

**NATIONAL UNIVERSITY**

**OF PUBLIC SERVICE**

**Doctoral Council**

**ANETT KASZA**

**THE POSSIBILITIES AND LIMITATIONS OF USING THE UNDERGROUND  
RAILWAY SYSTEM OF THE CAPITAL CITY IN PROTECTION AGAINST  
DISASTERS**

author's introduction and criticism to the PhD dissertation

Budapest

2016

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## 1. THE DESCRIPTION OF THE SCIENTIFIC PROBLEM

Due to its centralised administration, Hungary has become capital-centred. As a result of its central role, some threats also occur in a more concentrated form in Budapest than in other settlements. Such threats include the location of plants dealing with hazardous materials or the transportation of dangerous goods. Industry involves the use of an increasing number of dangerous materials, more and more extreme meteorological conditions occur and the malfunctioning of the critical infrastructures can also upset normal operation within minutes, both on the level of individuals and on state level. The new challenges of our day may also occur in the capital city in a more concentrated form, for instance harmful actions, where the aim is to cause harm to as large masses as possible. Extreme weather conditions also require the arrangement of defence on a larger scale, as the population density is higher in a given area, thus the devastating effect of the weather conditions affects larger masses. As a result, the reconsideration of tasks concerning civil protection in this field is essential.

The conventional methods of civil protection were developed after the First World War, and these principles and methods still constitute an integral part of the civil protection plans today. The currently valid, regional emergency plan of the Metropolitan Directorate of Disaster Recovery defines two methods of civil protection in order to ensure the protection of the population of Budapest: *evacuation and isolation*. However, the plans do not elaborate on the definition and provision of the conditions thereof. For instance, in order to be able to apply these two methods of civil protection efficiently during an emergency, transportation facilities, systems of mass media and, not the least importantly, facilities suitable for isolation are necessary. The question arises, whether these two methods are sufficient in view of the threats, and what equipment, structures are available for the realization thereof.

In order to ensure the protection of the population of the capital, and to be able to apply the procedures included in the security plan in practise, primarily those existing facilities must be taken into consideration which are suitable to be used in the course of civil protection measures with regard to the threats. For this end, the features thereof must be examined in detail, and they must be compared to the set of requirements defined for protection. In my opinion, the protective features of the available facilities cannot be ignored in the course of emergency planning, that the possibilities of the underground railway lines of Budapest must be taken into consideration.

The underground railway system was originally planned to provide protection against weapons of mass destruction, but other protective capabilities are available in the underground facility. The dual function of the facility has not been examined appropriately until now. Today we do not primarily have to be prepared for protection against weapons of mass destruction, thus it is important to examine whether the underground railway system can be used in case of different threats. The emergency planning of the capital city will only be complete if the conditions of the civil protection methods defined by it will also be ensured. This can be facilitated by the scientific examination of the protective capabilities of the underground railway system, which analyses the types of threats, and the methods of civil protection the Budapest underground railway system be used with. The technical conditions available to achieve this are also examined, together with the possibilities of the improvement, modernisation thereof. The analyses are also necessary concerning the issues of the capacity of the non-protected sections, and the way and tasks they can be used for when planning for the future.

## **2. RESEARCH AIMS**

In order to examine and answer the issues that arose, my aims are to

- **Examine** how the public transportation of large cities was formed and how it developed. I analyse the history of the construction of the Hungarian underground railway system, its position and role in the public transportation of the capital, and also the technical solutions of underground railway system construction.
- **Systematize** the technical parameters, basic equipment, appliances of facilities of life protection and their possible role in civil protection.
- **Examine** the protective capabilities, technical parameters of civilian shelters and those of the protected sectors of the underground railway system, then conclude the similarities and differences.
- **Analyse** the technical devices, appliances of the protected sections of the underground railway system as well.
- **Examine** whether the protective capabilities of the underground railway system can be integrated into the civil protection planning of the capital. In order to achieve this, first I **analyse** and **assess** the threats characteristic of Budapest, including the internal dangers of the underground railway system as a threat, and the effects thereof, and also the possible methods of civil protection.

