UNIVERSITY OF ŽILINA

TRANSCOM 2011

9-th EUROPEAN CONFERENCE
OF YOUNG RESEARCH AND SCIENTIFIC WORKERS

PROCEEDINGS

SECTION 9

SECURITY ENGINEERING
FORENSIC ENGINEERING

ŽILINA June 27 - 29, 2011
SLOVAK REPUBLIC

UNIVERSITY OF ŽILINA

TRANSCOM 2011

9-th EUROPEAN CONFERENCE
OF YOUNG RESEARCH AND SCIENTIFIC WORKERS

under the auspices of

Ing. Eugen Jurzyca
Minister of Education, Science, Research and Sport of the Slovak Republic

&

Prof. Ing. Tatiana Čorejová, PhD.
Rector of the University of Žilina

SECTION 9

SECURITY ENGINEERING
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TRANSCOM 2011
9-th European conference of young research and scientific workers

TRANSCOM 2011, the 9-th international conference of young European researchers, scientists and educators, aims to establish and expand international contacts and co-operation. The main purpose of the conference is to provide young scientists with an encouraging and stimulating environment in which they present results of their research to the scientific community. TRANSCOM has been organised regularly every other year since 1995. Between 160 and 400 young researchers and scientists participate regularly in the event. The conference is organised for postgraduate students and young research workers up to the age of 35 and their tutors. Young workers are expected to present the results they had achieved.

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The Efficiency of Biometric Systems in Fight against Terrorism

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Abstract. The paper is oriented in the positions of the reasonableness of biometric systems in fight against terrorism and gives a comparative overview of Rudmin's [10] and Kirkpatric's [7] analysis of the efficiency of biometric systems in fighting against terrorism. In the paper we can find a summary of the controversial Rudmin's analysis which summarized that terrorist's identification on the basis of biometric technology is not effective. Research is limited to the case study of implementation of biometric systems. In this paper, original research questions based on assessments regarding the applicability of biometrics in fight against terrorism are highlighted. Some of the most important guidelines for original scientific research are exposed which is essential to understand the importance of biometrics in fight against terrorism. Biometrics are a constantly changing technology (hardware and software), also they include the vulnerability of information systems and approaches to terrorism and threats. Based on a literature review (supporters of biometrics on one hand and an opponents of biometrics on the other), we define the fundamental questions for further scientific research which includes reliability of biometric systems as a basis of personal data protection at biometric identification.

Keywords: terrorism, biometry, efficiency

1. Introduction

Biometrics is the science of identifying the identity, on the principle of natural body characteristics such as fingerprint, face, voice, iris (static biometrics) or behavioral body characteristics, such as walking, signature, dynamic typing (dynamic biometrics). The main domain of biometrics is to provide authentic and qualitative evidence in personal identification/ authentication [3]. Enhancing the mobility of the population and consequently the related globalization of terrorism require a global increase in the availability of information which can identify people at the local level. We need to ensure credible and readily available information and consider their possible confidentiality. Interventions in human rights and fundamental freedoms are limited by the principles of necessity, appropriateness, down in the law. An individual must be provided adequate protection against tampering (repressive) State authorities in privacy.

The usability of biometric systems for any identification system, and for full security, flexibility, and long-term system life, is highly recommended in fight against terrorism [4]. Terrorists can be followed only by means of biometrics [7]. Biometric systems are a constantly changing technology (hardware and software), the vulnerability of information systems and approaches to terrorism and threats [2]. The contribution is oriented in the positions of the reasonableness of biometrics systems in fight against terrorism.

There are many factors and motives leading usage of personal identification systems which have to be safe, reliable and easy to use. Under the system of information protection roles and responsibilities involved in the security system of a country shall be specified [9]. At the stage of risk management it is necessary to take all necessary control procedures that might represent potential risk which must be reduced to minimum or eliminated.

2. New topics on the global security scene

In the global space, biometrics is increasingly gaining in importance as a scientific discipline. Identification systems are designed for use as a safety mechanism at the inlet of real or virtual space which at the same time can also enter the territory of a country when it is necessary to confirm the authenticity or identify the person.

The importance of biometric systems (the identification) in recent years has increased in Slovenia, as well as in the European Union and worldwide. On one hand it is a strategic question for both Slovenia and geopolitical connections which include EU, NATO issues of security and potential increasingly important terrorist attacks. At the same time it is also important for Slovenia to harmonize standards to apply to the standards valid in this area accept for the inclusion in NATO. In the field of biometrics there are also a considerable number of foreign researches. In Slovenia biometric technology is currently used in most of the private sector for the purpose of building entrance. At the national level it is so far the only known project to introduce biometric travel documents where identification is based on a fingerprint. It is necessary to maintain control of key technologies related to providing security and movements of citizens. Strategic interest of Slovenia is not only the security aspect of biometric systems. Given that this is a global trend, the expected expansion and strong market in this area as well as the opportunity to contribute to economic growth through commercialization of such systems. The emergence of information technology has presented endless possibilities for match-ups involving old and new technologies and among new and advanced technologies [14].

2.1. Conflicts between biometry and human dignity

The conflict between aspirations to security through constantly improved biometric identification and respect for human dignity inspired scientists to provide researches of biometric systems security analysis.

There is a point of question “What price must be paid to make life safer?”. Ethically speaking, what is the best use that can be made of this biometric identification? Are we not deluding ourselves by thinking that each person's freedom can be protected by identifying other people at the time when the individual technical traceability already exists as far as everyday surveillance is concerned? The aim of biometric technology is to make sure that the person who claims a certain identity does exist. Also there is a slippery slope leading from identification to identifying behavior and therefore personality there does appear to be a certain risk or even a natural inclination.

2.2. Risk of abuse

When data are collected, the purpose must be clearly and precisely stated, explained and justified, which implies that the authority or organisation which is proceeding with the collection must be precisely identified. The securing of consent is the essential principle to observe when collected the biometric data. The principle is violated when collected the identifying data without the subject's knowledge (remote iris photography, remote electronic registration) or when consent is not required, as it is the case in England, to sample a hair, a fingernail or saliva. In France, the need for consent to sample genetic material is included in Code Civil in articles 16.10 and 16.11 [8], is a systematic collection of laws designed to comprehensively deal with the core areas of private law. It was recently negated by the law to the effect that refusal to comply with a request for sampling is an offence of French National Consultative Ethics Committee on Health and Life Sciences [1]. The very principle of consent is therefore overturned and normally this should encourage greater caution and more meticulous attention to the way in which samples are taken and the identifying data is used and stored.

Strict respect for the purpose at hand is vital and any confusion between identification and information of personal nature must be avoided. A considerable amount of data can be used for

other purposes than those for which it was originally intended thus enabling pervasive and close supervision of people, their movements and activities.

3. Biometry efficiency analysis

3.1. Rudmin's analysis

The effectiveness of biometric methods of identification and mass surveillance, and their use in catching terrorists has given, but there are also skeptics [10]. The presentation sets out an analysis based on Bayesian theorems are carried out. Results of the survey as interpreted, to worry about indicating the ineffectiveness of identification systems. Therefore are high investments (of investors) (security services, state security agencies, police, army, etc.) in identification systems for monitoring and combating terrorism meaningless? What is therefore likely to happen provided the individual is really a terrorist if mass surveillance identifies him or her as a terrorist? Analysis assumptions; when the probability is equal to 0, then the identified individual are not a terrorist. When the probability is equal to 1, then each found a suspected terrorist and certainly very real terrorist. If the probability of 0.5 (50%–50%), then control is as effective as throwing a coin. Whether someone is a terrorist or not is a completely random decision. To calculate the Bayes' theorem[1] another three assumptions are needed;

- Share of terrorists in the population.
- The probability that a mass surveillance identifies the real terrorists.
- The likelihood that innocent citizens are wrongly identified as terrorists.

According to the U.S. census 300 million people live in the USA. There is assumption that 1000 terrorists live in the U.S., which in his opinion is a rather high estimation [10]. This means 1 terrorist per 300,000 people. The next assumption is that the effectiveness of mass control is 0.4, which means that the mass surveillance identified 40 % of real terrorists. Even this assumption, is too high because the terrorists can avoid scrutiny and are therefore more difficult to be identified by means of mass control systems. The third assumption is that the rate of misidentification equals 0.0001 (0.01 %) then innocent people are wrongly identified to be terrorists, although they are not. The result is 30,000 innocent individuals and 400 real terrorists.

Taking into consideration these assumptions and the Bayesian calculation we find that the probability an individual is a terrorist, if mass surveillance identifies him or her as a terrorist is only 0.0132 [10]. This is very close to zero and very far from 1. Based on these assumptions and on the calculation we can conclude that the mass surveillance to catch terrorists is inadequate. What are the different assumptions? Let us assume that the effectiveness of mass control is 0.7, which means that the mass surveillance identified 70 % of real terrorists. In this case the probability that individuals are terrorists if mass surveillance identifies them as terrorists is still only 0.0228. This is also very close to 0, and the likelihood is very far from 1. Furthermore we assume the effectiveness of mass surveillance to be 0.9 which means that the mass surveillance identified 90% of real terrorists. The rate of misidentification is 0.00001 (FAR–False Acceptance Rate), which in this case means that in the U.S. there will be only 3000 innocent people wrongly identified as terrorists. Regarding these assumptions, the probability is still only 0.2308, which is much worse than throwing a coin.

When is mass surveillance efficient? Only in the case when the actual percentage of terrorists in the population is high enough. Instead of 1000 actual terrorists in the United States it will therefore be assumed that there are a million of terrorists. In this case, the proportion of actual terrorists is 0.00333, the probability that an individual is really a terrorist, if mass surveillance identifies them as a terrorist is 0.99. This is already very close to certainty [10].

Is biometry useful only in unrealistic, paranoid assumptions (a million terrorists in the U.S.)? And if this paranoid assumptions are not met, will there actually be a lot of innocent individuals

[1] Bayes' theorem is a simple mathematical formula to be used for conversion of the conditional probability of certification (testing) subjective claims (hypotheses).

wrongly accused of a terrorist attack, it should be mentioned that in the U.S. this is clearly already happening, for example lists of unwanted air passengers "No Fly" lists, etc.)? Also there is another option; mass control may not be aimed at identifying terrorists, but finding individuals who are not as rare as terrorists [10]. Search for terrorists among 300 million Americans is therefore mathematically impossible. But implementation of the same biometric technology for mass political control of citizens can mathematically be very effective.

3.2. Kirkpatrick's findings

"The only way to trace a terrorist is through biometrics [7]. The FBI, which has more than 75m fingerprints on its criminal and civil computer records, is adding biometric details from suspects detained in Iraq, Afghanistan and elsewhere. We are obtaining DNA from terrorists around the world as we encounter them.

British police give access to US intelligence databases containing DNA samples, fingerprints and digital images of thousands of foreign nationals seized around the world by the US as terror suspects. As the war on terror increasingly comes to rely on biometric technology – the use of physical characteristics unique to individuals such as iris pattern, DNA and fingerprints to verify identify – western civilization police and intelligence agencies are drawing up plans for sophisticated biometric databases which would allow them to share sensitive information [5].

4. The research questions-baseline

The conceptual framework of these paper suggests that research supported activities may have intended and unintended effects upon the biometric system and that these effects may enhance system performance (in terms of improving accessibility, reliability, efficiency and quality) or detract from it. Based upon the conceptual framework of research, there are multiple levels at which the effects of the biometric system against fighting terrorism could be measured. These include:

1. Is catching terrorists by the use of biometric methods for mass surveillance really (mathematically) impossible and meaningless?
2. Can mass surveillance of total population effectively detect terrorists?
3. What is the position of mathematical science based on Rudmin's statistical results obtained in realistic operating environment?
4. Can biometric methods for mass surveillance successfully detect globally-known terrorist (as recorded in all worlds' databases) even though an individual was identified as a terrorist on local level and managed to escape sophisticated identification system? How is the safety of personal data considered in relation to other systems?
5. Is psychologist-philosopher Rudmin's strictly mathematical view of the use of biometric identification systems suitable to demonstrate functional reliably of biometric systems in fight against terror/terrorism?

Regarding mathematical-statistical evaluation of the usefulness of the system it would be appropriate to take into consideration the following parameters:

- statistical reliability-Reliability,
- statistical – stochastic efficiency of the system (serving) – efficacy
- frequency characteristic of the current failure λ (t),
- frequency of inspections carried out by the biometric system in comparison with other
- legacy systems (card, ID card, etc.),
- the availability of biometric system vs. other identification system, which available (smart
- card, ID card, classic passports, etc.),
- error – possibility of identification (FAR, FRR, etc.),
- forgery of biometric identifiers,
- speed of identification and

- ability and speed of “cloning” of identity (identity theft).

The current research will focus upon identifying and measuring process effects within the biometric system and measures of system performance, and to some degree service utilization and coverage of non-focal effects.

5. Conclusion of Rudmin’s analysis vs. Kirkpatric’s findings

Rudmin presented the analysis of the usability of biometric systems in very sociologically biased [10]. On this basis of analysis concludes that the systems of mass surveillance to catch terrorists are useless. Rudmin also recognizes the third option that Secret Service just wasted taxpayers’ money and justified its existence. Is the money spent on something else? And if somebody asks for the results of their work, you can always hide behind “national interests”.

Analysis does not take into consideration many of the effects on life safety which implementation of biometric systems to combat terrorism should bring. It is necessary to highlight the importance of integrity displaying qualitative and quantitative parameters, respectively. Indicators of performance and security of the biometric identification system are based on a practical platform [7].

There are issues of biometric efficiency security system, but it is essential to process from the viewpoint of protection of personal data. Question: “How much security for how much privacy?” It is very important to explore identification systems for mass surveillance. The review of literature can be traced to a multitude of studies dealing with current identification technologies in the context of privacy. The research is based on assumptions, on the right to privacy, but it is rarely based on the results of qualitative or quantitative scientific approaches. With further research we will try to set the level of knowledge of the technology for mass surveillance, and associated legislation in Slovenian (European) area. Due to lack of knowledge of biometrics and inadequate legislation of biometric technologies for personal identification use we can foresee many opportunities, both in economic terms as research in public administration as well as in business segment.

6. Discussion and Further research

The technology is primarily aimed at finding terrorists and automation of the process of personal identification that also intervenes in our lives and privacy. Further research should be based on:

1. Quantitative methods of statistical analysis (surveys processed in SPSS, etc.), the study of social acceptability of identification systems. We want to make a survey on the population of different age groups and degrees in relation to knowledge of the technology for mass surveillance and an awareness of the effects of price controls for security,
2. Scientific research work in the field of reliability engineering and statistical evaluation of results of the applied biometric system that developed terms of efficacy and safety. Survey parameters: FAR (False Acceptance Rate), FRR (False Rejection Rate), reliability (Reliability), efficiency (Efficacy) and characteristics of the current frequency of failure λ (t) will be presented. Within this research qualitative assessment of the statistical parameters that affect the safety and effectiveness of a biometric system and their interaction in real system operation also will be presented.

The identification of individuals on the basis of more characteristics should ultimately contribute to optimal identification/authentication of individuals. The reasons for failures due to biometric identifications can generally be attributed to collection problems (due to problems with the operator, subject, collection devices, or software), or to intrinsic characteristics of the subject. This distinction is important, because failures due to collection problems can be lessened or eliminated with better quality control, but failures due to intrinsic characteristics of the subject limit

the effectiveness of that biometric [12]. The impact of poor data quality can be reduced in various ways, many of which depend on effective methods of automated data quality measurement [13]. Also it should be simpler to restrict access to space (real-virtual space, buildings, it might also be a country, or security of protected information. An integrated biometric performance and network queuing model along with the airline schedule and passenger counts could be used to effective visualize and determine acceptable matcher operating points and needed staffing [11]. Some generic image quality metrics can be effective when used in assessing biometric sample quality, such as the use of an image's spatial frequency power spectrum as a measure of quality [15].

Research design achieves multifaceted positive impact in the use of biometric systems that can be remitted to the practical and theoretical contribution to science. The survey results will be available to support decisions on amending the Law on the use of biometric systems. Enhancing the mobility of the population and consequently the related globalization of terrorism requires a global increase in the availability of information which can identify people at the local level [6]. Currently the field of personal identification representing: Europe 80% of the market, smart cards represents 15% of Asia, North America, only 5% (other biometrics). In response to this trend it is expected to increase the use of biometric systems for identification in the EU.

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Measurement of Contact Potential and Their Application in Security Industry

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Abstract. This contribution thesis deals with measurements of contact potential on the chosen surface with the usage of scanning mechanism. It is mainly focused on the construction of suitable devise used for measuring of contact potential on different surfaces and papillae lines, which are on the inner sides of our fingers.

Keywords: Contact potential, Scanning mechanism, Fingerprint

1. Introduction

This article describes basic attributes of electric current. In more detail characterize charge and its conduct in electric current and methods of calculation of its potential. Important aspect of work is using this acquired knowledge in security technologies, rather in person biometrics identification. More precisely, this can include links to the field of fingerprint data. Fingerprinting is now a widely used method for identification of individuals.. For its evaluation is used a lot of methods, which will be described in this article. But the method, which will be researched in this work, is the new one in this filed.

The next part of the article is dedicated to fingerprints methods, their axioms and using. It is also consider their division according axiom of function. More closely describes biological processes caused finger- print and describes relativity of constancy, nonrecurring and indissolubleness. In this dissertation includes knowledge about fingerprints expertise, which makes it possible to compile and analyze biological individuality of identified person.

The last part of the article is addict to measurement of the contact potential. This research consists in repeatable measuring contact potential for chosen metals with different structure of the surface with using different bits.

2. Contact potential

Contact potential is a scalar quantity, not scalable. Difference of potential between any two points (i) and (f) of the electric field is equal to the difference of the value of potential energy per unit charge at the following points:

$$\Delta\varphi = \varphi f - \varphi i = \frac{Ep, f}{Q} - \frac{Ep, i}{Q} = \frac{\Delta Ep}{Q} \tag{1}$$

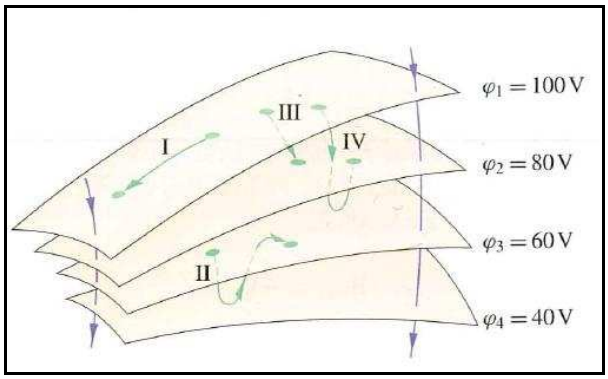

Fig. 1. Equipotential surface

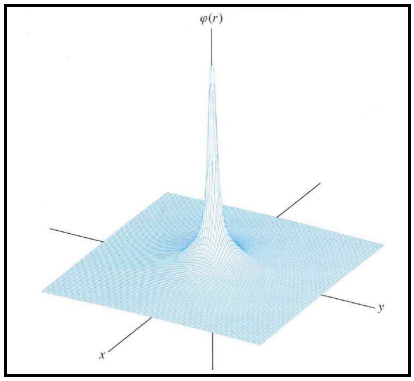

Fig. 2. Course of electrical potential

3. Fingerprints

Fingerprint is the doctrine, which explores the impressions of shapes of papillary lines (inside the fingers, palms and soles) and stop in which the ridges appear. Fingerprints are the oldest techniques of criminology disciplines dealing with identification of persons. Identification of persons through fingerprints is based on the existence of ridge lines that are created in some parts of human body surface. This is the inside of the fingers, palms, feet, hands and fingers.

All fingerprint data base of criminology is based on physiological knowledge about the human skin. If we look at our skin from the inside of the phalanges of the hands or toes, we find that there are grooves on it to create complex shapes. We call the ridge (see figure below). The spirit and essence of ridges is not yet fully understood. Probably it is associated with tactile grip and limb function. They are continuous, raised reliefs, whose height is about 0.1 to 0.4 mm and width of approximately 0.2 to 0.7 mm. These lines are crossed each other, changing direction, fork and join, interrupt, etc., and involves a variety of shapes, which are called dermatoglyfes.

Fig. 3. Ridge

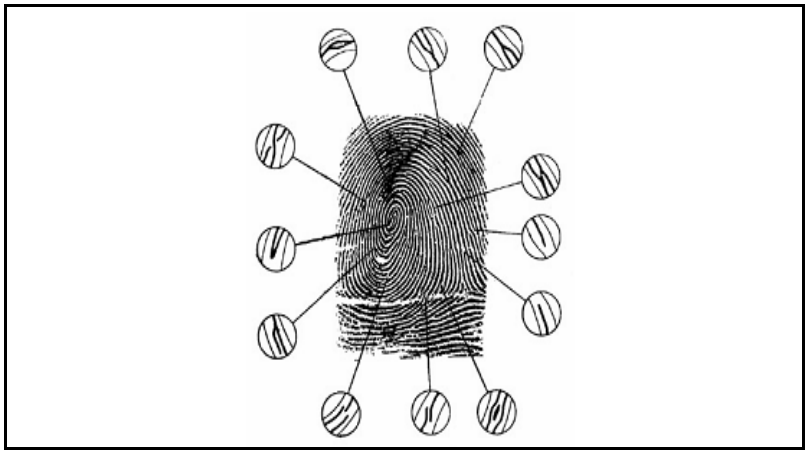

Fig. 4. Special ridges

4. Measurement of contact potential

4.1. Measurement of contact potential on the coin

Test will be the subject of coins (1 FORINT), in which repeated measurements detect the potential of the materials from which coin are consist. Further measurements detect potential migration of these metals. The first series of measurements to provide a basis for applying the method outlined in security technologies, specifically fingerprint data.

Fig. 5. Sensing part

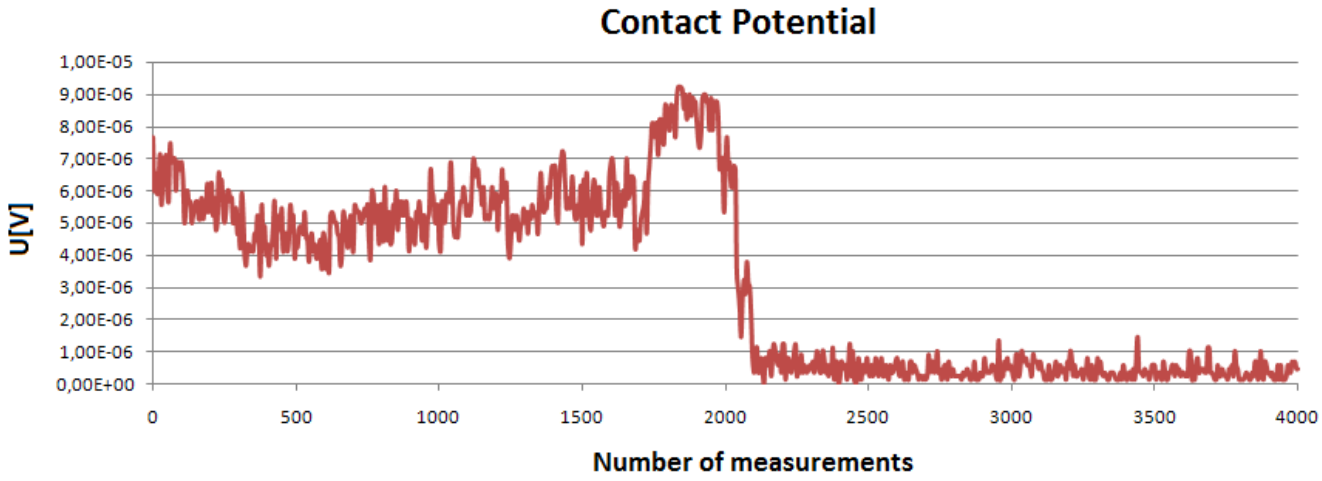

Fig. 6. Contact potential shift (measurement)

4.2. Measurement of the ridge line of contact with potential

In the last part of the practical potential measurements will be investigated for stainless steel ridge area. The premise is that the impression created on the desktop, leaving a trail (ridge) is so strong that it can be measured using this measuring device.

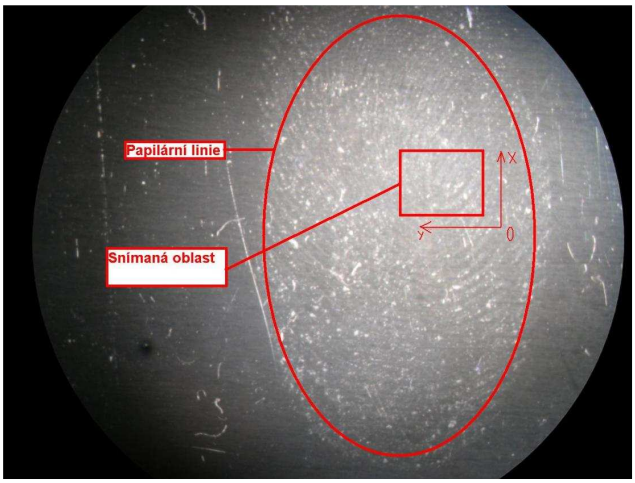

Fig. 7. Sensing part

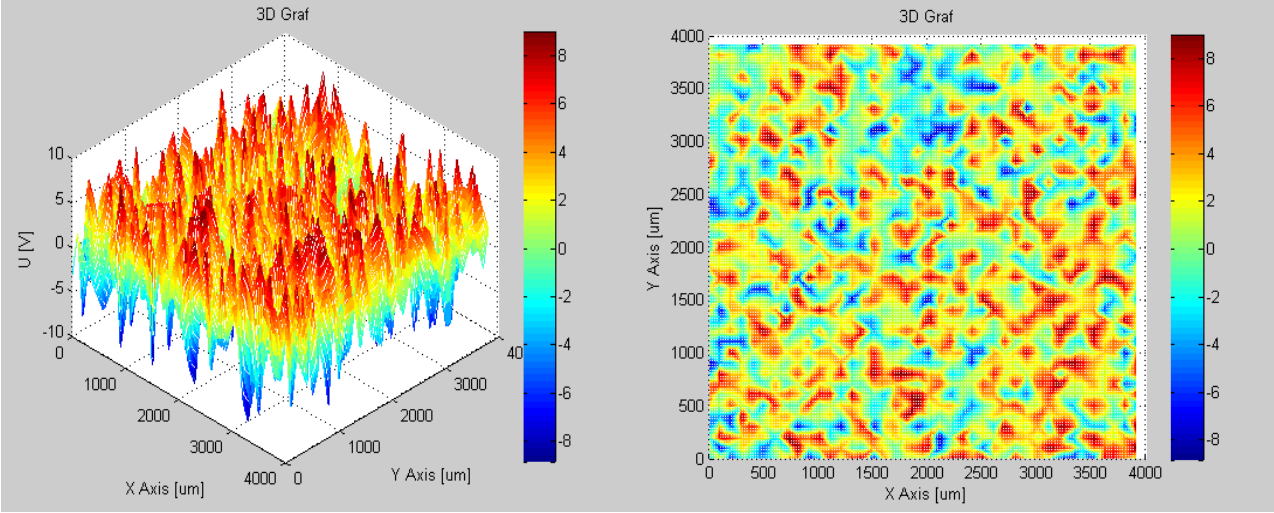

Fig. 8. 3D View ridges

5. Conclusion

The first measuring was focused on a copper coin of. Measurement of contact potential copper tipped released the first test surface (Cu) with a tolerance of 10%. In the second case, the measurement tip deviation was significantly bigger. The second measurement was scanned portion of the iron coins. It achieved similar results as the first measurement. The third measure was a combination of the first two. Used tip panned transition of these two materials in section (copper and iron). The results show how it changes the contact potential of these two metals. Last measurement captures ridges that were created fingerprints on stainless steel surface. These lines were recorded in three axes (x, y, z). The results showed too many errors and I would like fingerprints not recommend this method.

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Analysis of Automotive Vehicle Protection Systems in the Field of UNECE Regulations Requirements

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Abstract. In the paper, the deeds – UNECE regulations and EU directives, requirements of which must be met by protection system before its introducing into distribution or installing in automotive vehicle, are presented.

Keywords: homologation, automatic alarm receiver, diagnostics, evaluation of conformity

1. Introduction

The paper presents the principle of homologation of the group of electrical engineering and automotive electronics. Conditions of selected researches of conformity with the UNECE Regulation No. 97, entitled: “Uniform provisions concerning the homologation of alarm systems (VAS) of vehicles and vehicles with regard to their alarm systems (AS)” are shown in the example of alarm systems.

2. Homologation of products in the free market

The rules of certification and conformity evaluation of products, which the activity may endanger the safety of users, are often insufficient for product groups of particular interest where reliable operation can decide on the health and even live of users. Such products, with specific technical requirements are covered by the "old approach directives" called sectoral directives. This group includes selected vehicle electrical and electronics devices, automotive systems, data transfer systems, aviation equipment and other.

The specificity of the conformity evaluation of products such groups is to broaden the parameters tested, increase requirements and perform additional formal. Such a procedure is called the homologation process. Homologation system common to all EU countries is based on a network of national institutions, which task is to supervise the correctness of the system with respect to certain product groups inside the country. The Ministry of Infrastructure deals with homologation of electrical engineering and vehicle electronics in Poland.

The tasks of homologation authority include issuance, extension and revocation of homologation, in cooperation with accredited testing laboratories and the supervision of business trade in the area of approval.

In their legislation, Member States accept governing the records of homologation and homologation requirements for the possession of the individual products. The necessity of homologation of vehicles and their components is determined in Poland by the Law on Road Traffic, which article 68, par. 1 reads: "The manufacturer or importer of new motor vehicle, farm tractor, motorbike, tram or trailer and the objects of their equipment or parts is obliged to obtain for each new type of vehicle, object of equipment and parts homologation certificate issued by the minister responsible for transport".

The manufacturer or importer of a new vehicle which is subject to mandatory homologation shall apply to the competent institution of homologation of the device with the application for approval, including presenting the results of confirmatory testing of the product's compliance with regulatory requirements.

Such researches can be done only in specially approved (notified) testing laboratory, which have an appropriate technical and human resources (for example Laboratory of Car Electrical Engineering at the Kielce University of Technology).

It is entirely irrelevant whether the homologation will be issued on the basis of sectoral directives of the European Commission or the rules of the European Economic Commission of the United Nations. There is also no matter which Member State granted the homologation, or which of the authorized laboratories did the research. The international principle of multilateral recognition of the documents is valid. The procedure for homologation of products in the European Union is shown in Figure 1. Devices which are traded goods should be clearly marked with homologation number. Failure to comply with this requirement, or the marketing of unapproved products entails a prohibition on the sale.

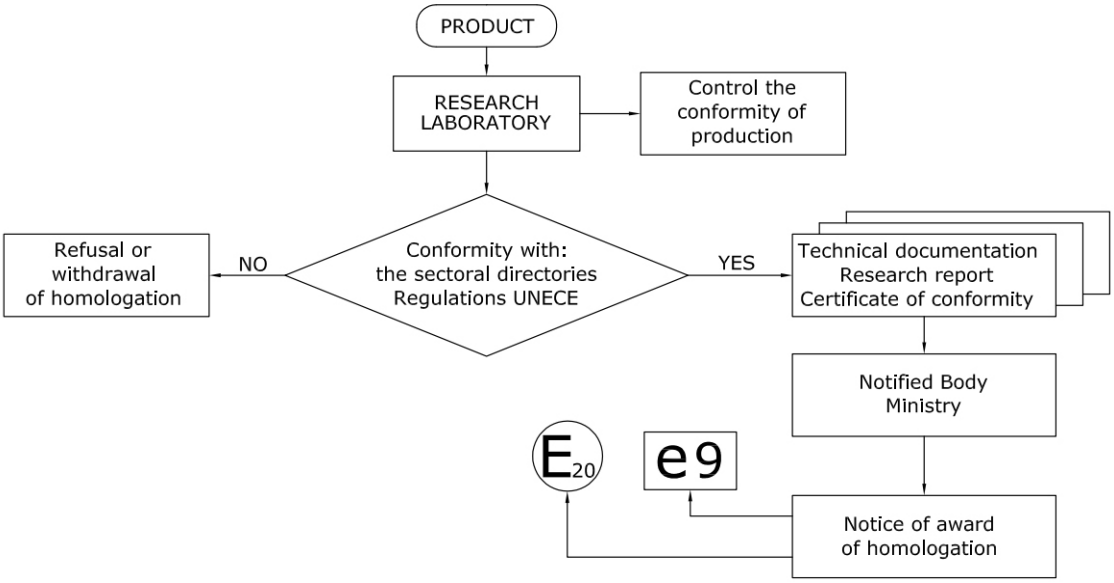

Fig. 1. The procedure of homologation in the EU.

3. Study of some parameters of alarm systems

According to the requirements of European standards, every motor vehicle must have a lockable door lock and factory-fitted steering wheel lock. This lock is usually combined with ignition switch used as the main switch of wiring and starter switch. This standard set of security in practice does not constitute any difficulty to a thief.

Electronic anti-theft systems, and various electro-mechanical device limit the effect of theft and are currently used by all producers, but their effectiveness changes. The principle of maintaining the design of security devices in secret has contributed to reducing the amount of stolen cars.

The most common way of securing vehicles by the manufacturers is to use the transponder that is electronically coded key. In this solution, there is no inertia of action, even though many of the exchange of data occur between the transponder and the receiving aerial located in the vehicle. Figure 2 shows electronic anti-theft systems of motor vehicles.

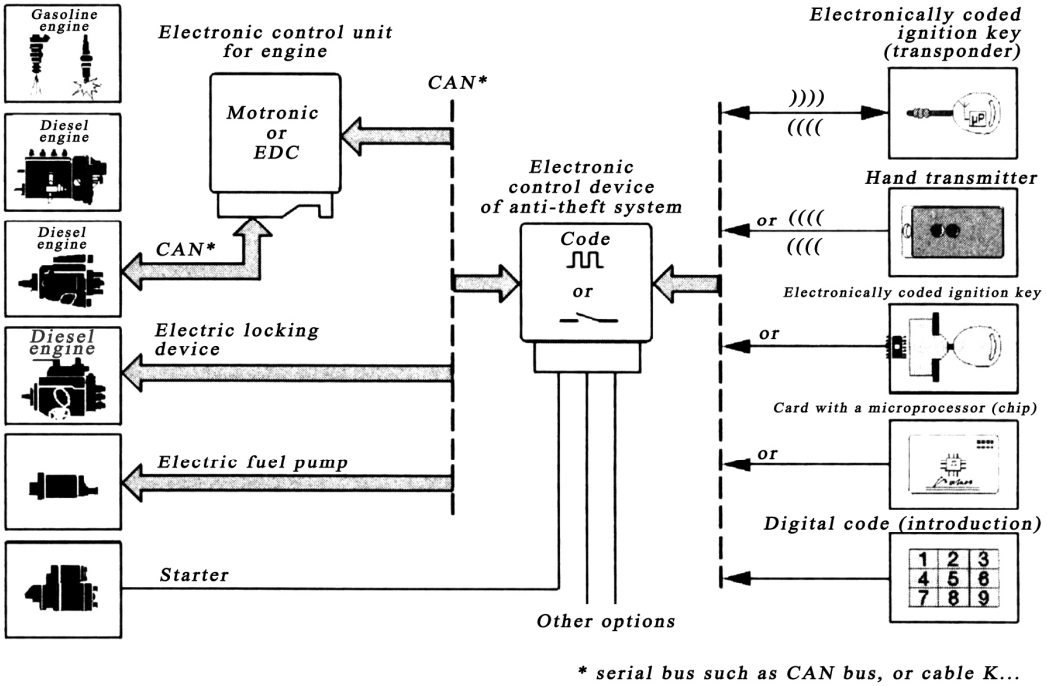

Fig. 2. Methods of action of electronic anti-theft systems [1].

The protective circuit includes transmitter placed in the car key (transponder) and receiving aerial of lock signal. Aerial reads the transponder signals from the system and control device processes information. The system is closely linked to the engine work control device. When you try to start, the vehicle's transponder sends a coded signal to a control device which analyzes the signal. If the signal is correct, control unit sends to the transponder its own special, alternating coded signal produced by a special generator. Alternating coded signal starts computational process in the transponder and the control device performs computational process simultaneously. If the results of calculations that the transponder and control unit exchanged between them are the same, the lock is released allowing the ignition.

Security system must meet the requirements of UN / ECE Regulation 97th to secure the vehicle effectively and safely.

The research program of alarm systems according to the Regulations includes:

1. General requirements (section 5 – subsection 5.1 ÷ 5.10 R-97/ECE)
2. Specific requirements (section 6 R-97/ECE)
3. The parameters of action and research conditions (section 7 - subsection 7.1 ÷ 7.2 R-97/ECE)

Remote control research (radio controls) and measuring the energy consumption of a system in an active state are significant in terms of safety and effectiveness of the vehicle security.

Remote control research (radio controls)

Remote control must meet the requirements of ETSI standards (European Telecommunications Standards Institute) according to point 5.3 R-97/ECE. The frequency should equal 433.92 MHz and maximum radiation power 25 mW.

Research are carried out for conformity with the essential requirements regarding the use of radio frequency spectrum in accordance with the requirements of ETSI EN 300 220-1 V1.3.1, ETSI EN 300 220-3 V1.1.1, and ETS EN 300 113 relating to the parameters of the radio interface for short-range devices working in the frequency of 433.05 MHz to 434.79 MHz. *Note. Regulation of the Minister of Infrastructure of 6.08.2002r. Appendix No. 1 Frequency ranges and parameters of the devices for general use.*

Remote control are the short-range radio controls of category AR0, emitting a radio signal with variable codes (encoder Keeloq) by pressing the buttons on the housing. An example of the range and results of the radio remote control test is presented in the Table 1.

Tested parameter	The measurement result	The test result
Nominal frequency	433.892 MHz	compatible
Deviation of frequency for operating voltage (limit values of ± 43.94 kHz)	28 kHz	compatible
The maximum radiation power	10.2 μW (-19.91 dBm)	compatible
Emission band of the transmitter at: -36dBm (limit values from 433.05 MHz to 434.79 MHz)	433.33 ÷ 434.27 MHz	compatible
Undesirable emissions in the range to 4GHz (for devices operating at frequencies below 470MHz.)	below: - 36 dBm	compatible

Tab. 1. An example of the range and results of the radio remote control test.

Energy consumption in normal conditions should not exceed the average value of 20 mA for a complete alarm system on-state with the gauge of state, according to subsection 7.2.7 R-97/ECE. Verification is carried out in standby mode (on-state) and in neutral state, with all sensors and all the elements of the system on-state. Sample results are an average of five measurements and it is given in Table 2.

No. device	Current consumption [mA]	
	Neutral state	Standby
1	7.1	19.9
2	7.1	19.7
3	7.0	19.9

Tab. 2. Sample results of the measurement of current consumption by the system.

The tested device can obtain a certificate of homologation in case of meeting all requirements specified in the Regulations.

4. Conclusion

The main task of the homologation process is to ensure the reliability and safety of using, particularly in commonly used groups such as motor vehicles manufactured in the millions series. The quality of internal communication systems has a great importance particularly in the vehicles due to the extensive use of the information technology. Until recently neglected, a problem of electromagnetic compatibility of components and whole systems has recently become a matter of great importance. This involves both the resistance to environmental influences and low emission of their own interferences. The need for external supervision of product quality is not always properly appreciated, especially by manufacturers. However, such supervision is necessary and introducing it to the system must be flexible in responding to technical and legislative changes.

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[4] Regulations No. 97 UNECE (UN / ECE) *Uniform provisions concerning the approval of vehicle alarm systems (VAS) and of motor vehicles with regard to their alarm systems (AS).*

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Analysis of Fire-fighting Deficiencies Influencing the Rate of Fire-fighting Intervention in the City's Housing Development

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Abstract. The fire is always a function of time, it means that the longer the time elapses from the start of the fire, increases not only the area affected by fires, but also the damage by fire that will occur on the property of citizens and particularly increases the risk of injury or killing people in rescue. To minimize the risks or completely eliminate them depends on rapid and effective intervention of fire fighters. This requires the elimination of all factors which could frustrate such intervention. The article addresses the analysis of gaps in the speed and effectiveness of fire-fighting action on urban neighborhoods. Illustration is given for the amount of penalties that may be legal, employed physical persons fined if found in their offense.

Keywords: assembly area, access road, fire hydrant, penalties.

1. Introduction

In determining the actual fire conditions and implementation of the intervention on several urban neighborhoods in the Slovak Republic a few constantly repeated deficiencies were found. For our purposes those deficiencies can be divided into:

- exterior,
- interior.

For a small scope of this article we will concentrate on in exterior residential home deficiencies.

2. Unmarked and busy boarding area for fire equipment

According to [1], the assembly area is a permanently open area that serves the onset of fire brigades and the location of firefighting equipment for conducting the intervention. One of the basic conditions for carrying out rapid and effective intervention is to ensure conditions for its continued freedom. However, given the lack of parking spaces especially in large housing estates, people park wherever they can find free space. These open areas, where people illegally park obstruct the boarding area, and also access roads, of which we'll discuss the issue further (fig. 1). To avoid this problem it is necessary that all the boarding areas are marked as prohibited and to monitor its compliance. Marked boarding areas however, are the exception rather than the rule, most of them are not marked at all.

According to [2], § 59, paragraph 2, letter d), any legal, people or business obstructing the assembly area are required to be identified and reported to enable perminant vacation. In this event they can be fined up to 16,596 €.

Fig. 1. Busy boarding area for fire equipment.

Amounts are for individuals in [2], § 61 paragraph 2 letter a) says that if a person commits an offense on the fire prevention team, have failed to observe the stated prohibitions and orders relating to fire protection, may be reprimanded or fined up to 99 €. This means that anyone who leaves thier car in the assembly area may if found guilty under this Act, be reprimanded or fined.

Among some of the big problems is the seemingly thoughtful planting of trees along the frontage of buildings (fig. 2), which over time not only grow up but also in width. Thereby preventing use of the assembly area to conduct rapid fire-fighting from outside the building. Although trees may be cut out which interven the fire brigade, this extends the time necessary for effective firefighting operations. This delay may result in risking persons rescued the effects of fire or increase the damages caused by fire.

Fig. 2. Planting of trees along the frontage of buildings.

3. Blocked access roads

Access roads should be according to [1], the minimum passable width of 3.5 m. The access road, also used for car parking should remain free as per the passable lane width. Although most access communication conditions meet the minimum width, for lack of parking spaces where parking is permitted unilaterally, cars are parked on both sides (fig. 1). Therefore blockage of these places falls below the permissible level. Therefore fire and heavy machinery have no opportunity to pass around them.

One of the possible alternatives can be unblocked communication usually parked cars, thereby creating sufficient space for the passage of fire fighting techniques. This however can only be used with a small number of cars, because it is time-consuming to deal with the situation. A greater number of cars may cause a delay which later could be fatal for vulnerable people.

Another option to unblock the communications is usually long-distance transportation of water from where it is still possible to get the technology up to the point of intervention. Use of these options may not solve the problem regarding parking cars. If we want a comprehensive deal, it is necessary to consider the possibility of block or multi-storey parking garage to address the shortage of parking spaces. If the citizens will be able to park their car somewhere else, not forced to violate the rules and stand in the places reserved for another purpose.

To determine the amount of the fine in this case it shall proceed according to [2] § 61 paragraph 2 letter a), which means that even in this case, car owners can be repramanded or have imposed a fine of up to 99 €.

Legally people conducting business that obstruct access roads are also under [2], § 59, paragraph 2, letter d), issued a fine of up to 16,596 €.

4. Unmarked and broken fire hydrants

Fire hydrants are divided into above ground and under ground. In terms of above ground fire hydrants their biggest problems are caused by rusting valves, which subsequently can be very difficult to open or not open at all. Here comes into play the possibility of finding another hydrant. This problem interferes hinders the firemen and is quite often encountered. Therefore, their functionality rely on a certainty and that they never need to supply water to the place of action themselves.

