

# Enhancing the Management Level of Critical Infrastructure Protection

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The requirements of the European Union on the security and safety and the critical infrastructure protection. The conception of the critical infrastructure protection in the conditions of the Slovak Republic. The system of the university preparation of the experts in Slovakia and its particularities in the conditions of the crisis management. Requirements on the crisis managers operating in the area of protecting the elements of the crisis infrastructure. The conception of the curricula, the structure of the general and professional, compulsory and optional subjects and particularities in the accreditation process.

**Keywords:** Education, crisis management, critical infrastructure, protection.

## 1. INTRODUCTION

The traditional perception of security and safety was based on the military aspects and was connected with the level of ensuring the defence of a particular country or region. Currently, a new and comprehensive perception of security and safety which affects all areas of the social life of the country and its inhabitants is enforced. It is inevitable to deal not only with the military dimension of the security and safety but also with the political, socio-political, cultural, economic, technical and technological, environmental, with the security and safety inside the country and last but not least just with its legal dimension. The crisis phenomena are an inseparable part of the company development and all activities of people. Today it is necessary to take effective preventive measures which will prevent the rise of crisis phenomena or will maximally reduce their devastating effects – here the protection of human lives is to be emphasised.

The changes in the global security and safety environment are transferred also to the conditions of individual countries. In September 2005 the Slovak Republic adopted the amended strategic document in the area of security and safety, i.e. the Safety and Security Strategy of the Slovak Republic. Subsequently its basic ideas should

gradually appear in the generally obligatory legal regulations connected with the security and safety of the Slovak Republic whose basis is created by the Constitution of the Slovak Republic, the constitutional law about the security of the state during the state of war, state of emergency and state of distress as well as a whole range of further legal regulations.

The security of the state and its inhabitants is not only a subject of practical steps in each country but also a technical elaboration of this area and scientific research of the essence of the security and safety and the methods and tools through which it is achieved. Also in Slovakia we gradually succeed in linking the theory and practice, in taking into account the particularities of the security and safety environment as well as the security and safety of the system on the one hand and the current requirements and the strategic partners on the other hand. The area of security and safety has no adequate position in the structure of the scientific branches and in the awareness of the scientific and research community as well.

## 2. TASK OF THE CRITICAL INFRASTRUCTURE IN THE SOCIETY

The infrastructure is an aggregate of linked structural elements and relations between them which create a compact complex determined to support the society and processes which run inside of it. This term is usually used only in connection with the artificially created structures, although its part can be formed also by elements of natural character – e.g. the waterways. The infrastructure is thus especially an economic category. It includes institutions which form inevitable assumptions for the overall operation and development of economy, especially its manufacturing sphere. According to the character and specialisation of these institutions the infrastructure is divided into three groups.

The manufacturing infrastructure can be considered the basis. We include here the transportation network (roads, bridges, tunnels, railroads, ports, airports, ...), the radio, TV, wire and other telecommunication devices, the equipment for supplying and distributing the products, energy, water management, scientific and research and other equipment. The other group is created by the non-manufacturing (social) infrastructure. The system of the housing, educational, healthcare, repair, cultural institutions, service facilities, financial institutions but also management institutions in the area of public administration is its part. The specific military infrastructure (defence infrastructure) is the third part of the infrastructure – here belong all institutions, objects and services which creates inevitable conditions for the activities of the armed forces and enable to fulfil the tasks of the state defence.

The basic facilities of the state or regional infrastructure with necessary buildings, objects and premises are part of the national economic capital fund in the sense of the value bringing a yield or benefit in the framework of the economic operation. The construction of premises in the area of infrastructure is very expensive from the point of view of the capital inputs. It means that their appreciation is very small in a short time horizon; the return on investments is long and uncertain. Therefore the investments into the infrastructure are little attractive for the private capital, they often exceed the possibilities of individual entrepreneurial subjects. The state or public resources and investments are of key importance in the area of building the infrastructure. For the

economic activity of the private sector the infrastructure has mainly a character of inputs which are one of the assumptions for existence of the private production or providing private services.

Every infrastructure regardless to the area and level of investigation is created by a relatively complete set of individual objects, equipment, systems and their elements. It is created by standard conditions in the framework of which it fulfils its functions. If the internal or external conditions for the infrastructure operation are changed and cause reduction of its extent, content or functionality, it is inevitable to define the critical level of the state of its functional elements. If we exceeded it, this fact could seriously threaten the operation of the whole system and subsequently of the whole society. This marginal infrastructure level is designated as the critical infrastructure.