- **Perform** the systematisation of the threats characteristic of the capital in order to select the most effective method of civil protection.
- **Examine** the protective capabilities, applicability and limitations of the underground railway system, and also **determine** the development aims which are necessary to make the facility able to provide effective protection against other sources of danger besides its function as a shelter.
- **Examine** the organisational structure, preparedness and possible modernisation of the civil protection organisation of the underground railway system.
- On the basis of my examinations, I **determine** the capacity and applicability of the sections of the underground railway system not possessing shelter function in case of measures of protections affecting large masses.

### 3. HYPOTHESES

In order to compile my hypotheses, first I carried out preliminary research, and on the basis thereof, I conceptualised the issue, then, through identifying the variables of the topic, I stated the scientific problem. I determined the areas to be examined and the hypotheses, then I assigned the necessary research methods thereto. On the basis of the above, I formed the following hypotheses:

- *I assume*, the increased needs of transportation due partly to urbanisation processes made the construction of the underground railway system necessary, and that the architectural design of the underground railway lines and stations fulfils the requirements concerning metropolitan public transportation system;
- *I assume*, that the current technical condition of shelters does not fulfil the requirements of defence against emergencies caused by today's characteristic threats;
- *I presume*, that the sectors of the underground railway system with sheltering function possess additional capabilities compared to conventional civil mass shelters.
- *I assume* that due to the metropolitan features, central position, and number of its residents, in Budapest the intensified occurrence of threats typical of capital cities, and the effects of these threats must be expected;
- *I assume*, that even in their current condition, a number of the determining defence capabilities of the capital's underground railway system can be integrated into the

- system of defence against threats characteristic of the capital, and make the facility suitable for other purposes of civil protection in addition to its sheltering function;
- *I presume*, that the sections of the underground railway system that do not possess sheltering function can also be used for tasks related to the protection of the population.

#### 4. RESEARCH METHODOLOGY

In order to fulfil my research aims, I used the following research methods:

- My research was mainly characterised by the general research methods, which include *analysis, induction, deduction, and synthesis*;
- I used a *chronological-historical examination method* in the course of processing the history of transportation, public transportation and the construction of the underground railway system, as a result of which I gathered the available literature;
- Sadly, the issue of sheltering and the usage of the underground railway system for defence purposes does not abound in literature, which made my research work difficult. *I reviewed* the available Hungarian, Russian and English printed and electronic *literature*. In addition, I studied the relevant legislation and internal norms, and also gathered qualitative and quantitative data through in-site inspections. I evaluated the data and drew conclusions concerning the issue.
- *I consulted* experts dealing with sheltering and the defence functions of the underground railway system. I also approached the engineers who participated in the processes of the construction of the underground railway system and in the designing of the protective equipment, and interviewed them. I integrated the results of the interviews in my research material;
- I organised the information and images gathered from the literature with the method of *analysis*, then *synthesized* the theoretical and practical conclusions into a new unit;
- The general definitions (transportation, public transportation, underground railway system, defence capability, shelter, disaster, etc.) providing the basis for the research were submitted to logical comparative analysis, or were formed through the method of analogy;
- In order to share information widely and to obtain professional reactions, I continuously published my partial results in professional periodicals, at Hungarian and international conferences, in Hungarian and English language.

## **5. THE BRIEF DESCRIPTION OF THE RESEARCH BY CHAPTERS**

*In the first chapter* I described the formation of the public transportation in large cities, from the beginnings through the main international stages of development to its current form. I examined the role the underground railway system plays in public transportation, thereafter the chapter detailed the establishment, development, current system of the public transportation of Budapest.

