МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ
УЧРЕЖДЕНИЕ ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ
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АНГЛИЙСКИЙ ЯЗЫК

СБОРНИК
НАУЧНО-ТЕХНИЧЕСКИХ ТЕКСТОВ
НА АНГЛИЙСКОМ ЯЗЫКЕ

Для студентов, магистрантов и аспирантов
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Сборник включает в себя оригинальные научно-технические тексты на английском языке по всем специальностям академии с комментариями. Особое внимание уделяется таким новым специальностям как «инноватика» и «информационная безопасность». Тексты предназначены, главным образом, для самостоятельной работы студентов, аспирантов и магистрантов СГГА, но могут также использоваться для аудиторных занятий в целях совершенствования навыков чтения и перевода специальной литературы.

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Text 1
INNOVATION

The term innovation derives from the Latin word ***innovatus*** (to renew or change). Although the term is broadly used, innovation generally refers to the creation of better or more effective products, processes, technologies, or ideas that are accepted by markets, governments, and society. Innovation differs from invention or renovation[1] in that innovation generally signifies a substantial positive change compared to incremental[2] changes.

Inter-Disciplinary Views. Due to its widespread effect, innovation is an important topic in the study of economics, business, entrepreneurship, design, technology, sociology, and engineering. In society, innovation aids in comfort, convenience, and efficiency in everyday life. For instance, the benchmarks[3] in railroad equipment and infrastructure added to greater safety, maintenance, speed, and weight capacity for passenger services. These innovations included changing from wood to steel cars, from iron to steel rails, stove-heated to steam-heated cars, gas lighting to electric lighting, diesel-powered to electric-diesel locomotives. By mid-20th century, trains were making longer, more comfortable, and faster trips at lower costs for passengers. Other areas that add to everyday quality of life include: the innovations to the light bulb from incandescent to compact fluorescent and LEDs[4] which offer longer-lasting, less energy-intensive, brighter technology; adoption of modems to cellular phones, paving the way to smart phones which meets anyone's internet needs at any time or place; cathode-ray tube[5] to flat-screen LCD televisions[6] and others.

Business and Economics. In business and economics, innovation is the catalyst to growth. With rapid advancements in transportation and communications over the past few decades, the old world concepts of factor endowments and comparative advantage[7] which focused on an area's unique inputs[8] are outmoded for today's global economy. Now, as Harvard economist Michael Porter points out competitive advantage, or the productive use of any inputs, which requires continual innovation, is paramount for any specialized firm to succeed. Economist Joseph Schumpeter, who contributed greatly to the study of innovation, argued that industries must incessantly revolutionize the economic structure from within, that is innovate with better or more effective processes and products, such as the shift from the craft shop to factory. In addition, entrepreneurs continuously look for better ways to satisfy their consumer base with improved quality, durability, service, and price which come to fruition in innovation with advanced technologies and organizational strategies.

One prime example is the explosive boom of *Silicon* startups[9] out of the *Stanford Industrial Park*. In 1957, dissatisfied employees of Shockley Semiconductor, the company of Nobel laureate and co-inventor of the transistor William Shockley, left to form an independent firm, ***Fairchild Semiconductor***. After several years, ***Fairchild*** developed into a formidable presence in the sector. Eventually, these founders left to start their own companies based on their own, unique, latest ideas, and then leading employees started their own firms. Over the next 20 years, this snowball process launched the momentous startup[8] company explosion of information technology firms. Essentially, *Silicon Valley* began as 65 new enterprises born out of Shockley's eight former employees.

- **Organizations.** In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share, and others. All organizations can innovate, including for example hospitals, universities, and local governments. For instance, former Mayor Martin O'Malley pushed the City of Baltimore to use *CitiStat*, a performance-measurement[10] data and management system that allows city officials to maintain statistics on crime trends to condition of potholes. This system aids in better evaluation of policies and procedures with accountability and efficiency in terms of time and money. In its first year, CitiStat saved the city $13.2 million. Even mass transit[11]systems have innovated with hybrid bus fleets to real-time tracking at bus stands. In addition, the growing use of mobile data terminals[12] in vehicles that serves as communication hubs between vehicles and control center automatically send data on location, passenger counts, engine performance, mileage and other information. This tool helps to deliver and manage transportation systems.

- **Sources of Innovation.** There are several sources of innovation. General sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc. These also include internet research, developing of people skills, language development, cultural background, Skype, Facebook, etc. In the simplest linear model of innovation the traditionally recognized source is *manufacturer innovation*. This is where an agent (person or business) innovates in order to sell the innovation. Another source of innovation, only now becoming widely recognized, is *end-user innovation*. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. End-user[13] innovation is, by far, the most important and critical source of innovation. In addition, the famous robotics engineer Joseph F. Engelberger asserts that innovations require only three things: 1) a recognized need; 2) competent people with relevant technology; and 3) financial support.

Innovation by businesses is achieved in many ways, with much attention now given to formal research and development (R&D)[14] for "breakthrough innovations." R&D help spur on patents and other scientific innovations that leads to productive growth in such areas as industry, medicine, engineering, and government. Yet, innovations can be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes. The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice – but there are many exceptions to each of these trends.

An important innovation factor includes customers buying products or using services. As a result, firms may incorporate users in focus groups (user centred approach), work closely with so called lead users (lead user approach) or users might adapt their products themselves. Regarding this user innovation, a great deal of innovation is done by those actually implementing and using technologies and products as part of their normal activities. In most of the times user innovators have some personal record motivating them. Sometimes user-innovators may become entrepreneurs, selling their product, they may choose to trade their innovation in exchange for other innovations, or they may be adopted by their suppliers. Nowadays, they may also choose to freely reveal their innovations, using methods like open source. In such networks of innovation the users or communities of users can further develop technologies and reinvent their social meaning.

Notes:

1. Renovation – 1) восстановление, реконструкция; 2) обновление, освежение.
2. Incremental – поэтапный (напр. о внедрении технических средств).
3. Benchmark – эталон, стандарт.
4. LED – (light-emitting diode) светодиод, СИД.
5. Cathode-ray tube -электронно-лучевая трубка, ЭЛТ.
6. Flat-screen LCD television – ЖК-телевидение.
7. Comparative advantage – сравнительное преимущество/отличие.
8. Inputs – вложения, затраты, инвестиции.
9. Start(-)up – "стартап" (недавно созданная фирма, обычно интернет-компания).
10. Performance-measurement – измерение производительности.
11. Mass transit – общественный транспорт.
12. Data terminal – терминал данных.
13. End-user – конечный пользователь.
14. Research and development (R&D) – научно-исследовательские и опытно-конструкторские работы; НИР и ОКР.

Text 2
VALUE OF EXPERIMENTATION

When an innovative idea requires a better business model a real world experimentation approach increases the chances of market success. Potentially innovative business models and customer experiences can't be tested through traditional market research methods. Recent years have seen considerable progress in identifying important key factors/principles that affect the probability of success in innovation. Of course, building successful businesses is such a complicated process, involving subtle interdependencies among so many variables in dynamic systems, that it is unlikely to be made perfectly predictable. But the more business can master the variables and experiment, the more they will be able to create new companies, products, processes and services that achieve what they hope to achieve.

Goals. Programs of organizational innovation are typically tightly linked to organizational goals, to the business plan, and to market competitive positioning.

Companies cannot grow through cost reduction and reengineering alone... Innovation is the key element in providing aggressive top-line growth[1], and for increasing bottom-line results[2]. One survey across a large number of manufacturing and services organizations found, ranked in decreasing order of popularity, that systematic programs of organizational innovation are most frequently driven by: improved quality, creation of new markets, extension of the product, range, reduced labor costs, improved production processes, reduced materials, reduced environmental damage, replacement of products/services, reduced energy consumption. These goals vary between improvements to products, processes and services and dispel a popular myth that innovation deals mainly with new product development. Most of the goals could apply to any organization be it a manufacturing facility, marketing firm, hospital or local government. Whether innovation goals are successfully achieved depends greatly on the environment prevailing in the firm. Innovative companies will typically be working on new innovations that will eventually replace older ones.

There are two fundamentally different types of measures for innovation: the organizational level and the political level.

Organizational Level. The measure of innovation at the organizational level relates to individuals, team-level assessments, and private companies from the smallest to the largest. Measure of innovation for organizations can be conducted by surveys, workshops, consultants or internal benchmarking[3]. There is no established general way to measure organizational innovation. Corporate measurements are generally structured around balanced scorecards[4] which cover several aspects of innovation such as business measures related to finances, innovation process efficiency, employees' contribution and motivation, as well as benefits for customers. Measured values will vary widely between businesses, covering for example new product revenue, spending in R&D, time to market, customer and employee perception & satisfaction, number of patents, additional sales resulting from past innovations.

Political Level. For the political level, measures of innovation are more focused on a country or region competitive advantage[5] through innovation. In this context, organizational capabilities can be evaluated through various evaluation frameworks, such as those of the European Foundation for Quality Management. The OECD[6] Oslo Manual (1995) suggests standard guidelines on measuring technological product and process innovation. The new Oslo manual from 2005 takes a wider perspective to innovation, and includes marketing and organizational innovation. These standards are used for example in the European Community Innovation Surveys.

Other ways of measuring innovation have traditionally been expenditure, for example, investment in R&D (Research and Development) as percentage of GNP (Gross National Product). Whether this is a good measurement of innovation has been widely discussed and the Oslo Manual has incorporated some of the critique against earlier methods of measuring. The traditional methods of measuring still inform many policy decisions. The EU Lisbon Strategy has set as a goal that their average expenditure on R&D should be 3% of GNP.

Notes:

1. Top-line growth – наивысший прирост.
2. Bottom-line results – окончательный результат.
3. Benchmarking – бенчмаркинг, сравнение эффективности.
4. Balanced scorecard – сбалансированная карта показателей деятельности, система взаимосвязанных показателей (метод оценки уровня управления, основанный на использовании большого количества критериев).
5. Competitive advantage – конкурентное преимущество.
6. OECD (Organization for Economic Cooperation and Development) – Организация экономического сотрудничества и развития, ОЭСР.

Text 3
DUTIES & RESPONSIBILITIES OF A SAFETY ENGINEER

Safety engineers, also known as safety managers, work for companies where job safety is critical, such as manufacturing plants, mining operations and virtually anywhere heavy equipment and machinery is used. They are largely responsible for the safety record of a company, so they must be ever-vigilant to detect signs of potential accidents.

To perform their professional functions, safety engineering professionals must have education, training and experience in a common body of knowledge. They need to have a fundamental knowledge of physics, chemistry, biology, physiology, statistics, mathematics, computer science, engineering mechanics, industrial processes, business, communication and psychology. Professional safety studies include industrial hygiene and toxicology, design of engineering hazard controls, fire protection, ergonomics, system and process safety, safety and health program management, accident investigation and analysis, product safety, construction safety, education and training methods, measurement of safety performance, human behavior, environmental safety and health, and safety, health and environmental laws, regulations and standards. Many safety engineers have backgrounds or advanced study in other disciplines, such as management and business administration, engineering, education, physical and social sciences and other fields. Others have advanced study in safety. This extends their expertise beyond the basics of the safety engineering profession.

Develop Safety Programs. Safety engineers develop programs and processes for safety in the workplace. Once the program is developed, they may also be charged with putting the new process in writing in the form of a manual. They present the new program to management to ensure they have a thorough understanding so that they can implement the program in their specific work areas. They may be involved with planning and conducting training classes and seminars for workers.

Eliminate Unsafe Practices and Equipment. Safety engineers evaluate existing work procedures to uncover areas where safety may be at risk. They analyze accident reports to determine if the cause was due to faulty equipment or a poor procedure, and recommend any necessary corrections. Safety engineers regularly inspect tools and equipment to check for possible defects. They may also observe workers to ensure that they are operating machines and equipment in a safe manner.

Ensure Compliance. Safety in the workplace is regulated at the federal government level by the Occupational Safety and Health Association (OSHA). Safety engineers are typically required to obtain OSHA certification, which requires 10 hours of online and on-site training. They must ensure that the company is in compliance with all OSHA regulations, and they work closely with an OSHA investigation of accidents involving injury in their workplace.

Working Conditions. Safety engineers spend much of their time reviewing and inspecting on-site safety conditions and investigating accidents. They also have an office in which they analyze data and write reports. They may have to do some traveling to worksites, conferences, and seminars. Safety engineers generally work forty hours per week. In many cases, longer hours are necessary. Manufacturing plants may require some shift work. Sometimes safety engineers have to answer unexpected emergency calls. There may be some danger involved in their work, but safety precautions minimize this danger.

Safety engineers often meet with clients, workers, and managers. They must be able to convince these people of the need for safety measures. In addition to knowledge of the engineering problems involved in keeping work areas and other public places free from hazards, safety engineers need to have a good knowledge of management methods, safety laws, and industrial psychology. They should be good at solving problems.

Functions of a Safety Engineer. The major areas relating to the protection of people, property and the environment are:

Anticipate, identify and evaluate hazardous conditions and practices.

Develop hazard control designs, methods, procedures and programs.

Implement, administer and advise others on hazard control programs.

Measure, audit and evaluate the effectiveness of hazard control programs.

Draft a future safety plan and statement based on real time experiences and facts.

Text 4
SARETY ENGINEER JOB DESCRIPTION

Definition and Nature of the Work. Safety engineers are responsible for keeping people free from danger, risk, or injury in the workplace. They develop safety programs to minimize losses due to injuries and property damage. They try to eliminate unsafe practices and conditions in industrial plants, mines, and stores as well as on construction sites and throughout transportation systems. Safety engineers work for a wide variety of industrial and commercial companies. Many work for insurance companies. Others are employed by government agencies or safety organizations. Still others teach in colleges and universities or work as independent consultants.

Safety engineers work in many different types of industrial and commercial companies to ensure safety in the workplace as well as in the products the companies make. Safety engineers often have other titles, such as director of safety, safety manager, or safety coordinator. Sometimes technicians assist them. The duties of safety engineers vary depending on where they work. Engineers employed in large manufacturing plants often develop broad safety programs. They study the buildings, equipment, procedures, and records of accidents in their plant and point out safety hazards. They may suggest ways to fix unsafe structures or recommend changes in the layout of the plant. Sometimes they draw up plans for the regular maintenance of machinery or teach safe work habits to managers and workers.

Other safety engineers work with designers to make sure that their company's products are safe. They may be responsible for seeing that a new automobile model meets safety standards. Or they may check the design and production of children's toys.

Safety engineers who work for insurance companies usually provide consulting services to their clients. They are experts who can spot hazards and recommend ways to eliminate them. For example, they may review plans for a shopping center that is to be insured by their company and point out dangerous traffic patterns. Once the center is built, they inspect it and check that the elevators have been installed properly so that there will not be accidents. They also study maintenance procedures and may recommend that floors be cleaned when customers are not present. The shopping center owners may be able to lower their insurance rates by following the safety engineer's suggestions.

In the trucking industry[1], safety engineers review patterns of traffic accidents. They study routes, schedules, loads, and speeds to determine how these factors affect accidents. They also inspect trucks for safety hazards. Safety engineers in the mining industry must check to see that underground or open-pit mines meet the requirements set by state and federal laws. They also design equipment, such as lamps that are used underground. During mining emergencies they may be in charge of rescue teams.

Education and Training Requirements for Safety Engineers. You generally need a bachelor's degree in science or engineering to become a safety engineer. It usually takes a minimum of four years to get this formal training. Some employers prefer to hire graduates with special degrees in safety management or occupational safety and health. Others look for people who have a master's degree or some work experience in a related field. In some cases graduates of two-year college programs can become safety engineers after some years of experience as technicians in this field. Undergraduate courses should include behavioral, medical, and social sciences. A list of colleges offering degrees in occupational safety and health is available from the American Society of Safety Engineers. Many companies provide additional training for their employees. Safety engineers continue to study new developments in their field throughout their careers.

In some cases engineers need to be licensed by the state in which they work. They generally need a degree from an approved engineering college, about four years of work experience as an engineer, and a passing grade on a state examination before being licensed as professional engineers.

Advancement Possibilities and Employment Outlook. Advancement depends on education, experience, and the industry. In large manufacturing companies, for example, safety engineers can become managers in charge of safety for a large department, an entire plant, or a group of plants. In an insurance company, safety engineers can advance to department head, branch manager, and eventually executive. Some start their own consulting firms.

Health and safety engineers, except mining safety engineers and inspectors, are projected to experience average employment growth through 2014. Although there is a growing concern for the safety of workers and consumers, there has also been a demand for less government intervention and regulation. Much of the employment growth is expected to be in private industrial firms. This growth will be due to the continuing self-enforcement of government requirements, the rising costs of insurance, and the insistence of unions. Insurance companies should also employ more safety engineers. The best jobs will go to graduates of college programs that are related to safety.

Note:

1. Trucking industry – грузоперевозки.

Text 5
WORKPLACE SAFETY

Workplace Safety and health laws establish regulations designed to eliminate personal injuries and illnesses from occurring in the workplace. Workplace safety refers to the working environment at a company and encompasses all factors that impact the safety, health, and well-being of its employees; this covers managers, supervisors, partners, stockholders, officers, and family members of the workers. It does not cover independent contractors or family members of a farm operator. Safety violations can include environmental hazards, unsafe working conditions or processes, drug and alcohol abuse, and workplace violence.

The leading authority administering workplace safety is the Occupational Safety and Health Administration (OSHA). OSHA requires the Secretary of Labor to propagate regulations and safety and health standards to protect employees from having to work in dangerous or hazardous conditions. Every private employer who engages in interstate commerce is subject to OSHA regulations. Standards made by OSHA are published in the Code of Federal Regulations (CFR).

The federal guidelines imposed by OSHA are complemented by state regulations, although federal laws and regulations pre-empt state laws where they overlap or contradict one another. Under OSHA, states can pass their own workplace health and safety laws and standards, but they must meet OSHA criteria and approval if they regulate an area directly covered by OSHA regulations. Though, they may regulate in areas not governed by federal OSHA regulations. The amount of state regulation varies greatly. States with their own workplace conditions law are called "state plan states".

Penalties for OSHA violations can be civil or criminal and vary depending on the nature of the violation. OSHA must refer cases to the U.S. Justice Department for criminal enforcement. Typically, however, OSHA relies on civil penalties as a deterrent to violators.

Construction safety and health. Construction workers build our roads, houses and workplaces and repair and maintain our nation's physical infrastructure. This work includes many hazardous tasks and conditions such as work at height, excavations, noise, dust, power tools and equipment, confined spaces and electricity. Construction workers incurred the most fatal injuries of any industry in the private sector in 2009, but this number declined in both 2009 (by 16%) and 2008 (by 19%). With this decrease, private sector construction fatalities are down by more than a third overall since peaking in 2006. Economic conditions may explain much of this decline – the total hours worked in construction also went down 17 per cent in 2009 and 10 per cent the year before. These decreases were more pronounced in some construction subgroups. Fatal injuries involving workers in the construction of buildings, for example, were down more than a quarter (27%) from 2008, with most of the decrease occurring in nonresidential building construction (down 44%). Fatalities in heavy and civil engineering construction were down 12 per cent, and the subsector with the largest number of fatal work injuries – specialty trade contractors – had 16 per cent fewer fatalities in 2009 than in 2008.

