a parameter results in relatively large changes in the outcomes, the outcomes are said to be sensitive to that parameter. This may mean that the parameter has to be determined very accurately or that the alternative has to be redesigned for low sensitivity.

- **Statistical entropy**

a measure of variation or diversity defined on the probability distribution of observed events. Specifically, if P is the probability of an event a , the entropy $H(A)$ for all events a in A is: $H(A) = -\sum_a P_a \log_2 P_a$ The quantity is zero when all events are of the same kind, $p = 1$ for any one a of A and is positive otherwise. Its upper limit is $\log_2 N$ where N is the number of categories available and the distribution is uniform over these, $p = 1/N$ for all a of A The statistical entropy measure is the most basic measure of information theory.

- **Systems analysis**

this term has many different meanings. In the sense adopted for the Handbook, systems analysis is an explicit formal inquiry carried out to help someone (referred to as the decision maker) identify a better course of action and make a better decision than he might otherwise have made. The characteristic attributes of a problem situation where systems analysis is called upon are complexity of the issue and

uncertainty of the outcome of any course of action that might reasonably be taken. Systems analysis usually has some combination of the following: identification and re-identification) of objectives, constraints, and alternative courses of action; examination of the probable consequences of the alternatives in terms of costs, benefits, and risks; presentation of the results in a comparative framework so that the decision maker can make an informed choice from among the alternatives. The typical use of systems analysis is to guide decisions on issues such as national or corporate plans and programs, resource use and protection policies, research and development in technology, regional and urban development, educational systems, and health and other social services. Clearly, the nature of these problems requires an interdisciplinary approach. There are several specific kinds or focuses of systems analysis for which different terms are used: A systems analysis related to public decisions is often referred to as a POLICY ANALYSIS (in the United States the terms are used interchangeably). A systems analysis that concentrates on comparison and ranking of alternatives on basis of their known characteristics is referred to as decision analysis.

Tt

- **Technical assessment**

assessment (analysis and normative evaluation) of a particular technical device, system, or procedure with regard to a defined set of criteria, goals or objectives (e.g. technical security assessment according to the standards of the Orange Book).

- **Technological determinism**

the belief that technology develops by its own laws, that it realizes its own potential, limited only by the material resources available, and must therefore be regarded as an autonomous system controlling and ultimately permeating all other subsystems of society. Evidence for the first proposition is largely taken from the natural history of technology, its progressive character and the cooccurrence of independent inventions. Evidence for the second proposition stems from the unwarranted generalization that everything that is invented is ultimately installed and ignores human playfulness, individual and collective interests and man's cognitive limitations. The conclusion is nevertheless supported by the fact that technology has indeed penetrated all spheres of human existence from interpersonal communication, to definitions of the quality of life in technological terms.

- **Tenth theorem of information theory**

with the addition of a correction channel equal to or exceeding in capacity the amount of noise in the original channel, it is possible to so encode the correction data sent over this channel that all but an arbitrarily small fraction of the errors contributing to the noise are corrected. This is not possible if the capacity of the correction channel is less than the noise. This theorem is an isomorph of the law of requisite variety.

Uu

- **Ultrastability**

the ability to modify internal relationships and/or to influence environmental conditions in the interests of neutralizing actual or potential obstacles to the maintenance of stability. The ability of a system to change its internal organization or structure in response to environmental conditions that threaten to disturb a desired behavior or value of an essential variable. The changes such systems are capable of are qualitative in the sense of changing the mode of interaction with an environment in steps or jumps, not along a continuum, and they are purposeful because such systems seek a behavior that is disturbance defying. Ultrastability is stability of a logical level higher than the stability to which a system converges without change of its internal organization or structure. Ashby's homeostat was the first mechanical demonstration of this form of stability heretofore reserved to living organisms.

- **Unity**

that which is distinguishable from a background, the sole condition necessary for existence in a given domain. The nature of a unity and the domain in which the unity exists are specified by the process of its distinction and determination; this is so regardless of whether this process is conceptual or physical.

Vv

- **Validation**

the process of determining how well one system replicates properties of some other system or, more generally, any comparison between the representation of a system and specified criteria. The validation of an operating model cannot be separated from the purpose for which it is designed and used. Validation is the process of increasing the confidence that the outputs of the model conform to reality in the required range. In some cases, the model's output can be compared to data from historical sources or from an experiment conducted for validation. A model can never be completely validated. We can never prove that its results conform to reality in all respects. It can only be invalidated. Predictive models be validated only by judgment, since a model may fit past data well without having good predictive qualities.

