

## METHODOLOGY OF CRITICAL TRANSPORT INFRASTRUCTURE OBJECTS IDENTIFICATION

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The article describes experiences from Czech Republic and Slovakia in case of critical transport infrastructure elements selection and identification. The attention is focused on objects, which have high importance for international transport corridors.

**Key words:** Critical transport infrastructure, new methodology of objects identification

### 1 Introduction

Present situation brings new challenges in many fields of research. One of them is research in security field. This decade is characterised as period of war against terrorism. New threats, new technologies, current political and economical changes in the world requires deeper research in finding possible ways, how to protect inhabitant his family, property and state. This article gives current overview on this issues with focus on critical (mainly transport) infrastructure.

### 2 Critical infrastructure research

At first, it is very important to state definitions for following terms. For purposes of this article were used definitions from terminological dictionary of crisis management.

- Critical Infrastructure (CI) is part of national infrastructure (chosen organisations, agencies, objects, systems, equipment, services and systems), their destruction or malfunction as an effect of risk factor would cause serious threat to economical and political functioning of country, as well as threat of lives and health of inhabitants.
- National Defence System (NDS) is set of elements, governmental measures, through which ministries, other governmental agencies, courts, offices of public prosecution, local government, legal entity and personal entity creates presumption for successful provision of country defence and it also provides sources, means and conditions for armed forces and their

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partners, so that they are able to fulfil their responsibilities according to international acts and treaties about common defence.

- Critical infrastructure is part of national security system.

For real understanding of complexity of critical infrastructure, it is important to mention all sectors of critical infrastructure. In majority of countries, they are – energetics (mainly nuclear energy), water (providing of drinkable water for inhabitants), foodstuff (its quality), health protection, finance and transport (road, railway, air and water transport). Some countries also mention science and research.

Critical infrastructure protection (if particular sectors are not chosen) is a set of measures which are provided by owner, administrator of object, private security service and chosen police unit with aim to protect property of defensive infrastructure, especially to protect objects with high importance. The protection works continuously, in usual situation as well as in period of crisis situation.

Goals of critical infrastructure protection are:

- prevent entrance to the object and activities of non-authorized persons and groups,
- decrease or prevent the possibility of security risk occurrence (terrorist attack, sabotage, thefts, and others),
- to provide functionality of technologies and utility of stored items,
- to provide secure functioning and security of inhabitants and armed forces, who are located in close surroundings of such objects.

Object protection can be divided into basic and advanced. Advanced protection can be further divided according to method of providing on:

- advanced object protection belonging to category of objects with high importance,
- advanced object protection belonging to category of other important objects.

Basic object protection is based on preventing object from usual theft, non-authorized access to information, which create trade secret as well as to prevent non-authorized access to information systems, etc.

Basic object protection is completely organized and financed by legal entity, owner or administrator of object, as a part of internal property protection measures.

### **3 View on critical infrastructure according to European legislation**

Council directive 2008/114/ES was defined European Critical Infrastructure. For its identification and marking it is essentials to know the most possible types of attacks on ECI. According to directive, they are:

- direct action – direct armed physical attack on target, done by armed terrorist groups,
- bomb attack – attack, which is usually done by individual or small group with usage of non-conventional bombs (not air bombing),
- CBRN attack – attack with usage of chemical, biological, bacteriological or radioactive materials,
- Cybernetic attack – attack, which is focused on destroying of information and data or violation of computer system and programs, using internet network,

- Information action – attacks, which are focused on gaining or violation of certain information, to influence information based processes ( for instance influence computer system, so that it seems to be working properly, but it works with manipulated data), and also protect own information and computer systems.

Source: [2]

Due to actual tasks, which are derived from mentioned documents, it is needed to define minimal security requirements on elements of critical infrastructure. It is important to state, that European Union accept private sector as valid and equivalent partner, compared to government agencies. One of very important tasks is to prepare security plans for providers of critical infrastructure elements. Actual task is to find out if providers have prepared these plans, if no; member countries have to accept measures for their creation. One of other requirements is that every provider should have his own officer for security issues. The most actual task is to identify threats, menaces and vulnerable places.

European Union has its own European research in this field. However, 6<sup>th</sup> framework programme, which was supporting research and science in Europe ( in years 2004-2006), did not pay any attention to this issues. This has changed in current 7<sup>th</sup> framework programme, which is valid for period from 2007 and defines security as individual field of research. Not that long time ago was created European Security Research Advisory Board. This board is intensively cooperating on security appeals and EPCIP is working out with proposals in programme Prevention, preparedness and consequence management of terrorism and other security – related risks. This programme involves appeals on project proposals, oriented on development, evaluation, implementation and spreading of tools, methods, techniques and architecture models in infrastructure The main contribution of these projects should be in protection of inhabitants against terrorist attacks and identification of threats of individual person. Research activities in 7<sup>th</sup> framework programme in field of security were supported by 14 200 000 €.