Young workers safety and health. In 2010, there were approximately 17.5 million workers less than 24 years of age, and these workers represented 13% of the workforce. Young workers have high occupational injury rates which are in part explained by a high frequency of injury hazards in workplaces where they typically work (e.g. hazards in restaurant settings associated with slippery floors and use of knives and cooking equipment). Inexperience and lack of safety training may also increase injury risks for young workers. And, for the youngest workers, those in middle and high schools, there may be biologic and psychosocial contributors to increased injury rates, such as inadequate fit, strength, and cognitive abilities to operate farm equipment such as tractors. In 2009, 359 workers less than 24 years of age died from work-related injuries, including 27 deaths of youth less than 18 years of age. For the 10 year period 1998 to 2007, there were an annual average of 795,000 nonfatal injuries to young workers treated in U.S. hospital injury departments. The rate for emergency department-treated occupational injuries of young workers was approximately two times higher than among workers 25 years and older. The U.S. Public Health Service has a Healthy People objective to reduce rates of occupational injuries treated in emergency departments among working adolescents 15-19 years of age by 10% by 2020, from the 2007 rate of 4.9 injuries per 100 fulltime equivalent workers.

Hazards to outdoor workers. Outdoor workers are exposed to many types of hazards that depend on their type of work, geographic region, season, and duration of time they are outside. Industry sectors with outdoor workers include the agriculture, forestry, fishing, construction, mining, transportation, warehousing, utilities, and service sectors. Outdoor workers include farmers, foresters, landscapers, groundskeepers, gardeners, painters, roofers, pavers, construction workers, laborers, mechanics, and any other worker who spends time outside. Employers should train outdoor workers about their workplace hazards, including hazard identification and recommendations for preventing and controlling their exposures.

Text 6
GIS

GIS is an information technology which stores, analyses and display both spatial and non-spatial data.

GIS Objectives:

1. To maximize efficiency of decision making and planning
2. To provide efficient means for data distribution and handling
3. To eliminate redundant database – minimize duplication
4. To integrate information from many sources.
5. To generate new information via complex analysis/queries involving geographical reference data.
6. To update data quickly and cheaply.

For any application there are five generic questions a GIS can answer:

Location: What exists at a particular location? This question seeks to find out for the answer like, location of a particular object or area in terms of latitude/longitude or X/Y.

Condition: Identify where certain condition exists. This tends to answer for all those questions where certain conditions are satisfied.

Trends: What has changed since? This question is applied to find a noticeable difference or change incurred within a particular time period.

Pattern: What spatial pattern exists? This is the most logical question answered by GIS, that is distribution of spatial features and reasons behind that distribution.

Modeling: What if…

GIS consists of five key components**:**

1. Computer Hardware Module: It is generally a computer or central processing unit. It is linked to a disk drive storage unit, which provides space for storing data and programs. A digitizer, scanner and other device is used to convert data from maps and documents into digital form and send them to computer.

2. Computer Software Module: The GIS software includes the programs and the user interface for driving the hardware. GIS software generates, stores, analyzes, manipulates and presents geographic information or data. It is essential for driving the hardware.

3. Data: Geographic data and related tabular data can be collected in house, compiled to custom specifications and requirements, or purchased from a commercial data provider.

4. People: People are the core to GIS. Both technical specialists who develop and manage the system as well as end users who employ the technology are critical to the success of GIS.

5. Methods: A neatly conceived implementation plan and business rules are the models and operating practices are unique to each organization.

The process of representing an analogue signal or an image by a discrete set of its points is known as *digitizing*. This data after conversion is in the binary format, which is directly readable by computer. The data to be converted can be a text, an image, audio or a video. The analogue signals are variable whereas the digital format is the discrete one. These discrete units are known as bits. These bits organized in groups are known as byte. The digital signals are mainly represented in the form of sequence of integers. These integers can be converted back to analogue signal that are approximately similar to the original analogue signals.

Text 7
GIS FOR LAND ADMINISTRATION

Today, government invests heavily in geospatial data and technology because nearly everything in the public realm happens in the context of geography. Governments of all sizes use GIS to analyze complex situations and create solutions across disciplines. GIS helps them increase efficiency, reduce costs, improve coordination, and deliver transparency and accountability. From the decennial census[1] and stimulus reporting to fleet routing[2] and pot-hole[3] repairs, GIS is key to enhancing government services, democratic processes, and the health of the nation.

Land Registration. Land cadastres were originally registers of property and property rights used by the ruling authority to levy taxes, dating back to Roman and Greek governance. In the 16th century, some rulers ordered extensive surveys to establish legal boundaries to accompany the tax rolls[4]. Today, the buying and selling of property involves a transaction on the land records cadastre. This transaction is important to public and private interests such as land registry agencies, banks, and title insurance companies.

As the foundation of a free market economy with leveraged[5] capital, many countries are adopting land privatization for taxation to fund government services and economic development. GIS, with integrated surveying and database management, along with map production and modeling support, is considered the essential information technology for land records solutions.

Cadastre Workflow. Creating and maintaining an effective land administration system is a multifaceted process often managed by many disparate agencies and organizations. Duplicated efforts and data quality problems are common. Although separate GIS applications have been used to manage individual aspects of land records in the past, the full potential of GIS can best be realized when applied across the entire cadastre workflow.

Enterprise GIS, with a geodatabase, data models, and an array of applications, provides the framework for an integrated workflow[6] for creating and updating a cadastre that can be easily shared both within and between organizations. National Mapping and Cadastral Agencies (NMCAs), using ESRI's[7] GIS, can streamline workflows and enforce cadastral procedures in the correct and legal way through efficient job management. This delivers cost efficiencies and ensures that quality is maintained consistently throughout the process.

Efficient and Accurate Mapping. Clearly, data automation leads to greater efficiency in many workplace tasks. Automating land records using GIS provides the data management tools for efficient maintenance of land records maps and data. Whether it be a parcel split or a more complex subdivision of a large tract into smaller residential lots with new rights-of-way[8], GIS includes the tools, workflow, error checking and version management that make mapping and public records tasks quick and easy.

Data accuracy is crucial. GIS tools check for errors during data automation and maintenance as part of the workflow. Advanced GIS technologies provide interfaces and integration of survey data. Because survey-accurate measurements establish the legal definition of a parcel, this capability is essential in the accuracy of land records and assessment data. As new, more accurate, data is collected, GIS has the capability to adjust existing data to conform to new survey measurements while preserving the spatial integrity of the land records geodatabase.

Public Access to Data. According to the United States Office of Management and Budget, more than 60 percent of all Internet users interact with government Web sites. E-government will save taxpayers a significant amount of money and add value to their experience with government as their needs are better served.

GIS technology supports Web standards and is often the engine of government portals. ESRI's GIS is used to locate polling places, reserve campgrounds, report on traffic conditions, locate property for lease or sale, report crime statistics, identify planned development, and show the location of emergency events and their impact on the community.

The Internet has introduced a whole new way to interact with government. GIS makes that interaction more powerful and presents data in a form that makes viewing and understanding easy.

National Cadastre Systems. National cadastre systems require many levels of technology that have the capacity to manage millions of land parcels and real estate objects. ESRI's integrated collection of GIS products is well suited for these requirements. In addition, national cadastre systems are often decentralized and operate as an enterprise of multiple computers in many locations, requiring more than desktop applications.

The ESRI geodatabase template for land records supports the industry's efforts to standardize the way land records are defined and stored in data management systems for multiple users. ESRI's ArcGIS for Server technology supports public access to land records and title registry via the Web.

Computer-Assisted Mass Appraisal. Integrating GIS and computer-assisted mass appraisal (CAMA) enables the tax assessment function to be concurrent with spatial data that is relevant to the tax valuation model. It also supports the creation and maintenance of a more accurate land records basemap using the tools and functions of GIS and provides a single repository of parcel geometry and descriptive data supporting workflow, updates, and mass appraisal input.

GIS adds value to CAMA systems, such as an appraisal model, which can place added value on property that has, for example, frontage on a golf course or lake. If the parcel data and land-use data are maintained in a geodatabase, the frontage calculation is simple and easy using the spatial intelligence of the GIS.

Parcel Management. The ArcGIS Land Parcel Data Model helps users manage land parcels using core ArcGIS capabilities. Using an open and flexible object-based data model, the land parcel data model accommodates a wide range of applications and parcel definitions. Thematic layers in the land parcel data model, such as parcel framework, ownership and taxation, and administrative areas, are mapped to the geodatabase structure. Several layers can combine to form a set of feature classes in a feature dataset.

The ArcGIS Land Parcel Data Model also implements topology as a flexible set of integrity rules that define the behavior of spatially related geographic features and feature classes. Users can model spatial relationships, such as adjacency, and manage the integrity of coincident geometry between feature classes such as coincident parcel boundaries and subdivision boundaries

GIS for Surveying. As a surveyor, you depend on a variety of software and technology in your daily workflows. GIS technology integrates with other systems while providing new functionality and a central database. A GIS database gives you a better way to easily manage, reuse, share, and analyze your survey data, saving you time, money, and resources.

Because GIS software solutions are interoperable with the many data formats used in the field and office, you can deliver your data in the format required by your clients while maintaining the data's core integrity.

GIS for Urban and Regional Planning. No matter how large or small your community is, planners must deal with spatial information: parcel, zoning and land use data, addresses, transportation networks, and housing stock. As a planner, you also study and keep track of multiple urban and regional indicators, forecast future community needs, and plan accordingly to guarantee the quality of life for everyone in livable communities.

Federal, regional, state, county, and local planning agencies have realized the power of enterprise GIS to identify problems, respond to them efficiently, and share the results with the public. ESRI GIS solutions provide tools to help you reach your agency mission while doing more and spending less.

Notes:

1. Decennial census – перепись, проводимая с десятилетними интервалами (т. е. через каждые десять лет).
2. Fleet routing – транспортный маршрут.
3. Pot-hole – выбоина на дороге; яма на дороге.
4. Tax rolls – налоговые ведомости.
5. Leveraged – с использованием кредита (заемных средств), с кредитом заемными средствами.
6. Workflow – ход работ; ход производства; последовательность операций.
7. ESRI (Environmental Systems Research Institute) – американская компания, производитель геоинформационных систем (ГИС).
8. Right of way – право прохода или проезда через чужую землю.

Text 8
ESRI

History. ESRI[1] president Jack Dangermond was one of several GIS pioneers who studied at the Harvard Laboratory for Computer Graphics and Spatial Analysis. While others went on to successful careers in academia[2] and consulting, Jack and his wife, Laura, founded Environmental Systems Research Institute, Inc. (ESRI), in Redlands, California.

ESRI's early mission was to organize and analyze geographic information to support land planners and land resource managers in making well-informed environmental decisions. These projects consisted of site or regional land studies resulting in maps that geographically delineated constraints and opportunities for development. ESRI staff applied the principles of integrated landscape analysis developed and implemented in the 1960s by Ian McHarg using manual mapping and map overlay techniques[3].

The more projects we completed, the more we learned how using geography as a framework for data integration provided a new dimension in the way people approached problems. GIS allowed them to visualize the problems, which helped provide quicker and better solutions. We became convinced that GIS could truly make a difference in the world.

ESRI also began developing relationships with like-minded companies in Germany, Japan, Australia, and Canada. These companies formed the foundation of what is today a large, international network of distributors providing GIS software, support, and services.

The transition from project to product. It became clear that to fully leverage[4] the methods and technologies used for project work, ESRI needed to introduce software products that would automate the manual mapping processes.

ESRI developers began formulating the concepts that ultimately led to the release (in 1982) of ARC/INFO, the first commercial GIS. It combined computer display of geographic features, such as points, lines, and polygons, with a database management system for assigning attributes to these features.

The ARC/INFO system was the culmination of several factors, all of which converged in the late 1970s and early 1980s. The basic principles behind rational land management using geographic information had become accepted by the larger professional community and validated by the implementation of several successful projects. Finally, research in core GIS software design and theory had reached a level of maturity that made commercial applications possible.

Much of this research was done at the Harvard graphics laboratory in the late 1970s as part of the Odyssey software project. The project pioneered GIS software development in data structures and algorithms, command line user interfaces[5], and modular software[6] engineering techniques. With software products came software users and the beginning of a community. The first ESRI International User Conference was held in 1981 with 16 attendees. It has grown substantially over the years, today attracting more than 14,000 attendees.

Mainstream. As computer hardware technology shifted to UNIX workstations and PCs during the 1980s, ESRI's GIS software tools changed accordingly. This shift allowed ARC/INFO users to change hardware platforms[7] and take advantage of the capabilities of distributed processing[8] and data management. It also led to the opportunity to form relationships with organizations that wished to build applications on top of Esri software or support the software in niche industries. Today, the ESRI Partner Network consists of over 2,000 companies.

In the 1990s, Esri experienced a period of rapid growth spurred by faster and cheaper computers, network processing, electronic data publishing, and new data capture techniques such as remote sensing and GPS. ESRI's first desktop solution, ArcView, had a major impact on the industry by opening up the possibilities of GIS to more users. In addition, ESRI's growing business partner and developer programs allowed further expansion and the advent of customized solutions[9].

While most organizations choose to implement the software on their own, ESRI continues to offer project-, implementation-, and industry-focused services.

GIS and the enterprise. In the late 1990s, ESRI reengineered ARC/INFO to develop a modular and scalable[10] GIS platform that would work both on the desktop and across the enterprise. The result was ArcGIS.

Next, ESRI released ArcGIS Server, the corresponding data management component for ESRI's ArcGIS software family. It allows GIS capabilities to be delivered to large numbers of users over existing networks. Analysts can author maps, globes, and geoprocessing tasks on their desktops and publish them online using integrated tools. GIS functions can be delivered as services throughout the enterprise. Users can connect to central servers using traditional desktop GIS as well as Web browsers, mobile computing devices, and digital appliances. This server technology provides broad support for interoperability standards and allows integration with other enterprise software. ESRI has also actively participated in the development of GIS standards.

Each stage in ESRI's evolution has involved major technology changes. Today it's the Web and Web GIS. The power of the Web promises to support more GIS collaboration[11]. Applications already possible include sharing commercial services, mashups[12], and data replication[13] services. The Web is also making GIS more distributed, multiparticipant, and open.

This means that more and more people are engaged in activities such as creating and interacting with maps online, so ESRI has steadily integrated the online experience into ArcGIS technology. Software such as ArcGIS Desktop and ArcGIS Explorer provide instant access to a host of online services, including maps and tools. ESRI is also taking advantage of cloud computing[14] opportunities to help make GIS available to anyone, anywhere. ArcGIS.com is ESRI's newest online experience that brings content, tools, and the growing GIS community together in one Web portal.

Notes:

1. ESRI (Environmental Systems Research Institute) – американская компания, производитель геоинформационных систем (ГИС).
2. Academia – научное сообщество.
3. Overlay techniques – метод наложения (различных данных на одно и то же место в памяти), оверлейный метод.
4. Leverage – использовать с выгодой.
5. Command line interface – интерфейс типа командной строки.
6. Modular software – модульное программное обеспечение.
7. Hardware platform – аппаратная платформа (совокупность компьютеров с полностью совместимым программным обеспечением).
8. Distributed processing – распределённая обработка, компьютерная система, в которой обработка выполняется несколькими компьютерами, подсоединёнными к локальной или телекоммуникационной сети.
9. Customized solution – заказное ПО, программное обеспечение, разработанное по конкретным требованиям отдельного клиента.
10. Scalable – 1) с изменением масштаба, масштабируемый; 2) расширяемый (о модульной системе).
11. Collaboration – координация совместной деятельности.
12. Mashup – мэшап (интернет-приложение, объединяющее данные из нескольких интерактивных источников).
13. Data replication – тиражирование данных.
14. Cloud computing – "облачные" вычисления (метод взаимодействия клиента и сервера, при котором клиентская информация обрабатывается и хранится на удалённом сервере; позволяет уменьшить требования к аппаратному и программному обеспечению компьютера клиента).

Text 9
INFORMATION SECURITY

Information Security Components: or qualities, i.e., Confidentiality, Integrity[1] and Availability (CIA). Information Systems are decomposed in three main portions, hardware, software and communications with the purpose to identify and apply information security industry standards, as mechanisms of protection and prevention, at three levels or layers: physical, personal and organizational. Essentially, procedures or policies are implemented to tell people (administrators, users and operators) how to use products to ensure information security within the organizations.

Information security means protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction.

The terms information security, computer security and information assurance[2] are frequently incorrectly used interchangeably. These fields are interrelated often and share the common goals of protecting the confidentiality, integrity and availability of information; however, there are some subtle differences between them.

These differences lie primarily in the approach to the subject, the methodologies used, and the areas of concentration. Information security is concerned with the confidentiality, integrity and availability of data regardless of the form the data may take: electronic, print, or other forms.

Computer security can focus on ensuring the availability and correct operation of a computer system without concern for the information stored or processed by the computer.

Governments, military, corporations, financial institutions, hospitals, and private businesses amass a great deal of confidential information about their employees, customers, products, research, and financial status. Most of this information is now collected, processed and stored on electronic computers and transmitted across networks to other computers.

Should confidential information about a business' customers or finances or new product line fall into the hands of a competitor, such a breach of security could lead to lost business, law suits or even bankruptcy of the business. Protecting confidential information is a business requirement, and in many cases also an ethical and legal requirement.

For the individual, information security has a significant effect on privacy[3], which is viewed very differently in different cultures.

The field of information security has grown and evolved significantly in recent years. There are many ways of gaining entry into the field as a career. It offers many areas for specialization including: securing network(s) and allied infrastructure, securing applications and databases, security testing, information systems auditing, business continuity planning and digital forensics science[4], etc.

History. Since the early days of writing, heads of state and military commanders understood that it was necessary to provide some mechanism to protect the confidentiality of written correspondence and to have some means of detecting tampering[5].

Julius Caesar is credited with the invention of the Caesar cipher ca. 50 B.C., which was created in order to prevent his secret messages from being read should a message fall into the wrong hands.

World War II brought about many advancements in information security and marked the beginning of the professional field of information security.

The end of the 20th century and early years of the 21st century saw rapid advancements in telecommunications, computing hardware and software, and data encryption[6]. The availability of smaller, more powerful and less expensive computing equipment made electronic data processing within the reach of small business and the home user. These computers quickly became interconnected through a network generically called the Internet or World Wide Web.

The rapid growth and widespread use of electronic data processing and electronic business conducted through the Internet, along with numerous occurrences of international terrorism, fueled the need for better methods of protecting the computers and the information they store, process and transmit. The academic disciplines of computer security, information security and information assurance emerged along with numerous professional organizations – all sharing the common goals of ensuring the security and reliability of information systems.