*In the second chapter* I described the position of safety-of-life facilities in the protection of the population and of material possessions. I described the two basic methods of civil protection, the basic function of local and long-distance protection, including the role, importance and the legislative background of the use of sheltering. I categorized the types of shelters on the basis of different aspects, described the main technical details, parameters thereof, as well as the legislative background of their use. I described the purpose of the dual function of the capital's underground railway system, the design requirements of the shelter function, the principles of its application and the shortcomings of its legislative background. I presented the basic purposes, types technical and technological solutions of the civil protection systems in the underground railway system in a detailed and systematic form, in addition to the requirements concerning the application of the systems. Finally, I prepared a comparative table of civil shelters and the protective parameters of the sections of the underground railway system, and carried out a comparative analysis concerning the defence capabilities, technical solutions, application possibilities of the two facilities.

*In the third chapter*, apart from interpreting the notion of security, I categorised the threats characteristic of the capital, analysed and examined the 13 threat factors in detail, presented the expected effects thereof and the possible methods, measures of civil protection that can be used in the course of defence. Through the risk-based analysis of the threats concerning the capital, I defined the probability of occurrence, effect and scale of risk for each event. I assigned the methods of civil protection suitable to mitigate the effects of harmful events to the real threats. I described the threats which pose a risk on the safety of commuters using the underground railway system, thus, processing experiences from international and domestic events, summarised the effects of the potential harmful events occurring in the underground railway system.

*In the fourth chapter* I interpreted the notion of the defence capabilities of the underground railway system, presented a possible categorization of the capabilities from the aspect of the public transportation function of the underground railway system. I examined the threats characteristic of the capital and presented how the underground railway system can be used to manage these threats and to mitigate their effect. I analysed and systematised the possible areas, limitations of usage, and determined the requirements that must be fulfilled by the facility to make it suitable to be used successfully and efficiently for the mitigation of the examined threats.

In order to explore each and every potential defence capability of the underground railway system, I had to examine the expected course and effect of the examined threats, and the features, typical parameters, characteristics of the operation of the facility in a complex way. Thus, in this chapter, in addition to the dual-purpose defensive sections, I also examined the characteristics of the non-protected sections and the possibilities of their usage. Finally, I reviewed the activation possibilities of the organisation of civil protection of the underground railway system, and the current situation of the training system.

## **6. SUMMARY OF CONCLUSIONS, RECOMMENDATIONS**

On the basis of my research carried out within my doctoral thesis, I have stated the following summarized conclusions:

*In the first chapter*, having examined the development and main international stages of the public transportation of large cities in addition to the role of the underground railway system in the public transportation of large cities, I *found* that the development of public transportation was basically influenced by three factors: urbanisation, technical development and financial and economic possibilities.

*When examining the formation and development of the public transportation of Budapest, it can be stated* that the development of the capital's public transportation system was highly influenced by the unification of Pest, Buda and Óbuda, and by the experiences of large international cities concerning their developments. Although the Second World War caused significant relapse in the development, during the reconstruction such transportation strategies and aims were stated which placed special emphasis on underground transportation. The decision-makers determined the aims, expectations and requirements concerning Hungarian underground railway transportation. The construction of the Hungarian



underground railway system was influenced by the aims of public transportation development, international experiences, and the advancement of construction technologies, swift urbanisation, altered needs of residents, as well as the arising cold war situation, due to which the government of the country ordered the construction of a dual-purpose underground railway system.

*Having examined the history of the construction of the Budapest underground railways system, I found* that the construction and launch of the Millennium underground railway line (M1) had European significance, but the other lines also did not fall below international standards. Analysing the construction technologies, it can be stated that the underground railway system of Budapest was constructed with a technology that corresponded to international practice, which consists partly of sections running just below the surface and partly of low-level sections. The low-level lines and their tunnels were created with tunnel boring machines, the ones running below the surface were constructed with top-down engineering technology, which corresponded to the technological and safety requirements of the time. These construction technologies ensured the dual function, that is, sheltering in addition to passenger transportation. On the whole, it can be concluded that by today, the underground railway system is a fundamental element of the public transportation of the capital, it fulfils the needs of the residents and at the same time it functions as a mass shelter.

*In the second chapter* I described and justified why the safety-of-life facilities are important elements of the protection of the population and of material property. I presented the two fundamental methods of civil protection, the basic role of local and long-distance defence, including the role, importance and legislative background of the use of shelters. I categorized the types of different shelters on the basis of different aspects, presented their main technical details, parameters.

