



AuToMa

AUTOMATION, TECHNOLOGY TRANSFER AND
MANAGERIAL PRACTICES FOR THE GROWTH
OF SMES, A BETTER EMPLOYABILITY AND THE
PROMOTION OF THE ENTREPRENEURSHIP

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IO5: Handbook for AuToMa learners

Glossary

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GLOSSARY

TERM	EXPLANATION
<i>Absolute encoder</i>	A transducer of linear or angular displacement in which the output signal is directly digital. Each of the output words containing n bytes is realized respectively on n parallel or concentric paths using two different states for defining the logical 0 or 1
<i>Absolute humidity</i>	The amount of water vapour present in a unit volume of gas
<i>Absolute pressure</i>	The pressure measured against a perfect vacuum
<i>AC motor</i>	An AC motor is an electric motor that is driven by alternating electric current.
<i>Access Point – Client</i>	This is the most frequently used topology for connection of devices in wireless networks. A large number of mobile devices use the services of one base station (BS) also known as Access Point (AP) controls/manages all clients which are associated to it. The base station instructs the client which channel to use for transmission and when. Depending on the assigned rules some clients could be granted priority at the expense of other clients (QoS).
<i>Acknowledgement message</i>	A message to confirm that a message has been received correctly.
<i>Active sensor</i>	A sensor which directly converts one type of energy into another, without an external source of energy or excitation to be required
<i>Actuator</i>	An actuator is a controllable mechanical device for performing manufacturing operations. An actuator uses electrical, hydraulic or pneumatic energy from an external source and converts it into mechanical movement energy (physical work).
<i>Air Motor</i>	Device which transforms pneumatic energy into mechanical rotary movement with the possibility of continuous motion is known as pneumatic motors.
<i>Analog sensor</i>	A sensor which converts the non-electrical quantity to be measured into an analog electrical signal
<i>Asynchronous motor</i>	An asynchronous motor is an alternating current motor where power from stator is supplied to the rotor by means of electromagnetic induction.



Atmospheric pressure	The pressure of the atmosphere on the earth surface. The atmospheric pressure at the sea level is assumed to be 101.325 kPa. This pressure decreases with the increase in altitude
Benchmarking	The measurement of performance against best practice as a means of setting goals for improvement - applied by firms to business processes (e.g. within their sector), or by national or regional policy-makers (e.g. in relation to support for the creation of a new technology -based firms)
Best practice	The methods and achievements of the recognised leader(s) in a particular field
Business angel	A particular type of informal investor, usually a successful entrepreneur, who is willing to invest in high-risk, high-growth firms at a very early stage, and adds value by supplying hands-on business advice
Calorimetry	A scientific field comprising methods for measurement of heat that can be produced or absorbed during chemical reactions or physical changes
Capacitance transducer	A transducer in which the variation of the non-electrical quantity to be measured is converted into a variation in the capacitance of a capacitor
Carrier Sense Multiple Access with Collision Detection (CSMA/CD)	A computer networking access method in which a carrier sensing scheme is used. When the sending device detects another signal while transmitting its own frame, it stops transmitting that frame and then waits for a random time interval before trying to send that frame again
Catalytic gas sensor	A gas sensor whose operating principle is based on catalytic reactions and heat release leading to a change in the sensor temperature.
Chemical sensor	A sensor in which as a result of the display of chemical effects (chemical adsorption, electrochemical reactions, etc.), the changes in the quantity being measured are converted into electrical signals
Cluster	a grouping of large companies, of small and medium-sized enterprises and universities or large public research institutions operating in a particular sector and region - designed to stimulate innovative activity by promoting intensive interactions
Coefficient of relative strain sensitivity	A quantitative characteristics of strain effect – a ratio of the relative change in strain gauge resistance to the relative change in strain gauge length
commercialisation	The process by which the results of research projects are converted to marketable products or services, either by the inventors or by third-party developers
community patent	A single affordable patent offering a guarantee of legal certainty for the protection of an intellectual property rights throughout the European Union - long-standing proposals for such a patent remain blocked by