Notes:

1. Integrity – целостность, сохранность.
2. Information assurance – обеспечение; гарантирование информации.
3. Privacy – секретность, конфиденциальность.
4. Forensic science – судебная экспертиза.
5. (Computer) tampering – преступное использование компьютера.
6. Encryption – шифрование, зашифровывание, процесс применения шифра к защищаемой информации.

Text 10
BASIC PRINCIPLES OF INFORMATION SECURITY

Key concepts. For over twenty years, information security has held confidentiality, integrity and availability (known as the CIA triad) to be the core principles of information security. There is continuous debate about extending this classic trio. Other principles such as Accountability have sometimes been proposed for addition. It has been pointed out that issues such as Non-Repudiation[1] do not fit well within the three core concepts, and as regulation of computer systems has increased (particularly amongst the Western nations) Legality is becoming a key consideration for practical security installations in 1992. In 2002 the OECD's[2] Guidelines for the Security of Information Systems and Networks proposed the nine generally accepted principles: Awareness, Responsibility, Response, Ethics, Democracy, Risk Assessment, Security Design and Implementation, Security Management, and Reassessment. Based upon those, in 2004 the NIST's[3] Engineering Principles for Information Technology Security proposed 33 principles. From each of these derived guidelines and practices in 2002, Donn Parker proposed an alternative model for the classic CIA[4] triad that he called the six atomic elements of information. The elements are confidentiality, possession, integrity, authenticity, availability, and utility.

Confidentiality. Confidentiality is the term used to prevent the disclosure of information to unauthorized individuals or systems. For example, a credit card transaction on the Internet requires the credit card number to be transmitted from the buyer to the merchant and from the merchant to a transaction processing network. The system attempts to enforce confidentiality by encrypting the card number during transmission, by limiting the places where it might appear (in databases, log files[5], backups[6], printed receipts, and so on), and by restricting access to the places where it is stored. If an unauthorized party obtains the card number in any way, a breach of confidentiality has occurred.

Breaches of confidentiality take many forms. Permitting someone to look over your shoulder at your computer screen while you have confidential data displayed on it could be a breach of confidentiality. If a laptop computer containing sensitive information about a company's employees is stolen or sold, it could result in a breach of confidentiality[7]. Giving out confidential information over the telephone is a breach of confidentiality if the caller is not authorized to have the information.

Confidentiality is necessary (but not sufficient) for maintaining the privacy of the people whose personal information a system holds.

Integrity. In information security, integrity means that data cannot be modified undetectably. This is not the same thing as referential integrity[8] in databases, although it can be viewed as a special case of Consistency as understood in the classic ACID model of transaction processing. Integrity is violated when a message is actively modified in transit. Information security systems typically provide message integrity in addition to data confidentiality.

Availability. For any information system to serve its purpose, the information must be ***available*** when it is needed. This means that the computing systems used to store and process the information, the ***security controls*** used to protect it, and the communication channels used to access it must be functioning correctly. ***High availability*** systems aim to remain available at all times, preventing service disruptions due to power outages, hardware failures, and system upgrades. Ensuring availability also involves preventing ***denial-of-service attacks***[9].

Authenticity[10]**.** In computing, e-business and information security it is necessary to ensure that the data, transactions, communications or documents (electronic or physical) are genuine. It is also important for authenticity to validate that both parties involved are who they claim they are.

Non-repudiation. In law, non-repudiation implies one's intention to fulfill their obligations to a contract. It also implies that one party of a transaction cannot deny having received a transaction nor can the other party deny having sent a transaction.

Electronic commerce uses technology such as digital signatures and public key encryption[11] to establish authenticity and non-repudiation.

Notes:

1. Non-repudiation – с невозможностью отказа от авторства когда невозможно заявить, что вы не посылали какое-либо сообщение. Например, если в нём присутствует ваша цифровая подпись.
2. OECD – Organization for Economic Cooperation and Development (Организация экономического сотрудничества и развития, ОЭСР).
3. NIST – National Institute of Standards and Technology (Национальный институт стандартов и технологий США).
4. CIA – Central Intelligence Agency (Центральное разведывательное управление, ЦРУ (США).
5. Log file – регистрационный файл.
6. Backup – резервная копия (программ, данных).
7. Breach of confidentiality – разглашение секретной информации public key encryption – шифрование с открытым ключом.
8. Referential integrity – целостность ссылочных данных, ссылочная целостность.
9. Denial of service attack – атака (системы) с целью нарушения нормального обслуживания пользователей.
10. Authenticity – подлинность, достоверность, аутентичность.

Text 11
RISK MANAGEMENT

Risk management is the process of identifying vulnerabilities[1] and threats to the information resources used by an organization in achieving business objectives, and deciding what countermeasures, if any, to take in reducing risk to an acceptable level, based on the value of the information resource to the organization.

There are two things in this definition that may need some clarification. First, the *process* of risk management is an ongoing iterative[2] process. It must be repeated indefinitely. The business environment is constantly changing and new threats and vulnerability emerge every day. Second, the choice of countermeasures (controls) used to manage risks must strike a balance between productivity, cost, effectiveness of the countermeasure, and the value of the informational asset being protected.

Risk is the likelihood that something bad will happen that causes harm to an informational asset (or the loss of the asset). A ***vulnerability*** is a weakness that could be used to endanger or cause harm to an informational asset. A ***threat*** is anything (man-made or act of nature) that has the potential to cause harm.

The likelihood that a threat will use a vulnerability to cause harm creates a risk. When a threat does use a vulnerability to inflict harm, it has an impact. In the context of information security, the impact is a loss of availability, integrity, and confidentiality, and possibly other losses (lost income, loss of life, loss of real property). It should be pointed out that it is not possible to identify all risks, nor is it possible to eliminate all risk. The remaining risk is called *residual risk.*

A risk assessment[3] is carried out by a team of people who have knowledge of specific areas of the business. Membership of the team may vary over time as different parts of the business are assessed. The assessment may use a subjective qualitative analysis based on informed opinion, or where reliable dollar figures and historical information is available, the analysis may use quantitative analysis.

The research has shown that the most vulnerable point in most information systems is the human user, operator, designer. The practice of information security management recommends the following to be examined during a risk assessment:

security policy;
organization of information security;
asset management[4];
human resources security;
physical and environmental security;
communications and operations management;
access control;
information systems acquisition, development and maintenance;
information security incident management[5];
business continuity management;
regulatory compliance[6].

In broad terms, the risk management process consists of:

1. Identification of assets and estimating their value. Include: people, buildings, hardware, software, data (electronic, print, other), supplies.
2. Conduct a threat assessment. Include: acts of nature, acts of war, accidents, malicious acts originating from inside or outside the organization.
3. Conduct a vulnerability assessment, and for each vulnerability, calculate the probability that it will be exploited. Evaluate policies, procedures, standards, training, physical security, quality control, technical security.
4. Calculate the impact that each threat would have on each asset. Use qualitative analysis or quantitative analysis.
5. Identify, select and implement appropriate controls. Provide a proportional response. Consider productivity, cost effectiveness, and value of the asset.
6. Evaluate the effectiveness of the control measures. Ensure the controls provide the required cost-effective protection without discernible loss of productivity.

For any given risk, Executive Management can choose to ***accept the risk*** based upon the relative low value of the asset, the relative low frequency of occurrence, and the relative low impact on the business. Or, leadership may choose to ***mitigate the risk*** by selecting and implementing appropriate control measures to reduce the risk. In some cases, the risk can be ***transferred*** to another business by buying insurance or out-sourcing[7] to another business. The reality of some risks may be disputed. In such cases leadership may choose to ***deny the risk***. This is itself a potential risk.

When Management chooses to mitigate a risk, they will do so by implementing one or more of three different types of **controls**.

Administrative. Administrative controls (also called procedural controls) consist of approved written policies, procedures, standards and guidelines. Administrative controls form the framework for running the business and managing people. They inform people on how the business is to be run and how day to day operations are to be conducted. Laws and regulations created by government bodies are also a type of administrative control because they inform the business. Some industry sectors have policies, procedures, standards and guidelines that must be followed – the Payment Card Industry (PCI) Data Security Standard required by Visa and Master Card is such an example. Other examples of administrative controls include the corporate security policy, password policy, hiring policies, and disciplinary policies.

Administrative controls form the basis for the selection and implementation of logical and physical controls. Logical and physical controls are manifestations of administrative controls. Administrative controls are of paramount importance.

Logical. Logical controls (also called technical controls) use software and data to monitor and control access to information and computing systems. For example: passwords, network and host[8] based firewalls[9], network intrusion detection systems, access control lists, and data encryption are logical controls. An important logical control that is frequently overlooked is the principle of least privilege. The principle of least privilege requires that an individual, program or system process is not granted any more access privileges than are necessary to perform the task. A blatant example of the failure to adhere to the principle of least privilege is logging into Windows as user Administrator to read e-mail and surf the Web. Violations of this principle can also occur when an individual collects additional access privileges over time. This happens when employees' job duties change, or they are promoted to a new position, or they transfer to another department. The access privileges required by their new duties are frequently added onto their already existing access privileges which may no longer be necessary or appropriate.

Physical. Physical controls monitor and control the environment of the work place and computing facilities. They also monitor and control access to and from such facilities. For example: doors, locks, heating and air conditioning, smoke and fire alarms, fire suppression systems, cameras, barricades, fencing, security guards, cable locks, etc. Separating the network and work place into functional areas are also physical controls.

An important physical control that is frequently overlooked is the ***separation of duties***. Separation of duties ensures that an individual cannot complete a critical task by himself. For example: an employee who submits a request for reimbursement[10] should not also be able to authorize payment or print the check. An applications programmer should not also be the server administrator or the database administrator – these roles and responsibilities must be separated from one another.

Notes:

1. Vulnerability (security vulnerability) – уязвимость, слабое место, слабое звено в защите данных – свойство системы, позволяющее реализовать соответствующую угрозу.
2. Iterative – итеративный, повторяющийся.
3. Risk assessment – оценка рисков (анализ информационных потребностей системы и определение возможных потерь из-за недостатка информации или её утраты при восстановлении системы).
4. Asset management – управление активами.
5. Incident management – контроль происшествий, одна из подсистем в системах сетевого управления.
6. Regulatory compliance – регулируемая совместимость.
7. Outsourcing – привлечение соисполнителей, аутсорсинг, привлечение, когда это выгодно, к выполнению контрактной работы внешних соисполнителей.
8. Host – главный компьютер.
9. Firewall – межсетевой экран (МЭ), брандмауэр, защитная система, (сетевой) заслон.
10. Reimbursement – возмещение, компенсация.

Text 12
DEFENSE IN-DEPTH[1]

Information security must protect information throughout the life span of the information, from the initial creation of the information on through to the final disposal of the information. The information must be protected while in motion and while at rest. During its lifetime, information may pass through many different information processing systems and through many different parts of information processing systems. There are many different ways the information and information systems can be threatened. To fully protect the information during its lifetime, each component of the information processing system must have its own protection mechanisms. The building up, layering[2] on and overlapping[3] of security measures is called defense in depth. The strength of any system is no greater than its weakest link. Using a defence in-depth strategy, should one defensive measure fail, there are other defensive measures in place that continue to provide protection.

The three types of the above mentioned controls (administrative, logical, and physical) can be used to form the basis upon which to build a defense-in-depth strategy. With this approach, defense-in-depth can be conceptualized as three distinct layers or planes laid one on top of the other. Additional insight into defense-in- depth can be gained by thinking of it as forming the layers of an onion, with data at the core of the onion, people the next outer layer of the onion, and network security, host-based security and application security forming the outermost layers of the onion. Both perspectives are equally valid and each provides valuable insight into the implementation of a good defense-in-depth strategy.

Security classification for information. An important aspect of information security and risk management is recognizing the value of information and defining appropriate procedures and protection requirements for the information. Not all information is equal and so not all information requires the same degree of protection. This requires information to be assigned a security classification.

The first step in information classification is to identify a member of senior management as the owner of the particular information to be classified. Next, develop a classification policy. The policy should describe the different classification labels, define the criteria for information to be assigned a particular label, and list the required security controls for each classification.

Some factors that influence which classification information should be assigned include how much value that information has to the organization, how old the information is and whether or not the information has become obsolete. Laws and other regulatory requirements are also important considerations when classifying information.

The type of information security classification labels selected and used will depend on the nature of the organization, with examples being:

In the business sector, labels such as: ***Public, Sensitive, Private, Confidential***.

In the government sector, labels such as: ***Unclassified, Sensitive But Unclassified, Restricted, Confidential, Secret, Top Secret*** and their non-English equivalents.

In cross-sectoral formations, the Traffic Light Protocol, which consists of: ***White, Green, Amber*** and ***Red***.

All employees in the organization, as well as business partners, must be trained on the classification schema and understand the required security controls and handling procedures for each classification. The classification of a particular information asset has been assigned should be reviewed periodically to ensure the classification is still appropriate for the information and to ensure the security controls required by the classification are in place.

Access control. Access to protected information must be restricted to people who are authorized to access the information. The computer programs, and in many cases the computers that process the information, must also be authorized. This requires that mechanisms be in place to control the access to protected information. The sophistication of the access control mechanisms should be in parity with the value of the information being protected – the more sensitive or valuable the information the stronger the control mechanisms need to be. The foundation, on which access control mechanisms are built, start with identification[4] and authentication[5].

Identification is an assertion of who someone is or what something is. If a person makes the statement *"Hello, my name is John Doe"* they are making a claim of who they are. However, their claim may or may not be true. Before John Doe can be granted access to protected information it will be necessary to verify that the person claiming to be John Doe really is John Doe.

Authentication is the act of verifying a claim of identity. When John Doe goes into a bank to make a withdrawal, he tells the bank teller he is John Doe (a claim of identity). The bank teller asks to see a photo ID, so he hands the teller his driver's license. The bank teller checks the license to make sure it has John Doe printed on it and compares the photograph on the license against the person claiming to be John Doe. If the photo and name match the person, then the teller has authenticated that John Doe is who he claimed to be.

There are three different types of information that can be used for authentication: **something you know, something you have, or something you are.** Examples of *something you know* include such things as a PIN, a password, or your mother's maiden name. Examples of *something you have* include a driver's license or a magnetic *Something you are* refers to biometrics. Examples of biometrics include palm prints, finger prints, voice prints and retina (eye) scans. Strong authentication requires providing information from two of the three different types of authentication information. For example, something you know plus something you have. This is called two factor authentication.

On computer systems in use today, the Username is the most common form of identification and the Password is the most common form of authentication. Usernames and passwords have served their purpose but in our modern world they are no longer adequate. Usernames and passwords are slowly being replaced with more sophisticated authentication mechanisms.

After a person, program or computer has successfully been identified and authenticated then it must be determined what informational resources they are permitted to access and what actions they will be allowed to perform (run, view, create, delete, or change). This is called ***authorization***[6].

Authorization to access information and other computing services begins with administrative policies and procedures. The policies prescribe what information and computing services can be accessed, by whom, and under what conditions. The access control mechanisms are then configured to enforce these policies.

Different computing systems are equipped with different kinds of access control mechanisms - some may even offer a choice of different access control mechanisms. The access control mechanism a system offers will be based upon one of three approaches to access control or it may be derived from a combination of the three approaches.

The ***non-discretionary***[7] approach consolidates all access control under a centralized administration. The access to information and other resources is usually based on the individuals function (role) in the organization or the tasks the individual must perform. The ***discretionary***[8] ***approach*** gives the creator or owner of the information resource the ability to control access to those resources. In the ***Mandatory access control***[9] ***approach***, access is granted or denied basing upon the security classification assigned to the information resource.

Notes:

1. In-depth – исчерпывающий, доскональный, тщательный.

2. Layering – использование слоёв, разделение на слои или уровни, например, развитие ОС путем добавления к базовому ядру дополнительных уровней.

3. Overlapping – перекрытие; наложение; совмещение.

4. Identification – идентификация, отождествление, установление, выявление, процесс, позволяющий при вхождении пользователя в систему установить его личность путём сравнения его атрибутов с хранящимися в базе данных атрибутами всех зарегистрированных пользователей; в отличие от аутентификации, дополнительных идентификаторов не требует.

5. Authentication – аутентификация, проверка (подтверждение) подлинности, процесс, позволяющий установить, что пользователь или компьютер, пытающийся получить интерактивный доступ к определённой категории информации, компьютерной системе, вычислительной сети или электронной почте, действительно тот, за кого себя выдаёт.

6. Authorization – авторизация; разрешение, санкционирование, утверждение, предоставление прав доступа (в систему).

7. Non-discretionary – недискреционный (не предоставляющий свободы действий).

8. Discretionary – необязательный; выполняемый по усмотрению пользователя или программы.

9. Mandatory access control – мандатный контроль за доступом (не допускающий передачи прав доступа между пользователями).

Text 13
GEODETIC SURVEYING

What is Geodesy. Geodesy is the science concerned with determining the size and shape of the Earth and the location of points upon its surface.

Why is Geodesy Important? The Earth is an irregular surface and is difficult to model. Accurate positions are required for a wide variety of applications including mapping and charting, flood risk determination, transportation, land use and ecosystem management.

The art of **Surveying** the earth surface considering its shape and size is called **Geodetic Surveying**. Geodetic Surveying is suitable for finding out the area of any region on the earth surface, the length and directions of the border lines, contour lines and location of basic points. It is assumed that the shape of earth is spheroid. The convention held by the International Geodetic and Geophysical Union in 1924 assumed 41, 852, 960 ft as the earth's diameter at the equator and at the poles the diameter is 41, 711, 940 ft. Computation of the equatorial diameter was based on the fact that due to gravitational attraction the earth was flattened exactly by 1/297. Thus, measurements of distances are taken along curved surfaces and not along straight lines. Therefore for geodetic surveying, earth's both diameters are considered. The latitudes and longitudes are determined considering the spheroidical shape of the earth. The points which are used to find out the shape, size and coordinates of the earth surface are called ***Geodetic Datum***[1] in geodetic surveying. Hundreds of such points are marked for carrying out geodetic survey.

Finding exact location of an object. ***Triangulation:*** As the name indicates, a triangle is incorporated to find out the location of the point in respect of latitude and longitude. The measurements of the sides of the triangle and the angles in the triangle which is drawn with respect to the particular point are found out. With the help of these measurements, longitude and latitude of the triangulation point are calculated. In geodetic surveying, ***benchmarks*** are also used for determining the height or elevation of a point. The surveyor gives a permanent mark in the area which shows the benchmark for ages.

GPS based control station: The GPS or Global Positioning System based control station capture the radio signal given by the satellite. This signal is then processed and analyzed to find out the latitudes and longitudes of the given point.