*I concluded* that the civil shelters of the capital are in poor technical condition, one reason of which is the lack of financial sources concerning maintenance, and also that in the course of the privatization of buildings, apartments, the new owners did not pay appropriate attention on the maintenance of these facilities. The situation was worsened by the paradigm shift that occurred in the field of civil protection, which abandoned the classic tasks of civil protection, including the importance of safety-of-life facilities. It results from the above, that the underground railway system of the capital has special importance in the field of sheltering.

*Having examined the purpose of the dual function of the underground railway system,* the architectural requirements concerning its shelter function, the principles, legislative

background of its use, and **concluded** that the currently prevailing legislative regulations concerning the civil protection function of the underground railway system do not provide clear guidance concerning the principles and requirement and usage thereof. This is highly conspicuous in case of the structure and training of the civil protection organisations of the underground railway system.

**Having examined the basic function**, types, technical and technological solutions of **the protective systems of the capital's underground railway system**, it can be stated that these were created specifically for defence purposes during wars, but they possess other defence capabilities, which, with the necessary conditions, can be well used for protection from disasters and other emergencies. I carried out a comparative analysis concerning the defence capabilities, the possibilities of the technical solutions of civil shelters and the Budapest underground railway system as well.

**I concluded** that the defence capability of the sections of the underground railway system ranked as class III and IV is fundamentally identical to the defence capabilities of the shelters ranked in the same classes, however, the forms of architectural, engineering and technical implementation are different, which is the result of the unique features of the underground railway system. **The results of the comparison also proved** that on the basis of the defence parameters and technical features of the underground railway system, it possesses significantly better and higher defence capabilities than the smaller civil shelters of similar defence capabilities. However, its usage in shelter mode requires more time, and larger human and financial resources. **It was also proved** that due to its dual functions, and to the better performance of the systems, appliances necessary for the sheltering tasks, it possesses several defence capabilities which the civil shelters are not able to provide.

**In the third chapter**, apart from interpreting the notion of security, I categorised the threats characteristic of the capital, analysed and examined the fourteen threat factors in detail, presented the expected effects thereof and the possible methods, measures of civil protection that can be used in the course of defence.

**I concluded** that in the case of certain threats no classic methods of civil protection exist, or if they exist, they can only be used to a limited extent. In several cases only prevention can help mitigate the effects, or security must be increased through different technical solutions. It was also proved that the risk of different threats and the possible methods of civil protection must be defined as early as in the prevention phase, since without these the population and the organisations participating in the defence cannot be successfully prepared for the performance

of the tasks. Due to the above I performed the risk-based evaluation of threats characteristic of the capital, I defined the probability of occurrence, vulnerability and the extent of risk connected to each event.

*I also concluded* that the vulnerability of Budapest to threats is higher than medium level. I proved that the occurrence of dangerous effects new for the capital must also be taken into consideration, which have not hitherto been taken into account in emergency planning.

*On the basis of my analyses, I concluded* that nowadays the range of threats characteristic of the capital has been extended, thus it is reasonable to revise the currently prevailing emergency plans and to take the effects of new threats into consideration also for the safe operation of the underground railway system. *In addition, I proved* that the classical civil protection rescue methods are not always sufficient for providing defence, in certain cases the complex interpretation and application thereof is necessary.

*I examined* the capital's underground railway system as a dangerous facility, analysed the types of emergencies connected to its transportation operation, and the effect thereof on passenger safety.

*I concluded* that the occurring fires, explosions, smoke, and the emergencies arising from the appearance of large masses in a short period of time pose the largest threat on the passengers of the underground railway system. The effect of possible terrorist attacks occurring during the normal operation of the underground railway system, and the effects generated by the outbreak of panic among passengers must not be ignored either. The company operating the underground railway system should also revise the currently used operation procedures, and complement or modify them in such way as to make them suitable to prevent, manage the threats connected to the operation of the underground railway system.

