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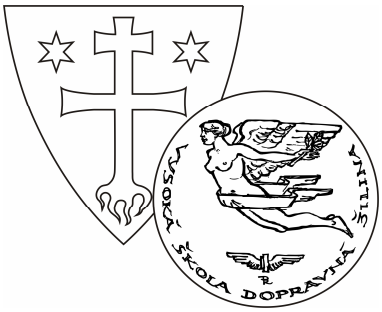

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SECTION 9

SECURITY ENGINEERING. FORENSIC ENGINEERING

ŽILINA June 22 - 24, 2009
SLOVAK REPUBLIC

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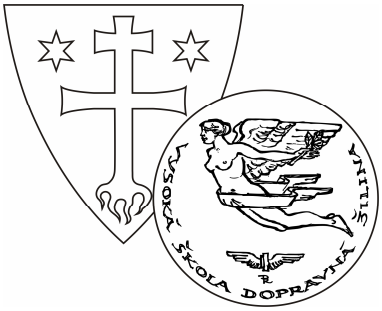

TRANSCOM 2009

8-th EUROPEAN CONFERENCE
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SECTION 9

SECURITY ENGINEERING. FORENSIC ENGINEERING

ŽILINA June 22 - 24, 2009
SLOVAK REPUBLIC

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TRANSCOM 2009
8-th European conference of young research and scientific workers

TRANSCOM 2009, the 8th 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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Transcom 2009, 22-24 June 2009
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The Biomonitoring of the Thermoelectrically Power Station Impact Over The Environment. The Control of the Degree of Pollution by Heavy Metals in Adjacent Areas

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Abstract. Plants can be used as a bioindicators providing information on the environmental quality or environmental changes as well as biomonitors when offers information about the quantity of effluents. The main polluting of the thermoelectrically power plant area of influence is represented by the ash resulting from burning coal, whose composition contains a low content of heavy metals. The paper estimates the content in heavy metal in a clean and a polluted area with ash from a thermoelectrically power station. The control of the degree of the pollution with heavy metals Cu, Cd, Pb, Ni, Zn, Co in the vegetation, plants, and plant-food products can be achieved through the instrumental analysis of AAS in most favorable conditions.

Keywords: biomonitoring, heavy metals, thermoelectrically power station ash, AAS.

1. Introduction

The directive of the Council of European Union 61/96, establishes the general frame concerning the prevention and the control of pollution, specifying all the measures which are required by the integrated implementation concerning the prevention and the control of pollution. In order to obtain a high level of protection for the whole environment, are emitted worms, standards and the legislative documents. Energy installations in particular those which use the coal as fuel can influence the environment, sometimes leading to the damage of the ecological balance in the areas where they are located, they represented a complex impact over all environmental factors in the adjacent area (air, soil, flora and fauna, food and passenger) so that the energy sector is considerate as the main source of environment pollution. The environmental appreciation belonging to an area, at the time consists in the quality of the air, soil, the population` s health and the recorded deficit of the plants and animals. Each of these factors can be characterized by the representative quality indicators for assessing the degree of pollution and each of them has established permissible limits. The main effluent of the influence area of the thermoelectrically power station is the ash. Flying ash removed by smoke, the ash` s dust trained by the wind through the stag waste dumps and the coal dust from coal storage or transport and preparation thereof together represent a solid smoke which is found as aerosols. When the ash resulted by the burning coal contains a small nut of heavy metals (Cr, Ni, Cd, As, Pb) the formed aerosols are non-toxic. From the harmful point of view these become significant only in large quantities. Monitoring of environmental polluting compounds include multiple areas of investigations as: air, water, soil, vegetation, both in urban and rural areas. The large numbers of species of effluents, their distribution involve

sampling strategies and analytical methods of investigation, especially in what concerns the development, implementation and application of these methods in the programs of environmental protection. As a result of increasing of the degree of the industrialization, default the polluting factors, it was established that plants can give qualitative and quantitative information concerning the change caused by the impact of industrialization over the environment, its argument representing the ecologic relationship of the balance between the environmental factors and the actual needs of different plant species. The assessment of the degree of pollution of the environment using plants is based on their important characteristics as: quite response to chemical changes in composition of plants as a result of their reduced capacity to maintain the homeostasis and their ability in accumulating certain polluting as the result of their adaptation to the new environmental conditions. Plants can be used as bioindicators, when they offer information over the quantity of effluents [1, 2] Biological samples of lichens, moss and needle of conifers are normally used for the monitoring of the environmental pollution in the Scandinavia countries [3]. Using the ICP-AES method were analyzed these metals on a surface of 188,ooo Km^2, icluding the teritorries of Fin;and, Norway amd Russia. Lichen samples (Parmelia Caperata) and moss samples (Hypnum Cuprissiforme) were used during 1989-1994 as indicators fro the air biomonitoring in North-East of Italy [4]. Oak leaves were used in Sweden to estimate the degree of pollution with Pb and Cd [5]. Moss and needles are frequently used in the various organic effluents analysis [6, 7].

2. Experimental

2.1. Objectives

The sampling and the methodology of investigation of the environmental pollution, in general of the degree of pollution near the source of pollution power thermal coal-is achieved by: identifying potential pollutant sources, the pollutant substances and their concentration, long term monitoring of the degree of pollution and its rate [8, 9]. Starting from the dates in literature to assess the degree of pollution by heavy metals we proposed to use as bioindicators and biomonitors the vegetation in the area of the thermoelectrically power station based on solid-coal as fuel and that in an area considered unpolluted. There were determined the concentration of heavy metals in soil, water, vegetation, and vegetal products (green pepper, cucumber, onion, garlic and potatoes) in order to observe the influence of the effluents agents over the vegetal products grown for consumption, in both areas.

2.2. Implementation

Equipment: Atomic absorption spectrophotometer, Varian-type Tehnoton metrology verified.

Reagents: Aldrich Standard solutions (Cu, Cd, Pb, Ni, Zn, Co and Cr) , H3PO4,HNO3, H 2SO4, HCl, H2O2. All reagents used were of p.a. and spectral purity.

The Method: It have been taken samples of 100 g of plant and were heated 8 hours at 50-60 0 C. After that the temperature was raised to 105 0 C and maintained for 6 hours. After drying the samples were calcined at a temperature of 200-2500 C, and for a complete calcination the temperature was raised to 5000 C for 6 hours. After cooling, the ashes are treated with 0, 5 ml bidistiled water and 5 ml Hydrochloric acid 6N and then evaporate on a sand bath; the operation is repeated twice. Further, residue dissolve in 10 ml HCl 0,5 N, the quantity passing into a rated balloon with a volume of 25 ml, which brings the rate using bidistilated water.Using AAS it was determined from these obtained solutions: chromium, zinc, copper, cobalt, nickel, cadmium, and lead [10]. The quantity of metal is calculated using

the right line equation probably the most appropriate calibration curve. In each casa the samples were performed three parallel analysis and the reading of the absorbing was repeated every five times [11].

3. Results. Comments

3.1. Utvin locality (a field area anthropogenic polluted by the ash resulted from the ash waste dumps of CET Timişoara)

Experimental values	Metal content (ppm)						
	Zn	Cu	Co	Ni	Cr	Pb	Cd
Minimal values	80,0	18,7	21,0	17,0	21,5	16,5	1,00
Maximum values	123	55,0	50,5	29,0	35,0	55,0	3,20
Average Values	89,0	45,8	35,8	25,6	26,2	40,5	2,05

Tab 1. The heavy metal content-total forms-in the soil horizon 0-20 cm, Utvin

Distance to hald	Metal content (mg/kg dry substance)						
(waste dump)	Zn	Cu	Co	Ni	Cr	Pb	Cd
500 m	6,4	2,85	4,46	2,8	0,52	0,16	0,59
1000 m	32,4	6,10	7,54	4,5	0,54	0,19	0,54
2000 m	37,5	9,82	6,85	5,0	0,55	0,25	0,38

Tab 2. Variation content of heavy metals (average values) of vegetation at different distances from the hald ashes of CET Timişoara-Utvim city area

Analised product	Metal content (mg/kg fresh edible product) maximum values						
	Zn	Cu	Co	Ni	Cr	Pb	Cd
Cucumbers	10,2	0,68	0,16	0,15	0,14	0,20	0,50
Onion	14,8	1,37	0,81	0,38	0,33	0,53	0,08
Pepper	15,1	3,50	0,29	0,40	0,31	0,08	0,05

Tab 3. Heavy metal content in some vegetables cultivated within village Utvin area

Commentary: Values of climatic parameters of Utvin city area can be considered normal and has not been a significant influence over the accumulation of heavy metals in soil and plants. Given the fact that the ashes hald is located in the eastern city, Utvin is expected that winds led the dry ash, determining the concentration of heavy metals in soil and to create the pollution phenomena of the land area.

Ashes has an appreciable content of heavy metal-total form-higher than the normal values for agricultural soil but not so high as to be limited to crop plants. The soil of Utvin area is a land of anthropogenic additional load with heavy metals especially cadmium, lead, cobalt, copper, and even zinc. The physical-chemical parameters of this type of soil keep these metals in a still, inaccessible from for plants. This state of affairs is temporary because the impact between the ash and the soil in this area during a longer period of time has as a result the action of concentrating of heavy metals in soil and plants.

The pH and the content of heavy metals in water samples collected in the perimeter area of the hald ashes show that it has not a significant contribution to the contamination of plant products with heavy metals.

Experimental results obtained in the heavy metals measurement in vegetables grown next to the ash storage of CET Timişoara, reveal some of their increased concentrations. The higher

concentrations of toxic heavy metals (Cd, Pb) or potentially toxic (Zn, Cu) have been identified in some vegetables especially in leafy vegetables and roots. Although some heavy metals have been identified in higher quantities at the limit of toxicity or slightly above some limit, the average values of their concentrations in the vegetables analyzed are included generally in the normal range. This state of affairs shows that the pollution phenomenon is still early and therefore we cannot speak about a clear process of pollution with heavy metals. Yet, this phenomenon may increase if the anthropogenic impact is extended without taking any specific agropedoameliorative measures.

4. Conclusions

A number of plants, in this case the grassy vegetation, the vegetables, fruits can be used as biomonitors of the pollution degree in general, with heavy metals in particular by analyzing the chemical composition of the constitutive elements from the adjacent area of the pollution sources with combustion products of thermoelectrically power station on coal. The degree of pollution with heavy metals Cu,Cd,Pb,Ni,Zn,Co in plant food products can be achieved through the instrumental analysis in AAS in optimum conditions. In both areas the maximum highest limits of toxicity admitted for heavy metals in food products were not exceeded, unaffecting the people` s health.

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Road Tunnel Lighting

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Abstract. The contribution furnishes information on the lighting of road tunnels. It focuses on photometric characteristics, on the division of lighting in road tunnels on the basis of threshold zones and on the problems of emergency lighting.

Key words: tunnel, tunnel lighting, luminance, emergency lighting, tunnel lighting zones

1. Introduction

Ensuring safe driving in tunnels and underpasses puts great requirements for lighting. Regardless of the time of day, the continuous passage through a tunnel is of importance to safety. With the increasing quality of lighting, the visual as well as psychic well-being of drivers grows as well. The result is making decisions of better quality and in better time and also more continuous driving at balanced speed. Emergency exits and places with communication facilities for emergency calls are equipped with permanent emergency lighting.

Tunnel lighting must enable the safe adaptation of eye to the transition from light to dark and vice versa. This occurs at the tunnel entrance and also at the tunnel exit. To limit unfavourable claustrophobic effects of enclosed space, lighting levels higher than those of roads having similar significance but locating in the open air are used.

Tunnel lighting thus ensures, night and day, the safety and continuity of traffic and visual well-being of participants in traffic similar to that in adjacent stretches of open-air road, and is a necessary condition for the following:

- providing the drivers entering the tunnel, passing through it or exiting from it with the sufficient amount of visual information on the continuation of road ahead of them, on potential occurrence of road obstacles, including information on other vehicles and their movements;
- driver's feelings equal to those in adjacent open-air stretches of road;

The achievement of above-mentioned points is the most demanding in daytime, especially when the sun shines. To tunnel lighting the following photometric characteristics are the most important:

- luminance level of road and of lower part of tunnel walls;
- uniformity of distribution of luminance on the road;
- glare limitation;
- light flicker limitation;

The phenomenon of flicker is due to periodical changes in luminance in the driver's field of vision, e.g. due to daylight penetrating to the tunnel tube through holes in its walls or due to acting of lighting fixtures spaced wrongly.

2. Division of tunnel lighting

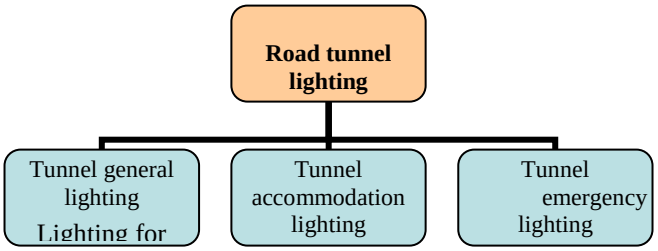

Fig. 1. Road tunnel lighting.

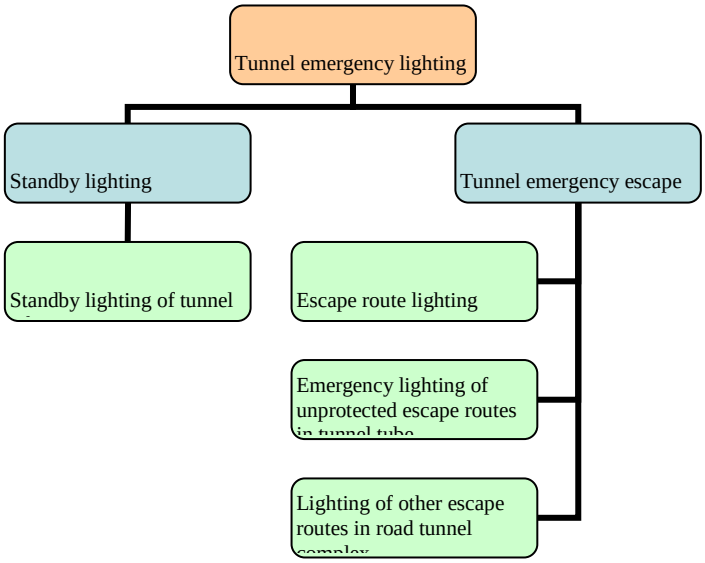

Fig. 2. Tunnel emergency lighting.

2.1. Tunnel lighting zones

Tunnel lighting is to ensure interior visibility comparable with exterior one. With regard to the adaptation of driver's eye, tunnel lighting is the most critical in daylight hours, when the driver passes from the environment of high luminance level to that of low luminance level. The greater that difference between these luminance levels, the longer is the process of visual adaptation and the longer is the path of vehicle in the given adaptation time. Five zones of lighting are defined in the longitudinal direction of tunnels, see Fig. 3.

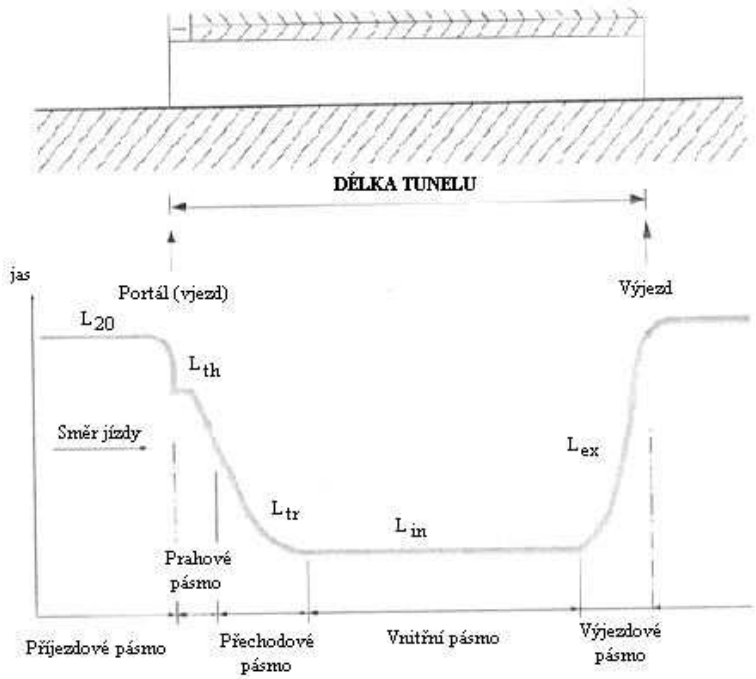

Fig. 3. Typical longitudinal section through single-direction tunnel

Access zone – is the stretch of road that is actually exterior to the tunnel entrance, from where the driver can see the interior of the tunnel.. The value of luminance in the access zone is designated L_{20}.

Threshold zone – the first internal stretch of the tunnel at the entrance to the tunnel tube. The lighting of this zone must be based on the visual perception of the driver who is still outside the tunnel and is thus surrounded by the luminance of access zone. The length of this zone depends on the design speed and should equal to the relevant overall stopping distance. The value of luminance in the threshold zone is designated L_{th}.

Transition zone – is the stretch of the tunnel at the entrance to the tunnel tube following the threshold zone. This transition must be gradual to provide the eye time sufficient for adaptation to the lower luminance level. The value of luminance in the transition zone is designated L_{tr}.

Interior zone – is the internal stretch of the tunnel tube, after the transition zone. In the interior zone the level of luminance keeps the constant value. That is why it is necessary to maintain in the interior zone of the tunnel during the day the higher level of luminance than by night. The value of luminance in the interior zone is designated L_{in}.

Exit zone – is the stretch of the tunnel tube where the vision of the driver approaching the tunnel exit is affected by the luminance of space after the tunnel. The value of luminance in the exit zone is designated L_{ex}.

3. Emergency lighting

Emergency lighting is designed in both single-direction tubes and backup power supply to it comes from an uninterruptible power source, i.e. it will be put into operation immediately after a failure in the electric network. The UPS will feed standby lighting (interruptibly),

which ensures about 70% of operating illuminance. Emergency lighting fixtures are situated on the walls along both the sides of either tunnel tube, 0.8 – 0.9 m above the road about 12m from each other. IP 65 lighting fixtures will be used. Emergency lighting of unprotected escape routes must ensure the minimum value of illuminance E_m = 2 lx in the axis of unprotected escape route. The value of illuminance of the central zone of unprotected escape route of the minimum width equal to a half of the width of this route must be minimally 50% of the given value. A ratio of maximum illuminance to minimum illuminance along the axis of unprotected escape route must not be greater than 40:1. In points of escape exits, of entry into rescue routes, locations of extinguishers and SOS boxes, emergency lighting of unprotected escape routes must ensure the value of illuminance E_m = 5 lx, and these spaces will be illuminated by additional reflectors.

The functionality of emergency lighting must be ensured in case of fire for 120 minutes. The required functionality of the system is P_{660}120 min (test regulation ZP No. 27/2006).

The continuous marking of direction to escape exits (rescue routes, portals) between rescue routes is realized by photoluminescence direction plates with given distances, at the height of axis of the upper sign of about 1.5 m above the escape pavement in both the directions along both the sides alternately (12m) in the tunnel tube at the spacing of about 24m along either of the sides (see Fig. 4).

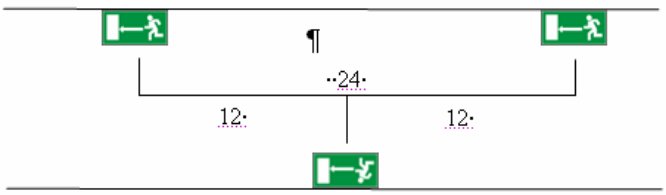

Fig. 4 Layout of signs in tunnel tube

As well, emergency lighting is installed in rescue routes at the illumination of 15lx as a minimum and inside SOS boxes.

Emergency lighting switching is automatic with a possibility of manual operation, in case of power failure or in the course of identification of fire by the control system on the basis of initiation by the fire alarm and detection system, and must correspond to the requirements of EN 1838.

All cable distribution is represented by cabling satisfying the standard ČSN IEC 60 331, and ensures the functionality for 120 minutes as a minimum (P_{660}120), including bearing structures according to the test regulation ZP No. 27/2006.

Along the kerbs, permanently turned-on mark lights are installed spaced up to 36m from each other on both the sides. During tunnel evacuation, these lights serve for the better orientation of persons escaping from the tunnel. Lights should be of type not too exceeding the level of pavement and thus not standing in the way of evacuation.

3.1. Power supply to emergency lighting

All safety systems, it means including emergency lighting, are fed from two sources independent of each other, namely: distribution network of PRE, UPS and diesel generator set.

In a case of network and/or diesel generator set failure, the tunnel will be closed to traffic by means of temporary road signs at the entry into the tunnel (portals) that is fed from the uninterruptible power supply.

The power supply itself – battery backup UPS and diesel generator sets have outputs so high that they enable the functionality of control and safety devices, including standby lighting

even in case of complete loss of voltage in main supply lines of PRE for tunnel operation in the following way:

- standby lighting of tunnel tubes, connections and temporary road signs in the tunnel ….. 30 min.
- SOS boxes, radio-communication, measurement of physical quantities, fire pump, fire alarm and detection system, electric security system, jet fans, fans for ventilation in rescue routes…. 90 min
- emergency lighting of tunnel tubes and rescue routes, control system, voice wireless announcement and video surveillance systems … 120 min

4. Conclusion

Tunnel lighting is an integral component in ensuring not only road tunnel safety but also road underpass safety. The ensuring of safe driving in tunnels and underpasses puts high requirements just for lighting, and regardless of the time of day, what is of importance to safety is continuous passage through the tunnel. With the increasing quality of lighting, the visual and thus also psychic well-being of drivers passing through the tunnel grows.

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Occupational Risk Assessment Standards

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Abstract. In accordance with the applicable law, the assessment of occupational risk is the obligation of each employer. Each employer is required to inform each worker employed on a particular work stand about the risk associated with that work stand. The occupational risk assessment should be periodically verified, taking into account the actual state of hazards on a given work stand. Quite often, hazards existing on a work stand create the risk of an accident or the risk of occurrence of an occupational disease. In that case, the employer is obliged to undertake actions aimed at reducing or limiting the risk by implementing effective protection measures.

Keywords: occupational risk, assessment of occupational risk, work stand, hazard.

1. Introduction

The general rules of assuring the safety and health protection of employees are defined by the European Union Directive 89/391/EEC, under the provisions of which, a Regulation on the general Health & Safety of Work provisions has been introduced to the Polish law and the Labour Code [1]. The last amendment of the Labour Code - Dz.U. No. 237/2008, in accordance with the above-mentioned Directive, imposes on the employer increased responsibility for the state of Health & Safety, regardless the fact that employees are independently burdened with Health & Safety obligations. In accordance with the EU law that makes an employer obliged to carry out active Health & Safety policy, the employer is required to constant monitoring of the H&S state in his establishment and to carry out activities aimed at preventing hazards in the work process through making decisions concerning the improvement of the existing safety level on the site. A passive attitude of the employer, or direct or indirect charging employees with costs related to H&S protection constitutes an evident breach of the Labour Code, which means in practice that it is impermissible to charge employees financially for the increase in H&S protection costs.

In accordance with Article 226 of the Labour Code [4], the employer shall be obliged to: assess and document occupational risk associated with the work being performed, use necessary preventive measures to mitigate the risk, and to inform employees about the occupational risk that is linked to the work being carried out and about the rules of protection against hazards. This obligation is fully in line with European Union directives, according to which an employer shall make the assessment of risk to the Health & Safety at work, and also he shall assess the level of risk occurring on individual work stands and shall have an obligation to strictly document all hazards, accidents and occupational diseases and to maintain appropriate documentation in this regard.

2. Occupational risk assessment process

The assessment of occupational risk plays a crucial role in the process of supervising the state of Health & Work Safety. It provides necessary information required for planning corrective and preventive actions on any identified irregularities in the work process.

In determining the occupational risk, it is important not only to establish hazards and their level, but, above all, to indicate appropriate measures to reduce them. Thus, the assessment of occupational risk is integral to three main elements: the identification of hazards and their size, the assessment of the hazard level, and the development of a working conditions improvement plan.

The state of occupational risk will be influenced by several factors, of which the following could be distinguished: factors that pose a risk to human health, organizational activities, technical activities, and the human factor. Only by implementing appropriate technical & organizational solutions, will we have the chance to reduce the occupational risk level, regardless the level of hazards that will result from the technological process itself. As can be seen on the enclosed diagram - Fig. 1, the process of occupational risk assessment is a multi-stage process and should be carried out step by step in the prescribed order.

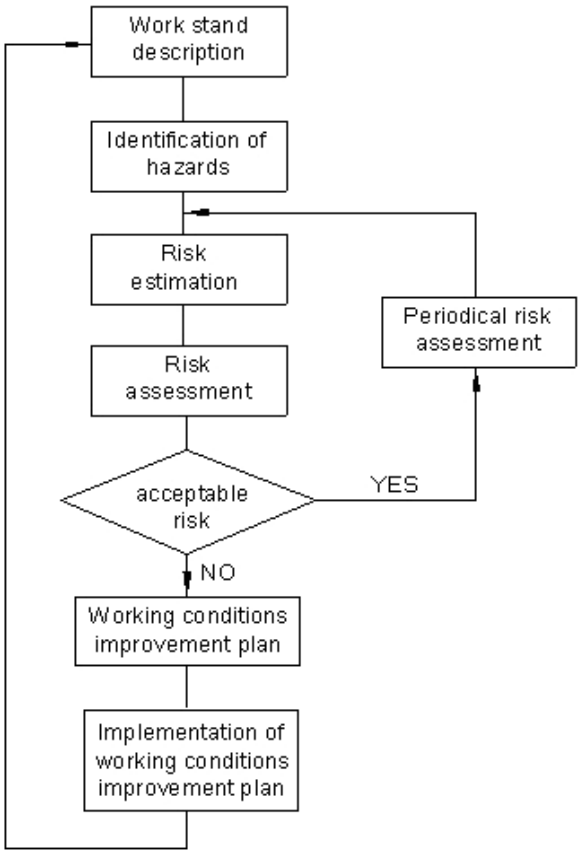

Fig. 1. Particular stages of occupational risk assessment

The risk assessment should be documented in a manner, as defined by the employer and resulting directly from the existing hazards, the level of employment, and the needs of the enterprise.

The occupational risk assessment documentation should include [3]:

- description of the work stand being assessed,
- occupational hazards identified on that work stand, together with their sources,
- protective measures necessary to be used on the work stand and to eliminate the hazards,
- estimated level of occupational risk,
- defined potential effects of the risk,
- specified risk acceptability criteria,
- method of responding in an emergency, and
- conclusions or actions aimed at improving the current state of safety.

2.1. Description of the work stand

When describing the work stand, it is necessary to take into account the following factors:

- situation of the work stand, the space, within the worker will move, and hazards created by the work stand's environment,
- a detailed description of tasks to be carried out, a description of activities performed by the employee,
- a detailed description of the production process,
- a description of machines, tools and equipment operated on the work stand, their technical condition and hazards created by them,
- materials, raw materials and preparations used on the work stands, and the hazards created by them,
- qualifications, certification and training required on the work stand, and
- working clothing and personal protection equipment appropriate to the work stand.

2.2. Identification of hazards

The most important role in the proper assessment of occupational risk is played by the identification of work stand hazards, or the correct assessment of working environment conditions that might cause an accident or illness (harm, physical injury, or a loss of health or property). The identification of hazards should be started from gathering complete information on the work stand and the working environment. The source of this information can be:

- technical data on machines and equipment used on the work stand,
- operation & maintenance documentation and work-stand instructions,
- results of the measurements of harmful and hazardous agents,
- oppressive agents occurring on the work stand,
- Safety Data Sheets for hazardous substances,
- documentation of accidents at work and near misses,
- documentation of occupational diseases,
- results of the assessment of workers' state of health,
- regulations and normative documents,
- a description of the work stand,
- observations of the work stand, and
- failures.

3. Estimation and assessment of risks

The estimation of occupational risk parameters can be done by a different method, depending on the establishment's needs and existing external factors. Such occupational risk estimation methods are recommended, whose use does not need specialized knowledge. An important consideration is that the outcome be satisfactory for determining the risk acceptability and working out appropriate corrective and preventive actions. Thus, risk estimation consists in the right assignment of values to the risk parameters occurring on a given work stand.

The estimation of the risk should be followed by its assessment in order to establish, whether or not the reduction of the risk is required, and whether the required safety level has been attained. A basic risk acceptability criterion are the requirements of regulations, and in their absence the employer should establish their own requirements for risk acceptability, taking into account opinions by Health & Work Safety experts.

There are many methods of occupational risk assessment; here, we can point out to two basic methods: the quantitative method and the qualitative method. The assessment by quantitative methods is applicable, when there is a large quantity of statistical data available on the number, type and causes of accidents at work, near misses and occupational diseases. Usually, we do not have reliable statistical data available in a number large enough as to estimate the risk; in that case, a less complex risk assessment method, namely the qualitative method, needs to be used. This method consists in assigning appropriate conventional values to the risk factors – the estimation of the degree of possible losses, and the probability of occurrence of damage. The estimation of effects is done based on suitably devised scales; the risk analysis should be made separately for each identified hazard.

4. Conclusion

The assessment of occupational risk involves the identification of hazards occurring in the work stand, which are closely related to the production activity of an establishment. In accordance with the applicable regulations, the assessment should determine the level of risk on a specific work stand. The source of basic information necessary for making an occupational risk assessment on a particular work stand should always be vigilant observation of the working stand concerned.

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Industrial Accidents Databases and European Scale for Accidents Assessing

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Abstract. This article presents overview of some functional databases which summarize facts about accidents and incidents in four countries. Presented countries are France, Great Britain, Netherlands and Germany. The emphasis is given on database ARIA and its European scale which is used for accidents assessment and presented on seminars organized in France.

Keywords: database, accident, ARIA, incident, consequence.

1. Introduction

With increasing number of technological disasters in historical overview came into an existence the necessity of its documentation and archiving in many countries. There arose out of technological disasters summarization many databases in many countries of the world. One of the most important in Europe is called ARIA (Analyze, Recherche et Information sur les accidents), which was found). The meaning of this database consists of collecting data and major accidents prevention propagation by the means of collected data. The working group of engineers and technicians provide for collecting, analyzing and placing of data into prepared former which serves for the lessons learned from technological disasters. Collected major accidents concern about health and safety dangers in society, agriculture, environment, plant activities, storage houses and many others.

Nowadays it includes more than 30 000 accidents and incidents which has happened not only in France but also abroad. More than 2000 of them were completed and edited in documents until the year 2005. Conclusions from some accidents should be used as a lesson for new order making and modification of those which exist for risk identification and analysis in risk management.

Accidents and incidents searching should be done by following choosing criteria:

- date,
- country,
- activities,
- typology,
- consequences,
- European risk criteria for accidents,
- key words or phrases,
- number of an accidents.