- **Verification**

a (computer) model is said to be verified if it behaves in the way that the model builder wanted it to behave. This means that the instructions are correct and have been properly programmed. One check for verification is to hold some of the variables constant to determine whether the output changes in anticipated ways as other variables are changed. Another typical check is to test how the model behaves in limit situations.

Ww

- **Whole**

without recognition of its parts a whole is an essentially structureless and unanalyzable unity. If its parts are independent or randomly sampled by an observer, a whole has no outstanding quality other than that of being an observer's aggregate. If a whole is qualitatively different from a mere aggregate of its parts, the difference lies in its structure or organization. Thus any whole may be understood as, described in terms of, and considered equal to a structure or an organization of component parts. In some cases the properties of its parts may be ignored without appreciable loss of understanding a whole, particularly when parts are numerous, simple and the same as in the objects of computer sciences, macro-economics, and quantum physics all of which heavily rely on mathematics for their constructions. When the parts are few, complex, different, and tenuously related, as in a marriage, the properties or the parts figure more prominently in the understanding of a whole and can not be ignored in favor of such wholes' organization.

ENGLISH FOR DIGITAL ECONOMY



A

- **A/B testing**

a/b testing involves the testing of two variants in order to determine which one is better. for example, a/b testing can be used to find out which of two webpage options yields a better conversion rate. if it's assumed that version a has a better conversion rate, it's used as the basis for a new, slightly different version and then tested again to discover the better performing version.

- **Adaptive design**

adaptive design is an alternative to responsive design and relies on creating a separate program design (mobile vs. desktop) for each view. adaptive design is often referred to as dynamic serving.

- **Agile (software) development**

agile software development or agile development for short is a group of methodologies used in software projects aimed at producing fit-for-purpose software faster and more reactively. agile development can be understood as the opposite of traditional waterfall software development. examples of agile methods include scrum and kanban.

- **Api as a service**

api-as-a-service (aaas) combines the api economy and software renting and provides application programming interfaces as a service.

- **Api economy**

api economy is a business model where the use of application programming interfaces, or apis, takes center stage. by using apis, a company can, for instance, make their business processes or data available to others.

- **Application programming interface (api)**

application programming interface, api, is a communication channel through which two pieces of software (e.g. two digital platforms) can exchange information in a

technical manner. apis are central to the api economy and the platform economy, for instance.

- **Artificial intelligence (ai)**

artificial intelligence (ai) is a computer program that is able to perform intelligent operations independently. artificial intelligence is difficult to define, since giving an exhaustive definition of intelligence is already challenging.

Bb

- **B2b e-commerce**

b2b e-commerce refers to an online store for businesses. normally, b2b (business-to-business) e-commerce is understood as an ordering system. the difference to a b2c online store targeting consumers is, for example, the requirement to identify the buyer through registering and the need to provide different billing options (such as invoicing).

- **B2c e-commerce**

b2c (business-to-consumer) e-commerce is a form of online commerce colloquially known as online shopping. b2c e-commerce refers to an online service that provides consumers with goods to purchase. examples include shops such as netanttila or verkkokauppa.com.

- **B2d marketing**

b2d (business-to-developer) marketing is an operational model that aims to engage software developers directly and by doing so affect customer acquisition. b2d marketing is a method of the platform economy which typically provides apis in as developer-friendly form as possible to enable their proactive deployment.

- **Beta**

a beta publication refers to a phase in online service development in which the service is coming together functionality-wise but genuine user experiences are required before the service can be finished in a user-centered way. in online service development, the aim of the beta phase is to recognize both programming issues and usability-enhancing procedures. the beta phase is particularly often used in connection with online services and it can be either freely available (open beta) or restricted to a specific target group (closed beta).

- **Big data**

big data refers to the collection, storage, sharing, searching, analyzing and presenting of enormous, unorganized and continuously growing masses of data with the help of statistics and information technology. as the internet of things and the industrial internet continue to spread, there is believed to be a growing demand for big data -related expertise.