The critical infrastructure is that part of the national infrastructure (selected organisations and institutions, objects, systems, premises, services) whose destruction or loss of functionality due to the risk factors will cause threat or disruption of the political, social and economic functions of the state or will threaten the lives and health of the inhabitants. [2]

The EU documents [2] define the critical infrastructure as a component, system or their part being in the member states which is an inevitable assumption of perceiving the basic functions of the society, health, defence, security and safety, quality of life of the inhabitants from the economic and social point of view. Its disruption or destruction would bring serious consequences in the member state because these functions could not be maintained.

The critical infrastructure ensures the standard functions of the system according to the possibilities in the operating and crisis situations. It is a subset of the specialised state infrastructure containing all systems and assets whose damaging, destruction or abuse would cause threat for health, property or life of the citizens and basic functions of the state. Its basic subjects are the top state bodies, determined self-government bodies, country-wide manufacturing or supplying companies as well as relatively small enterprises of local importance whose production cannot be replaced by other sources. The health-care, distribution and service workplaces of temporary or durable character and the state crisis

management system are an integral part of the critical infrastructure.

All country citizens are dependent on an appropriate infrastructure operation every day. The critical infrastructure here is understood as systems, organisations and premises important for the state. If these premises and infrastructure systems ceased to work, serious consequences not only for the state but also for economy, society and every citizen can develop. Their disruption has a permanent impact for ensuring the functions of the state; it causes extensive disruptions of the public order or has other negative effects. These impacts are the more serious the more complex the infrastructure systems are and the stronger their mutual dependence is.

The critical infrastructure is typical by a whole range of specific properties. The individual areas of the infrastructure services are physically, virtually and logically linked to networks. Knots whose disruption causes regional, state-wide but also cross-border negative impacts are created inside of them. Especially the energy systems (electric transfer systems, gas pipelines, crude oil pipelines and product pipelines) and information and communication systems represent the networks of this type. The network links between the lines of business represent a higher development infrastructure level enabled especially by improving the information technologies. On the one hand, it brings much better utilisation of the infrastructure but on the other hand the high level of dependence can cause extensive chain disruptions. Even a small disruption of the infrastructure can arouse large consequences. The impacts of infrastructure disruptions can cause health and psychological damages of people; they can have character of uncertainty, factual economic damages and they can even cause the loss of inhabitants' confidence in political management of the region or state [3].

The possible threat of the critical infrastructure by natural disasters, accidents due to technical or human failures, terrorism or criminal activities underlines the necessity of measures for protecting the critical infrastructure. Measures for restricting and coping with damages but especially preventive measures to prevent the rise of major failures or at least minimising their consequences are realised and prepared for this critical infrastructure [5].

### 3. TRAINING OF EXPERTS IN THE AREA OF CRISIS MANAGEMENT

The systematic, permanent, efficient and effective professional preparation of the crisis management workers at all state administration levels, regional and local self-government, training of the employees of the executive security and safety system elements with emphasis on the armed forces, armed security units and units of the emergency systems as well as the entrepreneurial subjects with an emphasis on the subjects of the economic mobilisation is and inevitable assumption of a quality performance of the security and safety system in the area of prevention as well as solution of crisis phenomena. On the other hand the quality of the security and safety system is dependent on the level of the crisis way of thinking, i.e. identifying the constitutional officials but also top politicians and managers of the entrepreneurial subjects involved in the critical infrastructure system with the importance of the crisis management for the society and with the necessity of its corresponding financial provision. Though the crisis way of thinking affected us by the real security and safety situation, it has to be supported by coping with basic theoretical issues in the area of crisis management. Last but not least, it is inevitable to ensure also the relevant preparation of the citizens in the area of protection against negative effects of the crisis phenomena as well as issues of self-protection and mutual aid in distress.

The preparation of experts in the crisis management area as well as citizens in the area of protection against negative effects of the crisis phenomena and self-protection and mutual aid in distress is realised in individual EU countries in various ways, however, it is guaranteed and checked by the state everywhere. Universities, specialised secondary schools and also various institutes and training centres are part of the educational institution network.