Main instrument for Geodetic Surveying is a ***theodolite***. It is the basic surveying unit used for geodetic surveying. Theodolite consists of a telescope which is placed on a swivel and it can be rotated both horizontally and vertically. Triangulation points are determined by the theodolite in geodetic surveying. Two circles – one vertical and another horizontal, are used to read out the readings. But in the modern theodolite the reading is done electronically. Geodetic Surveying can be done by geographers, engineers and surveyors specialised in related disciplines.

Use of Geodetic Surveying. ***Engineering purposes:*** The engineers use geodetic surveying for finding out the exact location of the concerned point or area. Latitudes and longitudes are needed for any engineering constructions. *Construction purpose*: The builders use geodetic surveying for finding out the direction of the buildings or their exact location. *Land Surveying* and assessment: The vertical elevation and the horzontal attributes, the latitude and longitudes of the area surveyed are found out through geodetic surveying. Geodetic surveying is thus considered as an important method of surveying.

What is Geodetic Leveling? Vertical surveying is the process of determining elevations above mean sea-level. In geodetic surveys executed primarily for mapping, geodetic positions are referred to an ellipsoid, and the elevations of the positions are referred to the geoid. However, for satellite geodesy the geoidal heights must be considered to establish the correct height above the geoid. Precise geodetic leveling is used to establish a basic network of vertical control points. From these, the height of other positions in the survey can be determined by supplementary methods. The mean sea-level surface used as a reference (vertical datum) is determined by averaging the hourly water heights for a specified period of time at specified tide gauges.There are three leveling techniques: differential, trigonometric, and barometric. Differential leveling[2] is the most accurate of the three methods. With the instrument locked in position, readings are made on two calibrated staffs held in an upright position ahead of and behind the instrument. The difference between readings is the difference in elevation between the points. Trigonometric leveling[3] involves measuring a vertical angle from a known distance with a theodolite and computing the elevation of the point. With this method, vertical measurements can be made at the same time horizontal angles are measured for triangulation. It is, therefore, a somewhat more economical method but less accurate than differential leveling. It is often the only practical method of establishing accurate elevation control in mountainous areas. In barometric leveling[4], differences in height are determined by measuring the differences in atmospheric pressure at various elevations. Air pressure is measured by mercurial or aneroid barometer, or a boiling point thermometer. Although the accuracy of this method is not as great as either of the other two, it obtains relative heights very rapidly at points which are fairly far apart. It is used in reconnaissance and exploratory surveys where more accurate measurements will be made later or where a high degree of accuracy is not required.

Notes:

1. Geodetic datum – геодезическая основа, основные исходные геодезические данные.
2. Differential leveling – сложное нивелирование.
3. Trigonometric leveling – тригонометрическое нивелирование.
4. Barometric leveling – барометрическое нивелирование.

Text 14
NATIONAL GEODETIC SURVEY: WHAT WE DO

Vision: Positioning America for the Future.

Mission: The Mission of NOAA's National Geodetic Survey (NGS)[1] is "to define, maintain and provide access to the National Spatial Reference System[2] to meet our nation's economic, social, and environmental needs."

What We Do. NGS provides the framework for all positioning activities in the Nation. The foundational elements - latitude, longitude, elevation and shoreline information - contribute to informed decision making and impact a wide range of important activities including mapping and charting, flood risk determination, transportation, land use and ecosystem management. NGS' authoritative spatial data, models and tools are vital for the protection and management of natural and man-made resources and support the economic prosperity and environmental health of the Nation.

The National Geodetic Survey (NGS), an office of NOAA's National Ocean Service, manages a network of Continuously Operating Reference Stations (CORS) that provide Global Navigation Satellite System (GNSS) data consisting of carrier phase and code range measurements in support of three-dimensional positioning, meteorology, space weather, and geophysical applications throughout the United States, its territories, and a few foreign countries.

Surveyors, GIS users, engineers, scientists, and the public at large that collect GPS data can use CORS data to improve the precision of their positions. CORS enhanced post-processed coordinates approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically.

The CORS network is a multi-purpose cooperative endeavor[3] involving government, academic, and private organizations. The sites are independently owned and operated. Each agency shares their data with NGS, and NGS in turn analyzes and distributes the data free of charge. As of June 2011, the CORS network contains over 1,800 stations, contributed by over 200 different organizations, and the network continues to expand.

NGS conducts a cooperative program that provides surveyors with a means to detect and correct errors in **E**lectronic **D**istances **M**easuring **I**nstruments (EDMI). NGS has established more than 300 EDMI **C**alibration **B**ase **L**ines (CBL) throughout the United States in cooperation with various government agencies, universities, professional societies, and others. These highly accurate base lines provide a locally accessible standard for length measurement. For each state, NGS provides users with location descriptions and the adjusted results of calibration base line[4] measurements.

NGS Aeronautical Survey Program (NOAA's National Geodetic Survey) has been performing aeronautical surveys since the 1920's when it was known as the U.S. Coast and Geodetic Survey. The survey data provides the critical runway[5], obstruction, navigation-aid, and airport-feature information required to safely fly into airports nationwide. The Federal Aviation Administration (FAA) uses the data to develop instrument approach and departure procedures, determine maximum takeoff weights, update aeronautical databases and publications, and prepare airport planning and engineering studies. NGS develops survey standards, guidelines, models, and tools designed to assist surveyors conducting aeronautical surveys. To meet recent demands, the NGS Aeronautical Survey Program (ASP) has shifted from conducting surveys to providing quality assurance and guidance for airport surveys contracted by airport sponsors in support of the FAA Airports Surveying GIS Program. While the number of NGS aeronautical surveys is reduced, NGS' expertise is greatly leveraged. NGS utilizes a combination of in-house[6] photogrammetric analysis and field survey methods to ensure the airport safety-critical[7] data is compliant with FAA advisory circulars.

Additionally, NGS participates in accuracy assessment studies of new and emerging technologies – such as Light Detection and Ranging (LIDAR[8]) and satellite imagery – that can be leveraged[9] to support the collection of aeronautical information.

Notes:

1. National Geodetic Survey (NGS) – национальная геодезическая служба США.
2. National Spatial Reference System – национальная система пространственных координат.
3. Endeavo(u)r – предприятие.
4. Calibration base-line – эталонный базис.
5. Runway – взлётно-посадочная полоса.

6. In-house – внутренний, внутрифирменный, собственный.
7. Safety-critical – определяющий безопасность.
8. LIDAR – лидар, метеорологический лазерный локатор ИК-диапазона.
9. Leverage – использовать с выгодой.

Text 15
SATELLITE GEODESY

Satellite geodesy is the measurement of the form and dimensions of the Earth, the location of objects on its surface and the figure of the Earth's gravity field by means of artificial satellite techniques-geodesy by means of artificial satellites. It belongs to the broader field of space geodesy, which also includes such techniques as geodetic very long baseline interferometry[1] (VLBI) and lunar laser ranging[2]. Traditional astronomical geodesy is *not* commonly considered a part of satellite geodesy, although there is considerable overlap between the techniques.

The main goals of satellite geodesy are:

1. Determination of the figure of the Earth, positioning, and navigation (geometric satellite geodesy).
2. Determination of Earth's gravity field and geoid (dynamical satellite geodesy).
3. Measurement of geodynamical phenomena, such as crustal dynamics[3] and polar motion[4].

Satellite geodetic data and methods can be applied to diverse fields such as navigation, hydrography, oceanography and geophysics. Satellite geodesy relies heavily on orbital mechanics.

First steps (1957-1970). Satellite geodesy began shortly after the launch of Sputnik in 1957. Observations of Explorer 1 and Sputnik 2 in 1958 allowed for an accurate determination of Earth's flattening[5]. The 1960s saw the launch of the Doppler satellite Transit-1B and the balloon satellites Echo 1, Echo 2, and PAGEOS. The first dedicated geodetic satellite was ANNA-1B, a collaborative effort between NASA[6], the DoD[7], and other civilian agencies. ANNA-1B carried the first of the US Army's SECOR[8] (Sequential Collation of Range) instruments. These missions led to the accurate determination of the general shape of the geoid, and linked the world's geodetic datums.

Toward the World Geodetic System (1970-1990). The Transit satellite system was used extensively for Doppler[9] surveying, navigation, and positioning. Observations of satellites in the 1970s by worldwide triangulation networks allowed for the establishment of the World Geodetic System. The development of GPS by the United States in the 1980s allowed for precise navigation and positioning and soon became a standard tool in surveying. In the 1980s and 1990s satellite geodesy began to be used for monitoring of geodynamic phenomena, such as crustal motion, Earth rotation, and polar motion.

Modern Era (1990-present). The 1990s were focused on the development of permanent geodetic networks and reference frames. Dedicated satellites were launched to measure Earth's gravity field in the 2000s, such as CHAMP, GRACE, and GOCE.

Satellite geodetic measurement techniques. Techniques of satellite geodesy may be classified by instrument platform.

A satellite may

be observed with ground-based instruments (*Earth-to-space-methods*[10]);

carry an instrument or sensor as part of its payload to observe the Earth (*space-to-Earth methods*);

use its instruments to track or be tracked by another satellite (*space-to-space methods*[11]).

Geodetic use of GPS/GNSS. Global navigation satellite systems are dedicated radio positioning services, which can locate a receiver to within a few meters. The most prominent system, GPS, consists of a constellation of 31 satellites (as of June 2011) in high, 12-hour circular orbits, distributed in six planes with 55° inclinations. The principle of location is based on trilateration. Each satellite transmits a precise ephemeris with information on its own position and a message containing the exact time of transmission. The receiver compares this time of transmission with its own clock at the time of reception and multiplies the difference by the speed of light to obtain a "pseudorange." In theory, three satellites are required to position the receiver in three-dimensional space, however the receiver's clock will likely not be synchronized with the atomic clocks aboard the satellite, so a fourth pseudorange measurement is used to correct the receiver's clock bias. In this manner, the receiver's position can be determined to within a few meters. More sophisticated methods, such as real-time kinematic (RTK) can yield positions to within a few millimeters. In geodesy, GNSS is used as an economical tool for surveying and time transfer. It is also used for monitoring Earth's rotation, polar motion, and crustal dynamics. The presence of the GPS signal in space also makes it suitable for orbit determination and satellite-to-satellite tracking.

Laser ranging. *Satellite laser ranging*[12]. In satellite laser ranging (SLR) a global network of observation stations measure the round trip time of flight of ultra-short pulses of light to satellites equipped with retroreflectors[13]. This provides instantaneous range measurements of millimeter level precision which can be accumulated to provide accurate measurement of orbits and a host of important scientific data. Satellite laser ranging is a proven geodetic technique with significant potential for important contributions to scientific studies of the Earth/Atmosphere/Oceans system. It is the most accurate technique currently available to determine the geocentric position of an Earth satellite, allowing for the precise calibration of radar altimeters and separation of long-term instrumentation drift from secular changes in ocean surface topography.

Doppler techniques. Doppler positioning involves recording the Doppler shift of a radio signal of stable frequency emitted from a satellite as the satellite approaches and recedes from the observer. The observed frequency depends on the radial velocity of the satellite relative to the observer, which is constrained by orbital mechanics. If the observer knows the orbit of the satellite, then the recording of the

Doppler profile determines the observer's position. Conversely, if the observer's position is precisely known, then the orbit of the satellite can be determined and used to study the Earth's gravity. In DORIS, the ground station emits the signal and the satellite receives.

Optical tracking. In optical tracking[14], the satellite can be used as a very high target for triangulation and can be used to ascertain the geometric relationship between multiple observing stations. Optical tracking with the BC-4, PC-1000, MOTS cameras consisted of photographic observations of a satellite, or flashing light on the satellite, against a background of stars. The stars, whose positions were accurately determined, provided a framework on the photographic plate or film for a determination of precise directions from camera station to satellite. Geodetic positioning work with cameras was usually performed with one camera observing simultaneously with one or more other cameras. Camera systems are weather dependent and that is one major reason why they fell out of use by the 1980s.

Radar altimetry. A radar altimeter[15] uses the round-trip flight-time of a microwave pulse between the satellite and the Earth's surface to determine the distance between the spacecraft and the surface. From this distance or height, the local surface effects such as tides, winds and currents are removed to obtain the satellite height above the geoid. With a precise ephemeris available for the satellite, the geocentric distance to the satellite, determined for the time of each observation, along with the local radius of the ellipsoid are available. It is then possible to compute the geoid height by subtracting the ellipsoidal radius and the satellite height from the satellite's geocentric distance. This allows direct measurement of the geoid, since the ocean surface closely follows the geoid. The difference between the ocean surface and the actual geoid gives ocean surface topography.

Notes:

1. Very long baseline interferometer – интерферометр со сверхдлинной базой.
2. Lunar laser ranging – лазерная локация Луны.
3. Crustal dynamics – динамика земной коры.
4. Polar motion – движение полюсов.
5. The earth's flattening – приплюснутость земного шара.
6. NASA (National Aeronautics and Space Agency [Administration]) – Национальное управление по аэронавтике и исследованию космического пространства, НАСА.
7. DoD (Department of Defense) Министерство обороны США, МО США отвечает за спонсирование многих стандартов в области разработки ПО.
8. SECOR – система SECOR, система дальней радионавигации и обнаружения воздушных целей, состоящая из четырёх наземных РЛС и спутниковой РЛС с активным ответом.
9. Doppler – эффект Доплера, доплеровский эффект; доплеровская частота, доплеровский сдвиг частоты.
10. Earth-to-space method – система передачи по линии "Земля – космос".
11. Space-to-space communication – связь между КА.

12. Laser ranging – измерение расстояния лазером.
13. Retroreflector – световозвращатель.
14. Optical tracking – оптические наблюдения (ИСЗ).
15. Radar altimeter – импульсный радиовысотомер больших высот.

Text 16
GLOBAL POSITIONING SYSTEM

The **Global Positioning System (GPS)**[1] is the only fully functional Global Navigation Satellite System (GNSS)[2]. Utilizing a constellation of at least 24 Medium Earth Orbit satellites that transmit precise microwave signals, the system enables a GPS receiver to determine its location, speed, direction, and time. Other similar systems are the Russian GLONASS[3], the upcoming European Galileo positioning system, the proposed COMPASS navigation system of China, and IRNSS of India. Developed by the United States Department of Defense, GPS is officially named **NAVSTAR GPS** (Contrary to popular belief, NAVSTAR is not an acronym, but simply a name given by John Walsh, a key decision maker when it came to the budget for the GPS program). The satellite constellation[4] is managed by the United States Air Force 50th Space Wing. The cost of maintaining the system is approximately US$750 million per year, including the replacement of aging satellites, and research and development.

Following the shooting down of Korean Air Lines Flight 007 in 1983, President Ronald Reagan issued a directive making the system available for free for civilian use as a common good. Since then, GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, and hobbies such as geocaching[5]. GPS also provides a precise time reference used in many applications including scientific study of earthquakes, and synchronization of telecommunications networks.

Simplified method of operation. A typical GPS receiver calculates its position using the signals from four or more GPS satellites. Four satellites are needed since the process needs a very accurate local time, more accurate than any normal clock can provide, so the receiver internally solves for time as well as position. In other words, the receiver uses four measurements to solve for four variables: x, y, z, and t. These values are then turned into more user-friendly[6] forms, such as latitude/longitude or location on a map, then displayed to the user.

Each GPS satellite has an atomic clock, and continually transmits messages containing the current time at the start of the message, parameters to calculate the location of the satellite (the ephemeris[7]), and the general system health. The signals travel at the speed of light through outer space, and slightly slower through the atmosphere. The receiver uses the arrival time to compute the distance to each satellite, from which it determines the position of the receiver using geometry and trigonometry. Although four satellites are required for normal operation, fewer may be needed in some special cases. If one variable is already known (for example, a seagoing ship knows its altitude is 0), a receiver can determine its position using only three satellites. Also, in practice, receivers use additional clues (doppler shift[8] of satellite signals, last known position, dead reckoning[9], inertial navigation[10], and so on) to give degraded answers when fewer than four satellites are visible.

Notes:

1. Global Positioning System (GPS) – система глобального позиционирования.
2. Global Navigation Satellite System (GNSS) – глобальная навигационная спутниковая система.
3. GLONASS (global navigation satellite system) – российский вариант глобальной (спутниковой) системы (радио)определения местоположения, система GLONASS.
4. Constellation – 1) созвездие; 2) совокупность, группа.
5. Geocaching – геокешинг, геокладоискательство (игра в "поиск кладов" с использованием GPS-навигаторов).
6. User-friendly – удобный для пользования.
7. Ephemeris – 1) эфемериды, таблицы положения небесных тел; 2) эфемеридная информация (напр. о координатах ИСЗ).
8. Doppler shift – доплеровский сдвиг частоты, доплеровская частота.
9. Dead reckoning – навигационное счисление (пути).
10. Inertial navigation – инерциальная навигация.

Text 17
TOTAL STATION

A **total station**[1] is an optical instrument used in modern surveying as well as by police, crime scene investigators, private accident reconstructionists and insurance companies to take measurements of scenes. It is a combination of an electronic theodolite (transit), an ***electronic distance meter*** (EDM)[2] and software running on an external computer.

With a total station one may determine angles and distances from the instrument to points to be surveyed. With the aid of trigonometry and triangulation, the angles and distances may be used to calculate the coordinates of actual positions (X, Y, and Z or northing, easting and elevation) of surveyed points, or the position of the instrument from known points, in absolute terms.

The data may be downloaded from the theodolite to an external computer and application software will generate a map of the surveyed area.

Some total stations also have a GPS interface which combines these two technologies to make use of the advantages of both (GPS – line of sight[3] not required between measured points; Traditional Total Station – high precision measurement especially in the vertical axis compared with GPS) and reduce the consequences of each technology's disadvantages (GPS – poor accuracy in the vertical axis and lower accuracy without long occupation periods; Total Station - requires line of sight observations and must be set up over a known point or within line of sight of 2 or more known points).

Most modern total station instruments measure angles by means of electro-optical scanning of extremely precise digital bar-codes[4] etched on rotating glass cylinders or discs within the instrument. The best quality total stations are capable of measuring angles down to 0.5 arc-second. Inexpensive "construction grade" total stations can generally measure angles to 5 or 10 arc-seconds.

Measurement of distance is accomplished with a modulated microwave or infrared carrier signal[5], generated by a small solid-state emitter within the instrument's optical path, and bounced off of the object to be measured. The modulation pattern in the returning signal is read and interpreted by the onboard[6] computer in the total station. The distance is determined by emitting and receiving multiple frequencies[7], and determining the integer number[8] of wavelengths to the target for each frequency. Most total stations use a purpose-built glass prism as the reflector for the EDM signal, and can measure distances out to a few kilometers, but some instruments are "reflectorless", and can measure distances to any object that is reasonably light in color, out to a few hundred meters. The typical Total Station EDM can measure distances accurate to about 3 millimeters or 1/100th of a foot.

Some modern total stations are 'robotic' allowing the operator to control the instrument from a distance via remote control. This eliminates the need for an assistant staff member to hold the reflector prism over the point to be measured. The operator holds the reflector him/herself and controls the total station instrument from the observed point.