	certain Member States
Condensation humidity sensor	A humidity sensor based on the dependency of water vapour condensation temperature taken on a cooled solid surface on water vapour concentration.
Contact transducer (contactron)	A transducer in which linear or angular displacement is converted into open or closed state of contacts, controlling electric circuits
Controller	Controller is a part of the system that automatically controls the robot manipulator and other devices, gathers and analyzes the information from transducers about the status of the system, also exchanges data between users and other controllers via fieldbuses.
CTR–thermistor	A thermistor with a particularly large TCR in the range of critical temperature
Current loop	An interface in which the sensor output generates a current which changes according to the change in the variable being measured. Unlike voltage output sensors, the signal from the current loop sensor can be transferred at greater distances and it is less affected by disturbances
DC motor	A DC motor is an electric motor that is driven by direct electric voltage and current.
Decentralized periphery	Distributed input-output devices connected via a fast serial connection to the central controller.
DeviceNet	DeviceNet is a network system used in the automation industry to interconnect control devices for data exchange. It uses Controller Area Network as the backbone technology and defines an application layer to cover a range of device profiles. Typical applications include information exchange, safety devices, and large I/O control networks
Differential pressure	The difference between two pressures
Differential transducer	A transducer in which the input variable causes a change of different sign in the output variable in two separate parts or halves of the transducer. Theoretically, the differential transducer has sensitivity twice as high as the single one
Digital sensor	A sensor which converts the non-electrical quantity to be measured into a digital output signal.
Direct piezoelectric effect	The appearance of electric charges on the surface of a plate made of some dielectric materials when it is mechanically loaded. The charges are proportional to the applied force
Distributed control systems (DCS)	A major type of subsystems within the integrated systems for production control.



Doppler effect	The change in the frequency or wavelength received by the receiver when the source and/or receiver move against each other. Frequency increases when the source and receiver get closer and it decreases when they are afar.
Duty factor	The relation between the duration of the high level in the periodic signal to its period usually given in percent.
Eddy-current transducer	A transducer based on the change in coil active resistance and inductivity when a conductive object approaches the coil due to the eddy-currents induced in the object
Eddy-currents	The currents induced in a conductor when the magnetic field passing through the conductor alters in time or the distance between the conductor and the magnetic field source is changed.
Electrical drive	An electrical drive is a controlled electromechanic system that consist an electrical motor, power converter and mechanical transmission joined to drive a mechanical load by electrical energy.
Electrochemical gas sensor	A gas sensor whose operation is based on the effect of gas concentration on the oxidizing-restoring reactions taking place in the electrochemical cell.
End effector	Industrial robot is always equipped with an end effector that is used to accomplish a certain task. For example, a gripper as end effector can be used for pick and place or holding a product.
EnOcean networks	EnOcean is a protocol for wireless data transfer with autonomous power. EnOcean has an operating range of about 300 meters and can implement information exchange of up to 120 Kbit/s.
Entrepreneurial innovation	A market-oriented approach to innovation policy which addresses not only the suppliers and immediate users of new knowledge but also indirect beneficiaries, end-users and intermediaries
European patent	A mechanism for the protection of à intellectual property rights in multiple signatory states on the basis of a single application to the European Patent Office (EPO) - has the same legal effect as a national patent in each of the designated states, so protection is not uniform
Explicit messages	A communication mechanism, which is applied to initial identification, configuring and diagnostics of network devices.
Exploitation	see commercialisation
Field networks	Computer networks underlying the structure of network systems for control, which include intelligent units such as regulators, programmable logic controllers, intelligent sensors, actuators, etc.
Flow rate	The quantity of a fluid – a liquid or gas, which passes through pipes or open channels for a specific time. When measuring the flow rate, units are used referring to the volume or weight of the flow for a certain time. The most commonly used units are m ³ /s, l/s or kg/s
Fragmented	A communication mechanism, in which data is divided and sent in