The security system of the state is a system of the public administration institutions, forces and means of the armed forces, security units, emergency units and services, legal entities and self-employed persons, legal standards, mutual links and relations through which the security and safety of the state, its citizens, material values, cultural heritage and environment is guaranteed. This definition shows that also a whole scale of experts who operate on the security and safety system is very extensive - from politicians and

state officials at various working positions in the framework of the central but also local bodies of the state administration through crisis managers working in the state, self-government and private institutions, professional soldiers, policemen, firemen and other emergency workers up to the crisis managers in the entrepreneurial subjects.

The system of preparing the staff of the individual subjects of the state crisis management including the preparation of experts in the area of critical infrastructure operation and protection has to contain:

- defining the target groups,
- stating the content and extent of education,
- selecting the forms, methods and tools of education,
- training of the educational institutions,
- stating how the training is financed.

The conception of educating experts of the security and safety system has to solve the preparation in a complex way. That is why the preparation, education and improvement of the staff of individual institutional elements of the crisis management should come to the foreground and should ensure:

- the education and permanent improvement of the professional knowledge and management abilities for the needs of solving emergencies and crisis situations at the corresponding management level in the framework of ensuring the state defence, protection of persons, property and environment as well as the internal security and order in the country,
- improving the technical and technological knowledge and skills necessary for solving emergencies and crisis situations as well as being able to work with systems utilised in the crisis management system,
- the psychological and ethical preparedness of the staff to cope with the consequences of the emergencies and crisis situations,
- the professional and language ability to transpose the relevant legal standards in the area of the crisis management in connection with harmonising the corresponding EU documents and the ability of mutual collaboration and communication with the relevant bodies of other EU countries with an emphasis on the V4 countries and Austria.

The preparation of the constitutional officials and selected politicians for understanding the basic

crisis management area including the protection of critical infrastructure should be ensured adequately. It should be aimed at:

- getting acquainted with the basic legal regulations in the crisis management area before starting to work in a constitutional position or at a certain working position in the crisis management system (the Constitution of the Slovak Republic, the Constitutional Act No. 227/2002 Coll., the Law 387/2002 Coll. and other legal regulations should be emphasised),
- informing about the international obligations of the Slovak Republic in the crisis management area including the protection of the European critical infrastructure elements and about the tasks of individual ministries in this area,
- clarifying the position and tasks of individual ministries in the crisis management area where ensuring the preparation for the state defence, protection of citizens, property and environment during emergencies and crisis situations as well as ensuring the internal security and safety and order in the country is defined.

In spite of the fact that preparation and education of the citizens in the crisis management area concerns each citizen, the preparation system has to be strictly differentiated. It is inevitable to realise the great variedness of the working positions in the security and safety system and the extensively structured target groups. The **target groups** for preparing the staff in the crisis management area and protection of the critical infrastructure can be defined as follows:

- the constitutional officials (ministers, ministry secretaries, MPs or top representatives of the political parties - the possible constitutional officials),
- the top managers and other selected employees of the state administration central bodies,
- the employees of the state administration central body departments and other central bodies of the state administration,
- the leading employees of the local state administration bodies,
- the employees of the crisis management departments of the regional offices at the seat of the region and district offices,

- the heads of the self-governing regions, employees of the crisis management at the offices of the self-governing regions, mayors of the villages and towns including specialists working as professionals at the level of the determined towns and villages or in favour of several selected villages,
- the leading employees of the basic emergency units of the Integrated Emergency System,
- the selected professionals from the Armed Forces of the Slovak Republic,
- the selected policemen,
- the leading employees of the voluntary emergency organisations, non-profit organisations participating in solving crisis situations and helping the citizens,
- the statutory representatives and selected professionals or specialists of the state-owned and private companies which are the subjects of the economic mobilisation and can be ranked to the critical infrastructure elements,
- the headmasters or determined employees of the schools and educational institutions responsible for the content and forms of education in the area of security and safety,
- the subjects participating in preparation of inhabitants for coping with crisis situations and self-protection in the case of threats caused by consequences of emergencies and crisis situations.