#### **4 Risk evaluation in critical transport infrastructure**

Risk evaluation in transport is kind of new issue. There were only very few papers published in this field yet. The risk evaluation method, according to technical norm is following:

- evaluate surroundings of system (everything what has impact on functioning and behaving of system),
- identification of threats of objects a asset definition,
- risk analysis,
- evaluate risk and state if the risk is acceptable.

In following part is presented methodological procedure for solution of such issues. At first, it is very essential to divide transport system, to its basic parts- transport infrastructure, transport means and management of transport operating. Legal framework, human activities and surroundings has also huge influence on transport system operating. Therefore, it is possible to apply complex process of risk evaluation, which corresponds to this methodology. In case, when the risk is unacceptable, we have to propose measures, which will enable to lower that risk. If the risk is acceptable, it depends on contracting authority, if he applies measures or he will continue with monitoring the state of risk and make the analysis again.

First task – to evaluate surroundings of system, it is very important to pay attention on all natural and human sources, which can possibly be a threat to transport system. Such process, which evaluates surroundings of transport system, is extremely complicated. It is necessary to focus on complex wideness of possible threats.

Second task is aimed on individual identification of particular threats in transport system. As a possible model for identification of threats, we can use model, which was designed for research task, which we were working on for Slovak Railway Company (ŽSR). It was necessary to make deeper investigation in case of these six groups.

### Identification of threats in transport

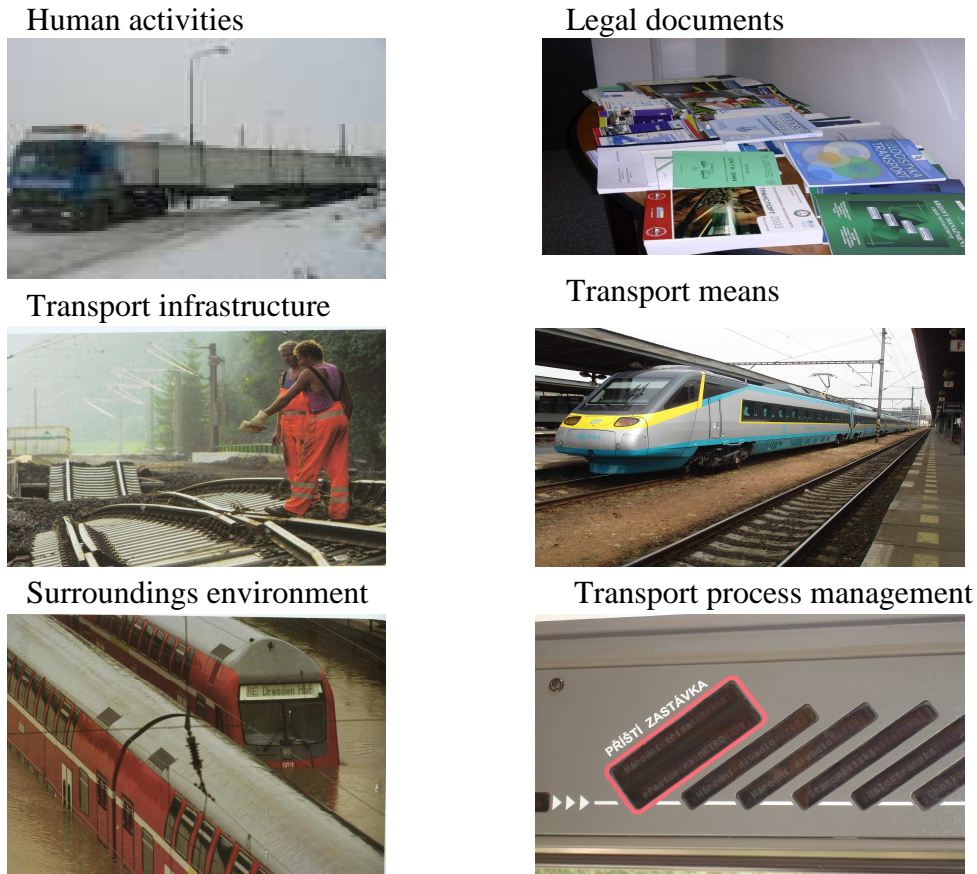


Figure n.1 Identification of threats in railway transport

Source: [4]

If we take into consideration transport infrastructure, at first we should analyse its particular objects (look at fig. 2). Firstly we should look at railway tunnels, as the most threatened objects. During analysis of possible threats for railway tunnels, we came up to conclusions, presented in figure n.2. Changes in understanding of threats, has changed rapidly, compared to past – military threats, through, relatively present threats by natural influences up to the present and presumable threats – possible terrorist attacks. Present trends shows, that terrorist attacks will be focused on attacks with very serious influence on society.