Underground fire hydrants have particular problems with their tags, which in most cases are completely absent. For this reason, a car is often parked right over them or close to them. Designation of a under ground hydrant should be in accordance with [3], ie placed on a embedded firm platform with vertical pole of 1.8 m, or the same amount placed on the building at a distance of 6 m from the underground hydrant. Has dimensions 70 mm x 140 mm, is facing the hydrant and it is indicated the distance in meters to the nearest tenth of a meter from the hydrant. Most signs are still located in housing estates which are is outdated, unreadable or less visible (fig. 3). May often be lost in the repair of the facade and completely removed. In time of stress that occurs when intervention may be difficult to find such a table, thereby extending the time that we need to ensure water supply for fire fighting. This causes serious problems especially in winter when the place of the under ground hydrant may be hidden under the snow.

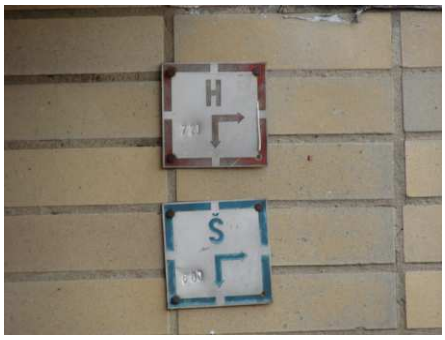

Fig. 3. Outdated sign fire hydrant.

These hydrants can also be overlaid with asphalt pavement repair either partially or completely. This is due to lack of coordination with the water company or managment of under ground hydrants and other such devises.

Frequently the lack of consideration finds the outlet location of underground hydrants in the middle of intersections, busy roads or in areas designated for parking. Hydrants placed according to [3] incorrectly located, which may result in the need for their unavailability.

A person who parks their car and so prevents the use of a Fire and rescue corps underground hydrant for fire-fighters may be according to [2] § 61 paragraph 3 letter b), rebuke or they can be fined up to 165 €.

Employed or legal persons, under whose administration the overhead and underground fire hydrants are covered by [2] § 59 paragraph 1 letter e), the obligation to maintain them functional otherwise they can be fined up to 8,298 €.

5. Dead-end street

Many of the streets in urban neighborhoods are built as dead-end streets (fig. 4). This particular solution is to ensure appropriate conditions for conducting the fire intervention. In the intervention itself or after its completion there can be a problem with turning the large-scale firefighting equipment such as fire ladders and platforms. In order this rotation, which would be very difficult to ensure sufficient turning radius, it is preferable to solve this problem with negotiable communications. Fire vehicles are thus not only able to avoid the rotation, but this can also prevent congestion that can cause obstruction of other vehicles, waiting for departure. It is also the possibility of arrival at the intervention site from two directions which is preferable because that way we can reduce the risk of blocked communications in half. In several streets, which are intersecting each other, we can reduce this risk even more.

Fig. 4. Dead-end street in urban neighborhood.

6. Conclusion

Many users and operators of facilities know that such facilities exist around their buildings but have no idea at all of their use and therefore, do not even realize their illegal conduct when those communications are used for purposes other than those proposed. Therefore they should educate themselves on their function, location, and the basic requirements imposed on them also to point out the shortcomings which may occur in their use. We have delivered our findings weighed the arguments that support the legislation, and are devoted to this issue, also addresses the amount of fines that may be legal, employed and persons for their unlawful conduct imposed.

Deficiencies, which are described in the work are only the most common of several that have been observed in the controls. In addition to these it is possible to mention other significant shortcomings, such as. Poorly or not at all unmarked streets, permanently blocked entrances to homes and etc..

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Forms and Organizing Supply of People by Drinking Water

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Abstract. In the article is solved problematic of supply of people by drinking water. In the article is characterized transport technology. Deal with technology as cisterns or other means.

Keywords: Drinking water, forms of supply, organizing of supply, supply for the population with drinking water.

1. Introduction

By constant weather of change, more and more growing and by multiplying of crisses situations, is considerabic amount of quality drinking water contaminated or it is completely loosed. Results of these events can arrive loss of life (either on the basic human needs – thirst) or can be may to the weakening of human organism with disease from shortage of drinking water. One of the negative consequences of the shortage and quality drinking water is fighting for her.

Some war conflicts have been going on several years. Over the past 50 years came because of shortage of water about 40 armed conflicts, while in 18 of them were involved in Israel. Disputes of Iran, of Iraq and of Syria even in 1974 led to the invasion of Iraq troops into Syria and destroyed the dam reservoir, has been holding water for the Iraq territory.

2. Forms of supply

Supplying of drinking water in Slovakia is solved by public water systems, where public water can not building of the different reason (whether it was poor water pressure or is difficult to accessible location) at the time commute to organization population by spare supply with tankers or other means. On Figure 1 is illustrated the possible forms of supply population with drinking water.

At the inception of crises situation is necessary change the system of supply by drinking water. Under crises situation in field of supply population with drinking water is understanding that status, when there to decrease yield of water source. Elimination public water or spare supply may be to crisses situation.

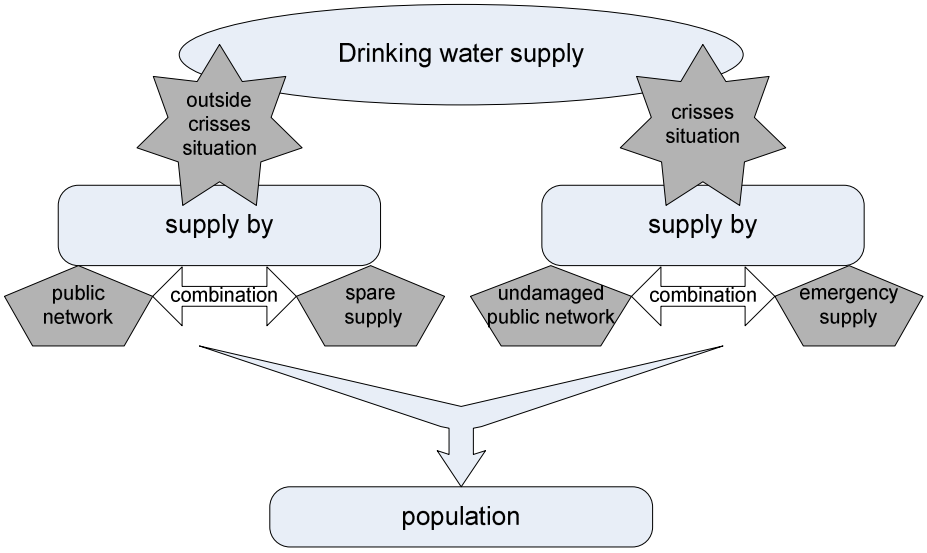

Fig. 1. Forms of water supply.

Into main causes occur crises situation may include natural disasters, unprofessional activities with public water, with transport means serving to the transporting drinking water for population, with unprofessional manipulation in fuelling and emptying water cistern, sabotage etc.

Public supply with water can be excluded from operation owing to:

- destructive activities:
  - destruction of pipeline,
  - destruction of the accumulation reservoir,
  - disruption tank or treatment of drinking water,
  - to prevent transport of drinking water to population,
- contamination of drinking water route for supplies or on route to drinking water and the subsequent disabling consumption of food and drinking purposes,
- extremely adverse weather conditions (high temperatures and to decline in stocks of raw water to produce drinking water of low temperature.

According to the scale of disposal of public supply with water is to distinguish other possible supply with drinking water. On Table number 1 is characterized, what of supply is necessary for different shortage of drinking water.

The main idea of the emergency supply with water is the way to solve optimal supply the drinking water in the crisses situation. Its main task is to ensure the necessary quantity of the desired quality of drinking water and provide sufficient means of transport.

System of supply	Characteristic
Public supply	set of object and equipment serving the public need, the mass supply of the population (it supplies more than 50 persons or supplying with water, which has an average minimum dose of 10 m^3 per day) and other customers with water
Spare supply with drinking water	form of water supply in case of interruption or restriction of water supply from public supply shall be conducted at locations, where can be built the public supply regular distribution of drinking water carried by cisterns the supplier intended schedule for opinions on the abstraction of drinking water consumers into their own hands
Emergency supply with drinking water	form of dealing supply with water to form crisis situation form of supply drinking water, which provides supply drinking water for only a minimum level needs of drinking water purpose is to provide the necessary amount of water required qualities, when to current water supply system is completely or partially broken

Tab. 1. Characteristic supply of drinking water

3. Organizing supply

It is therefore necessary to determine a sequence for handling a crisis situation. In this part of the solution of emergency supplies through mathematical relationships.

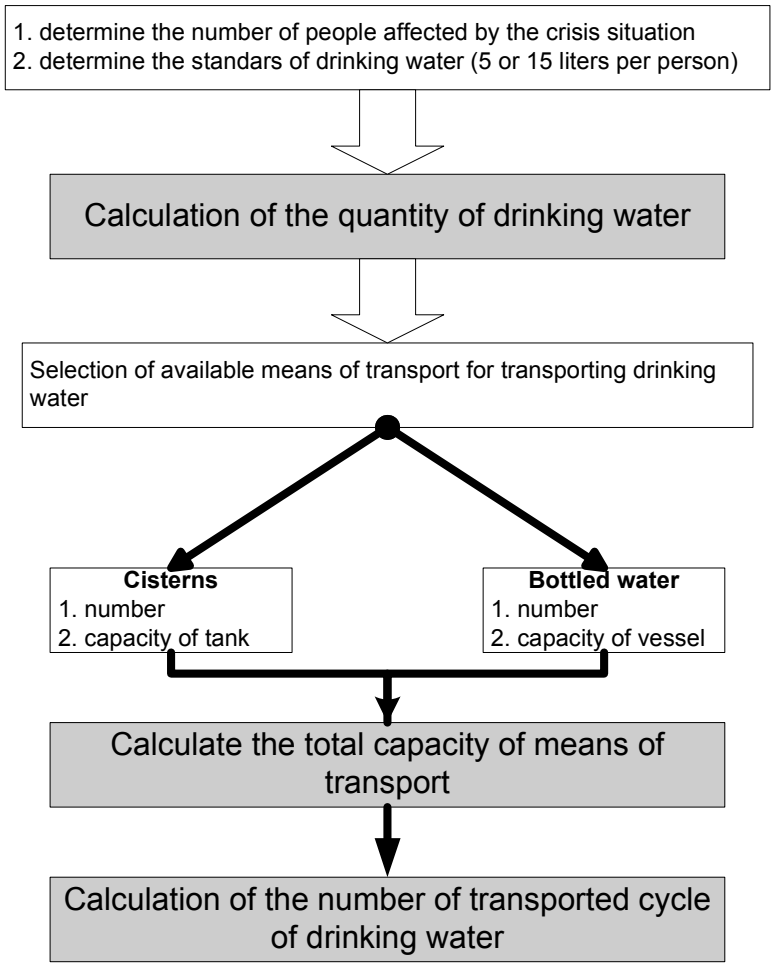

Fig. 2. The sequence of steps for calculating the quantity of drinking water, capacity of means of transport and number of cycle.

Necessary quantity of drinking water for populations affected by the crisis situation is determined by [1]:

$$V_{NZ} = n_{os} . V_N \quad . \tag{1}$$

Where V_{NZ} - capacity of water for emergency supplies in m^3,

n_{os} - number of supplied people affected by crisis situations,

V_N - standardized amount of water consumption per person in liters (the first 3 days it is 5 liters per person, the next day 15 liters).

Emergency supplies with drinking water solved in terms of transportation of drinking water by means of transport may be provided by different types of this means. These means of transport are classified cisterns (includes cistern trucks, cistern trailers, cistern semi-trailers, exchange containers – next only “cisterns” and other means) (Figure 2).

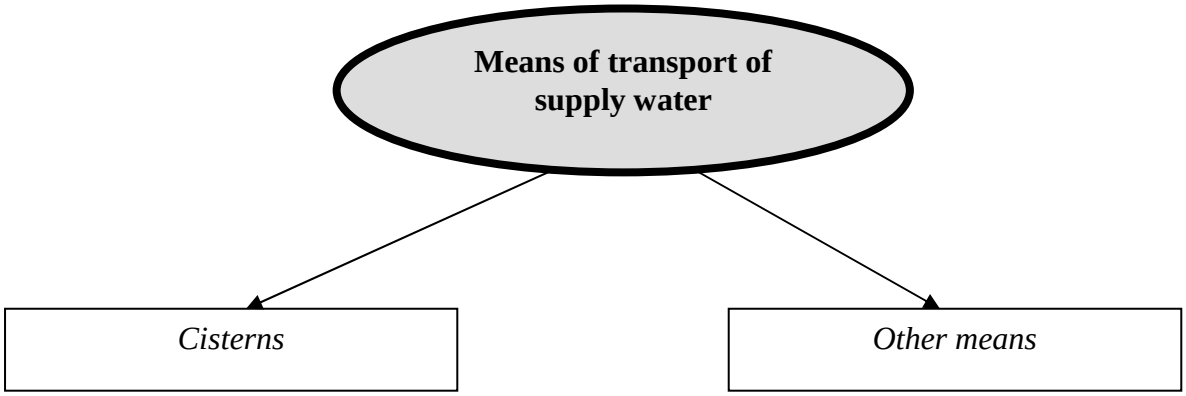

Fig. 3. Part of means transporting the drinking water.

Among the requirements for cisterns vehicles need to include:

- the greatest transport capacity of cisterns cars for efficiency transport,
- good driveability driving in difficult terrain,
- only cisterns, which are designed to carry of drinking water.

Most popular means for carrying drinking water are cisterns means, there having a greater capacity of transported drinking water. This means of transport are in many cases supplies used as the first. Frequently used cistern cars belong CAv-11, CKV-7, CAV 12 AQUA.

If you use bottled water can carry drinking water on plastic bottles or containers with a capacity of 0,25 liters to 15 liters. By emergency supplies the peoples will be transported mainly depend on:

- capacity of used containers,
- shape and dimensions of loading area,
- useful weight of the truck,
- driveability of the mean in difficult terrain.

To be able to calculate the total capacity of means, choose the number and type of means. To determine total carrying capacity of the mean is determined by the following relationship [2]:

$$V_V = \sum_{i=1}^{m} n_{vi} . V_{Vi} \quad . \tag{2}$$

Where:
V_V - total capacity of the means carrying drinking water (m^3),
m - number of types of means,
n_{vi} - number of means i-th types,
V_{Vi} - capacity of the i-th types of mean carrying drinking water (m^3).

By cisterns means get of their total capacity carried drinking water. When bottled water get of the space laden areas of composition, which is designed for carrying bottled drinking water. Within the bottled water is most commonly used variety, which are loaded cylinders holding 2 and 5 liters.

Using the relation [2] we can calculate also a combination of capacity cistern cars and means carrying bottled water.

To determine the appropriate number of cycle, which must pass the means transporting drinking water, is expressed in the relationship [3]:

$$x = \frac{V_{NZ}}{V_V} . \tag{3}$$

Where:
x - number of cycles,
V_{NZ} - total capacity drinking water determined on emergency supplies (m^3),
n_{vi} - number of means i-th types,
V_{Vi} - capacity i-th types means (m^3).

For the specific example I show, what is the difference in the quantity supply of drinking water in selected countries of the EU.

To assess the amount of transport means I chose a fictitious crisis situation, which resulted was the damage of public water network. Supply with drinking water must be ensured for 10 days for 11 600 people in the city Bytča in Zilinaer region. To calculate the required number of drinking water use relationship [1]:

		Day					
		1.	2.	3.	4.	5.	6 and more
State	SVK	58 000 liters per person			174 000 liters per person		
	CZE	58 000 liters per person		116 000 liters to 174 000 liters per person			
	GER	must, as you can			46 400 liters per person		174 000 liters per person

Tab. 2. Calculation of fictitious minimum benefits of drinking water in different countries

In Table 2 the calculated total amount of drinking water supplied to 11 600 population for every day. Consider the fourth to six day, the calculations suggest that:

- SVK should deliver 522 00 liters,
- CZE is supplied from 348 000 to 522 000 liters,
- GER only 313 000 liters of water to population.

Comparison of the observed data, I concluded, that if the city of similar size as Bytča in Germany, accupies last place in the quantity of the drinking water, but itmust not be that maximum drinking water seeks to achieve in the first three days. For comparison, Slovakia and Czech adds the first three days only 5 liters.

To be aware that, unlike 5 liters per person, which is between Slovakia and Czech at 11 600 people listed in the fictitious example of the difference up to 174 000 liters of drinking water. The amount of water used in the SVK on the sixth day converted into capacity cistern techniques, for example, type CKV-7 and CAV-11 used to supply.

Following amendments to respect the values I get [2]:

$$174000 = n_{V1} \cdot 7000 + n_{V2} \cdot 11000$$

Relationship [2] I found, that the number of pieces of equipment needed to provide transportation is:

n_{v1} = 17 pieces CKV-7,

n_{v2} = 5 pieces CAV-11.

In this case a problem occurs with many techniques that can be ensured. Thus many techniques designed to supply operators do not. The city Bytča the number 11 600 is the maximum number of cistern techniques, which may be counted as two or three pieces. If follows that the techniques used in this quantity must make a number of cycle, brought to the requzred quantity of drinking water.

One of the major preconditions for the calculation is to solve the temporal aspect supply population with drinking water.

In terms of time duration of one cycle of the car (turnover) is an expression of the relationship [4]:

$$t_o = t_j + t_{nv} + t_{č} \qquad (4)$$

Where:
- t_o - turnaround time car (min),
- t_j - driving time car (min),
- t_{nv} - time loading (implementation) and unloading (discharge) car with water (min),
- $t_č$ - total time waiting car (min).

Using relation 7 should still make time driving (relationship 5) a time loading and unloading (relationship 6).

$$t_j = l.n_{čj} = \frac{l^p}{\beta} n_{čj} = \frac{l}{V_t} = \frac{l^p}{V_t.\beta} \quad (5)$$

Where:
- t_j - driving time car (empty and loaded, too) (min),
- l - total distance traveled by car (km),
- $n_{čj}$ - standard time for one kilometer driving car ($km.h^{-1}$),
- l^p - distance transport (km),
- β - coefficient of utilization runs (without dimensional),
- V_t - technical speed car ($km.h^{-1}$).

$$t_{nv} = q.n_{čvn} = \frac{l^p}{V_t.\beta} + K.\gamma.n_{čnv} \quad (6)$$

Where:
- t_{nv} - time loading and uloading car (min),
- q - weight of freight transported by car (t),
- $n_{čnv}$ - standard time of loading and unloading one ton ($h.t^{-1}$),
- l^p - distance transport (km),
- V_t - technical speed car ($km.h^{-1}$).
- β - coefficient of utilization runs (without dimensional),
- K - useful weight car (t),
- γ - coefficient of utilization of transport capacity of car (without dimensional).

Relationship (6) is a solution for the case of means of transport carrying bottled drinking water, this relationship can also be reshaped to the cistern.

4. Conclusion

The biggest problem is very poor and inadequate transport equipment operators drinking water supply. This is mainly on technology, means of transport, which is only a few, but they are obsolete and in poor condition. Upgrading the technology we have brought the issue of improvement I drinking water supply.

Another problem in infrastructure in some cases is very difficult to get to places with means of transport carrying potable water, for example of the unacceptable road traffic due to crisis situation. As municipalities, which led to her only one access road, which was destroyed, then the use of techniques designed for the carriage unrealistic. In such a situation should also use air and water transport.

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Organizational Dynamics in Emergency Response

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Abstract. Article deals about organizational dynamics in emergency response. Organizational compositions of emergency respondents are unique for each emergency event. It depends of many factors. In this paper I am focused on dependencies between emergency characteristics and organizational composition of emergency response.

Keywords: organizational adaptation, attributes of emergency, organizational composition of emergency respondents

1. Introduction

Every emergency is characterized by its unique occur, suddenly and rapidly changing nature. Because there are no emergencies which reflect the same sequence of events, there is also a complex and difficult issue to create such an organizational composition design of Emergency Management elements and adequately secure emergency response.

Organizational dynamics of emergency response is dependent on the nature and attributes of the emergency, where its multidimensionality is given by its uniqueness. On the other hand, the elements involved in emergency response have different competence, responsibility, knowledge and capabilities, information and information systems.

2. Organizational Composition of Emergency Response

Organization of emergency response can be defined as unique composition of emergency management elements and their interrelationships at a particular time and place, enabling effective response to specific conditions of emergency.

At the time before emergency occur has the organization of emergency management static character (organizational structure of Emergency Management) resulting from the valid legislation. After the emergency occurs, however, there is dynamics in the organizational structure, which requires organizational adaptation to emergency.

The basic factor, which determines the composition of the organizational elements of emergency management, is size of emergency. It is very likely that in normal everyday situations such as traffic accidents will be organizational compositions much easier than in the case of natural disasters. Organizational simplicity of the composition can be expressed in a low number of participating rescue services of Integrated Rescue System (for example first respondents as Police, Fire Department or Rescue and Health Service) and so simple interaction between them. Unlike demanding emergencies in size and character, when there are many of elements participating in emergency response (other rescue services of Integrated Rescue System, municipality officers, elements of Civil Protection of governments). In this multidisciplinary dimension of the emergency can be identified a large number of interrelationships between the elements and tasks, mutually between elements and also different degrees of behavior of these elements in emergency response.

Lazo (Lazo, 2004) in his study highlights the importance of creating a flexible structure of the response with a clear identification of roles and responsibilities of all involved organizations and

individuals that would be able to adapt to changing conditions of emergency, but also various types of its. With the details of organizational adaptation in response deals Kreeps and Bosworth (2007), which based their research on the trial of the Disaster Research Center taken in the last 20 years and created the typology of organized emergency responses depending on the (new or old) tasks and (new or old) organizational structure. Bruinsma (2010) deals with organizational dynamics in the context of adaptive workflow and workload elements of emergency management.

3. Complexity of Relationships in Organization of Emergency Response

Complexity of relationships between components of emergency response organization (components are not only natural elements of emergency management, but also the processes, activities and interaction between these components) can be illustrated by a set of question and answers, which are in terms of emergency response core and render the whole emergency response system. In emergency response is necessary to know the answers to simple basic questions (which follow after the analysis of emergency attributes):

- **What must be done?** Within this issue is necessary to define the scope of tasks to be undertaken after the emergency occurs, whose specification is conditional to depth of knowledge (sufficient for a particular case) about the attributes of the crisis. In specifying the tasks is needed to logically distinguish tasks that may be superior (parent) or subordinate (subsidiaries), allowing association of similar tasks into groups and subgroups, making the structure of tasks much easier.
- **Who should perform it?** After determining the scope of tasks, which have to be performed in response, it is necessary to assign tasks to emergency response elements. According to defined roles and group roles of elements and the subsequent assignment of these roles to these elements (or groups) is appropriate to structure under the scope of tasks (depending on the possibilities that emergency offer).
- **When it must perform?** Emergency response expects continuous workflows. It is a time factor expressed sequence of actions that will be the emergency respondents carried out in chronological order.
- **Who has it done with?** This question deals with the interactive aspect of emergency response organizations. Specifies relations between the respondents, who exploit their own knowledge and skills in solving common problems. On the one hand, the answer must take in account of the specific capabilities and assumptions of individuals and groups and on the other hand the state of communication and information infrastructure between these elements.

This questions are basic to know answer in context of emergency response. They confirm complexity of multidimensional system of its components and relations between them, which are regulate according the law (because the performance of emergency management is highly regulated by law).

4. Dependencies between Emergency Attributes and Organizational Composition of Emergency Response

Structural arrangement of respondents and the performance of various activities depend on the characteristics of occurred emergency. There are many criteria for the classification of emergencies according to their attributes, but critical to organizational composition are primarily place of emergency, size and type of emergency, which determine the structure of managing and executive emergency respondents as well as the participation of other government institutions and private sector (Fig.1.).

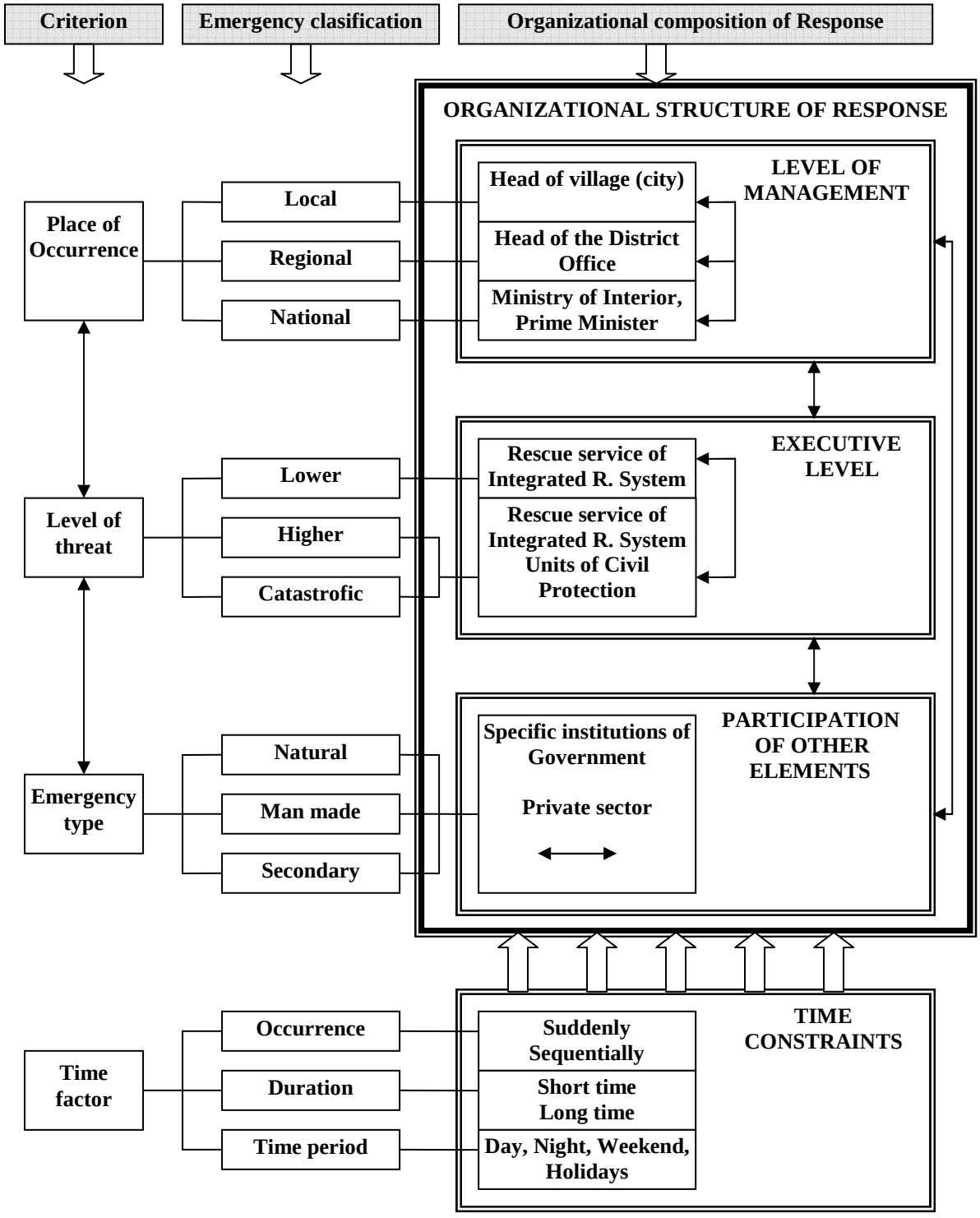

Fig.1. Dependencies between emergency attributes and organizational composition of emergency response

Figure shows the basic links between the nature of the emergency response and organizational composition. Defined structure of the response is an abstract formulation of difficult and complex organizational structure of the whole system of emergency management in the reality. I fragmented it into three elementary components, the level of management, executive level and participation of other elements, which are determinants of the main attributes of the emergency.

Level of management is most often structured by territory of country. Statutory representatives of various bodies of emergency management (village - the head, district office – the head, district office at the regional level – the head, etc.) are crucial in matters of decision-making about taking actions to eliminate or mitigate the consequences of emergencies and have general responsibility of management. Every emergency is allocated in the local level (municipality) and determines the first

responsibility to officials of village or city. If the emergency exceeds the territory of the municipality or the head of village is not able with own forces and means to handle with emergency, the responsibility takes hierarchically higher statutory or his authorized representative (head of the District Office at the regional level respectively head of Department of Civil Protection and Emergency Management), while maintaining mutual cooperation between the various levels of management.

Structure of *executive level* in emergency response is dependent on the level of threat to life, health, property or the environment (intensity and number of endangered elements), which emergency caused. For example, in Slovakia, for the lower level of threat there are rescue works performed by relevant rescue services of Integrated Rescue System on the scene of emergency, which are managed by commander mostly from Fire and Rescue Force. If signs of emergency are widespread or catastrophic, statutory authorities of local and regional government set up an executive advisory bodies of its staff and other professional and substantive elements eligible for receipt of proposals and measures to eliminate or mitigate the consequences of the emergency, so called Emergency Crews (Emergency Committees). If the impact of the emergency is widespread and long-term threats to democracy, legal status and safety of citizens, the responsibility for managing assumes the Security Council at the regional level.

Last type of elements involved in emergency response are those that are not directly involved in emergency management structure (they are not permanent members of emergency crews or committees to deal with emergencies), but their *participation* in the management of the response is taken into account. These elements have specific resources, information or knowledge and execute of their activities can contribute to reducing the negative impact of the emergency. Their participation is a specific in view on the type of emergency and from this perspective can be appropriately assigned to the emergency crews or civil protection units or are in close collaboration with them respectively. It is specific government institutions or the private sector organizations.

Important determinant influencing the organizational structure of the response is the time factor. Sudden occurrence of the emergency limited the participation of all the necessary elements in a particular time and place, while the sequential emergence provides a timeline to deploy the necessary forces and means. Similar constraints are relating to the time period and duration of emergency.

5. Conclusion

Every emergency response is different. Even though that there are identified specific roles and interrelationships between elements of the management and executive levels at the time before the occurrence of emergency, their cooperation and performing of activities is different for different emergency scenarios and organization of elements must adapt not only the attributes of the present emergency but also to changing conditions of its development.

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About the Need of Considering the Basis of Economic Security in Rating System of Euroregions

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Abstract. This paper is focused on the regional development aspects in European Union and the need of its transformation in relation to securing the requirement of improving efficiency and security of allocation, realization and sustainable development of supported projects. In this paper there are depicted some reflections about the actual concepts of regional development, then there is described and assessed a state of regional policy of EU following some reflections about necessity of incorporating aspects of economic security into the mechanisms of assessment and evaluating of euroregions in decision making process about the benefits selected project granted from the expenditures of EU regional policy.

Keywords: Regional policy, economic security, socio-economic development, European Union

1. Introduction

We are living in time of globalizing world economy, at times blurring the differences between the autonomy and functioning of the basic components of socio-economic systems. It's time insisting on the complexity factor perception of present reality and anticipating the future dynamic changes in reality. In principle, we can see an increasing of interdependency among the relatively separated states in all over the world. This, together with basic characteristic of globalization, creates a problem point of future sustainability of the world development. It is possible to identify problem areas of world socio-economic development in big cultural, social, political, religious, linguistic, natural, economic and political differences the most important world regions. At present, we can observe the conflict of two concepts of economic development.

1. Development, encouraging the most developed parts of individual economies at the expense of less competitive regions. This leads to the growing of regional disparities.

2. Harmonious development of all parts of the economic system in an effort to reduce regional disparities between developed and under-developed regions.

Argument for the first approach is that funds invested in the developed region bring many times higher profit than the contribution of funds invested in underdeveloped regions.

Argument for the second approach to the development of economic system is that "strength of the chain is determined by the strength of its weakest link".

In light of current world economic development as a better alternative seems to be building of more relatively independent and functionally connected centres of economic development, along the lines to ensure a balanced socio-economic development. Regional policy of European Union is important serious component of functioning and future development and sense of EU. The Regional policy could be tool for achieving inner stability of socio-economic development as the assumption of developing EU internal as well as external position in wider sized concept of security.

2. Regional Policy in European Union

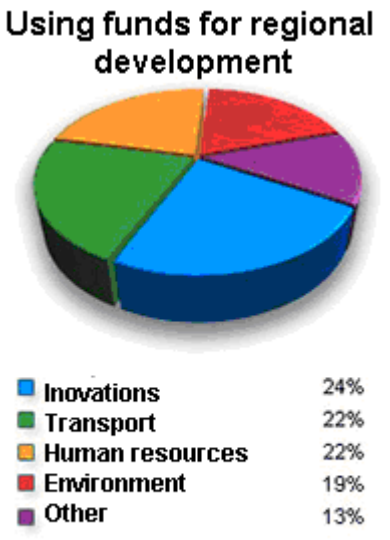
It is possible, in outlined seizing of socio-economic development, to accept EU regional policy as right tool to achieve a development objective by accenting the second concept within the borders of EU. Regional policy is an instrument of financial solidarity and growing force of cohesion and economic integration. The main objective of solidarity is to bring tangible benefits for citizens and regions which aren't such rich than highly developed regions in U.K. or in France. The basis of cohesion is thought, by which we all benefit from the fact that the difference in income and the amount of quality of life between the different areas of EU decreases. Large differences in prosperity levels exist between member states, but also within them. Among the wealthiest areas by GDP per capita (the standard measurement prosperity procedure) are only cities - London, Brussels and Hamburg. The richest country, Luxembourg, is seven times richer than Romania or Bulgaria, the newest and poorest EU members. [1] Dynamic effects of EU membership could, together with specifically focused regional policy, produce positive results. Particularly encouraging is the example of Ireland. Its GDP, which in 1973 (when Ireland joined the EU) represented 64% of the EU average, now is one of the highest in the union. [1] One of the priorities of regional policy is that living standards in countries which joined the EU since 2004, reached the average EU level as soon as possible.

2.1. Causes of Differences

Regional differences have various causes. They could result from long-term handicaps due to geographic remoteness or of recent social and economic changes, or a combination of these two factors. Impacts of these disadvantages are often reflected in social problems, lower quality schools, higher unemployment and inadequate infrastructure. In some member states is part of the problems caused by the previous centrally planned economies.

2.2. Cost of Success

Use EU accession of these member states to reorganize and restructure its regional expenditure. During the years 2007 - 2013 regional expenditure will be 36% of the EU budget, i.e. 350 billion over seven years. EU effort is focused on three goals: a gradual convergence (convergence), competitiveness and cooperation. These goals are essential with cohesion policy. Major emphasis is focused on member states from Central and Eastern Europe. Twelve countries joined the EU since 2004 received of the total regional funding available (for period 2007 to 2013) in amount of 51% until nowadays. [1] A beneficiary can draw funds from three different sources, depending on the type of assistance. European Regional Development Fund (ERDF) funding for programs related to general infrastructure, innovation and investment. ERDF funds are available for the poorest EU regions. The European Social Fund (ESF) funded training projects and other types of assistance in the field of employment, as well as programs to create new jobs. Like the ERDF and the ESF assistance they should require all countries. The Cohesion Fund is intended to finance investment in environmental and transport infrastructure, as well as projects to develop renewable energy sources. Funding from this source is reserved for countries whose standard of living is less than 90% of the EU (for the 12 new member states and for Portugal and Greece). [1] Spain, which had significant benefits from earlier operations of the Cohesion Fund will no longer be eligible for this assistance, in the future.



Source: European Commission

2.3. How These Funds are Used

A significant part of these funds is earmarked for areas with GDP of less than 75% of the EU average. [2] The purpose of expenditures is to improve the infrastructure of these areas and improve their economic and human potential. It is 17 out of 27 EU countries. At the table below we can see operational programmes which are available for Slovak republic in the field of regional development for years 2007-2013.

Regional programmes	Operational Programme Bratislava
	Operational Programme Western Slovakia, Central Slovakia and Eastern Slovakia
Cross-border, transnational and interregional co-operation	Operational Programme Slovakia - Czech Republic
	Operational Programme Hungary - Slovak Republic
	Operational Programme Central Europe
	Operational Programme Poland - Slovakia
	Operational Programme Austria - Slovakia
	Operational Programme South East Europe (SEE)

Tab. 1. Regional Development Programmes in Slovak republic 2007-2013. (Source [3])

Throughout upper mentioned goals of regional policy of EU, we are getting into field of euroregion's problems. In European politics, the term Euroregion usually refers to a transnational co-operation structure between two (or more) contiguous territories located in different European countries. Euroregions represent a specific type of cross-border region.

Official Name of Euroregion	Date of foundation	Countries involved	Capital in Slovakia
Váh-Dunaj-Ipeľ	6/1999	SK,H	Nitra
Beskydy	6/2000	SK,CZ,PL	Žilina
Ipeľ-Ipoly	8/1999	SK,H	Šahy
Bílé-Biele Karpaty	7/2000	SK,CZ	Trenčín
Neogradiensis	3/2000	SK,H	Lučenec
Podunajský Trojspolok	1/2001	SK,H	Dunajská Streda
Tatry	9/1994	SK,PL	Kežmarok
Slaná-Rimava	10/2000	SK,H	Rimavská Sobota
Karpaty	11/1999	SK,H,RO,UA,PL	Prešov
Kras	3/2001	SK,H	Jablonov n/Turňou
Pomoravie	6/1999	SK,CZ,A	Holíč
Zemplín	4/2004	SK,H	Královský Chlmec
CENTROPA	8/2006	SK,A,H,CZ	Bratislava
Západné Karpaty	10/2006	SK,CZ	Valča
Ung - Tisza – Túr	11/2005	SK,HRO,UA	Vojany
Košice-Miskolc	12/2000	SK,H	Košice
Ister-Granum	10/2001	SK,H	Štúrovo

Tab. 2. Euroregions with participation of Slovak republic. (Source: compiled by authors using sources [5], [6])

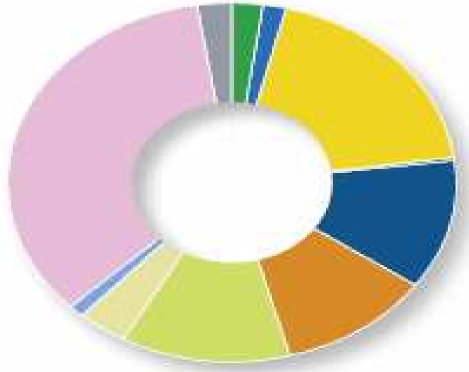
Upper table shows in which euroregions Slovak republic is participating. Following figure shows finances proposed for Regional development in 2007-2013 by EU.

NSRF Financial Table		
Operational Programme	**Fund**	**Total**
Convergence Objective	**Community Contribution**	
OP Information Society	ERDF	993 095 405
OP Environment		1 800 000 000
	CF	1 569 243 065
	ERDF	230 756 935
Regional Operational Programme	ERDF	1 445 000 000
OP Transport		3 206 904 595
	CF	2 329 495 498
	ERDF	877 409 097
OP Health	ERDF	250 000 000
OP Competitiveness	ERDF	772 000 000
OP Technical Assistance	ERDF	97 601 421
OP Research and Development	ERDF	883 000 000
ESF		
OP Education	ESF	600 000 000
OP Employment and Social Inclusion	ESF	864 000 000
Total ERDF		**5 548 862 858**
Total ESF		**1 464 000 000**
Total ERDF + ESF		**7 012 862 858**
Cohesion Fund		**3 898 738 563**
Total Convergence Objective		**10 911 601 421**
Competitiveness and Employment Objective		
OP Bratislava Region	ERDF	87 000 000
OP Research and Development	ERDF	326 415 373
OP Education	ESF	17 801 578
OP Employment and Social Inclusion	ESF	17 801 578
Total Competitiveness Objective		**449 018 529**
Total ERDF		**413 415 373**
Total ESF		**35 603 156**
Total NSRF 2007-13		**11 360 619 950**

Breakdown by theme as proposed by Slovakia in its draft operational programmes

European Regional Development Fund /Cohesion Fund 2007-13

Culture	2.3%
Energy	1.7%
Environmental protection and risk prevention	18.9%
Increasing the adaptability of workers and firms, enterprises and entrepreneurs	0.2%
Information society	11.8%
Investment in social infrastructure	11.1%
Research and technological development (R&TD), innovation and entrepreneurship	12.2%
Strengthening institutional capacity at national, regional and local level	0.1%
Technical assistance	3.4%
Tourism	1.2%
Transport	34.7%
Urban and rural regeneration	2.4%



European Social Fund 2007-13

Improving access to employment and sustainability	34.9%
Improving human capital	36.5%
Improving the social inclusion of less-favoured persons	10.8%
Increasing the adaptability of workers and firms, enterprises and entrepreneurs	10.3%
Research and technological development (R&TD), innovation and entrepreneurship	1.2%
Strengthening institutional capacity at national, regional and local level	2.8%
Technical assistance	3.5%

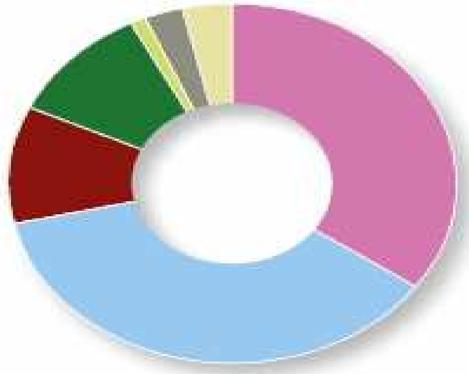


Fig. 1. Amount and distribution of finances proposed for operational programmes in the field of regional development during 2007-2013. (Source: [7])

2.4. Creating Growth and Jobs

Throughout upper mentioned goals of regional policy of EU, we are getting into field of euroregion's problems. In European politics, the term “euroregion” usually refers to a transnational co-operation structure between two (or more) contiguous territories located in different European countries. Euroregions represent a specific type of cross-border region.

It is just transnational character of euroregions, which can be source of problems in realisation and effective implementation of euro projects. The main problems can be identified in transparency, institutional, economic, language and policy differences among the countries or nation countries regions.

The aim is to coordinate regional policy with Lisbon agenda for growth and employment so that countries and regions more attractive for investment with its better availability, providing quality services and preserving environmental potential, to promote innovation, entrepreneurship and knowledge-based economy. By developing information and communication technologies, are creating more and better jobs. By increasing the number of employed people, are improving the flexibility of the workforce and will invest more in human capital [1].

3. About the Necessity of Changes in Euroregions Assessment

In principle, the current mechanism for regional development in EU can be accepted. It would be appropriate set it as combination both of presented concepts of socioeconomic development and optimize it in order to increase the efficiency and security of the redistributed funds for regional development.

From our point of view it would be appropriate to reform recent orientation of EU regional policy to the less developed region in sense of incorporation of competitive aspects, aspects of responsibility and security of using the euro funds. By the competition of similar development stage regions at the criteria of reliability, responsibility and security of using investments from the regional development funds, it would be secured a better ability and preparedness of regions to realize granted projects successfully.

We have to state it is necessary to create a new system of assessment and evaluation of less developed euroregions, in which the risks of project failures are higher. This system should be used to secure reliable indicators of selected characteristics in relation to efficiency, security, personal and institutional capacities and ability to rich success in realization and sustainability of projects and for decision making about an effective allocation of the benefits from regional development grant schemes especially from the investment return ratio (non profit ratio).

Investment return should be aimed to the final output from project not profit but well complex seized and reliable realized project. As a key criteria should be considered a real requirement for the project outputs, assessment and evaluating factor of project, success factor of region in which the project is going to be realized as well as assessment and evaluating of success factor for the interested relevant subjects. This should be made in intention to secure requirements for acceptable level of economic security and project viability It is possible to say that this can be seized as alternative modification of rating instruments and their adaptation to the state and need of assessment and evaluating of euroregions, regional subjects and securing the viability of needed useful projects of regional development considering a responsible prediction and successful realization, and sustainability selected projects development.

Setting of clear criteria for assessment and evaluating of euroregions as well as the requiring subjects should motivate all stake holders to develop relevant conditions and assumptions of successful project realization. This should lead to increasing of efficiency and security of allocation and using the EU regional policy funds.

Also, we have to state that it is needed to consider the economic output as well as the economic security indicator of relevant euroregions within the process of allocating and using the expenditures of EU regional policy incorporation of economic growth an economic security and stability indicators. It can be seized as the evaluation of real need and viability of selected project granted from the expenditures of EU regional policy. Assessment of euroregions should be oriented to achieve more complexity, not only to the indicators economic efficiency but also to the indicators economic security. That one has incorporated a aspect of overcoming the crisis situations and risk management in relevant euroregion not only in time of realization of benefited project, as well as in planned monitoring period. This is a sin of the projects sustainability in selecting of regions and countries.