Vehicular Accident Reconstruction applications. Total stations are used by police, crime scene investigators, private accident reconstructionists and insurance companies to take measurements of scenes. Once they take accurate measurements with a total station they can use software to recreate the accident in a 3D animation**.**

Mining applications. Total stations are the primary survey instrument used in many mining applications.

Underground mining. As the development drifts in an underground mine are driven, a total station will be used to record the absolute location of the tunnel walls (stope), ceilings (backs), and floors. This data can then be loaded into a CAD program, and compared to the designed layout of the tunnel.

At regular intervals, the survey party will install stations. These are small steel plugs that are drilled into the walls or the back. The plugs are installed in pairs. For wall stations, two plugs are installed in opposite walls, forming a line perpendicular to the drift. For back stations, two plugs are installed in the back, forming a line parallel to the drift.

When the survey crew wants to set up the total station in a drift, they use a set of plugs to locate the total station.

Notes:

1. Total station – электронный тахеометр.

2. Electronic distance meter (EDM) – электронное устройство для измерения расстояния.
3. Line of sight – линия визирования.
4. Bar-code – штрих-код.
5. Carrier signal – сигнал-переносчик, сигнал несущей частоты.
6. On(-)board – расположенный на плате; встроенный.
7. Multiple frequency – кратная частота.
8. Integer number – целое число.

Text 18
LAND USE

Land use[1] is the human modification of natural environment or wilderness[2] into built environment[3] such as fields, pastures, and settlements. The major effect of land use on land cover since 1750 has been deforestation[4] of temperate regions. More recent significant effects of land use include urban sprawl[5], soil erosion, soil degradation, salinization[6], and desertification[7]. Land-use change, together with use of fossil fuels[8], are the major anthropogenic[9] sources of carbon dioxide, a dominant greenhouse gas[10]. It has also been defined as "the total of arrangements, activities, and inputs that people undertake in a certain land cover type".

Municipal land use. Villages, cities, towns, boroughs, townships and counties are all governed by a set of designations assigned to particular parcels of land. Each designation, known as a parcel's zoning[11], comes with a list of approved uses that can legally operate on the zoned parcel. These are found in a government's ordinances[12] or zoning regulations[13].

Land use and the environment. Land use and land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals. Land use information can be used to develop solutions for natural resource management issues such as salinity and water quality. For instance, water bodies in a region that has been deforested or having erosion will have different water quality than those in areas that are forested. According to a report by the United Nations' Food and Agriculture Organisation, land degradation has been exacerbated where there has been an absence of any land use planning, or of its orderly execution, or the existence of financial or legal incentives that have led to the wrong land use decisions, or one-sided central planning leading to over-utilization of the land resources - for instance for immediate production at all costs. As a consequence the result has often been misery for large segments of the local population and destruction of valuable ecosystems. Such narrow approaches should be replaced by a technique for the planning and management of land resources that is integrated and holistic and where land users are central. This will ensure the long-term quality of the land for human use, the prevention or resolution of social conflicts related to land use, and the conservation of ecosystems of high biodiversity[14] value.

Land use in the United States. In the US, every legal activity must have its place in municipal and county zoning laws. Meaning if an adult entertainment facility can legally operate in a given jurisdiction, then the zoning laws must offer a proper and by-right zone for that business to operate within. With this example in mind, one can guess that choosing zoning wisely can make or break a city's image and inevitably its ability to attract more favorable business and industry**.**

To regulate what can be built where, cities create comprehensive plans[15] and zoning ordinances to create an order to the potential uses of land within their political boundaries. A municipality will spend thousands if not hundreds of thousands of dollars to determine where best to encourage industrial growth, allow residential building and permit commercial activity. These decisions have dramatic impacts on land values, safety and community interests. With so much at stake, the process of determining what can be built where has become extremely politicized.

Today active community groups wield much strength in the public land use approval process. Politics plays a big part in the approval process. But the reality is that mostly developers[16] create the rules. In the absence of opposition, a developer can change the real estate landscape for years to come by successfully rezoning one large parcel in area. Where there is opposition, today's developers have to take heed and listen to their demands.

With financial stakes so high for developers and residents and the approval process being susceptible to public pressure and politics, it is no surprise that there is now a subset of political culture known as land use politics.

Patterns of land use arise naturally in a culture through customs and practices, but land use may also be formally regulated by land use planning through zoning and planning permission[17] laws, or by private agreements such as restrictive covenants[18].

Notes:

1. Land use – землепользование.
2. Wilderness – дикая природа; дикая местность.
3. Built environment – антропогенная среда, преобразованная человеком среда.
4. Deforestation – обезлесение, вырубка леса.
5. Urban sprawl – рост городов, урбанизация.
6. Salinization – засолонение (почв).
7. Desertification – опустынивание.
8. Fossil fuel – ископаемое топливо.
9. Anthropogenic – антропогенный, вызванный деятельностью человека.
10. Greenhouse gases – парниковые газы (вызывающие парниковый эффект: водяной пар, углекислый газ, метан и т. п.).
11. Zoning – зонирование (разбивка города, страны или другой территориальной единицы на зоны различного назначения, например, жилые, производственные, сельскохозяйственные и др.).

12. Ordinance – указ, декрет, закон; предписание; постановление; распоряжение.

13. Zoning regulations – правила зонирования (районирование населённого пункта).

14. Biodiversity – биоразнообразие, биологическое разнообразие.

15. Comprehensive plan – комплексный план.

16. Developer – застройщик.

17. Planning permission – разрешение на перепланировку.

18. Restrictive covenant – рестриктивное [ограничительное] условие.

Text 19
THE NATURE AND PRINCIPLES OF LAND EVALUATION

General. Decisions on land use have always been part of the evolution of human society. In the past, land use changes often came about by gradual evolution, as the result of many separate decisions taken by individuals. In the more crowded and complex world of the present they are frequently brought about by the process of land use planning. Such planning takes place in all parts of the world, including both developing and developed countries. It may be concerned with putting environmental resources to new kinds of productive use. The need for land use planning is frequently brought about, however, by changing needs and pressures, involving competing uses for the same land.

The function of land use planning is to guide decisions on land use in such a way that the resources of the environment are put to the most beneficial use for man, whiles at the same time conserving those resources for the future. This planning must be based on an understanding both of the natural environment and of the kinds of land use envisaged. There have been many examples of damage to natural resources and of unsuccessful land use enterprises through failure to take account of the mutual relationships between land and the uses to which it is put. It is a function of land evaluation to bring about such understanding and to present planners with comparisons of the most promising kinds of land use.

Land evaluation is concerned with the assessment of land performance when used for specified purposes. It involves the execution and interpretation of basic surveys of climate, soils, vegetation and other aspects of land in terms of the requirements of alternative forms of land use. To be of value in planning, the range of land uses considered has to be limited to those which are relevant within the physical, economic and social context of the area considered, and the comparisons must incorporate economic considerations.

The aims of land evaluation. Land evaluation may be concerned with present land performance. Frequently however, it involves change and its effects: with change in the use of land and in some cases change in the land itself.

Evaluation takes into consideration the economics of the proposed enterprises, the social consequences for the people of the area and the country concerned, and the consequences, beneficial or adverse, for the environment. Thus land evaluation should answer the following questions:

- How is the land currently managed, and what will happen if present practices remain unchanged?
- What improvements in management practices, within the present use, are possible?
- What other uses of land are physically possible and economically and socially relevant?
- Which of these uses offer possibilities of sustained production or other benefits?
- What adverse effects, physical, economic or social, are associated with each use?
- What recurrent inputs are necessary to bring about the desired production and minimize the adverse effects? What are the benefits of each form of use?

If the introduction of a new use involves significant change in the land itself, as for example in irrigation schemes, then the following additional questions should be answered:

- What changes in the condition of the land are feasible and necessary, and how can they be brought about?
- What non-recurrent inputs are necessary to implement these changes?

The evaluation process does not in itself determine the land use changes that are to be carried out, but provides data on the basis of which such decisions can be taken. To be effective in this role, the output from an evaluation normally gives information on two or more potential forms of use for each area of land, including the consequences, beneficial and adverse, of each.

Text 20
LAND EVALUATION AND LAND USE PLANNING

Land evaluation is only part of the process of land use planning. Its precise role varies in different circumstances. In the present context it is sufficient to represent the land use planning process by the following generalized sequence of activities and decisions:

recognition of a need for change;

identification of aims;

formulation of proposals, involving alternative forms of land use, and recognition of their main requirements;

recognition and delineation of the different types of land present in the area;

comparison and evaluation of each type of land for the different uses;

selection of a preferred use for each type of land;

project design, or other detailed analysis of a selected set of alternatives for distinct parts of the area.

This, in certain cases, may take the form of a feasibility study.

Land evaluation plays a major part and contributes information to the subsequent activities. Thus land evaluation is preceded by the recognition of the need for some change in the use to which land is put; this may be the development of new productive uses, such as agricultural development schemes or forestry plantations, or the provision of services, such as the designation of a national park or recreational area.

Recognition of this need is followed by identification of the aims of the proposed change and formulation of general and specific proposals. The evaluation process itself includes description of a range of promising kinds of use, and the assessment and comparison of these with respect to each type of land identified in the area. This leads to recommendations involving one or a small number of preferred kinds of use. These recommendations can then be used in making decisions on the preferred kinds of land use for each distinct part of the area. Later stages will usually involve further detailed analysis of the preferred uses, followed, if the decision to go ahead is made, by the implementation of the development project or other form of change, and monitoring of the resulting systems.

Text 21
PRINCIPLES OF LAND EVALUATION

Certain principles are fundamental to the approach and methods employed in land evaluation. These basic principles are as follows:

1. Land suitability is assessed and classified with respect to specified kinds of use. This principle embodies recognition of the fact that different kinds of land use have different requirements. As an example, an alluvial flood plain with impeded drainage might be highly suitable for rice cultivation but not suitable for many forms of agriculture or for forestry. The concept of land suitability is only meaningful in terms of specific kinds of land use, each with their own requirements, e.g. for soil moisture, rooting depth, etc. The qualities of each type of land, such as moisture availability or liability to flooding, are compared with the requirements of each use. Thus the land itself and the land use are equally fundamental to land suitability evaluation.

2. Evaluation requires a comparison of the benefits obtained and the inputs needed on different types of land. Land in itself, without inputs, rarely if ever possesses productive potential; even the collection of wild fruits requires labour, whilst the use of natural wilderness for nature conservation requires measures for its protection. Suitability for each use is assessed by comparing the required input, such as labour, fertilizers or road construction, with the goods produced or other benefits obtained.

3. A multidisciplinary approach is required. The evaluation process requires contributions from the fields of natural science, the technology of land use, economics and sociology. In particular, suitability evaluation always incorporates economic considerations to a greater or lesser extort. In qualitative evaluation,

economics may be employed in general terms only, without calculation of costs and returns. In quantitative evaluation the comparison of benefits and inputs in economic terms plays a major part in the determination of suitability. It follows that a team carrying out an evaluation require a range of specialists. These will usually include natural scientists (e.g. geomorphologists, soil surveyors, ecologists), specialists in the technology of the forms of land use under consideration (e.g. agronomists foresters, irrigation engineers, experts in livestock management), economists and sociologists. There may need to be some combining of these functions for practical reasons, but the principle of multidisciplinary activity, encompassing studies of land, land use, social aspects and economics, remains.

4. Evaluation is made in terms relevant to the physical economic and social context of the area concerned. Such factors as the regional climate, levels of living of the population, availability and cost of labour, need for employment, the local or export markets, systems of land tenure which are socially and politically acceptable, and availability of capital, form the context within which evaluation takes place. It would, for example be unrealistic to say that land was suitable for non-mechanized rice cultivation, requiring large amounts of low-cost labour, in a country with high labour costs. The assumptions underlying evaluation will differ from one country to another and, to some extent, between different areas of the same country. Many of these factors are often implicitly assumed; to avoid misunderstanding and to assist in comparisons between different areas, such assumptions should be explicitly stated.

5. Suitability refers to use on a sustained basis. The aspect of environmental degradation is taken into account when assessing suitability. There might, for example, be forms of land use which appeared to be highly profitable in the short run but were likely to lead to soil erosion, progressive pasture degradation, or adverse changes in river regimes downstream. Such consequences would outweigh the short-term profitability and cause the land to be classed as not suitable for such purposes. This principle by no means requires that the environment should be preserved in a completely unaltered state. Agriculture normally involves clearance of any natural vegetation present, and normally soil fertility under arable cropping is higher or lower, depending on management, but rarely at the same level as under the original vegetation. What is required is that for any proposed form of land use, the probable consequences for the environment should be assessed as accurately as possible and such assessments taken into consideration in determining suitability.

6. Evaluation involves comparison of more than a single kind of use. This comparison could be, for example, between agriculture and forestry, between two or more different farming systems, or between individual crops. Often it will include comparing the existing uses with possible changes, either to new kinds of use or modifications to the existing uses. Occasionally a proposed form of use will be compared with non-use, i.e. leaving the land in its unaltered state, but the principle of comparison remains. Evaluation is only reliable if benefits and inputs from any given kind of use can be compared with at least one, and usually several different, alternatives. If only one use is considered there is the danger that, whilst the land may indeed be suitable for that use, some other and more beneficial use may be ignored.

Text 22
LAND MONITORING

Benefiting from Earth Observation satellite data, the GMES (Global Monitoring for Environment and Security**)** land monitoring service provides accurate and cross-border[1] harmonized geo-information at global to local scales.

The service provides geographical information on land cover including its seasonal and annual changes and monitors variables such as the vegetation state or the water cycle.

It has a wide range of applications for land use (land cover change, soil sealing, water quality and availability, spatial planning, forest monitoring and global food security).

The pre-operational land monitoring service of GMES is currently provided through the EU-funded project geoland. The project develops a set of three *mapping* services which serve as a basis for the provision of a series of *information* services.

EUROLAND (Mapping service). The European Land Monitoring Service addresses the local and the continental component (i.e. high spatial resolution, wall-to-wall land cover parameters and land cover change) of the land monitoring service. EUROLAND contributes developing and implementing an efficient processing chain for future updates.

The Biogeophysical Parameters Service provides a series of parameters on regional, European and global scales, both in near-real-time and off-line mode, which describe the continental vegetation state, the radiation budget at the earth's surface and the water cycle.

The Seasonal and Annual Change Monitoring Service aims to close the gap between low-resolution global coverage and the high-resolution by providing seasonal to annual European-wide coverage of physical properties describing bio-geophysical information parameters, such as land cover and land cover change.

The Spatial Planning Service provides highly accurate products and tools to describe, explain and forecast urban land use changes, from regional to European scale. Combining geographic information with ancillary geospatial and statistical data, the service helps analyzing demographic developments and urban land trends. It also helps describing the state of land consumption and its impact on the environment.

The AgroEnvironment Service supports the timely and accurate monitoring of agricultural land use state and its changes at European, national and regional levels. It provides indicators addressing agricultural land use and trends, farming pressure on water and soil resources, and the impact of agricultural land use changes on biodiversity and landscapes.

The Water Monitoring Service provides a pan-European model in order to allow an integrated analysis of transnational water bodies. In particular it addresses water balance, flow rates and flow depths in all major streams and rivers, soil moisture level, lake/reservoir depths and levels, snow depths, snow water equivalent and regional snow coverage.

The Forest Monitoring Service provides highly accurate and spatially detailed information on the state and development of forests. It contains information for Forest Area by four forest types (coniferous forest[2], broad-leafed forest, mixed forest and un-stocked areas/clear-cuts) as well as Forest Area Change.

The Land Carbon Service aims to set up pre-operational infrastructures for providing variables related to the terrestrial carbon cycle[3], in near-real-time (NRT), for describing the continental vegetation state (leaf area index and biomass), the surface fluxes (carbon and water), and the associated soil moisture.

The Natural Resource Monitoring in Africa Service will provide decision makers with factual environmental information. The thematic focus is on natural resource management in a seasonal as well as multi-annual perspective to facilitate decision making processes and medium term planning exercises.

The Global Crop Monitoring Service provides objective, near real-time assessments of crop conditions and yield forecasts in support of European policies in the fields.

Notes:

1. Cross-border – заграничный, зарубежный, иностранный.
2. Coniferous forest – хвойный лес.
3. Carbon cycle – углеродный цикл.

Text 23
RERORMING THE SWEDISH CADASTRE

Sweden’s greatest economic asset is real property[1]. All land in Sweden is subdivided into real property units. Lantmateriet is responsible for ensuring an efficient and legally secure real property subdivision and for maintaining a register containing information about real property, such as ownership and mortgages.

In Sweden, real property formation, which includes cadastral surveying and real property registration, is an important means of implementing legal changes and measures relating to real property. Official authorisation is required and Lantmäteriet[2] has the overall responsibility for the activities in the entire country. This cadastral system is relatively unique to Sweden and Finland. The ‘förrättning”[3] procedure is a secure, simple, neutral and cost-efficient system.

The legislation is from 1970's, but has a long history. However, legislative work is currently in progress in Sweden aimed at making possible the formation of properties in strata[4]. During recent years, Lantmäteriet has carried out a rationalisation programme to improve the efficiency of cadastral procedures: new technology and new working methods have been introduced and comprehensive training programmes have been undertaken. By using new technical support routines, modern field surveying methods, based on GPS and GIS, productivity has further increased.

Property formation includes – in addition to technical work – making legal decisions concerning the formation of new properties (subdivision), changes to existing properties (reallotment), creation of joint-properties, easements, utilities and common facilities. Previously the process was divided into several parts with many employees involved but is now handled by only one or two cadastral surveyors.

The cadastral surveyor is responsible for the whole procedure and takes important decisions such as the right to use new land, the time for taking over ownership, compensation and distribution of costs. The decisions are finally registered in the Real Property Register, which includes the Digital Cadastral Index Map.

Clients include private property owners and also many companies and organisations. Nowadays the market for cadastral services includes key activities within environmental and infrastructure sectors such as telecommunications, energy, railways, public and private roads, forestry and the Swedish Church.

A cadastral procedure begins when a written application is submitted to Lantmäteriet. The cadastral surveyor discusses the implications of the application including price and delivery times with the applicant. When the procedure has gained legal force, the results are registered in the Real Property Register. The complete documentation including minutes map and descriptions are sent to the appointed interested parties. The cadastral dossier is placed in Lantmäteriet's archives.

Notes:

1. Real property – недвижимость.
2. Lantmäteriet (швед.) – Land Registration Division (отдел регистрации земли).
3. The "förrättning" procedure – the cadastral procedure (система кадастрового учёта).
4. Property in strata – право собственности в многоквартирных домах.

Text 24
OPTICAL ENGINEERING

Optical engineering is the field of study that focuses on applications of optics. Optical engineers design components of optical instruments such as lenses, microscopes, telescopes, and other equipment that utilize the properties of light. Other devices include optical sensors and measurement systems, lasers, fiber optic communication systems, optical disc systems (e.g. CD, DVD), etc.