The **content of education** in the area of the crisis management has to be modified according to the individual target groups, the people should repeatedly get the same working position, and last but not least, it has to be connected with the fact how real the threat is – the real change of the external or internal situation. The content of the education taking into account the individual target groups should include the following thematic scopes:

- the safety and security and their influence on the sustainable development of the society,
- the EU and Slovak legal environment in the crisis management area with an emphasis on the possibility to restrict the basic rights and freedom of the citizens during solving the states of crises,
- the general scope of authority, functions and principles of operating the security and safety system of the Slovak Republic, the basic issues of the state defence and protection of

citizens, property and environment during solving the emergencies and crisis situations,

- the basic competences, scope of authority, principles and specific tasks of the crisis management in the process of prevention, crisis planning, solving the crisis phenomena but also during recovery of the endangered system,
- the system of the economic mobilisation and its tasks in the complex preparedness of the country for solving the crisis phenomena,
- the principles of organising and ensuring the internal security and safety and order in the country and its regions including the protection against the effects of international terrorism,
- assessing the actual social risks and social crises and their influence on the society's security and safety and its development,
- the socio-psychological and ethical aspects of the crisis situations,
- the protection of the state's economy and economic measures during states of crisis.

In the framework of all designed areas the emphasis should be laid on:

- mastering the requirements of crisis management legal environment and other legal standards,
- the knowledge and abilities necessary for an early analysis of the risks, for taking effective decisions and subsequent measures, for optimal leading people in crisis staffs and other crisis management subjects as well as for effective communication with affected people, media and general public,
- mastering the means and tools of the crisis management information system, including collaboration with foreign countries especial in the cross-border areas.

The **forms, methods and means** utilised in the area of preparing the crisis management staff can be divided according to the quality of the professional preparation, forms of the professional preparation and according to the type of participation in the professional preparation. According to level of the professional preparation we distinguish:

- the professional and higher education,
- the university education – 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> level,

- the lifelong education (further occupational education, purpose-oriented courses, career courses, etc.).

This education can be realised in a daily or external form. It can be also carried out in a correspondence form as well as through the e-learning method for a narrow extent of thematic areas and target groups. A specific method which is more and more enforced is the realisation of improvement trainings, trainings on model situations, training on simulators and uniting trainings of selected activities. According to the form of participation in the professional preparation we can distinguish the compulsory preparation (for each member of the given target group) and selective preparation (recommended – according to the character of part of the target group – with the aim for every employee who fulfilled the qualification assumptions as well as the compulsory course to be obliged once during a certain time period according to his/her own consideration to take part in some of the recommended courses).

The **educational institutions** in the area of the crisis management have to be established on the basis of valid accreditations, submitted projects and assessed competitive tendering. The state secondary schools and universities, public secondary schools and universities, the ministry educational institutions and private educational institutions offering courses according to requirements of the educational system and according to the agreement or contract can be involved in the educational process of the staff in the area of the crisis management.

The content, forms and methods as well as updating should be coordinated by a specialised research and consultancy workplace aimed at the area of educating the state officials, specialists as well as employees of the voted self-governing bodies in the area of defence, protection and internal security and safety and order in the country. This workplace should be established in the framework of a university, or a government educational institution. The workplace would call once a year (or twice a year) or according to the need a symposium (scientific and professional seminar) of the external members of the workplace, the competent representatives of the state bodies and other educational institutions. This symposium would assess the quality of education, its structure and content and also its effectiveness and influence on the security and safety level.

**Financing** the system of training the staff in the crisis management area is an inseparable part of the system designed. From the general point of view it will be possible to adopt the following principles which have to be inevitably worked out into the form of implementing regulations which will be approved by the Slovak government for ensuring the education in the area of the crisis management. The basic assumptions for financing the educational system are as follows:

- the costs for preparation of the constitutional officials, employees of the state administration central bodies and employees of the local state administration will be paid from the state budget determined for the crisis management or for education in the framework of individual state budget chapters,
- the costs for preparation of the employees and specialists of the territorial self-governing regions (self-governing regions and municipalities) will be covered from the approved financial means for education in the framework of the self-governing units' budgets,
- the selected educational forms and preparation of the voluntary non-profit organisations' employees will be financed from the financial means of the European projects (e.g. from the projects aimed at preparation the leading employees of the voluntary rescue and other non-profit organisations aimed at improving their legal, economic and management capabilities).

The current educational system of the Slovak Republic ensures partially the needs of the security and safety system. The education of experts who are able to fulfil the tasks in the area of the crisis management is not unified; however, from the complex point of view it ensures the needs of the social practice. The education of the constitutional officials and the employees of the state administration central body crisis management is not worked out and ensured on the required level. In the same way the system of preparing the citizens of defence, protection, internal security and safety and order in the country is not solved on a comprehensive level.