In principle, this assessment should be built at three levels. These indicators of economic growth, which are used for accepting selected region and regional project partner to the grant scheme as well as to decide about the real demand for the project in selected regions considering the potential of reducing the regional disparities should be complemented by the indicators of security and economic security and institutional capabilities of the relevant regions as well as the project subjects. The security and economic security indicators are indicating the complex potential of preparedness to secure the sustainability the future development of the projects and its positive multiple impacts in an involved euroregions.

It is necessary to create some motivation model for involved regions and subjects with similar living standards to be active in development of assumptions of stability and development of regional development projects in wider concept of economic security. It is needed to create some scales of regions with similar socio-economic characteristic and living standards. More responsible and prepared regions in with accomplished an assumptions of project security and sustainability would have an easier access to the EU expenditures of the regional development policy.

Assessment and evaluating of euroregions in the frame of allocating the expenditures of EU regional policy should consider:

- assessment and evaluating of economic security involved countries of potential granted project partners
- assessment and evaluating of economic security involved regions of potential granted project partners
- assessment and evaluating of economic security involved subjects of potential granted project partners

It should be completed by the evaluation of the assessed projects. Their sustainability, viability and efficiency together with it's development character.

The important areas of this assessment and evaluating of regional level of economic security are based on the process of identification a principal areas of operation in relation to effective, sustainable achieving economic objectives of selected regions with accenting the sustainability of acceptable development this regions.

These areas can be selected e. g. in following order:

- social stability area
- economic stability and possibilities of sustainable development (can be divided into the internal and external) area
- political stability area
- military and security stability
- environmental stability area

4. Conclusion

It is possible to state increasing of complexity and interdependence of success factors of state development or development of an integration unit. This is caused by the technological development, political turbulences and economic shocks in recent by the crisis influenced reality of global world.

Present period of world economy and policy development require the satisfaction of the need for the wider seizing state development strategies. This can be achieved by the identification of new factors of success or by intensification of existing ones in relation to the sustainability of that one, as one of these factors can be though to be regional policy and development of the state or integration unit. In using of instruments of regional development, it is necessary to accent a complexity assessment of relevant processes which are principally influencing the state and level of development relevant socio-economic system. In relation to this, it is necessary to clearly define basic functions and objectives of this system in a sense of complexity its existence and development.

This is source of the requirement for the applying of wider seized economic security as optimal approach to the issues of regional development in condition of the instable socio-economic reality. Outlined approach to the solved issues of implementation the economic security criteria into the process of assessment and evaluation of euroregions in the frame of restructuring the priorities of regional development should lead to better allocation of EU fiscal expenditures as well as to their higher rate of security and return.

There exists an assumption that in the first stage of mentioned process some of project partners will have to accept higher costs related to the secure the ability to accomplish more complex criteria of economic security and institutional capabilities of the project partners. Depicted processes should be followed by the realization and sustainability risks assessment. Depicted approach should be applied also to the states of projects partners.

Finally we would like to say that in our point of view it is just consideration of economic security principles, which could help to get the competitiveness advantage for European Union in comparison to the other key world global players. Source of this advantage can be identified in sustainable development and better allocation of the EU sources. It is important to say that the issue of sustainable development and its instruments is important theme in scientific discussion. It can be thought to be a key theme of crisis and security management in relation to secure a complex preparedness for recent turbulent socio-economic, political and security reality in the global system of world economy.

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Characteristics Influencing Breach Resistance of Passive Protection Elements

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Abstract. This article originated in response to requirement for creation of quantitative evaluation system of passive protection elements resistance, which could be implemented into complex process of technical effectiveness evaluation of property protection systems. It deals with introduction to characteristics that influence breach resistance of passive protection elements, specifically building constructions. These characteristics could possibly form basis for design of model for estimation of breach resistance time, which would use attributes of material of passive protection element.

Keywords: Breach resistance, building constructions, security, passive protection elements.

1. Introduction

Property crime is constantly the most frequent type of crime in Slovak republic. The issue of protecting one's property from intentional harmful human activities as burglary and theft has never been approached complexly. Some legal acts, technical norms and professional publications give us partial answers to question how to design these systems, but only from specific point of view. Optimal protection system design should include both assessment of technical effectiveness and economic efficiency. Most approaches to property protection are built around qualitative expert evaluations of designers or security managers, either by giving the owner a checklist of mandatory and voluntary protection elements, or minimal required amount of points set by corresponding law regulation while implementing the security measures or implement exact combination and specification of security measures.

But the issue of assessing technical effectiveness or economic efficiency of designed security system still remains unresolved. By security system we understand optimal combination of mechanical means of protection (passive protection elements), alarm systems (active protection elements), organizational and regime measures and physical protection for the purpose of this article. The objective of effective security system of object is to prevent the violator to achieve his goal. Safety of object is then understood as condition in which the access to protected interest is secured so presence of violator during the attempt to overcome security system is detected by alarm system and subsequently the violator is detained by members of response force before reaching his goal. We are interested in stopping of violator by physical protection before he reaches protected interest. Effectiveness assessment of security system can be then made by comparation of time necessary for overcoming of system by violator and time necessary for physical protection intervention. Therefore it is vital to specify time needed for overcoming of individual passive protection elements, what can be very complicated in particular cases (e.g. the building construction).

2. Passive protection elements

Passive protection elements create a system of physical barriers, whose primary purpose is to influence the violator so he gives up on his intention. If he does not give up, then the purpose is to

create sufficient time delay between the moment the attack begins and the moment violator reaches his goal, i.e. to impede or practically make the violator's penetration to the protected interest impossible.[3]

Passive protection elements can be classified from different viewpoints – by their position in security system and protected area (e.g. passive elements of perimetric, shell, room and item protection), by breach resistance (e.g. sorting into security classes), by type (e.g. building construction, opening fillings, locks etc.). One of these classifications can be viewed on Figure 1.

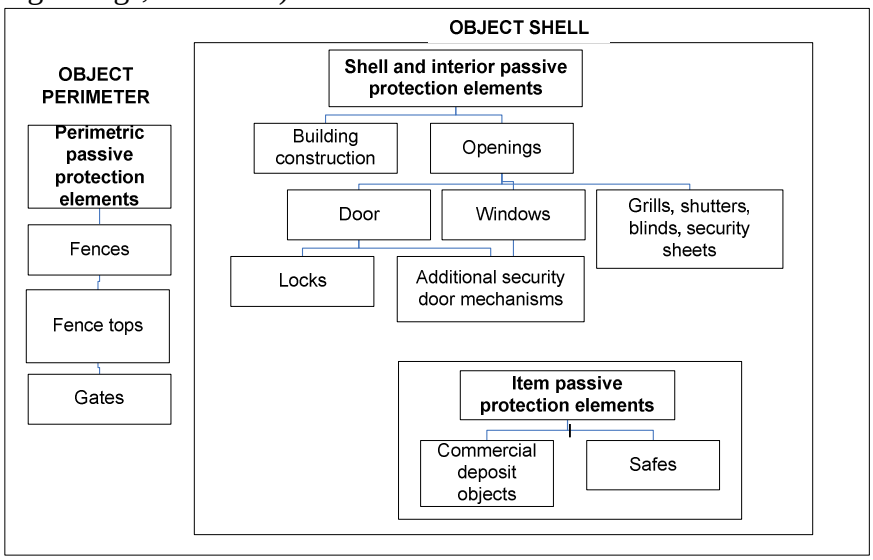

Fig. 1. Classification of passive protection elements by position in protected area

Current technical norms define breach resistance times only for some of passive protection elements and no breach resistance times of passive protection elements are defined complexly for all categories of tools. For instance norm STN P ENV 1627 Windows, door, shutters does not define breach times corresponding to appropriate resistance classes for all tools, but only for some of them. For example the breach resistance time defined by the norm for resistance class 3 is 20 minutes, but only for defined set of tools (screwdriver, wedge, crowbar), what makes it difficult to assess how would the opening filling resist more aggressive type of tool. [4]

Norm STN EN 1143-1 intended for security depositories is more elaborate. In it the breach resistance time of appropriate security class depends on tool expected to be used and so it is possible to calculate it for all tool categories. Breach times are equal to sum of operational time periods expressed in time units (minutes). The sum of operational times depends on value of breach resistance in resistance units RU (unit of resistance against break-in, which results from one minute use of tool with tool coefficient value equal to 1 and with base value equal to 0) and sum of all base values of every used tool in resistance units too[6]. [6]

Norms for security films and security glass do not mention time units, but only quantity of impacts by different tools which the specific passive element should resist. [7]; [8]; [9]

No technical norm defines breach resistance of building constructions, which belong to passive elements of shell protection, but National security authority of Slovak republic processed a classification of most used building constructions, where individual building constructions where divided into four basic groups by degree of confidentiality. [10] As for breach resistance of passive elements of perimetric protection, it is not addressed at all.

3. Breach resistance

Passive protection elements create a system of physical barriers, whose primary purpose is to influence the violator so he gives up on his intention. If he does not give up, then the purpose is to create sufficient time delay between the moment the attack begins and the moment violator reaches

his goal, i.e. to impede or practically make the violator's penetration to the protected interest impossible. This delay in violator's progress is called breach resistance time. Breach resistance is characteristic of passive protection element to withstand violator's attempts to penetrate it for specific amount of time.

Presently it is impossible to determine breach resistance expressed in time units for most of passive protection elements. It is possible to only verify or certify conformity of attributes for these elements.[2]

It is necessary to differentiate between terms "breach resistance" and "breach resistance time". While both are connected, the breach resistance is characteristic of passive protection element in the form of numeric value in resistance units, used to describe behavior of passive protection element during attempts for his penetration. Breach resistance time represents specific value in time units (seconds, minutes) – time period necessary for penetration of given passive protection element by violator during specific conditions and utilizing chosen methods and tools.

Passive protection elements breach resistance should represent the work it takes to bypass chosen passive protection element. It should be a constant value representing only attributes of passive protection element material, structural design and construction. It should not be influenced by external conditions. On the other hand, calculation of breach resistance time should take into account tools and methods used for bypassing, skills and physical condition of violator and specific conditions of environment.

Other viewpoint to consider is breach resistance against specific methods of attack. Passive protection element can be for example made of hard material that resists the mechanical stress well, but it may be in the same instance particularly vulnerable to thermal cutting. It would be useful to determine breach resistance for each tool, but that is practically impossible given the amount of existing tools. But it is possible to determine attributes that affect process of protection element bypassing and subsequently sort tools into groups by attributes that affect breach resistance time most significantly.

At first, we need to focus on breach resistance, because breach resistance time of given passive protection element for specific tool, respectively method of attack, can not be calculated without first knowing value of its breach resistance.

4. Characteristics influencing breach resistance

Breach resistance can be either deduced from data acquired by experimental testing, calculated by utilization of mathematic modeling or multi-criteria function derived from characteristics of passive protection elements, which are already known (e.g. rigidity of steel plates the safe is made of, density of concrete in wall etc.). We have focused on deriving breach resistance multi-criteria function, because of lack of resources necessary for experimental testing and insufficient input data necessary for exact mathematic modeling.

Since there is multitude of these characteristics for each type of passive protection elements, there was need to omit some of these and select characteristics, which could possibly influence breach resistance mostly. For this purpose, a discussion was realized with goal of selecting most influential characteristics. During this discussion we have focused on building construction, because breach resistance of those is not dealt with in any way. As our example, we chose ferro-concrete. From its mechanical, physical and other attributes, five attributes were specified as most affecting ones. These were:

1. Rigidity of steel reinforcements
2. Rigidity of concrete
3. Thickness of wall
4. Density of steel reinforcements (ratio of cubic capacity of steel reinforcements in one cubic meter of ferro-concrete)

5. Density of concrete (ratio of cubic capacity of concrete in one cubic meter of ferro-concrete)

These five attributes were specified, but this number may not be final, because there is possibility of reduction based on redundancy of two densities, which are complementary. But two questions arises – which one of two densities is more influential and which can be omitted? And how will we assess the importance of individual characteristics in multi-criteria function?

These issues could be dealt with by utilization of decision-making software and pair assessment of relative importance of individual characteristics by experts. These carefully selected professionals from field of security could be given questionnaire in form of pair assessment table and results could be compared and processed to achieve quantitative results of relative importance, which could then be incorporated into multi-criteria function.

5. Conclusion

This article introduced the issues connected with breach resistance and possible methods of its specification. As already mentioned, breach resistance could be either deduced from data acquired by experimental testing, calculated by utilization of mathematic modeling or multi-criteria function. We have focused on deriving breach resistance multi-criteria function, although this option is not the most exact one. But it still provides more precision than present methods and allows for quantitative evaluation that could move us one step forward to our goal – breach resistance time values that could be implemented into complex process of technical effectiveness evaluation of property protection systems.

Methods and issues mentioned in this article are in continuous process of evaluation and examination. Next step will be expert assessment of importance of characteristics for one specific type of passive protection element and design of multi-criteria function defining breach resistance of building constructions. We will also need to designate a gauge – passive protection element with set breach resistance – which will allow us to compare the passive protection elements between them and determine their breach resistance by comparation of their important characteristics.

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Possibilities of Breaking through Biometrical Systems

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Abstract. This article deals with biometric systems and their weaknesses, options how to break through them, and general recommendations to design and install these systems. The paper describes all theoretical possibilites of breaking through the systems, the most likely are examined. The second part describes the results of experiments.

Keywords: Biometric systems, artificial fingerprint, breaking through biometrical system

1. Introduction

In today´s world biometric identification is a buzz-word in the area of security. Both biometric security systems and the other access and security systems can be broken through. It is necessary to make some effort and have certain skills and knowledge of these systems. The systems are as strong and resilient to attempts to breaking through as their weakest spot. The aim of this paper is to warn against some possibilities of breaking through identification systems, to select the most likely ones and analyse them. Then some general suggestions how to improve security of these systems are analysed. In the end experimental results are presented.

2. Biometric security systems

2.1. Vulnerabilities of biometric identification systems

As mentioned above the security of the whole system can be judged according to its weakest spot. In the following figure a general scheme of an identification system, which can be applied to a biometrical system, is created. Some possible break-through spots are mentioned there.

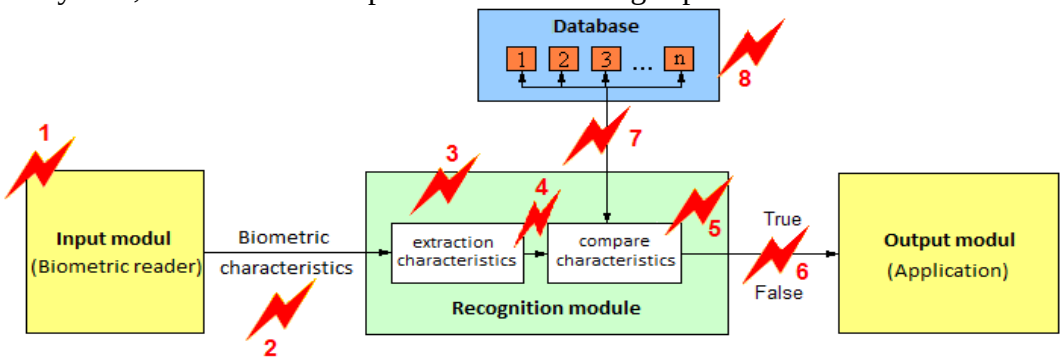

Fig. 1. Scheme of possible attacks on biometric systems

Ad.1. Faked biometric code

It is possible to say that this is one of the most frequent attacks on the system. Even a person not having detailed knowledge of the system can attempt to do it.. There are a lot of biometrical methods and in some of them falsifying a biometrical code is less demanding than in the others, e. g. we can mention some examples of falsification of a biometrical code, such as plastic surgery of a face and ears,, a surgical operation to change fingerprints, casting a false gelatinous or silicon finger. With the oldest optical readers the violators tried to falsify the print by copying a finger on a

photocopier. Yet, in the world there have been cases of damaging the users of biometrical identification system, for example, a car owner who had a biometrical reader installed in his car, lost his phalanx. Therefore, while improving security, it is necessary to make so called liveness-tests perfect.

Problems of falsifying biometrical codes were researched by Professor Tsutomu Matsumota from Yokoham National University. His team proved that it is possible to falsify a footprint in 80 % of all cases with the help of commonly available opportunities, materials and technologies (with optical and capacity readers). It is necessary to point out, that these tests were taken in 2002, and since then both sensors and evaluation algorithms have made progress, and that´s why our aim was to put these methods to the test on the contemporary sensors. We have also examined new possibilities how to break through these systems. Based on these experiments a series of recommendations to increase security of these systems will be drawn up in the future.

Ad.2. Replica of old data

It means attacking a transfer bus between a reader and a deciding module. An earlier acquired code, recorded by a hacker, is presented. To protect the system against this it is necessary to secure the transfer routes.

Ad.3 Modification of code extractor

A way that requires very professional knowledge of the system. To protect it you have to secure all communication interfaces against possible undesirable connecting.

Ad.4. Faked vector characteristic

A way that requires very professional knowledge of the system. To protect it you have to secure all communication parts of the system against unauthorized manipulation.

Ad.5. Modification of a subsystem serving to a confrontal

This attact also requires very professional knowledge of the system. To protect it you have to secure all communication channels of the system. Moreover, an authorized user can try to present a biometrical specimen, that is not registered in the system, and if this is accepted, it gives evidence that the algorithm for assessing or the threshold of sensitivity has been changed.

Ad.6. Change of confrontal result

It is an attack, which requires more professional knowledge and skills than attack in point 1 (see above), but they do not have to be on such level as points 2-5. This penetration lies in attacking the communication channel between the biometrical system and the application controlled by this system. In most cases this communication proceeds in two logical positions, and that is True or False.

Ad.7. Blocking communication with databases

It is a form of an attack which can run mostly with template databases, which are out of the reader. It is disconnection of the database and this way it is not possible to get a template and compare it with the code.

Ad.8. Template modification in databases

It is a form of an attack, that does not require any professional knowledge of the system, user´s or administrator´s knowledge is enough, and when a template can be modified or a new one can be created either intentionally or unintentionally. To protect it, it is advisable to allow administration access to the system to the minimum of people and to select a suitable mode and technical precautions to eliminate an unauthorised person to get into the system.

2.2. General recommendations to increase security of identification systems

It is a system of particular suitable measures which can lead to minimizing of biometrical system threats.

To secure communication channels – it is advisable to lay data cables and other cables so that they cannot be broken in from the outside, it is possible to lay cables in cable routes equipped with contacts, which are connected to IAS (Intruder Alarm System), and in case of disruption they activate an alarm. It is absolutely unsuitable to have the data line uncovered.

To use suitable assembling posts and packaging – it is advisable to use the right model for outdoor use, it is essential to avoid using indoor elements for outdoor use.
Suitable location of the reader – It is convenient to locate the reader so that it is in view of camera system (CCTV) or covered with a IAS detector. Next, it is necessary to place the reader and secure that only the reading part projects out of the wall or the assembling post so that it is not possible to access the communication environment, e. g. USB or COM, etc. This is a weakness of some readers (mostly those for indoor use), these readers are incorrectly installed into indoor environments without a suitable cover.
To choose a suitable method of identification – some light model situations can be mentioned, for example, it will be useless to use biometrical identification of an iris for a company producing car parts, in this case hand geometry or a fingerprint will do. Another example is a company providing strategic research, developing IT, hardware or software and similar applications, in this case the geometry of hands is not appropriate. Depending on the size of the database of users it would be suitable to choose, for example, a fingerprint, iris geometry, venous circulation, 3D facial identification, possibly with high-security premises it is possible to resort to multiple-biomery (using more biometrical features for identification). This possibility is quite unknown on the European market.
To apply suitable mode measures – it is necessary to train users and instruct them with a suitable user´s access, next limit the number of administrators administering the system. The more administrators, the bigger possibility of intentional or unintentional template damage or adding an unwanted template.

2.3. Artificial fingerprint casts

As the area of biometrical identification represents huge points at issue, we decided to focus on breaking through biometrical systems with fingerprints while carrying out our experiments.

The examined area deals with artificial fingerprint casts and also measuring at communication interfaces. The latter part is in its infancy, so part 1 – artificial casts will be dealt with in detail.

Here we set off in two ways, a person cooperates willingly and creates a mould voluntarily, the other way is removing a latent print and creating a mould for the cast. In the first case it is necessary for a person registered in the system to cooperate. We were inspired by Professor Matsumota, we just used our accessible materials. Lots of materials for moulds were tested, including resin, different kinds of filling silicons, plastics, ceramic materials. Granular plastic materials determined for melting proved to be the best. Fusible plastic materials, silicons, resin and gelatine were used for casts. Gelatine proved to achieve model similarity of 85 % but thanks to its properties it is not quite suitable material as far as storing and durability. Another problem is drying out, after drying it deforms. Therefore we are still looking for a suitable material for the cast.

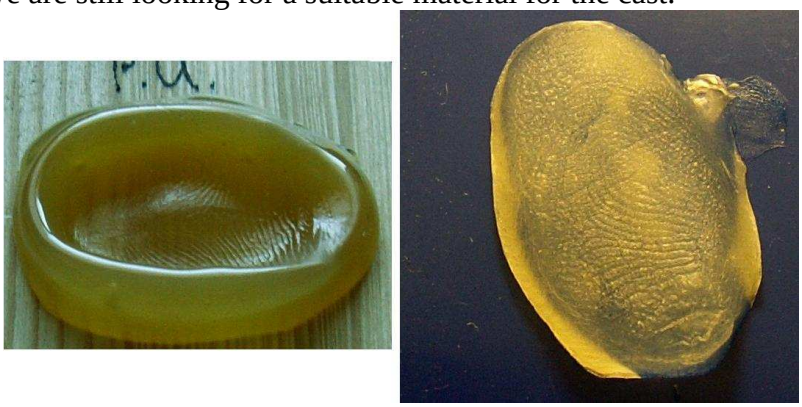

Fig. 2. On the left – a mould from a fusible plastic, on the right - a gelatine artificial print.

While obtaining a latent print, a smooth surface was used, the print of high quality was produced. It was photographed, grafically edited, and developed on a PCB (Printed Circuit Board) desk. As we were developing the desk of the surface connection under amateur-hobby conditions,

capillaries were cauterised. We have found a suitable company dealing with professional production of PCD desks that is able to produce desks of higher precision. This experiment will be repeated with a professional device.

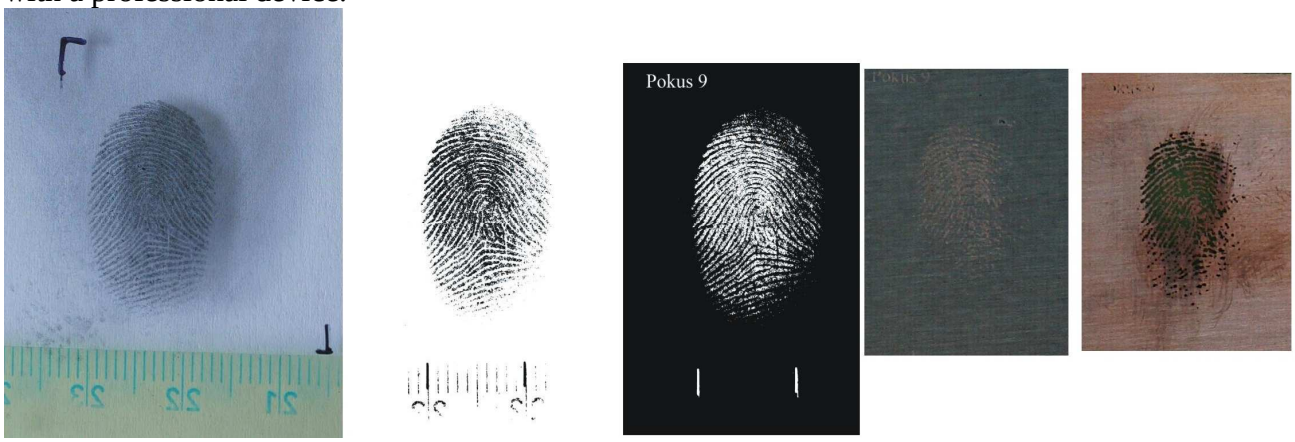

Fig. 3. Technique of processing latent print

3. Conclusion

As we demonstrated, breaking through a biometrical system is not as simple as some web articles describe. It is necessary to be cautious, because together with development of production of this equipment, attackers develop their knowledge and skills too. In the future we are planning experiments with silk-screen printing, etc. When suitable materials for an artificial finger are found, then cooperation in the area of improving evaluation will be started, and then editing algorithms or sensors may be inniciated.

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Corporate Crisis Turnaround and Strategic Reorientation

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Abstract. Making strategic decisions in the process of corporate decline is crucial for long term survival of any company. Mistakes in this process can lead to bankruptcy or liquidation of the company so decisions made in the process of decline have certain differences compared to those made in the process of corporate grow. For successful strategic reorientation in the time of corporate crisis there are certain steps and procedures which can make decisions more accurate and objective if interconnections to other level of corporate turnaround are kept in mind. This paper addresses these procedures and describes strategic reorientation as integral part of corporate turnaround.

Keywords: strategy, crisis, turnaround, company

1. Management of companies in crisis

In the all broad aspects of which are incorporated in the process of running and managing business there is always a certain amount and certain areas which are source of risk. Omission, whether conscious or unconscious, leads to development of crisis. These sources of risk are by this mean placed in the outside environment or in the internal structure of the company. But from the managerial point of view it is considered that management can also respond to external sources of risk and their development to the form of corporate crisis. Management and its responses are crucial to the internal and also external actions toward the crisis and also preparation which can be made toward the sources of risk.

This leads to presumption that only place where it is possible to solve the crisis or to prevent development of crisis is the managerial level so that relationship manager – crisis and success with managing corporate crisis is contained in these points:

1. Prevention of circumstances formation which can lead to crisis – it requires steps to prevent development of risks to the form of crisis, that means pre-crisis reaction to the risks which can eventually lead to crisis (for example cash flow early warning systems, creation of mechanisms which can monitor the level of customer confidence, market share and so on),
2. Reaction to already developed crisis situation – reaction to the crisis which has already been developing (that means risk went out of control) and it is necessary to give more focus and effort to stop spreading the crisis (for example additional infusion of liquidity if cash flow management was not properly controlled, quality improvement if market share started to fall as reaction and so on),
3. Crisis management as part of corporate strategy – where approach manager (or management) – crisis is part of strategy and there area prepared systematic tools for prevention and reaction to the crisis. It means that management is always conscious about internal and external sources of risk and control mechanism, reaction plans and post crisis scenarios are already prepared for needs of eventuality.

If these points are underestimated then external or internal sources of risk can cause crisis and that tools of corporate turnaround are required for setting the processes to the place where business is profitable and can meet it obligations towards banks, customers, vendors and all trade partners.

Mainly in the times of economic and financial crisis we can see wide Darwinian behavior of companies so to speak that fittest and not strongest survive or even came empowered from crisis.

Management of processes in phase of corporate decline has its differences in the three main areas – the strategic, operational and financial. These three have to be addressed all at one time in the short period. The reason is that corporate decline is a sign of crisis or at least that something is wrong with the processes of the company. The main difference between management of companies that are facing or already are in the crisis and those that are managed during the growth state of company are mainly in the dimension of short time span for addressing the source of crisis. It means that there is no time for mistakes because these can deepen the crisis or even lead to bankruptcy. Second difference is in the pressure that emerges from responsibility in the crucial phase of directing company processes which phase of corporate turnaround certainly is. The pressure is mainly psychological and financial. Higher uncertainty that is incorporated in the process of turnaround creates pressure on the management but also on employees as well as on the subcontractors. As was already mentioned turnaround management have to be performed on three areas [1]:

- Strategic turnaround – strategic turnaround or strategic reorientation of business
- Financial turnaround – revitalization of corporate finance, restoring the financial health of company
- Operational turnaround – or operational restructuring, restoring efficiency of corporate processes

At each level have to be addressed separately but with regards to the other levels and theirs subjects.

2. Strategic management and strategic change

Strategic change is crucial process which requires vast resources, appropriate planning and experienced decision making. This process is irreversible because resources and time used for change of strategic direction is so fundamental, that second reorientation cost company additional resources. This process is underlined in the process of strategic change during the corporate turnaround. During the corporate decline it is even more crucial to make proper decisions because any mistake in this process can almost certainly lead to bankruptcy. This is the reason why strategic change during turnaround process when used inappropriately can cause vast damage but when used in the correct way can lead to success of turnaround. The most addressed topics are usually complex and nowadays they include these points [2]:

- transforming a business unit that succeeded for years by focusing on technological prowess to a unit that must now focus on customer service,
- leading an organization from domestic competition to the global battlefield,
- accelerating growth by focusing not just on building things but on all the services that go with after-sales support,
- changing the culture from one of considered deliberations to a fast, first-mover approach,
- redesigning jobs to incorporate new technology that we hardly understand.

3. Strategic reorientation as a tool of corporate turnaround process

As was mentioned, the process of strategic response to crisis has its specifics. These are given by the specific requirements of strategic management and process of turning the business around. Strategic management requires precise planning, data and resources as necessities for successful strategic change. On the other hand the process of corporate turnaround requires quick response and coordination of this response in financial, operational and strategic area.

From this point of view there also should be a specific application of these requirements in the process of the implementation of strategic change. The process is presented on the figure 1. At the

primal stage of solving the crisis there is necessity for stabilization processes mainly in the financial and operational area (t.i. F/A area). This time can be used for external and internal analysis. Data provided by this analysis will be used in later stages of turnaround after stabilization. Stages of complete turnaround will be following:

1. Stage of stabilization – stabilization of F/A area accompanied by external and internal analysis and creation of strategic reorientation plan
2. Stage of strategic reorientation – after survival of company was assured in the stabilization stage follows stage of implementation and monitoring of strategic reorientation

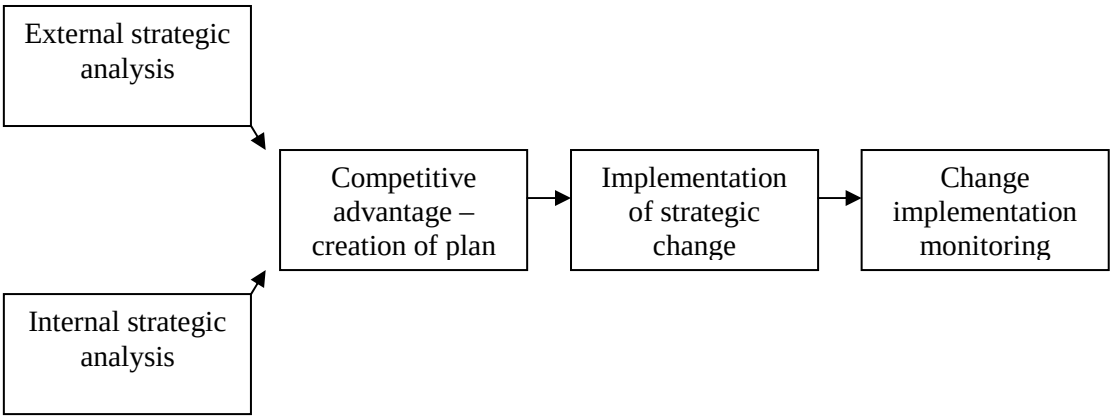

Fig. 1. Process of implementation of corporate change. (Source: Author)

The main question is why is strategic change required? If mistakes which led to corporate distress are caused in the area of finance or operational area it does not have to be the reason that source lays in there. Company can operate with best equipment and the best people and even thou it does not produce satisfied results because of lack of understanding of environment and the customer specifically. In the process of corporate turnaround it is important to act according these steps:

1. Stabilize the functions of the company – it is done mainly in the area of corporate finance (return to financial health, restoring liquidity) or in the operational area (innovation of production lines, using low cost materials),
2. Search for mistakes and sources of distress – after consequences were addressed and company was stabilized, it is important to find the cause of these, to find where the source of problem is placed,
3. Addressing the sources of distress – it is important that source of corporate distress is not implemented only as a specific tool of turnaround management but that it is part of new corporate strategy so the crisis will not repeat again and it is secured by strategic change as the response to the crisis.

If the source of the crisis is in the strategic area than it is important to find what went wrong. The reasons of these in the strategic can by divided in two main categories:

1. External source – the change of external environment to the point when company is not possible to satisfy the customer and customer is taken over by competition (for example changes in technology, new distribution systems)
2. Internal source – internal changes with strategic dimensions which can cause dissatisfaction of customers, rise inefficiency and costs

Both have to be addressed during the analysis. At the phase of stabilization there is place for analysis of both the internal and external environment. After phase of stabilization there is enough time and data to implement changes in the strategy that can restore long term health for the company.

4. Conclusion

The main problem with implementing strategic change during corporate turnaround is the time pressure and quick action which have to by done to restore health of the company. For strategic reorientation to by successful it is important to have as accurate data as it is possible to get. So the phase of financial and operational problem management is accompanied by the analysis of external and internal situation. After the phase of stabilization there is time and data for strategic change if the source of the problem had strategic character.

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The High Valuable Assets Protection in Hostile Environment

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Abstract. The article briefly describes protection of Coalition camps and bases in Iraq and Afghanistan. It tries to provide some inspiration how to protect important objects of critical infrastructure against asymmetric threats. The forward deployed operating bases in Iraq and Afghanistan are vulnerable to asymmetric threats, especially to threats coming from the sky such as mortar rounds and artillery rockets. Using of mentioned means is the main method to bring terror and fear among soldiers in camps. To protect personnel and camp infrastructure is the big challenge and it is necessary to take appropriate solutions. The armed conflicts usually launch the development of security technologies, procedures and training. The experience obtained during conflicts can help to improve protection of critical infrastructure in peacetime. It is more effective and cheaper to implement security technologies and procedures tested in real conditions, than looking for solutions by own.

Keywords: protection, high valuable asset, detection, asymmetric threat, security.

1. Introduction

Nowadays, security environment becomes a big challenge for protection of high valuable assets, whether we speak about critical infrastructure buildings, military buildings and assets or other objects important for state security and prosperity. To provide complex protection for such high valuable objects is very hard and financially difficult task. At a time when any major conflict is not expected, the armed forces of each country converted into tasks that are different than they were in previous years. Terrorism and asymmetric threats are spreading around the world to fight against western civilization and western values or just to meet their own requirements by invoking fear and panic, whatever reasons they have. Asymmetric threats pose a very dangerous way to fight because they use unconventional, sometimes special means to bring terror and fear.

All this brings many challenges that we must deal in the protection of high valuable objects with. There are various unconventional practices, approaches and ways of fight on the one hand and the lack of technical solutions, personnel and material to protect such objects on the other hand. The second may come from lack of interest to invest into security technology, security personnel training by operators or owners, lack of financial resources or just because of ignorance that the particular object could be in danger.

In last few years the development of technical means for high valuable assets protection has been increasing due to regional conflicts as was the war in Iraq, or current conflict in Afghanistan. This is the main reason what leads me to show some security concepts used in military base protection, specially the protection of forward deployed operating bases in unfriendly environment. These bases could by considered as important objects, in some cases as objects of critical infrastructure from Alliance point of view. Whereas the bases are constantly threatened by insurgents, the protection measures must ensure sufficient cover for internal infrastructure and personnel. Technical protection means and also security procedures used in war zones could be appropriate inspiration for critical infrastructure protection in peaceful regions, too. As it was already many times in the past, military technology, operational procedures and training were often reproduced in the civilian sector, because they were directly tested in real combat situations. Therefore the financial costs of technical means for protection are essentially lower than on

acquisition of newly proposed devices. These devices have to go through different stages of evolution, from project across constructing a prototype and testing to fully operational stage. To use military technology has advantage because of speed of implementation and real testing in specified conditions. So let´s look at, how is solved protection of forward deployed operating bases in war zones and which of the following knowledge could help to improve critical infrastructure and high valuable object protection in peacetime.

2. High valuable assets in hostile environment

As it is shown by experiences of operation Enduring Freedom and Iraqi Freedom, forward deployed operating bases are highly vulnerable to conventional and asymmetric/terrorist attacks. Personnel operating at the base need protection against the large scale of threats from any direction. Mentioned operations have initiated rapid development in the area of improving protection. This effort can be divided into several areas as protection of bed-down facilities, entry point protection, survivability enhancement for conventional structures, buildings, shelters, implementation of modern and improved monitoring and surveillance systems and decision aids for physical security sensors [5].

To speak about protection of critical infrastructure facilities in the Slovak Republic, the physical protection and enhancement of constructions, buildings and shelters is not interesting in this article from our point of view. The one of the hardest and also most important tasks in high valuable facilities protection is to detect and identify coming threat. Because of that, there are very hard requirements set up for physical security sensors and monitoring systems. Therefore is better to pay attention on solutions used for monitoring of forward deployed operating base surroundings, warning and eliminating any threat in unfriendly environment. We can take some interesting tips and ideas, which were successfully tested in practice in last conflicts.

To protect forward deployed operating base in hostile environment is required, that “the sensor system must be able to operate reliably at an early stage of base camp development when an intrusion detection capability must be established quickly under austere conditions” [5]. To ensure system functionality, reliability and correct detection setting is necessary to rapidly evaluate weather, terrain effects and other environment specificities [5]. In such dangerous environment like Iraq and Afghanistan, there is no chance to deal with threats by using only one security system. To ensure sufficient protection is necessary to develop “multi-layer” security system consists of several components, which are able to cover and compensate deficiencies of each elements and systems used. The selection of right combination of security systems is dependent on local environmental conditions such as soil, weather and many other things [2], [3]. Vulnerabilities result when terrain, weather, system performance constraints, or detection zone features and maintenance are overlooked or ignored during the planning and implementation of sensor-based physical security. Factors mentioned above can cause that security system is unreliable or there are a lot of false alarms there. It is important to keep in mind following criteria in the development phase of “multi-layer” security system:

- Completeness of coverage,
- False and nuisance alarm rates,
- Probability of detection,
- Zone at which the alarm occurred,
- Delay time [2].

In the field of protection of forward deployed operating base in hostile environment for intrusion detection is usually used combination of following detection systems:

- Passive infrared sensor, Active infrared sensor, Microwave radar, Near-infrared Beambreak sensor, CCTV,
- Fence mounted sensor, Taut wire, Ground motion sensor, Ported coaxial cable, Break wire,

- Seismic, Acoustic, Magnetic sensor, Electrostatic field / capacitance
- Terrain-following sensors,
- Unattended ground sensors (UGS) [2].

3. Threat detection and monitoring used at base

All above mentioned devices for intrusion detection and identification are effective against ground intruders. But the biggest threat for forward deployed operating bases in Afghanistan is threat coming from the sky. This threat includes mortar grenades, various types of artillery ammunition, rockets and other explosive devices, which are usually misused against coalition armed forces. While insurgents have little chance to obtain cruise missiles or ballistic missiles, their ingenuity has no borders and they often use 107 artillery rockets as compensation for cruise and ballistic missiles. They launch artillery rockets against camps from higher positions around the camps. Insurgents also use mortars to cause losses among coalition forces inside the camp area. As a reaction to such kind of asymmetric way of fight is not only to reinforce shelters, constructions and buildings, but also to dispose with technical devices for early threat detection, early warning of personnel in camp area and at least for active defence against mentioned threats. To secure monitoring, warning and defence are widely used proactive monitoring and active defence technologies. Systems must be able to react and eliminate threats coming from any direction and also provide effective and inexpensive protection against “cheap” air threats, like unmanned aerial vehicles, mortar grenades [1], [5].

For more than seven years, surveillance systems made by Rayethon have been at work on the front line to detect intruders. The first is Rapid Aerostat Initial Deployment Surveillance system and second Athena multi-domain awareness system. Nowadays, there are more than 500 such surveillance systems deployed in Iraq and Afghanistan. These systems are variable, designed on a variety of platforms, including towers, aerostats and mobile version on vehicles. The big advantage of mentioned systems is stand-off capability due to renewable energy technology – primarily solar and wind. “System flexibility also allows solutions to be quickly adapted to changing mission requirements” [1]. These multifunction systems are primarily designed for border security, but according to experiences from conflicts in Iraq and Afghanistan, mentioned surveillance systems could be effective, low-cost and immediate solution for critical infrastructure protection [1].

4. Active defense technology

To provide active defence of bases and camps deployed in hostile environment is necessary to establish some kind of shield or “umbrella”, which is able to eliminate small, fast targets at low altitude. Solution for protection of coalition forces, camps and convoys brought Germans few years ago. The most used defence system is The Reihnmetall Protective Shield. This system provides complex protection against asymmetric threats. Protective shield consists of command and control element, threat detection element and assessment element coupled with offensive capabilities to engage detected threats. Missile and counter rocket, artillery and mortars defence is provided by air defence system called Skyshield MOOTW/C-RAM. The Skyshield is countermeasures system that is able to track and defeat ballistic threats, as rockets, artillery and mortar rounds, which are often weapons used by insurgents and terrorist groups. In addition to threat detection, the system is able to calculate estimated flight path of threat and identify point, where is the insurgent´s position. This capability allows security forces to react and defeat attackers. The system consists of radar (two radars-depends on defended area) usually located near the camp centre, fire-control centre and automatic gun towers in the camp corners [1], [4], [6].

There are many other protective systems, which can be used in operations such as conflict in Afghanistan. We can point out conventional air defence systems, airfield security systems

protecting arriving and departing aircraft against ground-to-air missiles, or many “non-lethal “ defence systems able to defeat threats by directed energy. Many of them are unfortunately only in testing phase [7].

5. Conclusion

The aim of this article is to bring some interesting information about problems connected with high valuable assets and objects in war zones. Knowledge and experiences obtained in various conflicts during last few years were transferred into camp protective systems development, production and implementation to operational phase. Also development of security directives and procedures was based on experiences from Iraq and Afghanistan conflicts. All written above could help to solve issues of critical infrastructure protection. At first, there is no preferable, more effective and primarily cheaper solution than lessons learned from armed conflicts instead of own financial demanding development and testing of newly designed technology. Old rule is that armed conflicts are engine of development of new defence and protection technologies. The second reason to look for inspiration in conflicts is that protective and defensive technologies, procedures and rules, structures and content of security personnel training, who provide protection of high valuable objects and assets, are tested in real combat conditions. No laboratory test can simulate such real conditions like armed conflict.

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Organization and Operation of Fire Brigades in Ankara

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Abstract: The article deals with the activities of fire brigades in Ankara (Turkey). It describes the organizational structure of fire brigades. Article focuses on convening system for rescue works. Intervention teams and their rescue operations are describes there.

Keywords: fire, fire brigade, rescue, Ankara.

1. Introduction

Turkey is a Eurasian country that stretches across Anatolian peninsula in western Asia and Thrace in the Balkan region of south-eastern Europe. Turkey is surrounded by four seas and it is mostly mountainous country. Turkey is 783,562 square kilometres in area with population of 74,816,000 and the population density is 95.5 inhabitants per square kilometre. The capital of Turkey is Ankara. City of Ankara is located in the centre of Turkey in Central Anatolia. Ankara's altitude is 900 m above sea level. The city covers an area of 2,516 km², with population of around 4.5 million and the population density of 1,551 inhabitants per square kilometre [1].

2. The organizational structure of fire brigades

The first fire unit in Turkey was established in 1714. Initially, the fire units were supervised to the army. After 209 years on the 25 September 1923 organization of the fire scheme was transferred to local government. This structure remains to the present day. The first fire unit was established in Ankara in 1922 and was transformed into a civilian ownership on February 16, 1924 as agreed by the city governments.

Today in Ankara, there is total of 26 fire stations, working in these 744 fire fighters and 144 fire vehicles operate. The main station is located in the district of Altındağ. Smaller substations are distributed through the district. Figure 1 shows a diagram of the organizational structure of fire brigades in Ankara [2].