- **Blockchain technology**

blockchain technology refers to the way in which operators that don't know each other can produce and maintain decentralized databases. the technology allows for the members of the chain trust each other even though they don't know one another. the best-known blockchain technology application is the virtual currency bitcoin.

- **Business design**

business design is a modern business model conceptualization. business design is closely related to service design and shares some of its principles but applies them to the business concept of the entire company. the central idea of business design is to alter business activities in a customer-oriented manner in order to create strong customer loyalty.

- **C2c e-commerce**

c2c e-commerce refers to the selling of goods directly from one consumer to another online. typically, an online service serves as a platform and enabler for this type of digital commerce. examples include tori.fi and huuto.net.

- **Call to action (cta)**

call to action (or call-to-action, cta) refers to a prompt that attracts the attention of a web page visitor and guides them to perform a desired action. a cta is usually a link or an image which the visitor is supposed to click, or which requests the user's email address or asks them to make a phone call. a cta is one of the basic tools of conversion rate optimization.

- **Cloud adoption**

cloud adoption refers to an organisation's move from its own servers and data centres to cloud-based solutions hosted by third parties. cloud adoption is a strategic initiative for organisations, typically aimed at reducing costs, reducing risk and ensuring scalability. an organisation can move to the cloud, either in whole or in part, depending on its needs and its digital strategy.

- **Cloud service**

cloud service is a general term for a software service which is available over the internet. cloud service is a metaphor as it's often depicted as a cloud in presentations. previously, pieces of software were sold primarily as local software licenses, but it's now common business practice to offer cloud services through software renting.

- **Composable business**

composable business refers to the design, implementation and development of an enterprise's digital infrastructure using business-level components (pcbs) that can be replaced according to market needs in a more flexible way than those based on a traditional monolithic architecture. the adoption of a composable business approach is usually aimed at gaining competitive advantage, resilience and adaptability.

- **Composable commerce**

composable commerce is an approach that selects the best software components and combines them into a customised application, offering functionality familiar from e-commerce. composable commerce is therefore a set of e-commerce services built according to the principles of composable commerce.

- **Conversion**

conversion means the completion of a measured action on a web page. a successful conversion can involve subscribing to a newsletter, filling out a contact form or buying a product from an online store. conversion rate optimization is used to improve the conversion rate, given as a percentage.

- **Conversion rate optimisation (cro)**

conversion rate optimization refers to the editing of a web page with the aim of improving the conversion rate of the page. cro is usually an inevitable form of business development for consumer online stores, since even the smallest enhancement in the conversion rate has a direct impact on sales.

- **Customer experience (cx)**

customer experience is the sum of encounters experienced by a customer in various digital and traditional media. in the digital era, the significance of ensuring a positive customer experience is highlighted since the buyer may come across an organization in various contexts. encounters are provided by web pages, newspapers, radio, television and social media channels, among others. an organization should aim at providing a consistent customer experience through these encounters, to ensure the desired outcome (for example, a purchase or a recommendation).

Dd

- **Data economy**

data economy refers to the utilization of digital data in commercial transactions.

- **Digital heart™**

the digital heart™ is a combination of several software products and customized systems integrated tightly together through modern api:s enabling and supporting the core business of the company. the digital heart™ is the most important digital system for core the core business processes in a highly digitalized organization. Without a digital heart, an organization withers or dies, so it is in the core of the organization's strategy and is actively developed to achieve a defensible competitive advantage in the marketplace. examples of digital heart companies include wolt, airbnb and verkkokauppa.com

- **Deep technology (deep tech)**

deep technology refers to a startup whose business idea is based on a scientific or otherwise extensive (deep) understanding of technology. the term has been adopted to set certain companies apart from other startups which are also technology driven. a deep tech company may, for instance, base the core of its operations on particularly complex mathematics in the creation of software algorithms. deep technology companies typically comprise artificial intelligence companies, which try to replicate human thinking, build navigation systems for flying cars and so on.

- **Digital body language**

digital body language encompasses all the digital activities performed by an individual. every time a person performs a google search, visits a web page, opens a newsletter or downloads a guide, they contribute to their digital body language. digital body language is used in building marketing automation.