#### 4. POSITION OF THE FACULTY OF SPECIAL ENGINEERING IN THE SYSTEM OF PREPARING EXPERTS IN THE AREA OF CRISIS MANAGEMENT

The Faculty of Special Engineering at the University of Žilina in Žilina is a faculty with a management and technological orientation. It prepares university-educated experts in the area of the crisis management emphasising the protection of citizens, economy and nature in the crisis situations for the needs of the public administration and entrepreneurial sector. Currently the Faculty of Special Engineering at the University of Žilina in Žilina provides the bachelor, Ma and PhD. study as well as various forms of lifelong education in accredited specialisations and study programmes where we creatively develop the scientific and research activity and the results are presented in our publication activities.

The Faculty of Special Engineering at the University of Žilina in Žilina had been ensuring the preparation of experts for the needs of the army transportation and military civil engineering for almost 50 years. In 1995 it gradually started to transform into a civilian university educational institution performing in the area of the crisis management. The lecturers at the Faculty of Special Engineering worked out curricula and ensured accreditation of a new study specialisation Civilian Security and Safety in the framework of which the preparation of the crisis managers started. Step by step the scope of the faculty grew in the area of the crisis management and currently there are four accredited study programmes in all three levels of the university education:

- the crisis management in the framework of the study specialisation Civilian Security and Safety,
- the security and safety management in the framework of the study specialisation Protection of People and Property,
- the emergency services in the framework of the study programme Rescue Services,
- the transport in crisis situations in the framework of the study programme Transport Services.

The faculty realises the lifelong education according to the requirements of practice and concentrates mainly on preparation of the public sector employees. There are the following accredited programmes of the lifelong education:

- the security and safety manager in the public administration and in the entrepreneurial subjects,
- the security and safety of the information systems in the public administration and entrepreneurial subjects,
- the basic professional preparation of the fire protection specialists,
- the further professional preparation of the fire protection specialists,
- the basic professional preparation of the fire protection technicians,
- the further professional preparation of the fire protection technicians,
- the professional preparation for prevention employees in the area of municipality protection,
- the management of security and safety systems for protecting persons and property.

#### 5. PREPARATION OF EXPERTS IN THE AREA OF SECURITY AND SAFETY AND PROTECTION OF THE CRITICAL INFRASTRUCTURE

The security and safety of the country is substantially dependent also on the level of functionality, resistance and effectiveness of the critical infrastructure protection elements. The risks of their disruption have both anthropogenic and natural sources; they are not connected only with terrorism but also with a whole range of possible human or technical failures. Generally it can be said that the importance of comprehensive research is indisputable. The level how the critical infrastructure is defined and the determination of the optimal protection of the individual elements is worked out in the same way worldwide. In some areas the USA are in the foreground, Australia or Japan or East Asia play the leading role in other areas. In Europe the issue of protecting the critical infrastructure elements is coming to the foreground currently. It is an important priority to work out theoretically this area and based on scientifically defined criteria to determine the critical infrastructure elements correctly and to adopt measures for their comprehensive and effective protection.

This process involves the solution of the research project 0471-10 – Protection of Critical Infrastructure in the Transportation Sector – supported by the Agency for Support of Research and Development. In the first phase its objective

was the assessment of the level and character of the security and safety system of the Slovak Republic and creating the fundamentals of the knowledge basis in the area of defining the importance of the critical infrastructure for the security and safety of the society, identifying the risk sources which threaten it, their analyses and comprehensive assessments. Special attention was paid to stating the tasks for the state and public administration institutions in the process of determining the critical infrastructure on the Europe-wide, national and regional level. A specific area for investigations is to state the requirements on preparation of experts who would deal with this area in practice. In spite of the fact we can involve them to the crisis management system, a whole range of specifics and particularities are to be taken into account during their preparation. The graduates of the bachelor study of the study programme Security and Safety and Protection of the Critical Infrastructure accredited in the framework of the study programme Civilian Security and Safety are qualified professionals of the state administration and self-government, legal entities of the manufacturing and non-manufacturing character operating in the specialisation security and safety services. The graduate’s profile respects the requirements of the study specialisation’s description and, at the same time, it is compatible with the descriptors of the National Qualification

Framework. The compatibility level is shown in the figures 1 to 3.