There are also reported accidents which happened in Slovakia. Up to now there are six accidents in the time period 1987 – 2002.

Next database is called MHIDAS (Major Hazards Incident Data Service) which collects data for The Great Britain in area of accidents and incidents. It includes nearly 10 000 records concerning to chemical accidents that have happened in the world. The accident list was created according to various criteria. The main requests for accident classification are membership of the chemical/petrochemical industry and it should contain numerical damage expression.

In Netherlands the function database is called FACTS (Failure and Accidents Technical information System) including more than 23 000 information about industrial disasters where hazardous substances are included from all around the world data back to the year 1920. It includes not only accidents that have happened but also nearly accidents from the consequences point of view. The most serious accidents are reported electronically and they are available for next using.

In the Germany there is database called ZEMA. It includes information about nearly accidents, incidents and also major accidents with serious consequences on people, environment and property.

1.1. "Lessons learnt from industrial accidents" (Seminar)

These seminars about accidents investigation are organized one time per two years by France this time. The time before it was organized each year. It should help organizations to improve prevention and tools that should be used for consequence assessment of accidents.

It was organized in many places in France namely: Lyon (April 1999), Lyon (June 2000), Reimes (June 2001), Bordeaux (June 2002), Dijon (June 2003), Caen (June 2005), Paris (May 2007).

The main aim is to collect data about accidents and their analyzing concerning to the future prevention. Inspectors present main facts about the accident including: describing of an accident, consequences, realized measures, material and system falling, organization aspects and important findings in each case. Each time there are presented accident which has happened in countries all over the world

All of the accidents which are presented in seminar are assessed by European scale showed on picture 1.

Fig.1 European scale for industrial accident [5]

This severity scale was made official in 1994 by the Committee of Competent Authorities of the member States which oversees the application of the Seveso directive. It is based on 18 technical parameters designed to objectively characterise the effects or consequences of accidents: each of these 18 parameters include 6 levels. The highest lever determines the accident's severity index.

The main difficulties encountered stem from the attribution of an overall index covering the consequences that are completely different according to the accidents, while these consequences can only be directly compared between themselves: death, length of waterway polluted, harm to the fauna, flora, property damage, operating losses. Dialog is often difficult

with the media or victim associations which poorly understand the mixture of various categories of consequences formed within a single and obscure index. No one deduces that a valuation system between the various interests involved in the industrial accidents was knowingly established.[5]

In following text we will show the tables which determine each indices and its magnitude:

- dangerous material release,
- human and social consequences,
- environmental consequences,
- economic consequences.

	Dangerous material released	1	2	3	4	5	6
Q1	Quantity Q of substance actually lost or released in relation to the « Seveso » threshold *	Q < 0,1 %	0,1 % ≤ Q < 1 %	1 % ≤ Q < 10 %	10 % ≤ Q < 100 %	De 1 à 10 fois le seuil	≥ 10 fois le seuil
Q2	Quantity Q of explosive substance having actually participated in the explosion (equivalent in TNT)	Q < 0,1 t	0,1 t ≤ Q < 1 t	1 t ≤ Q < 5 t	5 t ≤ Q < 50 t	50 t ≤ Q < 500 t	Q ≥ 500 t

Tab.1. Scale for dangerous material released [5]

	"H" Human and social consequences						
H3	Total number of death: including - employees - external rescue personnel - persons from the public	- - - -	1 1 - -	2 – 5 2 – 5 1 -	6 – 19 6 – 19 2 – 5 1	20 – 49 20 – 49 6 – 19 2 – 5	≥ 50 ≥ 50 ≥ 20 ≥ 6
H4	Total number of injured with hospitalisation ≥ 24 h : including - employees - external rescue personnel - persons from the public	1 1 1 -	2 – 5 2 – 5 2 – 5 -	6 – 19 6 – 19 6 – 19 1 – 5	20 – 49 20 – 49 20 – 49 6 – 19	50 – 199 50 – 199 50 – 199 20 – 49	≥ 200 ≥ 200 ≥ 200 ≥ 50
H5	Total number of slightly injured cared for on site with hospitalisation < 24 h : including - employees - external rescue personnel - persons from the public	1 – 5 1 – 5 1 – 5 -	6 – 19 6 – 19 6 – 19 1 – 5	20 – 49 20 – 49 20 – 49 6 – 19	50 – 199 50 – 199 50 – 199 20 – 49	200 – 999 200 – 999 200 – 999 50 – 199	≥ 1000 ≥ 1000 ≥ 1000 ≥ 200
H6	Total number of homeless or unable to work (outbuildings and work tools damaged)	-	1 – 5	6 – 19	20 – 99	100 – 499	≥ 500
H7	Number N of residents evacuated or confined in their home > 2 hours x nbr of hours (persons x hours)	-	N < 500	500 ≤ N < 5 000	5 000 ≤ N < 50 000	50 000 ≤ N < 500 000	N ≥ 500 000
H8	Number N of persons without drinking water, electricity, gas, telephone, public transports > 2 hours x nbr of hours (persons x hours)	-	N < 1 000	1 000 ≤ N < 10 000	10 000 ≤ N < 100 000	100 000 ≤ N < 1 million	N ≥ 1 million
H9	Number N of persons having undergone extended medical supervision (≥ 3 months after the accident)	-	N < 10	10 ≤ N < 50	50 ≤ N < 200	200 ≤ N < 1 000	N ≥ 1 000

Tab.2. Scale for human and social consequences [5]

Environmental consequences		1	2	3	4	5	6
Env10	Quantity of wild animals killed, injured or rendered unfit for human consumption (t)	Q < 0,1	0,1 ≤ Q < 1	1 ≤ Q < 10	10 ≤ Q < 50	50 ≤ Q < 200	Q ≥ 200
Env11	Proportion P of rare or protected animal or vegetal species destroyed (or eliminated by biotope damage) in the zone of the accident	P < 0,1 %	0,1% ≤ P < 0,5%	0,5 % ≤ P < 2 %	2 % ≤ P < 10 %	10 % ≤ P < 50 %	P ≥ 50 %
Env12	Volume V of water polluted (in m^3) *	V < 1000	1000 ≤ V < 10 000	10 000 ≤ V < 0.1	0.1 Million ≤ V< 1 Million	1 Million ≤ V< 10 Million	V ≥ 10 Million
Env13	Surface area S of soil or underground water surface requiring cleaning or specific decontamination (in ha)	0,1 ≤ S < 0,5	0,5 ≤ S < 2	2 ≤ S < 10	10 ≤ S < 50	50 ≤ S < 200	S ≥ 200
Env14	Length L of water channel requiring cleaning or specific decontamination (in km)	0,1≤ L < 0,5	0,5 ≤ L< 2	2 ≤ L< 10	10 ≤ L < 50	50 ≤ L< 200	L ≥ 200

Tab.3. Scale for environmental consequences [5]

Economic consequences		1	2	3	4	5	6
€15	Property damage in the establishment (C expressed in millions of € - Reference 93)	0,1 ≤ C < 0,5	0,5 ≤ C < 2	2 ≤ C< 10	10 ≤ C< 50	50 ≤ C < 200	C ≥ 200
€16	The establishment 's production losses (C expressed in millions of € - Reference 93)	0,1 ≤ C < 0,5	0,5 ≤ C < 2	2 ≤ C< 10	10 ≤ C< 50	50 ≤ C < 200	C ≥ 200
€17	Property damage or production losses outside the establishment (C expressed in millions of € - Reference 93)	-	0,05 < C < 0,1	0,1 ≤ C < 0,5	0,5 ≤ C < 2	2 ≤ C < 10	C ≥ 10
€18	Cost of cleaning, decontamination, rehabilitation of the environment (C expressed in millions of € - Reference 93)	0,01 ≤ C < 0,05	0,05 ≤ C < 0,2	0,2 ≤ C < 1	1 ≤ C < 5	5 ≤ C < 20	C ≥ 20

Tab.4. Scale for economic consequences [5]

2. Conclusion

In the time of new technologies and deriving technological accidents it is necessary to collect information about accidents that has happened in the world and assess experiences that should be taken into account next time. In Slovak republic there is missing such a database with accident characterization and the way of solving and assessing risks or dangerous events.

Acknowledgement

The collection of the accidents and their analysis is necessary in order to prevent new accidents from occurring again. As a consequence, it is necessary for inspectors to have illustrations of accidents situations, in order to understand what happened actually and what measures were finally taken in such situations. For this purpose it is very useful to create databases of industrial accidents and collect necessary data to assess them.

During the meetings in France, each presentation is carried out by an inspector concerned by the accident - technical description of the accident, the effects, the measures taken, the systems or material that failed, the organisational aspects and particularly the lessons learnt

from the accident. The different levels of the accidents are investigated and presented, technical but also judicial or organizational approaches may be carried out.

A glance on the regulations in force is also possible. So, the interest is the share of experience with a high number of inspectors. Apart from the presentations, time is left for exchanges of points of view. The aim is the enrichment of the knowledge for the participants based both on the discussions and the presentations.[6]

This kind of seminar is still missing in our country. The fact is that industrial accidents in Slovak republic are not a “frequent events” but it gives a space for meeting inspectors from other countries and our inspectors with the aim of changing experiences in lessons learnt from industrial accidents. We can take an example from other countries and start collecting and assessing industrial accidents.

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The Examination of Network Analysis Methods Utilization in Slovak´s Criminalistic Practice

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Abstract. These paper gives you basic information about main meanings of network analysis methods in criminalistic, especially in planning actions during process of criminalistic inquiry. Criminalistic inquiry means a process before and during judicial inquiry.

Keywords: criminalistic inquiry, clear making, planning, method of network analysis, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Material Point Method (MPM), Graphical Evaluation and Review Technique (GERT)

1. Introduction

The feeling of safety is very important factor for our society. So as it should be possible fill this physical necessity, it is necessary right management in the area of crime case's inquiry. Clear up rate has been decrease from 48,63% to 41,49% during last free years [5]. The question about increasing of per cent clear up rate is on the right place. One of the alternatives should be right and early decision making in chronological point of crime case's inquiry process. Crime case's inquiry includes ventilation of individual types of crime cases, which relate with crime inquiry and evidence in justice. The terms given by Code of criminal procedure are necessary to abide before and during justice procedure. That's why is very necessary to create a system of management, which should act as complex and which should act in a complex way and check their full filing.

Also it is needed to mention difference of crime case's solutions. It is evident, that each criminal act is committed by different form and entity sequence of inquiry or evidence by justice is different as well. Even though is possible to find a similar mark of crime inquiry, for example methods of identification or safeguard of a proof. Similarities of individual types of crime cases and experiences from previous crime cases provide a definition of crime versions and then continue with identification of perpetrator for criminal act and determinate a form of commotion crime cases etc. It could be said, that differences and similarities give a possibilities of utilization to developed effective way of criminal cases solution. It should be used an exact sciences as for example network analysis. The network analysis is a powerful tool used to control single steps in some complicated processes. Its principle is to determine critical steps and points in such a process. Therefore it could be used by criminal cases which needed fast decision making. It could be used a lot of network analysis methods.

2. The methods of network analysis

There are more methods of network analysis as a Critical Path Method (CPM) with it modification CPM-GE, methods MPM, PERT, GERT and some other. Presented method has following advantages by the development of clear making process:

- they ensure an effective utilization of time, forces and means based on logical and mathematical proved organization of work.
- they enable effective planning and control of complicated processes during project planning in the are of security management focused on important activities and positions of the process,
- they ensure a graphic representation of all activities with visible presentation of decisions approved,
- they enable to determine of reserves and to achieve fulfilling of the task to creating an effective system of security,
- they enable to realize elasticity changes in a plan.

A framework procedure of a network construction contains three principal stages (Fig.1):

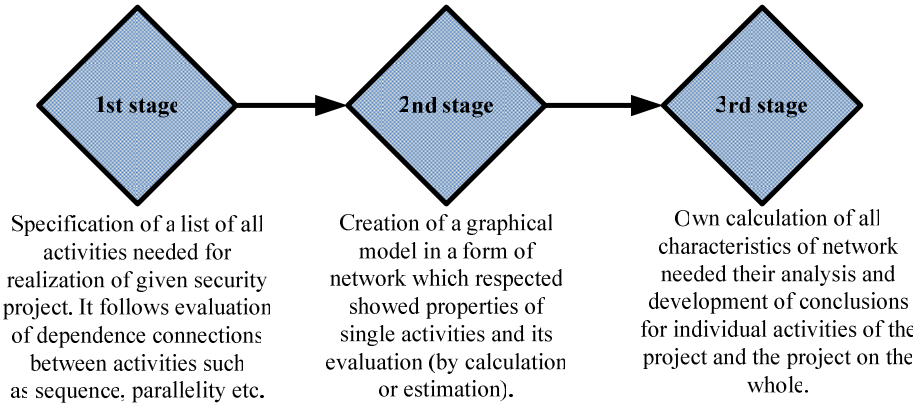

Fig.1. Principal stages of a network construction

2.1. Critical Path Method (CPM)

Critical Path Method is utilized in all forms of processes at present. It main aims are to determine:

- minimum time of process (action) duration,
- critical path which is the longest path in the network and which selects from all activities of a project the critical ones from the time point of view. It means the activities which have no time reserves,
- an analysis of the reserves [3].

2.2. Material Point Method (MPM)

The Metra Potential Method (MPM) was introduced by B. Roy in 1959. MPM is a means of describing interdependencies between tasks in a project graphically. Using MPM the length of the critical path is shown directly in the diagram and the critical path itself can be identified easily [4].

2.3. Program Evaluation and Review Technique (PERT)

The aim of the PERT method is to give probability containing estimates of duration of complicated programs and projects. It should be used in such access as are research or development project when one cannot expect to have exact estimates of single activities durations. Elaborated network is considered to be of the stochastic nature and duration of each activity is taken as the stochastic variable with probability density function of β-distribution.

The duration of each activity is defined by three expert estimates: the optimistic estimates (a_{ij}), the most probable estimate (m_{ij}) and the pessimistic estimate (b_{ij}) [4].

2.4. Graphical Evaluation and Review Technique (GERT)

The Graphical Evaluation and Review Technique, commonly known as GERT, is a network analysis technique used in processes that allows probabilistic treatment of both network logic and activity duration estimated [3].

3. The meaning of CPM and PERT methods in process of criminalistic clear making

As it was mentioned in introduction of this paper, reassign clear making of different criminals in order to give each individual feeling of safety is very important for our society. The right management is the most important extent of the criminalistic inquiry process as a sophisticated list of action with the time duration, graph of these actions, critical path and probabilistic calculations [1,2].

The most applicable methods for clear making of crime cases are CPM and PERT. The advantages of these methods are limpidity of activity's time duration, determination critical path and probabilistic calculation. The main reason of this choice is possibility to compare both of methods, because CPM is deterministic and PERT is stochastic one.

The meaning of Critical Path Method (CPM) is namely in determination series of steps such as timetable during criminalistic clear making. One of the advantages is graphic presentation of single acts which shows which acts can be done simulates, which must follow each other etc.

The aim of CPM is that it gives minimum time of the process. Critical path gives them activities which are for process critical from the point of view of time. Knowing these activities can help to better control of the process to limit time of financial loses.

The CPM is a deterministic method what means that each activity is evaluated just by one value. Program Evaluation and Review Technique (PERT) is a stochastic method what means that it takes into acc and stochastic nature of each activity. Therefore is better suitable for criminalistic purpose because criminalistic process can be counted as a stochastic too.

The advantages of PERT method is based on simplifying of planning process of large actions which belong process functions during clear making criminal acts too. It is used in such cases when the time of activity can't be determined exactly but just with some probability. By PERT method is the main aim not critical path but some probabilistic calculations as:

1. Determination of time action with chosen probability of ending crime cases clear making.
2. Determination of probability for chosen time or time intervals of crime cases clear making.
3. Determination of probability which can be chosen nod or activity on critical path.

4. The utilization of network analysis methods in Slovak´s criminalistic practice

The network analysis methods are using in very limited forms in the area of crime case´s clear making in Slovak republic. The main reason is jejuneness about possibilities and way of using between members of Police Forces. In the present time methods of network analysis are using just in region of Trencin. These information came from an e-mail conversation with Regional Direction of Police Forces in Slovak republic (Tab.1).

Regions of Slovak republic	Utilization of network analysis methods in criminalistic practice	Regions of Slovak republic	Utilization of network analysis methods in criminalistic practice
Region of Banska Bystrica	◙	**Region of Presov**	●
Region of Bratislava	●	**Region of Trnava**	◙
Region of Kosice	●	**Region of Trencin**	○
Region of Nitra	◙	**Region of Zilina**	●
Legend	○ use	● not use	◙ without respond

Tab.1 The utilization of network analysis methods in criminalistic practice

5. Conclusion

The utilization of methods of network analysis in area of crime case clear making is just in some part of regional police in Slovak republic.

I assume that meaning of this method during clear making of crime cases was clarified enough in this paper. The Critical Path Method and method PERT as well are advisable methods for effective of all process, especially of chronological, technological and organization aspects.

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The Influence of a Shortage of Drinking Water for Population´s Life and Health

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Abstract. At now is increasingly solves Theme shortage of drinking water for humans. Already the many of water, that we can be used to ensure that our daily needs, it is still less. Not only we have a small many of water, but water slowly losing their quality. Some countries have few opportunities to drink high-quality, reliable and healthy water. It should be noted, that water is not so easily renewable. Drinking water obtained from seawater, does not all freshwater quality. Any emergency event, in which there is a shortage of drinking water, must be dealt with an emergency supply of drinking water. Supplies using different techniques. Water supply is provided through tankers or packaged water. Packed water is in most cases the simplest way to supply.

Keywords: Drinking water, supply for the population with drinking water, shortage of drinking water

1. Introduction

Water is a very important fluid for human health, the shortage of it may endanger the health or life of a man. By elementary school, we know, that man can endure without food for more than a week, but without water we would withstand the most 3 days. Protection of a man, his health and life, the shortage of drinking water can provide a steady supply of drinking water, health guarantee its purity, that is, its impeccable character. The supply must be assured, whether in everyday life or at the time of emergency event.

2. Characteristics of drinking water and its shortage

Under the Law No. 596 of 2002 on the protection of human health, water intended for human consumption, is such water, which is in its original state or after processing, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether was supplied from the grid, such as water tanks or packed water in consumer packaging, or is that water which is used in food establishments in the manufacture, processing, preservation, sale of products and substances intended for human consumption.

Drinking water is medically sound, if not for permanent use or use does not change the health status of people and the presence of micro organisms or substances affecting human health, acute, chronic or late action, and whose properties perceptible senses, does not prevent its consumption or use.

In respect of water, there exist for man the main dangers:

- shortage of water,
- surplus of water,
- contamination of water - by pathogenetic microorganisms,
  - by substances poisonous or radioactive,
- change in the nature of substances present in water [1].

Currently, on the Earth there is about 1,4 billion cubic kilometers of water. 97% of this amount is a salt water (seas and oceans). The remaining 3% are glaciers, the water contained in the atmosphere and soil, of which we remain around 1% of drinking water. There are 1,2 billion people who are in shoratge sufficient access to drinking water. We have to realize, which can cause inadequate drinking water for our organism. In the absence of a good quality water can completely terminate our body, whether we are ill or may even die. But the day we see how many people and especially children are sick and even die, unfortunately, due to shortage of safe drinking water. Every year we see an ever greater number of the world's population, which is threatened by a shortage of drinking water. Global warming, caused by extreme weather events, is the greatest threat that causes the deficiency. On the one hand, severe droughts, which is the shortage of water, on the other hand, the large amount of rainfall and rapid melting of snow, when the land is not enough to capture this amount, and thus there is in most cases, to flooding. Shortage of drinking water in such situations threatens the maximum, whether the shortage of any or the pollution. Further development of this upward trend, the shortage of water may give rise to wars of this valuable raw material.

Already in the past, mankind fought for drinking water. Settlements that were created were mainly near streams, rivers and lakes. Establish the various dams, the water remained on the ground, to serve either as drinking water for people or animals, or used to irrigate the land.

3. Supplying the population with drinking water

Supplying drinking water to population planning and adoption of preventive measures to ensure supply of drinking water for the population. Emergency drinking water supply tanks or other means of transport:

- interruptions in supply of drinking water to public water,
- for failure to supply drinking water to public water supplies [5].

Each event that caused the lack of water, showed humanity how to prepare for the decline in raw material, which is becoming increasingly scarce. Any decline in the world brings greater and greater poverty. Getting to good quality water is already in some countries almost impossible. People have learned to exploit this situation and provide high-quality water in the form of packaged water, which is a in some cases a very expensive affair.

The solution to the situation is public water supplies, either by tankers or container with water (Fig. 1). The minimum supply of drinking water per person per day are listed in Table 1.

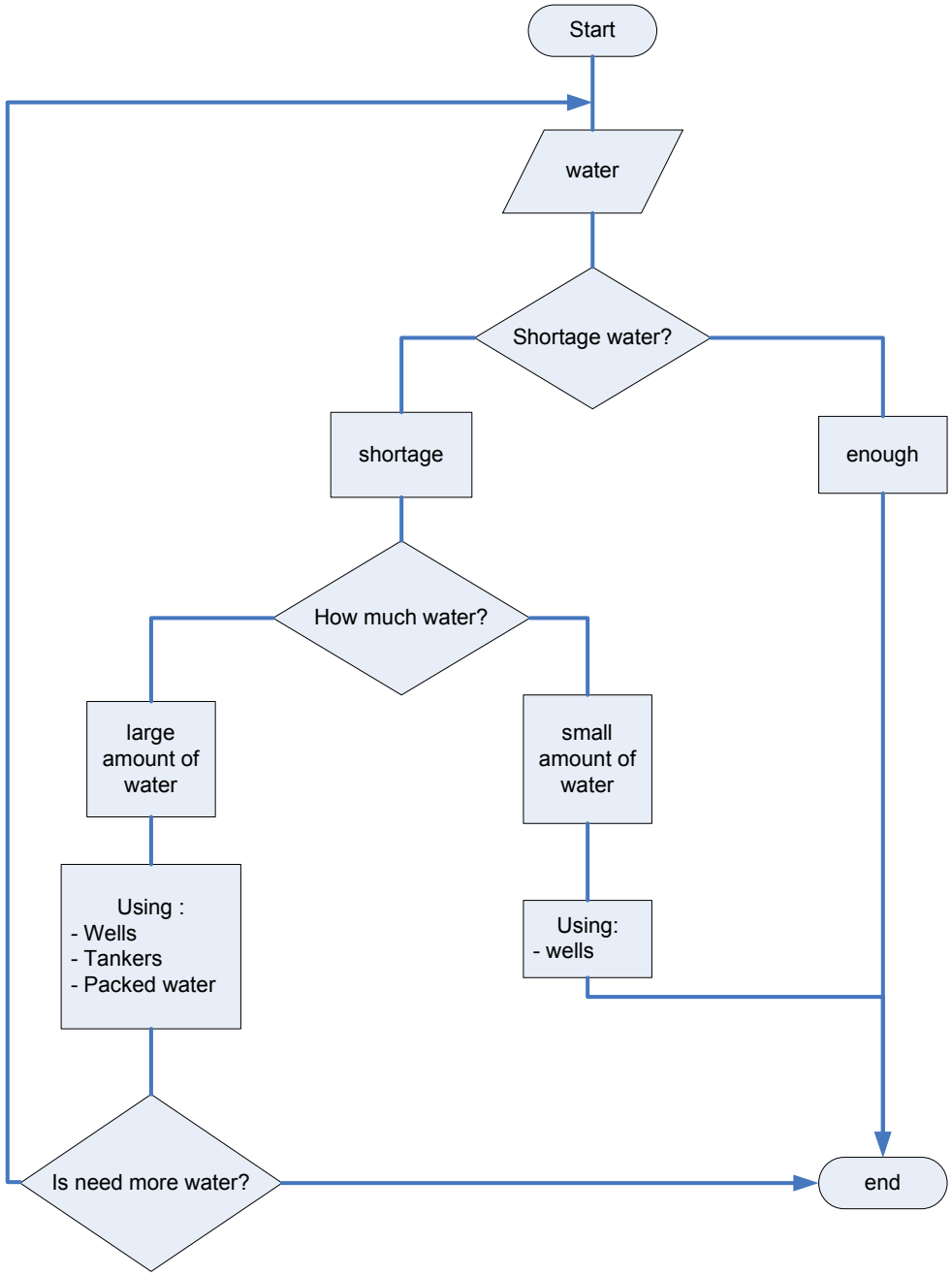

Fig. 1. Algorithm the Supply for the population with water by emergency events.

From the picture shows that water may be drinking or productive. This water can be enough, whether the pipe transport to places where the people or animals. Shortage of water is mainly due to emergencies:

- natural disasters that are caused by natural forces,
- technological accidents, the failure of the operational status,

- disasters,
- terrorist attacks.

The minimum dose of drinking water per person per day	
in emergency situations	15 l
exceptional adverse conditions (not to exceed 3 days)	only 5 l

Tab. 1. The minimum dose of drinking water [5].

Supply of drinking water in packaged practical solution in terms of time, withdrawals of drinking water is less than in the tanks, the packaging is smaller and better transfers as a bucket or container for water.

4. Conclusion

Unfortunately, water is the greatest need for living, whether man, animals or plants. Each of us needs for its life. Each of its lack can cause injury and even death. It should be noted that the contamination may occur very quickly, whether by natural disasters, or disasters of almost all human activity. Pathogens is best transmitted through water and not only surface water but also groundwater. Any contamination can lead to the worst epidemics. It is not enough to ensure adequate quality of drinking water for humans and suitable water for the economy, but to increase the prevention of pollution, to ensure remediation of water flows and total water that surrounds us.

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Developing Trends in the Integrated Rescue System in Slovakia

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Abstract. This article deals about developing trends in Integrated Rescue Services of nowadays, specifically focuses on the organization structure of Integrated Rescue System and Construction of information- communication infrastructure. All these developing elements are the objectives defined by the Conception of development and construction of integrated rescue system by 2010.

Keywords: Emergency, incident, Integrated Rescue System, IT, organizational, communication

1. Introduction

Regional level of crisis management has unique position in the process of crisis situations solutions. Organizational elements of regional public administration are besides a lot of tasks related to the implementation of preventive measures and making contingency plans, responsible for the rapid and coordinated activation of all the elements of directive and executive bodies necessary to effective response to emergencies too. The need of creating reciprocal external and internal linkages among them is really justified. The system, which ensure continuity of all rescue forces and their components as well as public authorities, was created in conditions of Slovak legislative in 2002. Until going into effect of act about Integrated Rescue System started the process of construction and the gradual development of a system whose primary objective is to ensure immediate and efficient coordination of rescue subjects and their components in providing urgent assistance if the life, health, property or the environment is directly threatened.

2. Two-stage planning for the development of Integrated Rescue System in Slovak Republic

Nowadays, Integrated Rescue System is presented a number of developing elements related with technical, organizational, personnel and legislative changes, which are implemented in accordance with the plans defined by the Conception of development and construction of integrated rescue system by 2010, approved by Government Resolution No. 103, 20. February 2006. Realization of the various impacts of the concept is performed in two, stages, which represent:

1. Completing the structural and organizational links in integrated rescue system by 2007.
2. Construction of information and communication infrastructure of integrated rescue system by 2010. [2]

This target level of development of Integrated Rescue System and its implementation in practical terms is a prerequisite for rapid and effective response all participate elements of crisis management for any emergencies or disasters.

3. The current organization of the Integrated Rescue System in Slovakia

Appropriately designed structural and organizational ties between the governing and executive elements at the national, regional and local level of crisis management are the foundation of effective communication and cooperation between them in the providing assistance in an emergency.

3.1. Organizational structure of Integrated Rescue System in Slovak republic

In performance of the tasks resulting from the conception were all the efforts focused on completion the Coordination centers of Integrated Rescue System (hereinafter referred to as "coordination centre"), including equipment with new technology for receiving and processing emergency calls. Special importance has been placed in exploit the potential of other rescue forces and their parts, corporate and personal entities, which technical or staffing equipment can provide essential support for main rescue forces. All these objectives resulted in the current organization of the Integrated Rescue System (Fig. 1).

Nowadays, under the law, in the Integrated Rescue System (hereinafter "IRS") operate the Ministry of Interior, Ministry of Health, District office at the headquarters of the region, which establishes a coordination center, rescue subjects and the Police force. Rescue subjects can be divided into two groups, which are main rescue forces, include five subjects as The Fire and Rescue Brigade, Providers of Health and Rescue services, Mining Rescue Service, Mountain Rescue Service and Control Chemical Laboratory and other rescue forces include Army of Slovak Republic, Municipal (city) fire brigades, factory fire departments, factory fire brigades, civil protection units, the municipal police, services of the Railway Police, the Slovak Red Cross, other corporate and personal entities and workplaces performing state supervision or activities according to special regulations such as National toxicological and Information Center, National Veterinary and Food Administration, offices of Environment, Slovak Hydro meteorological Institute and many others. Currently in Integrated Rescue Services operate more then 3,860 subjects.

3.2. Coordination centre as the main organizational, information and communication element of Integrated Rescue System

Coordination center is the main organizational element of IRS. It is established under the responsibility of the Department of Civil Protection and Crisis Management of District office at the headquarters of the region. This regional principle of the arrangement of the IRS foreseen close cooperation between coordination centre, main rescue services, other rescue services, Police force and executives of the region. For this purpose, are the Regional operational centre of Health and Rescue service and Regional operational centre of Fire and Rescue Brigade, the part of coordination centre. Representation by the Police in terms of coordination centre, absent, although in the EU is this procedure standard. The reason is the legal barrier, namely the fact that the police have a special status in the integrated rescue system. Because the nature of most emergency requires police intervention, it is necessary in the future build regional operational center of Police Force in the coordination centre. This should ensure rapid communication and transfer of information on events occurring.

In the event of an emergency such as natural disaster, industrial accident, terrorist attack or their accumulation, coordination centre performs the role of communication and information center. It provides early warning and notifies all the entities needed to address the crisis situation solutions, convene The Crisis Staff of region and the Commission for it's to deal with emergencies. Also, about the emergence of an incident shall immediately notify the Section of Crisis Management and Civil protection of Ministry with the requirement for broadcast information on their occurrence in the Slovak Radio and Slovak Television. To support rapid decision-making coordination centre uses the prescribed documentation and appropriately dimensioned information systems.