*In the fourth chapter I examined* the possibilities of using the defence capabilities of the capital's underground railway system in defence against threats characteristic of Budapest. From the point of view of the facility's function as a means of public transportation, I categorised the defence capabilities of the underground railways system into three basic groups, which provided the basis for my further examination. The first group contains those capabilities which can be realized with the complete shutdown of the public transportation function of the underground railway system. I examined four defence capabilities in this group, the provision of sheltering, the possibility of physical protection in stations and in the tunnel system, the information of the population and possibilities concerning the protection of material property.

***I concluded*** that the operation of the underground railway system as a mass shelter can be realised with the complete shutdown of the operation as a means of transportation, and the conditions for the realisation thereof are provided, but the time necessary for its readiness for application is long, and this capability cannot be used for protection against disasters or fast-paced emergencies. The protection of the removed population can be solved, the conditions for informing the population are given, the protection of material property can be ensured in the facility, but its conditions are not established.

***I proved with calculations*** that an inhibiting factor concerning the removal of the population is the small capacity of the currently used escalators, and I made a recommendation for the modification thereof. I examined the possibilities of increasing the passenger transportation capacity of the underground railway system, and those of the conditions of informing the population.

***I concluded*** that transportation capacity can be increased through traffic management, of which I suggested three forms: reducing journey times, increasing clear journey time and the operation of trains in the wrong direction.

***I analysed*** the capabilities which can be used while maintaining the public transportation function of the underground railway system. Within this, I examined the possibility of the partial operation of the appliances of civil protection, ensuring physical protection only in the station areas, the possibilities of drinking water and electricity supply and the capability concerning the information of the population.

***I concluded*** that the partial operation of the appliances of civil protection have no obstacles, but the current organisational structure and the standby system of the civil protection organisation does not enable this. The physical protection is ensured for those seeking shelter in the underground railway system, but in case of large masses, chaos can occur on the platforms, which can have a negative effect on passenger traffic, panic can break out which can cause further problems. I made a recommendation to create a method of decreasing the flow of the masses of people, and the conditions necessary for law enforcement also must be ensured.

***I proved through calculations*** that in special cases the capacity of the drinking water and power network is able to fulfil certain household and institutional needs in the vicinity of the underground railway system.

***I concluded*** that no one has hitherto examined these possibilities, and the technical conditions are also missing thus this defence capacity, supply possibility cannot be used in

case of emergency. On the surface the creation of access points for the water and power supply is technically possible, their costs are influenced by the distance of construction. I examined the possible application and limitations of the defence capacities of the underground railway system from the point of view of the effects of threats characteristic concerning the capital, and from that of possible defence. I performed the examination for 12 threats and processed the results in the form of a table, systematised and presented the practical applicability of the defence capabilities of the underground railway system in detail. The analysis also shows that it has several defence capabilities the application of which does not require the shutdown of the public transportation, or which can be applied with modification in traffic management, and thus increasing the efficiency of the defence tasks.

I analysed the possibilities and conditions of applying the sections, lines of the underground railway network which do not possess shelter functions in managing different emergencies. ***I proved through calculations*** that the capacity of the underground railway system can be increased by 100 000 people if, in special cases, the non-protected areas of the system are used for the physical protection of the population.

***I concluded*** that the above lines and sections of the underground railway system possess the defence capacity necessary for physical protection, its ceiling structures are able to bear ruin weight load, but the financial and personnel conditions needed for the application are deficient. As for technology, the appliances and defence systems of civil protection (energy and water supply, filtered air supply, the conditions of mass communication from the tunnels, etc.) are missing, thus these stations and tunnels can only be used for a short period of time, and are unsuitable for longer stay. Those organisations and sub-units of protection are also missing which would plan, manage and control the civil protection tasks in these lines and sections.

Having examined the basic function of the civil protection organisation of the underground railway system, its organisation structure, levels and time norms of alert and standby, and the tasks to be performed in these cases, ***I concluded that*** concerning the structure and preparedness of the civil protection organisation of the underground system, in accordance with its basic function, can sufficiently perform the tasks connected to sheltering function.