Because optical engineers want to design and build devices that make light do something useful, they must understand and apply the science of optics in substantial detail, in order to know what is physically possible to achieve (physics and chemistry). However, they also must know what is practical in terms of available technology, materials, costs, design methods, etc. As with other fields of engineering, computers are important to many (perhaps most) optical engineers. They are used with instruments, for simulation, in design, and for many other applications.

Engineers often use general computer tools such as spreadsheets[1] and programming languages, and they make frequent use of specialized optical software designed specifically for their field. Optical engineering metrology uses optical methods to measure micro-vibrations with instruments like the laser speckle interferometer[2].

4,000 years ago there were some signs and indications that early optical engineers used optical applications. People who designed and built the Stonehenge[3] and Pyramid of Cheops used basic optical engineering principles. These structures had a connection with the earth and sun. These early engineers knew light travels in straight lines and understood the cycle of the seasons, which made these structures relative to the calendar and the compass. In 350 BC, Plato and Aristotle argued about the accurate nature of light. Plato thought vision was achieved by the discharge of optical beams from the eyes. Aristotle believed vision is accomplished when particles from the object releases into the pupil of the eye. In 300 BC, Euclid, who wrote and studied optics and geometry, wrote the book Optics, which heavily contributed to the study of the science of optics.

Optical engineering is the engineering discipline that focuses on the design of equipment and devices that function by using light. It is based on the science of optics, a field of physics that studies the properties and behaviors of visible light and its two nearest neighbors on the electromagnetic spectrum, infrared and ultraviolet. The practice of optical engineering is ancient, and the use of mirrors, shaped and polished crystals, or containers of clear water for purposes such as magnification or focusing sunlight to start fires is more than 2,000 years old. In modern times, this field is important to a very wide array of technologies, including optical instruments such as microscopes and binoculars, lasers, and many commonly used electronic and communication devices.

Some practical applications of optics can be done using a model of electromagnetic radiation based on classical physics. This is because the predictions of modern quantum mechanics diverge noticeably from classical mechanics only at the atomic or subatomic scale or under extremely unusual conditions such as near-absolute zero temperatures. Many modern optical technologies are based on how individual photons interact with atoms and particles, where the predictions of classical mechanics cease to be a useful approximation of reality, and so the science of quantum optics is necessary to understand and master these phenomena. Materials science is also important knowledge for optical engineering.

The design of many devices that use light to view or analyze objects involves optical engineering. Viewing instruments such as binoculars, telescopes, and microscopes use lenses and mirrors to magnify images, while corrective lenses for eyeglasses and contact lenses refract incoming light to compensate for defects in the wearer's vision. Thus, their creation demands considerable scientific knowledge of how these optical components will affect incoming light. Successful optical lens design requires understanding of both how a lens composition, structure, and shape will affect the functioning of an optical device, and how a lens shape and materials will affect factors such as the device's mass, size, and distribution of weight, as well as its ability to operate in different conditions.

The design of devices called spectrometers cannot be done without optical engineering. A spectrometer uses the properties of incoming photons to discover information about the chemical composition or other traits of the matter that the light has been emitted by or interacted with. Spectrometers exist in a wide array of different types and are enormously important to modern science and industry, in applications ranging from identifying the composition of minerals to quality control in the metalworking industry to studying the motion of other galaxies.

Optical engineering is likewise essential to fiber-optic technology, which transmits information through cables using pulses of light instead of electricity. Optical fibers are flexible materials that can be used as waveguides, materials that can guide the direction of light. They guide light as it travels by taking advantage of a phenomenon called total internal reflection, which keeps the light channeled down the core of the fiber. The design of optical fibers requires an understanding of how light is refracted as it moves through different media, along with the refractive qualities of different materials. Fiber-optics is essential to modern communication technologies, such as telephones, high-speed Internet, and cable television, due to their enormous capacity.

The design of lasers, which produce narrow beams of coherent light, also relies heavily on optical engineering. Lasers work by energetically exciting a material, called a gain medium, until it begins releasing energy in the form of photons. Designing a working laser involves knowledge of both the quantum properties of light and of different materials that can be used as gain media in order to create photons with the qualities necessary for the laser's intended use and of how optical equipment such as lenses and mirrors can focus that light. Laser technology is widely used in modern life. It is the basis for optical disk media formats such as CDs and DVDs, the detection technology LIDAR (light detection and ranging), and in many industrial applications.

Notes:

1. Spreadsheet – электронная таблица.
2. Laser speckle interferometer – интерферометр с использованием лазерной спекл-структуры.
3. Stonehenge – Стоунхендж (один из самых больших и известных в мире кромлехов; сооружён в 1900–1600 до н.э.; расположен близ Солсбери, графство Уилтшир).

Text 25
WHAT DOES A LASER ENGINEER DO?

A laser engineer is a scientist or engineer who has extensive training in designing, building, operating, and maintaining high-energy manufacturing or research laser equipment. The qualifications for this position will likely depend upon the particular area in which the engineer works. Those in a research and development position will likely be designing new laser technology, improving existing technology, and developing new products. Those in manufacturing will be more hands-on[1], building products and parts and designing processes that utilize solid state laser technology.

Educational requirements will vary among employers, but most laser engineers have a bachelor's degree in some type of science-related field, like physics, engineering, laser technology or optics. Some laser engineers have a master's degree or even a PhD[2] depending on the position. Most laser engineers have experience in the field of laser product development, laser applied research, or modeling solid state lasers in an industrial or manufacturing context.

Solving problems in the use of laser equipment is one of the basic responsibilities for a laser engineer. Diagnosing technical problems and using test equipment to fix lasers is part of this job. A laser engineer working in a manufacturing context will likely have good interpersonal skills because he communicates frequently with operators and vendors. A laser engineer working in a research context is more likely to focus on the conceptual and creative aspect of laser technology, so collaborative skills and teamwork are more important.

One of the primary job duties of a laser engineer is working with specialized computers to program basic functions for laser equipment, enter data, and create software to work with the laser equipment. Along with the standard business programs, a laser engineer needs a working knowledge of Autocad®, materials resource planning, product data management, and other engineering-related software. Laser engineers working in the manufacturing area create or review technical drawings and coordinate with manufacturing personnel to determine the actual steps and type of lasers necessary in various manufacturing processes. A research laser engineer also needs to create and review detailed technical drawings to be used in the design and creation of laser technology and equipment.

Notes:

1. Hands-on – практический.
2. PhD – от Doctor of Philosophy; = Ph.D. a) доктор философии (учёная степень; примерно соответствует степени кандидата наук в РФ.

Text 26
DIGITAL MAPPING

Digital mapping (also called digital cartography) is the process by which a collection of data is compiled and formatted into a virtual image. The primary function of this technology is to produce maps that give accurate representations of a particular area, detailing major road arteries and other points of interest. The technology also allows the calculation of distances from one place to another. Though digital mapping can be found in a variety of computer applications, such as Google

Earth, the main use of these maps is with the Global Positioning System, or GPS satellite network, used in standard automotive navigation systems.

History. The roots of digital mapping lie within traditional paper maps. Paper maps provide basic landscapes similar to digitized road maps, yet are often cumbersome, cover only a designated area, and lack many specific details such as road blocks. In addition, there is no way to “update” a paper map except to obtain a new version. On the other hand, digital maps, in many cases, can be updated through synchronization with updates from company servers. Early digital maps had the same basic functionality as paper maps – that is, they provided a “virtual view” of roads generally outlined by the terrain encompassing the surrounding area. However, as digital maps have grown with the expansion of GPS technology in the past decade, live traffic updates, points of interest and service locations have been added to enhance digital maps to be more “user conscious”. Traditional “virtual views” are now only part of digital mapping. In many cases, users can choose between virtual maps, satellite (aerial views), and hybrid (a combination of virtual map and aerial views) views. With the ability to update and expand digital mapping devices, newly constructed roads and places can be added to appear on maps**.**

Data Collection. Digital maps heavily rely upon a vast amount of data collected over time. Most of the information that comprise digital maps is the culmination of satellite imagery[1] as well as street level information. Maps must be updated frequently to provide users with the most accurate reflection of a location. While there is a wide spectrum on companies that specialize in digital mapping, the basic premise is that digital maps will accurately portray roads as they actually appear to give "life-like experiences[2]".

Functionality and Use. Computer programs and applications such as Google Earth and Google Maps provide map views from space and street level of much of the world. Used primarily for recreational use, Google Earth provides digital mapping in personal applications, such as tracking distances or finding locations.

The development of mobile computing (tablet PCs[3], laptops, etc.) has recently (since about 2000) spurred the use of digital mapping in the sciences and applied sciences. As of 2009, science fields that use digital mapping technology include geology, engineering, architecture, land surveying, mining, forestry, environment, and archaeology.

The principal use by which digital mapping has grown in the past decade has been its connection to Global Positioning System (GPS) technology. GPS is the foundation behind digital mapping navigation systems.

The coordinates and position as well as atomic time obtained by a terrestrial GPS receiver from GPS satellites orbiting the Earth interact together to provide the digital mapping programming with points of origin in addition to the destination points needed to calculate distance. This information is then analyzed and compiled to create a map that provides the easiest and most efficient way to reach a destination. More technically speaking, the device operates in the following manner:

GPS receivers collect data from "at least twenty-four GPS satellites" orbiting the Earth, calculating position in three dimensions.

1. The GPS receiver then utilizes position to provide GPS coordinates, or exact points of latitudinal and longitudinal direction from GPS satellites.
2. The points, or coordinates, output an accurate range between approximately "10-20 meters" of the actual location.
3. The beginning point, entered via GPS coordinates, and the ending point, (address or coordinates) input by the user, are then entered into the digital map.
4. The map outputs a real-time visual representation of the route. The map then moves along the path of the driver.
5. If the driver drifts from the designated route, the navigation system will use the current coordinates to recalculate a route to the destination location.

Notes:

1. Satellite imagery – получение изображений с помощью ИСЗ.
2. Life-like experiences – реальное представление.
3. Tablet PC – планшетный ПК; карманный ПК.

Text 27
CARTOGRAPHY

Cartography (from Greek *chartis* = map and *graphein* = write) is the study and practice of making maps. Combining science, aesthetics, and technique, cartography builds on the premise that reality can be modeled in ways that communicate spatial information effectively.

The fundamental problems of traditional cartography are to:

Set the map's agenda and select traits of the object to be mapped. This is the concern of map editing. Traits may be physical, such as roads or land masses, or may be abstract, such as toponyms or political boundaries.

Represent the terrain of the mapped object on flat media. This is the concern of map projections.

Eliminate characteristics of the mapped object that are not relevant to the map's purpose and reduce the complexity of the characteristics that will be mapped . This is the concern of generalization.

Orchestrate the elements of the map to best convey its message to its audience. This is the concern of map design.

Modern cartography is closely integrated with **geographic information science (*GIS science*)** and constitutes many theoretical and practical foundations of geographic information systems.

Technological changes. Mapping can be done with GPS and laser rangefinder[1] directly in the field (for example by Field-Map technology). Real-time map construction improves productivity and quality of mapping. Image is showing mapping of forest structure (position of trees, dead wood and canopy).

In cartography, technology has continually changed in order to meet the demands of new generations of mapmakers and map users. The first maps were manually constructed with brushes and parchment[2]; therefore, varied in quality and were limited in distribution. The advent of magnetic devices, such as the compass and much later, magnetic storage devices[3], allowed for the creation of far more accurate maps and the ability to store and manipulate them digitally.

Advances in mechanical devices such as the printing press[4], vernier, allowed for the mass production of maps and the ability to make accurate reproductions from more accurate data. Optical technology, such as the telescope, other devices that use telescopes, allowed for accurate surveying of land and the ability of mapmakers and navigators to find their latitude by measuring angles to the North Star at night or the sun at noon.

Advances in photochemical technology, such as the lithographic and photochemical processes, have allowed for the creation of maps that have fine details, do not distort in shape and resist moisture and wear. This also eliminated the need for engraving, which further shortened the time it takes to make and reproduce maps.

Advances in electronic technology in the 20th century ushered in another revolution in cartography. Ready availability of computers and peripherals such as monitors, plotters, printers, scanners (remote and document) and analytic stereo plotters, along with computer programs for visualization, image processing, spatial analysis, and database management, have democratized and greatly expanded the making of maps. The ability to superimpose spatially located variables onto existing maps created new uses for maps and new industries to explore and exploit these potentials.

These days most commercial-quality maps are made using software that falls into one of three main types: CAD, GIS and specialized illustration software. Spatial information can be stored in a database, from which it can be extracted on demand. These tools lead to increasingly dynamic, interactive maps that can be manipulated digitally.

With the field rugged computers[5], GPS and laser rangefinders, it is possible to perform mapping directly in the terrain. The construction of the map in real time improve productivity and quality of the result. Real time mapping is done for example with Field-map technology.

Map types. In understanding basic maps, the field of cartography can be divided into two general categories: general cartography and thematic cartography. ***General cartography*** involves those maps that are constructed for a general audience and thus contain a variety of features. General maps exhibit many reference and location systems and often are produced in a series. For example, the 1:24,000 scale topographic maps of the United States Geological Survey (USGS) are a standard as compared to the 1:50,000 scale Canadian maps. The government of the UK produces the classic 1:50,000 (replacing the older 1 inch to 1 mile) "Ordnance Survey" maps[6] of the entire UK and with a range of correlated larger- and smaller-scale maps of great detail. ***Thematic cartography*** involves maps of specific geographic themes, oriented toward specific audiences. As the volume of geographic data has exploded over the last century, thematic cartography has become increasingly useful and necessary to interpret spatial, cultural and social data.

An orienteering map combines both general and thematic cartography, designed for a very specific user community. The most prominent thematic element is shading, that indicates degrees of difficulty of travel due to vegetation. The vegetation itself is not identified, merely classified by the difficulty that it presents.

A topographic map is primarily concerned with the topographic description of a place, including (especially in the 20th and 21st centuries) the use of contour lines showing elevation. Terrain or relief can be shown in a variety of ways. A topological map is a very general type of map, the kind you might sketch on a napkin. It often disregards scale and detail in the interest of clarity of communicating specific route or relational information. Beck's London Underground map is an iconic example. Though the most widely used map of "The Tube[7]," it preserves little of reality: it varies scale constantly and abruptly, it straightens curved tracks, and it contorts directions. The only topography on it is the River Thames, letting the reader know whether a station is north or south of the river. That and the topology of station order and interchanges between train lines are all that is left of the geographic space. Yet those are all a typical passenger wishes to know, so the map fulfils its purpose.

Map symbology. The quality of a map's design affects its reader's ability to extract information and to learn from the map. Cartographic symbology has been developed in an effort to portray the world accurately and effectively convey information to the map reader. A legend explains the pictorial language of the map, known as its symbology. The title indicates the region the map portrays; the map image portrays the region and so on. Although every map element serves some purpose, convention only dictates inclusion of some elements, while others are considered optional. A menu of map elements includes the neatline (border), north arrow, overview map, bar scale[8], projection and information about the map sources, accuracy and publication. When examining a landscape, scale can be intuited from trees, houses and cars. Not so with a map. Even such a simple thing as a north arrow is crucial. It may seem obvious that the top of a map should point north, but this might not be the case. Map coloring[9] is also very important. How the cartographer displays the data in different hues can greatly affect the understanding or feel of the map. Different intensities of hue portray different objectives the cartographer is attempting to get across to the audience. Today, personal computers can display up to 16 million distinct colors at a time. This fact allows for a multitude of color options for even the most demanding maps. Moreover, computers can easily hatch patterns in colors to give even more options. This is very beneficial, when symbolizing data in categories such as quintile and equal interval classifications.

Map projections. The Earth being spherical, any flat representation generates distortions, where shapes, distances, and areas cannot all be conserved simultaneously. The mapmaker must choose a suitable map projection according to the space to be mapped and the purpose of the map.

Notes:

1. Laser rangefinder – лазерный дальномер.
2. Parchment – пергамент, пергаментная бумага.

3. Magnetic storage – магнитное запоминающее устройство.

4. Printing press – печатная машина; печатный станок.

5. Rugged computer – дооборудованный, с особой надёжностью и т. п.

6. Ordnance Survey map – карта Великобритании или Ирландии, выпускаемая картографическим управлением этих стран.

7. The Tube – метрополитен, подземка (в Лондоне).

8. Bar scale – масштабная шкала.

9. Map coloring – раскрашивание карты; раскраска карты.

Text 28
AERIAL PHOTOGRAPHY

Aerial photography[1] is the taking of photographs of the ground from an elevated position. The term usually refers to images in which the camera is not supported by a ground-based structure. Cameras may be handheld or mounted, and photographs may be taken by a photographer, triggered remotely or triggered automatically. Platforms for aerial photography include fixed-wing aircraft, helicopters, balloons, blimps[2] and dirigibles, rockets, kites, poles, parachutes, and vehicle mounted poles. Aerial photography should not be confused with Air-to-Air[3] Photography, when aircraft serve both as a photo platform and subject.

Aerial photography is used in cartography (particularly in photogrammetric surveys, which are often the basis for topographic maps), land-use planning, archaeology, movie production, environmental studies, surveillance[4], commercial advertising, conveyancing, and artistic projects. In the United States, aerial photographs are used in many Phase I Environmental Site Assessments for property analysis. Aerial photos are often processed using GIS software.

Oblique photographs. Photographs taken at an angle are called *oblique photographs*[5]. If they are taken from a low angle earth surface–aircraft, they are called *low oblique*[6] and photographs taken from a high angle are called *high* or *steep oblique*[7].

Vertical photographs. Vertical photographs are taken straight down.They are mainly used in photogrammetry and image interpretation. Pictures that will be used in photogrammetry are traditionally taken with special large format cameras with calibrated and documented geometric properties.

Combinations. Aerial photographs are often combined. Depending on their purpose it can be done in several ways: *panoramas* can be made by stitching several photographs taken with one handheld camera; in *pictometry*[8] five rigidly mounted cameras provide one vertical and four low oblique pictures that can be used together. In some digital cameras for aerial photogrammetry images from several imaging elements, sometimes with separate lenses, are geometrically corrected and combined to one image in the camera.

Orthophotos. Vertical photographs are often used to create orthophotos, photographs which have been geometrically "corrected" so as to be usable as a map.

In other words, an orthophoto is a simulation of a photograph taken from an infinite distance, looking straight down to nadir[9]. Perspective must obviously be removed, but variations in terrain should also be corrected for. Multiple geometric transformations are applied to the image, depending on the perspective and terrain corrections required on a particular part of the image. Orthophotos are commonly used in geographic information systems, such as those used by mapping agencies (e.g. Ordnance Survey[10]) to create maps. Once the images have been aligned, or 'registered', with known real-world coordinates, they can be widely deployed. Large sets of orthophotos, typically derived from multiple sources and divided into "tiles" (each typically 256 x 256 pixels in size), are widely used in online map systems such as Google Maps. OpenStreetMap offers the use of similar orthophotos for deriving new map data. Google Earth overlays orthophotos or satellite imagery[11] onto a digital elevation model[12] to simulate 3D landscapes.