- **Digital business**

digital business (electronic business) is an activity that aims at gaining a competitive edge via (or with the help of) the web. the internet has become one of the standard operational environments for electronic business, but there are alternatives. digital business focusses on innovations related to the operational concept and realizes them through modern electronic solutions. on the strategic level, the core of operations is based on digitization, not merely on turning traditional processes electronic. this entire glossary of digital business can be understood as a group of things used to implement digital business strategies. digital business is often linked to disruption-oriented approaches.

- **Digital customer experience**

digital customer experience is the sum of encounters experienced by the customer in various digital media.

- **Digital foot print**

digital footprint refers to the presence of a company, an organization or an individual in the digital media. for example, blog marketing aims at growing the digital footprint of a company online.

- **Digital marketing**

digital marketing means marketing that is carried out in digital media as opposed to so-called traditional marketing which focusses on media such as radio, television and newspapers. digital marketing comprises all marketing taking place online, e-mail marketing, mobile marketing, keyword advertising, social media marketing and so on.

- **Digital maturity**

digital maturity describes how holistically and efficiently an organization utilizes digital means in its core business. improving digital maturity increases a company's competitive advantage in its market. the digital business maturity model helps to roughly outline your starting situation, set goals that suit your strategy, and identify the means to raise the digital maturity level to meet those goals. the digital business

maturity model also helps to distinguish between easily applicable actions and those that require profound change.

- **Digital platform**

digital platform is an internet-based software solution that brings the operators of a certain area together to form one single value network. a digital platform can be figuratively described as the heart of a platform economy operator. the central element of a digital platform is a well-documented and comprehensive api, through which the platform can receive data from or send data to the operators of the value network (or the platform databanks). apis enable the linking together of several different digital platforms.

- **Digitization**

the term digitization (sometimes also digitalization) has no established definition, but it is characterized by the utilization of modern technologies in a way that fundamentally changes operations and creates significant value. value networks, customerization, new business models and implementing fast cycle time in product development are some of the typical features of digitization. according to gartner, digitization is a paradigm change grown out of technology development and the next stage of digital evolution. in digitization, everything is built with the customer in mind. to put it simply, digitization changes our everyday lives.

- **Digitisation of business**

digitization of business is a process in which a traditional business concept is reconceptualized and then altered to utilize digital means in the core business processes. digital technologies are no longer in a supporting role; instead, they can be found in the strategic core. the digitization of business involves concepts such as openness, network-like structures, digital business concept, user experience and accelerating change.

- **Disruption / disruptive innovation**

disruption is a phenomenon in which some innovation that's based on new technology challenges the traditional operators and operations of an industry. today, digital business enables disruption more efficiently than ever before. the meaning of

disruption is perhaps better explained by the term disruptive innovation, which refers to breaking an established operational model and replacing it with a new one. typical examples of disruptive operators include uber and airbnb.

- **Developer experience (dx)**

developer experience is a type of user experience that has been targeted at software professionals, such as software developers. an excellent dx is a central business objective, for instance, for saas and platform economy operators.

- **Devops**

devops is an agile operational model for producing electronic services. devops focuses on the communication between software developers, maintenance and production personnel. devops aims to build an environment in which building, testing and publishing software can happen quickly, often and reliably. devops relies on the practices of agile development and tools that automate infrastructure management. devops is a particularly central term in modern saas software development.

- **Domain**

domain is an internet-based home address that identifies an online service. for example, www.sofokus.com is a domain.

- **Extranet**

extranet is a website or web service for the stakeholders of an organization. using the extranet requires logging in, which verifies access rights. usually an organization offers both an extranet and an intranet, the former having less content than the latter.

- **Google ads**

google ads (was google adwords) is a tool for keyword advertising within the google search engine. google ads has become something of a standard in online marketing.

- **Google tag manager**

google tag manager is a tag management system, which enables the quick and easy analysis of visitor numbers and updates of online and mobile application tags and code strings meant for marketing optimization. through the tag manager interface, it

is possible to add and update adwords, google analytics, firebase analytics, floodlight and third-party tags and edited tags without having to touch the code of the website.

- **Google analytics**

google analytics is a free analytics tools provided by google, meant for website visitor tracking. google analytics is also used as a tool for enhancing websites' operationality. google analytics is deployed by adding a script to the website.