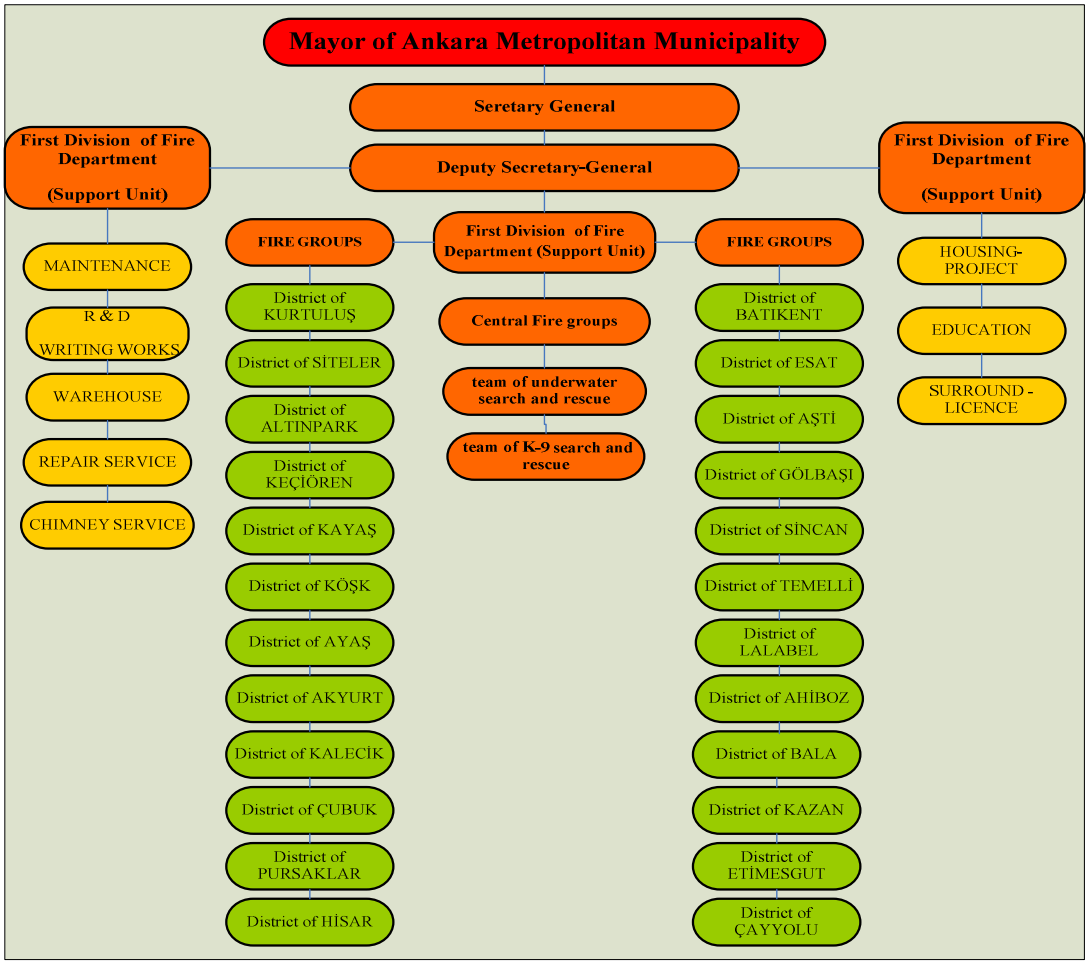

Fig. 1. Organizational structure of fire brigades in Ankara.

3. Fire brigades activities

Fire fighters work 24 hours a day, 365 days a year at the station. Emergency response fire department serves in 24-hour shifts from 9am-9am. After 24 hours shift, they have 48 hours off, and must be on standby in case of the necessary needs [2].

The main activities of the fire departments include rescuing people, animals and people assets. Main events include [1], [2]:

- Fires (object fires, buildings, natural fires, vehicle fires and others).
- Technical interventions (accidents, water withdrawing and others).
- Rescuing people and animals (rescue from heights and depths, a landslide, being recovered from the wreckage with the assistance of dogs, rescuing people from flooded areas).
- Environmental interventions (chemical, biological and nuclear accidents) and also provide pre-medical assistance.

They are also involved in the fire prevention, they lead educational activities in the field how to prevent fire and they inform the public about potential threats.

Except the fire brigades, they also have 4 other types of specialized rescue teams [1], [2]:

1. Underwater search and rescue team, this team consists of 5 specialists of different specialization.
2. Search and Rescue Team K-9 (Figure 2), which participates in search and rescue operations of all kinds. It consists of 5 people and 13 dogs. Dogs are trained for search campaigns after

natural disasters - rescuing people from cave-ins, rescuing people from debris and also the search campaigns for missing people.

3. Traffic accidents and technical interventions rescue team (traffic accidents, rescuing people from houses and other). There is a total of 12 teams in Ankara, which consists of 120 paramedics altogether.
4. A rescue team to rescue from heights and depths and all the other areas difficult to reach to. They also provide emergency medical assistance to these interventions.

Fig. 2. K-9 team.

4. What happens at fire station after emergency call

Turkey's phone lines are changing into IZS and instituting a single emergency number (112). But people still prefer original numbers (110 for fire-fighting units, 112 for medical assistance and 155 for the police). Emergency calls to number 110 are directed to the Operations Centre at the main station Altındağ (Figure 3), there are six operators on one amendment. After answering the call, operator finds out necessary information, and turns the alarm on at the main fire station, or contacts the unit appropriate to a response circuit.

The unit of 2 to 5 intervention vehicles with 7 - 17 firemen is sent out for the action, according to the seriousness. Interventions are usually transmitted by one rescue vehicle, one tanker truck syringe and one technical vehicle [2].

Fig. 3. Operations Centre equipments at the main station.

There is no time limit for unit to exit the fire station, as in Slovak Republic, but the exit is done as soon as possible (about 1.5 min).

Fig. 4. Part of vehicle parking at the main station.

Daily number of interventions in and around Ankara is ranging from 15 to 45 interventions in summer and 5 to 15 interventions in winter. The most common interventions include interventions to object fires. The graph is showing the number of hits in 1998 - 2010 on Figure 5 [2].

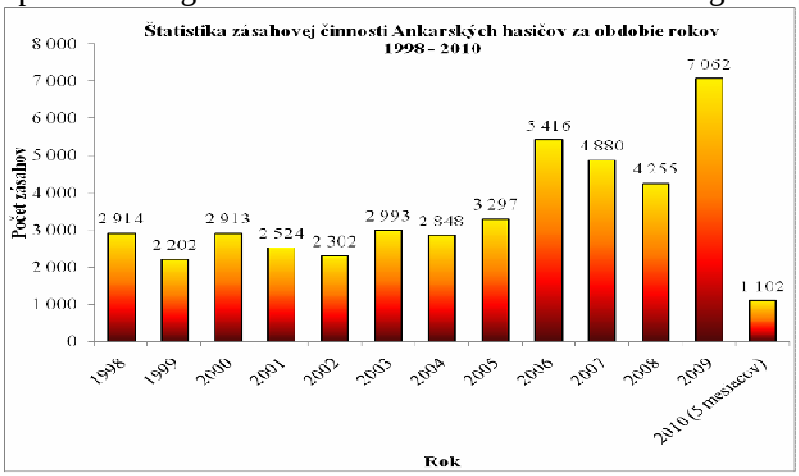

Fig. 5. Number of interventions in Ankara between 1998-2010 [2].

We can see that the number of fires in recent years have increased (Fig.5). This increase is mainly due to the fact that Ankara has been associated with other urban areas.

5. Conclusion

Generally, we can say that the work of Turkish fire fighters is similar to work of Slovak fire fighters. They have similar response teams, similar method of intervention and also similar fire equipment and gear. Compare to Slovak Republic, they send out more vehicles and fire fighter, what is admittedly expensive, but reliable.

The biggest difference compared to Slovak Republic is in structure of managing their commission. While our HaZZa falls under the Ministry of Interior, and it's been managed by the Slovak bureau of Hazza; in Turkey, the units are run and funded by the city government.

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Specifics of the Transport of Wounded by Emergency Medical Service

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Abstract. The article deals with a transport of wounded ambulance of emergency medical service (EMS). Its fast, safe and reliable arrival at the place of incident is affected by more factors. The article contains description and analysis of ground emergency medical services intervention. This is the process activities of EMS, which are carried out to rescue many injured.

Keywords: Ambulance, emergency medical service, transport, emergency event.

1. Introduction

Emergency medical service is established for providing of urgent health care of people in a state when a man‘s life or health is threatened. In Slovak republic there are 280 stations of EMS. 273 of them are ground EMS, which are equipped with one ambulance.

2. Ground ambulance of emergency medical service

Emergency medical service supports Emergency national centre (ENC) and particular supporters, which is engaged in ambulance. Ambulance is a vehicle classified as personal motor vehicle M1. It is used to offering of urgent health aid and offers fast, secure and reliable transport:

- patients,
- health ambulance carriage,
- givers of organs for purpose of transplantation,
- human organs,
- blood, blood derivate,
- medicine,
- medical devices.

We distinguish this type of ambulance:

- ambulance of EMS with carriage of three members (doctor and two paramedic, who one is driver),
- ambulance of EMS with carriage of three members (doctor and two paramedic, who one is driver) and with equipment of mobile intense unite, which is created for transport of newborn in couveuse,
- ambulance of EMS with carriage of two members (two paramedic, who one is driver).

All ambulance must be equipped with necessary machine, health technical and material for offering of giving urgent health care according to law.

Every type of ambulance is devoted to preparation of one sitting or lying person and it must fulfil general, specific materialistic – technical requirements. Generally they are based in a norm STN EN 1789 and it deals with:

- power of engine, brake system, communication technologies,
- electronic equipment (electronic installation, optic and acoustic warning systems, battery and generator),
- safety of patients and carriage (safety belts),

- protection against fire and electronic safety,
- internal spatial order (cabin, ambulance space),
- heath system, ventilator, light (enough light of ambulance space),
- doors, glazing, exhausting of anaesthetic gas.

For specific materialistic – technical equipment of particular types of ambulance belong:

- means of transport of patient, for fixing of movements of limbs and back bone,
- means for care for expiratory system, breathing, blood circuit,
- means for care for life threatening of states and basic diagnostics,
- medicine, bandage material, personal protection means.

According to Income of the Health ministry of Slovak republic from 11st of march in 2009 10548/2009-OL must be ambulance, in case of intervention at urgent events with more injured people, equipped with reflective waistcoats, ordering cards, documents for need of evidence of carriage, which are involved in solving of mass accident.

The ambulance provides two firms in private sector. They are Panax F.C.S. in Tvrdošín and Chirosan in Vrbové. Their business is oriented on editing and adjusting of a commercial motor vehicle for ambulance. The price of editing and equipment is from 55 000 to 60 000 EUR without VAT. Vehicles of different brands are being used nowadays. Among most frequent kinds belong: Volkswagen Transporter T5, Volkswagen Crafter, Renault Master, Renault Trafic, Citroen Jumper, Peugeot Boxer. The most used vehicle is Volkswagen Transporter T5, which has four-wheel drive and it is suitable for more difficult terrain condition.

3. The procedure for the deployment of EMS mobile elements

At the creation of emergency event it is necessary on basis of its interval, to involve certain number of ambulance for solution. Departure from station of ground EMS is realised on basis of the order issued by regional ENC. After arrival of certain place a carriage must confirm its arrival regional ENC.

On the place of emergency event carriages of ambulances provides urgent health aid with use of health technical and material. After prehospital care of injured their departure is realised into health device and then ambulance is coming back at the place of emergency event. Number of cycle of depends on number of injured. In the picture no. 1 there‘s depicted algorithm, according to which every ambulance follows chosen for taking action.

For securing of fast and secure arrival of ambulance at the place of emergency event, it is necessary so that vehicles would be equipped with function navigation system which simplifies and makes arrival of ambulance fast at the place of intervention. Its speed of arrival influence not only technical state of ambulance but also regime and means of transport.

For technical care about vehicle, the driver takes responsibility, who provide control within daily investigation:

- before departure:
  - state of fuel
  - state of oil in engine, break liquid, water in freezing system,
  - the functionality of breaks, leading, lights, light and sound signalisation machine,
  - the purity of glass and lights,
- during the drive: functionality of breaks, gear, machines and action of engine,
- after arrival at the station of ground health ambulance service: functionality of blades.

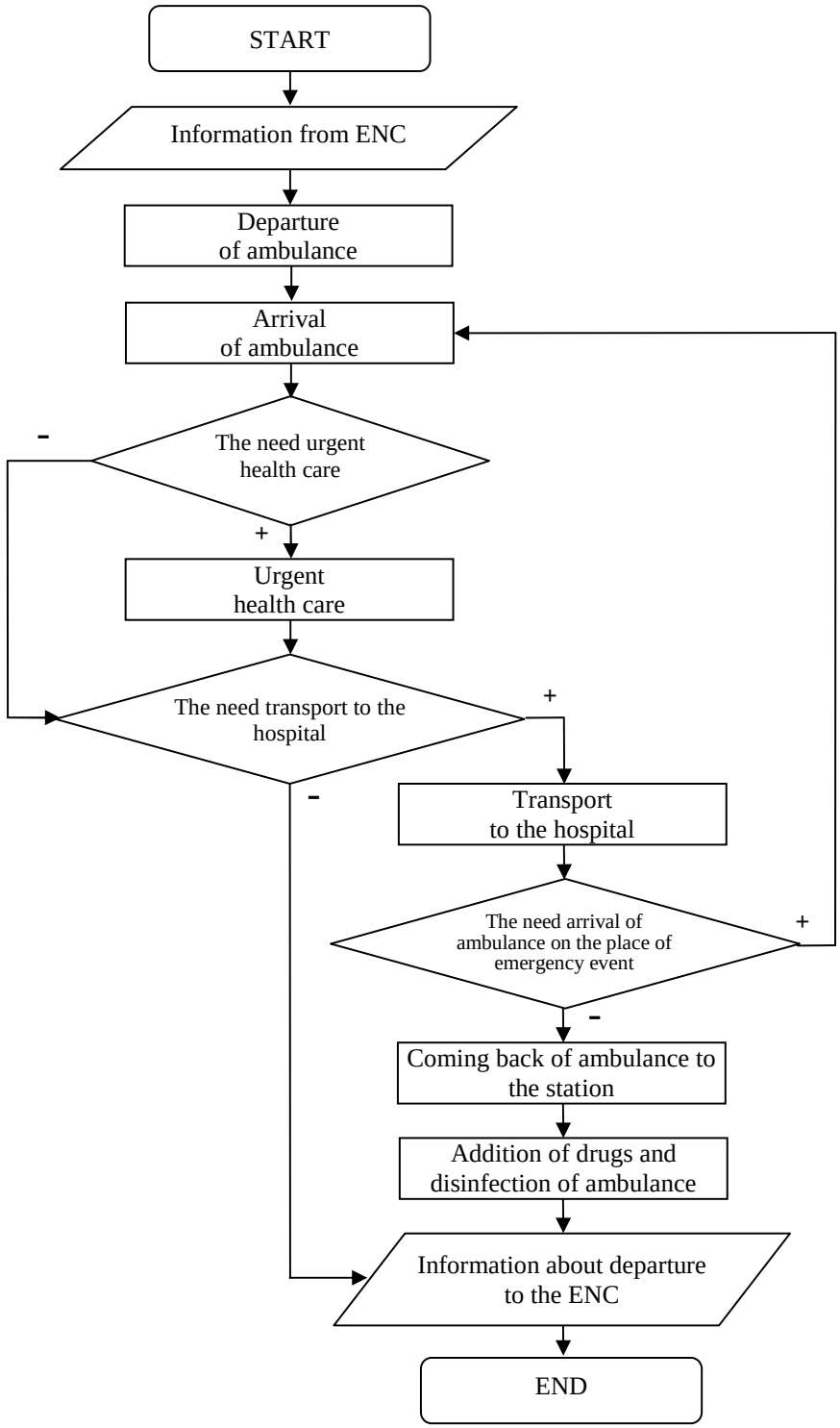

Fig. 1. The procedure for the deployment of EMS mobile elements

For technical investigation of ambulance particular providers are responsible of ground health ambulance service. With this investigation the control of all necessary actions is done for automobiles and elimination of found errors in specialised repairing centres. Not sufficient technical availability of ambulance can be caused:

- not suitable equipment of ambulance:
  - insufficient material,
  - not functioning machine,
- the participation of ambulance at the accident:
  - not sufficient conditions,

    - hidden vehicle failure,
    - busy traffic,
    - mistake of the driver of ambulance,
- neglected care of ambulance:
    - mistakes of the driver of ambulance,
    - mistakes of provider of ground health ambulance service.

The time of arrival of the ambulance is very important to saving lives. Among causes which are influence regime and mean of drive of ambulance, we can consider:

- the state of equipment of ambulance – lack of navigation system,
- by-pass – creation of obstacle on the road,
- slow drive of ambulance:
    - congestions,
    - failure of driver,
    - traffic accident,
    - unclear traffic situation,
- not suitable state of communication:
    - density of communication,
    - bad directional situation,
    - bad angle situation,
    - low quality of the surface of drive.
- big distance of the residence of station of ground EMS from the place of the emergency event,
- inept behaviour of other participants of the traffic.

4. Conclusion

Ambulance has to be as fast as it´s possible at the place where it´s the incident have to be many wounded. Nowadays, high claims are stated. There‘s an influence for fast arrival. The rapid arrival of ambulances affects the availability of the emergency event and also the technical condition of the ambulance.

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Queuing Systems in Supply Chain Networks

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Abstract. Stochastic methods of operational research can be very useful for designing supply chain network, because logistic decisions influence total cost of enterprise. This article shows one of such methods called queuing theory and then one model of supply chain network where a warehouse can be optimized using the queuing theory.

Keywords: Queuing system, supply chain, warehouse, inventory holding cost, back order cost.

1. Introduction

Queuing theory is the mathematical study of waiting lines, or queues. There are many types of queuing systems which can be analyzed and optimized by queuing theory. In all of them customers come to service center in order to obtain service and if all servers are busy, customer has to wait in a queue (waiting line). Customers can be people, machines, computer processes, telephone calls etc.

2. Queuing theory

This section gives more information about queuing systems and about possibility of their classification called Kendall classification.

2.1. Queuing system

Elementary queuing system looks like on the Fig. 1.:

- Population of costumers can be considered limited (closed systems) or unlimited (open systems).
- Arrival defines way that customers enter the system. Mostly the arrivals are random, time intervals between two arrivals are random variables.
- Queue represents number of customers waiting for service. Every queue is described by its maximum size and queuing discipline. Maximum queue size is the maximum number of customers that may wait in a queue. If the queue length is limited, some customers leave the system without being served. Queuing discipline represents the way the queue is organized. Usually queuing discipline is FIFO (first in first out, i.e. first come first serve). But there are also other possibilities, for example LIFO (last in first out, i.e. last come last serve) or serving in random order. System can have either one or more queues.
- Service represents some activity that takes time and that the customers are waiting for. Typically service takes random time. According to number of servers we talk about single channel systems (with one server) or multi channel systems (with more servers).
- Output represents the way customers leave the system. In most cases this property of system is not very important.

2.2. Kendall classification of queuing systems

According to Kendall classification every queuing system is described by combination of letters and numbers: X/Y/n, where

- X is inter-arrival time distribution,
- Y is service time distribution,
- n is the number of servers.

Some authors add more number or letters that express more properties of the system. Some of symbols used instead X and Y are in the Tab.2.

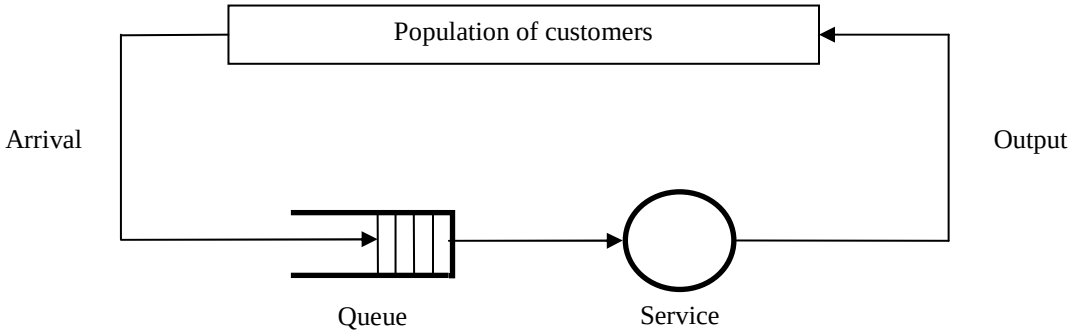

Fig. 1. Queuing system

	X	Y
M	Poisson process	exponential distribution
E_m	Erlang distribution with *m* phases	Erlang distribution with *m* phases
D	deterministic (known)	Constant
G	general (any)	General

Tab. 1. Symbols used in Kendall classification

3. An example of designing supply chain network

There are many applications of queuing theory. In this section we show an example of modeling a supply chain network shown on the Fig. 2 using this theory. Our supply chain consists of one manufacturer with one warehouse who supplies for *n* identical retailers. We will assume that retailers' orders arrive to the warehouse as a Poisson process with rate λ. It means that inter-arrival times are random variables with exponential distribution with density

$$f(x) = \begin{cases} \lambda e^{-\lambda x}, x > 0, \\ 0, \ x \leq 0. \end{cases} \quad (1)$$

Each order is placed for a constant batch of items Ω. The warehouse keeps inventory in K buckets, each bucket holds Q batches of size Ω. It means that maximum number of units that can be kept in the warehouse is KQ. When an order arrives to warehouse, either it is fulfilled or in a stock-out situation it has to wait until finished goods arrive from the factory to the warehouse. The warehouse places orders to the manufacturer when one bucket is depleted from the inventory at the warehouse. Thus the inter-arrival time of orders at the manufacturer plant is the sum of Q inter-arrival times of orders at the warehouse which form a Poisson process, inter-arrival time of orders at the manufacturing plant is a random variables with Erlang distribution with rate λ and density

$$f(x) = \begin{cases} \frac{\lambda^Q}{(Q-1)!} x^{Q-1} e^{-\lambda x}, x > 0, \\ 0, \ x \leq 0. \end{cases} . \quad (2)$$

We assume that processing time for an order of Ω items (including setup, manufacturing and logistic time) is exponentially distributed wih rate μ. The manufactured items are shipped in batch of Q units. Processing time for Q units of one batch is Erlang distributed. Then manufacturing plant can be considered as single channel queuing system $E_Q/ E_Q /1$. We also assume, that system has one waiting line with infinite capacity, orders are based on the first-come-first-serve policy.

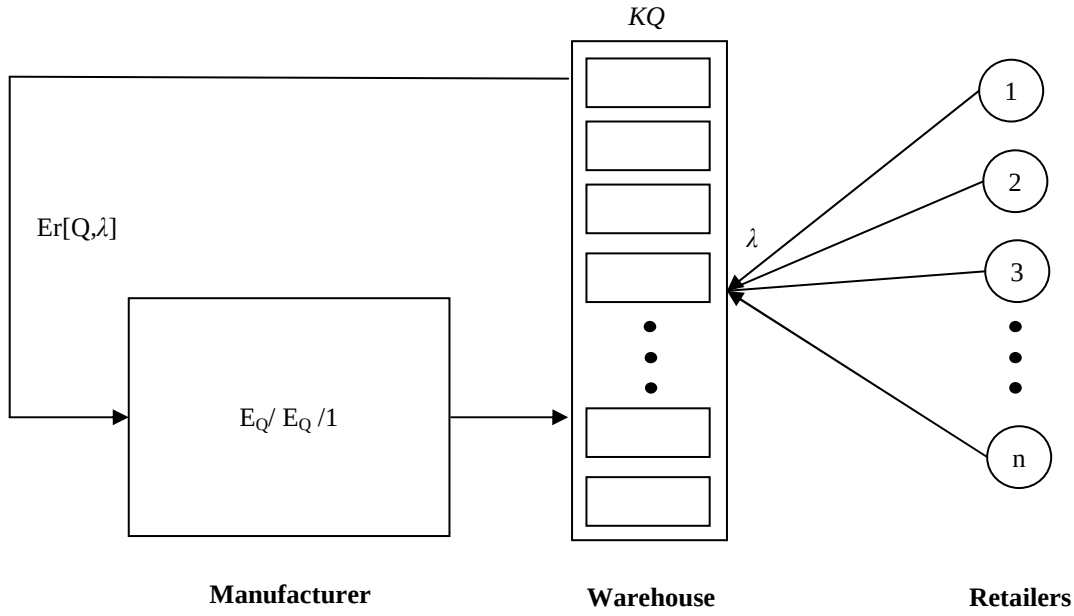

Fig. 2. Three-stage supply chain network

Given the values K and Q, we can compute the distribution of the number of orders/inventory in the system or the waiting times. Or we can design the supply chain by optimally choosing numbers *K* and *Q*. In the second case we try to minimaze total cost that consist of inventory carrying cost and back order cost. Inventory carrying cost depends on inventory quantity.

Back order cost is cost which occures when an order arriving to warehouse cannot be fulfilled because all buckets of warehouse are empty. This cost is a function of number of orders waiting to be fulfilled.

If we assume that inventory carrying cost and also back order costs are linear, total cost can be expressed as follows

$$TC(K,Q) = hE[I] + bE[B],. \qquad (3)$$

where *h* means inventory holding cost per unit per unit time, function *I(t)* means inventory at warehouse at time *t*, function *B(t)* means number of back orders in the system at time *t*.

Problem of designing our supply chain can be solved using queuing theory and probality theory.

4. Conclusion

In this article we have shown that theory of queuing systems is really useful tool that can be used also to model supply chain networks. This way for example a warehouse can optimize its inventory to minimize total costs consisting of inventory carrying costs and back order costs.

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Analog Video Camera Measuring

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Abstract. This work points out that even though video camera systems belong to one of the fastest developing branches of the commercial security industry, data in technical specifications published by producers or distributors very often do not match the reality. The purpose of this work is to clarify basic parameters of video cameras, such as Modulation Transfer function, horizontal resolution, and sensitivity and to create a simple procedure how to verify the data published by a producer.

Keywords: Modulation Transfer Function, horizontal resolution of the video camera, camera sensitivity

1. Introduction

Closed-circuit television systems (CCTV) is one of the fastest developing branches of the commercial security industry. Every day we are faced with new products with updated functions and characteristics. It has become very difficult not only for a current user but also for an installing company to make the right choice of high quality and time-proved CCTV components, not mentioning the fact that technical specifications of the product very often do not match the reality. The main contribution of this work should be a non-biased look at real capabilities of current industrial video cameras on the market and a procedure how to verify the technical parameters given by the producer.

Among the basic analog video cameras parameters are the modulation transfer function (MTF), determining the horizontal resolution, and sensitivity.

2. Determining the modulation transfer function (MTF)

The modulation transfer function at video camera systems may be explained as determining the light maximum and minimum intensity. To measure it is useful to use standardized black and white linear grid ISO 12233 – figure 1, which matches the white colour to a maximum light intensity and black colour to the minimum light intensity – figure 4. In such case the modulation or contrast is equal to one (100%), which means we are able to clearly identify individual colours from each other. If we increase the black/white periodicity revision, from a certain point the level of contrast or modulation decreases under 100%. If the modulation decreases below 5 %, individual colours (black and white) become grey and we are not able to recognise those individual colours (black/white) one from another anymore.

To measure transfer modulation we will need a light box PR3 and distinguishing linear test figure KTO 10 (fig. 1 left). Note: In stead of the light box we can use the standardized black and white linear raster ISO 12233 (fig. 1 right) and place it in a properly lighted place. Next, we prepare a TV monitor (TESLA MB301 in our case), digital oscilloscope (TEKTRONIX TDS 3032), a digital lux meter (DIGILUX 9500) and the tested video camera (EQ 2700).

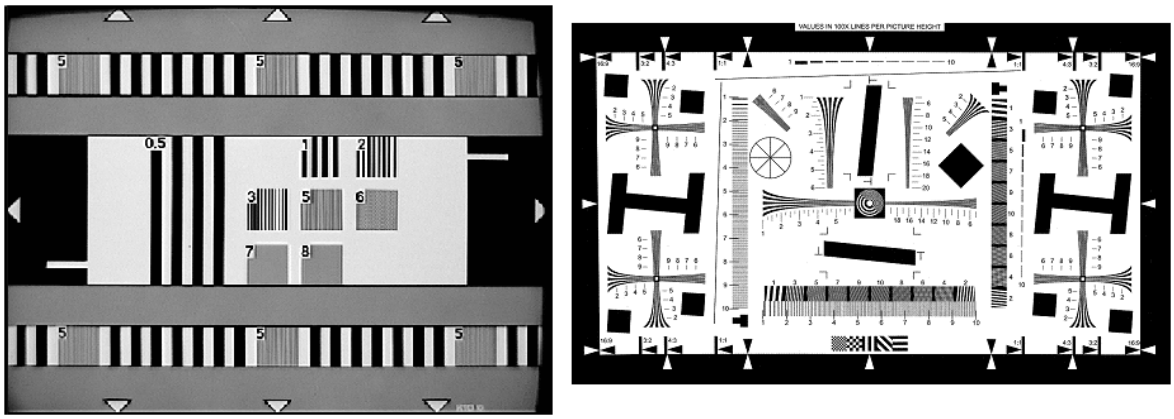

Fig. 1. The left figure shows distinguishing linear test figure KTO 10 and the right shows the standardized black and white linear raster ISO 12233.

2.1. Measuring procedure

Linking the equipment according to a fig. 2. We place the video camera and the light box so that the testing figure covers the whole camera's field of view. We set up the light intensity of the light box to a desired level. For this purpose we use a digital luxmeter and write down the measured value. We focus the camera on the testing figure and set up the optimum image quality (monitor adjustment: brightness, contrast, camera tuning: camera gain, integration times, if the camera objective is equipped with iris diaphragm it is possible to increase the image quality by closing the iris to a suitable f-number. Then, on the oscilloscope monitor we watch the course of the signal projecting the camera respond to the selected linear raster. On various linear rasters of the measured image (e.g. from 1 to 7 MHz) the modulation rate (fig. 3) is set up based on the equation (1).

To get the modulation transfer, an **IRE unit** is necessary to set up. This unit is used in television equipment to define a relative level of the TV signal, which was set up by the Institute of Radio Engineers. **1 IRE = 7.14 V**. The fig.4 describes the basic level of the TV signal (without chrominance information) with the total amplitude of 143 IRE and moving the black over darkness level by 7.5 IRE.

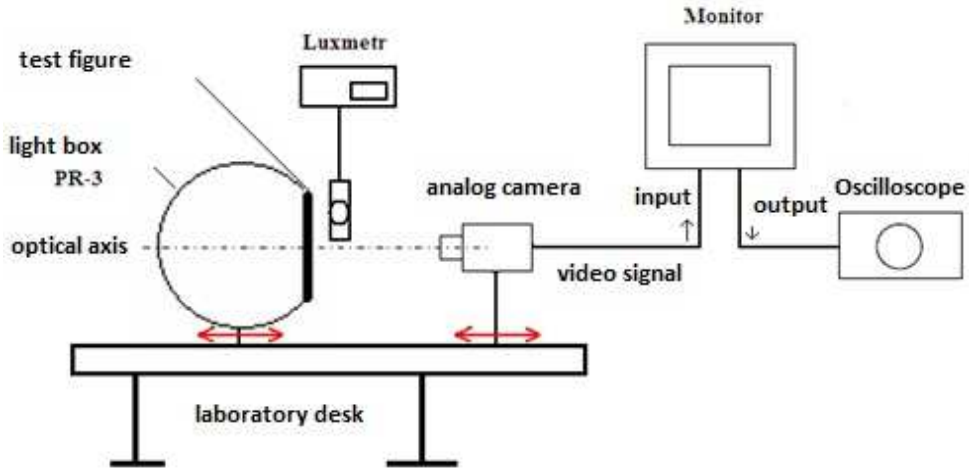

Fig. 2. A place for measuring the modulation transfer function.

3. A particular video camera measuring

An analogue video camera EQ 2700 was the subject of testing. The objective of the measuring was to set up the modulation transfer function. The optimum distance of the camera from the distinguishing linear test figure KTO 10 was adjusted to 62 cm. The light intensity of the distinguishing linear test figure KTO 10 was 320 lux. The camera was left in the basic factory set up. An aspherical

objective was with focal length f =3.25 ~ 88.0 mm was set to the position 3 (that is f=3 x 3,25 = 9,25 mm).

The courses of the TV signal shown below represent the camera response to the selected lines of the distinguishing linear test figure KTO 10 , fig. 3 left.

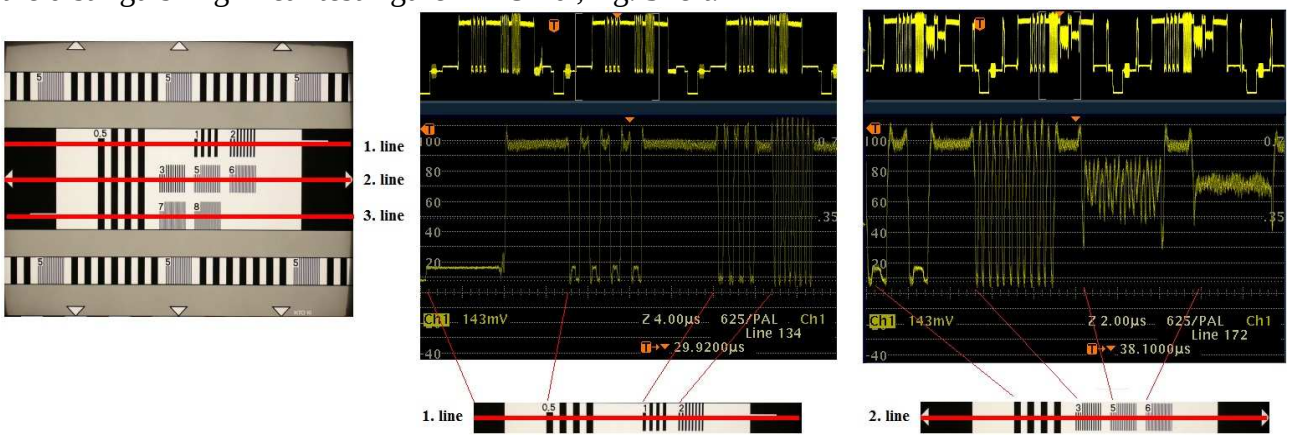

Fig. 3. Left – distinguishing linear test figure KTO 10 ; Middle – the course of the picture (TV) signal on the oscilloscope. Line 1: 0,5 – (0,5MHz) reference modulation 100%; 1 – (1MHz) modulation 100%; 2 - (2MHz) modulation 100%; Right - the course of the picture (TV) signal on the oscilloscope. Line 2: 0,5 – (0,5MHz) reference modulation; 3 – (3MHz) modulation 100%; 5 - (5MHz) modulation 31%; 6 – (6MHz) irresolvable.

Modulation transfer function (MTF) fig. 4 is calculated by substituting the measured values into the equation (1), where M is substituted with the average nominal amplitude of the TV signal representing the camera response to the reference linear raster 0.5 MHz. X is substituted with the nominal amplitude of the TV signal representing the camera response to the reference linear raster 0.5 MHz. Under the **raster** we understand vertical lines (black and white) in a given distance from each other. For the KTO10 image individual readings on the raster (0.5; 1; 2; 3…) represent frequencies in MHz. The frequency can be easily transferred to the camera resolution in TV lines. For the PAL standard (or CCIR) the space frequency of 1 MHz is adequate to app. 80 TVL (80 vertical lines on the image height).

$$Modulation = \frac{M}{x} \times 100\% . \qquad (1)$$

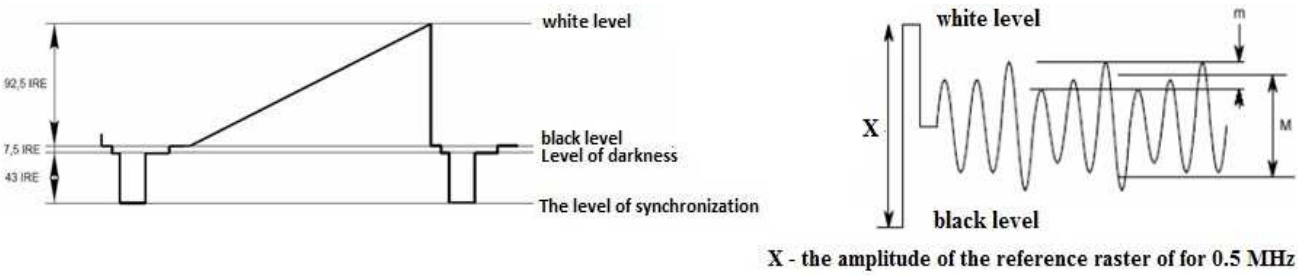

Fig. 4. Left – Basic level of the TV signal (without chrominance information, 143 IRE, black setting - 7,5 IRE); Right – Curve of videosignal staging response on reference linear raster 0,5 MHz

3.1. Measuring outputs

RASTR	LINE	IRE	MODULATION DEPTH
0,5 (REFERENCE)	white	100	100%
	black	10	
1	white	100	100%
	black	10	
2	white	100	100%
	black	10	

RASTR	LINE	IRE	MODULATION DEPTH
3	white	100	100%
	black	10	
5	white	84,1	31,10%
	black	56,1	
6	white		unrecognizable

Tab. 1. Modulation depth on the raster of 1 MHz, 2 MHz, 3 MHz, 4 MHz, 5 MHz, 6 MHz.

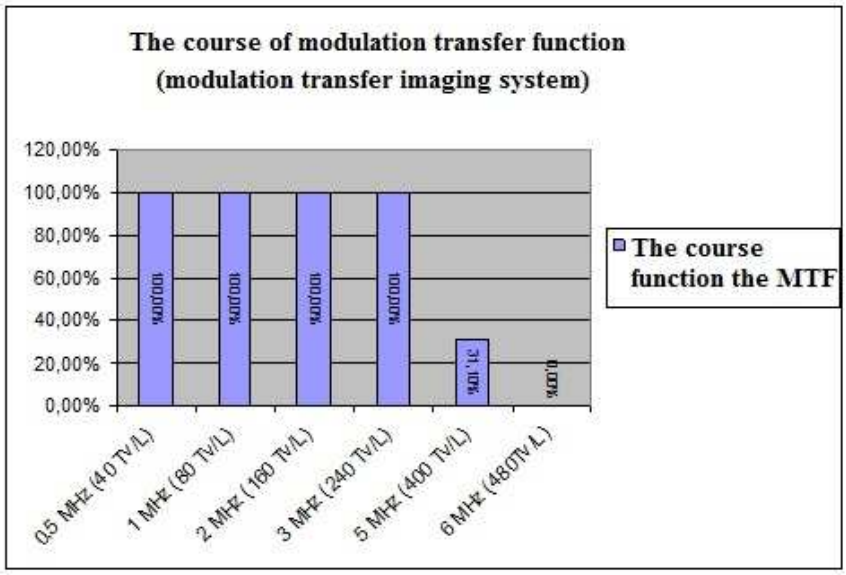

Fig. 5. The course of MTF (modulation transfer) imaging system.

4. Conclusion

On the measuring the modulation transfer function we have shown the basics of image transfer, ways of measuring and processing the measured data. It is the fundamental measuring from which other measuring of cameras' characteristics, such as horizontal resolution and sensitivity can be derived. Horizontal resolution is measured in the same way as MTF, except the horizontal linear raster is used (as well as sphenic rasters which are standardized according to TV lines). As long as we carry out the sensitivity measuring (that is lowering the light intensity), we are concerned with the depth of modulation, which cannot decrease below 5% during lowering the intensity. The light intensity is measured with a digital lux meter. The following data is measured for the given light intensity of the testing figure: a level of noise in the figure, unambiguous differentiation of individual linear rasters, and a nominal value of the TV signal level of darkness-level of white on the reference linear 0.5 MHz raster.

When carrying out the measuring with the particular video camera it has been found out that the camera resolves the linear raster of 5 MHz at 31.1% modulation. Horizontal resolution was 450TV/L at the 27% modulation. And the measured sensitivity of the camera in the night mode (monochromatic display) was 0.33 lux while the producer reports the sensitivity of 0.1 lux.

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Comparison of Air Emergency Medical Service in Selected Countries of the European Union

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Abstract. The aim of the article is comparison of the air emergency medical service in Slovakia and in selected European Union member countries. The article contains the basic activities of air rescue medical service in selected countries, statistical comparison of the number of interventions and air emergency medical service activities. It contains comparison of ambulance by the its selected technical parameters.

Keywords: air emergency medical service, ambulance, basic activities.

1. Introduction

The air emergency medical service was created to provide help and to save people's lives in hardly available places. In many countries the service is provided nearly thirty years.

Up to now it went through many changes and nowadays it is possible to come across with this service also in places accessible to for the land rescue health service. An air emergency medical service is an aircraft used for emergency medical assistance in situations where either a traditional ambulance cannot reach the scene easily or quickly enough, or the patient needs to be transported over a distance or terrain that makes air transportation the most practical transport. The air emergency medical service in chosen membership countries, which are simultaneously the neighbouring countries of Slovakia, has influence on development and activities of the air emergency medical service in Slovakia. Those are: Czech Republic, Poland and Austria.

2. The air emergency medical service - purpose, role and management

For purposes to secure urgent health care helps the land safety health service also the airline safety health service. The advantage of the airline service unlike the land service is speed which is able to undergo distances and secure urgent health care and accessibility where the land safety service cannot get especially in mountainous areas.

The operation of the air emergency medical service is a network of stations. In each station are only an ambulance, areas for personnel and material equipment for functioning. Because of using helicopters for functioning, Slovakia as an only country from the comparing countries has the air emergency medical service called as the helicopter emergency medical service. In the other countries the name is specified only as the Air emergency medical service.

The deployment of stations in the area of the states is different according to individual criterions. The emergency area is mostly the whole area of the state if it is necessary, but each station has determined a smaller territory of emergency area. Important is to be at the place of intervention in 15 minutes. This time depends on the travelling speed of the ambulance, therefore the smaller rescue area of the station has a radius in the range from 50 km to 70 km.

The operation of the air emergency medical service is different in the countries. The division of stations is influenced by the expanse and segmentation of the area of the state, the number of population, the economical, political and social forwardness of the state. The comparison of surrounding states with Slovakia is indicated in the Tab.1.

Countries	Slovakia	Czech Republic	Austria	Poland
Expanse [km^2]	49 500	78 864	83 850	312 680
Number of the population [mil.]	5,2	10,4	7,8	38,5
Biggest keeper	Air Transport Europe	Delta system Air; Alfa Helicopter	ŐAMTC	HEMS
Type of the organization	the private	the private	the private, non profit	supported by the
Type of the helicopters	Agusta A-109K2	EC 135 T2, Bell 427	AS 350B, AS 355N	EC 135
Name of the area	Krištof	Krystof	Christophorus	Rescue
The number of the stations	7	10	16	18
Number of helicopters	8	10	unknown	18

Tab. 1. The air emergency medical service in Slovakia and abroad.

3. Transport means for air emergency medical service

The provision of help and transport of injured people is secured by the ambulances. As an ambulance, helicopter is used as a mean of transport of the airline traffic. The helicopter is able to fly in the air by low and forward gears, hang in the air, and move into sides and reserve. As well it can vertically take off and land, what substantially decreases the big demands for the starting and landing flight path.

In Slovakia is this service secured by the type of helicopter Agusta A-109K2 which is depicted in the Fig. 1. As compensation is used type AS 355N.

In Czech Republic for functioning is used especially the type of helicopter EC 135 T2 and also Bell 427. The army of the Czech Republic, as one of the keeper uses type W-3A Sokol to secure the service.

Fig. 1. Helicopter Agusta A109K2.

Poland secures the service by the type of helicopter EC 135, which is depicted in the Fig. 2 and Agusta K109. Type Mi-2 Plus is as a compensation of the already mentioned types.

Fig. 2. Helicopter EC 135.

Austria uses the type of helicopter AS 350B and EC-135 T2 to secure the service.

The comparison of some technical parameters of used ambulances is in the Tab. 2.

Type / Parameter	Agusta A-109K2	AS 350 B	AS 355 N	Bell 427	EC 135
Diameter of the rotor [m]	11,00	11,69	10,69	11,28	10,20
Dimension (length x height) [m]	13,04 x 11,00	10,93 x 3,14	12,94 x 3,14	11,42 x 3,20	12,60 x 3,51
Maximal speed [km/h]	263	287	278	259	287
Travel speed [km/h]	250	245	224	256	254
Unfilled weight [kg]	2 000	1 174	1 305	1 760	1 455
Maximal starting weight [kg]	2 850	2 250	2 600	2 970	2 427
Rise[m/s]	9,8	8,5	6,5	10,16	7,62

Tab. 2. Technical parameters ambulance.