Aerial video. With advancements in video technology, aerial video is becoming more popular. Orthogonal video is shot from aircraft mapping pipelines, crop fields, and other points of interest. Using GPS, video may be embedded with meta data and later synced with a video mapping program. This ‘Spatial Multimedia’ is the timely union of digital media including still photography, motion video, stereo, panoramic imagery sets, immersive media constructs, audio, and other data with location and date-time information from the GPS and other location designs. Aerial videos are emerging Spatial Multimedia which can be used for scene understanding and object tracking. The input video is captured by low-flying aerial platforms and typically consists of strong parallax from non-ground-plane structures. The integration of digital video, global positioning systems (GPS) and automated image processing will improve the accuracy and cost-effectiveness of data collection and reduction.

Notes:

1. Aerial photography – аэрофотосъёмка.
2. Blimp – аэростат.
3. Air-to-air – воздух-воздух, воздухо-воздушный.
4. Surveillance – наблюдение, контроль.
5. Oblique photograph – перспективный аэроснимок.
6. Low oblique photograph – перспективный аэрофотоснимок без захвата линии горизонта.
7. High oblique photograph – перспективный аэрофотоснимок с захватом линии горизонта.
8. Pictometry – пиктометрия (уникальная информационная система, объединяющая аэрофотосъемку и программное обеспечение, способное обеспечить рассмотрение объектов с разных сторон и в разных масштабах).
9. Nadir – надир (точка, противоположная зениту).
10. Ordnance Survey – картографическое управление (в Великобритании и Ирландии).
11. Satellite imagery – получение изображений с помощью ИСЗ.
12. Digital elevation model – цифровая модель местности.

Text 29

ENVIRONMENTAL PROTECTION

The conservation of natural resources[1] is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others.

Environmental protection[2] is a practice of protecting the environment, on individual, organizational or governmental level, for the benefit of the natural environment and (or) humans. Due to the pressures of population and our technology the biophysical environment is being degraded, sometimes permanently. This has been recognized and governments began placing restraints on activities that caused environmental degradation[3]. Since the 1960s activism by the environmental movement has created awareness of the various environmental issues. There is not a full agreement on the extent of the environmental impact of human activity and protection measures are occasionally criticized.

Academic institutions now offer courses such as environmental studies, environmental management and environmental engineering that study the history and methods of environmental protection. Protection of the environment is needed from various human activities. Waste, pollution, loss of biodiversity, introduction of invasive species, release of genetically modified organisms and toxics are some of the issues relating to environmental protection.

Evolving approaches to environmental protection. Discussion concerning environmental protection often focuses on the role of government, legislation and enforcement, however in its broadest sense environmental protection may be seen to be the responsibility of all people and not simply that of government. Decisions that impact on the environment will ideally involve a broad range of stakeholders[4] including industry, indigenous groups, environmental group and community representatives. Gradually environmental decision-making processes are evolving to reflect this broad base of stakeholders and are becoming more collaborative in many countries. Environmental protection is influenced by three interwoven factors: environmental legislation, ethics and education. Each of these factors plays its part in influencing national level environmental decisions and personal level environmental values and behaviours. For environmental protection to become a reality it will be important for societies to develop each of these areas that together will inform and drive environmental decisions. Although environmental protection is not simply the role of government agencies they are however generally seen as being of prime importance in establishing and maintaining basic standards that protect both the environment and the people interacting with it. Outlined below are several approaches to environmental protection that are currently evolving.

Voluntary Environmental agreements. In industrialised countries voluntary environmental agreements often provide a platform for companies to be recognised for moving beyond the minimum regulatory standards and thus support the development of best environmental practice. In developing countries such as throughout Latin America, these agreements are more commonly used to remedy significant levels of non-compliance with mandatory regulation. The challenges that exist with these agreements lie in establishing baseline data, targets, monitoring and reporting. Due to the difficulties inherent in evaluating effectiveness their use is often questioned and indeed the environment may well be adversely affected as a result. The key advantage of their use in developing countries is that their use helps to build environmental management capacity.

Ecosystems approach. An ecosystems approach to resource management and environmental protection aims to consider the complex interrelationships of an entire ecosystem in decision-making rather than simply responding to specific issues and challenges. Ideally the decision-making processes under such an approach would be a collaborative approach to planning and decision-making that involves a broad range of stakeholders across all relevant government departments as well as representatives of industry, environmental groups and community. This approach ideally supports better exchange of information, development of conflict resolution strategies and improved regional conservation.

International Environmental Agreements. Many of the earth's resources are especially vulnerable because they are influenced by human impacts across many countries. As a result of this many attempts are made by countries to develop agreements that are signed by multiple governments to prevent damage or manage the impacts of human activity on natural resources. This can include agreements that impact on factors such as climate, oceans, rivers and air pollution. These international environmental agreements are sometimes legally binding documents[5] that have legal implications[6] when they are not followed. These agreements have a long history with some multinational agreements being in place from as early as 1910 in Europe, America and Africa. Some of the most well known multinational agreements include: the Kyoto Protocol, Vienna Convention on the Protection of the Ozone Layer and Rio Declaration on Development and Environment.

Government. Many Constitutions acknowledge the fundamental right to environmental protection and many international treaties acknowledge the right to live in a healthy environment. But complete environmental protection seems impossible at this current global position. Also, many countries have organizations and agencies devoted to environmental protection. There are International environmental protection organizations, as the United Nations Environment Programme.

Notes:

1. Conservation of natural resources – охрана природных ресурсов.
2. Environmental protection – охрана окружающей среды.
3. Environmental degradation – ухудшение экологии, ухудшение состояния окружающей среды.
4. Stakeholders – заинтересованные стороны; заинтересованные круги.
5. Legally binding document – юридически обязательный документ; документ, имеющий юридическую силу.
6. Legal implication – юридический вывод.

Text 30
CHALLENGES IN ENVIRONMENTAL PROTECTION

The main issues for developing countries like Brazil and Mexico are that protected areas suffer from encroachment and poor management. In Brazil, protected areas are increasing but there are significant challenges caused by human impacts. Logging[1] and mining are potentially huge threats to protected areas. Between 1998 and 2009, 12,204 km^2 of forest within protected areas was cleared, with 1,338 mining titles being granted and 10,348 awaiting approval. Developing countries need to allocate more money from their budgets if they hope to address these problems in environmental protection.

Several challenges face African governments in implementing any environmental protection mechanisms. In Tanzania for example the challenges include: lack of financial resources to manage protected areas, poor governance and corruption and significant illegal logging and hunting. Also with such large allocations of land to national parks has been the displacement of indigenous people and a lack of local participation in environmental decision-making processes. As a result of these factors recent calls have been made to allow “parks with people” as one means to support better overall management and care of the land.

Due to the Australian climate being dominated by desert and semi-arid[2] regions, most of the environmental protection challenges focus on availability and management of water resources.

Case Study. Franklin River Dam: In 1979, the building of a hydroelectric dam was proposed on the Franklin River in Western Tasmania. The advantages of this project would be increased power production and the creation of job in a region with one of the highest unemployment rates in Tasmania.. Conservationists were concerned about the high concentration of Aboriginal sites and that it was one of Australia's last true wild rivers. The issue quickly became a focus of environmental protection, with the Tasmanian Wilderness Society leading the resistance movement. The situation escalated from a state referendum to a public blockade of construction, eventually leading to federal legislative intervention and a state challenge in the High Court. The state lost the case with the area proclaimed the Franklin-Gordon Wild Rivers National Park in 1981, part of the Tasmanian Wilderness World Heritage Area.

Notes:

1. Logging – заготовка и транспортировка леса.
2. Semi-arid – засушливый; полупустынный; пустынный.

Text 31
NATURAL RESOURCE MANAGEMENT

Natural Resource Management refers to the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations.

Natural resource management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation, and the future sustainability of industries like agriculture, mining, tourism, fisheries and forestry. It recognises that people and their livelihoods rely on the health and productivity of our landscapes, and their actions as stewards of the land play a critical role in maintaining this health and productivity. Natural resource management is also congruent with the concept of sustainable development, a scientific principle that forms a basis for sustainable global land management and environmental governance to conserve and preserve natural resources.

Natural resource management specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources. Environmental management is also similar to natural resource management.

After the United Nations Conference for the Environment and Development (UNCED) held in Rio de Janeiro in 1992, most nations subscribed to new principles for the integrated management of land, water, and forests. Although program names vary from nation to nation, all express similar aims.

Integrated natural resource management (INRM). A process of managing natural resources in a systematic way, which includes multiple aspects of natural resource use (biophysical, socio-political, and economic), meets production goals of producers and other direct users (e.g., food security, profitability, risk aversion) as well as goals of the wider community (e.g., welfare of future generations, environmental conservation[1]). It focuses on sustainability[2] and at the same time tries to incorporate all possible stakeholders from the planning level itself, reducing possible future conflicts. The conceptual basis of INRM has evolved in recent years through the convergence of research in diverse areas such as sustainable land use, participatory planning, integrated watershed management, and adaptive management. INRM is being used extensively in community-based natural management.

Geographic Information Systems (GIS). GIS is a powerful analytical tool as it is capable of overlaying datasets to identify links. A regeneration scheme can be informed by the overlay of rainfall, cleared land and erosion. In Australia, Metadata Directories such as NDAR provide data on Australian natural resources such as vegetation, fisheries, soils and water.

Community Based Natural Resource Management (CBNRM). The CBNRM approach combines conservation objectives with the generation of economic benefits for rural communities. The three key assumptions being that: locals are better placed to conserve natural resources, people will conserve a resource only if benefits exceed the costs of conservation, and people will conserve a resource that is linked directly to their quality of life. When a local people's quality of life is enhanced, their efforts and commitment to ensure the future well-being of the resource are also enhanced.

CBNRM is based particularly on advocacy by nongovernmental organizations working with local groups and communities, on the one hand, and national and transnational organizations, on the other, to build and extend new versions of environmental and social advocacy that link social justice and environmental management agendas with both direct and indirect benefits observed including a share of revenues, employment, diversification of livelihoods and increased pride and identity. CBNRM has raised new challenges, as concepts of community, territory, conservation, and indigenous are worked into politically varied plans and programs in disparate sites. The capacity of indigenous communities to conserve natural resources has been acknowledged by the Australian Government. The Australian Government Departments of Agriculture, Fisheries and Forestry and the Department of the Environment, Water, Heritage and the Arts share responsibility for delivery of the Australian Government's environment and sustainable agriculture programs, which have traditionally been broadly referred to under the banner of 'natural resource management'.

Land management. In order to have a sustainable environment, understanding and using appropriate management strategies is important. Some important points of land management are:

- Comprehending the processes of nature including ecosystem, water, soils.
- Using appropriate and adapting management systems in local situations.
- Cooperation between scientists that have knowledge and resources and local people that have knowledge and skills.

There are five fundamental and helpful ecological principles for the land manager and people who need them. The ecological principles relate to time, place, species, disturbance and the landscape and they interact in many ways. It is suggested that land managers could follow these guidelines:

- Examine impacts of local decisions in a regional context.
- Plan for long-term change and unexpected events.
- Preserve rare landscape elements and associated species.
- Avoid land uses that delete natural resources.
- Retain large contiguous or connected areas that contain critical habitats.
- Minimize the introduction and spread of non-native species.
- Avoid or compensate for the effects of development on ecological processes.
- Implement land-use and land-management practices that are compatible with the natural potential of the area.

Notes:

1. Environmental conservation – охрана окружающей среды.
2. Sustainability – устойчивость; устойчивое развитие.

Text 32
ECONOMICS

Economics is the social science that analyzes the production, distribution, and consumption of goods and services. Current economic models emerged from the broader field of political economy in the late 19th century. A primary stimulus for the development of modern economics was the desire to use an empirical approach more akin to the physical sciences. Economics aims to explain how economies work and how economic agents interact. Economic analysis is applied throughout society, in business, finance and government, but also in crime, education, family, health, law, politics, religion, social institutions, war, and science. At the turn of the 21st century, the expanding domain of economics in the social sciences has been described as economic imperialism.

Common distinctions are drawn between various dimensions of economics. The primary textbook distinction is between ***microeconomics***, which examines the behavior of basic elements in the economy, including individual markets and agents (such as consumers and firms, buyers and sellers), and ***macroeconomics***, which addresses issues affecting an entire economy, including unemployment, inflation, economic growth, and monetary and fiscal policy. Other distinctions include: between positive economics (describing "what is") and normative economics (advocating "what ought to be"); between economic theory and applied economics and between rational and behavioral economics[1].

Microeconomics. Economists study trade, production and consumption decisions, such as those that occur in a traditional marketplace. In Virtual Markets, buyer and seller are not present and trade via intermediates and electronic information.

Markets. Microeconomics, like macroeconomics, is a fundamental method for analyzing the economy as a system. It treats households and firms interacting through individual markets as irreducible elements of the economy, given scarcity[2] and government regulation. A market might be for a *product*, say fresh corn, or the *services of a factor of production*, say bricklaying. The theory considers aggregates of *quantity demanded* by buyers and *quantity supplied* by sellers at each possible price per unit. It weaves these together to describe how the market may reach equilibrium as to price and quantity or respond to market changes over time. Such analysis includes the theory of supply and demand[3]. It also examines market structures, such as perfect competition and monopoly for implications as to behavior and economic efficiency. Analysis of change in a single market often proceeds from the simplifying assumption that relations in other markets remain unchanged, that is, partial-equilibrium analysis. General-equilibrium theory allows for changes in different markets and aggregates across *all* markets, including their movements and interactions toward equilibrium.

Production, cost, and efficiency. In microeconomics, production is the conversion of inputs into outputs[4]. It is an economic process that uses inputs to create a commodity[5] for exchange or direct use. Production is a flow and thus a rate of output per period of time. Distinctions include such production alternatives as for consumption (food, haircuts, etc.) vs. investment goods (new tractors, buildings, roads, etc.), public goods (national defense, small-pox vaccinations, etc.) or private goods (new computers, bananas, etc.), and "guns" vs. "butter".

Opportunity cost[6] refers to the economic cost of production: the value of the next best opportunity foregone. Choices must be made between desirable yet mutually exclusive actions. It has been described as expressing "the basic relationship between scarcity and choice.". The opportunity cost of an activity is an element in ensuring that scarce resources are used efficiently, such that the cost is weighed against the value of that activity in deciding on more or less of it. Opportunity costs are not restricted to monetary or financial costs but could be measured by the real cost of output forgone, leisure, or anything else that provides the alternative benefit.

Inputs used in the production process include such primary factors of production as labour services, capital (durable produced goods used in production, such as an existing factory), and land (including natural resources). Other inputs may include intermediate goods used in production of final goods, such as the steel in a new car.

Economic efficiency describes how well a system generates desired output with a given set of inputs and available technology. Efficiency is improved if more output is generated without changing inputs, or in other words, the amount of "waste" is reduced. A widely-accepted general standard is Pareto efficiency[7], which is reached when no further change can make someone better off without making someone else worse off.

The production-possibility frontier (PPF)[8] is an expository figure for representing scarcity, cost, and efficiency. In the simplest case an economy can produce just two goods (say "guns" and "butter[9]"). The PPF is a table or graph showing the different quantity combinations of the two goods producible with a given technology and total factor inputs, which limit feasible total output.

Much applied economics in public policy is concerned with determining how the efficiency of an economy can be improved. Recognizing the reality of scarcity and then figuring out how to organize society for the most efficient use of resources has been described as the "essence of economics," where the subject "makes its unique contribution."

Specialization. Specialization is considered key to economic efficiency based on theoretical and empirical considerations. Different individuals or nations may have different real opportunity costs of production, say from differences in stocks of human capital per worker or capital/labour ratios. According to theory, this may give a comparative advantage in production of goods that make more intensive use of the relatively more abundant, thus *relatively* cheaper, input. Even if one region has an absolute advantage as to the ratio of its outputs to inputs in every type of output, it may still specialize in the output in which it has a comparative advantage and thereby gain from trading with a region that lacks any absolute advantage but has a comparative advantage in producing something else.

It has been observed that a high volume of trade occurs among regions even with access to a similar technology and mix of factor inputs, including high-income countries. This has led to investigation of economies of scale and agglomeration to explain specialization in similar but differentiated product lines, to the overall benefit of respective trading parties or regions.

The general theory of specialization applies to trade among individuals, farms, manufacturers, service providers, and economies. Among each of these production systems, there may be a corresponding *division of labour* with different work groups specializing, or correspondingly different types of capital equipment and differentiated land uses.

An example that combines features above is a country that specializes in the production of high-tech knowledge products, as developed countries do, and trades with developing nations for goods produced in factories where labor is relatively cheap and plentiful, resulting in different opportunity costs of production. More total output and utility thereby results from specializing in production and trading than if each country produced its own high-tech and low-tech products.

Theory and observation set out the conditions such that market prices of outputs and productive inputs select an allocation of factor inputs by comparative advantage, so that (relatively) low-cost inputs go to producing low-cost outputs. In the process, aggregate output may increase as a by-product[10] or by design. Such specialization of production creates opportunities for *gains from trade* whereby resource owners benefit from trade in the sale of one type of output for other, more highly valued goods. A measure of gains from trade is the *increased income levels* that trade may facilitate.

Notes:

1. Behavioral economics – поведенческая экономика.
2. Scarcity – недостаток, нехватка, дефицит, недостаточное количество.
3. Supply and demand – спрос и предложение.
4. Input-output – затраты-выпуск.
5. Commodity – предмет потребления; товар, продукт для продажи.
6. Opportunity cost – альтернативные затраты, издержки [затраты] упущенных возможностей.
7. Pareto efficiency – эффективный по Парето.
8. Production-possibility frontier – граница производственных возможностей.
9. Guns and butter – политика "пушек и масла" (политика, основанная на стремлении осуществить как военную, так и внутриэкономическую программы).
10. By(-)product – побочный продукт.

Text 33
SUPPLY AND DEMAND

The supply and demand model describes how prices vary as a result of a balance between product availability and demand. Prices and quantities have been described as the most directly observable attributes of goods produced and exchanged in a market economy. The theory of supply and demand is an organizing principle for explaining how prices coordinate the amounts produced and consumed. In microeconomics, it applies to price and output determination for a market with perfect competition, which includes the condition of no buyers or sellers large enough to have price-setting power.

For a given market of a commodity, *demand* is the relation of the quantity that all buyers would be prepared to purchase at each unit price of the good. Demand is often represented by a table or a graph showing price and quantity demanded. Demand theory describes individual consumers as rationally choosing the most preferred quantity of each good, given income, prices, tastes, etc. A term for this is constrained utility[1] maximization (with income and wealth as the constraints on demand). Here, utility refers to the hypothesized relation of each individual consumer for ranking different commodity bundles as more or less preferred.