messages	fragments which later are concentrated at the receiver point thereby forming the initial size of the message.
Frame	A unit of information whose source is the data layer. It consists of a header and trailer and data from the upper layers. The header and trailer contain control information needed by the receiver.
Frequency converter	A electronic device meant for controlling the rotational speed, torque, direction and other parameters of an AC motor by means of changing the frequency and the phase order of the electrical power that is supplied to the motor.
Gateway	Combines two local as well as global networks which are incompatible in terms of access procedures and protocols (e.g. DeviceNet and CANOpen).
Gauge pressure	The pressure measured in relation to the atmospheric pressure
Governance (of innovation)	Issues related to the involvement of stakeholders - scientists, industry, consumers and public authorities - in the process of innovation policy design, implementation and evaluation
Gravimetric gas sensor	A gas sensor in which small changes in mass caused by gas molecule adsorption results in a change in the mechanical properties of the system. This causes a change in the resonance frequency of a resonator on which an adsorption sensitive layer has been applied
Gravimetric humidity sensor	A humidity sensor in which the sorbed moisture changes the mass of the sorbent applied on the surface of a piezoelectric resonator. This results in a change in the resonance frequency of the resonator
GSD files	GSD files contain information about the basic capabilities of a device. GSD files have a standard file format, which is described in the PROFIBUS guidelines. With a GSD file, system integrators can determine basic data such as the communications options and the available diagnostics.
Hydraulic cylinder	The hydraulic cylinder converts hydraulic energy into mechanical energy.
Incremental encoder	A transducer for determining the displacement or rotation velocity of an object as well as the direction of motion using a small number of paths (2 or 3) with a less complex mask compared to the absolute encoder
Incubation	"One-stop" delivery of business support services for new firms, often linked to a university or large public research institution - traditionally, the package includes inexpensive accommodation, but virtual incubation is becoming more common
Indicators	Quantifiable factors which serve as proxies for underlying behaviour of interest to policy-makers or others- a country's high-tech patent applications per million population is one indicator of its innovative





	capacity
Induction transducer	A generator type of transducer based on the electromagnetic induction law. It is a combination of a permanent magnet with a coil in which electromotive force is induced proportional to the linear or angular velocity.
Inductive transducer	A coil placed on a magnetic core with an air gap. The coil parameters are changed by the input variable which is usually linear or angular displacement
Industrial liaison office (ILO)	A unit within a university or a large public research institution which interacts with industrial users of its intellectual property, for example, by negotiating licensing agreements - ILOs are also well placed to support spin-offs since they have close research and business links
Industrial robot	Standard EN 775 defines an industrial robot as automatically controlled, programmable, and multifunctional, with several degrees of freedom of a machine that is installed in automated manufacturing systems.
informal investors	Often the only available source of finance for high-tech start-ups - they include entrepreneurs' friends and families, and business angels
Initial public offering (IPO)	The "flotation" of a company through the open sale of its shares in a stock market - the conventional exit route for early investors such as à business angels and à venture capital funds
Innovation	The conversion of new knowledge into economic and social benefits - now acknowledged to take place as the result of complex long-term interactions between many players in an innovation system
Innovation expenditure	Defined by the Community Innovation Survey as business spending on the full range of innovation activities - in-house R&D, outsourced R&D, machinery and equipment linked to product and process innovation, acquisition of patents and licenses, industrial design, training, and the marketing of innovations
Innovation finance	All of the sources of finance available to high-tech start-ups in their early stages of growth - includes seed capital funds, informal investors, banks and venture capital funds
Innovation Relay Centre (IRC) network	Europe-wide networks of local technology brokerage agencies, specialising in support for transnational à technology transfer
Innovation system	The local, regional or national environment for innovative activity - in addition to companies it includes the research base, innovation finance, business support services and schemes, and the networks through which these components interact