In addition to a number of tasks associated with the occurrence of an incident, coordination centers providing from 1.7.2003 the continuous income to the emergency line 112. By representatives of the Department of Civil Protection and Crisis Management of District office at the headquarters of the region shall evaluate the emergency calls. Subsequently, either will issue instructions for main rescue force to carry out the intervention or redirect the call to the emergency operation center of main rescue force. With the introduction of the single European emergency call number 112, the original emergency lines 155, 150 and 158 remained maintained, and their operational centers are, with the exception The Health and Rescue Service established at local level. Regional operational centre of Health and Rescue Service is located in the dispatcher's room of coordination centre. (Fig. 1)

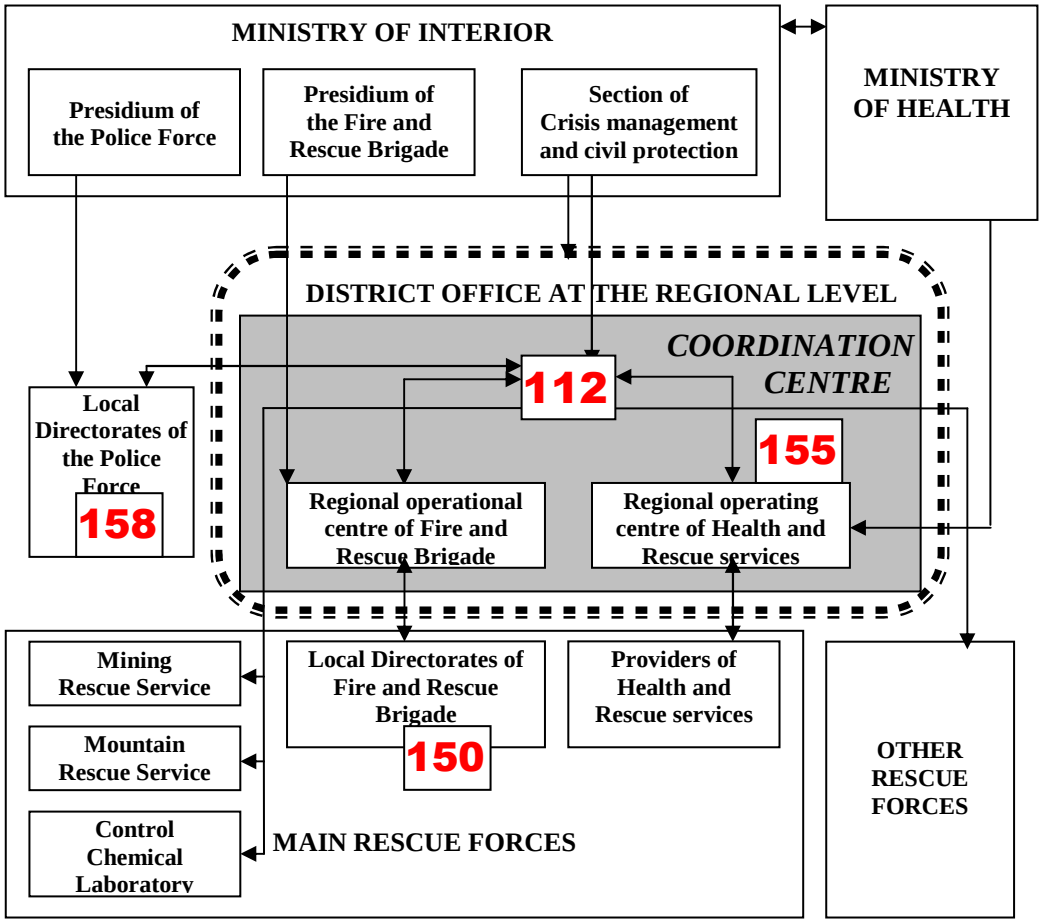

Fig. 1. Current organization of Integrated rescue system in Slovak republic.

4. Construction of informational and communication infrastructure of Integrated Rescue System in Slovakia

Organizational and technical changes made in the past years are creating a suitable environment for the implementation of other points. These objectives currently include the construction of communication - informational infrastructure (hereinafter referred to as "CII") of integrated rescue system. CII shall mean summary of the technical conditions and organizational measures necessary for the provision of voice and data transfer between the coordination centers, emergency operational centers, dispatch centers, the Ministry and the Ministry of Health by telecommunications networks, telecommunications equipment, radio networks and mutually compatible software [4].

In accordance with the second stage of development IRS in terms of the approved conception is construction of CII realized in two stages, which represent:

3. Completing the CII integrated rescue system
4. Completing the coordinated centers and operational emergency centers including the addition of hardware and software to support management and information processing in the integrated rescue system [2].

The fulfillment of these objectives will allow not only rapid flow of information between all entities but also support the management and decision making in the event of an incident. This functionality of system is one of the indicators of the quality of rescue services, which is in crisis management of each country justified its position.

4.1. The current form of informational and communication infrastructure of IRS

When providing assistance in the emergency, the speed is the most important element. In another sense, damage value is directly proportional to emergency operational time (Fig.2). There are many factors external and internal environment of IRS, which may affect the speed in the positive or negative direction. Biggest role in this issue represents just the quality and level of communication and information structures. Facilities all organizational elements of modern technology and sophisticated information systems are essential to reduce the risk of loss of time in providing assistance in an emergency.

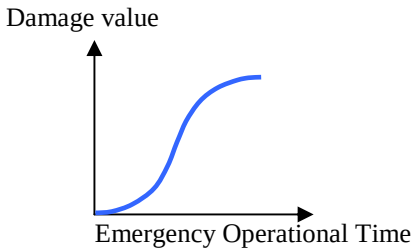

Fig. 2. The dependence between the damage and emergency operational time [3]

Under this contract were all that operational centers equipped with the new information system named Coord Com^{TM}, which is the product of the Swedish company Ericsson. Is it system of technical support of management and information processing in CII, which among

other things allows the reception and display of caller positioning. In terms of coordination centers, the system is running in productive operation since July 2008. Currently, the coordinating center is equipped with a database, application and communication server and with server of Geographical Information System (hereinafter "GIS"), but its functionality is still not fully utilized (Tab. 1). This requires making a number of tasks associated with the addition of the necessary data, fundamental data and contact information for rescue forces, action plans, procedures and other ancillary data to support management activities in providing assistance in emergency, which is the priority of nowadays.

FUNCTION	DESCRIPTION OF THE FUNCTION	UTILIZATION
Case Management	Speeds up case identification via interview support and quick classification. Advanced	partial
Automatic Alarms	Action taken immediately on alarm	partial
Call Management	Reduced waiting time via distribution and prioritization	full
Geography	Advanced system functions for localization of incident and emergency efforts GIS System	partial
Integration	Presents case location and location of resources in real-time. Support to help choose the right resource	full
Contacts and Services	Pre-defined ways to contact resources and services without any delay	partial
Resource Management	Functions to put the right resources quickly in place. Real-time status information and localization	partial
Action Plans	Pre-defined instructions reduce the time to activate efforts	no
Sending and Receiving Case Info	Serve the latest information to all staff involved	partial
Reporting and Statistics	Reports and statistics are used for continuous performance improvements	partial
Authorization	Different organizations can work in the same system at the same time. Reduces both costs and dispatch time	partial
Training	Possibility for interactive training in live recorded authentic scenarios	partial
Voice Recording	Each case can be replayed for analysis	full

Tab. 1. Key Coord Com^{TM} system functions [3]

Another important element in response to emergency is installation of technology of system Coord ComTM in the all emergency operational centers, which allowing immediate data transfer of information about emergency, including the localization of the caller. This technology currently consists of 122 dispatcher's workplace and 168 terminals, which enable the acquisition and input information into the system. Operational centre in Ministry and Ministry of Health at the national level and the coordination center including Operational Centre of Health and Rescue Services and The Fire and Rescue Brigade at regional level of organization structure of IRS is equipped with dispatcher's technology and the other Main Rescue Components with terminals. It is very necessary, that the communication between the coordination centre, Ministry and Main Rescue Components should be dealt through single system of support.

4.2. Recommendations

In accordance with the first and second stage of building an information and communication infrastructure as well as incomplete usage Coord ComTM not only in its basic functions, is necessary in the future:

- Regularly update necessary data, fundamental data and contact information for rescue components.
- Add the index questions.
- Develop action plans for decision support.
- Verbal transfer of information between coordination centre and main rescue components replace data transfer of information about emergency.
- Decrease in localized circuit caller Mobil operator O2.
- Provide automatic positioning of vehicles and rescue groups Main rescue components in the provision of assistance.
- Providing video-streaming current situation on the spot intervention.
- Organizationally adapt CII needs, based on anticipated threats in the region and the frequency of usage main rescue components.
- Develop the internal rules of operation coordination centers and operational centers, and many others.

5. Conclusion

When saving lives, seconds are crucial. In order to ensure immediate assistance to citizens in time to find themselves in distress, it is important to have a revamped system of management of rescue operations. Development of Integrated Rescue System represents infinite cycle of organizational, technical, personal, legal and other substantial changes and innovations.

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Security Sector Reform and Implementation of EU Norms

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Abstract. In the coming years Security Sector Reform (SSR) looks set to become an essential component in the delivery of the EU´s defence, security, development, crisis management and conflict prevention policies. That's why this article focus on it's development and implementation issue as the most important questions of SSR problem.

Keywords: Security sector reform, European Union (EU), European Security and Defense policy (ESDP), Common foreign and Security policy (CFSP).

1. Introduction:

In Brussels on 28 November 2005, over 120 participants from the diplomatic, security and development communities attended a major seminar entitled 'Developing a Security Sector Reform concept for the EU' co-organised by the UK Presidency of the EU, the European Commission and two nongovernmental organisations. The objective was to develop a shared understanding of security sector reform (SSR) that would lead the EU to adopt a more co-ordinated and coherent approach. As a global actor the European Union (EU) now needs to develop an effective, overarching and comprehensive SSR strategy that would enable it to address current security challenges as a prerequisite for achieving the Millennium Development Goals.

Since the firs phases of expansion, European Union (EU) has demanded certain criteria that should be completed by member states. First of all it was good governance, democratic control, accountability, transparency and related reforms of the security sector. It has to be said, that a number of EU´s member states have been at the forefront of developing and implementing the norms of security sector reform in external action. Even the new members have been significant proponents of Security Sector Reform (SSR) in international forum like Slovakia during its United nation (UN) Security Council presidency in 2007.

This experiences can never happen if the lack of moral authority and rich vein of expertise. Very important component of the whole process of SSR were the arms of the EU institutions associated with SSR, European Commission (Commission) and Council of the European Union (Council). However, they have made a great progress regarded to SSR, but their efforts lag behind the EU´s most progressive states in this area (UK and Netherlands). Yet institutions of EU are ahead of other member states and institutions regarding to SSR.

2. Definition of SSR

Despite the emergence of inter-departmental mechanisms for funding conflict prevention and peacebuilding activities within their domestic executive structures, many donor governments are still reluctant to fund activities relating to the security sector. One of the reasons for this is the continuing misperception that SSR relates predominantly to achieving

more efficient military capacities and counter-terrorism programmes, rather than to justice and development. There are numerous definitions of SSR, but broadly speaking, it is a "reform process applied in countries whose development is hampered by structural weaknesses in their security and justice sectors and often exacerbated by a lack of democratic oversight's encompasses a broad variety of assistance programmes, such as: the development of norms of' good practice' in the security sector; the control, collection and destruction of small arms; enhancing civilian control over the military; and community based policing and justice reform".[1] SSR is relevant in many diverse contexts and can be deployed in support of a range of key objectives -including poverty reduction, conflict prevention, post conflict reconstruction, promotion of human rights and democratisation. As a result, its application must be tailored to, and constantly reviewed against, local conditions and development.

3. Developing SSR

The adoption of the European Security Strategy in December 2003 committed the EU to making a significant contribution to security and stability in the world. Numerous Council and Commission policy statements subsequently have established SSR as apriority means of achieving those objectives. Because SSR spans a range of issues and activities within European Community and Council competence it is especially important for the EU to devise an overarching, comprehensive strategy for its application. Such a strategy - with common goals that plays to the strengths of different institutions and ensures coherence between short- and long-term interventions - would increase the impact of SSR programmes. Without an overarching strategy, individual ad hoc interventions risk the likelihood off ailing to maximise their potential. The EU´s Comparative Advantage In the coming years SSR looks set to become an essential component in the delivery of the EU´s security, development, crisis management and conflict prevention policies. And the EU´s power as a donor, its presence in many countries, and its access to a wide array of political, developmental and security tools, gives it a comparative advantage as a proponent of SSR principles for future EU SSR policies To be stable and sustainable, SSR programmes must rely on locally owned processes that inevitably take time to develop. Nevertheless, such processes, involving positive dialogue between the EU SSR implementers and partner countries will help to strengthen shared political commitments. Beyond this, future EU SSR policies will have to ensure that the security sector's efficiency at tackling insecurity improperly balanced by transparent and democratic practices. To avoid confusion the EU needs to define more precisely what it means by SSR. The OECD-DAC (*Development Assistance Committee)* policy and guidelines could serve as a useful source here. As highlighted by a recent European Commission internal paper on SSR, numerous exist in programmes implemented under the first pillar already fit OECD-DAC categories. Last but not least, since SSR is cross-pillar in nature its implementation will require a dual legal basis: covered by both article 14 of the Treaty of the European Union for CFSP/ESDP joint actions and article 308 of the Treaty establishing the European Community for Community actions.

[1] **H.Hanggi, F. Tanner,** Promoting security governance inthe EU's neighbourhood**, Chaillot Paper, No 80, July 2005, annex a6.**

4. The difference between hard and soft norms

In this chapter we will focus on EU´s external action regarding to SSR, which is called as 2. Pillar, actions of a Council associated with Common Foreign and Security Policy (CFSP). In particular, it will lay out the various EU agendas impacting SSR "hard" and "soft" norms and explore institutional dilemmas that influence them

If we want to find out, what is the difference between hard and soft norms, we have to know something about international norms classification. "International norms take different forms, including international agreements with legal forms negotiated in the framework of IGOs, politically binding agreements and operational principles, guidelines, best practises and handbooks developed by IGOs for specific programme needs. They can also be classified in different ways. Norm can be universal or regional, constructive or regulative, **binding (hard) or non-binding (soft)** and country type specific or universal".[2]

Both binding (hard) and non-binding (soft) norms are issued by IGOs. For example resolutions or declarations of the UN General Assembly are not legally binding. On the other side, convention, agreements or treaties negotiate in the UN system can become legally binding if ratified by a certain number of member states. Norms issued by UN Security Council under the Chapter VII are strictly binding. It's very important, because efficiency is needed when there are situations to be solved. In the EU is different situation. While the norms adopted by the EU under the first pillar (European Communities) are mostly binding EU regulations with direct effect, the norms adopted under the second pillar (CFSP) are mostly non binding (common positions, common actions and common strategies).Even if the rules are binding, there is tendency among states to violate not just non- binding but also binding ones. States remain free to disregard, usually with impunity, even those rules by which they are formally bound. On the end of this part is important to say that number of international legally or politically binding agreements containing SSR general norms (it means universal international norms) is very small, while the number of legally non-binding norms in the area of SSR has become quite substantial.

5. EU agendas and SSR

The development of "hard" and "soft" norms within the EU with regard to SSR and their implementation by member states has been shaped by four agendas: conflict prevention, crisis management, good governance and enlargement. This process has been going on for several years, long ago before the Council and the Commission developed their SSR concepts in 2005 and 2006. Mentioned agendas have had a significant influence over the development and implementation of EU SSR norms.

[2] **David M. LAW**. Intergovernmental organisations and security sector reform, **DCAF, 2007, p. 30**

5.1. Conflict prevention

After such tragedies in the 90s as the Balkan wars and the failure of the international community to prevent the genocide in Rwanda gave the EU ample reason to improve its institution and policies for conflict prevention. The first coherent approach to conflict prevention made at the highest level came from Swedish presidency in 1998. The resulting EU Programme for the Prevention of Violent Conflicts committed EU to develop its overall institutional capacity.

In line with the fundamental values of the EU, the highest political priority will be given to improving the effectiveness and coherence of its external action in the field of conflict prevention, thereby also enhancing the preventive capabilities of the international community at large. Conflict prevention calls for a co-operative approach to facilitate peaceful solutions to disputes and implies addressing the root-causes of conflicts. It is an important element of all aspects of the external relations of the European Union. The development of the European Security and Defence Policy (ESDP) has, since the outset, also been intended to strengthen the EU´s capacity for action in the crucial field of conflict prevention. The EU should:

- set clear political priorities for preventive actions,
- improve its early warning, action and policy coherence,
- enhance its instruments for long- and short-term prevention, and
- build effective partnerships for prevention.

EU instruments for long- and short-term prevention

The Union has an extensive set of instruments for structural long-term and direct short-term preventive actions. The long-term instruments include development co-operation, trade, arms control, human rights and environment policies as well as political dialogue. The Union also has a broad range of diplomatic and humanitarian instruments for short-term prevention. Structures and capabilities for civil and military crisis management, developed within the framework of the ESDP, will also contribute to the capabilities of the EU to prevent conflicts. It must use these instruments in a more targeted and effective manner in order to address root-causes of conflict such as poverty, lack of good governance and respect for human rights, and competition for scarce natural resources.

Co-operation and partnerships

The EU must build and sustain mutually reinforcing and effective partnerships for prevention with the UN, the OSCE and other international and regional organisations as well as the civil society. Increased co-operation is needed at all levels, from early warning and analysis to action and evaluation. Field co-ordination is of particular importance. EU action should be guided by principles of value added and comparative advantage.

Implementation

The EU and its Member States share the responsibility to implement this programme. Future Presidencies are invited to promote this implementation and make recommendations on its further development. The Commission is invited to implement the recommendations made in its communication on conflict prevention, within its area of competence. Members States are encouraged to develop national action plans to increase their capabilities for conflict prevention.

5.2. Crisis management agenda

"In response to crises, the Union's particular characteristic is its capacity to mobilise a vast range of both civilian and military means and instruments, thus giving it an overall crisis-management and conflict-prevention capability in support of the objectives of the Common and Foreign Security Policy."[3] This 2000 quotation from Javier Solana, the European Union's (EU) High-representative for the Common Foreign and Security Policy (CFSP), describes what recently became the dominant discourse on the EU´s external capacities. Since then, the notion of "Crisis Management" is supposed to embody a conflict resolution methodology, which constitutes EU´s specificity on the international arena. This kind of discourse on EU Crisis Management constitutes one among several other attempts to define the role of the EU as an international actor. This issue has been hotly debated since more than 30 years, paved by numerous attempts aiming at defining EU´s identity and the foreign policy which could be representative of the European project essence. In this context, the concept of Crisis Management works towards formulating a certain vision of the EU as an international security actor. A vision of an Europe having both civilian and military capabilities, and the ability to combine and include them in a security continuum. According to the discourse associated to EU Crisis Management, only the EU is able to combine all these means together.

EU crisis management is closely related to CFSP, and it's ESDP component, which came into force with the Treaty of Amsterdam of 1999. The key components of ESDP are their humanitarian and rescue missions stated by the so – called St Petersburg's tasks (Petersburg Tasks were defined in 1992 in the Treaty of European Union as humanitarian and rescue tasks, peacekeeping tasks and tasks of combat forces in crisis management, including peace-making). But it is still harder military security mindset and approach that dominates the EU crisis management perspective.

In my opinion, ESDP execution is characterised by lack of effective mechanism for engaging civil society. In addition, the mindset dominating to ESDP actions is short – term. Therefore, ESDP falls of the long – term approach required for ESDP missions. Furthermore, due to financial crisis, these missions are currently subject to relatively unstable and limited funding. This gives rise to concern that SSR actions driven by the EU crisis management agenda alone run the risk of downplaying norm that require longer-term developing perspective consistent with human rights, democratic oversight, good governance, accountability, and transparency.

Despite deficiencies in norm implementation, the crisis management agenda for SSR is important because specifically named SSR missions, such as EUSEC (European Communications Security & Evaluation Agency of the Military Committee) in the Democratic Republic of Congo [4] have been mounted under the ESDP mechanism and will continue to be so in the future.

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[3] **DAVIDSHOFER, S.** *EU Crisis Management: the modalities and political implications of a reappropriation,* **Paper prepared for ISA 48 th Annual Convention, Chicago, Illinois, 28 February - 3 March, 2007**

[4] The mission provides advice and assistance to the Congolese authorities in charge of security while ensuring the promotion of policies that are compatible with human rights and international humanitarian law, gender issues and children affected by armed conflicts, democratic standards, principles of good public management, transparency and observance of the rule of law.

5.3 Good governance

SSR norms promoted within the good governance are the norms of professionalism, transparency, accountability, democracy, human rights and democratic oversight. From this point of view, SSR is just a part of good governance agenda rather than vice-versa.

Good governance is also complex of characteristics, which are needed for the. It is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. It assures that corruption is minimized, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to the present and future needs of society.

Participation

Participation by both men and women is a key cornerstone of good governance. Participation could be either direct or through legitimate intermediate institutions or representatives. It is important to point out that representative democracy does not necessarily mean that the concerns of the most vulnerable in society would be taken into consideration in decision making. Participation needs to be informed and organized. This means freedom of association and expression on the one hand and an organized civil society on the other hand.

Rule of law

Good governance requires fair legal frameworks that are enforced impartially. It also requires full protection of human rights, particularly those of minorities. Impartial enforcement of laws requires an independent judiciary and an impartial and incorruptible police force.

Transparency

Transparency means that decisions taken and their enforcement are done in a manner that follows rules and regulations. It also means that information is freely available and directly accessible to those who will be affected by such decisions and their enforcement. It also means that enough information is provided and that it is provided in easily understandable forms and media.

Responsiveness

Good governance requires that institutions and processes try to serve all stakeholders within a reasonable timeframe.

Consensus oriented

There are several actors and as many view points in a given society. Good governance requires mediation of the different interests in society to reach a broad consensus in society on what is in the best interest of the whole community and how this can be achieved. It also requires a broad and long-term perspective on what is needed for sustainable human development and how to achieve the goals of such development. This can only result from an understanding of the historical, cultural and social contexts of a given society or community.

Equity and inclusiveness

A society's well being depends on ensuring that all its members feel that they have a stake in it and do not feel excluded from the mainstream of society. This requires all groups, but particularly the most vulnerable, have opportunities to improve or maintain their well being.

Effectiveness and efficiency

Good governance means that processes and institutions produce results that meet the needs of society while making the best use of resources at their disposal. The concept of efficiency in the context of good governance also covers the sustainable use of natural resources and the protection of the environment.

Accountability

Accountability is a key requirement of good governance. Not only governmental institutions but also the private sector and civil society organizations must be accountable to the public and to their institutional stakeholders. Who is accountable to whom varies depending on whether decisions or actions taken are internal or external to an organization or institution. In general an organization or an institution is accountable to those who will be affected by its decisions or actions. Accountability cannot be enforced without transparency and the rule of law.

From the above discussion it should be clear that good governance is an ideal which is difficult to achieve in its totality. Very few countries and societies have come close to achieving good governance in its totality. However, to ensure sustainable human development, actions must be taken to work towards this ideal with the aim of making it a reality.

Good governance has enjoyed rapid ascent in recent years as a policy priority for EU external assistance, particularly as concerns development cooperation and the EU´s near neighbourhood. The agenda has moved from a technical approach focusing on corruption and a limited understanding of the promotion of the rule of law to approach positing that good governance impacts almost all aspects of EU action in any third country. This shift is not surprising given the role that good governance has played in driving the global development agenda, in particular with regard to the UN millennium declaration agreed in 2000 [5].

6. Conclusion

6.1. Challenges for an SSR strategy

If the EU does adopt an overarching SSR strategy in 2006, it would have to develop implementation guidelines in order to codify the use of existing EU instruments and raise awareness and develop training both in the EU institutions and member states governments. It would also need to be integrated into EU planning and analysis frameworks for the next Financial Perspective (FP 2007-2013), thereby informing Regional and Country Strategy Papers and thematic programmes. Indeed, with EU Budget discussions ongoing on new financial instruments, this is the prime time to ensure that SSR is mainstreamed into External Relations planning and programming over FP 2007-2013.The biggest challenge to achieving more effective EU engagement in SSR is, however, a lack of coherence and co-ordination, made worse by the competing interests amongst EU institutions and member states. Joint planning and evaluations for SSR programmes by the Council and the Commission would help to improve implementation. The presence of SSR contact points in each of the Commission's relevant Directorate Generals (Enlargement, External Relations, Development, Trade) and the Council's General Secretariat would also facilitate better coordination. EU task forces, sufficiently tailored and flexible to operate in country and jointly headed by the Council and the Commission (with contact points in Brussels), should be in charge of SSR coordination and implementation. Preferably EU Special Representatives – operating under a dual Council/Commission mandate - would head these taskforces, and Commission staff might also be seconded to the Special Representative's support teams. The set ask forces would help to develop implementation guidelines for SSR, drawing upon the implementation framework being developed by the OECD DAC.

[5] http://www.un.org/millenniumgoals/

6.2. Challenges for the implementation of norms

In reality, there seems to be a significant disjuncture between declared norms, implemented norms and any other wider wisdom gained from experience in the EU approach to SSR. If we were in ideal world, it would not be difference between these. Generally, aspirations about, what SSR can achieve are and how SSR norms contribute to this also may have to be revised. It may be that expectations on SSR norms are simply set unrealistically high, leading to an unfair assessment of progress. In addition, there is a little SSR implementation experiences that has been subject to independent third party assessment. That which does exist has usually been undertaken by those without specialist knowledge to SSR. There is also a highly controversial issue of how any international actor, including the EU, can actually transform norms to local institutions, actors and wider society.

The key to making progress in EU norm implementation is a greater understanding and awareness of its importance, built on conceptual clarity. Conflict prevention, which has an older policy legacy within the EU than SSR, remain generally poorly understood with limited implementation across the range of EU instruments and in the many geographic instruments that it is relevant.

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Fire Modeling and its Ways of Application in Sphere of Fire Safety

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Abstract. Fire is phenomenon , which can't stay without the notice anywhere, because of strong support of rules, regulations and ordinations in jural system. Results which brings computer modeling, based on usage of software facilities can be used in reality to prevent or solve out of cases of fire behavior. This paper describes basic principle of fire modeling and ways of its applications.

Keywords: fire modeling, fire safety, software facilities.

1. Introduction

Computer modeling and visualization are important tools for understanding the processes of fire behavior. Fire models range in complexity from simple correlations for predicting quantities such as flame heights or flow velocities to moderately complex zone fire models for predicting time-dependent smoke layer temperatures and heights. Zone fire model calculations can run on today's computers within minutes because they solve only four differential equations per room. Zone models approximate the entire upper layer with just one temperature. This approximation works remarkably well but breaks down for complicated flows or geometries. For such cases, computational fluid dynamics (CFD) techniques are required.

2. Fire modeling

Fire modeling is something which is often found to be mysterious for common people. Yet, understanding what it is, what it can do, and what it cannot do can be vital to successful development of some types of fire cases. Thus, the information should be of value also to fire investigators, claims adjusters, and other individuals involved with fire losses. Most of them are not aware of either the strengths or the limitations of the fire modeling.

Fire modeling can normally be considered as the prediction of fire characteristics by the use of a mathematical method which is expressed as a computer program. The needs of fire litigation from fire modeling are specialized. Usually, there is a great deal of specificity about the sequence of fire ignition and the materials involved in the process. This commonly precludes the use of handbook data as input to fire models. Instead, it will usually be necessary to conduct a sectional full-scale mockup to obtain appropriate data describing the initial part of the fire. This information then serves as input to a fire model, using which the later fire development can be approximately predicted.

2.1. What is computer fire model?

A fire model is a physical or mathematical representation of burning or other processes associated with fires. Mathematical models range from relatively simple formulae that can be solved analytically to extensive hybrid sets of differential and algebraic equations that must be solved . Software to accomplish the latter is referred to as a computer fire model.

2.2. Uses of computer fire models

Computer fire models are used primarily for two purposes:

- reconstruction and analysis of a fire
- fire-safe design of a structure.

The first one is usually an easier task, because there is always other information available such as forensic evidence, eyewitness accounts, fire department reports, etc. A computer fire model in this case is most often used to supplement the other information in demonstrating that a particular hypothesis is or is not plausible. Quite new way how to use fire modeling is to implement results in training of firefighters. Simply said : virtual fire fighter training tool

3. Perspective of fire modeling

The most effective method for learning how to fight fire is to fight fire. This however is expensive and particularly dangerous for the trainee. In particular, some fire situations that must be trained for are too large and dangerous to recreate in a training setting involving real fires. Methods are then needed to allow fire fighters to gain valuable experience using virtual reality techniques already applied in other fields so that they may learn without the possibility of harming themselves or others. It is a challenge to simulate fire fighter training scenarios that are accurate and to present them in a form that are realistic and practical due to the large amounts of computational resources required. Presently, fire fighter trainers either concentrate on incident command issues or depend on an “expert” to alter the fire. The trainer developed here shall be physics-based so that the fire and smoke visualized shall be closer to what one would expect to find when fighting real fires.

Presently, fire fighters train in the classroom and in live fire training using real fires in real facilities. Visual based training presently relies on experts to run the fire and are not physics-based. Project of fire modeling will continue to develop a computer-based fire fighting training tool to improve training opportunities while lowering the cost and risk of death and injury. Two methods are being used to create a training tool. The first and simpler method is to use FDS (based on method CFD) and Smokeview to create animations of fire scenarios. These animations will be viewable in a standard DVD player. The DVD menus will be used to walk a fire fighter through a series of decisions. The second method will be more interactive. Using Smokeview, the trainee will “walk” through an FDS generated fire scene observing and making decisions. Several scenarios will be simulated with FDS. These scenarios involve cases where experimental data is available. In subsequent years, more generic scenarios will be modeled; a ranch house (one level) and a townhouse (multi-level). The fire science software tools, NIST FDS and Smokeview, will be used as a basis for developing a virtual reality based fire fighting training tool. As a fire simulation unfolds a series of natural break point will be encountered where the trainee will be asked questions such as: Should the window be opened? Should the door be closed? Should the hose stream be opened? The simulation will continue based on the answers provided. These questions will be designed to teach the trainee about tactics relevant to fire fighting such as the effect ventilation

on fire spread. Since FDS cannot yet perform calculations in real time, simulations will be precomputed for all possible question outcomes. Smokeview will be enhanced to be able to jump from one scenario to another according to the trainee's responses.

4. Conclusion

Expansion of computer science and information technologies causes that scientist together with IT specialists are trying to find the ways how apply these tools and knowledge's they got almost into each area of public society life. One of them is also sphere of public safety.

Acknowledgement

The acknowledgement heading is of the same style as the heading references "Reference" and it is not numbered. The text of acknowledgements is of the style "Text". The authors are asked to pay special attention to the form of references. The NAMES OF AUTHORS should be typed in capitals, the Titles of Journals, Books or Proceedings in italics with the first capital letter in all significant words. The titles of articles are typed similarly as the basic text without the first capital letter in all words. When referenced in the text, enclose the citation number in square brackets, for example [1].

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Uncertainty and Its Representation in Process of Risk Analysis

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Abstract. In process of risk analysis we commonly have to deal with the uncertain values of different parameters within this process. This article describes possible approach to treat the uncertainty in the risk analysis and also presents the way of how the results of this process can be represented to better explain the occurring uncertainty. The described approach is based on the abstract model of examined risk, which is fitted into the process of risk analysis and the resulting uncertainty of the examined risk is represented by graphical fan chart method.