4. Comparison of air emergency medical service activities in selected countries

By the ambulances are acted interventions which secure the provision of urgent health care. Each country has the distribution of intervention differently. This division is initiated in Tab. 3.

In Slovakia each station has to secure the service to 772 000 of the population. In the last 5 years there are on average 1041,8 intervention annually. On average for one station it is 148 interventions annually. Each day is in the area of Slovakia acted approximately 2,8 intervention.

In the comparison with Slovakia in Czech Republic each station has to secure the service for 1 040 000 of the population what is about 40% more than in Slovakia. On average one station has 327,3 intervention annually. The average number of intervention for one day is approximately 9.

In Poland in the recount of the number of population each station has to secure the service for 2 138 889 of the population what is about 187,92% more than in Slovakia and in the comparison with the other countries it is the biggest number of population for one station. The average number of intervention for one station is 321,2 annually and the average number of intervention for one day is 15,8.

In Austria in the recount of the number of population each station has to secure the service for 487 500 of the population what is about 34,38% less than in Slovakia and in the comparison with the other countries it is the lowest number of population for one station. The average number of intervention for one station is 752,4 and the average number of intervention for one day is approximately 32.

Country	Functioning
Slovakia	• primary flights, • secondary flights, • investigative flights, • repatriation flights (transport of our citizen from abroad), • reconnaissance flights (at mass tragedies and disasters), • other necessary flights,
Czech Republic	• rescue actions, • haunting actions, • saving at natural disasters, • sanitary service, • the army rescue service during the war conflict,
Poland	• emergency medical service, • sanitary air emergency medical transport , • medical air transport from abroad, • medical air transport from the country,
Austria	• operations for the internal medicine, • operations for the neurologic character, • operations at sport accidents and accidents in the free time, • operations at the traffic accident.

Tab. 3. Distribution functioning.

5. Conclusion

Slovakia is the smallest state from the comparing countries. The advantage of this service in Slovakia against to the comparing countries is that the functioning is not narrowly profiled. It means that it is not used only for health and sanitarily service as in Poland and Austria, but it also provides investigative service as in Czech Republic. Furthermore it provides help to determine places, the expanse of disaster and to skim results of mass tragedies and disasters as the only one from the comparing countries.

In spite of that, the expanse and jagged surface of the area of Slovakia is similar to Czech Republic and Austria and in spite of every advantages which helicopter emergency medical service has, its usability in our conditions is very low.

Ambulance helicopter emergency medical service carried out every intervention of second-third day of the year. Ambulance carried on average 1041 interventions. The main reason, capacity of helicopter emergency medical service is underused, it may be that the operation of the station is expensive.

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Using Robot Systems to Measure Electromagnetic Fields in Security Applications

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Abstract. This work describes the analysis of radiated electromagnetic fields of specifically chosen computer technology on a proposed workplace with a modern robot system, and its subsequent interpretation not only from the positive point of view. In addition, the result of the analysis will be processed in the form of an engineering design to show appropriate consequences and further applications of the fields. Finally the received results are summarised and suggestion made to use EM fields in practise.

Keywords: Robot system, electromagnetic field, electromagnetic radiation, electromagnetic spectrum, Stäubli TX40, R&S FSH3

1. Introduction

Electromagnetic radiation is one of the most spread forms of mass in the nature. Nevertheless we are not aware of the invisible particles of the electromagnetic spectrum because apart from eyes we do not have any other sense organ for their direct reception. Above all, in the last century particular particles of the electromagnetic field have been used to the large extent and their further applications are evident.

Procedures needed to reach the set up goals are described chronologically in this work. First, the design of a measuring workplace and its further construction is analysed using a modern robot system and available laboratory equipment. Then the developed software (for mutual communication and further visualisation) is described together with the structure of individual appliances connection. One of the chapters shows graphs of some selected results of the electromagnetic fields analysis carried out on computer equipment.

2. The design and construction of a measuring workplace

2.1. The design of a measuring workplace

The design of the measuring workplace starts, first of all, with the equipment that is vital for the quality of measuring. It is a spectrum analyser that is able to display, given the limitation factors of the technology of its production, the spectrum of the electromagnetic radiation. Each measuring needs a proper antenna and a proper configuration of the whole equipment.

To make the whole process more effective, the received data are loaded in the computer and visualized using any software.

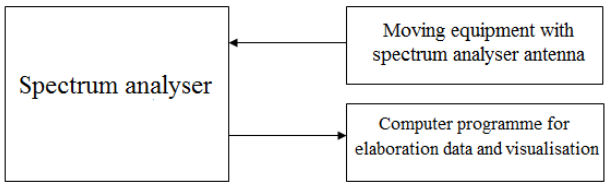

Fig. 1. Diagram of the designed measuring workplace

2.2 Construction of the measuring workplace with available resources

The first and at the same time most important part of the measuring system is the already mentioned hand spectrum analyser **R&S FSH3** made by **ROHDE&SCHWARZ,** a German producer, that can be connected using the serial/optical interface and a number of its special antennas **R&S HZ-11** from the same producer connected t the equipment by a coaxial cable.

As moving equipment a built up electromagnetic XY recorder moving on two axes was first considered, but later it was substituted with high quality and top robot equipment **TX 40** made by **STÄUBLI,** a renowned producer, with a CS8 controlling system and its own integrated software VAL3. The robot can move in 6 joints so that it enables us to carry out measurements in the third axe Z.

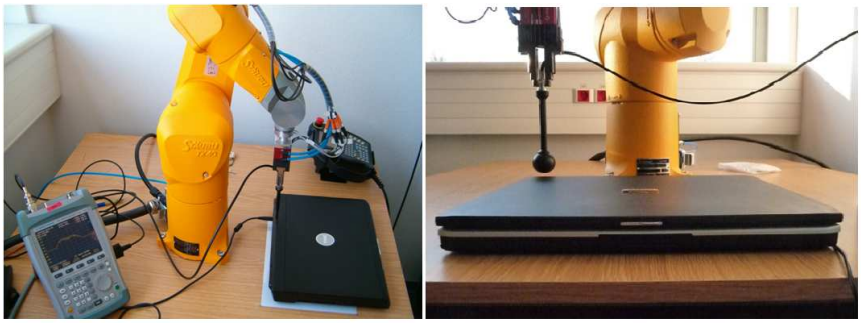

Fig. 2. Robotic system STÄUBLI TX40

As the most useful solution for saving and visualizing the received data **Agilent VEE Pro 7.5,** a graphic software, was used as due to its control devices it is able to communicate with the selected spectrum analyser. It was necessary to program and test on any PC with minimum HW requirements the **PPrg.vee** software, which used the mentioned controlled devices both for setting up the parameters of the spectrum analyser and for reading the received values in each measuring and save them into a text file.

For the further it was necessary to match the measured values with appropriate coordinates, which means to receive the robot location data at its each point and also synchronize the robot's movement in real time with the PC software that communicates with the spectrum analyser (Pprg.vee) so that the software has enough time to save all parts of the spectrum or evaluate the maximum before the robot moves to another measuring point. So it is important to connect to the PC software. After the two less effective trials, finally the multimeter Agilent 34401A was selected to read values at the robot's digital outputs. The multimeter as well as the digital analyser FSH3 is able to communicate with software developed in Agilent VEE Pro 7.5 thanks to specific controllers. The multimeter is connected to the PC by the USB/GPIB interface.

The final solution is so simplified that only one robot's output is sufficient. The starting value on this output is the logical 1 (in our case the logical 1 = 24V, logical 0 = 0V). On each move the robot changes the output value from the logical 1 to the logical 0 and vice versa. The output voltage is measured by the multimeter at any time, (in our case 100 ms) and at this time we always have the actual value on the robot's output in the Pprg.vee software and we detect whether the robot has moved to another point or not. However, in this way of detection we need to synchronise dimensions parameters of the computer technology- length in axes X, Y, Z and also the interval of individual measuring points (spacing) at each axis so that the real movement grid of the robot was identical with the grid automatically generated by the PPrg.vee software.

For visualisation **BestValue.exe** software in C# environment and **Visualx_UTB_209.m** in MATLAB. The former selects the maximum from the received values at all points and saves it to a text file and the latter transfers the data into final graphs of various types that are completed with photographs of the measured computer technology to show a better picture of measured characteristics.

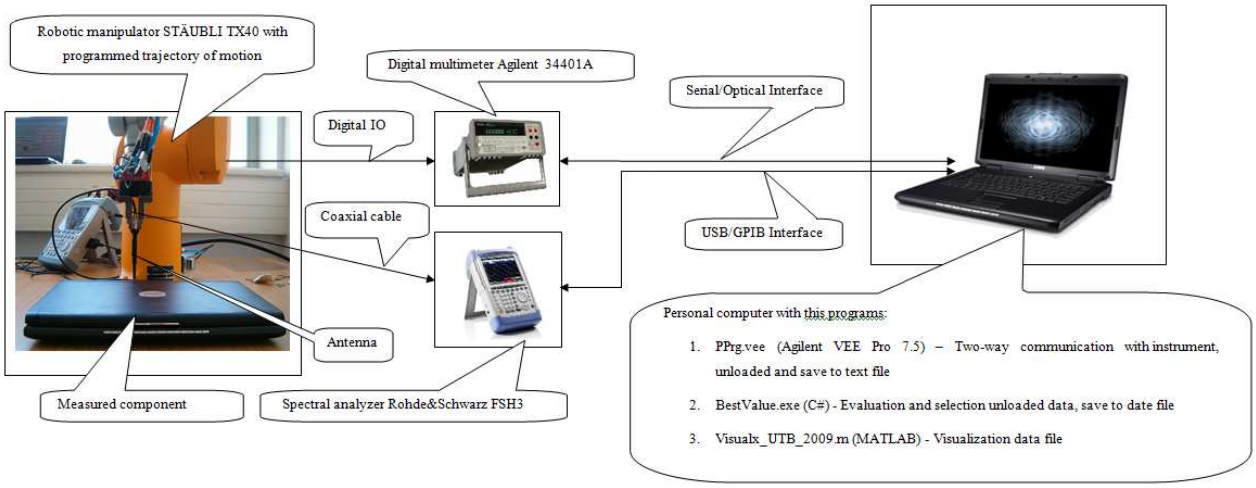

Fig. 3. Diagram built-up measuring workplace

3. Measuring the Dell Vostro 1500 notebook radiation

3.1 Measuring setting up

One of the measuring was carried out on the Vostro 1500 notebook from Dell, a branded producer. The frequency of wireless data transfer - wifi (2.463) that is specified in IEEE 802.11 was selected for the measuring. The notebook's wifi card radiation is clearly visible on the spectrum analyser. To make sure the wifi is fully occupied , the notebook was connected wirelessly to another computer by the AD –HOC mode and copying of a great volume of data from one computer to another was carried out.

The notebook was placed in the robotic hand radius. The back left corner was placed to the origin of the coordinate system. The R&S 7405-905 antenna from a Rohde & Schwartz measuring antenna set was used for measuring.

3.2 Measuring results

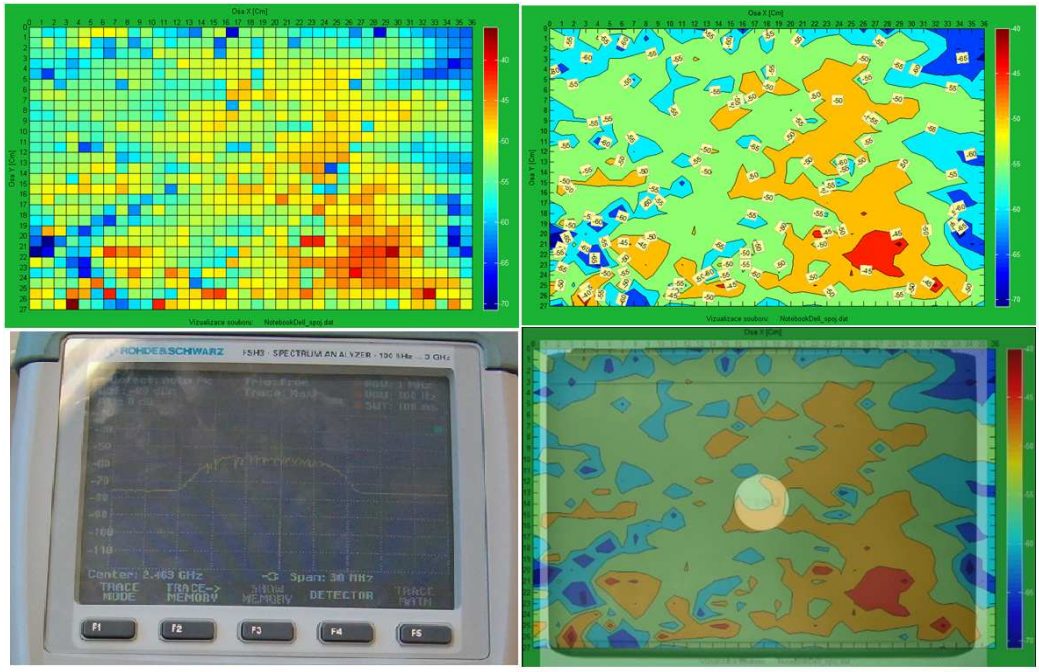

Fig. 4. Visualisation of the Dell Vostro 1500 notebook measuring results

4. Potential practical applications

An example of a practical application is measuring the electromagnetic radiation of the keyboard from the data protection point of view. A team of American researchers have managed to catch and read electromagnetic impulses of pressed keys of various keyboard types at the distance of 1m, and when using better equipment even at the distance of 20m through a wall and with software they managed to determine the type of the pressed key from the electromagnetic spectrum.

This fact might be used by special police or army teams when tapping or following dangerous persons in order to support the national security.

Currently we are developing a robotic chassis controlled by a laser scanner that would be able to drive outside and which enlarges the automatic measuring possibilities of the electromagnetic field and spreading electronic safety signals in a larger area.

Fig. 5. The first version of a robotic chassis for outdoor measuring

5. Conclusion

This work describes the design of the special automated workplace suitable for measuring electric and magnetic fields at various frequency scales. Its completion using available resources brought up a number of both hardware and software problems. Suitable equipment had to be chosen as well as additional hardware to connect them mutually and to program utility software in a few development environments. In addition, the measuring procedure had to be designed and created and adjusted to its automated measuring workplace. The received results were saved in data files and then graphically visualised in a suitable form thanks to another developed software.

Using a robotic system and automating the whole measuring workplace we are able to receive a greater number of values in a shorter time period, lower the physical work of the personnel to the minimum, and obtain more precise and more detailed results compared to the standard hand measuring. This methodology can be used at any electromagnetic radiation or electromagnetic compatibility measuring no matter if we use wire or wireless parts of the electronic safety system.

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Integration of the Enterprise Resource Planning Systems and Risk Prevention

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Abstract. The article deals with system integration of the enterprise information systems and areas of system integration in the enterprise. It analyzes the structure and life cycle of the Enterprise Resource Planning System and the various phases of its implementation process. In conclusion, there are areas of the company, in which an implemented information system can prevent potential business risks.

Keywords: integration, system, project, enterprise.

1. Introduction

At present, the ongoing development and implementation of information systems in an effort to unify support for all business processes in a single universal product shows significant increase. Many companies in an effort to streamline its business processes undergo difficult transformation procedures, which are based primarily on exactly defined requirements of the company and thorough adaptations of the system to specific circumstances. All of these activities, including the merger of various components of information technology and existing business applications on multiple platforms in a single information system, are the subject of system integration.

To maintain the company position on the market the existence of a complex information system is undoubtedly a necessity. The main motivating force is to gain a competitive advantage against companies that don't use such a system, but mainly it's the efficient use of resources and cost savings.

Grasping the potential of modern information system means to have information on all business operations and transactions anytime and anywhere. Currently, when the information are a business article, ownership of the right information at the right time and the right place is the key factor for success and maintaining the existence of the company.

2. System Integration

The reasons given in the introduction lead to a fundamental business decision, to implement a company-wide information system even at high input costs. In consideration of the scope and difficulty of this type of project for this purpose we use the services of system integrators who by means of outsourcing ensure the complete integration of new information system with existing systems in the company. Business activities of the company are not influenced, it can concentrate on its business while the implementation process is running. The integrator takes responsibility for the transition to the new information system, for its functionality and quality, including support services such as installation of hardware and software, consulting, training, servicing and maintenance. Outsourcing services in system integration projects also helps to diversify the risks threatening the success of these projects between the investor and the contractor.

The first system integration projects started to be implemented in its simplest form at the end of the eighties of the last century. The main impulse was distrust to the mass introduction of information systems with questionable effectiveness and to mass installation of personal computers

in enterprises. Adapting to the ever new trends and demands placed on the development of business applications developed the area of system integration in the form, in which it is today.

Slovak Society for System Integration states that it is a complex of activities and services aimed at creating an information system and information technologies. They have to ensure the scope of the enterprise, its objectives and priorities and to provide comprehensive information about the organization and its surroundings. These information technologies have to support major internal and external processes of the enterprise.

The goal of system integration is establishment and a permanent maintenance of an integrated ERP system that makes optimal use of potential of available information technology for maximum support business objectives. The information system is created by integrating a variety of sources, namely the different products and services.

The core of system integration is not only the integration of technological components of information systems, but also linking them with business objectives. Achieving these goals is accomplished through semantically vertically organized components of system integration.

The highest position has the integration of business strategy, which determines the long-term business objectives, together with the information strategy. The top management of the company looks for consistency of the information and communication technologies with the business objectives.

This is closely related to the integration of vision. Its subject is the development and implementation of an enterprise information system, through which the enterprise will be able to increase its competitiveness and support its key business processes.

The next level, which the enterprise information system should cover, is the integration of the company with its surroundings. It means to be able to flexibly adapt to changes in an external environment, for example economical, political and other. Information compatibility with major business partners is very important. Is also essential to provide and obtain information necessary to make decisions related to management of the company.

The core of the system integration is complete integration of all internal business processes and their mutual relations. The objective is to fully use information system support, which it provides and integration of its functions with business objectives. Vertical and horizontal integration of business processes is aimed to shortening the periods of their duration, streamline their business in order to save resources and optimize processes in order to maximize the quality of the products or services.

Infrastructure of the corporate information system represents the last component of system integration, and that is technology integration. The platform consists of hardware components of user station at various levels of corporate information pyramid that are linked to the corporate computer network. The software integration of workstations is compiled by program equipment, which provides automation of selected functional areas of the company. Processing requirements of users runs at various application servers that are integrated with the data warehouses, data servers. User access to these servers is through an integrated user interface, which can be different for different levels of the enterprise. Principle and specific nature of application control through these interfaces remain the same.

3. Enterprise Resource Planning Systems

Information systems for enterprise resource planning (ERP systems) are complex systems that unify business functions with partial information needs of all parts of the enterprise in a global application that uses a common data warehouse. It contains separately configurable files of functionality covering various business activities.

Before current ERP solutions companies used MRP systems for material requirements planning and later MRP II systems for manufacturing resource planning. The current ERP system scope

covers the functionality of the previous systems and they are enhanced by functionality in financial management and human resource.

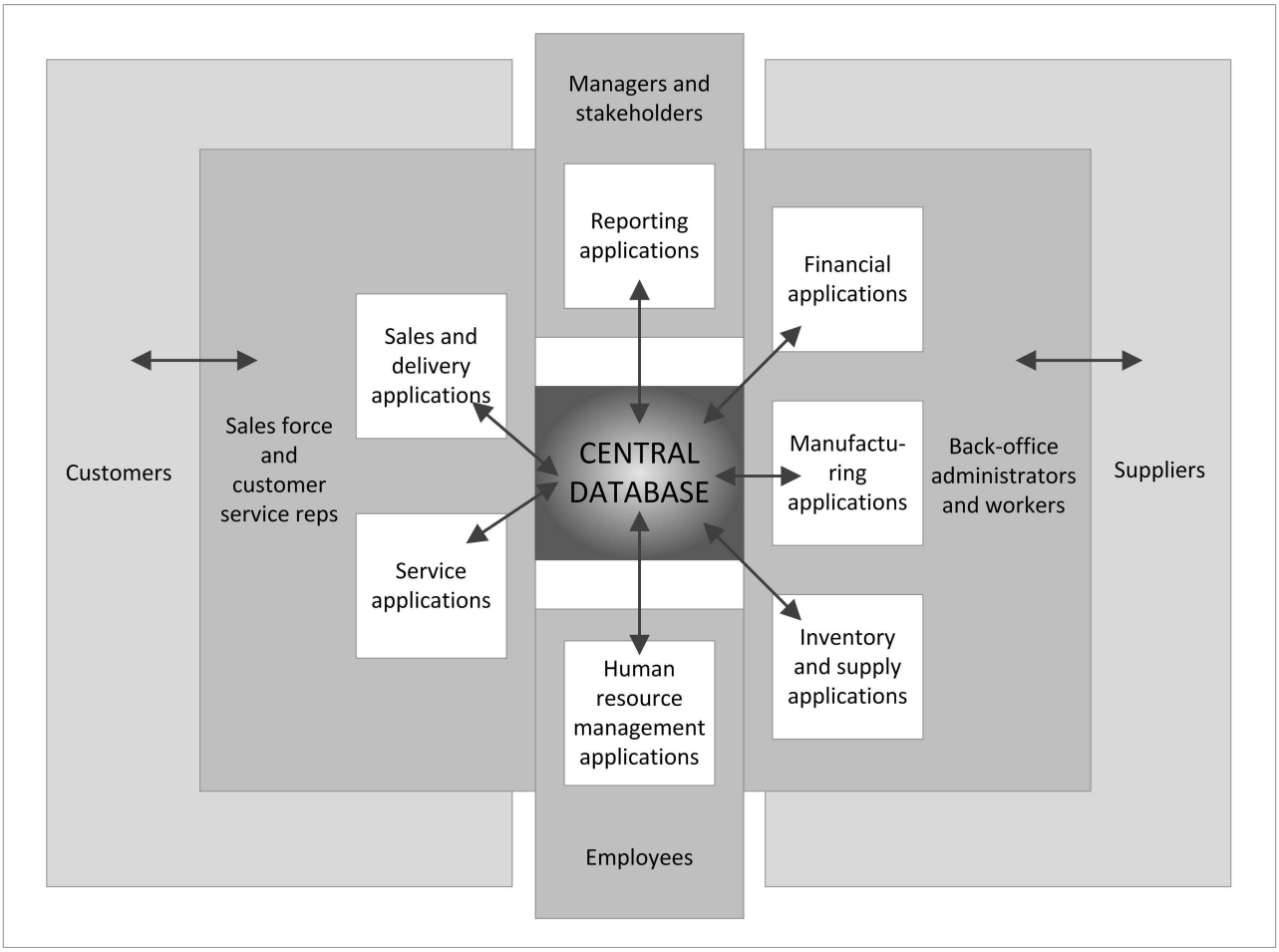

Fig. 1. Structure of the ERP system

Modern ERP systems include Advanced Planning and Scheduling System and business solution, such as Customer Relationship Management Systems and Supply Chain Management. Structure and construction of today's ERP systems is illustrated by figure 1.

These ERP systems provide transaction processing requirements and access to the information through a three-tiered client/server architecture, which technical core is a group of database, application and presentation servers. Launching of applications and processing of requests from users of the system is performed by one or more application servers. Presentation tasks and interaction with graphical user interface run at the user stations. The database server system is composed from the relational databases, which are formed from the interconnected tables by ID keys. Thus created data warehouse performs the management of enterprise data and communicates with application servers when processing the requirements of a particular application, which is generated by the user of the station.

4. Life Cycle of Enterprise Resource Planning System in the Company

Different requirements of customers from the different sectors of the economy are presently being met by several suppliers of ERP systems. The amount of investment costs of the company into the ERP system implementation must reflect its needs, size and scope.

At present, therefore the suppliers of ERP systems develop and offer ERP systems in three forms. The first form means that the system is universal and does not reflect the specific conditions of each sector and then using them requires additional configuration. The second form contains the

package modules, pre-configured for specific industry sectors and specific size of the enterprise, for example small and medium-sized enterprises. The third form of the software is an operational installation at the customer after the previous configuration and adaptation to individual requirements of the company.

Business decision to implement any of these forms of information system starts a life cycle of the ERP system. Life cycle model of the ERP system in a company can be summarized into the following four phases: selection, configuration, implementation, use and operation (Figure 2).

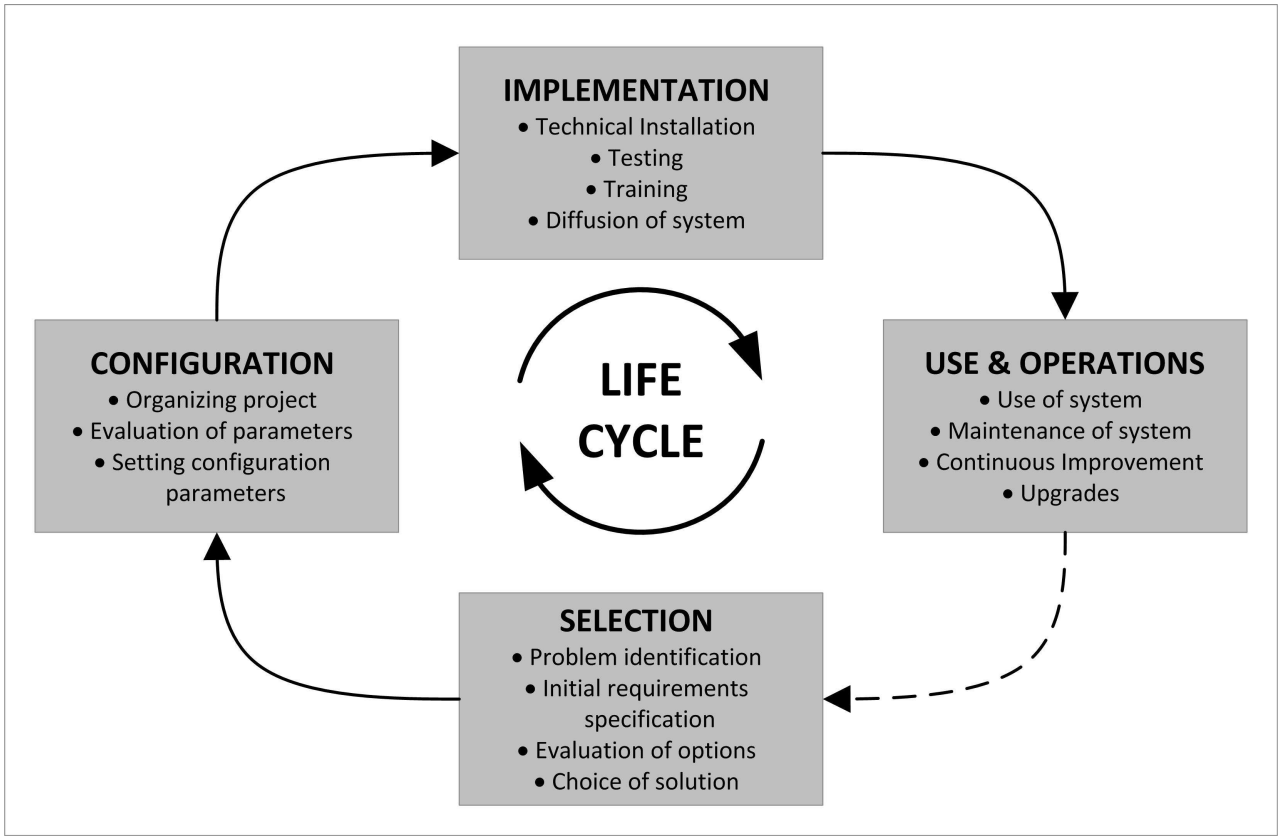

Fig. 2. Life cycle model of the ERP system in a company

Like may the main stages overlap each other or they may contain additional partial phases, the transition between the main phases can be divided into subphases. In the next section I will describe the fundamental tasks and content of activities of the life cycle phases of the ERP system.

4.1. Selection Phase

The first phase in the life cycle of an ERP system is the initiation by the company to introduce such a system. It includes activities, usually of the company management, which result is the assembly requirements for future system, defining each variant, assessment and evaluation of selected solutions and acquisition activity itself. Identification of problems in the enterprise, which could be resolved by introducing the system, is the initial condition for a successful implementation of those activities. The selection of a system that best reflects the business needs may be based on evaluation factors, for example: range of functionality, costs, time to implement, requirements for system maintenance, etc.

4.2. Configuration Phase

By deciding to introduce a specific ERP system, the life cycle continues by the configuration. Before it is necessary to determine the scope and objectives of the project system integration in the project plan, to approve timetable and necessary resources (people, money), to establish requirements for IT infrastructure and also to provide the project team members on the side of

company and the supplier, including the project manager. The main task of this phase is to adapt the system configuration to business requirements of the company. The important role in the system configuration has the customer project team, who knows various business processes in detail. These business processes need to be set according to best practices that are integrated in the modules of the ERP system. In view of the possible risks of failure of the project of implementation ERP system, this is the most important phase. Neglecting a detailed analysis of the company's needs may subsequently lead to delays in implementation and the failure to achieve the desired functionality of the system.

4.3. Implementation Phase

The implementation phase of ERP system is an interactive part of the process life cycle. According to the chosen implementation strategy, depending on project scope and approach of the organization, implementation can proceed in stages, step by step (Step by Step strategy) or at once (Big Bang strategy). Implementation phase includes technical - hardware and software installation, re-engineering or process design, enhancements and interfaces development, overall system configuration and testing. The results of testing the performance measurement and evaluation of system functionality are the base for the decision on releasing the ERP system into production phase. The end phase consists of user training activity of end users of the ERP system and the system switch to production. The result of the phase is an implemented ERP system with original company systems, or total replacement of all previous systems by the new ERP solution.

4.4. Use & Operation Phase

Routine operation is the final phase of a life cycle of the ERP system. The content of this phase is system management, continuous monitoring of integration with business needs and evaluating overall performance and functionality.

It also includes regular updates of system, introduction of additional functionality and integration with new information systems to support special fields of the company, for example: customer relationship management, management of supplier-customer relations, e-commerce, etc. until the company will have made a decision on the replacement of the old solution and thereby re-start a new life cycle of enterprise information system.

5. Enterprise Resource Planning System and Risk Prevention

The main motivation to the introduction of ERP systems is increasing of efficiency and effectiveness of company´s business processes, improving information flows inside and outside the company and especially reducing the operational costs. Implementation of ERP system indirectly provides prevention of potential business risks in all these areas.

Achieving the above expectations of implementation of the ERP system is dependent on the choice of an appropriate ERP system with respect to the organizational structure of the company, its objectives and strategy, corporate culture etc., and last but not least also on the customization and configuration of the system in a concrete enterprise.

Business areas, in which implemented an ERP system is to avoid risks, are the following: operation, management, strategic decision making, IT and organization.

Operational benefits of the ERP are linked to prevention of risks related to the performing routine operational activities of the organization. Restructuring, adaptation and automation of business processes according to best practices can mean benefits in terms of costs reduction, shortening of business cycles, increased productivity and quality and improved customer service.

Central data warehouse, immediate and reliable access to required data, as well as directly integrated tools for their analysis, will help prevent the risks arising from the needs of rapid decision making, preparation of business plans, efficient resource management, which directly

reflects the increase in business performance. Availability of information also improves the performance of operational control of individual departments of the company.

Strategic benefits relate to internal and external integration of ERP and thus the whole business. It is the integration of its modules with a central database and also link to key partners - suppliers or customers. Integration in this form enables to prevent risks that relate to differentiation of their products, with using electronic commerce to manage risks associated with expansion into new markets, simpler introduction of innovations, easier course of business operations at lower costs and thus faster overall growth of the company.

Essential for a successful operation of the ERP system is a clearly defined and unified IT infrastructure. Standardized and integrated IT infrastructure supports the minimization of risks related to updating and upgrading of the system and provides fast and cost-efficient deployment of new applications or support systems. It also saves costs related with setting up new users of the ERP system.

Global coverage of company needs and modular structure of ERP which reflects the organizational structure of the company reduces the risks related to maintenance of the system and business processes. It brings advantages in terms of rationalization of communication flows and simple and periodic reporting. Global integration of various areas of the company ensures compatibility outputs, recording changes in data in real time simultaneously in multiple locations, centralization of documentation, etc.

6. Conclusion

Currently, public and private sector are characterized by positive approach to innovative solutions that help to streamline their activities, basic and advanced operation, improve relations in the internal and external environment and not least to enhance competitiveness. These high goals generate complex tasks, which require a specific systemic approach, without which these objectives could not be successfully achieved.

As mentioned in the article, introduced ERP system allows effectively prevent various business risks. On the other hand, a complex process of introduction with high time and financial demands in the form of system integration project can jeopardize the existence of the company, if the project will not be successful.

It is therefore on consideration of the enterprise management, whether to take the risks related to the implementation of ERP system at the cost of preventing business risks in the future.

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Chinese Economic Success - Inspiration for Economy, Policy and Security

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Abstract. This paper is focused on the recent changes in global economic relations and increasing of China's importance in global politics, security and economy. It depicts the changes in China's security, economic, political strategy and its influence to its own development and empowering its position in international economic, political and security relations. At the end there are mentioned the implications of depicted facts for the security management of EU.
Keywords: China, economic security, sustainable development, soft power, strategic investments, Africa

1. Introduction

Nowadays, there exist several serious turbulences and breakings of an economic, social, political, and security balance of the world economic system. We are living in difficult period of global economic, political and security order transition. This together with accelerating of scientific improvement, as well as with increasing complexity of multidimensional structure of risks and threats is source of need for the taking a predictive strategic (economic, environmental, social, security and political) decisions related to the future development of global economy.

It is possible to state, that the disintegration of the socialistic block, the end of cold war, and the end of bipolar world order can be seen as the causes of necessity for the separated states and integration units to take transition:

- from existing, operation and development in somehow limiting, but very stabile environment from an economic and security balance point of view,
- towards the existing, operation, and development in very unstable conditions of transitioning world economy.

This creates a requirement for a development of new socio-economic and security strategies of states or integration units.

2. Actual Changes in Global Economy Related to the Political Economic and Security Position of State in Global Economic Space

It is possible to identify a significant trend to transition from bipolar world economy and security towards multipolar one, within the evaluating of present state of global economy and politics. As a theoretical option of future world order can be identified these options

unipolarity, bipoloarity and multipolar development of the world.

It is possible to take into the account these theoretical possibilities as the result of present global economic, political and security transition:

- Unipolarity. (that means an existence of dominant position of one state or integration unit, which is perceived as hegemonic or dominant key player of international economics, politics in the world global economy.)
- Bipolarity (that means an existence of two dominant positions of two states or integration unit, which are perceived as dominant key player of international economic, political and

security relations in the world. The development of both of them is guaranteeing the social, economic, political and security balance of the world)

- Multipolarity - (that means an existence of several – (more than two) dominant centers of social-economic and security development. This creates a dynamic balance by the necessity of interactions with the other centers. This reduces bad sides of monopoly or semi monopoly situations in dividing of world economic, political and security power.)

In relation to the presumption of unipolarity, it is possible to say, that in present state of world economic system influenced by the weakening of the US position there hardly exist a prognosis about a recovering its position of world hegemony or about the changing this position with another possible the most powerful state in future world development. It is caused mainly by the polycentric character of world socio-economic development. The most realistic presumptions of being the most important country with principal influence to the global economy and policy say about potential of China or India or European Union. But Chinese huge economic development is not connected with the same level of development in the other areas of state social economic system. Problems can be identified in relative political isolation, in sustainability of the current rates of economic development because of the high level of energetic and raw materials demand of Chinese economy, social area, and demographic imbalance caused the one child policy preferred by the Chinese authorities in the second half of 20th. century. Problems in future development of India can be viewed in the lack of institutional and democracy development.

Returning to the bipolar order in global economy seems to be unlikely because of current state of global economy development with significant trend of arising several new significant centers of social-economic development.(for example an Asian new core of dynamic developing East Asian countries, China, India and the other countries called Asian dragons or tigers.

The most likely looks the variant of multipolar future economic, political and security world order with several relatively equivalent centers of social and economic development and political and security power. This implicates many newdimensional restructured risks for the social-economic-political and security stability of the world economic system. Important seems to be a key fact, that the present transition of the world towards a polycentric world economy system order is not finished yet.

It is just uncertainty and complexity, variability, and instability of current conditions of re-structuralizing international economic, political and security relations, which are creating new serious challenges for states and integration units in relation to the setting up their future economic, political and security position in the frame of future global economy development.

In the security and crisis management point of view it can be stated that nowadays we are in the period impacted by the forming of future security states` positions as well as forming the world security order by utilization long term stability and development factors of key areas of economy, policy, security in current unstable conditions of the world economic system.

The process of creation and forming the economic, political and security position of the state is in current state of world economic system influenced by:

- incomplete transition of world economic system from bipolar to polycentric order one
- blurring of the differences and borders of an autonomous seizing and position of single key areas of operation and managing the state in the global environment
- increasing of the complexity and multidimensionality various real or potential determinants of future state development
- increasing of number, complexity, and interdependent multidimensional character of present risks as well as risks of future development of global economy together with development of the state or integration unit’s position within it.
- impacts of global trends e. g. increasing of regional disparities, decreasing ecological balance of environment, development of transport and IT technologies, accelerating of scientific development

This implicates fact, that nowadays it is neither possible nor effective to solve the key areas and problems of state existence in international environment separately without considering the synergic impact of the other ones. This is setting the need of change in seizing the basic aim of state existence and also the existence of its key subsystems.

The priority should not be seen in the maximization of growth in key indicators of a state development but its stability and future sustainability together with consideration of present and future threats of sustainable socio-economic state development. It is clear, that in present state of globalization it is not possible to solve the economic affairs without considering the policy, security, ecology, etc. It is just an increasing of complexity, which is the powerful stimulus for development of new security concepts as well as new conceptions of state development considering the recent changes in basic characteristics of global economic space. From this point of view it is just an economic strength and potential of sustainable development which are creating and enforcing the long term stability and security of the state. Military way of securing the state security is becoming inefficient. We can identify increasing of using the economic tools for securing the strategic security goals and objectives.

3. Strategic investments in Africa – important component of an economic security strategy of China

Former mentioned factors are in many countries main drivers of reevaluating of their strategic activities in relation to their future security -economic and political position in global context of the world economic system.

As a significant representative of mentioned approach to concept of state development can be considered the China. In context of recent changes in global economy, it is possible to state, that the China underwent serious, important changes in seizing its own strategic position and the priorities. It is in process of developing its position in global economy. Briefly, it is possible to depict basic frame of mentioned changes in these points.

- Transition from absolutistic state directing internationally isolated economy towards relatively closed state centrally directed economy with increasing features of market economy.
- Transition from preference of military approach to prevention and solving of security affairs towards preference of soft power and economic tools using in international affairs and also in security affairs as a principal component of its own wider seized security strategy.

As a proof of outlined changes can be seized a long term high rates of economic development, incorporation of China to WTO and the other international structures, as well as developing of China's economic and security position in global economy.

Year	2005	2006	2007	2008	2009	2010	2011 (projected by IMF)
Growth of Real GDP	11.3%	12.7%	14.2%	9.6%	9.1%	10.5%	9.6%

Tab. 1. Growth of Real GDP of China in selected years compiled by author based on data of IMF[1]

In recent time we can identify three basic tendencies in Chinese using of economic tools to enforcing its own multidimensionally seized security and politic position in global economy:

- using the pro-export oriented foreign trade policy together with under valuating currency policy of Chinese currency, all this is focused on the supporting of Chinese exporters,
- gathering or reducing huge amounts of dollar reserves considering the economic and security priorities of China in relation to the China vs. US foreign policy objectives,
- trying to develop foreign trade relations with an African and Latino-American countries focused especially to securing cheap raw materials in long term horizon for high energetic

demand of Chinese economy. There exists a tendency to achieve this objective through exchanging the long term mining concessions or permits for realization of huge infrastructural projects by Chinese firms in African states.

Recent economic development affected by present financial-economic crisis causes a decreasing of cheap Chinese Juan. It is because of serious global demand failing. Principally, this strategy is guaranteeing economic success of Chinese exporters within the frame of recent rules, and level of international trade relations` liberalization.

Level and way of using the dollar reserves seems in recent situation of wakening USA currency position to be the problematic tool. It can be a source of Chinese pressure to USA and its foreign trade partners aimed to the correction of their activities in relation to the Chinese foreign trade policy and security interests. From the China's point of view there exist a real risk of appreciation of Chinese currency and distortion of Chinese economic proportions, or decreasing of US dept by using smart monetary policy focused to decreasing US dollar exchange rate. Another notable feature of Chinese economic and security strategy are efforts to achieve increasing of Chinese impact to the international policy and security thank to the Chinese strong international trade position on the global market.

It is best noticeable in the increasing amount of bilateral exclusive profitable trade partnerships with an African and Latino American states. As proof of increasing importance of trade partnerships among the China and African states in China's foreign trade and security policy can be presented next figure

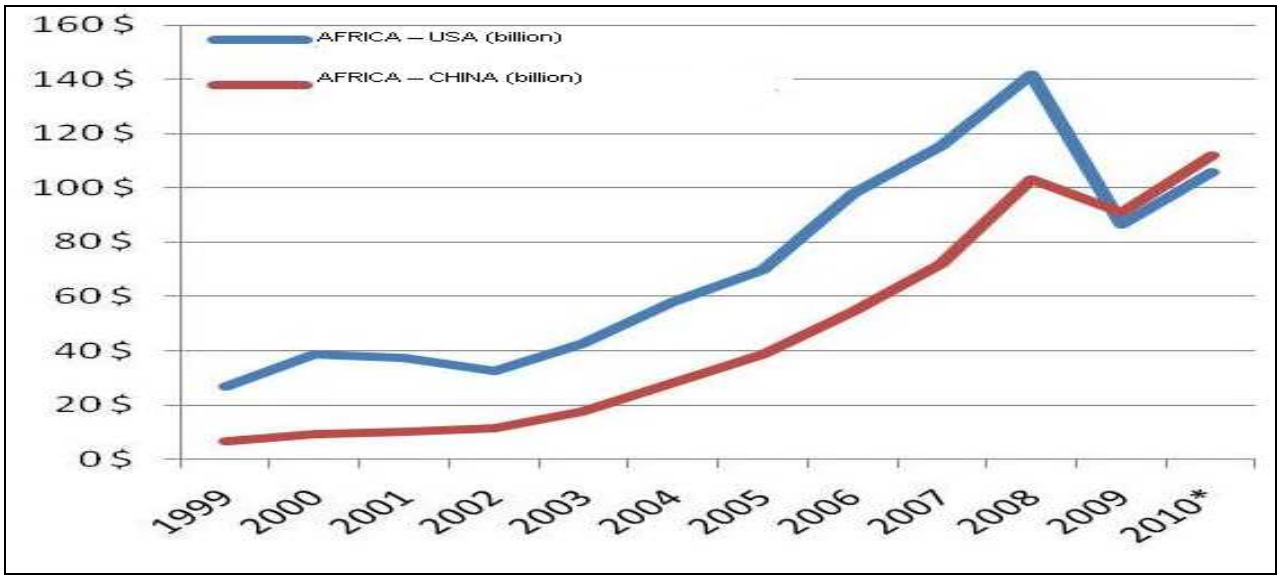

Fig. 1. Trade balance between Africa and China compared to trade balance between Africa and USA [2]

This one shows development of foreign trade balance between the China and African continent in comparison to the same statistics between USA and African continent. We can see at the figure basic increasing trend of both US and China's trade balance with Africa. The most interesting period showed in the figure from our point of view is period between the years 2008 and 2010. There ca be seen a dramatic change in US vs. Africa trade balance. From positive extreme increasing in 2007, 2008 to huge drop in 2009 and its relative recovering on lower level in 2009. This caused that China is the second in value of foreign trade with Africa just behind the EU. On the presented figure it is possible to see the serious impact of breaking recent financial and economic crisis to the US economy and to the US vs China trade relations too

On the figure it is possible to identify two serious effects. The first, it can be seen that the recent financial and economic crisis did not affect China crucially. This is caused by fact that China was not the source country of crisis, next by the fact, that China increased its orientation to the national inner marked. it helped to decrease an impact of the recent crisis thank to the large scale of

China’s national market. The second economic efficiency and profitability of Chinese exporters slowed the fall of the traded value between the China and Africa.