<i>Innovative firm / company</i>	Defined by the Community Innovation Survey as a firm that has introduced new or improved products, processes or services within the previous three years
<i>Intangible assets</i>	That part of a company's real worth formed by its staff and their skills, knowledge and creativity - fundamental sources of wealth and value in a knowledge-based economy (see also tacit knowledge)
<i>Intellectual property (IP)</i>	The original inventions and proprietary knowledge of a company or an individual
<i>Intellectual property rights (IPR)</i>	Defined rights to the exclusive exploitation of à intellectual property granted by a national or supra-national authority - most commonly, patents, trademarks and industrial designs
<i>Interface</i>	A connection between two or more devices which determines the signals for data exchange and procedures for interaction between devices
<i>Key sensor</i>	A sensor which positions the output signal at low or high level when the variable being measured reaches a boundary value.
<i>Knowledge base</i>	The accumulating sum of knowledge on which the advance of a particular industrial sector relies - includes not just codified knowledge but also à tacit knowledge and knowledge embedded in plant and equipment
<i>Large public research institutions (LPRI)</i>	Publicly-funded bodies, usually specializing in a particular scientific field - together with universities, they are the main components of the research base of a regional or national innovation system
<i>Lifelong learning</i>	Continuing education, including in company schemes - an essential means of accelerating assimilation of new technologies
<i>Light Emitting Diode (LED)</i>	A semiconductor device which emits light when current flows through it. The emitted light depends on the type of LED and can be visible, ultraviolet or infrared
<i>Linearly variable differential transformer (LVDT)</i>	A mutually inductive differential transducer with a moving core
<i>Logical topology</i>	Determines the way whereby users get access to the net and the feasible routes of data exchange between nodes.





Magnetic anisotropy	The difference in the magnetic permeability of ferromagnetic materials in different geometric directions
Magnetoelastic effect	The change in the magnetic permeability of ferromagnetic materials when mechanical stresses caused by external forces arise in them.
Magnetoelastic transducer	A transducer based on magnetoelastic effect
Magneto resistor	A resistor whose resistance is changed by a magnetic field
Mainframe computers	Enable the control of large bulks of data and solution of sophisticated calculation tasks.
MAN (Metropolitan Area Network)	MAN (Metropolitan Area Network) – covers the territory of a built up area (settlement) or a large building shared by a number of organizations;
Manipulator	A manipulator is a mechanism that consists of several links, motors and gears. A manipulator is the actuator of the robot system that uses end effector (tool) to accomplish the task.
Master device	A device that controls the interface bus. It starts communication, selects or addresses a slave device with which to exchange data and controls the clock signal. Usually there is only one master device on the interface bus
Master device of type 1	Master device of type 1 is usually a programmable logical controller (PLC), or computer working with special software in ProfiBus network. It sets the exchange rate and the slave devices find it automatically. It maintains the information exchange with the slave devices associated to it and operates as a principal controller exchanging input/output information with distributed periphery.
Master device of type 2	Master device of type 2 is for configuration and capabilities to ‘charge’ service and diagnose in ProfiBus network. It operates as a coordinating device and appears to be an active station with regard to master device of type 1 and its slave devices. Master device of type 2 is used for configuration, error diagnostics and parameter change.
Metal thermoresistor	A resistor based on metals (platinum, nickel, copper) whose resistance depends on temperature.
Mobility	In the context of innovation, mobility refers to the temporary transfer of skilled staff between industry and the research base, between regions, and between scientific disciplines, and to schemes to promote such transfers