- **Growth hacking**

growth hacking is a term that has no established definition. a growth hacker is a person that uses both traditional and digital marketing tools to achieve measurable results with ease. building up the user base of a saas business is a typical target for growth hacking. a growth hacker can be seen as an expert that shortens the build-measure-learn loop in businesses applying lean/agile principles.

Hh

- **Hackathon**

a hackathon is a limited-time event that concentrates intensively on resolving one, usually pre-determined, problem. a typical example would be a weekend-long event, either online or at a physical location, that aims to produce a tentative solution to the organizer's problem. a hackathon can be related to just about anything, but usually it's linked to service design, software development, user interface design etc.

- **Hosting**

hosting means the administration of a server for an online service. traditionally, hosting has been defined as the provision of physical server space (possibly even the server itself) as an outsourcing service. with technical development, hosting has developed toward virtualized cloud solutions. a modern hosting service is located in an environment provided by a big cloud provider.

Ii

- **Inbound marketing**

inbound marketing is a form of marketing that tries to attract its target group by providing it with things it is already interested in, in contrast to traditional interruption, or outbound, marketing. inbound marketing is a typical methodology for various types of digital content. examples of inbound marketing include useful guides and blog articles.

- **Industrial internet**

industrial internet refers to the connecting of physical equipment to smart processes, enormous data masses and analytics for the purpose of boosting industrial processes. the term is often used synonymously with the internet of things, but the industrial internet can be more accurately understood as the “digitization of the industrial sector” and a hyponym for the internet of things.

- **Infrastructure as a service (iaas)**

infrastructure as a service (iaas) is a form of cloud computing that offers virtualized computing resources over the web. iaas is one of the three main cloud service models, the other two being software as a service (saas) and platform as a service (paas). examples of iaas include amazon web services (aws), windows azure, google cloud platform and rackspace open cloud.

- **Internet of things (iot)**

internet of things or iot refers to the linking together of physical objects, services, systems, software and even people over the internet. this network-like entity can be controlled, measured and monitored via the internet.

- **Internet marketing**

internet marketing comprises all marketing that takes place on the internet. the term is related to and can even be considered synonymous to digital marketing.

- **Intranet**

intranet is a website or web service designed for organization-internal use. using the intranet requires logging in, which verifies access rights.

L

- **Landing page**

a landing page (also called a destination page) is the page to which the visitor is taken once they click an ad within a search engine or on a social media service, for instance. in other words, the landing page is a purposefully designed page to which a user is directed. the design of a landing page involves several best practices, the implementation of which will potentially enhance the conversion rate which began from the advert.

- **Long tail**

long tail means the varied but low-volume portion of a product range. the internet has made it possible to make a profit out of selling long-tail products. the concept was introduced by chris anderson in 2004.

Mm

- **Mach architecture**

mach architecture refers to a set of technologies that are used to create applications based on, among other things, the principles of composable business or composable commerce. mach stands for microservices-based, api-first, cloud-native and headless.

- **Magento**

magento is the world's leading open-source e-commerce platform.

- **Mobile first**

mobile first refers to a design method, whereby an online service is designed and built primarily for mobile users and only secondarily for desktop users. this change in paradigm is the result of the enormous increase in mobile devices and mobile use in the 2000s, which forced the rethinking of traditional desktop-centered service design.

- **MVP (minimum viable product)**

minimum viable product (mvp) is a new product that has the minimum number of features but is able to provide maximum amount of customer feedback. the objective of an mvp is not necessarily to build a new product or even a prototype but a version that can be used to test the so-called market compatibility of a product. mvp doesn't even need be a working piece of software. it can just as well be a web-format wireframe model or a video as long as it sufficiently well demonstrates how the product operates. however, in online service development mvp is commonly understood as the first published version of a working piece of software.

Nn

- **Network effect**

network effects occur when new users make a network more valuable to other, existing users. when a network reaches a critical point, competing and more limited networks start to lose their significance.

Oo

- **Online / web application**

an online application is a piece of software that can be accessed using a browser. today, a great deal of software is produced as online applications since practically all operating environments include a browser. all social media services are examples of online applications. the production of an online application requires considerably more programming skills than that of a website, which is usually set up on a ready-made content management platform.

- **Online service**

online service is a general term that describes practically any website entity on the internet. it can be understood as an umbrella term for a web site, online application and various other types of online service.