Taking into account the activities of China and the U.S.A., which are focused on ensuring the future sources of economic development, it can be stated that in the current reality of exhausting natural resources we are witnesses of a fight for raw material base (mostly) from the African continent. Especially ensuring resources for future development of the country is considered as a strategic priority of state security. In the relation to the Chinese-American "fight for Africa (especially for its raw material base)", This is documented e. g. by the rising of Chinese and African trade balance from 4,1 billion USD in 1992 to 107 billion USD.[2] We can observe two different approaches in this fight for the African resources. The U.S.A. tries to promote its interests in Africa through transnational institutions, in which it has a significant position, and its involvement in numerous military conflicts. On the other hand, China tries to promote business partnerships by the creation of long-term contracts based on the exchange of cheap natural resources for building new infrastructure, with individual African states. This can be viewed as the strategic idea of economic and security strategy. It also can be viewed only as the necessity of Chinese economy because of its huge development and its technological amortization and high energetic intensity ratio. The truth lies somewhere in intersection of these alternatives. It is possible to state increasing importance and impact of China’s position in international economics and security.

It has to be said that although the foreign trade balance between the EU and Africa is nearly three-time higher than balance between the Africa and China.[2] European union has serious problem with structure and non development character of the trade relations and investments in Africa. Notable difference can be seen also in the managing of human resources as the important part of strategic investments in Africa. In comparison to European Union, China tries to establish large community of the Chinese people in African states. This is really strategic in relation to the future development of China.

This one will allow to create new markets for Chinese production, it will accelerate the socio-cultural compatibility of both cultures, it will improve the negotiating position against the other states in the strategic talks with African states, it will allow to get the cheap African raw materials and also to export China’s social and economic problems to Africa. (For example. export of the Chinese unemployment into the African states. etc.)

4. Conclusion

China is improving its economic and security position by orientation to the non military sources of development. Most of all it is achieving this by the smart using of an economic tools for the securing its future development. By this, China is significantly empowering its security in global context.. It is worth of discussion if China is oriented to the economic security tools using in Africa only for its smart strategy of securing sustainability its future development or it is only reaction on its recent acute problems in its national scale with dissatisfied demand for energies and raw materials. Long term activities of Chinese economic diplomacy and foreign trade policy are sins of strategic accent of the mentioned priorities of China in Africa or in using tools of economic security to improving its recent and future security too.

China can be thought to be an example of changing view to the security and economic security in global context. There can be identified a change from orientation on the securing ability of using military power to defend own economic capacities and interests in time, to the orientation on the improving of the soft power and economic tools using. This is aimed to the securing the China’s political, security and economic foreign trade position in global context. As the problem can be seen sustainability of economic growth. This is potential problem because of demographical imbalance of Chinese economy, as well as because of the process of arising more than two centers of development in global economy.

It is clear that in recent world conditions and state of socio-economic development it is just

using of economic tools to be important component impacting of strategic development of the states.

At the end we can state the serious impact of Chinese foreign trade activities to the selected African countries. In long term horizon it is necessity to consider the empowering of China's position in Africa. It is really competitive and dangerous for the energetic and raw material stability of the world.

It is necessary by the effective foreign-trade policy to create opposition to the Chinese imports of cheap African natural sources. It is necessary because of the possibility that the African sources can be used by China for achieving the economic, political and military domination in global size.

The activities of China open the question of insuring the material, energetic security of EU in long term perspective. There is also question of revaluation of the geopolitical priorities of EU arising. Finally it can be stated, that this paper correctly shows that rising economic cooperation of China with African states is no the shape of solidarity more developed China with less developed African states as the recall on the period when the China was less developed and isolated country nearly as poor as present Africa. Mentioned economic activities of China in African continent are manifestation of clear geopolitical strategy aimed to the arising the China's influence in territory which will be the material base for future economic domination in the period of exploited resources.

It should be a priority of security, and crisis management to insure EU position in recent Fight for Africa by the activating proactive investments processes and restructuralizing its export and import in relation to the long term objectives of sustainable development of the European Union.

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Factors Affecting the Quantification of Risk

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Abstract. Description of the quantification of risk and problems associated with quantification is the aim of this article. We tried to pay attention to complexity of quantification and factors which influence quantification. Aging definition of a Risk, PD equation is the base of this work. It seems to be two-factorial equation, but we can say - after deeper investigation- that it is a multifactorial equation, because all factors influence each other.

Keywords: Risk, Quantification of risk, Probability, Damage, Risk matrix.

1. Introduction

The term „risk“ is very common nowadays. Risk is has not only been connected with natural processes, but also with social, economical and environmental processes. Risk can be understood in each process by different way and its definition can be different, too. The risk definition is essential before the risk analysis, evaluation and management is to be done. This is a reason why there have been invented number of methods which help us to identify, evaluate and manage a risk.

2. Risk equation

We have come out of the oldest definition of risk, which is in fact an economical equation of risk formulated in work „De Mensura Sortis“ in 1711 by Abraham de Moivre (Hald, 1984). Risk is defined as a loss of certain value and its measure is defined as a product of probability an potential loss (damage). Thereby the risk is understood as a function of probability of phenomenon of crisis and its damage.

The measure of risk is defined as a value, which is based on product of probability and damage:

$$R_i = P_i \cdot D_i \,, \tag{1}$$

where R_i is a risk, P_i is a probability of threat appearance, D_i is damage.

The disadvantage of the basic PD equations in the risk assessment process is that it does not describe any symptoms or causes of risk, what causes many problems:

- neglects the influence of other factors on the risk (social, political, legislative, environmental factors, ...),
- there are different types of loss which can not be always valued in a same way
- the equation is not sensitive to time, metric, structural uncertainty, especially for complex systems.

The equation is not „a mathematical formula“ and it should be rather understood as a formal inscription. It is a function of the probability of negative events and their damage, which may be influenced by environment, time, exposure...

If we want to deal with particular problems of the risk quantification, we will separately deal with each value from the equation.

3. Probability

Probability characterizes the rate of emergency event appearance. The probability can be expressed as a frequency or probability of a crisis phenomenon can be determined as a percentage of critical phenomena to the total number of events.

The probability can be expressed by a number, by a word or by an interval. The way of probability expression is determined by two basic approaches of probability evaluation:

- objective approach:
  - the value of probability is independent of the subject of evaluation
  - the main source of probability determination is historical and statistical data,
- subjective approach
  - the value of probability is based on experiences of a evaluator/an expert from a field, where certain risk situation occurs
  - there are not any data or there are incomplete data of previous risk situations.

Indication of degree	Descriptor	Lexical description degree of probability	Interval of probability (%)
A	Almost sure	Risk occurs almost always.	80-100
B	Very likely	Risk occurs in majority of situations.	60-79
C	Likely	Risk occurs occasionally.	40-59
D	Very unlikely	Risk could ever occur.	5-39
E	Almost excluded	Risk could occur exceptionally.	0-4

Tab. 1. Scale of probability with a description (Source: Hnilica, 2009)

Other factors that affect the likelihood are:

- evaluator - expertise, experience and knowledge of assessor have a great influence on the correct determination of the likelihood value of threats,
- the method of subjective probability quantification - it is important to choose an appropriate method for assessing the likelihood as the method chosen can affect some extent evaluator's insights (the quantile method, the relative size method, graphical method, the reference variant),
- the complexity of the problem (Varcholová, 2008).

4. Damage

The damage can be characterized as negative impacts on the lives and health, property, environment and human society during the crisis event.

Damage, likewise a probability, can be expressed quantitative, qualitative, semiquantitative, it depends on character of damage – death, injuries, property damages, environmental pollution...
Damage - according to quantitative criteria - should be categorized following:

- damage quantifiable by money – for example property damages,
- damage unquantifiable by money – for example injuries, death, environmental pollution.

Another way for damage categorization is according the time succession of risk event:

- direct damage - occur in time of disaster,
- indirect damage – occur in time shift**.**

Calculation of value of risk may influence incomplete or inaccurate expression of damage, especially when an evaluator forgets about the indirect damage. There can be a situation, when size of indirect damage will be bigger than size of direct damage (for example: leak of dangerous substance which causes environmental pollution) and measure of risk won't be correctly determinate.

Label	Categories of damage	Characteristic
1	Negligible	Effects have a minimum impact on function/process.
2	Minor	Event causes a small increase of costs/time. Most conditions are satisfiable.
3	Moderate	Event causes a slight increase of costs/time, but important conditions are satisfiable.
4	Serious	Event causes an increase of costs/time. Secondary conditions can not be reached.
5	Critical	Event causes a failure of function/process. Minimum of acceptable conditions are not fullfiled/satisfied.

Tab. 2. Categories of damage in general concept (Source: Mozga, 2001; Hnilica, 2008)

5. Risk matrix

Risk is graphically expressed by risk matrix, one-way risk measurement, mean measurement of damage, iso-curve of risk or f-D curve (Šimák, 2006).

Risk matrix is one of the simplest potential risk assessment method. The matrix allows to categorize risks according the two parameters: probability of risk appearance and potential loss (damage).

The more the risk is moving on a diagonal from the left down corner to the right up corner, the bigger attention we have to pay to the risk management.

			Damage				
			1	2	3	4	5
			Negligible	Minor	Moderate	Serious	Critical
Probability	A	Almost sure	big risk	big risk	extreme risk	extreme risk	extreme risk
	B	Very likely	medium risk	big risk	big risk	extreme risk	extreme risk
	C	Likely	medium risk	medium risk	big risk	big risk	extreme risk
	D	Very unlikely	small risk	medium risk	medium risk	big risk	big risk
	E	Almost excluded	small risk	small risk	medium risk	medium risk	big risk

Tab. 3. Risk matrix (Source: Hnilica, 2008)

6. Conclusion

After deeper assessment is obvious - that simple expression of risk measurement in the form of PD equation as a product of probability and damage – that original two-factor is only apparent. It is a fact, that we are able to quantify probability and damage on the base of many partial indicators, demonstrated in a wide range of operations, time parameters and other factors. In fact, this equation is a multi-factorial equation. These factors do not work separately (independently), but they influence each other.

There is a requirement for multi-criteria figuration from the point of probable mathematical modeling. There is a question to what extent we are able to catch, analyze, shape and transform to a form, which will be effective instrument in the hand of people from public sector management and the risk management.

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Information Systems for Crisis Management as a Part of Disaster Management Cycle

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Abstract. The field of crisis management undergoes rapid changes. One of the key drivers of this process is the introduction and constant progress in the Information Technology. In this paper we discuss the role of information systems in supporting decision making processes in crisis management. The crisis management poses particular challenges for information systems. It is characterized by dynamic, complex environments involving many actors in often very unique and extreme situations. We review the roles, benefits and challenges of the application of information systems to different phases of the crisis management by reviewing them in the context of the Disaster Cycle. Finally, we outline the directions for future research and applications for the field of the support systems for crisis management.

Keywords: Information Systems, Crisis Management, Disaster Management Cycle.

1. Introduction

After over three decades of application of computer based information systems to the crisis management, these systems are getting wider acceptance by the community of the emergency managers. The need for Emergency Management Information Systems (EMIS) (for more see Turoff et al., 2004) supporting the decision makers working under pressure and facing dynamically changing environments has been recognized by both practitioners and researchers. Disaster, crisis, catastrophe and emergency management are very often used synonymously and sometimes with slight differences, especially with practitioners and researchers. We use the term crisis management to emphasize that we are not concerned about small scale emergencies such as traffic accidents or building fires, but our focus is on disasters and catastrophes, no matter if natural or man-made. We would like to keep the Emergency Management Information Systems (EMIS) as the term used in the field for all of the information systems used for the crisis response and management support. The United Nations defined disaster as a serious disruption of the functioning of a society, and catastrophes refer to disasters causing such widespread human, material, or environmental losses that exceed the ability of the affected part of society to cope adequately using only its own resources. Both disasters and catastrophes create crisis situations.

2. Information Systems in Crisis Management

As defined by Simak (Simak, 2001), an information system is a system able to deliver information for immediate or later action. By concrete, it is a set of procedures, tasks, activities, people and technologies. An information system has four specific functions:

- data collection,
- data storage,
- data processing and analysis,
- data transfer and distribution.

Crisis management is one of the most challenging management tasks possible to imagine – combination of time pressure on decision makers, rapidly changing environment, uniqueness of each crisis situation, and high cost of decisions, often involving numerous human lives and large financial consequences makes the crisis management a very difficult task. A general role of information systems in crisis management is to help decision making process information and make right decisions.

The literature within the crisis management field typically identifies four to eight phases of the disaster management process, and presents them as a cycle (Turoff et al., 2009). The six phase cycle of disaster management cycle as presented in the Fig. 1 by Menon and Sahay (Menon and Sahay, 2006) is the most common one and will serve as the basis of our discussion.

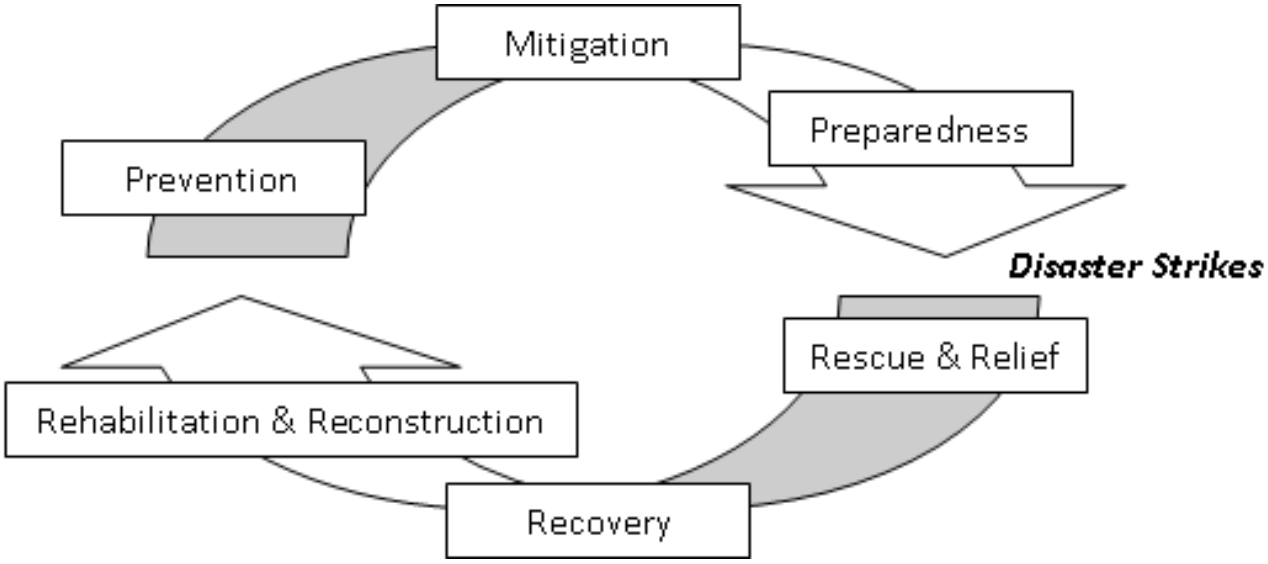

Fig. 1. Phases of disaster management cycle (Menon and Sahay, 2006).

Information systems can be a powerful tool that can support decision making process in all phases of the disaster management cycle. Historically, the main focus was on the response phase. With the paradigm shift, the role of crisis managers has immensely expanded and the focus is spread among all phases with emphasis on prevention.

In this paper we review the role of EMIS for the different phases of the cycle. We argue that from the perspective of an EMIS development, the six phases of the disaster management cycle ask for different types of EMIS tools that differ in terms of:

- problems the system is intended to address,
- audience for which they are intended,
- importance of ability to provide real-time data,
- ability to accommodate multiple actors (especially multiple organizations),
- sophistication of used technologies,
- data presentation to the user.

For wider discussion of applications and development of EMIS in context of specific phases of the disaster management cycle with support of definition of each phase according to World Health Organization (WHO, 2003) see the paper.

But discussing the EMIS would not be complete without the discussion of challenges and problems the EMIS are facing. Probably the most obvious is the cost of implementation of the EMIS and their relative value to the benefits they bring. Clearly, there are systems that are beneficial from both the user's perspective (enhance human decision-making) and they are cost-effective in terms of reduction of already allocated resources. One of the facts that are surprisingly often ignored is the maintenance the system – often the response organizations budget for introduction of a new system, but do not expect costs for the maintenance of the system, in particular keeping the database up to date.

3. Implementation of the Executive Dashboard Concept

Application of the executive dashboard concept to the context of the public emergency management entails specific adjustments. The question is whether the executive dashboards, which are becoming a main stream in the business organizations, have a potential to be successfully adopted in the public sector. This is a well recognized trend, that the profit oriented organizations are more advanced than public organizations in absorbing new technologies. This is especially true for technologies that increase organizational efficiency in terms of information flow and decision making. Although this trend seems unfavorable for the public sector, there are potential benefits for the public organizations – such as learning from somebody else's mistakes. We summarized the lessons learned during implementation of the executive dashboards in the business organizations. In the process of transferring those lessons to public organizations, we recognize that some significant differences between profit and public organizations exist. Those differences can have direct implications on the implementation and acceptance of the executive dashboards in the public sector. Our particular interest is the application of executive dashboards for the public emergency management, as an instrument to enhance decision-making in rapidly changing environments. Due to different goals within the emergency management and emergency operations, we identify a new set of tasks that an executive dashboard for emergency management should support:

- deliver situational awareness in a complex, multi-organizational environment,
- alert the user to emerging issues and problems in rapidly changing crisis environment,
- develop valid estimates of the changing status of the operational environment in complex highly interdependent systems,
- deliver timely information to improve decision making.

4. Conclusion

In this paper we highlighted the role of information systems in the crisis management as a part of the disaster management cycle. The potential benefits and importance of information systems for the crisis management are becoming recognized by practitioners at the all phases of the disaster management cycle. The information systems for the disaster management reflect the complexity and diversity of the challenges faced at the different phases of the disaster response. We observe a wide variety of systems that contribute to the overall set of solutions. We believe that the future of the information systems for disaster management lies with integrated information systems that build upon a set of problem-specific tools. We view it as a gradual process where advances in the existing modeling, simulation, data collection, etc. techniques will lead to more complex and interdependent tools that ultimately will provide comprehensive solutions to the overall emergency management at all the phases. Before it happens, there will be a slow process of improving existing tools and developing new techniques, often based on the emerging new technologies.

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Measurement of Electromagnetic Radiation inside Buildings with Security System Application

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Abstract. Following reports deals with the electromagnetic field transmission inside buildings. A measuring workplace and a measurement procedure of electronic fields was created for this purpose. The measurement procedure can also be applied to surveying of wireless networks' signal strength. The measurement system mentioned in this article was applied to the utility of security engineering where such aspect is crucial.

Keywords: Security engineering, Electromagnetic compatibility, Electromagnetic field, Wireless technologies.

1. Introduction

We deal with the electromagnetic wave dispersion on a daily basis and many people do not realize that. Cell phone, television or microwave for instance, all these gadgets are based on the principle of electromagnetic wave transmission. Electromagnetic waves spread through the area but various lines force them to spread according to the user requests while performing the posed requirements.

Not only every security device but also every element emits an electromagnetic field because of communication. The most frequent receiver of such field, in terms of security systems, is the security central. In order to make a reliable connection and not to endanger people's health or property a lot of emphasis is put on the connection between the security element and the security central when designing security systems.

2. Measuring Apparatus

The measuring workplace is divided into two parts: the transmitting part and the receiving part. The transmitting part composes of a signal generator R&S SM300 and an antenna (omnidirectional ProEter 10dBi or directive California). The receiving part (measuring one) composes of a laptop, spectral analyser unit R&S FSH3 and portable directive antenna HE200 (logarithmic-cyclic antenna – 500 MHz upto 3 GHz).

Measuring workplace consists of (Fig. 1):

1. Signal generator R&S SM300
2. Omnidirectional antenna ProEter 10dBi
3. Directive antenna California
4. Laptop with installed measuring SW
5. Spectral analyser R&S FSH3
6. Portable wireless antenna HE200 (logarithmic-cyclic antenna – 500 MHz upto 3 GHz)

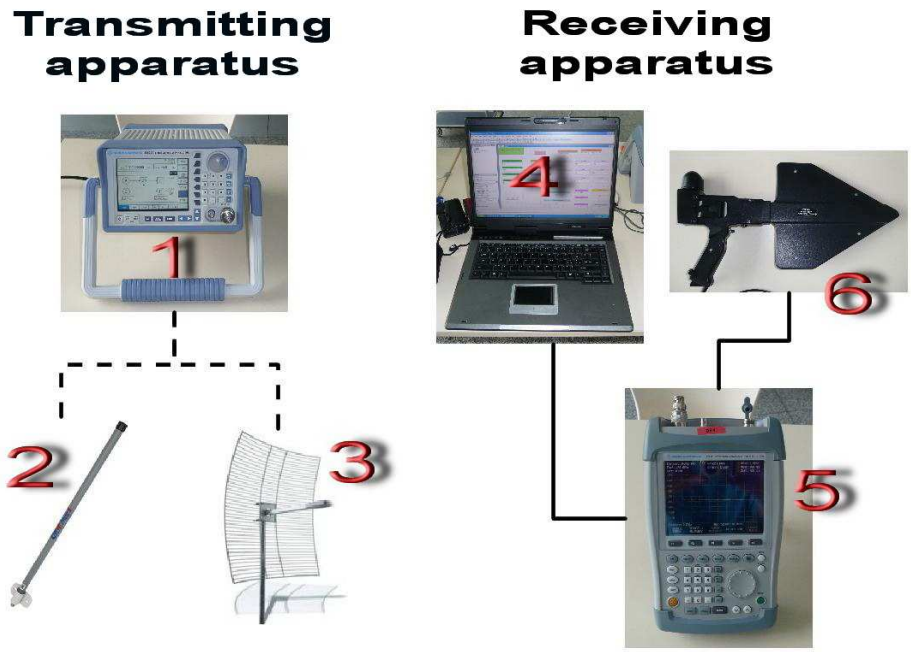

Fig. 1. Arrangement for measuring

2.1. Measuring Software

Software used for the measurement (saving recorded data, adjustment and operation of the measuring devices) of electromagnetic fields was created in the Agilent VEE Pro program. As the next step it was necessary to create a program, which will choose the maximum from the individual measurements and saves the maximum into a text file. Mentioned program (Maximum.exe) was programmed in the developer centre Microsoft Visual Studio in C#. The MATLAB program for recorded data visualization loads the adjusted recorded data from the Maximum.exe program and visualizes them afterwards.

3. Performed Measurements

3.1. Measuring Procedure

The U5 building of Zlín's University was chosen as the measuring location. As for the obstacle I selected a metallic post. Two antennas were used for the measuring – omni antenna ProEter 10dBi and directive antenna California. 5 measurements were done with each antenna. Each of these 5 measurements were averaged and visualized afterwards.

A testing measurement showed that a 40 cm step (both x and y axes) would be sufficient for the measuring along with a 5 second delay (4 sec for loading of the maximum and 1 sec for saving). A 20 cm (both x and y axes) testing measurement was also performed but the results were not satisfactory as in my opinion the visualization was not qualitatively superior. The receiving antenna was in the same height throughout all the measurements (it was attached to a guideline pole). Two people are required for the measurement itself. One of them points the receiving antenna in the direction of the transmitting one and moves around the measuring area. The second person sits at the computer with the launched measuring program and presses the appropriate button on the control panel after each movement. As you can see in the picture (Fig.2) the transmitting antennas are placed at different locations. The different placement of the omnidirectional and directive antennas was done because of noticeable differences during testing measurements thanks to distorted transmission. The measurement locations are marked with red dots in the picture (Fig. 2) and the size of one square in reality is 40x40 cm.

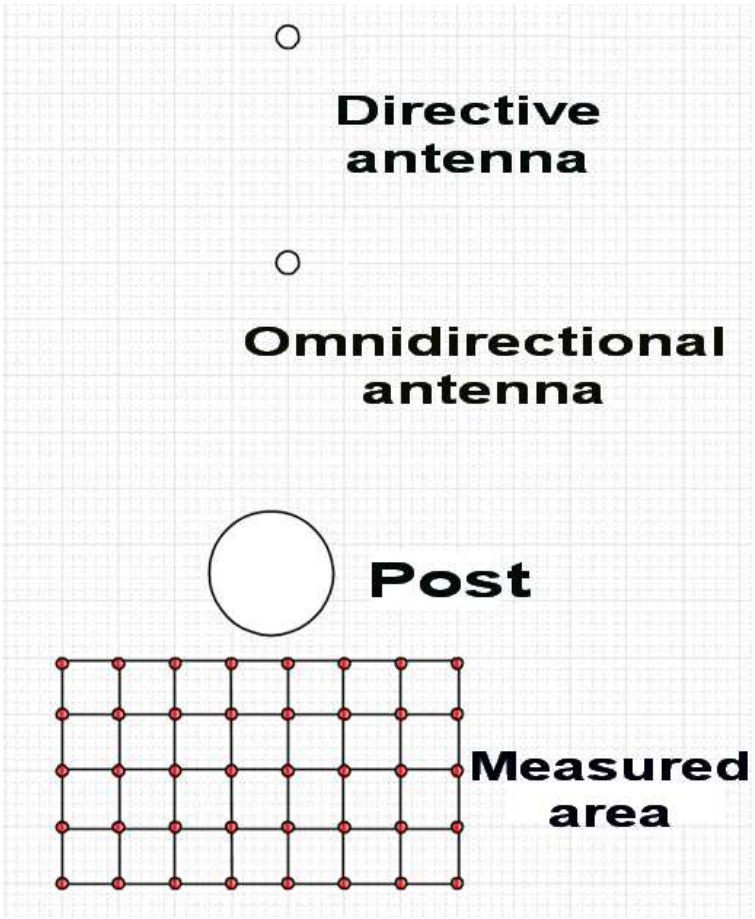

Fig. 2. Graphical representation – measurement behind the post

3.2. Measuring Devices Setup

Parameters for the measurement were set as follows:
Signal generator R&S SM300 – Frequency: 2 GHz, Level: -5 dBm
Spectral analyser – VBW: 300 Hz, RBW: 1 MHz, SWT: 100 ms, Ref: -20 dBm, Frequency: Center = 2 GHz a SPAN = 10 MHz, trace: max hold, detector: max peak, trig: free. Step was set to 40 cm on both axes x and y of the measured area, receiving antenna was in the height of 136 cm.

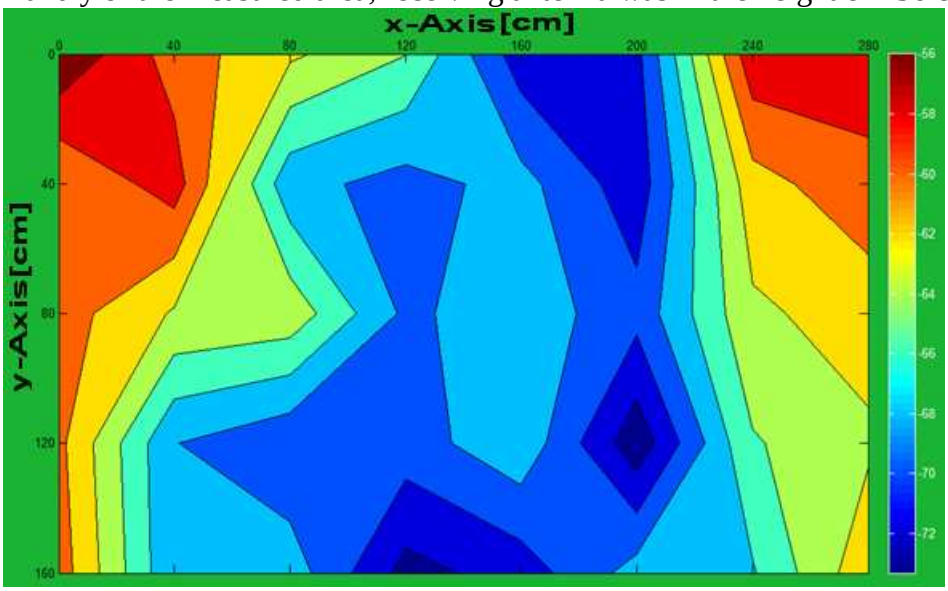

Fig. 3. Graphical representation – measurement behind the post, Omni antenna (avg of 5 measurements, dBm units)

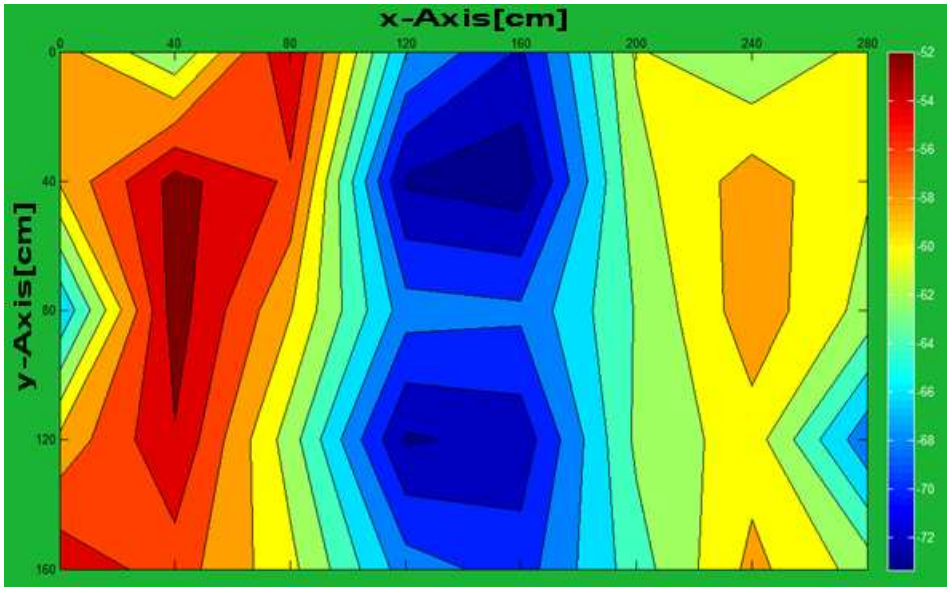

Fig. 4. Graphical representation – measurement behind the post, Directive ant. (avg of 5 measurements, dBm units)

4. Conclusion

As it can be seen on the visualizations (Fig. 3, Fig. 4) there is a difference between measurements with the directive and the omni antenna. There is an obvious screening of the post as the signal strength behind the post is significantly lower than when it is next to it. With the omni antenna the post screening is more significant than with the directive antenna. That can also be caused thanks to the closer placement of the omni antenna. A visible decrease in signal can also be deduced from the visualization, as it only takes small indirect visibility on the transmitting antenna to have such effect. The results of the measuring could have been altered by rebounds, which however are hard to avoid inside buildings. The distortion by other devices has most likely the biggest effect on the transmission of the radio signal in the same frequency band. The frequency around 2 GHz, which covers WiFi for instance, belongs to devices based on the FHSS modulation, other WiFi devices, Bluetooth and wireless telephones. Microwaves do not have to be taken into account, as long as the WiFi signal doesn't go exactly through the microwaves, as they are well screened. In conclusion the radio signal inside buildings has to deal with these basic problems: distortion by other systems in the same band, clear visibility and multipath signal transmission.

In connection with the security systems it is necessary to take into account all these conclusions, especially when it comes to designing EZS (ČSN CLC/TS 50131-7 regulation) and CCTV (ČSN EN 50132-7 regulation) so that a reliable operation of these systems would be assured along with the impact minimization of the electromagnetic interruption.

It is possible to continue in this task using different obstacles and also automate the measuring process applying a robotic system. As the next step factual measurements with real security systems should be performed, so that the values denoted by the producer regarding the reach of wireless networks could be verified.

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Environmental Protection in Zone of Main Railways in Poland

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Abstract. There were presented selected examples of environmental protection, currently used in Poland, in the process of upgrading main railways. There were discussed solutions apply strict nature protection, which is around rail and its restoration and was in the sphere of the three lines of action:
- the protection of animals along railways,
- reduction of traffic noise,
- nature compensation, involving the restoration of the area surrounding the railway route, leading ultimately to improved water relations, production of animal habitat conditions, etc.

Keywords: main railways, modernization, environmental protection

1. Introduction

Currently carried on the railway PKP PLK SA (Polskie Koleje Państwowe Polskie Linie Kolejowe Spółka Akcyjna) modernization of the main railways of international importance is to adapt them to conditions arising from EU directives and the provisions of the TSI CR (Technical Specifications for Interoperability of the Conventional Rail) [8].

According to the provisions of the Regulations of Ministers Council [6] the construction and upgrading of railway lines is known to the projects which had significant destructive impact on the environment. Therefore, an inquiry is required in accordance with specific procedures, involving the analysis and evaluation of all aspects of the impact of these investments. This procedure ends with a decision on the environmental conditions, which are indicated, inter alia, actions to be taken to minimize the negative impact of projects on the environment

Therefore - as an object of this paper-it was decided to bring the essence of the three basic tasks, communication supporting investments aimed at creating eco-friendly destinations:
1) protection of animals along railways,
2) reduction of traffic noise,
3) nature compensation, involving the restoration of the area surrounding the railway route, leading ultimately to improved water relations, production of animal habitat conditions, etc.

2. Animal protection systems along the railways

Rail transport can be a threat to the proper functioning of ecological corridors, including the threat to animal life. The most common requirements in the environmental field, imposed in the decisions on the environmental conditions at the modernization of railway lines are:
- construction of eco-viaduct
- adaptation of existing engineering structures (bridges, small culverts) to serve as wildlife crossings,

- the installation of acoustic containment against the intrusion of animals on the tracks (prevention device), activating automatically when the approach and passage of trains;
- the installation of optical prevention devices
- adaptation of drainage systems, rail lines to enable the migration of reptiles, amphibians and small mammals in a manner that will enable the safe entry and exit of these animals [7].

The company PKP PLK SA not only implements the provisions of environmental decisions, but also organizes its own initiative, share the protection of animals and develop solutions to prevent phenomena of the negative impact of rail transport on the environment [7]. Here are two types of acoustic systems for prevention, applied to retrofit main railways PKP PLK. The main advantage of these devices is their operation, consisting of a continuous movement of the signal with a moving train. Consequently, the animals leave their residence near the railway line only if a passing train. These devices can be used to replace commonly used in Western European systems, restrictions on access to high-speed railways lines, in the form of high mesh fences or underground and aboveground passages for animals.

UOZ-1 system is mounted on the bus E-20 Minsk Mazowiecki-Siedlce (Fig. 1) [7]. Basic elements:

- equipment UOZ-1 in the shape of a vertical cylinder with a height of 1,10 m and a diameter of about 0,30 m (tower type), installed at the track in places of permanent routes of movement of animals,
- EZG diagnostic modules with the software (in collaboration with the towers UOZ-1), installed in containers, automatic line block (sbl) SHL-12 type manufactured by Bombardier Transportation Poland [2].

Fig. 1. Views fragment main railway E-20 Minsk Mazowiecki-Siedlce with installed preventers UOZ-1 [2, 7]

UOZ -1 devices are automatically activated shortly before the passing train, on the basis of signals received from the wards automation automatic line block. These signals cause the run at the right moment of time in each procedure deterrent UOZ -1 devices. The complete sequence of repellent lasts from 50 to 180 seconds, and its length is automatically adjusted to the changing traffic situation on the railway line (the train slows down, speeds up or stops at the passenger stop).
SOLAR TUX System consists of the elements (Fig. 2) [7]:

- independent device-preventers (tower type) to deter the animals from the intrusion of the track, mounted on both sides along the track, approximately 70 m (the system has a total 239 preventers combined into sections, containing up to 8 pieces);
- base stations located outside the track on one, each of which supports up to 8 preventers tower (or one section), the system of notifying the arrival of the train, mounted along the railway line at intervals of about 840 m.

Preventer is an electronic device installed in a steel casing pipe (tube) approximately 0,24 m in diameter, wall thickness min. 0,006 m and a height of 1,2-1,5 m. The case is set on a foundation of reinforced concrete. Inside is an audio converter with the speaker. The device emits a modulated set of sounds with a frequency of 2-6 kHz, which changes with air temperature. The electronics are protected from moisture and extreme temperatures

The base stations are built (like preventer) a steel cylinder diameter of about 0,7 m and a height of about 0,012 m and a thickness of min. 6 mm. Cover the base station is also mounted on the foundation of reinforced concrete. Inside the station are: battery, electronics, and transferring the receiving signal of an incoming train, an electronic system for notifying a possible attempted burglary. Both devices (the presenter and the base station) are protected from devastation and burglary.

The system allows the device to run for a few seconds before the arrival of the train head. The horn also appears in section (containing up to 8 preventers), which equates to approximately 210 meters of the railway line. Depending on the speed of the train ahead run with a few seconds the following sections (also 8 preventers). Time of emitted sound is from a few to several seconds.

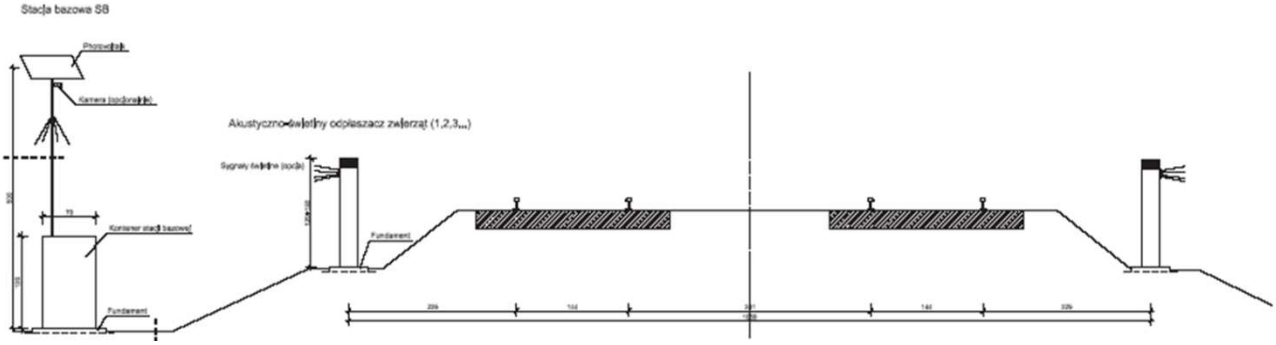

Fig. 2. Transverse section of the track with the SOLAR TUX system [7]

3. Reducing traffic noise

Modernization of the railway line in a dense building may exceed the limit value of intensity level of sound and vibration. Then there is the need for adequate security. Protection against noise and vibration transport is one of the issues included in the technical standards [8], guidelines and action programs on the environment [5]. There is also a directive of the European Parliament and European Council [1] on the evaluation and control of environmental noise. The law relating to environmental protection in the field of traffic noise resulting obligations of investors and managers, and so the use of methods of protection against noise. For several years, mostly practiced in Poland is a way to protect the screen in the form of acoustic baffles, arranged in parallel to the axis of the track, between the noise source and the recipient. These divisions are a regular feature excerpts upgraded bus stations, testing them with a densely built-up areas. This screens installed on the main railways for example, E30, on sections of Görlitz-Wrocław, Wrocław-Opole.

Screens should provide: Sound insulation min. 25 dB, sound absorption 5-7 dB. The effectiveness of an acoustic screen depends on many factors, such as screen location, the source of noise, height, length and shape of the screen material of the screen was made, the type of noise generated transport, traffic volume. The maximum effectiveness of the screen can be achieved on the basis of composition, such as creating a team of plastic screen-covered embankment vegetation (reducing the sound level to 20 dB). Normally, screens are performed as a conglomerate of several different materials. In Poland, most screens are built with a height of about 5 m. However, their effectiveness is 7-10 dB. Increasingly used in Poland are very effective screens to the surface diffusion (with diffuser Schröder). The effects of these screens, compared to the normal operation of the screen with reflective surfaces, are discussed in article [3].

4. Compensation for completing the requirements as natural environmental decision permits for the implementation of investments [4]

Modernization of the railway line led often by protected natural areas Natura 2000. Therefore, protective devices should be implemented and take action, as contained in decisions on environmental conditions of approval for the project. An example of the object of such activities (targeted to meet the requirements of Decision on environmental conditions of approval for the investment), known as compensatory nature is part of the railway E30. Offsetting natural bound for the restoration of the area surrounding the bus, which is improving water relations and create appropriate habitat conditions of the animals. In particular, the tasks included the construction of simple damming on forest ditches (small water retention) and renaturalisation of Wykrotnica stream, through built meanders. The area in which restoration work is designed in the natural environment belongs to the superintendence and Węgliniec Pieńsk and an environment within the modernized line E30 between stations Węgliniec and Zgorzelec [4].

5. Conclusion

The examples of some of the solutions currently used in the process of upgrading main railways in Poland, in order to comply with a decision on the environmental conditions of approval of the project. The above solutions apply strict conservation (which is around railway lines) and its restoration.

There were discussed two types of animal protection devices (UOZ-1 and SOLAR TUX), currently implemented by PKP PLK as innovative ways to protect the natural environment along the railway. Devices are characterized by numerous advantages. For example, the cost of service (security) section of the railway line to a length of 500 km using a set of devices UOZ-1 is equivalent to the cost of construction one eco-viaduct.

The topic of reducing traffic noise, focuses attention on the screens in the form of acoustic baffles, arranged in parallel to the axis of the track. Mentioned studies on the effectiveness of noise barriers with the surface diffusion (with Schröder diffuser).

There were considered compensation depend on the restoration of the natural area surrounding the upgraded line E30 (between stations Węgliniec and Zgorzelec), which improved water relations and the creation of suitable habitat conditions for animals. In particular, the tasks included the construction of simple damming on forest ditches (small water retention) and renaturalisation Wykrotnica stream, through built meanders.

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Cognitive Contextual Control Model in Human Reliability Analysis

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Abstract. Cognitive Control Model (COCOM) as a useful part of second generation Human Reliability Analysis (HRA) is used in various transport and technology processes assessments. COCOM was originally designed for communication control process in nuclear power plants. The aim of this paper is to explain the difference among traditional HRA approach and the COCOM as a base of second generation HRA. HRA is a base for Probabilistic Risk Assessment or Probabilistic Safety Analysis.

Keywords: COCOM, HRA, control, model, reliability, analysis, risk.

1. Human Reliability Analysis (HRA)

Human reliability analysis is the set of methods aimed to describe incorrect human actions in the context of Probabilistic Risk Assessment or Probabilistic Safety Analysis (PRA/PSA). The purpose of the HRA is to analyse and to determine the likelihood of human failure of operator being part of technological, transport, military, medical or other system. The majority of HRA methods were developed in the middle of the 1980's as a reaction on accident in nuclear power plant in Three Mile Island, 1979. PRA/PSA is typically represented by event tree showing the accident sequence (Fig.1).

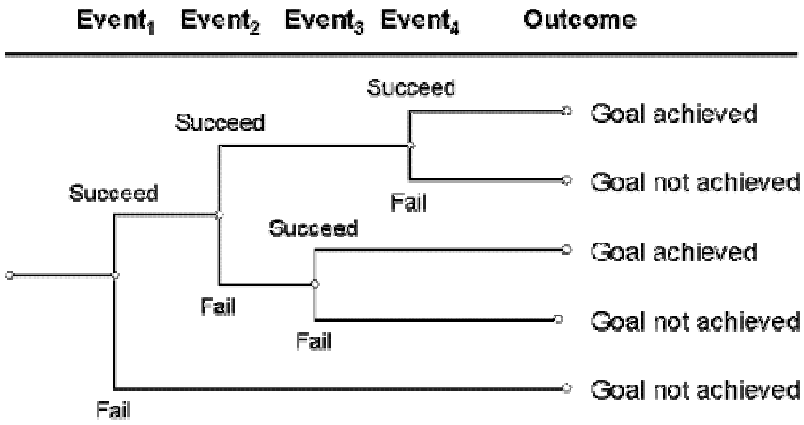

Fig. 1. Simplified Event Tree representation as outcome of PRA/PSA[1].