Multicast	A method for information transmission. The packet is cast by a transmitter to a host of recipients in the network. The transmitter addresses the packet using the multicast address of recipients after which it is sent over the net to each of the recipients forming the multicast address.
Multi-master	A communication mechanism, in which several master devices need to obtain access to data which is provided by one and the same slave device.
Mutually inductive transducer	A transducer based on the inductive transducer by placing on its magnetic core besides a magnetizing coil, also a measuring coil, in which an electromotive force is induced
Network protocol	A set of rules for exchanging information between processes or computers connected in a computer network. The communication in this network is based on a number of protocols with different functions and is carried out by means of exchanging packets.
Network topology	Defines the structure of the communications network. Two types of topology are distinguished: logical and physical.
New technology - based firms (NTBF)	spin-offs and other high-tech start-up companies
Normally closed (NC) switches	They have closed contacts and when mechanical action is exerted on them, they open and break the electric circuit
Normally opened (NO) switches	They have open contacts and when mechanical action is exerted on them, they close and close the electric circuit
NTC-thermistor	A thermistor with a negative TCR
Open coordination	A method for spreading best practice in the field of national policy-making in order to achieve convergence on EU goals, based on benchmarking, target-setting and à peer review
Optical gas sensor	A gas sensor based on the interaction between the electromagnetic waves and the studied gas. As a result, some emission characteristics as intensity, polarization, etc., vary
Passive network units	Provides a point for connection in the communication network without changing the parameters of the signal entering their input. This group of units includes: jack couplers, wall plates, patch panels and passive hubs.
Passive sensor	A sensor which cannot convert energy immediately, and controls the energy or excitation from another source
PDU (Protocol Data Unit)	Elementary packet protocol used in ModBus. The PDU structure does not depend on the type of connection line and comprises a function code and





	data field.
Peer review	The exchange of tools, methods and experience between policy-makers on the basis of information about relative performance
Period	The duration of one cycle in a repeating event. The period, usually denoted by T, is the length of time taken by one cycle, and is the reciprocal of the frequency f - $T=1/f$.
Physical sensor	A sensor in which as a result of the display of physical effects (piezoelectric, magnetostrictive, thermoelectric, magnetoelectric, etc.), the changes in the quantity being measured are converted into electrical signals.
Piconet connection	Master-slave organization in which the number of active connection at a certain time are less than the total number of slave devices. Non-active slave devices have got in touch with the master and are expecting a vacancy in idle state, to transfer data.
Piezoelectric transducer	A transducer based on piezoelectric effect
Piezotransformer	A transducer for measuring static forces. It is a combination of two transducers using reverse and direct piezoeffects, respectively
Pneumatic actuator	A pneumatic actuator is an output device for the conversion of supply energy (compressed gas) into useful mechanic work.
Pneumatic valve	The function of pneumatic valve is to control the pressure or the flow rate of pressure media.
Positioner	Positioner is a part of a robot system that holds the detail and puts it in appropriate position for the manipulator.
Potentiometer	A resistor along which a slide moves and makes electric contact. In this way the resistance between the slide and the respective terminal of the resistor varies
Pressure	A physical quantity which represents the relation between the applied force to a certain surface. The force is applied perpendicularly to the surface of the object
Proximity transducer	A contactless transducer whose output signal is a function of the reciprocal position of transducer and object. In direct operating mode it detects the presence or absence of an object
Pseudo digital sensor	A sensor which converts the non-electrical variable to be measured into frequency or time span.