The graduates of the second level of the university study programme Security and Safety and Protection of the Critical Infrastructure accredited in the framework of the study specialisation Civil Security and Safety have to identify (in compliance with the requirements of the study specialisation and National Qualification Framework for the level 7) the threats and risk sources in the social, economic, natural as well as technical and technological processes, to analyse them and assess them comprehensively and also to design procedures, utilisation of methods and forms for their reduction and elimination. They possess deep knowledge of the theory of the critical infrastructure protection with an emphasis on the energy industry, transport and the necessary fundamentals in the area of the information and communication technologies. They are able to design and realise preventive measures, to monitor and analyse the development of the risk and crisis factors, preparation of an adequate response to the arising crisis phenomenon, managing the continuity of the critical infrastructure element operation and realising an effective renewal of the systems in the ex post phase. The graduates have to be able to forecast the development of a particular part of the social, economic, natural or technical processes, to utilise the optimisation methods and other tools of the scientific management to

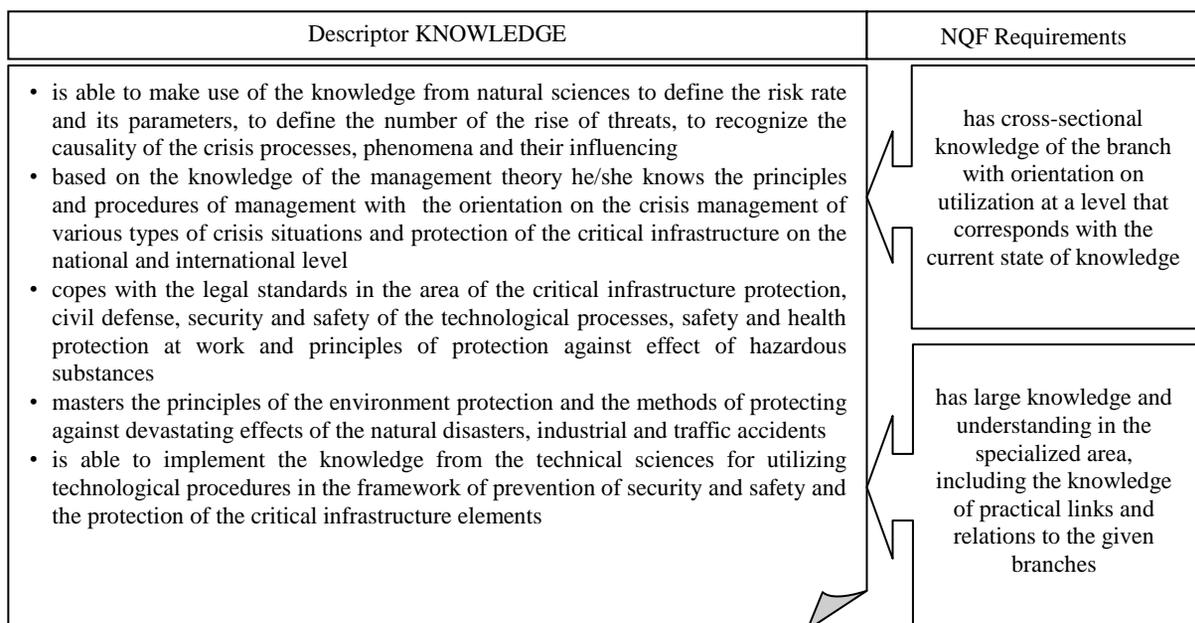


Fig. 1. Fulfilling the requirements of the descriptor “knowledge” according to the level number 6 (university education of the 1<sup>st</sup> level) of the National Qualification Network.

Source: [4]

Descriptor SKILLS	NQF Requirements
<ul style="list-style-type: none"> <li>• is able to analyze the development of possible threats of a critical infrastructure element, their consequences and to set solution variants</li> <li>• is able to plan, organize, ensure, check and assess its own activity as well as the activities of the subordinates</li> <li>• is able to solve practically a particular threat of the critical infrastructure element of the natural, ecological and economic character (the competence of the lower and middle manager responsible for the critical infrastructure protection)</li> <li>• is able to utilize practically the information and communication technologies when organizing the routine processes and during operative management</li> <li>• is able to solve independently situations and tasks connected with preventing crisis situations especially in the area of energy industry and transport, to create conditions for their solution and removal of possible consequences</li> <li>• is able to make use of the knowledge from branches extending their professional profile especially the fundamentals of the energy industry, transport technique and technology, civil engineering, machinery, logistics, topography, cartography, geographic information systems and properties of the hazardous substances</li> </ul>	<ul style="list-style-type: none"> <li>is able to acquire information actively and to utilise it for solutions of practical tasks in the branch</li> <li>is able to solve practical tasks in the branch using common research and development procedures, with a critical assessment of their suitability and adequacy</li> </ul>

Fig. 2. Fulfilling the requirements of the descriptor “skills” according to the level number 6 (university education of the 1<sup>st</sup> level) of the National Qualification Network.