From methodological point of view, as an inseparable part of second task is defining of possible impacts. It is necessary to express possible influences, impacts and damages. It is necessary to find suitable methods for objective evaluation of – technical equipment, buildings, but also inhabitant's lives and health. This seems to be the most difficult task. To summarize all mentioned above, it is essential to use standard methods used in every sector and to combine them with evaluation done by team of experts.



### Identifikácia ohrození v železničnej doprave

#### Železničná infraštruktúra



**Tunely**

Pri železničnej prevádzke môže v tuneloch dojsť k týmto ohrozeniam:

- záplava,
- zosuvy,
- lavíny,
- útoky teroristov,
- výbuch a požiar prepravovaného tovaru,
- samovraždy,
- zrazenie zveri,
- atď.



**Trate**

Pri železničnej prevádzke môže na tratiach dojsť k týmto ohrozeniam:

- záplava,
- zosuvy,
- lavíny,
- útoky teroristov,
- výbuch a požiar prepravovaného tovaru,
- samovraždy,
- zrazenie zveri,
- atď.



**Mosty**

Pri železničnej prevádzke môže na mostoch dojsť k týmto ohrozeniam:

- záplava,
- zosuvy,
- lavíny,
- útoky teroristov,
- výbuch a požiar prepravovaného tovaru,
- samovraždy,
- zrazenie zveri,
- atď.



**Stanice**

Pri železničnej prevádzke môže v staniach dojsť k týmto ohrozeniam:

- záplava,
- zosuvy,
- lavíny,
- útoky teroristov,
- výbuch a požiar prepravovaného tovaru,
- samovraždy,
- zrazenie zveri,
- atď.

Figure n. 2 Threat identification in railway infrastructure

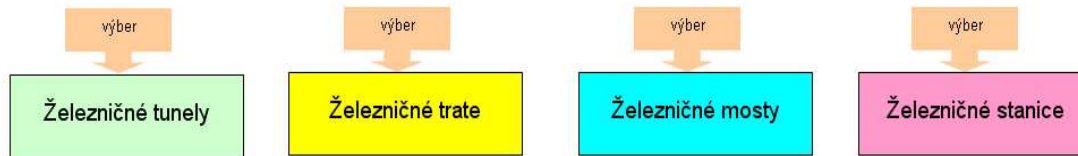
Source: [4]

Third task is risk analysis itself. This task is focused on calculation of particular values of risk. Note. Risk = probability of occurrence \* possible impact. Using suitable methods, we can arrange particular risks into two basic groups. In first group are risks, which are not acceptable, it is necessary to find corrective measures for these and to lower such risks. Into second group belong risks, which are acceptable. For those, we create system of measures, which will be applied according to economist's or manager's decision. It is possible to evaluate part of the risks as remaining risk, which doesn't have to be solved.

Fourth task in framework of risk evaluation is to process file – library of proposed measures. These measures were divided into two groups from methodological reasons. Measures influencing company's internal part and measures influencing surrounding environment – look at fig. n. 2.



### Identifikácia opatrení - odporúčani v železničnej doprave



#### Metodické poznámky:

Opatrenia uvedené v knižnici opatrení **sú rozdelené do štyroch skupín** – prvá opatrenia pre železničné tunely, druhá opatrenia pre železničné trate, tretia pre železničné mosty a štvrtá pre železničné stanice.

Navrhované **opatrenia** je potrebné **členiť do dvoch častí** – na ochranu proti vnútornému ohrozeniu a druhá na ochranu proti vonkajšiemu ohrozeniu.

Podľa možných zdrojov ich **vyberáme ako opatrenia**:

- nezávisle na ľudskej činnosti,
- vyplývajúce z ľudskej činnosti,
- vyplývajúce z prírodzenej povahy tovaru.

Vzhľadom na zadanie úlohy VaV je práve posledná odrážka veľmi významná – prepravované nebezpečné látky pri svojom úniku majú často výrazný vplyv železničnú prevádzku. V extrémnych prípadoch sú zdrojom ohrozenia, ktoré na dlhú dobu môže znemožniť prevádzkovanie daného dopravného objektu a preto sú v zvýraznené červenou farbou.

Figure n. 3: Proposal on recommendation in railway transport Source: [4]

## 5 Conclusion

Possibility to publish article on important international conference is great opportunity to present results of research. Present trends show importance of applicable research. The aim of article was the will to change knowledge of scientific community in field of critical infrastructure. The attention was paid on threat identification of objects, which are part of critical transport infrastructure.

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