Keywords: Risk analysis, uncertainty, process, model.

1. Introduction

In general, we can perceive a risk as the abstract model which modifies the input parameters with some specific mechanism under particular conditions into the resulting risk level. Accordingly, the aim of the risk analysis is to expose the mutual relation between key factors of the risk, dependencies between those factors and thus reveal the context of risk existence and also to measure its level.

There are several problems we have to deal with in the process of risk analysis. We can cover a significant group of such problems with the term uncertainty. This term represents incomplete knowledge of values of input and output parameters, which are used in the model, and also the abstraction of model itself. For the correctly performed risk analysis it is necessary to define specific types of uncertainty with regards to this process, and hence define appropriate methods which can be used to successfully accomplish the objectives of the risk analysis.

2. Different types of uncertainty

The source of uncertainty could be generally brought out by insufficient knowledge, inexact information or natural variability of parameters. According to the nature of uncertainty it is possible to classify it into two categories. First category covers stochastic uncertainty and second is formed by knowledge uncertainty. The significant characteristic of stochastic uncertainty is that it depicts the natural variability and random character of phenomenon. On the other hand the knowledge uncertainty is caused by insufficient knowledge or lack of information about examined phenomenon or object. The difference between these two types of uncertainty is basically in their removability. Stochastic uncertainty is irreversible type of uncertainty and cannot be removed, whereas the knowledge uncertainty is not finite and can be changed or removed (e.g. via expert methods).

The uncertainty, which occurs in the process of risk analysis, complicates this process. Correct approach to the uncertainty should lead to its partial elimination by selection of

appropriate methods which can be used to successfully deal with it. Therefore, it is necessary to be familiar with the design of the risk model, applicable within the risk analysis and to know where and what type of the uncertainty in this model occurs. The risk can be modeled in the process of risk analysis as follows (Fig. 1):

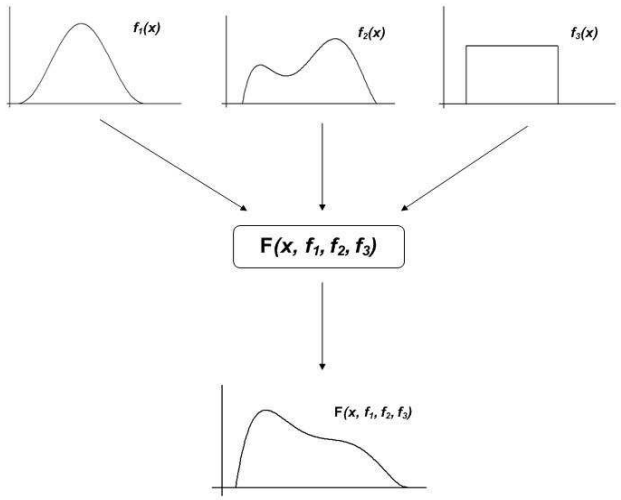

Fig. 1: Risk analysis model (source: author)

We are able to define three main group of the uncertainty based on the presented model of the risk:

- parameter uncertainty,
- model uncertainty,
- risk uncertainty.

Parameter uncertainty occurs in the risk analysis when the values of input model parameters, i.e. the risk factors are incomplete or unknown. The main reason for such uncertainty lies either in the random nature of risk factors or in the lack of correct data. From this point of view, we can consider the parameter uncertainty as combination of both stochastic and knowledge type. The elimination of parameter uncertainty could be achieved by estimation of parameter values based on probability distribution which defines the random behavior of the parameter.

Model uncertainty is based on abstractness of mathematical model, which simplifies the reality and does not reflect entire aspects of modeled environment. The abstract model focuses only on those characteristics which are necessary to accomplish defined goals and does not capture less important attributes, thereby the model uncertainty occurs. There is no general method which can be used to eliminate model uncertainty however the common approach to gain more reliable result is to introduce parallel models into the risk analysis process.

The last type of uncertainty, which we can deal with in risk analysis, is the resulting uncertainty of modeled risk. This type of uncertainty has some attributes, which are specific for parameter uncertainty, because the level of the risk is measured by output parameter of the model. Contrary to parameter uncertainty, the risk uncertainty has the distinction of understanding the risk as a specific phenomenon, which is uncertain by its own nature. To minimize this type of uncertainty we need to understand all aspects and details of examined risk phenomenon, identify possible sources of uncertainty within this phenomenon and use various methods to eliminate such uncertainty from process of risk analysis. The selection of

applicable methods is very specific to particular risk and the conditions under which the risk occurs.

3. Representation of uncertainty

With accordance to presented approach to the uncertainty within the process of risk analysis, we can represent the uncertainty via graphical methods. One of the graphical methods applicable for this purpose is Fan Chart graphical representation. This method was introduced by Bank of England in 1996, which has used to explain the uncertainty of inflation forecasts. Thanks to its graphical appeal and easily understandable form, many central banks subsequently started to use them, see figure 1:

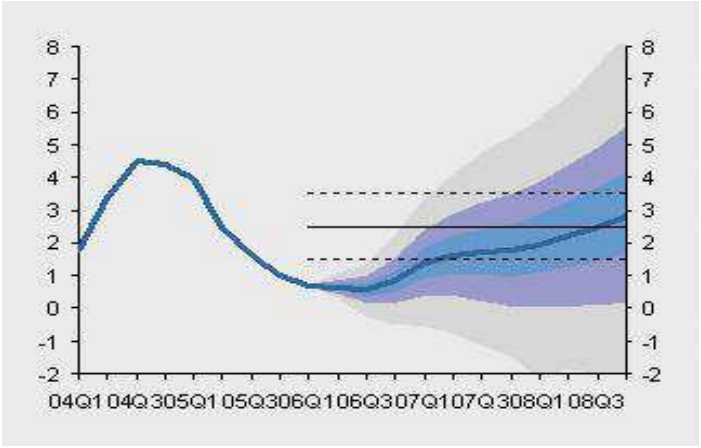

Fig. 2: Interval forecasting (Pekalski, Swierczyna, Zalewski, 2008)[1]

Fan chart represents the estimation of a confidence interval in which the resulting measure of risk will be found. The graph represents an extensity of the point estimation by an assessment of the estimation error, this being represented by the width of the interval. The basis of the graph is the central view, which is the most probable course of the risk for the given period. This forecast is represented by the line in the middle of the graph. The gradually spreading fan depicts the growth in uncertainty grows over time.

Two equally colored bands, below and above the central prediction represent the extension, of the interval in which the future risk value will be found, by a size corresponding to the increase in probability by 10% on the preceding interval – confidential intervals.

The data, which is necessary to calculate the estimation and the error of this estimation, can be retrieved by various exact and numeric methods of uncertainty propagation considering the assembled model of the risk. The central prediction, which represents the best estimation of the risk, could be created by methods of regression analysis (applying the regression function on time series), experts' estimations, outcomes of simulations and sampling methods or different methods of time series analysis. The error of the estimation represents the approximation of central prediction uncertainty, which is based on the model uncertainty. This error is the random variable which can be described by methods of graphical data analysis and thus to define its probability distribution.

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4. Conclusion

The risk cannot be assessed statically. The correct and balanced evaluation of the risk requires studying particularly the dynamics of risk trends and changes as well as the relations and dependencies on the various factors and conditions within the environment of the risk. However, all these attributes bring the different types of uncertainty into the process of risk analysis. This article has presented the approach to this uncertainty which indentifies its possible sources and also the possibilities of its graphical representation. The understanding of uncertainty is the precondition of the successful risk analysis and thus of taking effective measures to the risk elimination.

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Using Methods of Risk Analysis at Decision Making in Risk Management

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Abstract. Risk management is a central part of any organisation's strategic management. It is the process whereby organisations methodically address the risks attaching to their activities with the goal of achieving sustained benefit. The focus of good risk management is the identification and treatment of these risks. Its objective is to add maximum sustainable value to all the activities of the organisation. It marshals the understanding of the potential upside and downside of all those factors which can affect the organisation. It increases the probability of success, and reduces both the probability of failure and the uncertainty of achieving the organisation's overall objectives.

Key words: risk management, risk analysis, BPEST analysis, PESTLE analysis

1. 1 Introduction

Risk management is a rapidly developing discipline and there are many and varied views and descriptions of what risk management involves, how it should be conducted and what it is for. Some form of standard is needed to ensure that there is an agreed:

- *terminology related to the words used*
- *process by which risk management can be carried out*
- *organisation structure for risk management*
- *objective for risk management*

Importantly, the risk management recognises that risk has both an upside and a downside. Risk management is not just something for corporations or public organisations, but for any activity whether short or long term. The benefits and opportunities should be viewed not just in the context of the activity itself but in relation to the many and varied stakeholders who can be affected. There are many ways of achieving the objectives of risk management and it would be impossible to try to set them all out in a single document. Therefore it was never intended to produce a prescriptive standard which would have led to a box ticking approach nor to establish a certifiable process. By meeting the various component parts of this standard, albeit in different ways, organisations will be in a position to report that they are in compliance.

2. Risk

Risk can be defined as the combination of the probability of an event and its consequences (ISO/IEC Guide 73). In all types of undertaking, there is the potential for events and consequences that constitute opportunities for benefit (upside) or threats to success (downside). Risk Management is increasingly recognised as being concerned with both positive and negative aspects of risk. Therefore this paper considers risk from both

perspectives. In the safety field, it is generally recognised that consequences are only negative and therefore the management of safety risk is focused on prevention and mitigation of harm. [1]

3. Risk Management

Risk management should be a continuous and developing process which runs throughout the organisation's strategy and the implementation of that strategy. It should address methodically all the risks surrounding the organisation's activities past, present and in particular, future. It must be integrated into the culture of the organisation with an effective policy and a programme led by the most senior management. It must translate the strategy into tactical and operational objectives, assigning responsibility throughout the organisation with each manager and employee responsible for the management of risk as part of their job description. It supports accountability, performance measurement and reward, thus promoting operational efficiency at all levels. [6]

3.1. The Risk Management Process

Fig.1. The Risk Management Process [1]

Risk management protects and adds value to the organisation and its stakeholders throughsupporting the organisation's objectives by:

- *providing a framework for an organisation that enables future activity to take place in a consistent and controlled manner,*
- *improving decision making, planning and prioritisation by comprehensive and structured understanding of business activity, volatility and project opportunity/threat,*

- *contributing to more efficient use/allocation of capital and resources within the organisation,*
- *reducing volatility in the non essential areas of the business,*
- *protecting and enhancing assets and company image ,*
- *developing and supporting people and the organisation's knowledge base,*
- *optimising operational efficiency.*

3.2. External and Internal Factors

The risks facing an organisation and its operations can result from factors both external and internal to the organisation. The diagram overleaf summarises examples of key risks in these areas and shows that some specific risks can have both external and internal drivers and therefore overlap the two areas. They can be categorised further into types of risk such as strategic, financial, operational, hazard, etc.

3.3. Examples of the Drivers of Key Risks

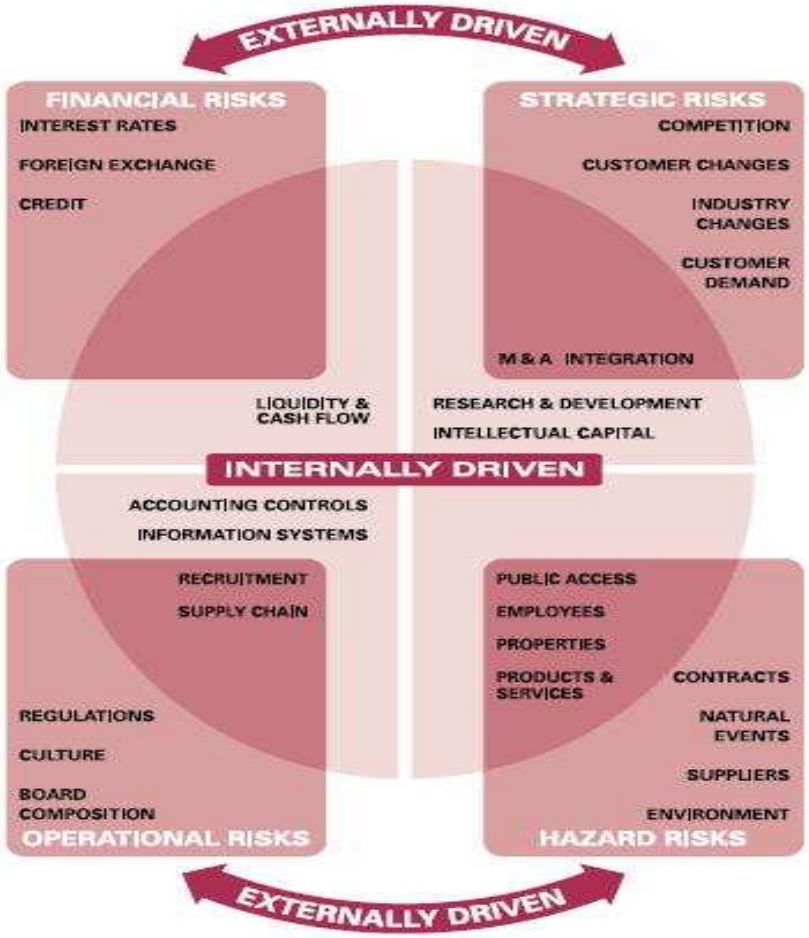

Fig. 2. Externally and Internally Driven Factor of Key Risk [1]

4. Risk Identification and Analysis

Risk identification sets out to identify an organisation's exposure to uncertainty. This requires an intimate knowledge of the organisation, the market in which it operates, the legal, social, political and cultural environment in which it exists, as well as the development of a sound understanding of its strategic and operational objectives, including factors critical to its success and the threats and opportunities related to the achievement of these objectives. Risk identification should be approached in a methodical way to ensure that all significant activities within the organisation have been identified and all the risks flowing from these activities defined. [2]

All associated volatility related to these activities should be identified and categorised. Business activities and decisions can be classified in a range of ways, examples of which include:

- Strategic - These concern the long-term strategic objectives of the organisation. They can be affected by such areas as capitalavailability, sovereign and political risks, legal and regulatory changes, reputation and changes in the physical environment,
- Operational - These concern the day-today issues that the organisation is confronted with as it strives to deliver its strategic objectives,
- Financial - These concern the effective management and control of the finances of the organisation and the effects of external factors such as availability of credit, foreign exchange rates, interest rate movement and other market exposures,
- Knowledge management - These concern the effective management and control of the knowledge resources, the production, protection and communication thereof. External factors might include the unauthorised use or abuse of intellectual property, area power failures, and competitive technology. Internal factors might be system malfunction or loss of key staff,
- Compliance - These concern such issues as health & safety, environmental, trade descriptions, consumer protection, data protection, employment practices and regulatory issues. [2]

Whilst risk identification can be carried out by outside consultants, an in-house approach with well communicated, consistent and co-ordinated processes and tools is likely to be more effective. In-house 'ownership' of the risk management process is essential.

4.1. Risk Identification Techniques - Examples

- *Brainstorming*
- *Questionnaires*
- *Business studies which look at each business process and describe both the internalprocesses and external factors which can influence those processes*
- *Industry benchmarking*
- *Scenario analysis*
- *Risk assessment workshops*
- *Incident investigation*
- *Auditing and inspection*
- *HAZOP (Hazard & Operability Studies)*

4.2. Risk Analysis Methods and Techniques - examples

Upside risk

- *Market survey*
- *Prospecting*
- *Test marketing*
- *Research and Development*
- *Business impact analysis*

Both

- *Dependency modelling*
- *SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)*
- *Event tree analysis*
- *Business continuity planning*
- *BPEST (Business, Political, Economic, Social, Technological) analysis*
- *Real Option Modelling*
- *Decision taking under conditions of risk and uncertainty*
- *Statistical inference*
- *Measures of central tendency and dispersion*
- *PESTLE (Political, Economic, Social, Technical, Legal, Environmental)*

Downside risk

- *Threat analysis*
- *Fault tree analysis*
- *FMEA (Failure Mode & Effect Analysis) [3]*

5. Comparison of Risk Analysis Methods and Techniques – BPEST vs. PESTLE

A PEST analysis is an analysis of the external macro-environment that affects all firms. P.E.S.T. is an acronym for the Political, Economic, Social, and Technological factors of the external macro-environment.

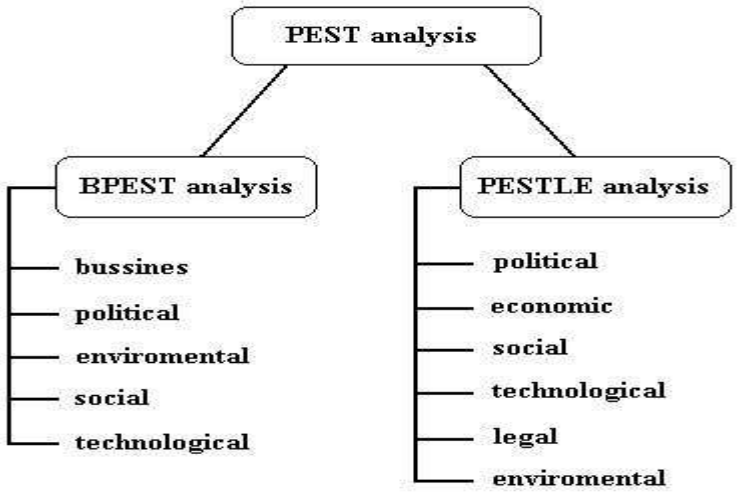

Fig. 3. The difference between BPEST and PESTLE analysis

Such external factors usually are beyond the firm's control and sometimes present themselves as threats. For this reason, some say that "PEST" is an appropriate term for these factors. However, changes in the external environment also create new opportunities and the letters sometimes are rearranged to construct the more optimistic term of STEP analysis. It is impossible to compare upside and downside risk analysis, so I decided to compare two specific models of PEST analysis.

5.1. BPEST analysis

A key acronym that is found when looking into strategic management is PEST. This refers to the key external influences that need to be considered within the organization which are Political, Economic, Social and Technological. The PEST analysis can be enhanced by having a specific Business dimension which then his referred to as BPEST, which ensures that suppliers, competitors and shareholders are included. A BPEST analysis will give a comprehensive review of the external environment which will consider all of the separate functions and departments across the organization. [4]

Business: takes into account the state of the industry both current and projected. It looks at the current and projected demand as well as the buyers behaviours in different market segments. There is also analysis of competitors to the organization in terms of the market share, mergers, failures, alternative products and newcomers. Suppliers also influence the business sector in terms of reliability and alternative sources.

Political: takes into account the pressure on the organization from legislation in terms of company law and employment laws. Also government policies on company taxes has to be considered along with the amount of support enterprises get. Managers need to be aware of developments in the EU that can affect the market and also major political changes that could occur.

Economic: looks in detail at all the aspects to do with interest rates, inflation, exchange rates and employment levels. Consideration is also given to the economies of the rest of the world especially the US economy.

Social: aspects can affect the organization with changes in population, and skill levels. There are also changes in spending patterns, customer confidence and peoples attitudes that affect the organization.

Technological: developments in terms of IT, industrial applications and new energy sources all lead to the organization having to think about the external influences.

5.2. PESTLE analysis

PESTLE analysis is in effect an audit of an organization's environmental influences with the purpose of using this information to guide strategic decision-making. The assumption is that if the organization is able to audit its current environment and assess potential changes, it will be better placed than its competitors to respond to changes. To help make decisions and to plan for future events, organizations need to understand the wider ‘meso-economic’ and ‘macro-economic’ environments in which they operate. (The meso-economic environment is the one in which we operate and have limited influence or impact, the macro-environment includes all factors that influence an organization but are out of its direct control). [5]

5. 2. 1 The PESTLE model

The PESTLE model provides users with a series of headings under which users can brainstorm or research key factors:

Political: what is happening politically in the environment in which you operate, including areas such as tax policy, employment laws, environmental regulations, trade restrictions and reform, tariffs and political stability.

Economic: what is happening within the economy, for example; economic growth/ decline, interest rates, exchange rates and inflation rate, wage rates, minimum wage, working hours, unemployment (local and national), credit availability, cost of living, etc.

Sociological: what is occurring socially in the markets in which you operate or expect to operate, cultural norms and expectations, health consciousness, population growth rate, age distribution, career attitudes, emphasis on safety, global warming.

Technological: what is happening technology-wise which can impact what you do, technology is leaping every two years, how will this impact your products or services, things that were not possible five years ago are now mainstream, for example mobile phone technology, web 2.0, blogs, social networking websites. New technologies are continually being developed and the rate of change itself is increasing. There are also changes to barriers to entry in given markets, and changes to financial decisions like outsourcing and insourcing.

Legal: what is happening with changes to legislation. This may impact employment, access to materials, quotas, resources, imports/ exports, taxation etc.

Environmental: what is happening with respect to ecological and environmental aspects. Many of these factors will be economic or social in nature.

5. 2. 2 The PESTLE process

Decide how the information is to be collected and by whom (often a team approach is much more powerful than one person's view).

Identify appropriate sources of information.

- *Analysis the findings.*
- *Identify the most important issues.*
- *Identify strategic options.*
- *Write a report.*
- *Disseminate the findings.*
- *Decide which trends should be monitored on an ongoing basis.*

5.3. Advantages and disadvantages of using a PEST analysis

Advantages

- *Simple framework.*
- *Facilitates an understanding of the wider business environment.*
- *Encourages the development of external and strategic thinking.*
- *Can enable an organisation to anticipate future business threats and take action to avoid or minimise their impact.*
- *Can enable an organisation to spot business opportunities and exploit them fully.*

Disadvantages

- *Some users over simplify the amount of data used for decisions – it is easy to use scant data.*
- *To be effective this process needs to be undertaken on a regular basis.*
- *The best reviews require different people being involved each having a different perspective.*
- *Access to quality external data sources, this can be time consuming and costly.*
- *The pace of change makes it increasingly difficult to anticipate developments that may affect an organisation in the future.*
- *The risk of capturing too much data is that it may make it difficult to see the wood for the trees and lead to 'paralysis by analysis'.*
- *The data used in the analysis may be based on assumptions that subsequently prove to be unfounded (good and bad).*

6. Conclusion

There are new trends in using analysis at decision making in risk management, nowadays. One of them are PEST analyses. In article, author tried to introduce risk management, process of risk identification analysis, using of BPEST and PESTLE analysis, process of modeling PEST analysis. Both of them have their advantages and disadvantages, which are also presented in article.

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Private Security Services

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Abstract. Last years there was the increased demand for the private security services not only from the companies but also from the private persons. This situation influences the profits of private security companies which are active by the protection of people and protection of property. Moreover, the state security forces can't operate in this area without their help.

Keywords: private security, private security services, private security services market.

1. Introduction

The private security companies provide security for people under contract and for profit. Worldwide, there are various conditions for subjects which are active in the private security sector. The private security services market in Europe is also varied from country to country and depends on public policies regarding the role of the private security services sector and on the national regulatory frameworks regulating private security at national level. This is the main reason why it is not possible to provide a standard definition of private security sector and each country has its "own definition". There is a strong difference across EU-countries in defining the conditions relevant for the private security industry. Some countries are characterised by very strict regulation (e.g. Belgium, Slovakia, Spain etc.), while in other countries the industry hardly faces any regulatory conditions (e.g. Germany, Austria, Czech Republic etc.). This diversity has sometimes led to differences in how activities coming under this area are defined, in proposals for statutory frameworks, in the conditions for accessing the profession and in how to define a minimum level of training, how to organise oversight of the sector or how to manage the sensitive issue of weapons.

2. Private Security Services Market in Europe

The market of the private security services is diverse and concerns different segments such as: guarding of public and private buildings, transport of valuable goods and money, airport and maritime security, electronic surveillance, and many others. Nowadays a new segment that is developing is "digital security" (security issues related to the collection, storage and transmission of digital information). This segment requires more specific ICT knowledge.

Demand for security services mostly comes from two client groups: industrial companies and public sector. There is of course the third group, private individuals but it is only a small part of the market. The industry demand for private security services has always been cyclical and is mostly influenced by specific events.

The private security companies are often requested to provide high level solutions and to cover a wide range of risks by clients.

The approximative number of subject in private security sector and security forces in all 27 EU member states on the present (see Table 1).

Country	number of PSCs	number of security force	1 security employee/ population (ratio)	number of police force	1policeman/ population (ratio)	turnover in the private security market (mil. €)
Belgium	196	12 673	821	39 000	267	556
Bulgaria	1 029	58 700	124	47 000	155	224,5
Cyprus	60	1 700	466	3 000	258	25
Czech Republic	5 629	51 542	198	46 000	222	692
Denmark	338	5 250	1010	14 000	368	250
Estonia	242	6 000	224	3 200	419	128
Finland	200	10 000	517	7 500	697	not available
France	4 800	150 000	427	250 000	256	4 640
Greece	1 000	30 000	428	50 000	214	275
Netherlands	320	33 158	555	49 000	314	1 300
Ireland	840	10 500	412	12 265	353	not available
Lithuania	67	10 000	360	20 000	180	not available
Latvia	300	5 500	230	10 600	217	not available
Luxemburg	10	2 200	210	1 573	294	not available
Hungary	11 304	80 000	125	40 000	250	550
Malta	6	1 600	256	1 904	215	not available
Germany	3 500	173 000	476	250 000	330	4 350
Poland	3 600	165 000	234	100 000	386	1 000
Portugal	113	28 000	275	46 000	228	677
Austria	200	10 000	830	20 000	415	212
Romania	2 765	92 000	235	55 000	393	40
Slovakia	1 730	24 387	224	20 224	270	not available
Slovenia	100	4 500	444	7 500	267	1
Spain	1 219	83 000	488	223 000	182	3 579
Sweden	250	13 500	670	18 000	502	700
Italy	965	49 166	304	425 000	139	2 400
UK	1 500	250 000	244	141 398	431	3 489

(PSCs – Private Security Companies)

Tab. 1. Private security market in 27 EU member states (2007).
(Source: CoESS Private Security Fact and Figures, www.coess.org;
Private security report in Slovakia 2007, www.minv.sk)

When we compare the data in table 1 with the population in EU member states, Austria, Denmark and Belgium have the less number of security force and Hungary, Estonia and Bulgaria have the highest number of security force.

2.1. Private Security Services Market in Slovakia

The market of the private security services in Slovakia is diverse different segments such as: guarding of public and private buildings, transport of valuable goods and money, electronic surveillance, and many others.

There are approximately 24 387 security force in Slovakia on the present (2007, 23 211 security guards, 326 investigators and 814 administration staff). There are 2 655 valid licences for the private security providers. [1]

The comparing of the number of security force (period 2001 - 2007) and the number of police force we can see in the following figure.

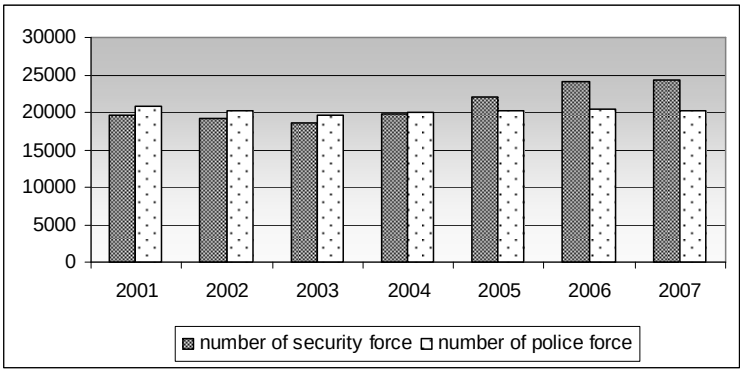

Fig. 1. Number of Security Force and Police Force.

(Source: Statistical data of the Ministry of the Interior of the Slovak Republic)

This figure shows that there are more security force than police force since 2005 in Slovakia.

3. Conclusion

The size of the geographic market for private security services is closely linked to an area's population size and density, level of urbanization, real local crime rates, perceived crime rates and economic growth.

In the following decade the experts forecast the increase in the private security sector to 7 or 8 percent per year worldwide. There are several private security experts which expect that Asia, Latin America, Eastern Europe, Africa and the Middle East are the future areas largely unpenetrated private security markets and characterized by rising crime rates, expanding economies, new business formation activity and heightened foreign investment. This increase can slow the present financial crisis which influences of course the global economy.

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Critical Infrastructure Meets the New Threats

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Abstract. The article describes the possible solving of protection against an aerial intruder. The using of aerials means mentioned in article provides possibility to overcome external passive elements of object protection. This new possible way of security violation is not analyzed in details, so we will try to focus on this problem in our further research work. The article briefly describes threats resources which can be used for violation from the air. Then there is mentioned, what is the priority for early detection and what kind of perspective active elements could by used for protection of critical infrastructure against these threats. After that there are mentioned some new developed systems applicable to detection as well as their principle, advantages and disadvantages. The significance of protection against security violation from the air is caused by increased risk of terrorist attack done by aerial means such e.g., airplanes or gliders.

Keywords: critical infrastructure, aerial intruder, security violation, camera monitoring system, passive coherent location, airborne threat.

1. Introduction

In the end of the eighties there was a change of military-political sphere which brought reduction of a large military conflict. The reaction of top politicians was caused by transfer of threats, which formerly had had military character, into non-military spheres. In 1999 NATO approved a new Strategic Concept of Alliance which is focused on crisis management and provides possibilities for non-article 5 (collective defence) interventions. Alliance tries to guarantee a complex security of all its members even in a new safety environment. The crucial milestone in the NATO evolution was the Prague Summit in 2002, where the further NATO member states Armed Forces development was defined. The Summit adopted a policy on creating highly effective and well prepared forces designated to counter-terrorist operations (NATO Response Force). Based on this policy, the member state's Armed Forces are transformed, step by step, to be able to successfully accomplish peace-support operations in incriminated areas and to solve crisis situations wherever in the world.

Slovak Armed Forces (OS SR) are affected by this transformation, too. However, the responsibility for protection and defence of critical infrastructure is mostly on shoulders of public administration (besides OS SR), it is necessary to realize that it will not be possible to cover all safety requirements because of the capacity. For that reason, it is essential to deliberate that the owners' responsibility for protection is increasing not only in peace time but also in crisis.

2. Problem of protection against an aerial intruder

Liabilities and assets – subjects, which based on their function, are significantly able to influence state functioning, lives and healthiness of mass of people. They are always a part of a so-called critical infrastructure (CI), or a defence infrastructure (according to current legal standards).

In 2005 the European Commission approved a document called "Green Paper on a European Programme for Critical Infrastructure Protection." The document describes possible means for improvement of prevention, protection, preparedness and adequate reaction within the protection of critical infrastructure framework according to the European Union requirements (EU). As tools for decreasing the risk to critical infrastructure can be used not only legislative tools, but also electronic and mechanic equipment to discourage, detect and signalize intruder's activities. However, the existing legislative standards define ways of protection in general rather than described specific suggestions for solution, it is necessary to realize, that in case of a critical infrastructure threat it is very important to stop the intruder before he achieves the subject of protection. It is necessary to use as many passive and active elements of protection as is required to detect and discourage intruder to achieve his plan or to seize him by security service before achieving his goals.