Source: [4]

Descriptor COMPETENCES	NQF Requirements
<ul style="list-style-type: none"> <li>• fulfilling the tasks in the area of the critical infrastructure protection in the public administration as well as in the private sector in the areas of protecting the inhabitants and property, technical and technological processes, environment, preparing the conditions for the state defense, internal security and safety of the objects as well as regions</li> <li>• a qualified expert of the state administration and self-government, legal entities of the manufacturing and non-manufacturing character operation in the area of security services</li> <li>• independent solutions of situations and tasks connected with preventing crisis situations especially in the area of the energy industry and transport, creating conditions for their solutions and removing possible consequences</li> <li>• the operative management of a small working group (team)</li> <li>• communicating during crisis situations</li> <li>• implementing the knowledge about social processes in society and in organizing the manager in the area of the critical infrastructure in conditions of solving crises</li> </ul>	<ul style="list-style-type: none"> <li>is able to solve professional tasks and coordinate partial activities and bear responsibility for the team’s results</li> <li>is able to identify and assess the ethical, social and further interconnections of the problems solved</li> <li>is able to acquire new knowledge independently and to improve the knowledge actively</li> </ul>

Fig. 3. Fulfilling the requirements of the descriptor “competences” according to the level number 6 (university education of the 1<sup>st</sup> level) of the National Qualification Network.

Source: [4]

increase the effectiveness of their work. They have to know the structure of the public administration and system of managing the state and the individual territorial units including the territorial self-government.

The graduates of the study programme Security and Safety and Protection of the Critical Infrastructure of the study specialisation Civil Security and Safety possess the following theoretical knowledge:

- they creatively implement the latest scientifically based knowledge and skills in a specific environment of the critical infrastructure protection,
- they implement their own methodological procedures and creative invention to identify the risk sources and threats in a particular environment of the determined element (or a whole sector) of the critical infrastructure,

- they look for new solutions and implement them creatively in practice, they purposefully adapt the best foreign experience to their own conditions,
- they work out security and safety plans and proposals for organisational legislative measures for the critical infrastructure element,
- they prepare and realise trainings for person belonging to the scope of the critical infrastructure element.

The graduates of the study programme Security and Safety and Protection of the Critical Infrastructure of the study specialisation Civil Security and Safety acquire the following practical knowledge and skills:

- they are able to implement the scientific management methods in the conditions of the critical infrastructure protection,
- they are able to make use of the technique and routine methodological procedures to acquire relevant information about the state of the critical infrastructure element security and safety,
- they are able to manage their subordinates with an emphasis on the complicated conditions for solving the crisis phenomena,
- they are able to understand the development of the events, process and activities they have under control and are able to deduce adequate conclusions from them,
- they are able to manage the preventive measures conceptually and to minimise the assumptions of the possible threats and risk sources.

The graduates of the study programme Security and Safety and Protection of the Critical Infrastructure of the study specialisation Civil Security and Safety possess the following additional knowledge, abilities and skills:

- they are able to work effectively both as an individual or a chief of a small or large team,
- they are able to transfer effectively the conclusions and conceptions of the higher administrative bodies into their work,
- they are in contact with the development in the area of the critical infrastructure protection and to enforce the changes into practice,
- they are able to utilise purposefully the information and communication technologies in the area of the crisis and security and safety

management in the framework of the critical infrastructure protection.

## 6. CONCLUSIONS

The system of education, science and research represents an important part of increasing the level and effectiveness of the Security and Safety System of the Slovak Republic. In the interest of further development of the security and safety system and improvement of the preparation of the experts working in individual institutions of the crisis management including the critical infrastructure element protection, it is necessary:

- to work out a conception of differentiated preparation of constitutional officials in the area of the crisis management,
- to analyse the system of education and professional preparation of the citizens in the area of the crisis management,
- to create a concept of lifelong education in the area of the crisis management of the state employees working in individual units of the crisis management,
- to deal comprehensively with security and safety and critical infrastructure element protection in all of its sectors on the national and European level as well,
- to re-assess the level and structure of the security and safety research and create conditions for an independent scientific branch,
- to rank the security and safety research to priorities of the scientific and research activity in Slovakia.

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