<i>Psychrometric humidity sensor</i>	A humidity sensor based on the dependency of air humidity on dry and humid thermometer readings
<i>PTC-thermistor</i>	A thermistor with a positive TCR
<i>Pulse width modulation</i>	Pulse width modulation (PWM) is a control technique that is used for controlling the power flow to the electrical devices by adjusting the duty cycle of the constant amplitude voltage and frequency.
<i>Pulse-width modulation (PWM)</i>	A method for modulation of a periodic signal by controlling its duty cycle
<i>Relative humidity</i>	The ratio of water vapour partial pressure to saturated water vapour pressure at a given temperature
<i>Remote frame</i>	Starts a request for transmitting data frames for the current identifier.
<i>Repeater</i>	Wireless network operating mode in which in order to extend the zone of hearing AP are used in repeater mode. The repeater operates in the same channel as AP through which the access to the support network is provided.
<i>Research base</i>	A region's or country's universities and large public research institutions - the academic science and technology resources from which its industry draws new knowledge
<i>Reverse piezoeffect</i>	Mechanical tension arises or a change in the geometrical dimensions of a plate made of some dielectric materials appears, when the plate is placed in an electric field.
<i>Rheostat transducer</i>	A rheostat especially made and designed. Its slide is moved by the input variable
<i>Rotary flow sensors</i>	A mechanical or electromechanical devices in which the rotary movement of propeller or turbine is used for evaluation of the flow rate
<i>SAN (Storage Area Network)</i>	SAN (Storage Area Network) – data storage network which is used for connecting large arrays of data to bunched servers.
<i>seed capital</i>	Seed capital funds invest relatively small sums in start-ups at the earliest stage, often to finance feasibility and market studies - many universities and large companies have established dedicated seed funds to stimulate à spin-off activity
<i>Semiconductor gas sensor</i>	A gas sensor whose operating principle is based on a change in the sensitive element conductivity when the analyzed gas is sorbed





Sensor	A device which converts physical and chemical quantities into electrical signals convenient to use
Servo drive	A servo drive is a combination of servo motor, servo amplifier and automatic control system. The means accurately controlling the rotational speed of the servo motor by getting feedback of the actual speed and position.
Slave device	A device that has to be selected or addressed by the master device before any data transmission. It cannot initiate communication and only can respond to the requests of the master device
Soft starter	An AC voltage converter, used for soft starting of induction motors by temporarily reducing the motor load and torque.
Solenoid	A solenoid is a coil forming the shape of motion of a cylinder in an straight tube.
Sorption humidity sensor	A humidity sensor, whose operating principle is based on the phenomenon of humidity sorption from the analyzed environment
Sorption-impedance humidity sensor	A humidity sensor whose operation is based on the dependency of the moisture-sensitive layer impedance on the sorbed moisture
Spin-off/spin-out	A new company established to commercialise the knowledge and skills of a university or corporate research team
Stepper motor	A stepper motor is an electric machine which transforms DC energy pulses into the mechanical energy of the motor shaft.
Strain effect	A change in the active resistance of a conductor or semiconductor transducer during its mechanical deformation.
Strain gauge	A conductor or semiconductor transducer whose operation is based on the strain effect phenomenon
Strobe broadcast	A communication mechanism, in which the master device sends an inquiry to all slave devices for the purpose of exchanging data with them.
Supply chain	A large company, its primary and secondary suppliers and contractors - innovation spreads relatively easily along supply chains (see also cluster)
Tacit knowledge	A knowledge that has not yet been codified, but remains embodied in researchers and in companies' owner-managers and key employees (see also intangible assets)
TCP (Transmission Control Protocol)	TCP (Transmission Control Protocol) is a network protocol for controlling information exchange. Data are transferred in packets and the protocol monitors the arrangement of the received packets and their fidelity. It has been designed for multi-task operation mode and is employed jointly with IP protocol TCP/IP
Technology audit	A formal method for evaluating a company's technology assets and requirements