In term of critical infrastructure threat by intruder, it is important to deliberate two possible ways of entering into the object of interest.

The first way is to enter into a protected object overland what causes that the intruder has to overcome passive protective elements. By using of proper passive and active protective elements it is possible to save enough time for activating a reaction of security services.

The second way can be the intruder's effort to get into the protected object from the air. This approach eliminates external protective elements, what poses higher requirements for active protective elements. Seeing that, the intruder is not decelerating in movement over external passive elements of protection, so there are posed higher requirements for detection. It means that the border of the critical detection point is shifted.

In case of attempt to get into the protected object from the air, it is very complicated to fulfil the basic requirement of effective protection. It means that the time of attack or time of external and internal passive protective elements overcoming is longer than the reaction time of security service. In this case, the most important role in the critical infrastructure protection is the application of appropriate active protective elements enabling an early air attack detection and recognition.

3. Threat resources

Nowadays, in time of threat removal from military to non-military sphere, the objects of critical infrastructure are extremely vulnerable to terrorist threats. In the terrorist inventory there are included air means suitable for a possible break into protected objects and to jeopardize them. These air threats can be separated into several categories in accordance with different criteria. We are not going to write about military airborne threats, but we will focus on the gently available and easily usable air means, increasing the risk of misuse them against the objects of critical infrastructure.

This very dangerous category of civil aviation includes small (sporty) motor and motor less airplanes, hanging and parachute gliders, as well as different types of unmanned aerial vehicles (UAV) or aerial models. Mentioned air means, with the exception of sporty motor

and motor less airplanes, are “invisible” for air traffic control as well as for air defence “emergency” system designated for protection of national air space. It means that these airborne devices can reach restricted or prohibited areas which are defined as the safety area around the objects of critical infrastructure and carry out air attack against critical infrastructure. However, these attacks are executed after a precise selection, the invaded object is not so important for terrorists. The more important are consequences of this attack as direct and indirect damages caused by getting the object out of order. These attacks can also have a symbolic character – representing power – in this case the devastating effect is not important. It has to be just a provocation or insult of legislative power or the goal is to evoke panic of population or to distract attention of competent organs from areas of terrorist interest by deceptive manoeuvre.

To accomplish mentioned actions the intruder can use various available or home-made explosive chemicals. The intruder can principally use a classic military and industrial explosive or a home-made explosive. The using of the mentioned aerial vehicles seems to be as an optimal delivery means of explosive into the protected object.

4. Protection against violation from the air

The problem of solving critical infrastructure protection against the threats described above is very complicated and requires not only beware of airborne threats, but also requires to set up a whole range of appropriate measures in all crisis management phases- from prevention phase through crisis planning to reaction and renewal.

In prevention framework it is necessary to create a risk monitoring and an evaluation system. It is linked with creating of mathematical or other models which are able to evaluate the most dangerous courses (directions) based on detailed and precise assessment of object surroundings, from where the protected object can be endangered by using of airborne delivery means which overcome passive protective elements. These models should also be able to determine a using probability of some air means to attack the object of critical infrastructure. This probability is based on results reached from analysis of individual types of usually used aerial means, directives and rules for flying, as well as from assessment of sporty aerial tools availability and required skills for using them.

The level of critical infrastructure objects protection will not be the same for all of them and will be dependent on assumed consequences caused by damage or disabling of some critical infrastructure element. Therefore, during the process of assessment model creation it is necessary to consider various particularities of the protected object and to create one model for a specific element of critical infrastructure to ensure detailed and precise description of all possible threats. It is important to prepare different preventive measures to hamper or completely eliminate using of aerial means or to demonstrate preparedness to withstand such a threat.

For crisis planning phase it is necessary to involve and, in case of air intruder detection, to elaborate procedures for a security service action and intervention in details. Seeing that actually used safety systems are not assigned prior to detection of air threats, throughout planning and preparing of new safety systems, it would be useful to consider such a system which would be based on technical parameters and able to detect also a threat from the air and to provide security service or other forces and measures able to provide enough time to intervene.

For provision of a sufficient reaction of security service or other emergency unit it is necessary to provide security services with equipment and resources enabling them to perform an effective intervention. The intervention has to cause minimum damage and has to be done

in accordance with respecting basic human rights and liberties declared in Constitution of Slovak republic and international agreements of human rights and liberties.

In last time, especially in military, there is a rapid development of so-called non-lethal weapons which are able to stop and eliminate an intruder and don't cause a serious injury or damage. Some of them are applicable in case of discourage and elimination of the intruder from the air. These systems utilize mostly electromagnetic waves of different wave lengths, what affects technical devices of aerial instruments as well as humans and disable them to achieve their goals. There are mainly high powered acoustic systems which usually cause a loss of orientation, sickness and affect decision process and human performance adversely.

Other means are for example microwave systems which affect intruder's receptors adversely, induce bad feelings or pain.

5. Active elements of protection providing detection of air intruder

One of the active protective elements which are able to provide detection capability is camera monitoring system. There is a rapid development of camera monitoring systems in present. One of the basic functions is an early detection of security violation in protected object surroundings based on a real time monitoring. This activity, provided by software and hardware elements of automatic detection system, would come to accelerate identification and evaluation of security violation. On the other hand, the automation would remove the human factor from the decision process what would reduce time needed for activation of security service into higher state of readiness. For that reason, the camera monitoring system has to dispose with an automatic detection capability of security violation by detection zones defined inside the camera or in evaluation device. These default detection zones have to appear from detailed analysis of the surrounding area from which the most probable direction of possible air attack against the protected object is designated.

The other important function of the camera monitoring system has to be a recording capability for further processing and evaluation as well as verification of alert brought up by another safety system. The disadvantage of the camera monitoring system used for an early detection of the air intruder is a limited range of optical sensors and high performance parameters sensitivity of optical instruments to atmospheric conditions and a current period of the day (day-night).

Mentioned dependency on atmospheric conditions is possible to be reduced or eliminated by other active elements of critical infrastructure protection applicable to detect the security violation. These facilities are a security video detection and monitoring systems based on detection in an infrared band. Exploitation of infrared detection systems provides detection of oncoming air threats with a different temperature than the temperature of background - surrounding area. By this anomaly are expressed not only motor airplanes but also all warm-blooded living organisms as for example human gliding by hanging or a parachute glider. However, the atmospheric conditions can influence the detection range of mentioned protective means; it cannot influence it as much as it is in camera monitoring systems.

Detection, identification and warning should be carried out automatically by using of appropriate software tools, which in accordance with predetermined criteria evaluate if the approaching air object is a potential intruder or only a false alert.

In this time, the most developing potential active protective system, for protection of critical infrastructure objects, which is able to execute the early detection, qualitative discrimination and evaluation of air threats could be a tracking system based on a passive coherent location (PCL).

The passive coherent location consists of exploitation and processing of electromagnetic energy radiated by other than a self source of energy. It means that this system uses the electromagnetic energy radiated by mobile operators or terrestrial television and radio broadcast. In this manner, the radiated energy covers the whole state territory what provides a continual electromagnetic field in which we are able to identify some specific changes by using of some technical devices. By reason that the radiated energy is reflected from all objects in electromagnetic field in all directions, this principle is used for moving target detection on the ground as well as in the air. The moving objects cause changes (fluctuations) of electromagnetic field based on it is easy to detect and distinguish them from stationary objects. The advantage of this detection system is low costs necessary for acquisition and maintenance. The system consists of a receiver kit only, working with a frequency used by a mobile operator, for example, deployed to ensure measuring of three dimensions in object's surroundings (azimuth, range and height). There is not required any permission for using a frequency band; the system does not influence other electronic systems because of the passive principle.

These systems have generally a good resistance against jamming because the intruder does not know the deployment and frequency of receivers. The passive coherent location system with its coverage 360 °, with a significantly longer detection range and better discrimination capability in a relatively long distance from the protected object is able to substitute the camera monitoring system. One of the disadvantages is that sources of the radiated energy are usually a property of a so-called third party (communication operator, television or radio broadcast keeper, etc.). The critical factor is the necessity to assign a continuous radiation of electromagnetic energy in crisis and situation worsening. This vulnerability can be eliminated by using of own emissive sources what leads to higher costs and a more complicated system structure.

6. Conclusion

The protection of critical infrastructure objects against the air intruder is a complex problem which requires more attention than it has been until now. The responsibility for the protection and defence is shifting to a civil sector what is caused by the Armed Forces transformation of the EU and NATO member states. Maybe, this shift will be more noticeable in the area of a critical infrastructure protection against air threats. A very specific form of the threat is a misuse of hanging and parachute gliders, unmanned aerial vehicles and aerial models as explosive delivery means to get in the protected area. Also using of hanging and parachute gliders as means to overcome external passive protective elements would require more attention of security system designers. For protection of critical infrastructure objects is required in risk analysis to consider all possible threats against protected objects and pay attention to specific or unusual way of security violation. Only then, it will be possible to develop and take appropriate means and measures to eliminate almost the entire spectrum of risks and to guarantee the sufficient protection for critical infrastructure objects not only in peace time but even in crisis.

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Damage Mechanisms of a Major Power Plant Components and it's Inspection Techniques

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Abstract. This paper deals with a damage mechanisms of a major power plant components and it's inspection techniques. For reliably operation of a power plant in long term is necessary carry out inspections of equipment and the key components of the power plant.

Keywords: Power plant, damage mechanisms of the power plant components, inspections techniques of the power plant components, nondestructive evaluation techniques for the power plant components

1. Introduction

The liberalization of international electricity markets and the growing demand for power is putting tremendous stress on existing power plants for generating electricity. The plants are being operated for longer periods of time under heavy load conditions. Reliability of key components of the power plant such as steam or gas turbines and generators is therefore in prime importance. Only effective operation coupled with a systematic maintenance and inspection concept guarantees continuous plant availability in the long term.

2. Damage mechanisms of the major power plant components

Many utility systems in the world have power plants operating with fossil fuel. Their service life is often acrossing 100,000 hours of the operation. As power plants reach their designed life, their units and equipment are subjected to time dependant degradation **phenomena** such:

a. high temperature tensile failures
b. creep and rupture failures
c. low cycle fatigue at elevated temperatures
d. hydrogen embrittlement
e. hot corrosion / erosion corosion failures
f. rise of microscopic cavities and microfissuring

It is essential to identify the critical areas where failures are likely to occur. Some examples of failure mechanisms and critical areas include:

- **Corrosion and abrasion**

  For example, fluids within high-temperature high-pressure pipelines, an integral part of fossil energy power facilities, can be corrosive and abrasive. Corrosive media, cavitations, and erosion can lead to pipe leakage and possible failure. Even a small leak in a pipeline could require utilities to shut down a facility for necessary time to

investigate the cause of the leakage. Unscheduled shutdowns cost utilities significant expenses.

- **Creep**
  Power plant components that operate at high temperatures such as boilers headers, steam pipes, valves and turbine casings are subject to creep failure. Creep damage occurs in different stages and the first sign is the formation of microscopic cavities at grain boundaries.
- **Cracking**
  In thermal power plants, turbine blades suffer from metal fatigue as a result of vibration. This problem is aggravated by other mechanisms such as creep in the case of high pressure turbines, or corrosion and embrittlement in the case of low pressure turbines.
- **Hydrogen damage**
  Failures of waterwall tubes are generic for some condensers; an evaluation of microfissuring would aid in identifying the presence of hydrogen damage.

Utility & Components		**Damage Mechanism**				
		Creep	Fatigue	Erosion	Corrosion	High Temp. Tensile Failure
Boiler & Auxiliaries	Drums		●		●	
	Steam Headers	●	●		●	
	Water Headers		●		●	
	Steam Piping	●	●		●	
	Superheater & Reheater Tubes	●	●	●	●	
	Waterwall tubes		●	●	●	
	Ductings			●	●	
	Precipitator			●	●	
	Structures			●	●	
Turbine	Rotor	●	●			
	Shell	●	●			
	Steam Chest	●	●	●		
	Casing	●	●			
	Blades		●	●	●	
	High Temperature Bolts		●		●	●
Generator	Rotor		●			
	Retaining Rings		●		●	
Condenser & Heat Excanger			●	●	●	

Tab. 1. Damage mechanisms of the major power plant components

Table 1 gives typical damage mechanisms of the major power plant components.

Highly stressed components in a power plant are also for example: the rotating components of the turbine-generator set, boilers, steam piping, valves and casing joint bolts.

Stresses are induced by temperatures, vibrations and pre-loads and of course by centrifugal forces on rotating components.

3. Inspection techniques for the major components of power plant

- To avoid unplanned outages and for optimize inspection and maintenance schedule is necessary to assess a condition and remaining life of the power plant components, particularly the components which operated at high temperatures, high pressure and high stress. For residual life assessment of power plant components are available two different approaches. One of them use data analysis based on operational history and the other one is based on periodic examination of critical components. The second method is widely adopted and it's more accurate.

Utility & Components		Inspection Techniques											
		Visual Inspection & Dimensional Check	Ultrasonic Thickness Gauging	Ultrasonic Flaw Detection	Penetrant Testing	Magnetic Particle Inspection	Eddy Current Testing	Hadness Measurement	In-situ Replica Metallography	Fiberoptic Examination	Destructive Tests on Samples	Chemical Analysis In-situ	Special Test Methods
Boiler & Auxiliaries	Drums	●	●	●	●	●		●				●	
	Steam Headers	●	●	●		●		●	●	●			
	Water Headers	●	●	●	●	●		●		●		●	
	Steam Piping	●	●	●		●		●	●	●			
	Superheater & Reheater Tubes	●	●		●						●		●
	Waterwall tubes	●	●		●						●	●	●
	Ductings	●	●		●								
	Precipitator	●	●		●								
	Structures	●	●		●	●							
Turbine	Rotor	●		●		●		●	●				●
	Shell	●	●	●		●		●	●				
	Steam Chest	●	●	●		●		●	●				
	Casing	●		●	●	●		●	●				
	Blades	●		●	●	●	●					●	●
	High Temperature Bolts	●		●		●		●			●		
Generator	Rotor	●		●		●							
	Retaining Rings	●		●		●							
Condenser & Heat Exchanger		●	●	●	●		●						

Tab. 2. Inspection techniques for major components of a power plant

Methods based on periodic examination involve:

- Various nondestructive evaluation (NDE) techniques for detection of cracks, effects of corrosion/erosion etc. In addition to commonly adopted techniques such as Ultrasonic thickness gauging, Ultrasonic flaw detection, Penetrant testing, Flourescent magnetic particle testing are employed Specialised techniques such as

assessment of hydrogen damage by Ultrasonics, measurement of steam side oxide scale by in-situ ultrasonics, boresonic inspection of rotors, video probe examination of critical components and eddy current examination of rotor blades and root.

- Metallurgical tests such as in-situ metallography using replica method, in-situ chemical analysis by metal spectroscope/X-ray fluorescence method, in-situ hardness measurement etc.
- Sampling of component specimens for detailed laboratory analysis

Table 2 gives typical inspection techniques for major components of power plant. Approach in this inspection methodologies is based on design criticality, past experience and previous failure information. Nondestructive evaluation (NDE) techniques are used for detection of failures in the critical areas and for monitoring those areas.

4. Chosen examples of the power plant components damages

Power plant is an industrial facility – it's a complex of structures, machinery and associated equipment for generating electric energy from another source of energy. Safety generation of electric power require reliably operation of all power plant components. Unfortunately some components, particularly the components which operated at high temperatures, high pressure and high stress, are subjected to damage or probability of a failure. In additional text are some examples of the power plant component damages.

4.1. Steam turbine

A steam turbine is a mechanical device that extracts thermal energy from pressurized steam, and converts it into a rotary motion. Because the turbine generates the rotary motion, it is particularly suited to be used to drive an electrical power generator – about 80% of all electricity generation in the world is by use of steam turbines.

In October 24, 1970 engineers were conducting performance and safety tests of a new large-capacity turbine at a shipyard in Nagasaki. The test site was located at Nagasaki Bay, surrounded by the ocean and mountains. The brittle fracture occurred in the 50-ton rotor, due to microstructural flaws and a strong notch effect. The four rotor fragment was scattered in all directions, killing 4 and injuring 61 people. One rotor fragment weighing 9 tons flew 880 meters towards the water, second fragment with weight about 11 tons flew 1500 meters and landed at 200-meter elevation in the mountain. Last two fragments remained in the laboratory – one flew across the test room damaging equipment and injuring people and the other one struck the floor. The reason of the low ductility at the rotor bore was a material grain segregation, which resulted in a low tolerance for brittle fracture. Most of the turbine components are made of steels with addition of different alloying elements such as chromium, vanadium, nickel, molybdenum, titanium etc. During operation, these materials undergo different metallurgical degradation processes due to high stress, creep, fatigue etc.

For reliably operation of the steam turbine in long term is necessary carry out an inspections of equipment. Typical recommended inspection periods from the original equipment manufacturer may vary from seven to ten years and are based on the condition of a fleet of turbine rotors. A stress analysis and fracture mechanics evaluation of a specific rotor can produce inspection periods of ten to fifteen years delaying the cost of an inspection or the replacement of a problem rotor. Once in a service the turbine rotor bores are examined ultrasonically on a periodic basis to look for any indications of cracks or other defects. Based upon the results of this examination the rotor is allowed to continue in operation, is repaired if necessary or is replaced. During the normal operation of the turbine rotor any existing crack will grow in a stable manner due to thermal fatigue cycling each time the unit is started. The

stresses which drive a crack in the rotor bore of turbine rotor are caused by the non-uniform distribution of temperatures particularly during a start up, the spinning of the rotor and pressure of the steam. The stable growth rate of a crack in the turbine rotor bore can be estimated from the depth and length of the crack, the nominal stress surrounding the crack and the material properties of the rotor. As the crack grows to some critical depth, the growth becomes unstable and the turbine rotor will fail. The evaluation process of rotor bore fracture is not a simple and contains finite element stress analysis, turbine rotor material properties, turbine start profile and deal with results of boresonic inspection. These inputs are used in a Monte Carlo mathematical simulation of crack growth to predict crack growth in the future and probability of failure. The result of simulation is a curve of failure probability versus time and is shown in fig.1.

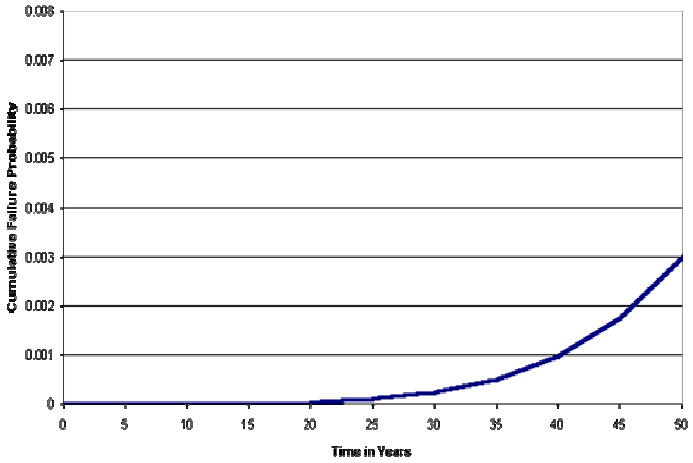

Fig. 1. Curve of failure probability versus time - rotor bore fracture

4.2. Conveyer

Conveyers are extremely valuable to processing coal fired power plants. Conveyers are used for transportation of material from one location to the next site. The next describes incident mention the importance of conveyer in power plant process. On the night of July 7, 2007 collapsed 28-year-old conveyor structure at the Madhya Pradesh State Electricity Board's Satpura thermal power plant at Sarni in India. Power generation in three units of power plant stopped the generation for 12 days due to the collapse of the coal conveyor system. The structure might have collapsed and also damaged due to acid vapour emanating from the water treatment plant located closeby and also due to heavy rains. Of course, this is an extreme case of conveyer damage. But when a conveyor belt gets torn or broken, the cost to repair or replace can be also rather high. Detectors based on the principle of electromagnetic induction can be used to monitor the broken steel cord and splice failure of a belt while the conveyor is working. It not only detects minor breaks before they become big problems, but it does this without ever touching the conveyor belt. Based on result of electromagnetic induction engineers can decide whether the belt has to be repaired to avoid accident.

5. Conclusion

Power plants operating experience and research in the fields of material sciences, degradation mechanisms, inspection techniques and methods combined with risk assessment techniques and associated data can be used to develop a more effective approach for piping, which can focus inspection on the more important locations and reduce personnel exposure, while at the same time maintaining and improving public safety. Utility owners can make effective decisions on the status of the equipment based on results of inspection techniques and risk assessment techniques.

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The Directive on Dangerous Substances REACH, GHS.

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Abstract. At modification of European chemical legislative (so-called REACH Direction) give out too application Globally Harmonized System of Classification and Labeling of Chemicals (GHS) worked out OSN. Report deal with classification, packing and labeling of chemicals look up the directive REACH and GHS. Versatile spectrum used chemicals, growing volume shop with them and actuality, that dangerous substances inductive of fire, accident and affection, in past was necessary start to work system of classification and labeling dangerous fixture and substances, which enable clear and understandable information about dangerous properties this substances and enable full warnings to experts so as public too. From this reason was sequential disposed collections of systems (Kemler code, Diamond of danger, Hazchem codes, R and S sentences, normalized labeling danger by EINECS). In this way begun in the world collections of systems with combination of national legislations and international systems. It led to ambiguity and to hard concept of information. It complicate classification and used marking especially for transport dangerous goods in international business. It led to series of harmonies.

Keywords: Registration, Evaluation and Authorization of CHemicals (REACH), Globally Harmonized System of Classification and Labeling of Chemicals (GHS), European Inventory of Existing Commercial chemical Substances (EINECS), European Chemicals Agency (ECHA), agency, danger, hazard, health, labeling, packing, law, directive, chemicals, protection, the European Union (EU), UN level.

1. Introduction

A European law about dangerous substances was introduced in 1967 to protect public health, in health of workers handling dangerous substances. The law, known as the Directive on Dangerous Substances introduced EU-wide provisions on the classification, packaging and labeling of dangerous substances. Since it was adopted in 1967 the directive has regularly been updated to take into account the latest scientific and technical progress so as to ensure the highest level of protection for individuals and the environment. This also ensures that the internal market functions most efficiently. The amendments to the directive enable newly identified hazardous materials to be added to the list of dangerous substances. The most recent introduce or modify the EU harmonized classification and labeling requirements for more than 800 and 600 substances respectively. Under the REACH regulation on chemicals, substances classified as carcinogenic, mutagenic or having reproductive toxic effects may need authorization to be used or placed on the market. [1]

The classification of dangerous substances places a substance into one or several defined classes of danger and characterizes the type and severity of the adverse effects that the substance can cause. The packaging of dangerous substances protects individuals from the known risks of a substance, and the labeling of dangerous substances provides information about the nature of the substance's risks and about the safety measures to apply during handling and use. [6]

The current classification and labeling system is in the process of being replaced by a new law known as the Regulation on the Classification, Labeling and Packaging of Substances

and Mixtures, which takes effect from 20 January 2009. The Regulation incorporates the classification criteria and labeling rules agreed at UN level, the so-called Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

1.1. The classification, labeling and packaging of chemical substances and mixtures

The production and use of chemicals is fundamental to all economies all over the world. However, it is also recognized that chemicals pose risks that should be indicated throughout the supply chain. Many countries have developed systems for providing information on hazardous properties and control measures of chemicals aimed at ensuring their safe production, transport, use and disposal. Yet, those systems are currently not always compatible with each other and often require multiple labels and Safety Data Sheets for the same product. [2]

Consequently, companies involved in international trade need to follow multiple regulations regarding hazard classification and labeling depending on where they do business and users may see inconsistent label warnings and Safety Data Sheets for the same chemical. The current system is also time-consuming and can result in barriers to international trade in chemicals.

Therefore, the European Parliament and Council adopted a new Regulation on the Classification, Labeling and Packaging of Substances and Mixtures which will replace after a transitional period certain provisions of the current directives related to the classification, packaging and labeling of dangerous substances (Directive 67/548/EEC) and preparations (Directive 1999/45/EC). [5]

The new Regulation incorporates the classification criteria and labeling rules agreed at UN level, the so called Globally Harmonized System of Classification and Labeling of Chemicals (GHS). It introduces new classification criteria, hazard symbols (pictograms) and labeling phrases, while taking account of elements which are part of the earlier EU legislation.

The Regulation requires companies to classify, label and package appropriately their hazardous chemicals before placing them on the market. It aims to protect workers, consumers and the environment by means of labeling which reflects possible hazardous effects of dangerous substances.

The labeling provisions take on board the red-framed hazard pictograms, signal words, hazard and precautionary statements provided for in the UN GHS, for example:

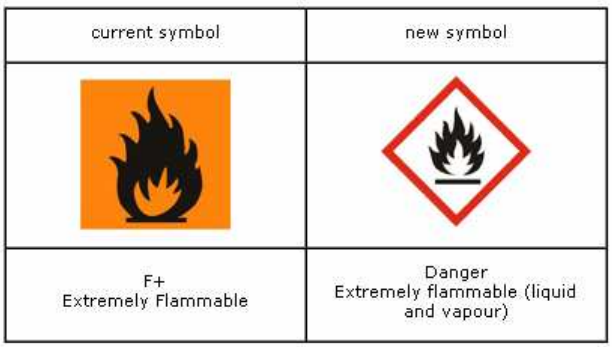

Fig. 1. The figure shows difference between current and new symbol.

The Regulation also takes over certain provisions of Regulation (EC) No 1907/2006 (REACH) regarding the notification of classifications, the establishment of a list of

harmonized classifications and the creation of a classification and labeling inventory. Important amendments to the law on dangerous substances.

Introduced a notification system for "new" substances which required lists of "existing" substances called EINECS – to be published. EINECS is the European Inventory of Existing Commercial Chemical Substances and lists all substances that were reported to be on the market on or before 18 September 1981. The substances placed on the market for the first time after this target date are considered "new" and are added to ELINCS. ELINCS is European List of Notified Chemical Substances. [4]

Next new elements of labeling:

- new pictograms
- new classification criteria
- signal words - brand-new
- Safety Data Sheet - little changes

2. What is REACH ?

REACH is a new European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the Registration, Evaluation, Authorization and Restriction of Chemical substances. The new law entered into force on 1 June 2007.

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, innovative capability and competitiveness of the EU chemicals industry should be enhanced. The benefits of the REACH system will come gradually, as more and more substances are phased into REACH.

The REACH Regulation gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA) in Helsinki. The Agency will act as the central point in the REACH system: it will manage the databases necessary to operate the system, coordinate the indepth evaluation of suspicious chemicals and run a public database in which consumers and professionals can find hazard information.

REACH has been developed in a climate of transparency and consultation. The Commission has held extensive dialogue with stakeholders before and after the proposal was presented. Stakeholders sent over 6000 responses during the REACH internet consultation and contributed to the REACH Impact Assessment both before and after the launch of the Commission REACH proposal in 2003. This helped the Commission to improve the design and cost-effectiveness of the system and subsequently the European Parlament and the Council of the European Union to amend the proposal under the co-decision procedure. [2]

REACH provisions will be phased-in over 11 years. Companies can find explanations of REACH in the guidance documents and can address themselves to a number of helpdesks.

2.1. How does REACH work

REACH is based on the idea that industry itself is best placed to ensure that the chemicals it manufactures and puts on the market in the EU do not adversely affect human health or the environment. This requires that industry has certain knowledge of the properties of its substances and manages potential risks. Authorities should focus their resources on ensuring industry are meeting their obligations and taking action on substances of very high

concern or where there is a need for Community action. REACH creates a single system for both “existing” and “new” substances; substances are now described as non-phase-in substances (i.e. those not produced or marketed prior to the entry into force of REACH). [6]

Its basic elements are described below:

1. All substances are covered by the REACH Regulation unless they are explicitly exempted from its scope.

2. Registration requires manufacturers and importers of chemicals to obtain relevant information on their substances and to use that data to manage them safely.

3. To reduce testing on vertebrate animals, data sharing is required for studies on such animals. For other tests, data sharing is required on request by other registrants.

4. Better information on hazards and risks and how to manage them safely will be passed down and up the supply chain.

5. Downstream users are brought into the system.

6. Evaluation is undertaken by the Agency for testing proposals made by industry or to check compliance with the registration requirements. The Agency co-ordinates substance evaluation by the authorities to investigate chemicals with perceived risks. This assessment may be used later to prepare proposals for restrictions or authorization.

7. Substances with properties of very high concern will be made subject to authorization; the Agency will publish a list containing such candidate substances. Applicants will have to demonstrate that risks associated with uses of these substances are adequately controlled or that the socio-economic benefits of their use outweigh the risks. Applicants must also analyze whether there are safer suitable alternative substances or technologies. If there are, they must prepare substitution plans, if not, they should provide information on research and development activities, if appropriate. The Commission may amend or withdraw any authorization on review if suitable substitutes become available.

8. The restrictions provide a procedure to regulate that the manufacture, placing on the market or use of certain dangerous substances shall be either subject to conditions or prohibited. Thus, restrictions act as a safety net to manage Community wide risks that are otherwise not adequately controlled.

9. The European Chemicals Agency (ECHA) will manage the technical, scientific and administrative aspects of the REACH system at Community level, aiming to ensure that the legislation can be properly implemented and has credibility with all stakeholders.

10. A classification and labeling inventory of dangerous substances will help promote agreement within industry on the classification of a substance. For some substances of high concern there may be a Community wide harmonization of classification by the authorities.

11. Rules on the access to information combine a system of publicly available information over the internet, the current system of requests for access to information and REACH-specific rules on the protection of confidential business information.

2.2. SCOPE

REACH is very wide in its scope covering all substances whether manufactured, imported, used as intermediates or placed on the market, either on their own, in preparations or in articles, unless they are radioactive, subject to customs supervision, or are non-isolated intermediates. Waste is specifically exempted. Food that meets the definition of a substance, on its own or in a preparation, will be subject to REACH however, such substances are largely exempted from Registration, Evaluation and Authorization. Member States may exempt substances used in the interests of defense. Other substances are exempted from parts of REACH, where other equivalent legislation applies. The Commission will review the scope of the Regulation five years after entry into force.

2.3. Registration

Registration means that a manufacturer or importer has provided a registration dossier to the Agency and not received any indication that it is incomplete. This does not by itself mean that the dossier is in compliance with the legislation nor does it mean all the properties of the registered substance have been identified. [1]

3. What is the GHS?

The GHS is an acronym for The Globally Harmonized System of Classification and Labeling of Chemicals. The GHS is a system for standardizing and harmonizing the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals; Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria; and Communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS).