"*Human reliability* is usually defined as the probability that a person will correctly performs some system-required activity during a given time period (if time is a limiting factor) without performing any extraneous activity that can degrade the system [1]."

The use of HRA was very often limited into quantification of Human error probability or the probability of erroneous action of nodes dividing the event tree into branches (Fig.1). A node can represent interaction between operator and process or the function of technical component. The probability of Erroneous action was described by following linear formula:

$$P_{EA} = HEP_{EA} * \sum_{k=1}^{N} PSF_k * W_k + C \,. \quad (1)$$

P_{EA} = the probability of a specific erroneous action,

HEP_{EA} = the corresponding human error probability,

PSF_k = numerical value of Performance Shaping Factors,

W_k = the weight of PSF_k,

N = the number of PSFs,

C = numerical constant.

Personal shaping factors are e.g. task characteristics, aspects of the physical environment, work time characteristics, etc. P_{EA} formula application counts the likelihood of failure as a result of human erroneous behavior or bad human performance.

Traditional HRA approach is based mostly on Information Processing models with focus on decision making and reasoning. The formula (1) doesn't take into account the context of the performance. It counts the probability of failure for specific types of action independently of the any context. The context is not considered well, therefore information processing models are useful in retrospective analysis rather than in prediction.

Second generation HRA is based on Cognitive models, typically represented by Contextual Control Model (COCOM), Extended Control Model (ECOM) and Cognitive Reliability and Error Analysis Method (CREAM), where the first method is fundamental to another two.

2. COCOM

Contextual Control Model developed by Erik Hollnagel is based on cognitive approach not on information processing approach typical for first generation HRA methods. It combines attitudes of engineers and psychologists.

Effective control depends on the ability to plan future action steps. It depends on conditions and on performance of chosen control mode. The level of control is given by context, by knowledge and skills of person, by expectations and by resources available to operator. COCOM defines four characteristic control modes. Their use depends on the actual situation and experience of the operator (human factor) involved in the process and on the time limits as well. It varies from Strategic to Scrambled/Lost control.

2.1. Four Control Modes

Scrambled control is typical choice for unexpected situations and/or with no time for planning, when thinking is paralysed and next action is unpredictable or haphazard and task demands are very high. 'The extreme case of scrambled control is the state of momentary panic.'[2]

Opportunistic control is characteristic by limited planning and anticipation because the context is not understood clearly or because of constrained time. 'In these situations the person will often be driven either by the perceptually dominant features of the interface or by those which due to experience or habit are the most frequently used, corresponding to the similarity matching and frequency gambling heuristics.'[2]

Tactical control is based on planning. 'If the plan is a frequently used one, performance corresponding to tactical control may seem as if it was based on a procedural prototype - corresponding to e.g. rule-based behaviour. Yet the regularity is due to the similarity of the context or performance conditions, rather than to the inherent "nature" of performance.'[2]

Strategic control considers the global context. Operator looks ahead at higher level goals. 'The strategic mode provides a more efficient and robust performance, and may therefore seem the ideal to strive for. The attainment of strategic control is obviously influenced by the knowledge and skills of the person, i.e., the level of competence. In the strategic control mode the functional dependencies between task steps (pre-conditions) assume importance as they are taken into account in planning.[2]

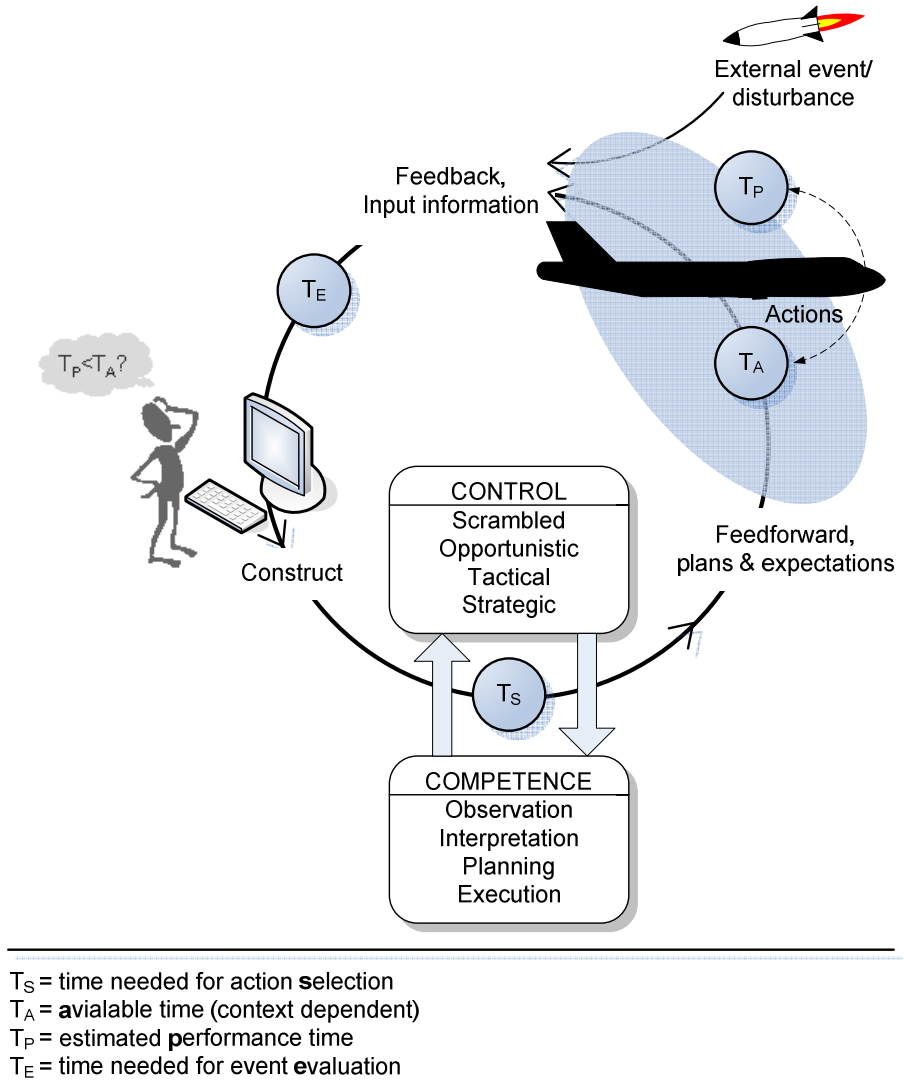

Fig. 2. The Contextual Control Model of Cognition (modified from [1]).

2.2. Contextual Decision Cycle

As written above, the control decision depends on time limits, context, performance type, expectancy of the situation and on knowledge, skills and attitudes of operating person taking a decision. The control decision process should be described by time cycles, where available time is crucial for the control mode choice.

The Algorithm of contextual control model should be described as following [fig.2]:

1. Process starts at the point of input information from the system.
2. Then the construct of action should be done and control mode is chosen at this point according the actual context of situation and time limit depended on the operator competences.

3. Next step is action taking, when external disturbance can occur from time to time. This phase is performed by the machine or technology
4. Observation made serves as feedback of decision made before as well as the input for another cycle of contextual control.

The operator comes into problem potentially leading to control loss when the performance estimated time is shorter than available time for the operation ($T_P<T_A$). Than scrambled control mode comes into process which can lead into no-control or chaos with serious consequences. On the other hand, strategic control seems to be ideal, taking whole context into account, but in real life the opportunistic or tactical control modes are mostly used in the process.

3. Conclusion

First generation HRA approach faced to many problems and the results tend to be misleading. Following problems were identified [3]: lack of data on human performance useful for quantitative predictions; use of expert-judgements methods without adequate agreement; less-than-adequate calibration of simulator data, proof of accuracy in HRA; inadequate treatment of some performance shaping factors; and lack of psychological realism caused by information processing approach instead of cognitive one.

The problems mentioned above lead to replacement of information processing approach to cognitive approach respecting the context. Contextual Control Model became fundamental for second generation HRA, and its variations can be used not only in technological process but also in all the processes when a man is a part of any kind of system.

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Options of Assessment of Selected Risks Affecting Investment in the Municipality

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Abstract. One of the solutions of negative impacts of economic crisis on the country is taking certain measures to raise inflow investments. Investors consider much more, where to invest their money in unsure times of crisis. This situation enlarges competition between countries in attracting investors. Success in this strong competition is determined by competitive business environment. There are many ways, how to improve it – one of them is to offer a tool of environment security consideration and risk assessment in various spheres in the municipalities and regions and help them make a best choice of the business placement, where are the business plans to be realized.

Keywords: risk, region, municipality, security, investment, crisis.

1. Introduction

An economy crisis is characterized by lack of inflow investments and by growing outflow investments from the territory. Mitigation of this tendency is clearly positive to the economy. No economic school worldwide has a doubt about that. Investors in this troubled period particularly carefully consider the location of its investment plan. It is therefore important to create conditions for investors, which will give us a comparative advantage against other countries. One option is an instrument that would assess the security environment in the region and village, through the main risks affecting the local business environment. The tool can be used not only by investors, but also for territorial economic unit, as an indicator of future development needs in relation to attracting future foreign investment.

2. The economic crisis in the SR

The economic crisis in the Slovak Republic was characterized by typical factors of this economic phenomenon for example rising unemployment, declining employment, declining GDP, adverse developments in the industrial production index and consumer price index and a number of other macroeconomic indicators.

Economy crisis could be truly demonstrated on the evolution of GDP, or foreign trade balance. Their evolution indicates the evolution of the economic crisis and due to it we are able to delimitate the most affected period on the timeline in SR. The most problematic period in terms of the GDP in Slovakia was the period between 4th quarter of 2008 and 1st quarter of 2010 the evidence of that is shown up on Fig. 1. This adverse situation is confirmed by the foreign trade statistics, which talks about depression at this time. [1]

Adverse evolution in the national economy during the period had a profound impact on the social sphere. Households experienced the crisis, especially on their income. According to official statistics [1] nominal wage growth had been in 1st quarter 2009 stopped, and then this value forfeited to the level half a year before. It should be noted that it was just steady growing before this moment. Increasing of unemployment rate was much more perceived by the whole society. This is not only a burden for the population, but also for the government itself. Registered unemployment

rate grow during the year nearly doubled - from a level of 7.4 % in 2nd quarter of 2008 to 13.0 % from February 2010. [1]

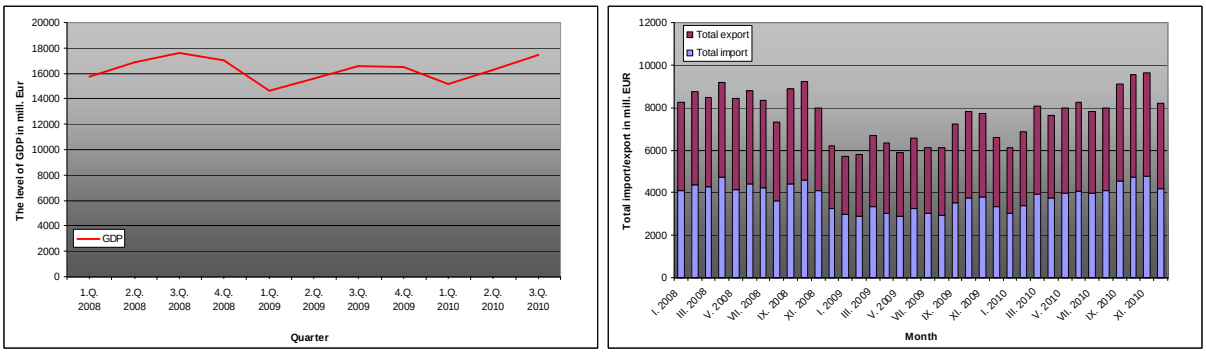

Fig. 1. Chart of the GDP and foreign trade SR according to the quarters in the years 2008 - 2010 [1]

The crisis thus in Slovakia caused not negligible changes of macroeconomic indicators.

3. The investment as a tool to face the crisis

Investments have naturally positive impact on national economy. They result into income to the state budget and municipal budgets, levies to funds of Social insurance, of unemployment decrease, etc. The investment also has a multiplier effect. When you take into account e.g. an investment into the establishment of production line, we can talk about several manifestation of multiplier effect. For example following attracting of smaller investors as suppliers, with smaller investment increase of turnover of some domestic enterprises in the role of suppliers, to the benefit of secondary specialized school graduates, which according to the plans of the investor, they should constitute an important part of its employees manufacturing base of operation and many others. Attracting investors from abroad or motivation of domestic investors to choose our country, our region and our community as a location to realize his business plan seems to be a difficult task especially in times of the crisis. Strict competition between countries, which compete for the acquisition of this investment, quite logically intensifies in bad times. To succeed in the competition, it is necessary to have a competitive business environment.

Business environment can be defined as the set of all social, political, economic and legal-legislative as well as other factors that affect business. [2] Each economy is from point of business environment very specific. In Slovakia there are many influences that have a negative influence to business environment. More intense negative impact has especially corruption, poor law enforcement, low labor market flexibility, frequent legislative changes with intensive impact to businesses [3], the unavailability of credit and high interest rates, but perhaps the worst is the wedge. [4] Resolving these issues is long-term task and its success may affect mainly the central government. We could draw from Owen Hughes and his approach to the management of public administration in effort to address such deficiencies or innovate the system. Hughes was one of the founders of Public administration described in his New Public Management (NPM). Into public administration management brings important elements characteristic for the private sector. He talks about transformation of public officials to managers whose task is, as in the private sector, efficiently distribute disposable resources to satisfy public needs. The public - citizens are set into the role of customers, who pay taxes and other fees for public administration services which are provided for them. We extended this idea - into the role of the customer should be considered not only individual citizen but also every enterprise, because enterprises also pay fees same as citizens and therefore they deserve the same approach – being seen as a customer.

4. Social demand for index evaluating selected risks in municipality

On the basis of NPM ideas have been conducted study called Slovak cities Benchmarking 2004 – 2008 in Slovakia. It is rating of selected cities according to such spheres and indicators, which form sphere of interest for individual city inhabitants. [5]

Therefore, the idea of enlargement NPM is appropriate to arrange assessment tool of municipalities according the risk impact on the investors realizing their business in the municipality, measured according chosen factors and indicators. This is in fact local and regional level research.
The point of the view described above should be summarized in the following sentences:

- improving the orientation of an investor who consider investment in an unknown environment,
- motivation of the territorially competent authorities and government to continuously improve the business environment,
- clear identification of critical points such as barriers to investment flows to the region or municipality,
- clear division into subsections, the possibility of introducing a simple electronic support system.

Investors in this case can be divided into two groups (domestic and foreign), according their point of view on the result of assessment. For each of them would the rating have slightly different meaning, but for both groups would be meaning clearly positive.

It would have majority effect for foreign investors which have not direct experience connected to the domestic market. In this case, already the existence of such support to the decision on the location of the plant can occur investor's sympathy in favor of SR when choosing eligible country for the implementation of his business plan (because competition between economies of countries is large and we realize that this ranking will have only a marginal impact, but each detail, which will help in this strong competition should be welcomed, if its cost does not exceed its manifest benefits).Unless the decision of the investor falls in favor of the SR, this tool will be certainly more appreciated because investor will be able according his own priorities find the right location. Especially minor investor, for whom the relevant government authorities will not worry too much, will strongly appreciate this.

When assessing the region or municipality as a potential site for carrying out the investment management tools like SWOT or PEST analysis are usually used. The advantage of our assessment would be that the investor according to his interest can analyze municipality and region on several stages of generality (complex index or subindex). In the case of introduction of electronic support can thereby eliminate the factors which are not interesting for him and he can use software calculation to determine the value of the index according his own criteria. Default values will be based on a survey among investors present in SR.

Choosing a suitable location should have a significant impact on the success of investments in any case; such a ranking of municipalities certainly alleviates the risk of failure due to circumstances that the investor failed to verify.

In this issue we made a simple survey. The target group is top management of companies operating in the Slovak market, or the major shareholders or board members in these companies. The first question we tried to determine whether respondents would welcome the existence of an index which takes into account the risks associated with investing in a municipality. Specifically, these were the risks of natural disasters and natural hazards, risks associated with the quality of transport infrastructure, the risks caused by the amount of local taxes, crime, the risks linked to the qualifications of potential employees and risks associated with the occurrence of inadaptable population in municipality or its vicinity.

For all respondents we had a positive response. When introducing the questionnaire into circulation, we assumed that some of the respondents will be afraid of overcompensation of public expenditure on such assessments compared with the effect that such an index would bring, so we were extraordinary surprised by the feedback on this idea. Surprising was also the answer to the second question connected to the influence which this index should bring on investment decision.

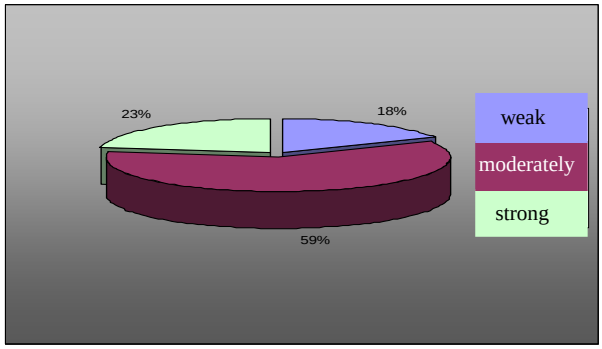

Fig. 2. Percentage distribution of influence index for the decision of the respondents

Respondents were given a choice of five options - no, slightly, moderately, strongly or absolutely. Options "absolutely" and "no" did not choose either one of the respondents. The possibility of "weak" voted 18 % of respondents, the "moderately" voted 59 % of respondents and the possibility of "strong" 23 % of respondents. The results are shown graphically in Fig. 2.

Interesting is also finding that strongly influenced by this index in particular small and foreign investors, so investors who have no a major foothold in the public sector to implement their business plans and investors who do not know thoroughly the local conditions and circumstances.

5. Conclusion

It is apparent from our results that there is a social demand for projects supporting the improvement of business environment in Slovakia, specifically for providing information about risks in region and municipality. Issue that deserves our attention is how such projects should be implemented so that their benefits exceeded the costs to implement them. It is also important to note that this is only a small fraction of solutions of the problems of our business environment and most of these problems, as already mentioned, could be solved particularly by the central government.

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Process Management in Public Administration

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Abstract. The article deals with defining the specifics of public administration with emphasis on the use of the process management. Compares the main differences in the objectives of private organizations and public sector organizations. It also provides a brief outline of the contents and procedures for process analysis. Its aim is to highlight the permanent pressure to streamline the functioning of government and highlights the possibilities of process management in this environment.

Keywords: Process management, process analysis, public administration, public sector

1. Introduction

Characteristic of commercial entity are an effort to survive, maximizing efficiency and finding a competitive advantage. Natural are investment in innovation and finding new methods of management. By contrast, public entities are characterized by greater inertia and solving operational management tasks. While today are getting a greater tendency to assume the elements of the commercial sector and public sector. There are beginning to show efforts to ensure the maximum lean and efficient public administration. It is therefore important to explore the possibilities of using modern methods of management in Public Administration. Such methods include for example, process modeling and process analysis to support process management. Process management and process-oriented models are very important source of increasing organizational performance and quality of its services. Basis for the introduction and use of elements of process management is the process analysis organization. It is processed in different ways based on several principles.

Process analysis consists of the following:

- Identifies key processes in the organization.
- Follows analyze organizations from the perspective of the current organizational structure, which aims to identify the supporting processes, the most important activities and assets belonging to individual processes.
- The process and the thread running in the organization are assigned to the identified activities; there is so called process model of organization.
- The individual activities, and thus the process and the thread are allocated the necessary resources to enable its effective implementation in terms of organization.
- In addition to resources to facilitate the exercise of each activity is analyzed in this step to various activities assigned material, financial or informational inputs needed for the development outcomes of the activity.

2. The Principle of Process Approach

The procedural approach is customer orientation. Emphasis is placed on value for customers. The government environment is focused on the orientation of citizens, entrepreneurs or other public administration institutions. The aim is to provide the highest possible functional benefit in providing services. The main question is: Is it possible to successfully implement the principles of process management in public administration?

Basis for understanding the processes within the public sector understands the fundamental differences between public sector and private companies. This difference is largely determined by their level of functioning and the use of modern approaches to managing organizations. Many specific area of public administration management is complicated by the use of the process management in this environment. It is therefore important to define the basic differences between organizations in the private and public sectors. These changes are not many, but by their nature generate specificity environment. The main differences can include: binding force of legal environment, focus on the citizen, lack of interest in making profits, minimal competition, complexity of activities, a large number of subjects of management and intensity of adoption of changes. From the perspective of entrants into the public sector can be divided into:

- Entities and perform state power and administration. (Government, local government and interest organizations
- Entities producing goods and services for consumption. (Public sector)

Comparable between the characters may be included in efforts to implement management processes, the use of information technology and efforts to streamline operations. These areas are characterized by the pursuit of the best download experience from the private sector. Currently in Public Administration successfully used several methods from the private sector.

Although, in several branches of government are denied the basic principles of the established rules of the commercial sector. We do not think as profitable, but in particular to compliance with basic statutory functions of the organization.

It leaves the market share (the public sector has in many areas of monopoly), but forward is getting rather minimizing costs and time efficiency.

An important difference is the way to approach the implementation process. While commercial entities have jealously guarded internal processes, and government bodies strive for maximum transparency, whether in contract but also the implementation of the various approval processes. Many processes are clearly defined rules. This leads to limited possibilities to optimize these activities, and great difficulty in implementing changes. Recently we faced with relentless trend to implement proven methods of individual commercial messages. This transition is seen conducting these procedures in the management of internal economic organizations (the introduction of international accounting standards, the current approach, controlling cost management, computerization and other databases). In addition to managing the economy is also obvious shift from functional to procedural control. This is particularly noticeable in order to provide services to the highest possible level and thereby fulfill its function spectacular.

This approach creates the preconditions for effective process automation through information technology (electronic services to citizens, the introduction of internal marketing documents, etc.). In the context of trends are establishing procedures for New Public Management and Business Process Management. Their role is to:

- Increase productivity
- Tracking and monitoring processes
- The shortening of the technological cycle
- Reduction of the error conditions and data redundancy
- Effective use of technology and information support
- Reducing costs.

The resulting product of public administration activities are mainly services. It is therefore an essential part of the analysis of the mapping process, therefore activities, the environment in which they are carried out and determining responsibility for their performance. With the necessity of introducing project management services you need to focus on the following activities:

- Activities carried out by staff - administrative acts performed by public service employee
- Activities carried out by software applications - information support government
- Activities which are a combination of people and applications - implementation activities in support of applications
- Activities carried out by groups of workers and are not specifically identified - a specific package of activities that are not exact or clear definition in the legislation or activities that are tied to specific situations.

3. Conclusion

Process management as a modern tool for increasing the efficiency of the organization is increasingly applied. It is therefore necessary to reflect on its potential use in Public Administration. Currently, the developed new methods and means which allows defining the specificities of the environment. The possibility of applications in Public Administration contributes significantly to the quality software support for process management.

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Backward Running Algorithm and Its Using in Register of Risks Creation

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Abstract. This paper describes the possibilities of risk register creation. In risk management there is an algorithm used to create risk register using the method of expert estimates. That algorithm works with terms of the fuzzy set theory as credibility, which replaces the probability. Credibility of risk is expressed by sets of assumptions and components of risk and their credibility. The algorithm uses AND-OR diagram and axiom on the assumption and consequence. One of the algorithms used in expert systems is the backward running algorithm. The paper describes the possibility of using the backward running algorithm to produce risk register, while the methodology of expert estimates is used.

Keywords: register of risks, expert estimations, credibility, algorithm , expert system, backward running method, fuzzy logic theory, diagram, diagram nodes, diagram edges, logic operators.

1. Introduction

Security systems have fundamental function in people and warehouse safety guarding. Process of creating security systems includes several phases which involve particular activities. The primary activity that is shaping the success and efficiency of subsequent steps and hence the quality of the overall security system is risk analysis. Within risk analysis relevant risks are identified, analyzed, classified and evaluated. Register of risk may be the output of risk analysis phase. To be consistent with STN standard, for each risk in register of risks it is needed to record its source, character, classification, consequences and credibility of its occurrence [1].

Within the process of risk identification different methods for detection of particular relevant risks are used. Probability models and also expert estimations methods belong to these methods [2]. Probability models are based on determining of probability. Expert estimations method is based on fuzzy logic, where probability is replaced by credibility. Credibility is the number parameter in interval from zero to one. Zero is considered a caliber for the whole non credibility and one is considered for whole credibility. Respective values are situated between these borderline calibers. Credibility of the risk occurrence for risks of risk register is parameter, which is used in replace of probability value in these cases, when there is no possibility to determine the risk value.

2. Creation of risks register

2.1. Expert estimations method

As in using probability models, in use of expert estimations method resource for application is the production theorem. Assumption is denoted as P and consequence is denoted as R. The existence of consequence can require simultaneous validity of several assumptions (conjunction of assumptions) or existence of consequence requires validity of at least one of assumptions (disjunction of assumptions) [2]. In contrast of enumeration of risk probability, enumeration of assumptions probability is replaced by description of credibility of particular risks assumptions in this method.

The credibility of each risks assumption will be expressed through the credibility of its components from these risk assumption. Again there is a possibility that the existence of assumption can require simultaneous validity of several components (conjunction of components) or existence of assumption requires validity of at least one of components (disjunction of components). It means that when we use expert estimations method, it is necessary to define a set of assumptions for each risk and consequence generation method (conjunction or disjunction on assumptions set). Next step is to define the set of components for each of the assumptions set. It is also necessary to define the assumption generation method (conjunction or disjunction on component set).

With components set, assumptions set and risks set it is also necessary to define the constant value α (alpha) working as limit, which divides risks into two groups. Fist group are risks, which belong to the register of risks and second group are risks, which do not belong to the risks register.

2.2. Risks register creating algorithm working by means of expert estimations method

Risks register creating algorithm working by means of expert estimations method works as follows:

a) From identified an analyzed set of risks one risk for defining its credibility (this risk is marked as R_k) is chosen.
b) For risk R_k set of assumptions with count n members (marked from P_{k1} to P_{kn}) is created.
c) From this assumption set one of assumptions (P_{ki}) is chosen.
d) For risks assumption P_{ki} its component set with count m members (from p_{ki1} to p_{kim}) is defined.
c) For each component from this component set credibility of the component is formulated.
d) With using logical operation conjunction or disjunction credibility of assumptions P_{ki} from whole members of its components set is formulated
e) Procedure, which is formulated credibility of assumption is used for each assumption from assumptions set of risk R_k .
f) With using logical operator conjunction or disjunction and credibility each assumption, credibility of risk R_k is formulated.
g) Under authority of constant value α is evaluated risk classified as member of risks register or not.
h) Procedure, which is formulated credibility of risk, is used for each risk of risks set [2].

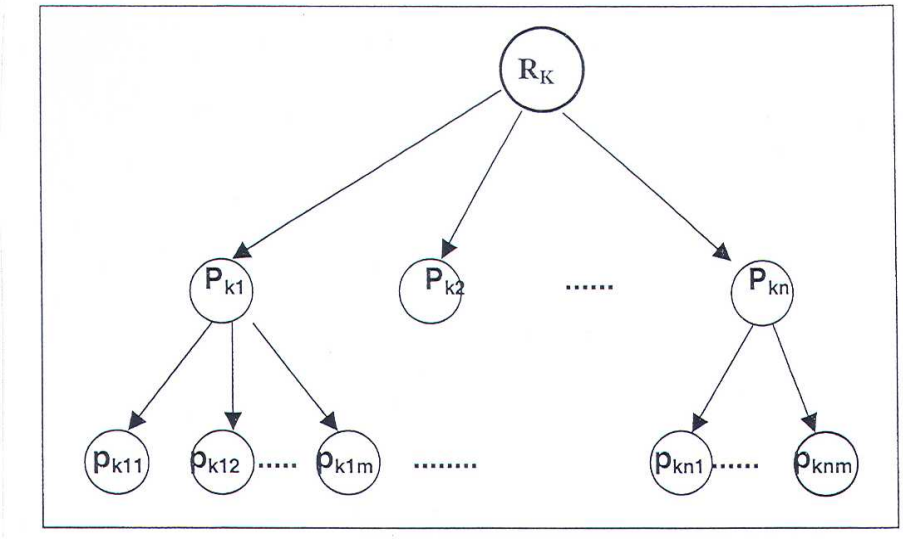

Fig. 1. Diagram of risk R_k, assumptions set, components set [2].

Until now in this text the risk has assumptions set and the assumptions have components sets. There is also possibility that security risk will be determined by only one assumption or that some of assumptions will be determined through the only one component and not by set of components. This case is not very frequent in practice, but it is necessary to incorporate this possibility to the algorithm. Result in this case is the formulation credibility of this alone assumption or component as absolutely credible (credibility value is 1) or absolutely no credible (credibility value is zero).

Another addition of the algorithm is the expression of the assumption creation pattern by the means of logical conjunction or disjunction operators. Based on the fuzzy logic theory it is possible to replace the logical operators by determining the maximal (OR) or minimal (AND) value of the assumptions or components set [3].

Described risks register creating algorithm has many similar properties as the backward running algorithm, which is used in expert systems. There is a possibility to use the expert system with backward running algorithm which respects the special terms of risk register creation for implementation of described algorithm in information system.

3. Expert systems and their algorithms

Expert systems are part of information systems, which are subgroup of artificial intelligence systems. They are subset of knowledge systems, which are more and more frequently used in many domains of nowadays human life. There is no common definition of expert system, because each domain, where the expert system is used, is specific.

On the other side, it is possible to say about expert systems, that they are described as computer systems, which simulate decision functionality of the expert in solving very specifically oriented problems. These systems are systems, which use this domain expert's knowledge (cogitation and decision) [4]. There exist expert systems used in practical life even in the management of risks domain, for instance CRAMM system or RiskPAC system.

Expert systems consist of several program modules. There are some modules, which are necessary for each expert system and these modules are database, knowledge base and inference mechanism. Knowledge for expert system is stored in knowledge base.

One of fundamental facts in expert system is meaning, that each of applications domains and each of problems category need different knowledge representation and different managing mechanism. This is the purpose of creating special problem oriented expert systems in practical use of experts systems [4]. One of the common characteristics of the expert systems is existence of special algorithms used in different domains with specifically described knowledge representation and managing mechanism for that problem domain.

Direct running algorithm and backward running algorithm or their combination are algorithms used in expert systems, which belong to basic and often used in expert systems.

3.1. Algorithm using backward running method

Backward running method corresponds with destination managed derivation. Problem solving lies in the finding of adequate and effective fulfillment of predetermined goal. It means, that it is necessary to backward define postulates (assumptions) of the predetermined goal achievement. Normally it is not possible to decide about evaluation for all assumptions immediately. This is the reason, why the evaluation of assumptions generates a set of new sub-goals of the searched solution. Evaluation of this set of sub-goals may generate new sub-goals of these sub-goals.

Above describe procedure of defining new sub-goals may continue till then evaluating of the last set of sub-goals can be evaluated on the basis of available facts. The facts may be obtained by query, observation, and measurement or by accessing some source of relevant information [3].

Because it is possible to use this method in evaluating credibility of risks in risk register, following text will describe and explain application of the described method of backward running in risk register creation algorithm with using expert estimations.

On the figure 1 the risk representation, its assumptions set representation and its components set representation is depicted.

To illustrate backward running method used in risk register AND/OR diagram may be used.

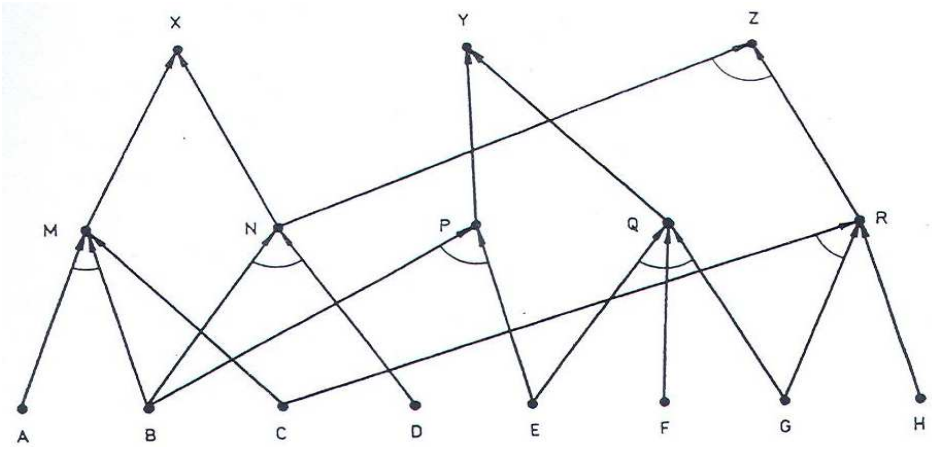

Fig. 2. AND/OR diagram [3].

Oriented diagram edges are binding pairs of diagram nodes of three types. Root nodes are these nodes, which are destination of edges, but not source of any edge. Nodes of described diagram, which are root nodes, represent general destinations or particular risks in risk register(X, Y, Z).

Next type of diagram nodes is leaf nodes, which are source of diagram edges to another node, but they are not destination of diagram edges. In described diagram leaf nodes are nodes, which are represented of sub-goals in the lowest level (A, B, C, D, E, F, G, and H). It means that the leaf nodes can be evaluated with some of methods, which were described in the previous text. In our case leaf nodes represent the components set of risk assumptions, which can be evaluated using expert estimation for each of leafs (components).

Last type of nodes is inner nodes, which are the source and simultaneously destination of some edge. Inner nodes in our diagram represent set of generated sub-goals (M, N, P, O, and R). In our case they represent the risk assumptions set.

Diagram edges coupled by arcs join entities, for evaluating of which the simultaneous evaluation of all entities joined by the arc is needed. We can say, that this is the operation of conjunction of sub-goals (AND operation). On the opposite side, diagram edges not coupled by arc corresponded to alternative condition. For evaluating of these goals or sub-goals it is needed to evaluate only one of the requirements and this represents the operation of disjunction (OR operation) [3]. In our case inner edges represent the assumptions.

Inner or root nodes evaluation (credibility of assumptions or risks) depends on evaluation of their sub-goals. They are named deductive entities. Goal evaluation can be formulated as a path in the diagram from leaf nodes to root nodes. This is reason why this method is named as backward running. Instead of using logical conjunction or disjunction operations in evaluating entities, operation of detection maximal or minimal value is used. This is possible by applying the theorem from fuzzy logic theory, which was described in previous text.

4. Conclusion

Direct running algorithm and backward running algorithm are implemented in many existing expert systems in this time. Logic of these methods corresponds with a lot of concepts used in solving real problems in many different human life domains. Because of this reason it is possible to use the backward algorithm with respect to the specifics in the case of evaluating security risks through credibility.

Specific implementation of backward running algorithm is planned as part of my dissertation work. The solution - application allows using expert's knowledge in register of risks creation. The work of risk managers can be more efficient. This can be possible by applying the computer science and knowledge of diagrams theory, fuzzy logic theory and also expert systems domain.

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The Model for Evaluating Efficiency of a Physical Protection System

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Abstract. The article focuses on efficiency of physical protection systems. Authors are describing draft of new approach for evaluating of efficiency of medium to large protection systems. Especially they are focusing on physical protection systems designed for protection of property, persons and tangible assets. They recognize various options how to use this model for evaluation and designing of physical protection systems. Protection system is the main and the most important tool for enforcement of a security policy so this topic can be considered as very essential issue of security management.

Keywords: efficiency of security system, physical protection system, index of security measures

1. Introduction

The efficiency of physical protection system can be understood as ratio between ideal and real processes in the system. Only ideal processes can completely eliminate all the risks that were identified in the designing phase [1].

Protection system is a tool for enforcement of a security policy.[9] This model is focusing on physical security, so we use the term physical protection system. One of the main responsibilities of this system is to secure system from violation of intruder so it is necessary to maximize likelihood of intruder's detection and to keep intruder in the vital area as long as possible, so tactical unit can move to object and make intervention.

We recognize several important points:

- ration between shortest time of intruder's advance through vital area and time of tactical unit intervention,
- maximum cumulative likelihood of intruder's detection in the vital area.

Based on these points we can formulate parameters for evaluation:

- cumulative likelihood of intruder's detection,
- index of security measures,
- cumulative likelihood of intruder's detection in the critical point of detection,
- likelihood of intruder eliminating.

Basically, index of security measures is ration between the shortest time of intruder's advance through vital area and time of tactical unit intervention, so it subsume various timing information independent of likelihood of detection or elimination.

This draft of model is supposed to be used mostly for evaluation of medium to large vital areas and security systems that are designed for protection of property and tangible assets.

We can describe two main objectives that can be done with such simulation of physical protection system:

- to effectively design physical protection system (the most vulnerable paths through vital area will be effectively protected),
- to optimalize financial costs spent on security, so various paths through vital area will be equally secured as long as there is same amount of tangible assets on the various paths.

2. Features

The model will be mathematically represented as a graph with edge path costs. For purposes of user-friendly environment of software based on this model it will be more suitable to visually represent graph as graph with both, edge and vertices costs, so transmission mechanism between these two systems has to be done.

Vertices can be then understood as inner and outer security zones. The zones are areas that have common parameters based on likelihood of detection parameter, e.g. rooms, sections or vaults. We can describe each zone with several parameters:

- cumulative likelihood of intruder's detection in the zone,
- assumed intruder's delay in zone (because of his movement, activity or attack in the zone),
- value of assets in the zone.

Edges can be understood as joints between vertices that have common parameters based on time delay of intruder, when he is moving from one zone to another, e.g. doors, windows, walls. Edges can be described with following parameters:

- time delay of intruder when he is going through,
- likelihood of detection during moving from one zone to another (e.g. magnetic contacts on doors or windows)[6].

In the graph there are two important kinds of critical paths:

- the shortest path (based on time of intruder's advance) to various inner zones,
- paths to various inner zones with lowest cumulative likelihood of intruder's detection.

Basically, it is important to evaluate these paths independently of each other because intruder will use the most vulnerable path to each zone.[7]

3. Efficiency of physical protection

Based on physical security we can evaluate physical protection system with two methods:

- absolute evaluation – we are using predefined fixed values of various kinds:
    - fixed value for lowest cumulative likelihood of detection,
    - fixed value for lowest index of security measures,
    - fixed value for lowest cumulative likelihood of detection in the critical point of detection.
- Relative evaluation – we are comparing protection of various paths (in terms of cumulative likelihood and cumulative time of intruder's advance) with cumulative financial value of assets allocated on these paths so we are trying to solve the problem, if physical protection system is optimally designed based on allocation of assets in the area.

We will demonstrate evaluation of physical protection system on an example. In the figure 1 there is a section plan of vital area with draft of physical security measures. Within each zone there are nonzero financial assets. Building and surrounding areas (under control of organization) are divided to several inner and outer security zones.

Definitions of outer zones (approaches):

- Zone 100 –
    - likelihood of detection depends on likelihood of detection of CCTV system[4],
    - time delay is zero (because of small distances),
    - financial value of assets is zero (there are not any valuable assets outside the building).

- Zone 200 -
    - likelihood of detection is zero (no detectors are allocated in this sector),
    - time delay is zero,
    - financial value of assets is zero.
- Zone 300 -
    - likelihood of detection depends on likelihood of detection of PIRs detectors,
    - time delay is zero,
    - financial value of assets is zero.

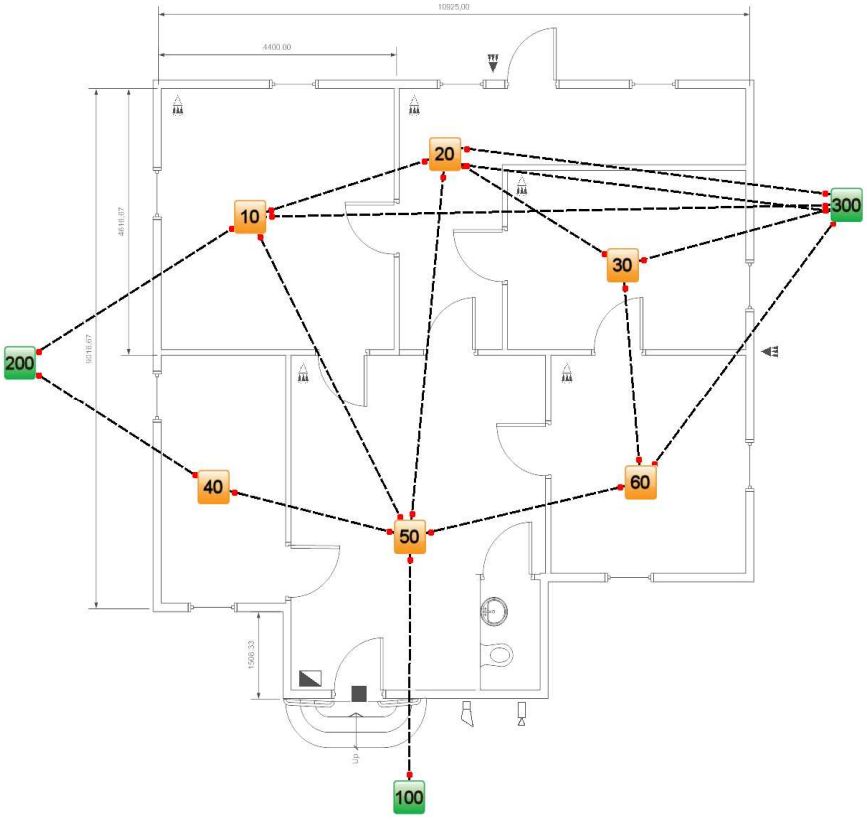

Fig. 1. Vital area in the form of graph.

Definitions of inner security zones :

- Zones 10, 20, 30, 50, 60 -
    - likelihood of detection depends on likelihood of detection of PIRs detectors,
    - time delay is zero (because of small distances),
    - each zone has specific financial value based on assets within zone.
- Zone 40 -
    - likelihood of detection is zero (no detectors are allocated in this zone),
    - time delay is zero (because of small distances),
    - each zone has specific financial value based on assets within zone.

In this example we are not using any particular values, because there is simply no need to do so now. However it is important to say, that particular values of all the delay time are dependent on type of intruder, who is attacking and especially of his skills and tools.[1] In practical use it will be necessary to define various types of intruders and specify their tools and skills. This will affect values of delay time and this will also affect likelihood of detection.[6]

We can define edges :

- edges 40-60, 50-60, 30-60, 20-30 and 10-20 :
    - likelihood of detection is zero,
    - delay time depends on delay time required for overcoming doors,
- edges 200-10, 200-40, 300-20 and 300-60 -
    - likelihood of detection is zero,
    - delay time depends on delay time required for overcoming windows,
- edge 300-30 -
    - likelihood of detection is zero,
    - delay time depends on delay time required for overcoming security door,
- edge 100-50 -
    - likelihood of detection depends on likelihood of detection of magnetic contact,
    - delay time depends on delay time required for overcoming security door.

In this example we did not take into consideration breaking of walls (breaching holes into walls), so all the edges are dedicated entry points. This reduction would be impossible in practical applications.[6]

Next figure shows building from figure 1 transformed to mathematical model of a graph with edge path costs. Some additional edges were created that shares same information.