Technology brokerage	A professional service offered by the innovation relay centres, involving the national or transnational matching of technology assets in one company or research centre to technology requirements in another
Technology foresight	The process of assessing the future needs and opportunities for the economy of a region or country, in the light of technological and market trends.
Technology transfer	The transfer of technology or know-how between organisations through licensing or marketing agreements, co-development arrangements, training or the exchange of personnel
Technology valley	A large scale à cluster, normally supported by a national or regional policy initiative, in which a critical mass or industrial and research activity in a particular field leads to self-sustaining innovation-led economic development - Silicon Valley is the classic case
Technology-based firm	Includes not only companies operating in high-tech sectors but, increasingly, technology users in traditional manufacturing and service sectors
Temperature coefficient of resistance (TCR)	A coefficient which characterizes the relative change in resistance of a certain element when temperature changes by one degree
Thermistor	A semiconductor resistor with large TCR in a wide temperature range.
Thermocouple	A transducer constructed of a pair of dissimilar wires welded in a hot junction. It is based on the thermoelectric effect
Thermodiode and thermotransistor	Semiconductor elements in which the dependency of p-n junction resistance on temperature is employed
Thermoelectric effect	Thermal electromotive force (t.e.m.f.) is produced between the free ends of the thermocouple which depends on the temperature difference between the hot junction and cold junction
Thermoresistive transducer	A conductor or semiconductor element whose resistance depends on temperature
Token	Data are transmitted in sequence from one computer to another until they reach the receiver. This is performed by a token which is a 3 byte long signal, it circulates along the loop and identifies which computer is active at this moment.
Token Ring	Token Ring is a kind of technology for LAN in which all computers are connected in series so that a closed loop is formed. Data ate transmitted in sequence from one computer to another until they reach the receiver.



	This is done by a token which is a 3 byte long signal, it circulates along the loop and identifies which computer is active at this moment.
Twisted pair	A type of cable in which two wires are twisted together for the purpose of canceling out the electromagnetic interference (EMI) from external sources. A twisted pair cable also reduces electromagnetic radiation from the cable and allows greater distance for transmission of data
UDP (User Datagram Protocol)	User Datagram Protocol (UDP) is a minimal transport packet protocol documented in IETF RFC 768. UDP is a simple interface between the network protocol under it and the application protocols over it. UDP does not guarantee data delivery. It operates at transport level.
Ultrasonic transducer	A transducer whose operating principle is based on emitting and receiving ultrasonic waves (over 20kHz)
Unicast	A method for information transmission. The packet is cast by a transmitter to a receiver in the network. The receiver in turn addresses the packet using the recipient's address after which the packet is sent to its destination.
University-industry interface	Open and continuous interaction between industry and the research base is now acknowledged to be a critical element of the innovation system - universities are adding the diffusion of knowledge to their traditional missions of education and research (see also industrial liaison office)
Utility model	a registered right for technical inventions, entitling the owner to forbid third parties from exploiting an invention - more flexible and less onerous than a patent, but lasting for a shorter period
UTP (Unshielded Twisted Pairs)	UTP (Unshielded Twisted Pairs) is the cable by which a higher transmission rate is maintained than by coaxial cables.
Venture capital	high-risk, high-return investment - venture capital funds are essential as a means of financing the rapid growth of new technology-based firms
WDS – Wireless Distributed System	Wireless Distribution System (WDS) is a technology which allows extension of the wireless network coverage zones by uniting several WiFi access points in one network without any wire connections to be needed. A distinguishing feature of this technology, compared to others, is the storage of MAC-address client network.
ZigBee networks	ZigBee wireless network features the unique properties of self-setup and self-recovery as the network devices form the network on a stand alone basis at the moment of switching by identifying each other. In case of a failure of some of these devices, the network undergoes self-recovery and starts transmission along a new route. Data are transmitted at a rate of 250 Kbit/s which also includes the service information of the net. ZigBee wireless operates within the ranges of frequency channels 868 MHz, 915MHz, 2.4GHz.



Z-Wave networks

Z-Wave is a protocol for wireless data transfer over short distances with minimum energy consumption. Devices based on Z-wave protocol implement not very high speed of about 40 Kbit/s within a range of 30 meters and operate with one battery for more than one year. Basically, this technology is applied in building smart homes especially in systems for lighting and heat control, fire precaution sensors, video monitoring and protection systems. Z-wave allows all these networks of sensors and devices to be controlled by means of a single remote control unit.