Many countries already have regulatory systems in place for these types of requirements. These systems may be similar in content and approach, but their differences are significant enough to require multiple classifications, labels and safety data sheets for the same product when marketed in different countries or even in the same country when parts of the life cycle are covered by different regulatory authorities. This leads to inconsistent protection for those potentially exposed to the chemicals, as well as creating extensive regulatory burdens on companies producing chemicals. [7]

The GHS itself is not a regulation or a standard. The GHS Document establishes agreed hazard classification and communication provisions with explanatory information on how to apply the system. The elements in the GHS supply a mechanism to meet the basic requirement of any hazard communication system, which is to decide if the chemical product produced and/or supplied is hazardous and to prepare a label and/or Safety Data Sheet as appropriate. Regulatory authorities in countries adopting the GHS will thus take the agreed criteria and provisions, and implement them through their own regulatory process and procedures rather than simply incorporating the text of the GHS into their national requirements. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the product life cycle from "cradle to grave." [2]

4. Conclusion

Transfer of classification and labeling dangerous substances from primary to new system EINECS to worldwide harmonized system GHS its happen already and first part, new classification chemical substances will be finished in December 2010, though specialist public including Fire Forces and Civil Defense are not enough inform. It can be confront with new information now, with which doesn’t used work yet (example: codes of hazard and safety instructions by GHS) and switch to GHS so can bring complication. It is so needs so that information have given at Fire Forces and Civil Defense and relevant responsible personnel.

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Six Sigma – the Tool of Quality Control

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Abstract: Profitability is one of the most important factors for any successful business enterprise. High profitability is determined by strong sales and overall low cost in the whole enterprise operation. In today's competitive environment, companies must produce high quality products at low prices. This directs the companies to produce and to use new strategies. Six sigma methodology evolved as a result of this need. Its expansion has occurred at the end of twentieth century and today it is implemented by many companies around the world in order to reduce the cost of poor quality. The article describes the basic principles of Six Sigma methodology.

Keywords: Six Sigma, process, product, tool, phase, cost, improving.

1. Introduction

Six Sigma methodology was developed by Motorola in 1986 for the purpose of improving its own company processes by combining previously known tools of quality management. Since then, the methodology was implemented by numerous companies around the world, giving them save financial resources. This methodology has found application in some major Slovak companies, such as Slovak Telecom, Volkswagen, U. S. Steel, T- Mobile, Allianz and Tatrabanka. [7]

In the following, I will try to present this methodology and describe more.

2. What is Six Sigma

Six Sigma is a statistical measurement. It is a management and company philosophy which is a way of measuring the perfectness of work in the sense of total quality. Six Sigma informs the producer about goodness of productions, services and processes. The name Six sigma is derived from statistics, where sigma denotes the standard deviation (1). Six, because the mean - average (the original target) and the limit, for which the products still considered good, are distinct from each other at least six standard deviations. Most companies operate at the level of 3-4 sigma.

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2} \qquad (1)$$

The process is generally considered to be the Six Sigma process, if it has at the most 3,4 defects per million opportunities - DPMO. The process, which has a normal distribution is known as a Six Sigma process if it has 3,4 products from a million products behind the point,

which is 4.5 sigma away from the average. The remaining 1.5 sigma is called Six Sigma drift, which expresses every process (the average), the time shifts to ±1.5 sigma. The equation (2) shows the calculation of DPMO.

$$DPMO = \frac{number\ of\ defects}{number\ of\ units\ *\ number\ of\ opportunities\ per\ unit} * 10^6 \quad (2)$$

2.1. Example calculation of DPMO

Lets suppose a company produces 5000 products. And say 3650 meet the requirements. Each product consist of 4 simple components, lets presume that each has a defect. So each product has 4 opportunities for error. In this case, then DPMO = (5000- 3650)/(5000*4)*10^6 = 67500, which approximately corresponds to the level of 3.0 sigma, the interpolation of the Tab.1.

Sigma	DPMO	Efficiency
0.5	841 345	15,9%
1.0	691 462	30,9%
1.5	500 000	50%
2.0	308 538	69,1%
2.5	158 655	84,1%
3.0	66 807	93,3%
3.5	22 750	97,7%
4.0	6 210	99,38%
4.5	1 350	99,87%
5.0	233	99,977%
5.5	32	99,9968%
6.0	3,4	99,99966%

Tab. 1. Levels of Sigma Performance [1]

Level 3.0 sigma in this example represents 93,3% production efficiency. The area from the lower specification to the upper specification limit is the area which meets the requirements of the customer. Fig. 1 shows, that products beyond this parameters represent the defective products, which are obviously cost of poor quality for any company.

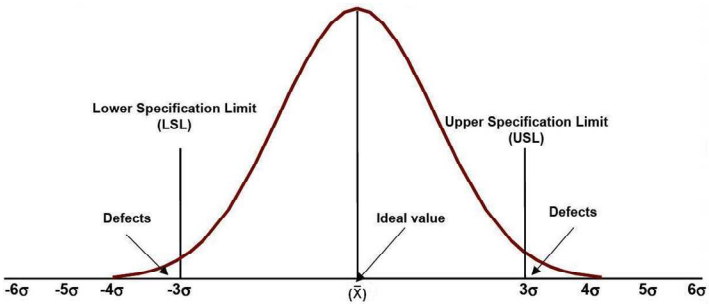

Fig. 1. Normal Distribution with specification limits set at ± three sigma

3. Implementation of Six Sigma

Six Sigma integrates the management and statistical tools to be used in various stages of implementation which are given in advance. Although their re-use or use in other phases is possible.

Six Sigma methodology is implemented through several methods, of which I will mention the one which deals with improving the existing processes in the company – DMAIC. DMAIC acronym means:

- First, the business problem is **D**efined to determine what needs to be improved.
- The team then **M**easures the current state against the desired state.
- The team **A**nalyses the root causes of the business gap.
- The team then brainstorms, selects and implements the best **I**mprovement solution.
- Last, the team **C**ontrols the long-term sustainability of the improvements by establishing monitoring mechanisms, accountabilities and work tools.

The sequence of steps and tasks in the various stages through the DMAIC process improvement is shown in Fig. 2.

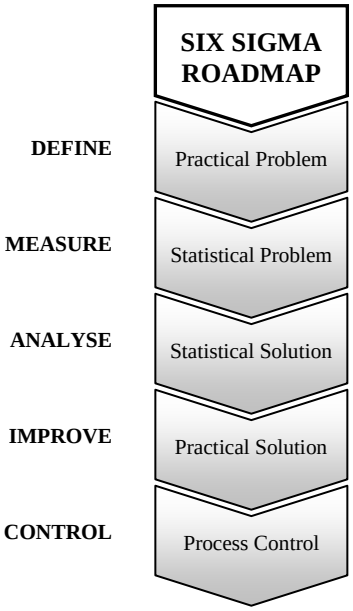

Fig. 2. The Six Sigma process

3.1. Define

This phase is to gain an understanding and clarify the goals and value of the project. The purpose is to clearly identify the problem, to estimate the financial impact of the problem, the requirements and the objectives of the project. The objectives of the project should focus on critical issues which are aligned with company's business strategy and the customer's requirements. In this initial phase is determined the project team, roles and responsibilities.

3.2. Measure

At this phase an assumption is made that the project has been approved. During this stage members of the team start to gather data on the problem. It is important to determine the correct measurement system as well as which parts of the process will be measured, because measuring all the parts would be costly. At this stage project team uses mainly statistical tools. The most commonly used tools for determining which process will be measured are Process Map, Fishbone Diagram and C & E Matrix – Cause and Effect Matrix. This phase includes a

map of relevant processes with identified Inputs and Outputs at each step of the process and validate that the problem exists based on the measurements.

3.3. Analyse

In the Analyze phase, the measurements collected in the Measure phase are analyzed so that hypotheses about the root causes of variations in the measurements can be generated and the hypothesis subsequently validated. At this stage that practical business problems are turned into statistical problems and analyzed as statistical problems. The result of this analysis is a statistical solution. The project team uses primarily tools that are graphically to demonstrate the individual measured data, such as. Pareto Diagrams, Histograms and Scatter Plots. The second group are tools that help to identify potential impacts of future changes, such as. Regression analysis and DOE – Design of Experiments.

3.4. Improve

The Improve phase focuses on developing ideas to remove root causes of variation, testing and standardizing. Project team designs and implements new solutions. Proposals are obtained using brainstorming. From these, project team select the best, and then they go into the testing phase. It monitors their impact on the process and after verifying the effectiveness and then the solutions are fully implemented.

3.5. Control

In Control phase, the project team documents and publishes results of process change. At the same time, checks whether the changed process is stable and implements process control with control plan to ensure that the same problems don't reoccur by continually monitoring the processes.

4. Conclusion

Methodology Six Sigma is a management tool through which companies can solve their economic problems focused on individual business processes or outcomes.

Six Sigma is diversifying into a large oriented organizations. In the future, it is likely that more changes will emerge, making Six Sigma even more beneficial application for organizations of all types and sizes. It undoubtedly represents a way of improving productivity, quality and the effectiveness of the company's processes. The open question remains, however, the cost of implementation and time expression of the first results.

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Demographical Determinants of EU Migration - Risk and Needs

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Abstract. This paper is focused on the negative population trend in EU and its disproportion to the population trends in the less developed selected world regions as the key driver of immigration pressure in direction to the EU. The author identifies the real immigration need but also the real immigration risks into the EU and he defines the need of selective EU immigration policy and necessity of improvement of security management and risk management approach to the problematic of international migration.

Keywords: International migration, Population ageing, Migration management, EU.

1. Introduction

The impact of globalization, increasing of the disparities between the poor and wealthy part of world, increasing number of conflicts, rebalancing of the world political economical and military stability, increasing pressure to the accessibility to rare natural resources and strategic raw materials, development of IT and nano technologies, development of transport that all is impulse of increasing migration pressure as the basis of adapting the individuals and sometimes whole countries to the changes and negative impacts of rebalancing of social, economical, political and military new shape of world system.

The international migration is nowadays getting to be actual question of expert and scientific discussions as the challenge, apprehension, but also as the solution of negative development of the world economics.

The importance of migration is documented by the fact that according to the United Nations organization at the beginning of the third century there is more than the 180 million of the migrants in the world.

Nowadays there are the processes of accelerating and improving cooperation of EU states. (That is documented by the EU enlargement and also by the increasing the political and economical integration.) The enlargement of EU is inspirited and driven by the idea of creating the common market that opens the space for increasing of importance and need of development of international migration, labor mobility and also the development of the capital mobility.

Increasing importance of the international migration, solid need of increasing of managed and regulated migration related to achieving of the positive effects for the interested countries at the background of the globalizing economics as well as the respect and responsibility in migration risk management and the need of the adoption of the effective regulations (which will be able to eliminate the risks of migration processes related to the slowing down the economic development, and also be able to maximize the positive effects of migration as accelerator of economic growth) can be taught to be one of key topics for the scientific and political discussion in present time.

2. Demographical trends in EU

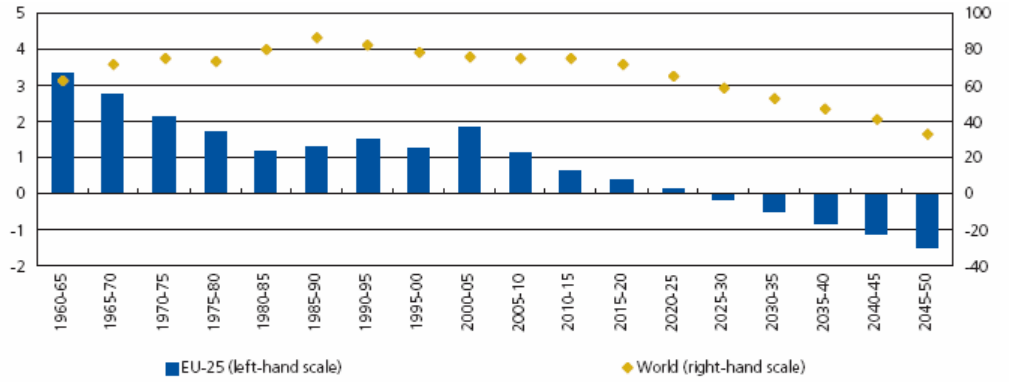
International migration as a process determining the future prosperity is for Europe and also the European Union key phenomenon. It is possible to identify the importance and the necessity of researching and predicting and managing the international migration in the area of the EU.

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
EU-25	458,5	464,1	467,3	469,3	470,1	469,4	467,0	463,0	457,3	449,8
EU-15	384,5	390,7	394,7	397,5	398,8	398,7	397,3	394,6	390,3	384,4
Euro zone	310,2	315,1	317,9	319,4	319,7	318,9	317,1	314,3	310,0	304,4
Belgium	10,4	10,6	10,7	10,8	10,9	11,0	11,0	11,0	11,0	10,9
Czech republic	10,2	10,1	10,0	9,9	9,8	9,7	9,5	9,3	9,9	8,9
Denmark	5,4	5,5	5,5	5,5	5,6	5,6	5,6	5,5	5,5	5,4
Germany	82,6	82,8	82,9	82,7	82,1	81,1	79,9	78,4	76,7	74,6
Estonia	1,3	1,3	1,3	1,2	1,2	1,2	1,2	1,2	1,1	1,1
Greece	11,1	11,3	11,4	11,4	11,4	11,3	11,2	11,1	10,9	10,6
Spain	42,9	44,6	45,3	45,6	45,6	45,4	45,1	44,6	43,9	42,8
France	60,2	61,5	62,6	63,6	64,4	65,1	65,7	66,0	65,9	65,7
Ireland	4,1	4,3	4,6	4,8	4,9	5,1	5,2	5,3	5,4	5,5
Italia	58,2	58,6	58,6	58,3	57,8	57,1	56,3	55,3	54,2	52,7
Cyprus	0,7	0,8	0,8	0,9	0,9	0,9	0,9	1,0	1,0	1,0
Lotyšsko	2,3	2,2	2,2	2,1	2,1	2,0	1,9	1,9	1,9	1,9
Litva	3,4	3,3	3,3	3,2	3,1	3,1	3,0	3,0	2,9	2,9
Luxemburg	0,5	0,5	0,5	0,5	0,5	0,6	0,6	0,6	0,6	0,6
Hungary	10,1	10,0	9,8	9,7	9,6	9,5	9,4	9,2	9,1	8,9
Malta	0,4	0,4	0,4	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Holland	16,3	16,7	17,0	17,2	17,4	17,6	17,7	17,6	17,5	17,4
Austria	8,1	8,3	8,4	8,4	8,5	8,5	8,5	8,4	8,3	8,2
Poland	38,1	37,8	37,4	37,1	36,8	36,5	36,1	35,4	34,5	33,7
Portugal	10,5	10,7	10,8	10,8	10,7	10,7	10,6	10,4	10,2	10,0
Slovenia	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	1,9	1,9
Slovakia	5,4	5,3	5,3	5,3	5,2	5,2	5,1	5,0	4,9	4,7
Finland	5,2	5,3	5,4	5,4	5,4	5,4	5,4	5,4	5,3	5,2
Sweden	9,0	9,2	9,4	9,6	9,8	9,9	10,0	10,1	10,1	10,2
Great Britain	59,9	60,9	61,9	62,9	63,8	64,4	64,7	64,7	64,6	64,3
Bulgaria	7,7	7,4	7,1	6,8	6,5	6,2	5,9	5,6	5,4	5,1
Romania	21,7	21,3	20,9	20,3	19,7	19,2	18,8	18,3	17,8	17,1

Tab 1 Population projections (at 1. January, million)

Estimating of Eurostat confirms our opinion about challenge of the negative population trend. According the data in table 1 we can see that if the present population trend will last the EU will be confronted with decreasing and ageing of the population. The worst situation will be in Germany some about 8 million inhabitants, Italy 5,5 million inhabitants. In the area of EU it will be more than 15,9 million inhabitants. It is interesting that estimations shows only 100000 population decreasing in EU-15. That will be caused by the increased migration from the other EU states to the EU-15 profitable area. Negative population trend is significant also in the new member states from the enlargement in the years 2004 and 2007. It is easy to state that these enlargements didn't cause the dramatic change in bad proportions of EU population.

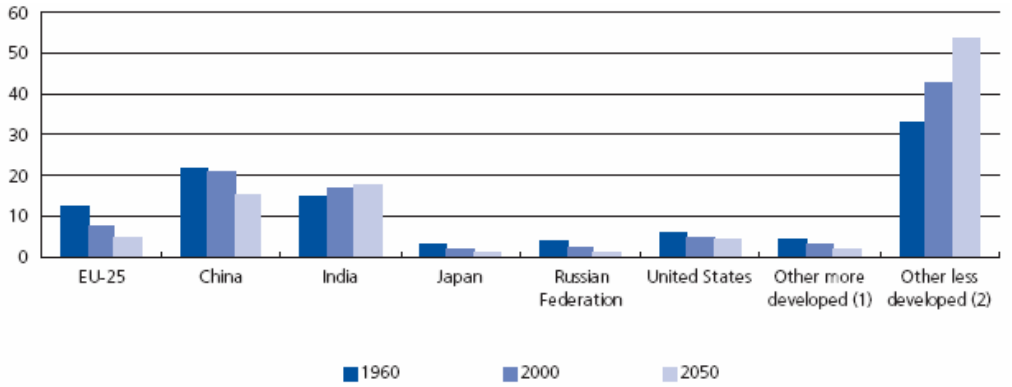
3. Comparing of EU population projections to the population projections in selected world regions



Source (excluding EU-25): United Nations, Population Division of the Department of Economic and Social Affairs.
The inhabitants of a given area on 1 January of the year in question (or, in some cases, on 31 December of the previous year); the population is based on data from the most recent census adjusted by the components of population change produced since the last census, or based on population registers. The data presented include population projections.

Fig. 1. Population change (Average annual, million)

Graph no. 1 shows the population change. According to this graph EU will start have the negative population change in the period between the years 2025 and 2030 and this negative population change will increase until the year 20250 up to the – 35 millions inhabitants.



(1) Excluding EU-25, Japan, United States and the Russian Federation.
(2) Excluding China and India.
Source (excluding EU-25): United Nations, Population Division of the Department of Economic and Social Affairs.

Fig. 2 World population (% of total)

Graph 2 shows share the selected regions on the world population and as we can see that there will be dramatic change of proportions of world population in 2050 for increasing of total population in less developed countries.

Presented data and graphs show that there is real need of supporting the immigration processes into the EU, but there is also the risk of huge immigration pressure which will overcome the needs of EU. The key drivers of these processes are the negative population trend, large disparities in social and economic development in EU and the future population

dominating less developed countries. These processes can cause the problems in the systems of social prevention and also in the labor markets. Migration represents also the social risk and the multicultural dilemmas. Nowadays we can say that the possible migration moves represent the highest unmilitary security risk. Problematic of international migration is very complicated because of its multilevel and transgeneration character.

Conclusion

At the end we can state negative trend of EU population projections. We can also confirm the increasing of importance of implementing effective multilevel migration management in the EU area. EU migration management should be based on selective immigration policy. It should be from the decision and executive institutions the complex of logical, in time, and functional step by step actions, which should be able to insure the dynamic balance between the state in structure and number of migrants real and needed by the monitoring actual migration state and migration needs, predicting the future real and needed state of immigration flows and by the active forcing in intentions of transformations actual state of migration flows to state needed. Real risk of immigration movements is source of social, economical, political, and also security risks, that makes the migration one of the most actual challenges for security and also for the risk management.

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Activities of China in the African Continent - Solidarity or Geopolitical Strategy

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Abstract. China's overall trade with Africa rose from $10.6 billion in 2000 to $40bn in 2006 and continues to increase, according to Chinese government statistics. China is resolutely and rapidly extending its presence and influence across the African continent as its companies move into terrain where western businesses hesitate to tread. In less than 10 years China has secured oil production and exploration deals in countries from the Red Sea to the Gulf of Guinea.

Keywords: International migration, Population ageing, Migration management, EU.

1. Introduction

We are living in the period of increasing pressure on needs of raw materials and energies. We can see the processes of accelerating of scientific and technological development and also the increasing size and variability of world output. Present time can be characterized like the period of overexploiting the raw materials. It seems to be clear that the question of securing the energy and natural sources is getting to be more and more actual, not only in short or midterm point of view, but also in the long term horizon.

2. Selected strategic activities of the most important world economies

At the present level of exploiting the world´s resources of energies and the raw materials we can see the strategic geopolitical activities, which are done by the most important economies with intention to get the forced position in the regions with large raw materials and energetic resources. We can see tendency of the Russian federation to get control of the polar resources of raw materials, we can also see the attempts of Russia to clear demonstration of territorial interests supported by the increasing impact of Russian oil and gas in Europe and Turkey. It is possible to identify the tendency of the USA to defend its influence and strategic position in middle east countries and Persian gulf etc.. In this mentioned context of geopolitical competition about rule over the world´s most important resources of oil and the other raw materials and energetic sources we can see the increasing activities of China as the developing and ambitious state.

2.1. Increasing of Chinese activities in Africa

The activities of China about increasing its impacts to the important strategic resources of the raw materials and energetic sources are naturally determined by the extension and the real needs of dynamic development of the China´s economics. As the important factor for this reality we can identify the general energetic intensity of China´s economics. The activities of China are territorially oriented to the regions and regimes which are agreeable with China´s regime. It is possible to identify the attempts of China to saturate the territories which are easy to manipulate to the relation of dependence on the China´s economic help, thanks to their unsure social and economic situation, high level of corruption or trade and political international isolation. China´s economic help is compensated by the cheap supplies of the raw materials and energetic sources. In this context the China´s attempts to get control over the African continent seems to be logical result of the China´s position in the international relations.

2.2. Why Africa?

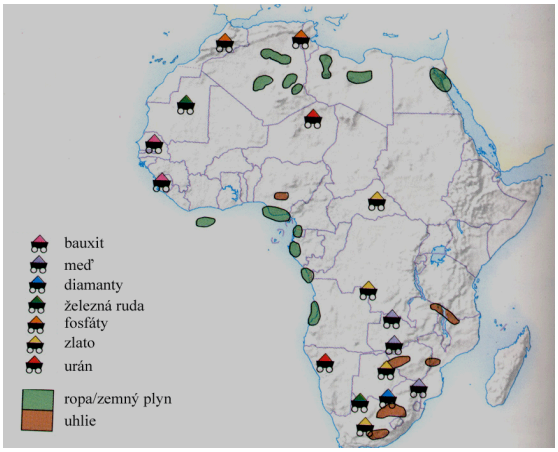

Fig. 1. Alocation of raw materials in Africa

Africa is with its area of 30 million km2 and population 661 million of inhabitants follows the Asia as the second largest continent of the world.[1] It can be seen as the large space for realization of the Chinese products in case of future development of economic situation in the supported African states. In spite of the good climatic conditions and huge sources of raw materials nearly all of the African states can be classified as the less developed countries. The differences in social and economic development allow China to get to the African markets and get the cheap imports of the important raw materials. These raw materials are used in production of the goods with higher added value. This is the impulse of Chinese profits from the trading with African states. Back warded African industry enables the existence of over plus of the cheap raw materials in Africa. Moreover, there are lots of states which are in primary dependency on the exports of the raw materials.

State	**Raw material**	**Share on state export**
Algeria	oil, gas	96,6%
Angola	oil	90%
Botswana	diamantes	74%
Gabon	oil	82%
Guinea	bauxite	70%
Congo	oil	80%
Libya	oil, gas	97%
Niger	uranium	67%

Nigeria	oil	98%
Togo	phosphates	50%
Zambia	copper	85,2%

Tab. 1. African states in dependency on export of one raw material

In table one it is possible to see the most famous African states in primary dependency on exporting the raw materials. As the table one shows the worst situation and the strongest dependency on exporting the raw material is in Nigeria, Libya, Algeria with the share of oil export on the level about 98 – 96% of total state export. This fact has a serious impact on the economic stability these states. Economic and social and political situation in these states is very sensible to the moves of world prices of the exported commodities. As it can be seen in table one there are more than ten countries which share of export of one commodity on the total volume of export is higher than 50% and ten countries in which that one is more than 65% and four countries in which that one is equal or higher than 90%. Depicted situation is source of social, economical, political, and also security risk.

State	Raw material	% of the world mining
Demokrat.rep. Congo	diamantes	3rd of the world
Guinea	bauxite	2nd of the world
JAR	gold	1st of the world (25% the world mining)
	diamantes	5th of the world
	chrome	1st of the world
	vanadium	1st of the world
	platinum	1st of the world
	manganese	20% of the world mining
Namibia	uranium	5th of the world
Morocco	phosphates	3rd of the world (3/4 world´s supplies)
Zambia	copper	5th of the world

Tab. 2. African exporters of raw materials of world importance

Most of the exploited materials are exported. The most important raw materials are these oil, gas, uranium, gold, diamantes, platinum and metals, bauxite iron ores, manganese etc..

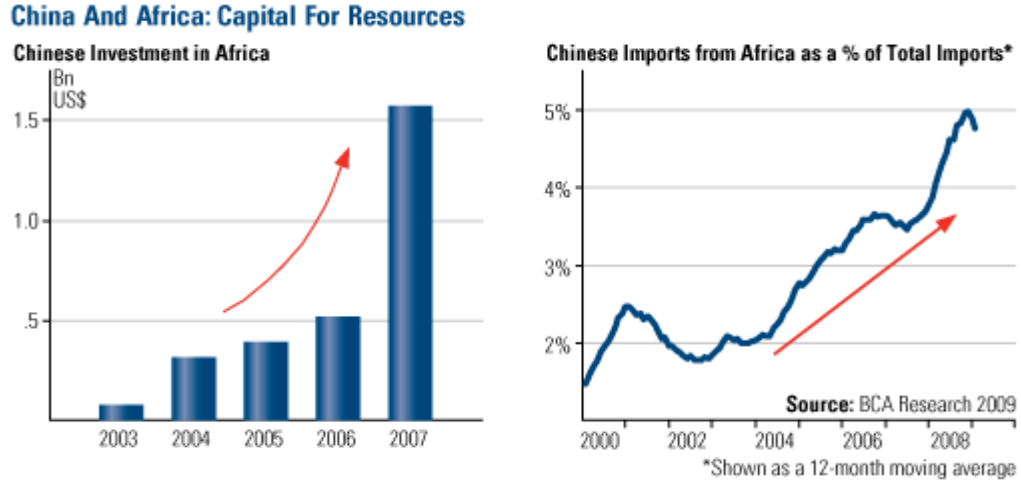

Fig. 2. Figures of Chinese investment in Africa and Chinese Imports from Africa as a % of total imports.

According the figures in the picture two there are flows of the Chinese billions into the Africa and the oil, gas and the other raw materials back into the China. It can be seen from the figures above the volume of Chinese direct investments into the Africa in the period 2003 – 2007 rose from about 0,1 billion USD up to the 1,6 billion USD. The most significant rising of volume of Chinese foreign direct investments into the Africa can be identified in the year 2007. Year to year change of volume of Chinese foreign direct investments in to the Africa in this year compared to the year 2006 was more than 1billion USD. Increasing trend can be identified also in China´s imports from Africa. In the period 2000 – 2008 the share of imports from Africa on the whole import to China rose up some about 4%.

Improving relations between the China and the African states can not be sized without the considering the huge economic development of China and its tries to empower its position in system of international relations in the long term perspective. From the African states point of view it is possible, in the cooperation with China, to find not only negative impacts on natural resources, but also positive effects of changing technologies, know how.

3. Conclusion

At the end we can state the serious impact of Chinese foreign trade activities to the selected African countries. In long term perspective we consider the empowering of China´s position in Africa to be really competitive and dangerous for the energetic and raw material stability of the world. According to our opinion there are some serious worries for the over exploiting of the world sources of energies and the raw materials through the imports of African materials to China's rapidly growing economic.

According to our opinion it is necessary by the effective foreign-trade policy to create opposition to the China´s imports of cheap African natural sources. It is necessary because of the possibility that the African sources can be used by China for getting 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 we think, 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. We think that the 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.

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Financial Provision of Crime Prevention in Slovakia

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Abstract. At the 1st of January the law of crime prevention and other antisocial activities came into the force. From this date not only the Crime Prevention Strategy in the Slovak Republic in the years 2007 – 2010 determinates the financial provision of crime prevention. The new law determinate the organization and force of organs of general power in the field of crime prevention. The law determinate the new rules of securing the rational financial provision of crime prevention too.

Keywords: financial provision, crime prevention, crime prevention strategy.

1. Introduction

Recently only the Crime Prevention Strategy in the Slovak Republic in the years 2007 – 2010 adverted how to use finance for the crime prevention. After approval of the bill on prevention of crime and other antisocial activities, financial provision of prevention is solved by this law too. Financial participation will still be required at financial provision of prevention projects, especially in the case of situational prevention.

2. Three - level prevention system and its financial provision

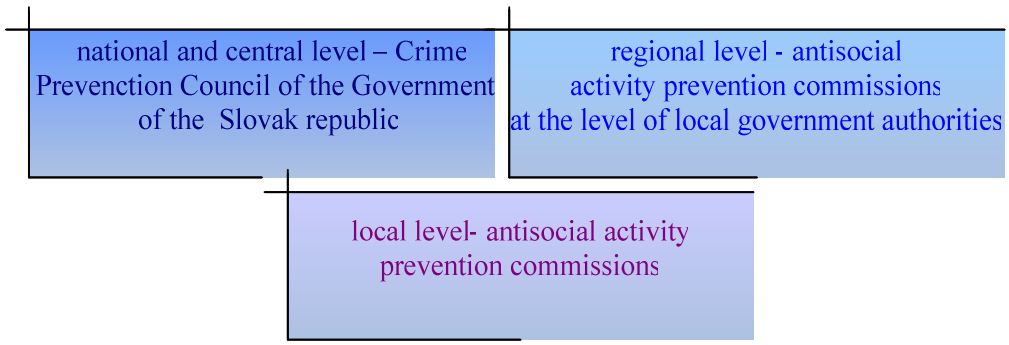

Fig. 1. Three level prevention system.

Following the **national** strategies, financial resources from the state budget were at first reserved on the suggestion of the RVPK in the chapter General Treasury Management. A positive trait of reserving financial resources was the continuity. The negative was their insufficient amount in respect of requirements of entities performing prevention projects and lack of systematic approach at financial provision of a whole range of crime prevention activities. In the past, **ministries** had to follow the strategies and reserve resources for

prevention within the framework of their own budgets. But it could not be done in the full extent because of restricted financial resources

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At the **regional level**, relevant authorities accepted requirements for financial provision of prevention and suggested their support. After their approval contracts were concluded between claimants and performers of the prevention and financial resources from the chapter of the Ministry of Interior were allocated. At the **local level**, financial provision of prevention was augmented by financial participation of entities at performance of the projects.

In 2007 – 2010, provision of crime prevention financing is required from reserved budget resources within the scope of the individual department budgets.