- **Open data**

open data refers to the information acquired by a company, organization or some other instance that hasn't been refined and that has been made available to the public for use free of charge. open data is used, for example, in the platform economy as a way of creating broader value networks around an organization.

- **Open source code**

open source code refers to the software production and development methods that provide a user with an opportunity to familiarize themselves with the source code of a program and to edit it according to their needs. the principles of open source code include the freedom to use the program for any purpose and to copy and distribute the original as well as the edited version. open source code can be used to refer not only to software development methods but also to the software created and to the developer community. closed software, whose source code is not published, can be considered the opposite of free software and open source code.

- **Organic search results**

organic search results are those search engine results that create traffic to a website without advertising. the order in which organic search results are placed is affected by several factors such as location, previous searches and so on. search engine optimization aims to affect organic search results.

- **Outbound marketing**

outbound marketing means traditional interruption marketing that utilizes methods such as cold calling. in addition, outbound marketing often refers to traditional mass marketing, in which, say, leaflets are distributed to tens of thousands of households. digitization has been a game changer in that the power of traditional marketing has waned radically which in turn has forced organizations to adopt inbound marketing tactics to support their sales.

Pp

- **Packaged business capability (pbc)**

a packaged business capability (pbc) is a set of applications or services developed around a specific business function. a packaged business capability is an collection consisting of services, a data schema and apis. packaged business capabilities are the building blocks of an composable business or composable commerce architecture. an example of a pbc is a shopping cart component.

- **Pivot**

pivot is a term used in the startup world to describe a deliberate major shift in business or strategy. pivoting is a practical tool for adapting a business agilely to the demands of environmental change. the vuca world and the transformational demands of digitalisation have shifted the requirement for pivoting capability from early-stage start-ups to all types of organisations. pivoting has been joined by a new term – micropivoting – which means adapting to market movements and the operating environment without changing the entire business strategy.

- **Platform as a service (paas)**

platform as a service (paas) refers to the provision of a software platform in the form of a cloud service. in the model, the developer doesn't need to worry about scalability or the need for more power as the platform automatically takes care of these. examples of platforms offering paas include microsoft azure, google app engine and force.com. paas is one of the three main cloud service models, the other two being infrastructure as a service (iaas) and software as a service (saas).

- **Platform economy**

platform economy is a business model brought about by the development of the internet. in the platform economy, some entity – such as a company, some other organization or an individual – provides others with a technical platform that is meant to be used for commercial purposes. by exercising platform economy, a company is

able to change the value chain logics of their industry. examples of platform economy operators include spreadshirt.com and amazon.com.

- **Portal**

portal is an online service which acts as a gateway to an array of different services. the services are either technically inside the portal or it can be a website that gathers external services to one place (like suomi.fi). in everyday speech, portal is used to refer to practically all kinds of online services.

- **Product-led growth (plg)**

product-led growth is putting your product at the center of your company. it is a strategy that uses the product as a channel to drive organizational key performance indicators such as sales, engagement, and reach. plg thus includes the idea of developing a fantastic product, providing a world-class user experience, and adding a viral loop to your product.

- **Publishing system / content management system (cms)**

nowadays, a website is nearly always built upon a publishing system. a publishing system, or today perhaps more often a content management system or cms, refers to a product that lets you create a website by focusing on content and navigation rather than programming. the world's most popular content management system by far is wordpress.

Rr

- **Reservation system**

a reservation system is an online service that allows you to make reservations for products. in addition to making a reservation, it's often possible to buy tickets through the system as well. the ticket booking system of the finnish railway company vr (vr.fi) provides a typical example.

- **Responsive design**

responsive design refers to the planning of an adaptive online service, in which the appearance of the service is designed to be responsive. a responsive online service uses one code from one web address to cater for the various devices a user has (desktop, tablet, smart phone, regular cell phone), but displays the content differently depending on the screen size.

- **Retargeting / remarketing**

retargeting or remarketing is a digital marketing method in which a web page visitor can be shown desired ads as they visit other sites. remarketing is used, for instance, to guide a visitor through the conversion funnel and to increase brand awareness.

Ss

- **Search engine marketing (sem)**

search engine marketing is buying advertising space from search engines. billing is done according to how many clicks the ad gets. google adwords is an example of a search engine advertising tool within google's search engines.