The law of demand states that, in general, price and quantity demanded in a given market are inversely related. That is, the higher the price of a product, the less of it people would be prepared to buy (other things unchanged). As the price of a commodity falls, consumers move toward it from relatively more expensive goods (the substitution effect). In addition, purchasing power from the price decline increases ability to buy (the income effect). Other factors can change demand; for example an increase in income will shift the demand curve for a normal good outward relative to the origin.

Supply is the relation between the price of a good and the quantity available for sale at that price. It may be represented as a table or graph relating price and quantity supplied. Producers, for example business firms, are hypothesized to be *profit-maximizers*, meaning that they attempt to produce and supply the amount of goods that will bring them the highest profit. Supply is typically represented as a directly-proportional relation between price and quantity supplied (other things unchanged). That is, the higher the price at which the good can be sold, the more of it producers will supply. The higher price makes it profitable to increase production. Just as on the demand side, the position of the supply can shift, say from a change in the price of a productive input or a technical improvement.

Market equilibrium occurs where quantity supplied equals quantity demanded. At a price below equilibrium, there is a shortage of quantity supplied compared to quantity demanded. This is posited to bid the price up. At a price above equilibrium, there is a surplus of quantity supplied compared to quantity demanded. This pushes the price down. The model of supply and demand predicts that for given supply and demand curves, price and quantity will stabilize at the price that makes quantity supplied equal to quantity demanded. Similarly, demand-and-supply theory predicts a new price-quantity combination from a shift in demand or in supply.

For a given quantity of a consumer good, the point on the demand curve indicates the value, or marginal utility, to consumers for that unit. It measures what the consumer would be prepared to pay for that unit. The corresponding point on the supply curve measures marginal cost[2], the increase in total cost to the supplier for the corresponding unit of the good. The price in equilibrium is determined by supply and demand. In a perfectly competitive market, supply and demand equate marginal cost and marginal utility[3] at equilibrium.

On the supply side of the market, some factors of production are described as (relatively) *variable* in the short run[4], which affects the cost of changing output levels. Their usage rates can be changed easily, such as electrical power, raw-material inputs, and over-time and temp work. Other inputs are relatively *fixed*, such as plant and equipment and key personnel. In the long run, all inputs may be adjusted by management. These distinctions translate to differences in the elasticity (responsiveness) of the supply curve in the short and long runs and corresponding differences in the price-quantity change from a shift on the supply or demand side of the market.

Other applications of demand and supply include the distribution of income among the factors of production, including labour and capital, through factor markets. In a competitive labour market for example the quantity of labour employed and the price of labour (the wage rate) depends on the demand for labour (from employers for production) and supply of labour (from potential workers). Labour economics examines the interaction of workers and employers through such markets to explain patterns and changes of wages and other labour income, labour mobility, and (un)employment, productivity through human capital, and related public-policy issues.

Demand-and-supply analysis is used to explain the behavior of perfectly competitive markets, but as a standard of comparison it can be extended to any type of market. It can also be generalized to explain variables across the economy, for example, total output (estimated as real GDP[5]) and the general price level, as studied in macroeconomics. Tracing the qualitative and quantitative effects of variables that change supply and demand, whether in the short or long run, is a standard exercise in applied economics. Economic theory may also specify conditions such that supply and demand through the market is an efficient mechanism for allocating resources.

Since at least the 1960s, macroeconomics has been characterized by further integration as to micro-based modeling of sectors, including rationality of players, efficient use of market information, and imperfect competition. This has addressed a long-standing concern about inconsistent developments of the same subject.

Macroeconomic analysis also considers factors affecting the long-term level and growth of national income. Such factors include capital accumulation, technological change and labor force[6] growth.

Notes:

1. Constrained utility – ограниченная полезность, практичность; выгодность, эффективность.
2. Marginal cost – предельные затраты (изменение общих затрат, необходимое для производства единицы дополнительного выпуска).
3. Marginal utility – предельная полезность.

4. Short run – короткий [краткосрочный] период (период, в течение которого одна группа факторов производства рассматривается как постоянная, а другая как переменная).

5. Real GDP (real gross domestic product) – реальный валовой внутренний продукт [ВВП].

6. Labor force – рабочая сила.

Text 34
APPLYING RIGOROUS ECONOMICS TO THE REAL WORLD

Tourism Economics operates with a singular objective: combines a deep understanding of the tourism sector with proven economic tools to answer the most important questions facing destinations, strategic planners, and investors. *Tourism Economics* designs market strategy models, tourism policy recommendations, tourism forecasting models, and tourism economic impact studies. Our vast experience and partnership with *Oxford Economics* have formed a powerful resource to assist our clients with their most important decisions.

Market Strategies. *Tourism Economics* tracks travel trends and prospects for over 180 countries on an ongoing basis. Our customized tourism opportunity models inform our clients' global investment and marketing decisions. Our flagship product, *Tourism Decision Metrics*[1], delivers detailed market data and reports to our clients' desktops for dynamic, real-time analysis of global travel markets.

Public Policy. Governments are faced with difficult economic development decisions. Tourism Economics helps to raise the profile of tourism through credible analysis of its economic impact[2]. We also assess destinations' tax, entry, investment, and funding policies[3] based on empirical analysis and international best practices. Finally, Tourism Economics has vast experience quantifying the economic impact of new tourism attractions and evaluating the merits of proposed tax concessions.

Tourism Forecasting. Our economists have developed tourism forecasting models with proven track records[4]. The reason is straightforward; our models are firmly-rooted in the economic drivers of origin markets along with the changing profiles of destinations and travelers. These forecasts are used to inform the investment and marketing decisions of our clients.

What We Do. Applying cutting-edge[5] economic and quantitative tools to our analysis, we draw on the latest research, an investment in global data collection and a suite of time-tested models to assemble the facts and findings for your decisions. We help you interpret this knowledge and present you with clear messages in clear language.

Tourism Decision Metrics. Tourism Decision Metrics is a desktop market intelligence software[6] developed for market strategists, scenario planners, tourism analysts and capital investors within both public and private sector organizations. TDM is a dynamic tool for international market analysis with data and reports covering 180 countries. The database includes 10-year forecasts based on Oxford macroeconomic model for every major origin and destination pair; over 30,000 indicators of tourism activity with details on purpose of trip and visitor spending. In addition, the platform provides tourism "dashboard" reports[7] and economic briefings for all major markets. The tool itself allows for easy analysis to answer a variety of questions of importance to a destination.

Where should I invest marketing?

Where should I limit my exposure[8]?

Where should we look for future growth opportunities?

Who are my emerging competitors within key markets?

Which are the highest yielding markets?

What does the economic outlook say about tourism prospects over the next 3, 5, and 10 years?

What would the effects be of a shift in tourism policy, a change to the economic outlook, or an external shock to the sector?

Tourism Economic Impact. The economic importance of tourism to a destination is commonly underappreciated and extends well beyond core hospitality and transportation sectors. *Tourism Economics* offers a solution to destination marketing[9] organizations (DMOs) and to industry associations that marries rigorous methodology and compelling communication to raise the profile of tourism as an economic engine.

Our approach combines visitor survey and industry data to provide maximum credibility and to ensure no component of tourism activity is overlooked.

Tourism Economics' impact models also capture the critical secondary benefits to the tourism supply chain and the economic gains through the local spending of tourism wages.

This provides a comprehensive view of tourism-generated sales, production, employment, wages, and taxes. But the best research is only as good as its communication. Our clients enjoy a presentation style of clear and compelling narrative, charts, tables, and maps. In this way, the message of tourism's importance is clearly conveyed and our clients' objectives are realized.

Our staff has completed nearly one hundred tourism economic impact studies for cities, states, regions, and countries across the world. We have also assessed the impacts of particular sectors such as aviation, film, and cruising.

Our team possesses particular experience developing Tourism Satellite Accounts[10] (TSAs) as ratified by the UN as the global standard for measuring the economic value of tourism. Our staff has implemented Tourism Satellite Account research for over two-dozen clients over the past decade, significantly raising the profile and understanding of tourism's role in the economy.

Tourism Forecasting. Invest in growth markets. This is a simple axiom that necessitates market forecasts. Our tourism economists have developed forecasting models to predict travel demand for every major global market and particular traveler segments. More important, these models have established proven track records for accuracy. The reason is straightforward; our models are firmly-rooted in the economic fundamentals of origin markets along with the changing dynamics of the tourism industry and traveler preferences.

We have built rigorous tourism forecasting models for clients in the US, Caribbean, Europe, Asia, and the Middle East. The purpose of these models is to identify short and long term growth opportunities, enabling our clients to invest in expanding markets.

Tourism Market Strategy. *The Tourism Economics* team has tracked the relationships between economic trends, tourism supply, and actual tourism demand. To assess our clients' market opportunities, we evaluate market share, economic growth, demographic shifts, traveler preferences, advertising response rate, high frequency leading indicators, pricing, industry costs, and risk factors**.**

Our (and your) competitive advantage is the application of Oxford Economics' renowned models for over 170 countries to predict tourism activity. These tourism models produce concise, actionable market metrics including:

Market size and share
Visitor preferences
Predictive economic indicators
Risks
Competitive threats
Market potential indices

Tourism Economics then offers our clients tailored recommendations on how best to capitalize on opportunities and control risks for the most relevant traveler and geographic segments.

Project Feasibility Analysis. *Tourism Economics'* ongoing analysis of tourism flows and economic dynamics provides a foundation for project feasibility analysis[11]. Our quantitative approach answers key questions: will the market support a proposed tourism attraction[12] or facility? What does a reasonable scenario of market demand imply for cash flow, profitability, and return on investment? What is the competitive market? We have conducted this analysis for resorts, condominium hotels, sports events, museums, and retail centers in the US, Caribbean, and Middle East to secure financing, gain government approvals, and adjust development scopes.

Project Economic Impact. A visitor attraction – whether it be a new resort, a sports event, or a museum – can deliver substantial economic benefits to a local economy. Tourism Economics measures the value of these benefits for developers and governments considering public-private partnerships.Our analysis weighs the direct and indirect economic impacts of the project in terms of visits, spending, jobs, wages, local production, and taxes and compares this to proposed tax abatements or other government subsidies. On this basis, developers are able to secure favorable terms and governments are able to make responsible economic development decisions. We deliver not only economic impact analysis, but credibility and support in discussions between developers and public officials.

Notes:

1. Metrics – метрики; измерения; система показателей.

2. Economic impact – экономическое воздействие.
3. Funding policy – политика финансирования.
4. Track records – достижения.
5. Cutting-edge – передовой, современный.
6. Intelligence software – интеллектуальная программа.
7. “Dashboard” reports – Excel панель отчетов (позволяет менеджерам получить подробный обзор бизнеса).
8. Exposure – направление, контакт.
9. Destination marketing – маркетинг туристического направления.
10. Tourism Satellite Account – туристический сателлитный счёт.
11. Feasibility analysis – анализ осуществимости (проектных решений).
12. Tourism attraction – объекты, привлекающие туристов.

Text 35
MANAGEMENT

What is management? What do managers do? How do I manage? These are standard questions that most of us in the management profession have been asked more than once. And questions we asked once in our careers too. Here, then, is a basic look at management.

Art and Science. Management is both art and science. It is the art of making people more effective than they would have been without you. The science is in how you do that. There are four basic pillars: plan, organize, direct, and monitor.

Make Them More Effective. Four workers can make 6 units in an eight-hour shift without a manager. If I hire you to manage them and they still make 6 units a day, what is the benefit to my business of having hired you? On the other hand, if they now make 8 units per day, you, the manager, have value. The same analogy applies to service, or retail, or teaching, or any other kind of work. Can your group handle more customer calls with you than without? Sell higher value merchandise? Impart knowledge more effectively? etc. That is the value of management – making a group or individual more effective.

Basic Management Skill #1: Plan. Management starts with planning. Good management starts with good planning. Without a plan you will never succeed. If you happen to make it to the goal, it will have been by luck or chance and is not repeatable. Figure out what your goal is (or listen when your boss tells you). Then figure out the best way to get there. What resources do you have? What can you get? Compare strengths and weaknesses of individuals and other resources. Will putting four workers on a task that takes 14 hours cost less than renting a machine that can do the same task with one worker in 6 hours? If you change the first shift from an 8 AM start to a 10 AM start, can they handle the early evening rush so you don't have to hire an extra person for the second shift? Look at all the probable scenarios. Plan for them. Figure out the worst possible scenario and plan for that too. Evaluate your different plans and develop what, in your best judgment, will work the best and what you will do if it doesn't.

Basic Management Skill #2: Organize. Now that you have a plan, you have to make it happen. Is everything ready ahead of your group so the right stuff will get to your group at the right time? Is your group prepared to do its part of the plan? Is the downstream organization ready for what your group will deliver and when it will arrive? Are the workers trained? Are they motivated? Do they have the equipment they need? Are there spare parts available for the equipment? Has purchasing ordered the material? Is it the right stuff? Will it get here on the appropriate schedule? Do the legwork[1] to make sure everything needed to execute the plan is ready to go, or will be when it is needed. Check back to make sure that everyone understands their role and the importance of their role to the overall success.

Basic Management Skill #3: Direct. Now flip the "ON" switch. Tell people what they need to do. It is like conducting an orchestra. Everyone in the orchestra has the music in front of them. They know which section is playing which piece and when. They know when to come in, what to play, and when to stop again. The conductor cues each section to make the music happen. That's your job here. You've given all your musicians (workers) the sheet music (the plan). You have the right number of musicians (workers) in each section (department), and you've arranged the sections on stage so the music will sound best (you have organized the work). Now you need only to tap the podium lightly with your baton to get their attention and give the downbeat.

Basic Management Skill #4: Monitor. Now that you have everything moving, you have to keep an eye on things. Make sure everything is going according to the plan. When it isn't going according to plan, you need to step in and adjust the plan, just as the orchestra conductor will adjust the tempo. Problems will come up. Someone will get sick. A part won't be delivered on time. A key customer will go bankrupt. That is why you developed a contingency plan in the first place. You, as the manager, have to be always aware of what's going on so you can make the adjustments required. This is an iterative process. When something is out of sync[2], you need to plan a fix, organize the resources to make it work, direct the people who will make it happen, and continue to monitor the effect of the change.

Is It Worth It. Managing people is not easy. However, it can be done successfully. And it can be a very rewarding experience. Remember that management, like any other skill, is something that you can improve at with study and practice.

Notes:

1. Legwork – работа, связанная с хождением по разным местам, разъездами.
2. Out of sync – не скоординировано.

Text 36
HOW TO BE A BETTER MANAGER

By F. John Reh

Here are some key skills and abilities that help anyone be a better manager.

Need For Good Managers Increasing. The need for good managers is not going away. It is intensifying. With ‘flatter’ organizations[1] and self-directed teams becoming common; with personal computers and networks making information available to more people more quickly; the number of raw managers[2] needed is decreasing. However, the need for good managers, people who can manage themselves and others in a high stress environment, is increasing. I believe anyone can be a good manager. It is as much trainable skill as it is inherent ability; as much science as art. Here are some things that make you a better manager:

As a person:

You have confidence in yourself and your abilities. You are happy with who you are, but you are still learning and getting better.

You are something of an extrovert. You don’t have to be the life of the party, but you can’t be a wallflower[3]. Management is a people skill - it’s not the job for someone who doesn’t enjoy people.

You are honest and straightforward. Your success depends heavily on the trust of others.

You are an includer not an excluder. You bring others into what you do. You don’t exclude other because they lack certain attributes.

You have a ‘presence”. Managers must lead. Effective leaders have a quality about them that makes people notice when they enter a room.

On the job:

You are consistent, but not rigid; dependable, but can change your mind. You make decisions, but easily accept input from others.

You are a little bit crazy. You think out-of-the box. You try new things and if they fail, you admit the mistake, but don’t apologize for having tried.

You are not afraid to “do the math”. You make plans and schedules and work toward them.

You are nimble and can change plans quickly, but you are not flighty.

You see information as a tool to be used, not as power to be hoarded.

Take a look at yourself against this list. Find the places where you can improve and then get going. And, if you need help, remember that's what this site is all about helping new managers get started and experienced managers get better.

Note:

1. Flatter organization – плоская структура организации.
2. Raw (manager) – необученный; неопытный.
3. Wallflower – аутсайдер.

Text 37
TEN THINGS TO DO TODAY TO BE A BETTER MANAGER

Listed below are ten things you can do to become a better manager. Pick one. Do it today. Pick another one for tomorrow. In two weeks you will be a better manager.

1. Select the best people. As a manager, you are only as good as the people on your team. Give yourself a better chance to succeed by picking the best people from the start.

2. Be a motivator. Human beings do things because we want to. Sometimes we want to because the consequences of not wanting to do something are unpleasant. However, most of the time we want to do things because of what we get out of it. It's no different at work, people do good work for the pay, or the prestige, or the recognition. They do bad work because they want to take it easy and still get paid. They work really hard because they want to impress someone. To motivate your people better, figure out what they want and how you can give that to them for doing what you want them to do.

3. Build Your Team. It is not enough that people are motivated to succeed at work. They have to work together as a team to accomplish the group's objective. After all, if we just want them to "do their own thing" we don't need you as a manager to mold them into a team, do we?

4. Be a Leader, Not Only a Manager. You have built the best team from the best employees available. You motivated them to peak performance. What is missing? Motivating a team is worthless unless you provide direction; unless you turn that motivation toward a goal and lead the team to it. It is the ability to lead others that truly sets a manager apart from their peers. Remember that leaders are found at all levels of the organization, so be one.

5. Improve as a Communicator. Communication may be the single most important skill of a manager. After all, all the others depend on it. You can't be a leader if you can't communicate your vision. You can't motivate people if they can't understand what you want. Communication skills can be improved through practice. Here are two exercises you can use to improve your ability to communicate effectively.

6. Get Better At Managing Money. To stay in business, a company has to make money. That means bringing money in the door and it means spending less than you bring in. Depending on your function in the organization, you may have more influence on one area or the other, but you need to understand both. You can help your company, your employees, and yourself be getting better at managing the company's money.

7. Get Better at Managing Time. The one thing you will probably have less of at work than money is time. The better you get at managing time, yours and others, the more effective you will be as a manager.

8. Improve Yourself. Don't focus so hard on your people that you forget about yourself. Identify the areas in which you are weak and improve them. The fact that you are reading this article shows you understand the concept. You need to put it into practice.

9. Take a Break. You are less effective as a manager if you are over-stressed. You are less tolerant. You snap at people more. No one wants to be anywhere near you. Take a break. Give yourself a chance to relax and recharge your batteries. Your increased productivity when you return will more than make up for the time you take off. Have a good laugh or go lie on a beach somewhere.

Management is a skill that can be learned. You can improve as a manager by working every day to get better.

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Никонова Ирина Владиславовна

АНГЛИЙСКИЙ ЯЗЫК

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