The Crime Prevention Strategy in the Slovak Republic in the years 2007 – 2010 and its global priorities require appropriate financial provision in the optimum amount – SKK 40 million annually. These resources will be allocated in the budget chapter of the Ministry of Interior of the SR from 2008 to 2010.

3. Quantification of financial resources of the individual state authorities

State authority	year 2007	year 2008	year 2009	year 2010
Ministry of Interior of the SR	16,9	40	40	40
National Bank of Slovakia	-	-	-	-
Supreme Court of the SR	8,28 *(bežné)* 1,5 *(kapitálové)*	17,5 0,5	18,65 0,2	19,85 0,2
Office of Prosecutor General of the SR	-	-	-	-
Ministry of Agriculture of the SR	0,44	0,44	0,44	0,44
Statistical Office of the SR	-	1,9	-	2,1
Ministry of Transport, Posts and Telecommunications of the SR	-	-	-	-
Ministry of Construction and Regional Development of the SR	-	-	-	-
Ministry of Foreign Affairs of the SR	-	-	-	-
Ministry of Labour, Social Affairs and Family of the SR	-	-	-	-
The Government Office – GS DZKD	-	-	-	-
Ministry of Finance of the SR	-	-	-	-
Ministry of Defence of the SR	1,5	1,5	1,5	1,5
Public Procurement Authority of the SR	-	-	-	-
Administration of State Material Reserves of the SR	-	-	-	-
National Security Authority of the SR	-	-	-	-
The Supreme Audit Office of the SR	-	-	-	-
Ministry of Health of the SR	5,0	-	-	-
Ministry of Culture of the SR	-	0,3	0,3	0,3
Ministry of Justice of the SR	-	0,1	0,2 0,1	0,1

Ministry of Education of the SR	1,8	1,8	1,8	1,8
Ministry of the Environment of the SR	325,390 *			
Geodesy, Cartography and Cadastre Authority of the SR	-	-	-	-
Nuclear Regulatory Authority of the SR	-	-	-	-

Tab. 1 Quantification of financial resources, which the individual state authorities plan to use in their budgets for crime prevention (in millions of SKK)

The individual public authorities plan to use for financing of their crime prevention related activities between 2007 and 2010 financial resources according to their own budget possibilities.

4. Financial provision of crime prevention by the law of crime prevention and other antisocial activities

For financing project in the field of the prevention criminality, which approved council by subsection grant provides neighborhood office in the seat of the region. For financing project in the field of the prevention criminality, which approved relevant Ministry, grant provides relevant Ministry.

The grant is possible to offer maximum to 80% of supposed expenses of the project. The grant is possible to offer to an applicant, who proves that has on financing of project safety at least for 20% of financial resources from different source than the state budget. In relevant fiscal year grant on the project can be offered only once.

The grant can't be offered to an applicant, who is:

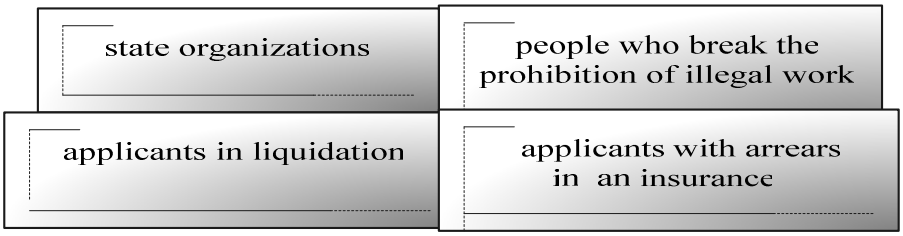

Fig. 2. pplicants who can't get the grant

If the applicants are from figure 2, than the grant cannot be granted them and the unused financial resources must be returned in 15 days of charging the grant.

Ministry of Interior of the SR gives 1, 3 millions of Euro on projects of crime prevention in year 2009. The sum is the same than in the last year when this ministry supported 138 projects from 263 projects which had been submitted.

Crime Prevention Council of the Government of the SR put out a new call appeal for projects of crime prevention. These projects are possible to set up in the area of social, situational and victimization prevention. They must be in according to the Crime Prevention Strategy in the Slovak Republic in the years 2007 – 2010.

The projects should be aimed to prevention and elimination of the crime of children and the youth. The law will take 65 060 € from the budget - this is the lump sum tax. And then every year it will take 1, 57 mil. €.

* Financial resources of the Ministry of the Environment of the Slovak Republic are intended especially at protection of water reserves, operation of alarm devices, water guard, and information and education campaigns

5. Conclusion

Prevention entities at individual levels will apply for financial resources for prevention programs also from EU funds. Therefore it is necessary to ensure coordination of allocation of financial resources to prevention programs from the EU funds for individual prevention entities.

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Vehicles Unimog used in HaZZ Poprad and Experience with them

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Abstract. This article deals with fire trucks to the terrene used by HaZZ (Hasičský a záchranný zbor - Fire and rescue department) Poprad. Focus on vehicles Unimog designated for forest fire-fighting. Shortly describes them and dealt about their positives and negatives. Moreover article focus on compare of Unimog used in HaZZ Poprad.

Keywords: extinguishing, fire, terrain, vehicle.

1. Introduction

Slovakia is a country with a heterogeneous geography of surface. It is made by plains, hollows, uplands, highlands, mountainous and it is covered by woods more than 40% from all part of territory [1]. Every year there are hundreds of forest fires which are often in hardly accessible places.

Into sphere of action of HaZZ Poprad belongs to also part the highest mountains in Slovakia (High Tatras). This environment imagines for vehicle movement in the nature hard terrain conditions. Therefore poprad's firemen needs quality vehicles, which can be use in hardly accessible terrain.

2. Fire-fighting fleet in Poprad

HaZZ in Poprad operates the variety of the land transportation vehicles. The complete list of the vehicles used at interventions in hardly accessible terrain can be visible in the following table 1.

Vozidlo	Type of vehicle	Year of manufacture
Tatra T148	Automobile	1979
Unimog U 1550 L/37	Automobile	2001
Unimog U 4000 L – hiromax	Automobile	2005
Scot Trac 2000R	Slide-controlled vehicle	2005
Bombardier SKI-DOO Expedition V1300	Snowmobile	2007

Tab. 1. Vehicles of HaZZ Poprad used at interventions in hardly accessible terrain.

The Tatra T-148 is the oldest, however, thanks to adequate service the car is in the full-action condition. It is not suited for the heavy terrain actions, but in the lighter settings it helps a lot. The advantage of this automobile is hidden in its huge water tank which volume reaches 6,000 liters. On the other hand, full-loaded car is too heavy for the cart-roads. Nonetheless, the

low-cost maintenance and easy handling made out of this vehicle very popular tool among the firefighters.

The Unimog vehicles are well-known all over the world because of the suitability of using them in all-terrain actions. This vehicle is described in detail in the article. Among the special vehicles belongs also the slide-controlled vehicle Scot Trac. Its very special vehicle used mainly in the time of heavy and long-lasting fires.

For the actions in the winter conditions there is a snowmobile Bombardier SKI-DOO Expedition V1300 equipped with the sledge. According to the fact that this snowmobile is not for a long time in the Poprad´s firefighting department, there have not been opportunities to use it yet. Moreover, there is needed snow to make it usable. The future use can be described as the people or material transportation or as environment survey.

3. Unimog U 1550 L/37

The chassis of this (figure 1) car has been made by Daimler Chrysler in the firefighting modification. The base of the carriage is composed of the flexible frame which allows a deal of flexibility during driving the heavy landscape. On the front of the frame there is the engine with the power 155 kW and revolutions at 2400 rpm. The maximum speed of this automobile is 95 km/h. In the two-door cabin which is equipped with the dust-free ventilation is a place for three passengers.

The vehicle superstructure was developed in the Austrian company named “Rosenbauer”. There is a built-in 2,500 liters water and 200 liters foamier tank. The water transportation is sheltered by the Rosenbauer pump NH30 which has the maximum pumping power 3,000 l/min. at the 10 bar pressure or 400 l/min. at the 40 bar pressure. Unimog has two hose reels for the immediate action and among the ordinary equipment it belongs also breathing apparatuses, hoses of classes B, C, and D, floating pump, or power-saw [2].

Fig. 1. Unimog U 1550 L/37.

According to the fact of 8-year service, the Unimog of the Poprad fire department has been used in many actions. It has been used not only at the heavy duty environment such as forest fire eliminations, but also at the miscellaneous technical actions, pulling the cars out of channels, for example. The only bad feature of this vehicle is very high gravity centre that

provides worse driving conditions. However, this car is very popular piece of the fire department equipment because of very easy maintenance and failure-free driving.

4. Unimog U 4000 L – hiromax

Chassis of Unimog U 4000 L is made by "Daimler Chrysler" too and has a similar construction like the Unimog u 1550 L/37.We could say that is the successor of the previous models.

On the chassis is a superstructure which is made by the company named "Transfér technológií". The base of superstructure is 2,000 litres cistern. On both sides of the cistern are situated two boxes of superstructure. Each box has on its side three up-hinged door. On the roof are covers of cleaning hatch of cistern and there are also hatches with covers which serve to fill up two 80 litres cisterns which are there for extinguishing addition. During intervention this vehicle use an extinguishing set HIROMAX A (figure 2).

The extinguishing system HIROMAX is patented system for production of aerosol at low water pressure- 8 to 10 bar (standard systems of aerosol production work with pressure 20 to 40 bar). Aerosol is created by water and air mixed in a special streamline. According the producer aerosol is suitable for fire extinguishing of oil products, vehicles, road tunnels, buildings and other closing areas where people are and to fire extinguishing some forest fires. The base of set HIROMAX A is an interconnected system of devices situated on the common frame which includes fluid motor, water pump and compressor. This pump with output pressure 10 bar provides maximal output 1,400 litres per minute and that reportedly overhangs the needs of every fire extinguishing systems of vehicles. The set HIROMAX A includes two water-hose reels which have wrapped coupled pair of hose (water and air), witch fall into the streamline [3].

Fig. 2. The extinguishing set HIROMAX A.

Thanks to the low lying gravity center the vehicle has a high riding quality in a complicated terrain. It indicates the experience of fire extinguishing the forest fire in the region Brezno in July 2007, where this vehicle handled extreme conditions. But with fire superstructure it is worse. As the doors of superstructure are dumpings and not rollers, it is not possible to open it in the dense forest. A work experience shows that extinguishing system of HIROMAX activates an oxidation of fire fireplace. Set by himself requires high motor evolve.

Design of hose system is not really good, because hoses are trapped at branches in forest terrain. They are already too warm after one or two hours of work and the weight of the streamlines are too high. Today because of those problems, this vehicle is out of service for a long time [4].

5. Unimogs comparison

In table 2 are some of technical data of Unimogs used in Poprad. Minimal requirements in table are specified in directions of president of HaZZ n. 37/2004 about modification of basic technical data and technical equipment of fire trucks for forest fire-fighting [5].

	Parameter	Minimum requirements	Unimog U 1550 L/37	Unimog - Hiromax
Chassis	Ascent angle (º)	27	35	45
	Tilt angle (º)	25	27	38
	Angle of approach (º)	35	30	44
	Angle of departure (º)	35	47	51
	Ground clearance (mm)	400	440	434
	Wheelbase (mm)	-	3700	3850
	Wade (mm)	750	800	1200
	Gross weight (kg)	9,5 - 12,5	9500	9500
	Dimensions - length (mm)	-	6435	6010
	Dimensions - width (mm)	-	2375	2662
	Dimensions - height (mm)	-	3295	2658
	Max. speed (km/h)	80	95	85
	Engine output (kW/t)	11	16,32	13,68
	Engine speed (rpm)	-	2400	2200
	Number of seats	3	3	3
Superstruct.	Tank capacity - water (l)	2500 - 3500	2500	2000
	Tank capacity - addition (l)	-	200	160
	Water pump - low-press. (l/min)	1800	2400	1400
	Water pump - high-press. (l/min)	250	250	-
	Air compressor (l/min)	-	-	1200

*Notice: marked data can be soft different in practice.

Tab. 2. Technical data of vehicles Unimog used in Poprad.

Compared to these cars (figure 3.) we find that the Unimog - HIROMAX dominated mainly in the properties of the terrain accessibility (Angle of approach and departure, ascent angle, tilt angle, wade). Classical Unimog has more powerful engine and reaches a higher maximum speed (maximum speed but it is not in movement on the ground important). As regards the parameters of the superstructure, it is better classic Unimog. It has more volume tanks and more powerful water pump. However, it is necessary to take into account that these parameters are sufficient for the extinguishing system of the Unimog HIROMAX. Absence of air compressor with classic Unimog is irrelevant, because the compressor is used exclusively for the operation of the extinguishing system HIROMAX. Equipment of vehicles is approximately the same, so it does not make sense to include in the comparison.

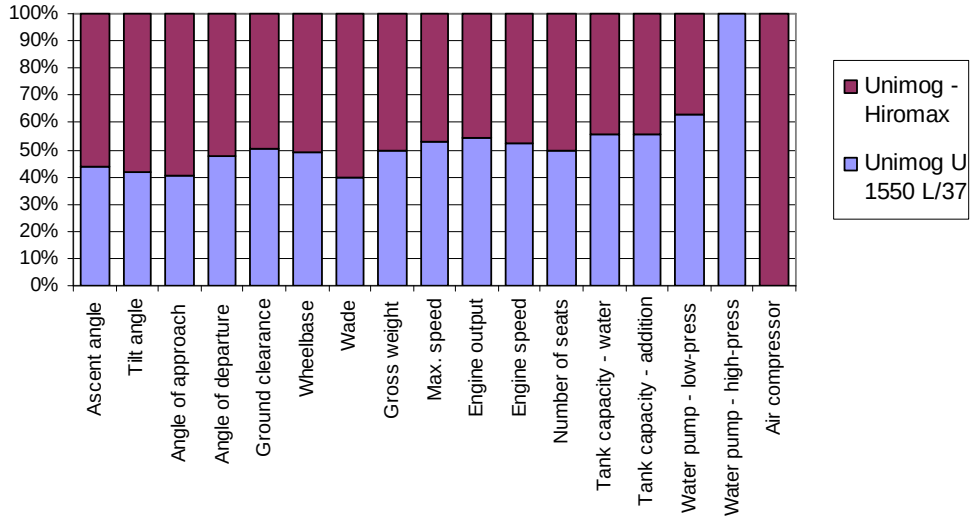

Fig. 3. Compare of technical data of Unimogs.

6. Conclusion

Extensive forest fires in hardly accessible terrain are very difficult to liquidate, it is best to locate them at the outset. To make this possible, it requires a good technique, which not only can safely overcome the difficult terrain, but also ensure the smooth supply of extinguisher agents.

In the Poprad are the vehicles, which satisfying the current requirements. Unimog vehicles have excellent handling characteristics and a sufficient supply of extinguishing agent. Even when the Unimog-HIROMAX has some technical difficulties and is now out of order have Poprads firemen available vehicles to hardly accessible terrain and are ready to intervention in hardly accessible places.

From below it is clear that the vehicle superstructure Unimog-HIROMAX is not well resolved and that the system HIROMAX A is not very suitable for extinguishing forest fires. These problems would solve the complete reconstruction of the superstructure, but in financial terms it is currently difficult to implement.

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Risk Analysis of Transport and Storage of Crude Oil, Case Study

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Abstract. In this paper we try to show how important is to find effective prevention tools in case of transport and storage of Crude Oil. We point out on one case study in "Buncefield" for better understanding of problem with damages and the hazardousness of accidents in storage tank farms of petroleum products. Then we're trying to find some similarities in Portuguese area in Sines complex storage tank farm, by doing some risk assessment. This assessment we provide by different ways. Firsttly we use with norm of Australian and New Zealand Risk Management; AS/NZS 4360:1999. After this we also use the TerEx software for forecasting possible accidents and scenarios. In the end we show how to evaluate possible contamination by the storage tanks with a method developed by the Energy Institute. With this work we try to represent the consequences (direct and indirect) of an accident of this type.

Keywords: risk, analysis, crude oil, case study.

1. Introduction

Within this paper we studied and analyzed risks associated with the transport and storage of Crude Oil. The case study "Buncefield" was prepared for better understanding of the reaction and consequences after the damages and the hazardousness of accidents in storage tank farms of petroleum products.

We did some analysis of risk with Sines complex storage tank farm (located in Portugal) and for this we had use different ways of assessment. We start assessment with norm of Australian and New Zealand Risk Management; AS/NZS 4360:1999. In the next step we would like to use event fault trees and event trees analysis for better understand form where the risk can become. This will be part of our future study to this problem. On the other hand we had used program TerEx – Terrorist Expert, for forecasting possible accidents and scenarios. With this work we try to represent the consequences, direct and indirect, of this type of accident, which can produce in the region.

2. Description of the Problem in Study

With this work we want to describe what are the risk's associated with the transport and storage of crude, with case study of "Buncefield" in England. For this we will have one complex of petroleum in consideration and this complex we will study and apply some techniques of risk analysis. The complex that we will study is located in Sines, 150 km from Lisbon, is the principal gate of entrance petroleum products and there is the local where they

refining 10,8 million ton per year (223 thousand barrels/day) (Resource Galp Energia) of crude – oil. This complex is positioned from the centre of the town at 4,41 km in a line (coordinates in Mercator Transverse Universal are: Centre of the city, X=511080, 64; Y=4201024, 37; with one elevation above the sea of 40 meters; one extreme in the Petroleum complex, X=515438, 81; Y=4201643, 71; with one elevation above the sea level of 49 meters. Resource Google Earth). And the harbor, where the petroleum products arrive by maritime transport is inside of the city, 1,21 km from one point (coordinates in Mercator Transverse Universal is: X=509987, 04; Y=4200525, 51; with one elevation above the sea of 2 meters. Resource Google Earth) to the centre of the city. Can this small distance represent some risk for the inhabitants and the pipeline transport? What can we do for reduce this risk? What new measures can we put on the field for increase the safety of the zone? Is it possible, that accident of "Buncefield" can have similar consequences in this Complex of Storage?

3. Study Case – Buncefield

An early morning of 11/12/2005, a normal Sunday in England, something was happening that causes a terrible disaster and put the country under a terrible smoke cloud. Nobody could predict that one tank form the Buncefield tank farm over filled and start to spilled the petroleum for almost the entire complex and provoke a terrible accident in the story of that country since the last World war. Second on report form the company SQW (www.sqw.co.uk), and the report is called: "Buncefield Social Impact Assessment Final Report", in the first lines of the introduction they said this : "(…) was the largest peacetime fire in Europe.", so with this affirmation we can realize the size and the harmful of that fire was. General maps where the locality is located in the United Kingdom is shown in figure 1 and detailed in figure 2.

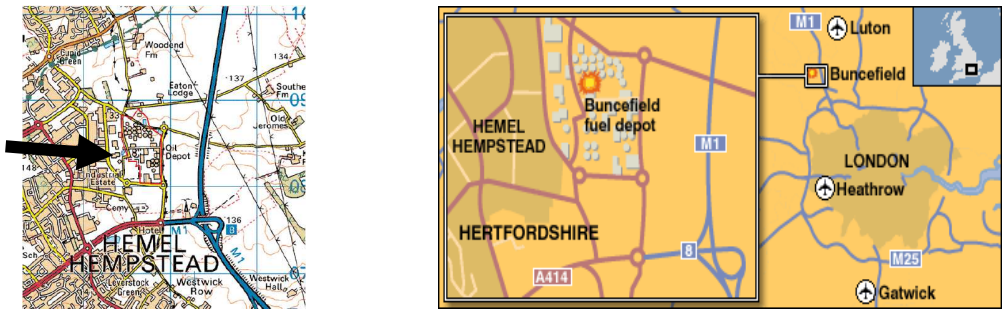

Fig. 1. map view; resource: http://news.bbc.co.uk/2/hi/uk_news/4525504.stm / global view; resource: "Buncefield Report Investigation Progress Report".

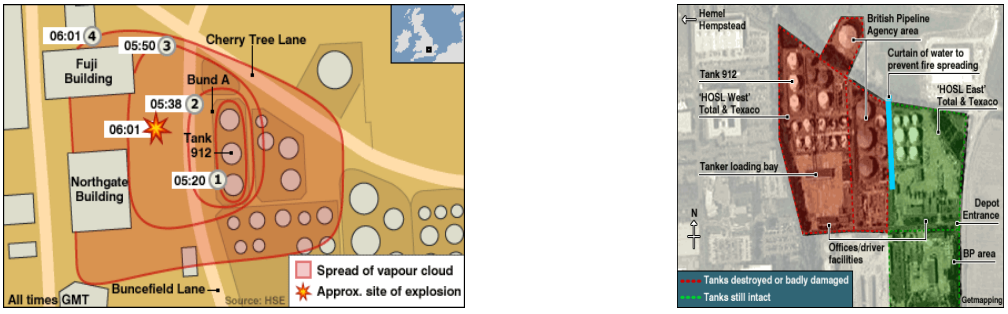

Fig. 2. record of the time; resource: http://news.bbc.co.uk/2/hi/uk_news/4525504.stm / What happen in that morning, 11/12/05, in the tank farm? / location of the tank; resource: Pool Fire

A pool fire is when you have a large quantity of one inflammable product storage in some large tank. This liquid is all the time producing some vapor because of the phenomenon of evaporation. If are some leak one the storage tank it will produce two different types of situations. The first situation you will have a pool of inflammable liquid in the ground and the second situation you will have entire surrounding environment saturated with evaporation product. If we had some source of ignition the fire will start. Sometimes it doesn't need any source of ignition because the environmental temperature is enough to auto – ignition the liquid.

If the fire starts on a pool ground with some minutes later we will have the transfer of heating from the pool on the floor for the large storage tank.

This type of fires is difficult to control and sometimes it can produce some jet fires with liquid rain form the jet. This means it can originate another fires in the complex.

In the figure above we can see an example of pool fire.

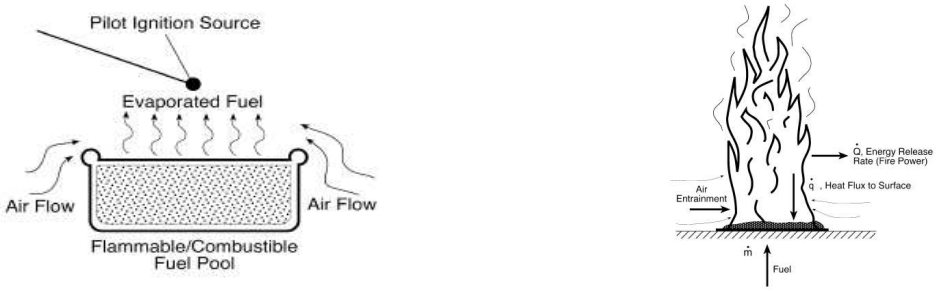

Fig. 3. scheme of a pool fire; resource: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1805/final-report/ch3-6.pdf.

We can see in the figures that exists the liquid (fuel) and is all the time evaporating due to the circulation of the air surrounding and the temperature. If exist one source of ignition near the fire will start (the fire triangle is completed; fuel, oxygen and ignition). After it starts it is very difficult to control it because like we can see in the image of the right we have the fuel on the bottom, and air in the environment.

Pool fire can have their origin in simple things like a cigarette or light of a lighter.

4. Risk Analysis with the Program TerEx

In this accident with these characteristics we will have burns of the first degree at one distance of 325 meters and upper we will only ear the sound and the light. With 60 seconds of exposure we will have 10% rate of mortality will be at one distance of 186 meters form the centre of the explosion. Rate for 50% will be at one distance of 161 meters. Inflammation of dry wood it will be at one distance of 97 meters and the firmness of steal start to break at one distance of 49 meters. The screenshot of the simulation can be seen in Figure 4. In our simulations we compared the pool fire and the PLUME's.

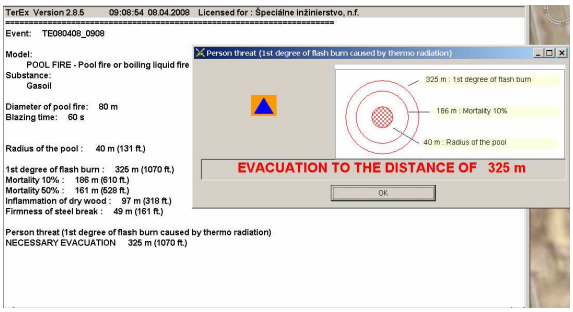

Fig. 4. screenshot of the simulation from software TerEx.

5. Conclusion

In the conclusion of this work we can realize accidents with storage and transport of the Crude Oil are a reality in our world. Most of the time accidents happen because system doesn't work correctly (study case "Buncefield" is a good example but are more and if we look through the work we will find some links to a web site where you can find more examples of fault functions or human error). "Buncefield" case is a good example of that kind of major accidents happens in nowadays, in XXI century and in rich countries, isn't only in the poor countries.

For assessing the risk we had use a wide variety of different methods. [2]

With the norm of Australian and New Zealand Risk Management; AS/NZS 4360:1999 we have assess the storage with an unacceptable risk and in this area we need to intervene right now or we can have a major accident. Maritime transport was assess like acceptable risk, they need to do more things for reduce the risk. [1] Pipeline transport was assessing like minimum and acceptable risk if we do some more work it can become smallest. Of course this work is based in our evaluation and this can change form person to person but we try to make all the cases for the worst scenario possible. So if other persons do the same work that we did the values won't change too much.

What we present here it is only a sample of the work we would like to done.

With the program TerEx we simulated different accidents in the same area and the output of the programs was the distance of evacuation. Without any doubt the scenarios of pool fires are much worst than the PLUME's but we can't forget PLUME's can be a starter for a pool fire.

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Influence of Inerts on Explosion Limits of Hybrid Mixture

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Abstract. Problems of formation of hybrid mixtures are a rather neglected hazard to the manufacturing process. With the origin of such mixtures a necessity of minimizing possible risks that may accompany the formation of hybrid mixtures is connected as well. The article focuses especially on problems of possible inerting hybrid mixtures.

Keywords: Inerting, hybrid mixture, prevention

1. Introduction

At present, when new substances are used, the formation of hybrid mixture is not any great problem; that appears at the moment when a possibility of formation of hybrid mixture is neglected and thus a hazard resulting from the formation of hybrid mixture is not handled sufficiently.

One of possibilities of preventing large-scale damage that can be caused by the occurrence of hybrid mixture is efficient inerting this mixture.

2. Definition of basic terms used

2.1. Lower explosion limit

The lower explosion limit (henceforth referred to as LEL) is the lower limit of explosion range [2]. LEL represents such value when a shortage of flammable substance in the mixture with an oxidizing agent manifests itself. Here it should be stated that LEL does not depend on a ratio of oxygen to nitrogen in the mixture as stated frequently [1].

2.2. Hybrid mixture

The hybrid mixture is a mixture of air and flammable substances of different physical conditions [2]. It should be mentioned here that a small amount of vapours of a flammable liquid or a flammable gas is sufficient for reducing the lower explosion limit of flammable dust-air mixture.

2.3. Inerting

Inerting is included in primary explosion protection. In practice this method is increasingly utilized for its efficiency and maintaining safety. The formation of explosive concentrations is prevented by means of inert substances. What is used in practice for inerting most is gaseous nitrogen. In the course of gas inerting, the space in which the inert is to be used is necessary to be enclosed. Nitrogen is capable to ensure a rapid increase in minimum

initiation energy and a drop in maximum explosion parameters in the system. On the other hand, nitrogen has in comparison with some other inert gases (e.g. carbon dioxide CO_2) the disadvantage of having the specific thermal capacity almost equal to that of oxygen.

An admixture of inert materials with the higher specific thermal capacity will affect more a change in the lower explosion limit as well as upper explosion limit. This fact is illustrated in Fig. No. 1 where an evident difference between the use of nitrogen and that of carbon dioxide can be seen.

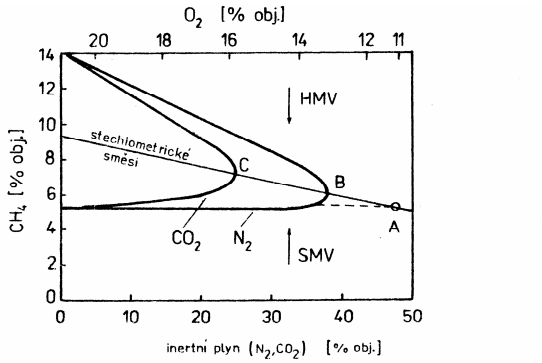

Fig.1. No. 1 Comparison of influencing LEL and UEL when inert gases N_2 and CO_2 are used [4]

3. Experimental determination of LEL of hybrid mixture

At the Faculty of Safety Engineering, one of themes of diploma theses dealt with the verification of possibility of inerting hybrid mixtures.

Measurement was a part of broader investigation and followed the theme of Bc. thesis aimed at the determination of lower explosion limit of a hybrid mixture, namely smooth flour – methane mixture. This mixture had been selected to ensure a possibility of easy repeatability of measurement in the future.

3.1. Measuring procedure

The mixture that was used in the experiment was a mixture of smooth flour, methane and air, under conditions of laboratory test.

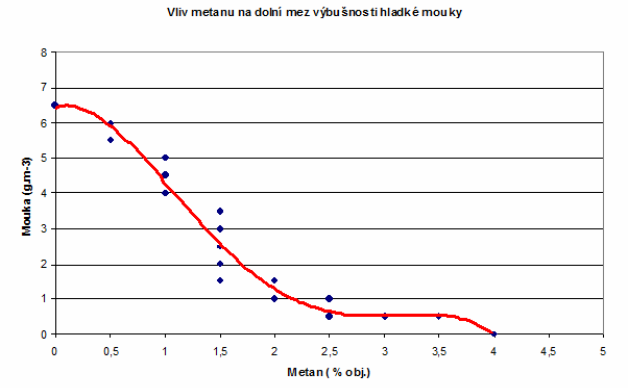

Fig 2. Measured values of dependence of LEL_{FLOUR} on methane amount.

As already outlined above, the experiment was based on the measurement that had aimed at the determination of lower explosion limit of the given hybrid mixture. Results of previous measurement – it is the basis for the determination of influence of inert admixtures on the lower explosion limit of hybrid mixture being studied, are presented in Graph No. 1.

Ground limestone inerting

The charge, i.e. the required amount of flour will be mixed with the determined amount of limestone in a beaker. This mixture of ground limestone and flour will be evenly poured in four spreading devices in the explosion chamber VK-100. The chamber will be covered with paper foil, and the required amount of methane will be added through the inlet valve, when simultaneously with gas supply the homogenization of methane – air mixture will be performed by means of a stirrer. After completing the homogenization, the mixture of flour and ground limestone will be raised in the explosion area. The formed hybrid mixture containing the given amount of inert powder will be subsequently initiated. After each measurement, impurities must be carefully removed from the internal space of the chamber to avoid affecting the next experiments.