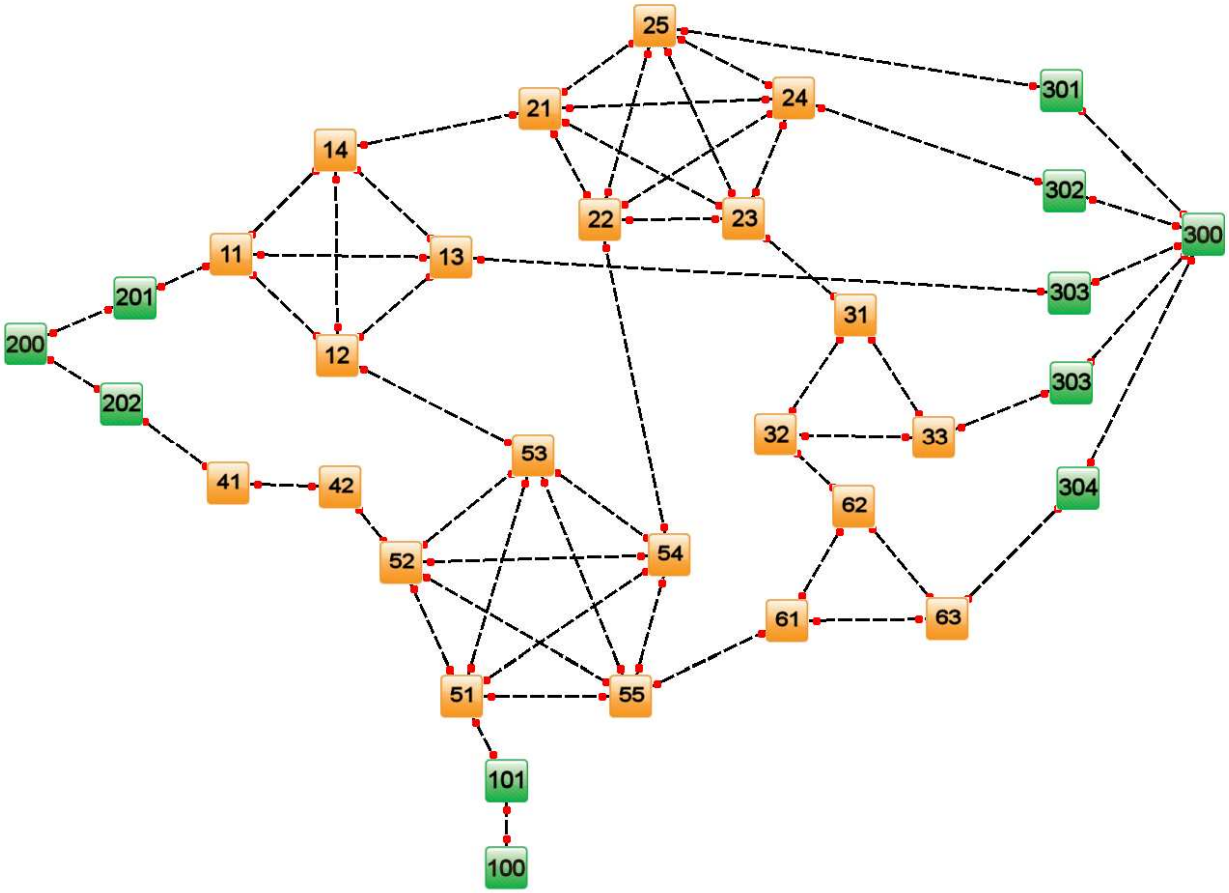

Fig. 2. Graph with edge path costs.

4. Input data and requirements

There are some important input parameters that have to be collected before evaluation process can start. The results of evaluation depend critically on these input data.

Firstly, we must have information about the intruder. We have to answer who most likely will attack the system. We have to specify as exactly as possible the tools, that intruder is going to use to breach walls and to overcome doors, windows, safes and other obstacles.

If we are using method of absolute evaluation, we have to determine various fixed values, because these values are not given by law or security standards:

- fixed value for lowest cumulative likelihood of detection in the paths with lowest cumulative likelihood of intruder's detection to each zone should be almost 100 percent,
- fixed value for lowest cumulative likelihood of detection in the critical point of detection on the path with lowest cumulative likelihood of intruder's detection to each zone should be more than 95 percent,
- fixed value for lowest index of security measures in the shortest paths to each zone should be at least 1.0.

We need to form a catalog of all security elements. We can divide all elements in two ways:

- according to place of use :
    - edge elements (doors, locks, magnetic contacts,...)[8],
    - zone elements (PIRs, seismic sensors,...).
- according to purpose of use :
    - elements that are designed to detect a intruder,
    - elements that are designed to delay a intruder.

For elements that are designed to detect intruders (like movement detectors) we have to specify likelihood of intruder's detection. For elements that are designed to delay a intruder (like walls, doors, locks, grillage,...) we have to specify delay time required to overcome this element (depending on chosen tools).[7]

If we want to use simulation for designing of physical protection systems, we need also to add information about costs for purchasing, installing and using various elements.

5. Conclusion

We recognize various options how to use this model for evaluation and designing of physical protection systems. It can be used for evaluation of physical protection systems. Of course, this system can be real or it can be just one or multiple drafts of planned system, so it can be used for comparison and selecting the best option for realization.

Another possibility is to use this model for more sophisticated purposes during design phase of physical protection system projection to fill the tasks of security system optimization with purpose of reduction of input costs and enhancing of total efficiency.

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Transport Modelling – a Tool for Prevention of Occurrence of Crisis Situations

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Abstract. At present period of rapid growth of automobilisation we should expect, similarly as it happened in the Western European cities in past, an increased rate of problems related to transport and the possible occurrence of crisis situations. These problems can be solved by means of support tools for transport modelling.

Keywords: Transport modelling, crisis situations, transport, OmniTRANS

1. Introduction

There are still more and more cities in Slovakia that are starting to experience problems with transport situation, although we cannot compare the problems of our cities with problems of big European and world metropolises. High transport intensity, insufficient capacity of communications, and accidents result in occurrence of crisis situations. Their unexpectedness and negative effects cause disturbance to functionality of the systems or their complete collapse. Prevention and preparedness of system for various crisis situations may reduce their negative effects. Therefore it is necessary to count with crisis situations and not to underestimate them. At present it is beneficial to solve the current difficult transport problems mainly by modelling of transportation and transport processes within the respective territory, supported by software systems.

2. Transport modelling and its tools

2.1 Transport problems

Nowadays the term “transport” is one of the most frequently used words by general public. Transport is often criticised and viewed as a disturber of the environment and lifestyle. The cause of all transport problems, which include traffic jams, delays related to commuting to work or lack of parking spaces, is attributed to insufficient capacity of communications and street network and lack of areas for stopping and parking of vehicles. The reason of this condition is omission of necessary measures related to change of social conditions and lifestyle. Taking into consideration the aforementioned changes, growth of mobility of population, but especially the change of transport distribution – in favour of individual transport - seems logical. Due to underestimation of these changes the inevitable measures in communication network and provision of parking and garaging for pre operation vehicles and residents have not been prepared and implemented.

2.2 Transport modelling

Transport problems in built-up areas can be solved only under complete analysis of the present state of transport in the territory being solved, using the latest prognostic methods, modelling of entire transportation and transport process. Application of these methods is required also by the current legislation, which requires the transport system of cities and large territorial units within

territory planning or transport and engineering documentation to be processed on the basis of the current transport relations within the territory. Application of these methods depends mainly on availability of necessary input data.

Utilization of modelling of transportation and transport process allows thorough comparison and evaluation of potential solution alternatives, including design and placing of new crossroads, their layout, flexible solution of traffic restraints – in case of traffic diversions and closure of certain parts at road network and simulation of different measures with optimal redistribution of transport. This model processing would enable to choose the most suitable solution alternative. At the same time, the modelling would be a suitable and cost-effective solution for regional public transport. Moreover, the model coordinates the transport timetables and this fact would be welcomed by the public. General basic simulation environment involves *macroscopic*, *microscopic*, and *mesoscopic* simulation tools (Fig. 1.).

Fig. 1. Basic simulation environment.

Macroscopic simulation tools stem from modelling of all traffic flows on the basis of standard macroscopic variables, such as intensity, density, velocity of traffic flow and their relations.

The microscopic simulation is based on modelling of movement of individual vehicles along the given communication network and considering of all parameters of infrastructure and means of transportation, including behaviour of drivers. Traditional calculation methods put the aggregated data, such as intensity, number of lorries in traffic flow and other data into mathematical formulas, which are significantly generalised for common application into practice.

Mesoscopis tools are an intersection of macroscopic and microscopic simulation tools, they have less detailed approach in both marginal levels, and their application is minimal compared to other categories.

Transport modelling can be divided into tree phases:

- analysis of the present state – performance and evaluation of necessary surveys,
- prognosis of perspective transport relations – the facts empirically achieved from analysis provide us with probable future needs,
- design of transport systems – securing the satisfaction of all future transport needs.

A transport model is an effort to simulate the real transport process on the basis of known facts specified by analysis. Modelling consists of calibration (testing of model) aimed at achieving sufficient accuracy of the model results in case of their application at road network and validation (accuracy) of model when describing the transport process within the monitored territory.

Transport modelling is used for example in the following cases:

- change in road infrastructure – incorporation of new road section or route – change in effectiveness of individual categories of the respective roads,
- change in transport organisation and unchanged road infrastructure,
- change in level of motorization or social and economic parameters,
- material change in significance of transport during workdays and weekends,

- determination of development trends under certain conditions for development of territory,
- comparison of solution alternatives.

Essential advantages of using the transport simulation include for example the following:

- possibility to afford risk experiments, which would not be possible to be evaluated in reality, because they could pose a threat to participants in the transport system,
- possibility to repeat unlimited individual simulations,
- possibility to assess some transport elements that have not been put into practice yet,
- experiment is made out of the transport area being solved,
- trial and error method,
- output of high quality for further work, etc.

There are many simulation tools for generation of general and detailed simulation models and experimenting with these models available at the market. By means of these products it is possible to create the detailed simulation modes, define simulation scenarios, carry out experiments with the model and assess the results of simulations. They also support tactical and strategic planning, usually in connection with infrastructure or operational changes, which are expected to ensure effective functioning of modelled terminal. The Dutch program OmniTRANS is one of the transport modelling softwares.

2.3 OmniTRANS – a tool for transport modelling

OmniTRANS was developed by Dutch company Goudappel Coffeng and was introduced in 1998 for the first time. It is a universal software environment designed for planning and modelling of transport. It uses the latest technologies and was developed in order to improve the quality and productivity of work in the process of transport modelling and construction of transport model.

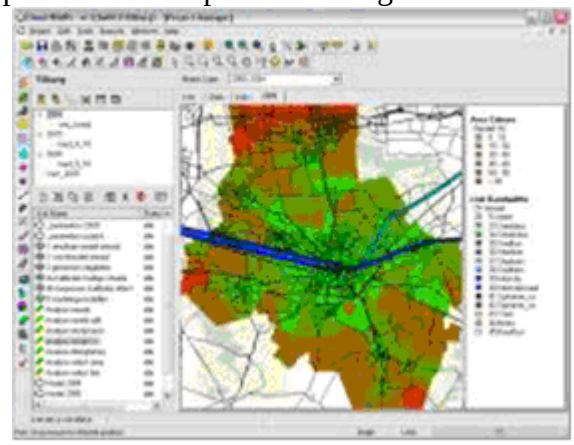

Fig. 2. The main window of OmniTRANS

OmniTRANS offers:

- better graphical interface enabling simpler development of model and analysis of problem,
- data administration and working with information related to transport planning,
- effective, fast and flexible job engine performing the operations,
- extended possibilities to develop the applications and construction of the model.

This tool for transport modelling includes sets for:

- the data manager pack,
- the static traffic assignment pack,
- the dynamic traffic assignment pack,
- the public transit assignment pack,
- the demand modelling pack,

- the matrix estimation pack,
- the export & import pack.

OmniTRANS is able to identify the purpose of road, types of transport used, and other parameters defined by the user, such as utilization of territory and transport system as the main dimension of the project. Dimensions of data in the projects are also used for saving the model results. Data may be used for automatic generation of reports or may be compared and analysed. It uses a concept of alternatives to generate the modelling of various matrixes of points of departure and destination points, social and economical data and various conditions of transport network. It offers a set of tools for creation, modification, modelling, analysis, searching and removing of errors at transport networks of various alternatives.

OmniTRANS can serve as a tool for implementation of long-term transport objectives, such as:

- creation of transport strategies and assistance in determination of the objectives of transport policy,
- assessment of impacts of new constructions on its surroundings and selection of transport strategy for the new object,
- by testing the alternatives the model is able to assess and choose an investment project which meets the determined objectives the best,
- graphical representation of problems at transport network, i.e. development of traffic congestions, shows how the specific proposals solve the problems,
- can be an effective tool for transport planning, development of cities and simplifies the political decisions,
- can evaluate all types of transport including automobiles, trams, buses, trolley busses, underground, as well as cycling and walking zones,
- is able to test the changes related to the network dependent on offer of transport infrastructure, quality of public transport and application of intelligent transport systems,
- provides basic information needed for assessment of impact of transport on the environment,
- enables to carry out an analysis of transport availability and services and effective introduction of new services into public transport,
- enables to generate economic and ecological surveys, graphic presentation of transport network situation.

The transport model has also a controlling function. It evaluates an impact of development projects on transport situation in its surroundings, provides the input data for evaluation of impact of new construction on the environment and sets the basic level of transport infrastructure and transportation services, which should be constructed and financed by the project investor.

Off-line status of the software can be used for testing of various situations at transport network – repairs and closures of roads, traffic accidents and obstruction of communications, football matches or concerts, in case of which a great number of passengers travel in one direction. The program is able to solve these situations by designing and integrating of signal plans into light signalling equipment. The model is capable of short-term prediction of transport and quick response to transport situation by changing the signal programs.

3. Conclusion

Excessive overloading of road network can result also in occurrence of crisis situations, such as increased accident rate. One of prevention possibilities is using the software for transport modelling. These programs can assist not only in solving the unfavourable transport situations, but also for transport planning.

Transport modelling can be used not only for designing of new transport network, but also for regulation and organisation of transport within already existing transport network. The advantage is that there is a possibility to prepare several solution alternatives, scenario and carry out an experiment in the virtual environment. On the basis of comparison of alternatives it is possible to choose an optimal one and implement it into the real environment.

OmniTRANS is one of the most famous softwares. It offers a wide range of practical methods that are used for conventional transport modelling. These help to find the source of problems at transport network and the methods for elimination of these problems.

In developed European countries the programs for transport modelling and planning are commonly used, unfortunately, it does not apply to conditions in the Slovak Republic. The issues are usually processed by standard methods with high proportion of intuitive and empirical procedures, which do not enable to include the essential depth, extent, and territorial impact of solution alternatives.

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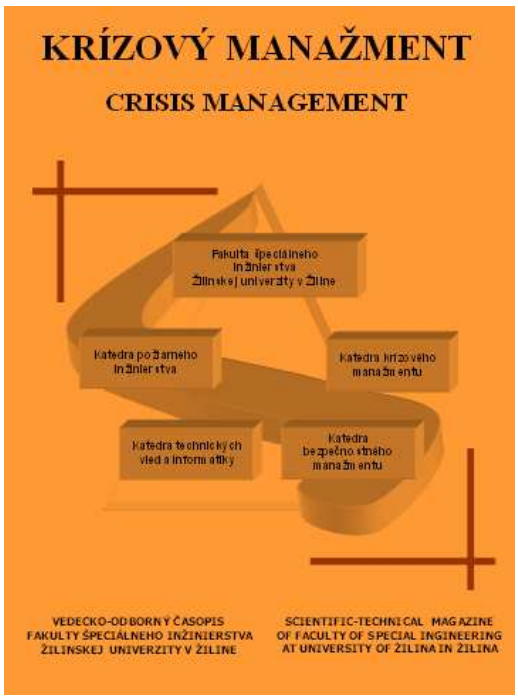

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Scenario Creation Using Bow – Tie Diagram

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Abstract. This article gives a basic overview in area of industrial accidents prevention especially it describes quite new approach in risk assessment of industrial processes using hazardous substances called ARAMIS. It also offers a structured procedure for modelling scenarios called bow - tie diagram which join fault tree analysis with event tree analysis.

Keywords: ARAMIS, bow – tie, disaster, prevention, critical event

1. Introduction

ARAMIS serves for assessing risks in industry and combines the strengths of determinism and acknowledged objective regularities. The aim is to create a unified procedure of risk assessment in all the companies belonging to one group that have to fulfil the SEVESO II guideline with the possibility of a mutual comparison with the "risks of these enterprises" regardless as to what industrial sector they belong. The output of the systematic procedure is to determine the risk, propose suitable measures with a subsequent investment plan in the area of improving the security of the operation. The figure 1 depicts the process of the risk assessment by the systematic procedure ARAMIS.

In the gas industry they adapted the ARAMIS procedure to their needs and divided it into the following phases:

- identifying hazardous equipment with the selection of critical events (the analyst works out a list of hazardous equipment and the setup of the operation and identifies the potential accidents which occur on these devices);
- working out the so called *bow tie*, i.e. identifying the possible causes and effects of the critical events which immediately link with the risk analysis (the decrease itself can be carried out with regard to the causes and affects identified);
- identifying the reference scenarios (the risk level is too high and it is necessary to reduce it). The risk is estimated by the probability method and the class of effects of each scenario;
- the phase connected with reducing the risk. New security barriers are proposed for the reference scenario. Their effectiveness is re-calculated according to the risk level (probability, the class of effects) with the new barriers. After this phase the risk has to be acceptable;
- proposing the introduction of residual risk maps (in the case of industrial equipment it is impossible to achieve a zero risk).

The basic condition for a safe technological process is the usage of equipment which has to withstand the operating load. On the other hand, we can say that no technological process is 100 % reliable and also the behaviour of the human factor cannot be reliably foreseen. Therefore it is necessary to look for the essence of the problem in the phase of determining the causes which can cause unpredictable events in routine operation or in special conditions. Determining the causes is the condition for creating scenarios (sub-group of this phase). We differentiate between the external and internal causes. The internal cause can be the failure of the technological equipment, an undesirable reaction in the system, human error, etc. The external cause can be natural disasters, accidents with objects in the surroundings, disruption in the supplying of energies, terrorism, etc. There are generic lists of the internal and external causes and various methods for their determination.

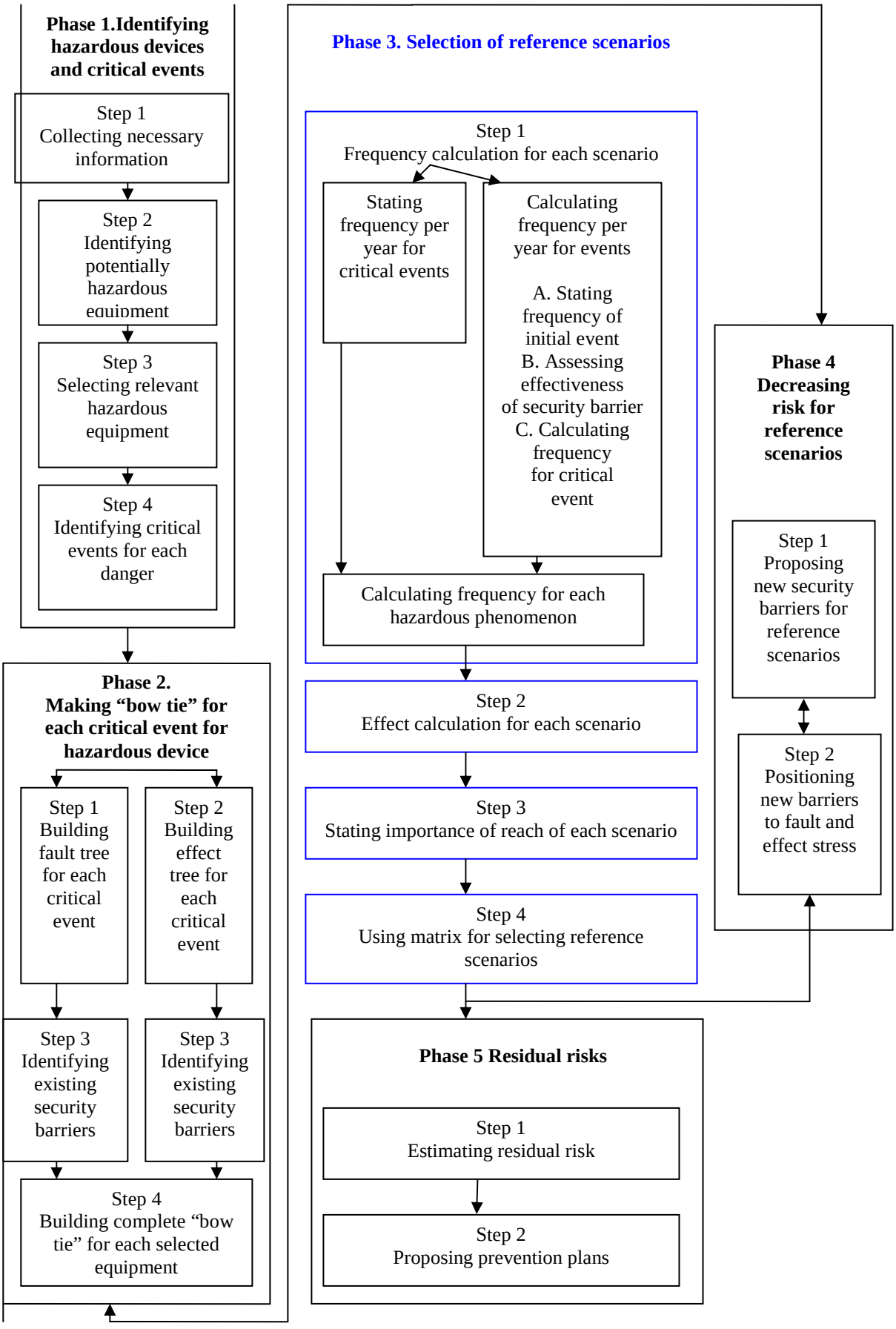

Fig. 1. Process of risk assessment by the systematic procedure ARAMIS

2. Scenario creation

The scenario can be defined as creating combinations and time linkages which can cause the development of undesirable phenomenon (danger, threat) in the technological processes in the industrial environment. Their creation is one of the most important steps in assessing the risks. The information and tools necessary for making a scenario are as follows:

- the experience from creating scenarios,
- the adequate methods,
- the selection of real and serious scenarios and further work with them.

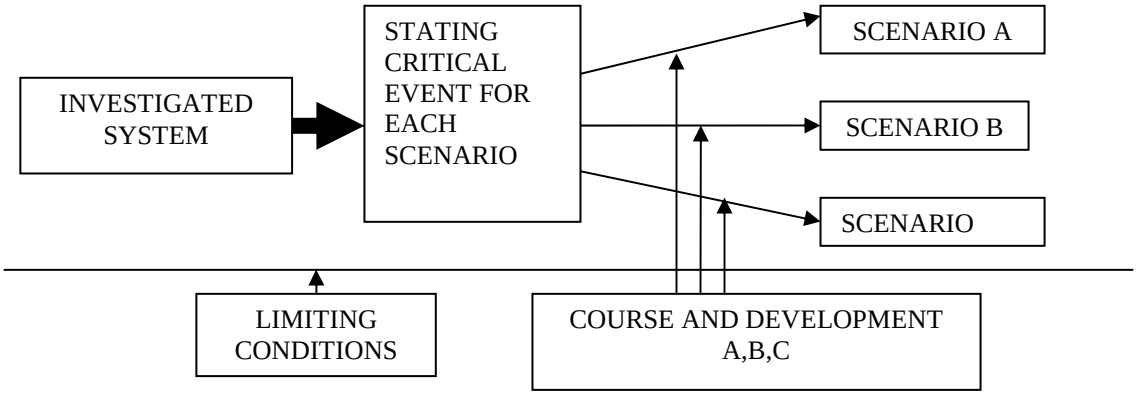

Fig. 2. Procedures in creating scenarios

For creating scenarios the ***fault tree*** and ***event tree*** in the form of computer programmes or sketches are preferentially used. The scenario can be also made by the ***bow tie*** method which is a new approach for the qualitative depiction of scenarios. The causes of the critical undesirable event (which is placed in the middle of the figure 3) are determined on the left side with the help of the fault tree. The critical event develops the right side where we can see the event tree with the final state of consequences and impacts of these scenarios.

Name of the event	Abbreviation
Undesirable event	**UE**
Critical event	**CE**
Initiating event	**IE**
Current event	**CUE**
Secondary critical event	**SCE**
Dangerous phenomenon	**DP**
Major event	**ME**

Tab. 1. Events analysed by the method *bow tie* (Source: ARAMIS, 2004)

The current event is the common operational status of a technological process or equipment. A current event in coaction with an undesirable event, as well as two undesirable events acting together at the same time, can arouse an initiation event. A critical event arises from an initiation event and develops on the right side of the created tree, concretely a secondary critical event from which it develops into a dangerous phenomenon and changes into a major event.

The *bow tie* includes events introduced in the table 1. On the left side of the figure 3 we can find an undesirable event which represents the primary features of the rise of a critical event. The initiating event is the primary cause of the rise of a critical event. The critical event is in the middle of the bow tie and means the *loss of containment.* This term is valid for fluids and gases and means a loss of integrity. For the solid substances the term *loss of physical integrity* is used. After the critical event (e.g. forming a puddle of flammable liquid after the rupturing of a tank) the secondary critical event follows. The dangerous phenomenon follows after the critical events (e.g. the ignition of a puddle of fluid – the so called pool fire, VCE). The final event on the right side of the event tree is a major event, i.e. negative impacts of an initiation event.

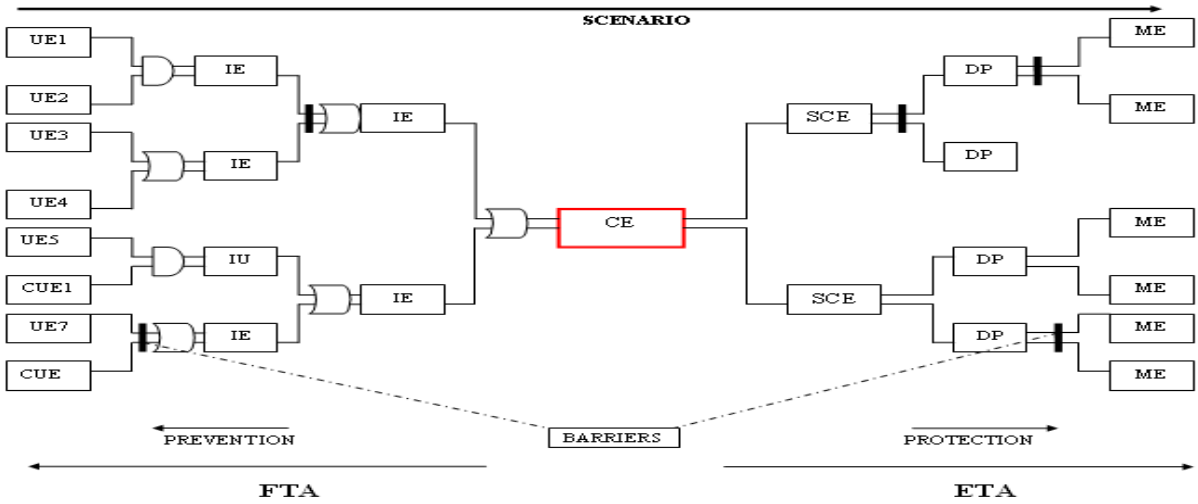

Fig. 3. Bow tie diagram

3. Conclusion

In Slovakia it is recommended that the systematic approach ARAMIS be used whose objective is to provide international systematic rules and procedures for assessing the risks by generic selection of the possible accident scenarios with regard to the effectiveness of the assessment and managing the security. The advantage of ARAMIS is its sufficient universality for it to be suitable for all companies (not only the chemical ones). It partially complies with the systematic approach PRA which is most frequently used in Slovakia for quantification of the industrial risks. In spite of mentioned advantages just very few companies are applying it. Bow – tie presents a new approach to develop scenarios in mentioned area but it requires to be skilled in area of industrial accident prevention and also to have an analytical thinking.

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Technical Breakdown of a Vehicle as a Cause of a Road Accident.

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Abstract. Most road accidents are caused by human error. In practise we could also meet with accidents caused by technical troubles, in other words by technical breakdown. In case of suspicion, that the road accident could be caused by a bad technical condition of a vehicle or by an accidental technical breakdown, we need to choose an appropriate diagnostic method to find the failure out. The use of particular diagnostic methods was applied to a real serious accident of the bus Karosa LC 735 which happened on 2 September 2007 in the area of the village Hriňová. I did the technical diagnostics of a crash bus with the cooperation of the Institute of Forensic Engineering of University of Žilina. The end result of the diagnostics was the fact that the technical breakdown had the crucial influence on that tragic accident where 8 people died.

Keywords: traffic accident, technical diagnostics, technical breakdown, bus

1. Introduction

Recently, vehicles have been of high technical standard but we cannot exclude the possibility of a technical breakdown. And the methodology of finding technical failures of road vehicles is the area where we need to create generally applicable technical system.
It is very important to establish the diagnostic procedure because we need to check all the groups and sub-groups, in some cases the parts and components of a vehicle. It is not possible to omit or forget something, to imperfectly judge the situation or not to find the technical breakdown. In fact, this could have the crucial influence on finding the cause of an accident. A possible incorrect procedure may also have considerable consequences of criminal law.

The aim of technical diagnostics is not only to analyze why complex technical systems break down but also to give the source to the system approach to be able to minimize the possibilities of technical failures.

2. Deinstalling diagnostics applied by the accident in Hriňová

Analysis of the airpressed brake-system components of the bus Karosa LC-735 with help of deinstalling diagnostic

From the crashed bus that had an accident on 2nd September 2007 on the road section between mountain hotel Poľana and the village Hriňová were deinstalled individual components of brake system that has been exposed to the deinstalling diagnostics and tests running at the special testing equipment in workshops of SAD Žilina.

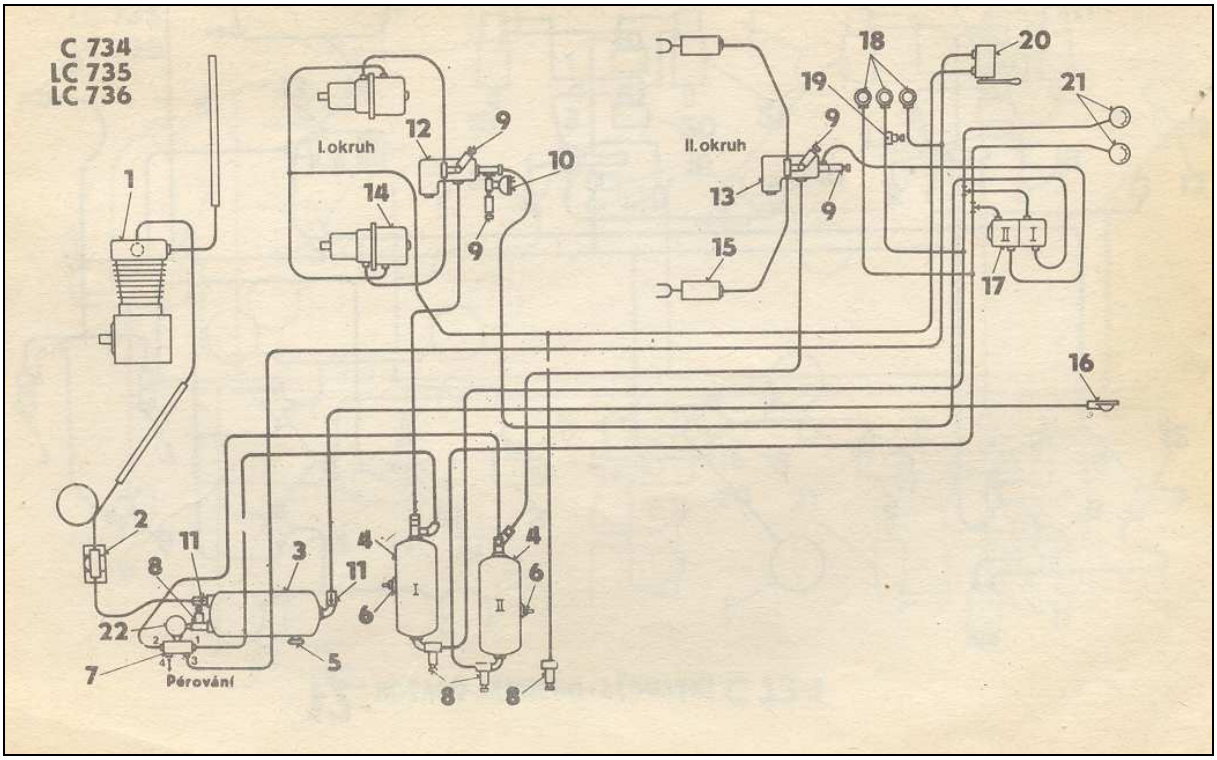

Fig. 1. The airpressed brake-system.

2	*anti –freeze system*	13	*load regulator of front axle*
3	*air receiver 40 l*	14	*spring wheel cylinder*
4	*air receiver 12 l*	15	*wheel cylinder*
5	*automatic drain valve*	16	*coupler*
6	*drain valve*	17	*two-circuit brake valve*
7	*centre valve*	18	*airtight switch*
8	*test connection - A*	19	*airtight switch*
9	*test connection - B*	20	*operating valve of hand brake*
10	*stop light switch*	21	*air pressure gage*
11	*return valve*	22	*pressure regulator*

Tab. 1. Description of the components on the Fig. 1.

We are dealing with the following parts of brake system:

1. Load regulator of front axle brake pressure
2. Load regulator of rear axle brake pressure
3. Control valve of hand brake
4. Operating valve of hand brake
5. Main pedal-operated air-brake valve
6. Centre valve with pressure regulator
7. Return valve between compressor and air receiver
8. Compressor

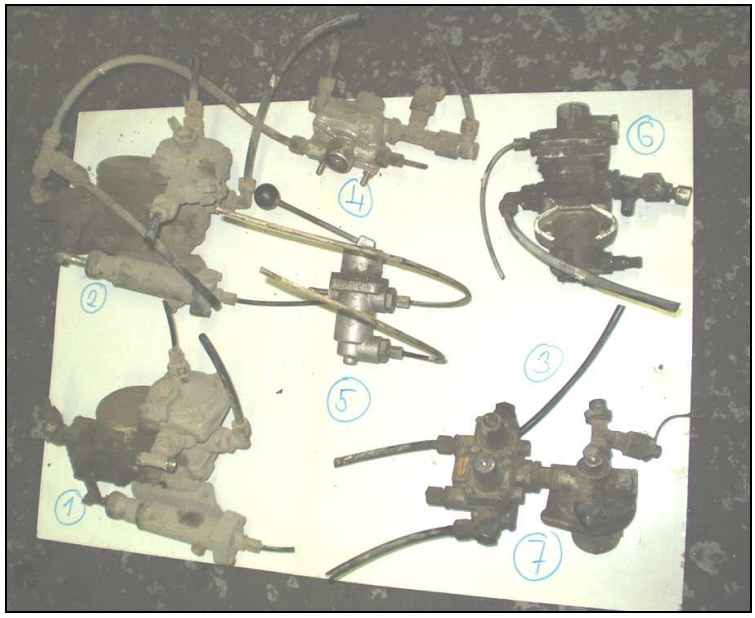

Fig. 2. Individual components of brake system deinstalled after the crash.

Fig. 3. Return valve still installed at the air receiver of the bus.

By pressure test of return valve we have found out, that at lower air pressure it is not functioning at all.

Fig. 4. Dismounted return valve with damaged gusset and sealing rubber band.

Fig. 5. On the left side are the damaged component parts, on the right side are the new, not damaged parts.

Conclusion of technical analysis of brake system components

The individual brake system components, which have been taken in for a deinstalling diagnostic we can evaluate as follows:

- Load regulator of front axle brake pressure — functioning without defects
- Load regulator of rear axle brake pressure — functioning with defects
- Control valve of hand brake — functioning without defects
- Operating valve of hand brake — functioning without defects
- Main pedal-operated air-brake system — functioning without defects
- Centre valve with pressure regulator — functioning without defects
- Return valve between compressor and air receiver — functioning with defects
- Compressor — functioning with defects

The defects that has been found out, are not abrupt, but are caused by the wear and in a longterm neglected maintenance.

Fig. 5. Activity indicator Test brake.

Front axle (cold brake):
Dependence brake-power of wheels to pressure in brake system.

brake pressure (bar)	brake force (kN)	brake force (kN)
	L	R
0,5	1,0	1,0
1,0	2,0	2,0
1,5	4,0	4,0
2,0	4,8	5,2
3,0	7,0	8,0

Tab. 2. Test results

As the bus was broken-down, the brake system was attached to external generator of air pressure. Surprisingly, the result of brake-test was suitable.

The cause of bus accident was technical malfunction in braking system. Partially operational compressor and dysfunctional return valve between compressor and air receiver caused inadequate air pressure in braking system and therefore dysfunctional braking system. This malfunction was not abrupt but was caused by the wear and in a long-term neglected maintenance.

3. Use of technical diagnostics in an expert branch „ Accidents in Road Transport“

Brake system breakdowns fall into the most important technical breakdowns and have the most tragic consequences, too.

With the cooperation of the Institute of Forensic Engineering of University of Žilina I analysed the technical condition of the brake system of the bus Karosa LC 735 which crashed on 2 September 2007 in the area of the village Hriňová and where 8 people died was also put to the dismantling diagnostics with the cooperation of the Institute of Forensic Engineering of University of Žilina.

4. Conclusion

Diagnostics of each group of a vehicle requires specific approach and procedure in finding the failure. It is very important not only to find the failure but also to specify the cause to be able to avoid the failure in the future.

An appropriate diagnostic method is particularly important in such cases when technical failure causes a serious accident with tragic consequences. There is no doubt that among those most serious accidents we can find the bus accidents. The bad technical condition of the bus caused that tragic road accident.

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Analysis of the Detection of Offenses and Spending Money on Preventive-repressive Activities of City Police Žilina

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Abstract. The article deals with the analysis and detection of breaches of spending money on preventive-repressive activities of City police Žilina in 2009. Data were got from the document "Report about the activities of the City police Žilina in 2009". City police is required to publish this document under the Act SNR No. 564/1991 Zb. "about the public police, as amended" every year. Activity of City police Žilina, its management and statistics solutions containing offenses are content of this article, in 2009.

Keywords: The City police, the offense, the budget, the activity

1. Introduction

In the meaning of the SNR Act No. 564/1991 Zb. "about the public police", City Police Žilina is department operating guideline for ensuring the general matters of public order, protection of the environment in the city and carrying out the tasks arising from the generally binding regulations of the city.

Management and funding of the City Police Žilina is governed by Act No. 523/2004 Z. z. and Act No. 583/2004 Z. z. "about the Financial Regulation, as amended". It is provided by advance. The city council of Žilina determines organization, a high wage and the range of technical means of City Police Žilina, with regard to the scope of its tasks.

A governor of City Police Žilina is its leader and chief. City Police Žilina consists of members of the city police, who are employees of the town of Žilina. City Police Žilina is disciplinary department of the city whose organizational structure consists of the governor, deputy chief, operations centre, department of professional police activities, the department of performance: I. – Centrum, II. – Vlčince, III. – Hájik, IV. – City emergency personnel, discipline and training center, indoor and organizational department.

In addition, activities of city police in Žilina are regulated by Statute and Organization Regulations of the City Police Žilina expect by the Act., valid from 1.9.2007. [1, 4].

2. Activity of individual departments City Police Žilina

Activity by each department of the city police were mainly focused on public order, addressing offenses, notices and complaints from citizens and members of city council and to ensure the all security situation in the city in cooperation with the Police Force SR.

Operating Centre secured the continuous 24/7 operation of the City Police Žilina. Emergency service line 159 was available for the needs of citizens. 22 640 various notices, impulses, inquiries, complaints and other was received through 159, in 2009.

In addition, except these actions, the employees were received information from the users of camera system and it was sent police patrol to place, if necessary. In 2009 it was used a total of 153

video records from the camera system for the needs of city police and 31 records for Police Force SR.

Also, workers operating center serving "the central security protection" and implement measures to protect the protected object according to characteristics of the received signal. In 2009 a total of 65 structures were connected to city police, and the operations centre staff processed 320 reports of a suspected breach of objects. They provided the same number of departure to the building objects through the emergency unit patrols the city.

During the absence of governor, deputy governor captain of department and at bank holidays and public holidays, employees operating personnel department manage the operational activities and operation throughout the city police under the current security situation in the city. They informed the governor (or deputy governor) of the incidents immediately.

Monitoring of observation with public order is one of the activities in the field of public policy, in cultural, social and sporting events in the city. 96 members of the city police secured this activity at the request of law enforcement agencies in ensuring the actions pursuant to the Criminal Law. Total 288 hours were worked during this activity [2].

Working position	Policemen	Operational staff
The governor + guvernor deputy	2	
Operation centre	4	
Professional police department activities	14	
Departmen of power	69	
Discipline and training center	1	
Indoor and organizational department		4
Severely disabled employees - camera system operation, informant		6
Together	90	10

Tab. 1. Personnel composition of City police Žilina in 2009 [1].

3. Implementation of the budget for 2009

Evaluation of the implementation of the budget for 2009, in view of current spending and capital spending and income is follows:

- **An Expenditure**

Approved budget: **1 800 766 €**
- Capital expenditure 200 388 €
- Common expenditure 1 600 378 €

Drawn budget **1 810 050 €**
- Capital expenditure 172 340 €
- Common expenditure 1 637 710 €

Implementation budget completely **100,52 %**
- Capital expenditure 86,00 %
- Common expenditure 102,33 %
- Completely overspend 9385 €

- **A revenue**

Approved budget: 139 415 €
Implementation: 246 927 € (177,12 %)
Overspend: 107 512€

A difference between increased revenue and increased draw of revenue

Increased revenue 107512 €
Increased expenditure 9 385 €

Difference **+ 98 127 €**

Approved budget 2009	Drawn budget 2009	Implementation budget 2009	% of overspend
Wages, salaries	975 901	980 762	100,5
Insurance	341 101	341 458	100,13
Common expenditure	281 550	315 491	112,06
Travel expenses	996	32	3,21
Power, water, heating	47 097	39 587	84,05
Material	84 744	94 184	114,14
Transport	32 624	36 051	110,51
Common maintenance	13 934	17 299	124,15
Pay for a rent	232	229	98,62
Services	101 923	124 392	122,04
Common transfers	1 826	3 717	203,59
Implementation of common expenditure and transfers	1 600 378	1 637 710	102,33
Implementation of common transfers		1 641 428	102,57

Tab. 2. Common expenditure in 2009.

The revenue

Budgeted revenue for City Police Žilina consist of two income types: from fines paid by the offender in the block procedure and from revenue arising from services provided by discipline and training center.

Total revenue consisted 246 927 €. This revenue was exceeded by an amount 114 415 € against to approved budget [2].

4. Statistics of offenses, solved by policemen in 2009

THE OFFENSES	§ 47	§49	§ 50	§ 22	GBR of city	Other	Total
Total found out of offenses /by own activity/	1491	58	266	15082	2089	657	19643
Total of reported offenses on departments of City police	344	29	226	1379	381	148	2507
Total of given offenses (§ 11, 372/1990 Zb.)	860	49	19	4001	895	336	6160
Total of forgotten offenses	91	0	20	11	44	5	171
Total of submitted offenses	3	0	20	16	110	6	155
Total of reported offenses to competent authority	12	7	56	152	26	31	284
Total of offenses heard in penalty procedure / in cash /	446	4	236	13401	942	351	15380
Amount of cash / € /	4016	48	2984	184183	8736	2563	202530
Total of offenses heard in penalty procedure / not cash /	23	1	112	477	20	25	658
Amount of cash / € /	620	30	2597	15151	429	621	19448

Tab. 3. Statistics of offenses in 2009

The key according to SNR Act No. 372/1990 Zb. “about the offenses”

§ 47 – offenses against to public order
§ 49 – offenses against to civil coexistence
§ 50 – offenses against to property
§ 22 – offenses against to transport section including pedestrian zone
§ 11 – offenses solved by rebuke, GBR – generally binding regulation [2].

5. Conclusion

The work of City Police Žilina patrols is a demanding activity that requires full mental and physical deployment throughout the workday, a thorough knowledge of laws necessary for the execution of tasks municipal police force, an adequate ability to communicate with the public. It should be remembered that the majority of the City Police Žilina employees carried out their work activities on the ground – on the streets and in all weathers, all year round, 24 hours a day.

Desired effect – only through cooperation of all components can be achieved in the protection of public order, life, health and property of citizens. These components participate on ensuring public order and general matters of public order in the city. City police cooperation directly with the public remains basic assumption.

If the requirements of the citizen in terms of powers and competencies of the law on public police is not be resolved, must be policeman by the person supplying all the information on the remit of the various bodies and organizations. Citizen can turn with their requirements for it.

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