- **Search engine optimisation (seo)**

search engine optimization (seo) is a process that aims at directing desired traffic to a particular website. essentially, the aim of seo is to make pages more visible in the organic search results of search engines (such as google).

- **Service design**

service design means the innovation, development and planning of services using customer-centric design methods. the central goal of service design is to plan a service experience in such a way that the service meets both the needs of the users and the business objectives of the service provider.

- **Sharing economy**

sharing economy refers to a business model in which a company, some other organization or a private individual shares a resource they own to others in return for compensation. the sharing economy is based on the idea that sharing a resource that someone owns wide enough minimizes the unit cost but still manages to create a commercially viable business. an example of the sharing economy is airbnb, which allows people to rent out their own apartments.

- **Social media**

the term social media is used in reference to online services based on social networking. these include, for instance, facebook, twitter, instagram and pinterest. community-driven online services are based on human interaction and are often some of the most utilized services online.

- **Software as a service (saas)**

software as a service (saas) is the acquisition of software as a service instead of a local desktop version. the use of saas is usually paid on the basis of resources used. saas also means that there are no customer-specific environments; instead, only one online application caters for the needs of all customers. saas is one of the three main cloud service models, the other two being infrastructure as a service (iaas) and platform as a service (paas). liveto is an example of saas.

- **Software integration**

software integration is the linking together of two separate pieces of software through programming. software integration is usually one of the typical tools in cases where an existing traditional business is being digitized, for example. in everyday speech, software integration is often shortened to integration.

- **Software subscription**

software renting is a method of licensing where the customer is given the right to use software over the internet for a recurring fee, such as a monthly subscription. the software isn't installed on a local machine but is typically used through an internet browser, which executes the user's commands over the web.

- **Ssl encryption protocol**

ssl (secure sockets layer) is an encryption method that aims at protecting the connection between two parties over the internet. the use of ssl has become standard, for example, in online banks and online stores, and now it's making its way to traditional company websites in the wake of the changes google made to its search engine.

Tt

- **Tailored online application**

tailored online application is a web app built for a specific purpose according to, for instance, a company's wishes. a typical tailored online application would be a saas created to provide support to business.

Uu

- **User experience (ux)**

user experience (or ux) refers to the comprehensive experience related to the use or consumption of a product or service. organizations that provide the most addictive, easy and memorable experience have the upper hand.

- **User interface (ui)**

user interface (or ui) comprises the view through which a service is used, and the functionalities needed for using the service. a user interface links the user and the computer and creates an operating principle for usage, leading (when done correctly) to a positive user experience.

Ww

- **Web analytics / visitor tracking**

web analytics refers to the tracking of website visitors and to the interpretation of their navigation behavior. web tracking allows an online service to be developed further.

- **Web browser**

web browser is a program that allows a person to search and use online services on the internet.

- **Web page**

a web page is a single page on a website.

- **Website**

a website (colloquially web pages or home pages) is a collection of web pages that deal with a particular subject. a website can focus on an individual or an organization. the majority of the internet consists of websites. websites have developed from being static calling cards to entities requiring increasingly complex programming skills.

- **Web store / e-marketplace / online store**

web store refers to the supply, demand, sales and other commercial transactions of goods and services performed with the help of information technology. a webstore is often understood in terms of being synonymous with b2c commerce, such as gigantti.fi. however, a webstore can also be b2b (e.g. a wholesale ordering system) or c2c (a marketplace for consumers).

- **Wordpress**

wordpress is by far the world's most popular content management system (cms). wordpress' market share of all online services is around 25% and around 50% when it comes to the market share of content management systems. originally a blog tool, wordpress has become the foundation of modern websites. there are over 47,000

commercial and free add-ons available for wordpress, making it possible to extend the functionality of a product to, for example, a webstore (woocommerce add-on).

ЛІТЕРАТУРА ТА ІНТЕРНЕТ-РЕСУРСИ

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English for Future: Методичні рекомендації для самостійної роботи. Тлумачний словник термінів техніки і ІТ / уклад. : І.Р. Плавущька, Н.І. Пасічник, Г. І. Шайнер, О.В. Барабаш, І.С. Миськів, О.О. Білик, О.О. Пуга, О.М. Ванівська, З.Р. Подоляк, Р.Б. Преснер. Тернопіль : ТНТУ Івана Пулюя”, 2024. 122 с.

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