At first, the influence of limestone inerting of flour itself without any admixture of methane was examined. Then this was gradually performed for 1% by volume, for 2 and for 3% by volume of methane. The overall result is given in Graph No. 2 where curves for all methane concentrations being determined are plotted. The raising pressure was 3 bars in all three experiments.

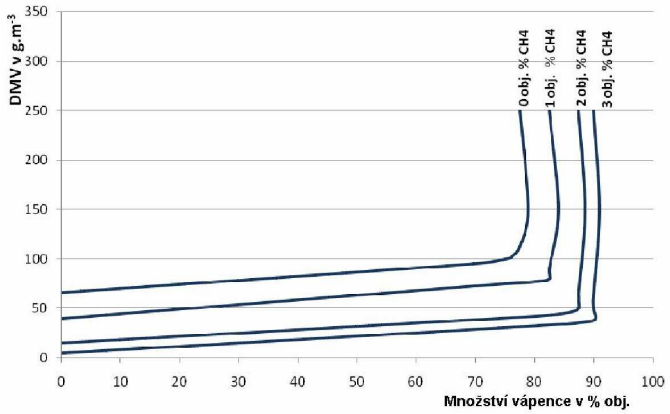

Fig 3. Influence of limestone on LEL of flour – methane hybrid mixture

Nitrogen inerting

Another part of experiment was to measure in the explosion chamber VK-100 the influence of gaseous inert substance on the explosion range of flour – methane – air hybrid mixture. In this case, nitrogen was selected as the inert substance. In practice, nitrogen is the gas that is used for inerting most frequently.

The determined amount of flour will be poured in the spreading dishes in the chamber. On electrodes, nitrocellulose blasting caps will be mounted, and the upper part of explosion area will be covered, likewise in the course of previous measurements, with paper foil. At first, nitrogen stored in a pressure bottle will be supplied to the chamber. In the paper foil, a hole will be produced to enable the determination of concentration of oxygen by an oximeter in the explosion area. After that nitrogen will be put to the space and the chamber fan will be switched on from the control panel to homogenize the mixture. On the oximeter display, the value of volume percentage of oxygen in the chamber will be read. As soon as the required value of oxygen is achieved, the oximeter mouthpiece will be taken from the paper foil and the

hole will be sealed with an adhesive strip. The inlet of nitrogen will be closed and the same procedure as with previous measurements will follow. The determined amount of methane will be supplied, flour will be raised and the mixture produced will be initiated. Again, the flame, foil rupture and temperature on the thermometer will be observed.

Measurement was carried out for three different volume amounts of methane in the hybrid mixture (1%, 2%, 3%). It is necessary to emphasise that inerting the hybrid mixture with an inert gas had not been measured in the explosion chamber VK-100 yet and measured results are thus of experimental character. The output of this measurement is the following overall graph illustrating the explosion ranges (Graph No. 3).

In the course of measuring the hybrid mixture with 3 volume per cent of methane, at the concentration > 8.5% by volume of oxygen in the mixture, a problem appeared; the initiation of the nitrocellulose blasting cap failed and thus the sufficient initiation energy as in all previous cases of measurement was not generated. The cause could be the amount of oxygen too small to cause the ignition of nitrocellulose. For this reason, these values of the mass concentration of flour ranging from 200 $g.m^{-3}$ to 300 $g.m^{-3}$ cannot be taken as experimentally correct. In Graph No. 3, the full line represents values really measured in the explosion chamber; the broken line represents expected values on the basis of analogy with the values of both previous measurements with 1% and 2% by volume of methane in case of successful initiation of the mixture.

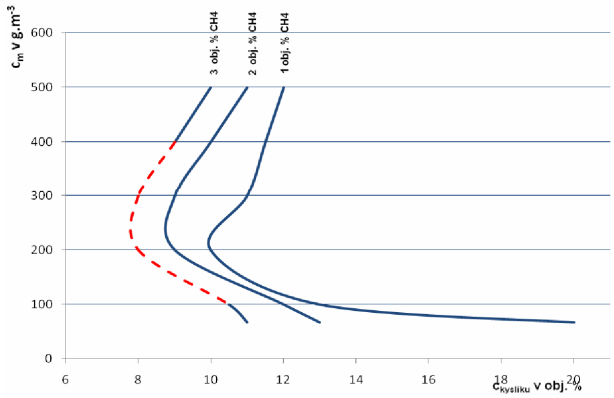

Fig 4. Influence of nitrogen on LEL of flour – methane hybrid mixture

4. Conclusion

Problems of hybrid mixtures are an ever topical subject. Thus it is clear that if hybrid mixtures will be formed, it will also be necessary to be concerned with them, to study their properties and possibilities how to minimize potential consequences brought with such a mixture as efficiently as possible.

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Factors Influencing Riskiness of Personal Transport

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Abstract. The contribution allocate on the problem with accumulative number of the road accident and the risk factors, which share on creation of the road accident.

Keywords: risk factor, road accidents, safety, personal transport, traffic participants.

1. Introduction

Human skills, scientific-technical and technological progress bring also a lot of risks and dangers. Transport is one of the human activities that are continually developing. Transport problems have all-society character since the transport is service for society; it underlies existence of society in urbanized area and affects human mobility in positive and negative way, too.

2. Risk factors

Growing importance of personal and freight transport result in increasing cars production as well as road network spreading. This process is often called as motoring expansion. Road transport is connected not only with manufacturing and working human activities but also with the way and style of the life. Rapid growth of motoring enables people almost unlimited possibilities of move, flexibility and freedom. However, each of technical equipments performs its function only if it is used in accordance with the rules of producers and companies, in contrary case, the negative aspects can become evident. The most important negative events accompanying road transport are as follows:

- hazardousness of each transport mode (motoring, cycling, walking) that means for all traffic participants,
- negative transport impacts on natural environment in form of air pollutants, solid wastes, vibrations and also the results of road accidents such as leakage of driving fuels, dangerous substances, etc.

Hazardousness of transport is indicated especially by road accidents. Road accident is event in road traffic resulting in killing or injury of person or property damage in direct connection with driving.

Road accidents are caused by a lot of factors:

1. human factor,
2. means of transport and
3. road and surrounding environment.

2.1. Human factor

Statistical surveys of accident rate expressly show that human factor especially driver and his behaviour are the main reasons of the road accidents. Human failing in road traffic causes more than 90% of all road accidents. The main reasons are disobedience to maximal allowed speed, non-usage of signalization, disobedience to cross walk, infringement of safe distance between cars, infringement of right of way, disobedience to STOP or danger overtaking.

The behaviour of the drivers in critical situations is different. This is connected with their temperament according to which we can distinguish these types of drivers:

- serene driver, who does not think about his personal problems during driving, he drives his car responsibly and with pleasure, he is able to relax during driving,
- un-serene, anxious driver is constantly unsatisfied, his uncertainty is increasing in situations that make demands upon his person (driving in unknown terrain, in convoy, in peak time,…),
- driver insensible towards anxiety who does not sense danger and therefore often causes transport collisions and by his ill judged acts endangers other participants of road traffic,
- aggressive driver – his behaviour can be compared with " animals fight for own area".

However, we must take into consideration that also serene driver can change to aggressive driver or driver insensible towards anxiety after consuming some psychotropic substances (alcohol, drugs) that cause expressive changes in his behaviour. Some medicines are also important, e.g. sedatives, antihistamines, etc. as well as the actual health and psychical condition of driver that have impact on the length and stability of driver response time.

At present the mobile phones are not only fashion but also one of basic elements for speedy and reliable ensuring of every day human needs. This fact is unfavourably shifted to transport, too. Driver has to know to distinguish when the phone performs its task and when it is the reason of possible bodily injury. Telephoning during driving takes away the driver attention and can cause road accident. Therefore the Law of the NR SR (National Council of the Slovak Republic) 315/1996 Z.z. on road traffic prohibits to driver "during driving to manipulate with mobile phone or carry out similar activity that is not connected with driving" (3).

Another phenomenon that influences the driver abilities in personal mass transport is passenger. Passenger can hinder the driver in view from the car and can also disturb his attention due to his questions or unsuitable behaviour.

Especially in autumn, when in the morning the visibility is reduced for longer time and dark comes sooner, transport police records notable growth of transport accidents with participation of non-motor participants of road traffic especially in town residential areas.

Drivers often do not respect the rights of pedestrians on the cross walks and do not anticipate enough their behaviour, especially near by cultural centres, schools and bus stops. On the other hand, the most frequent pedestrian disturbance is unexpected entry to the road closely in front of the car and driver has no chance to stop the car.

Transport accidents are considerably caused also by bikers. Their collision with car usually results in death or serious injury of biker. Especially during night the bikers are high risky factor, mainly if their dress is dark and they do not use the light. Bikers should respect the rule "to see and to be seen".

2.2. Means of transport

Motor-car moving in environment, controlled by driver, is dynamic system with three mutually connected and inseparable parts: driver, motor-car and environment. Driver is controlling member and his controlling inputs (driving wheel, accelerate and brake pedal) are dependent on his will, environment conditions and motor-car properties.

Motor-car safety must be seen as its most important operating property because human lives and health as well as transported materials are dependent on it. Motor-car safety is one of the basic factors for evaluation of transport quality by passenger in mass personal transport. Motor-car safety consists of three parts: effective safety, passive safety and ecological safety.

Active safety includes technical solutions and measures that enable the driver to prevent occurrence of such situation that can give rise to transport accident. They have preventive character. The sooner the driver sees some obstruction the better he can face to possible danger. Good visibility is the first safety factor. Great glass surfaces offer broad visibility and enable good peripheral vision. We cannot forget that 30% of road accidents happened during night what presents 50% of road accidents victims. Therefore motorcar lighting is very important aspect of active safety, especially meeting lights that enable better illumination of the road and so higher ability to notice details and contrasts. Safety motor car must “be able” to reduce speed as soon as possible especially in case of unexpected situation on the road. Four electronic systems are used to improve ability and intensity of braking: Automatic Braking System ABS, Electronic Brake Distribution EBD, Anti-Slip Regulation ASR (especially suitable in rain), Break **A**ssistant Systems in emergency BAS and Electronic Stability Program ESP.

Passive safety uses all accessible means and equipments for ensuring passengers protection during accident. Fixed motor-car frame, program deformable motor-car body, more efficient safety belts, airbags, head restraint and catching systems are the most famous instruments of passive safety. Their aim is to absorb crash energy in a maximum extent and protect persons in the car from its effects. Risk of death is 6 times higher for passenger who is launched from the seat in comparison with person belted up. But in mass transportation every passenger does not have his own seat. Therefore these means of transport have to be equipped with sufficient holder bars that are mounted in such height enabling to hold for all groups of passengers.

Except the elements of passive safety ensuring protection of persons in-motor-car there are also elements of passive external safety that reduce the accident impacts on other traffic participants. For this reason the motor-cars have round edges, deformable mirrors. Freight vehicles have barriers against motor-car underruning the vehicle axles, etc.

Ecological safety is the same importance and is divided into noise and toxic safety. The elements of toxic safety are e.g. catalytic converters, double casing of fuel tank, etc.

2.3. Road and surrounding environment

According to opinions of transport experts the residential areas – towns and villages- are the most frequent places of road accidents.

Transport processes make high demands on quality of sense cognitional processes of all traffic participants. Traffic participants must continually perceive various shapes, sizes, distances, colours, motion, speed, noise, various sounds, etc. and react on noticed transport situation. Driver, biker and pedestrian must continually perceive information necessary for identification of surrounding environment and its possible changes, identification of transport situation, self-locating, locating of surrounding motor-cars, pedestrians, bikers, barriers, road signs and other circumstances.

Driver and his behaviour are affected by number of internal and external factors connected with variable conditions on the road. The external factors include weather conditions (driving during night, in smog), road quality (adhesive properties) and behaviour of other traffic participants (so called dazzle of driver by oncoming vehicle, child run into road, …) and also collisions with animals The internal factors affecting driver performance include noise, cabin clime, driver seat, passengers, etc.

3. Conclusion

The paper indicates, in limited extent, problems of increasing number of road accidents connected with motoring explosion and insuffiency of road network.. It briefly indicates the main factors participating in road accidents occurance.

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Communication Centre for Emergency Situation in IRS

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Abstract: In every 112 emergency call situation, seconds are crucial. Being in the right place with the right resources as fast as possible saves lives reduces suffering and minimizes property losses. This calls for a maximizing of the cooperation between all of society´s public safety resources. With the right decision tools and resource coordination, emergency efforts will be faster and more prices. At the same time, efficiency increases and this contributes to lower operating costs. The greatest saving for society, however, can be counted in terms of saved lives and reduced suffering and property loss.

Keywords: GIS, GPS, IRS, communication centre, coordination centre.

1. Introduction

Communication between an emergency caller and a Call Taker in a communication center involves huge pressure. The Call Taker must try to get as much information as possible from a person acting in great distress. The case must be identified – What? Who? Where? – and prioritized before dispatch and coordination of emergency efforts.

Ericsson´s Public Safety Communication Center – CoordCom – is an efficient system for Call Taking and Dispatching with precise decision support. CoordCom makes it possible to communicate case information to all involved in true real time. The system helps the staff take the right actions in every situation. CoordCom provides the best conditions for saving lives and property – thus creating a safer society.

Ericsson is one of the world´s leading suppliers of Public Safety and National Security Systems as well as fixed and wireless communications systems for the commercial markets. We operate in more than 140 countries, providing a range of innovative communication solutions. The 10 largest telecommunication operators are Ericsson customers. We bring all our modern technologies into the Public Safety environment and integrate our services to provide the best combination of technology and information. Public Safety is a focused area for Ericsson and is a part of our main strategy.

2. IRS in region

The Žilina region is one of the eight regions of Slovak Republic (Fig. 1). There are 15 towns and 300 municipalities with more than 690 thousand people together (Fig. 2). It has a strategic base in northwest of Slovakia, adjoining with Czech Republic and Poland Republic.

Coordination center of Integrated Rescue System is builder up by county admiralty in region and helps to make technical conditions for Coordination center function [1].

Fig. 1. Coordination centers of IRS in regions.

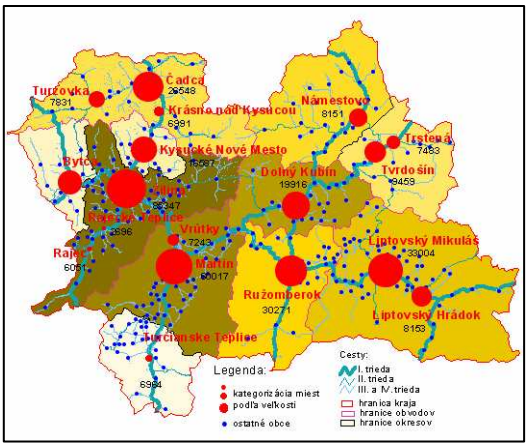

Fig. 2. Žilina region.

3. CoordCom, one system controls it all

CoordCom speeds up, streamlines and secures the Call Taking and Dispatching processes. Is saves time, utilizes available resources more efficiently and allows rescue statistics to be used for future improvements to emergency operations [2].

A Public Safety System must always be up and running, day and night, all the year round. No system failure whatsoever that might delay assistance in an emergency situation is acceptable. In CoordCom Communication Center is designed and built to ensure 24/7 system availability with maximum performance (Fig. 3).

Transactional Database Replication – Minimizes the impact of database server or network failures and facilitates system maintenance and reporting.

Clustering – Improves scalability and minimizes the impact of hardware failures by grouping virtual systems on physical computers.

Process distribution – Increases system process availability in installations with several sites.

Server Reliability – Provides maximum service availability by using multiple Application. Database and Communication servers.

Storage Area Network (SAN) – Minimizes database across time and maximizes reliability and availability via a scalable high-performance storage solution (optional).

Be more efficient:

- Automatic call distribution – secure and fast call taking.
- Case index questions – efficient interviewing and decision support.
- Correct prioritizing enhanced by case index.
- Assistant monitoring gives access to expert assistance.
- Digital maps with advanced for all involved.
- Efficient use of communication center staff using a centralized architecture.
- Precise dispatching means more efficient use of public safety resources.
- Integrates with and enhances existing communication infrastructure.
- Centralized architectural and management means low operation costs.
- High scalability enables future expansion and adaptation.
- Logging – powerful management tool for continuous improvements.

CoordCom can be configured in system sizes a small city/regional Communication Center to large National Network System (Fig. 4). It can be configured as a stand alone system or as a large distributed system according to organization size and availability requirements. The most powerful functionality is achieved in a modern all-IP infrastructure but CoordCom also offers considerable improvements on existing infrastructure. In CoordCom, all case information is available to every operator in real time irrespective of site location [3].

As a stand – alone system it can easily be upgraded to a large system when needed. Applications and databases can be placed on separate servers or combined on one server. Transactional replication is used to keep backups in multiple local servers. Each site maintains individual data storage, servers and clients. High availability is secured with reliable hardware – dual disks, power supplies and fans.

A nationwide distributed system has several Communication Centers and relies on a high-capacity private IP infrastructure with databases centralized in a Storage Area Network (SAN). Servers are configured for hot standby operation regardless of geographical position. Performance and availability are increased by transactional data replication from central servers to local servers.

The sites share system resources on geographically separated servers and data storage areas. An Operator Position can work against one or several geographical sites. The impact of system failures is also minimized since data and Operator Positions are distributed throughout the system.

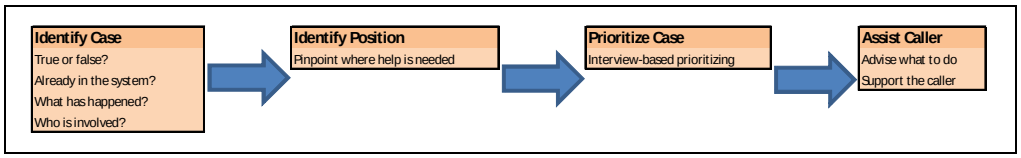

Fig. 3. Call taking diagram.

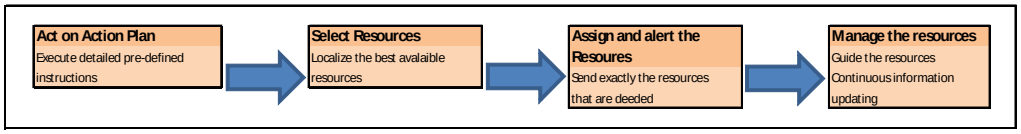

Fig. 4. Dispatching diagram.

The illustration shows a typical CoordCom system with integrated radio and multiple sites (Fig. 5). It has Intel-based servers and clients running Microsoft Windows operating systems, the NET runtime environment and Ericsson CoordCom software [4].

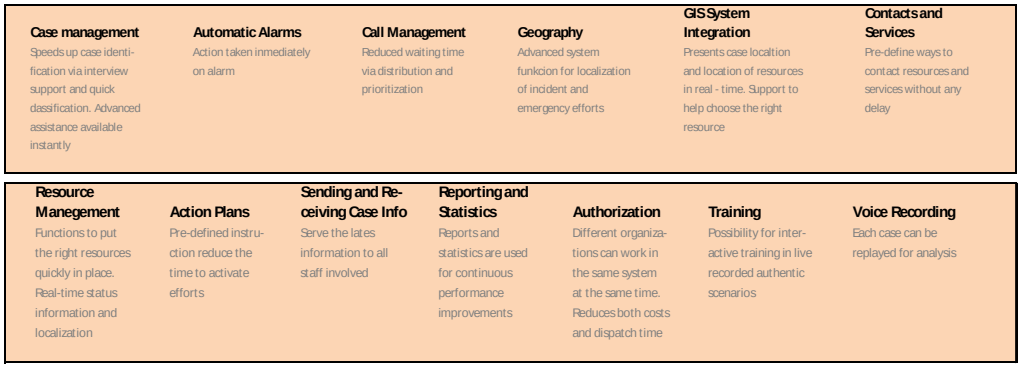

Fig. 5. Key systems function.

Soft switch server 1, – CXF Soft switch complete CTRL (Computer Telephony and Radio Integration) receives incoming calls and traffic and transfers all voice data to Operator Position.

Application and Database Servers 2, - Contains all CoordCom system applications, supporting network functions and system databases. CoordCom is verified on Intel-X86 technology and uses MS Windows Server technology:

- Application Server
- Database Server
- Communication Server

IP Network 3, - Includes LAN and WAN communication with Operator Position.

Operator Positions 4, - Connected to servers and databases via IP, and configured with hardware and CoordCom client software for VoIP:

- PC running Microsoft Windows XP
- Multiple TFT Display
- Headset and optional speakers

Remote Operator Position 5, - Identical to standard Operator Positions. Connected to the CoordCom system via WAN.

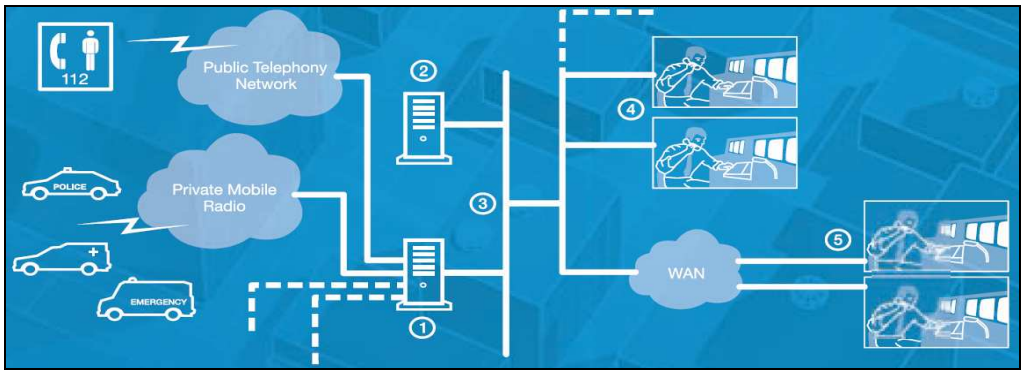

Fig. 6. CoordCom system overview.

4. Conclusion

CoordCom controls and co-ordinates the entire chain of emergency activities – from taking and identifying an incoming emergency all, to dispatching the right resources such as the police fire brigade and ambulance to the emergency site. CoordCom also enables analysis of the emergency effort to improve future actions. The system provides advanced call taking functions for interviewing, localizing and supporting the caller. The Dispatcher acts efficiently using case – specific action plans that give a complete overview of what to do, resource status and precise location. CoordCom also uses automatic instructions when applicable. All required communications channels are included in or supported by CoordCom.

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Support Artificial Intelligence for Management of Risks

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Abstract. The possibilities of using the newest practices and methodologies in IT (information technology) for adjudicating the risk. Two views on the influence of expanding the society informatisation. Existence of indefiniteness and uncertainty in all systems. Explanation the terms: artificial intelligence, soft computing, intelligent systems. Expected areas of using an artificial intelligence and intelligent systems. The basic possibilities of using fuzzy logic and the theory of fuzzy set for risk management. Explanation of fuzzy logic. Using of systems for monitoring uncertain information so frequently in practice. Basic architecture of expert systems and three basic moduls description. Existing expert systems using in risk management. The methods of risk management, using decision trees. The advantage of artificial intelligence for risk management.

Keywords: security, risk management, information systems, artificial intelligence, uncertainty, soft computing, intelligence systems, fuzzy systems, decision trees, fuzzy logic, expert systems, knowledge base, the base of facts, inference mechanism.

1. Introduction

Nowadays the term security is the most important term mentioning almost daily in our society. People and society are endangered by different kinds of a hazard with different levels. The safety is in human minds of the most important human needs on one of the highest level. We can see it in Maslow´s Hierarchy of Human Needs [1].

Risk management deals with risk adjudicating connected with specific threats. Risk management is scientist department, also it is activity directed to identifying, analyzing, assessing, classifying and minimize of the risks [2].

On the other side current age is characterized as the Information Age. The expansion of information technologies, new determinations and accesses is very wide. It is linked to the expansion of communication technologies and means. The expansion of information is much faster, communication and information changing among people and groups is becoming simpler.Constant progress and improvement of hardware and software devices causes the raise of using information technologies and technical means of this kind in all area of all human activity.

2. Support of Artificial inteligence

As we mentioned above, there is a trend that on one side brings increased hazards and threats for individuals and society from the aspect of usage and misusage of information systems or particular piece of information. On the other side this trend makes the usage of information systems available for the needs of safety increasing. Many information systems have become common assistant and supportive mean for risk management.

Modern program instruments, used in information systems, apply the most modern scientific approaches and processes from both, mentioned branch and from information area. The artificial intelligence is one of newer and more progressive branches in informatics.

Any human activity is always affected by certain rate of uncertainty. That is why we introduce it to reduce the estimated risk, that we cannot reach the certain target with accepted quality [3]. We are very often forced to introduce tolerance for indefiniteness and uncertainty by social systems and common life. It is not always possible to quantitate particular current values. Risk managers work permanently with the certain level of indefiniteness and uncertainty. In every system, where processes and methods of risk management are applied, even after maximum possible activities leading to reduce the risks, we can find certain level of risk that is called residual risk.

One of the basic features of "soft computing" is the usage of indefiniteness and uncertainty. The destination is to reach acceptable computer complication, hardiness and low prices of final product. Nowadays it is expected the sequence principle implementation of intelligent systems in many important areas of human activity. They are searched for their military application level. Next subject of research is the application level of intelligent systems in leading traffic infrastructure. There is no doubt about wide usage of mentioned systems even in the risk management area.

Intelligent systems use for their activity many components of artificial intelligence as fuzzy sets, fuzzy systems, neuron nets, generic algorithms and last but not least the expert systems.

In classical theory of information, making decisions and directing the needed additional information are obtained by different calculations. For example the means offered by the math statistics and probability theory can be used. We use simulation of processes of human intelligence in artificial intelligence. The support of high calculating speed of computers, offered by hardware applications with certain self-evidence rate, is added to specific processes.

Any different models and graphs are often used in decision making processes. One of the special graphs is tree graph. This kind of graph is used in risk management when we assess the risk in period risk analysis.

In artificial intelligence large part of searching and browsing processes and strategies deal with effective ways of tree graph analyses. The area of artificial intelligence that deals with this problem is called fuzzy system, based on fuzzy decision trees. Fuzzy systems are based on fuzzy logic.

Fuzzy logic, as a part of math, is near connected to indefiniteness and uncertainty. It is based on fuzzy sets theory that was invented by prof. L.A. Zadeh (University of California, Berkley) in 1965.

Common computers and computer systems are able to work only with single-valued information. Finally the information is recorded in computers as zeroes and ones. Indefiniteness and uncertainty are very real in common life in all types of social systems. The question is how to record and transmit the uncertainty for the needs of computer system, how to work with this uncertain information. The solution is offered by fuzzy logic.

For example the common terms like "warm" or "cold" must be exactly specified for the computer from the aspect of outside temperature. Fuzzy logic works with fuzzy sets. In fuzzy logic the problem of common life terms will be result by dividing the temperatures into particular periods and by assigning the membership degree to particular fuzzy set. Membership degree of fuzzy set determines the amount of value that belongs to the set [6].

In classic set theory the particular values either belong or not. From this view the fuzzy set theory is the extension of classic set theory. It allows us to specify and work with the uncertain terms with the help of membership degree of these uncertain values in fuzzy sets.

In our case with outside temperatures , i.e. the temperatures from -40C to 0 degree of Celsius would have the value of membership degree to the "warm" set and it would equal 0,2, but temperatures higher than 25 degree of Celsius would have the value of membership degree to the same set 0,8.

As we could see, in general, there is the level or membership degree to the set for every item of certain fuzzy set. This process requires modification of all information that will be using in system and are distinguished with indefiniteness. The information recorded this way is also usable by computer.

Nowadays the fuzzy logic has become the research entity. Such systems are used in different sections of human activity. Risk management, where new methods working with risk are investigated, is not the exception. The methods of risk analysis that function on the basis of fuzzy logic are developed. The example could be the method Fuzzy Set and Verbal Verdict Method /FL-VV/. The method is based on linguistic fuzzy variable [4].

The expert systems are the next item used in artificial intelligence. They are the part of larger term called knowledge systems. The knowledge system is computer system that processes the knowledge and it demonstrates the knowledge of problem that is linked to the knowledge [5]. The knowledge, unlike the information, is thought to be something that offers higher predicate value. The knowledge is understood as higher level of information and is often linked to some action, activity.

Expert systems are the systems where there is used experts knowledge in fixed problem area. In risk management the expert systems and their support have their fixed place i.e. in the risk analysis in phase of risk assessment. It is so in risk analysis methods like a method Fault Tree Analysis /FTA/ or Event Tree Analysis /ETA/ and Cause Consequence Analysis /CCA/. The famous are systems CRAMM, @Risk, Risk WATCH.

Three basic parts of expert systems are knowledge base, inference mechanism and the base of facts [7]. The knowledge base is conceptually similar to database.

The special knowledge are private knowledge also known as heuristics, or vague knowledge. These are knowledge that the expert extracts in the course of practice, and he knows that they can assist in solving certain problems. The existence of this unsubstantiated, misleading or incomplete information in the knowledge base is referred to as the uncertainty in the knowledge base. Each uncertain element of knowledge representation is assigned numerical parameters, which reflect the degree of uncertainty.

To solve a specific problem, it is necessary to provide data to system about certain solving case. These data are stored in databases as a set of data of the case. After that, they are substituted to generally formulated knowledge in the knowledge base. Particular data are given to computer in a conversational mode of working with system .

The third part of experts system is the inferential mechanism. It is a program module, which in advance determines a strategy of using knowledge from knowledge base, facilitates communication between the base of knowledge and the base of facts. The basic architecture of expert system can be extended of other modules i.e. the explanatory module, etc.

One of the founders of artificial intelligence, M. Minsk submitted a thesis that computers can do much more than it is prescript when creating programs [3]. He derived from the fact that the range of possible computer actions is determined by the principles of its programming. On the basis of his thesis new techniques and methodologies of programming has become to develop...

One of them is declaratory programming. In a declaratory programming rules are separated from the problem solving processes. That make again to the new programming techniques and completely new approaches to computer science. Based on the new programming techniques, new types of computer systems have grown up. One of them was so-called intelligent systems.

Intelligent systems are seen as artificial systems able to perform highly complex tasks and intelligent systems solve the tasks base on human intelligence[3]. In English the term "soft computing" is used for systems that are linked with the theoretical and methodological tools with the characteristics of living organisms, especially human being [3].

3. Conclusion

Artificial intelligence, in many ways could serve as a support tool for work in risk management. It brings with its progressive development new resources, techniques and methods, which in future will be put into practice and can be used in the area of work with risk. Information systems of artificial intelligence are generally used in their basic orientation as a means of support, in many areas.

The use of artificial intelligence for decision-making processes or for diagnostic procedures, or as systems for creating modes is very often. From this perspective, the proposal designed by artificial intelligence system meets the intentions of the designed supportive items for risk management. Therefore the use of artificial intelligence means as the means for supporting work of risk management in the near future is expected.

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