However, due to the long alert and standby time, and to the specific form of putting it on standby, it is not suitable to manage fast-paced emergencies and perform civil protection tasks while maintaining the public transportation function of the facility. I made a recommendation for the modernisation of the organisation, within the ***framework of which I developed*** a

possible organisation and management structure, and also determined the most important aspects, requirements of the modification.

## 7. NEW SCIENTIFIC RESULTS

### **I consider the followings to be the new scientific results of my research**

1. On the basis of my examinations, I was the first to perform the systematic, comparative analysis of civil shelters and the defence sectors of the underground railway system, and ***proved*** that due to its technical solutions, capacity and its high-performance appliances, the underground railway system has a higher level of defence and such defence capacities that civil shelters are unable to provide.
2. Through the risk-based examination of threats characteristic of the capital, and the expected effects thereof, ***I proved*** that the vulnerability of Budapest to threats is higher than medium level, and it is not possible to provide protection against the effects of new threats through the classic methods of civil protection, thus I made recommendations for updating, complementing the capital's emergency plans.
3. Through the comparative analysis and systematisation of the threats characteristic of the capital city and the defence capabilities of the underground railway system, ***I proved*** that the facility possesses such defence capabilities which can be applied well together with maintaining the public transportation function, and which can be used in defence against threats typical of the capital city.
4. Through examinations on the basis of the technical data concerning the own water and power systems of the underground railway system, ***I proved*** that in special cases – with appropriate technical modifications on the surface – the facility is capable of providing water and energy supply in its vicinity to fulfil household needs and the needs of public institutions.
5. On the basis of examining the current civil protection organisation of the underground railway system, ***I proved*** that due to the alert any standby system and time norms of the organisation, it is not suitable for performing defence tasks in a fast-paced emergency, while maintaining the transportation function, so I made specific recommendation for its modernisations, determining the main aspects, requirements of the modification.

## **8. THE PRACTICAL APPLICABILITY OF THE RESEARCH RESULTS**

I consider my research results, dissertation to be applicable in the following fields:

- My dissertation fills a gap both concerning the examination of the issue of shelters, and the review and analysis of the dual function of the underground railway system, and it can facilitate the process of emergency planning.
- My research results can provide a good starting point and basis in the course of developing the procedures and plans aiming at the application of the underground railway system in case of emergencies.
- It can facilitate the planning and revision of tasks related to the civil protection of Budapest.
- It can contribute to the planning of the reconstruction works on the M3 underground railway line, taking into consideration the application of the underground railways system in case of emergencies, and the modernisation of safety-of-life appliances.
- It can provide a basis for the modernisation of the structure of the organisation of civil protection in the underground railway system.
- It can facilitate further research into the topic.

## **9. RECOMMENDATIONS**

I recommend my dissertation to the following organisations:

- I recommend my research results to the instructors of the National University of Public Service and the Disaster Management Training Centre.
- I recommend the overview of my results to the experts of the Chief Engineering Office for Infrastructure of the Underground System, who deal with the application of the underground railway system for defence purposes.
- I also recommend it to those experts of disaster management who participate in tasks related to emergency planning.

## 10. THE LIST OF PUBLICATIONS BY THE DOCTORAL CANDIDATE RELEVANT TO THE TOPIC

### Peer reviewed articles in professional periodicals

*Anett Kasza*: „Assessment of the set of requirements concerning the usage of underground facilities for civil protection purposes” *Hadmérnök* (December issue) 2014 pp. 86-93. ISSN 1788-1919

*Anett Kasza*: „The history of underground transportation and the development of its dual function” *Műszaki Katonai Közlöny* Vol. XX. (No. 1-4) (2010.) pp. 57-71. ISSN 1219-4166

*Anett Kasza*: „The analysis of the disaster threats of Budapest” *Műszaki Katonai Közlöny* (online) Vol. XXI. (No. 1-4) (2011) pp. 191-212. ISSN 1219-4166

*Anett Kasza*: „The purpose of creating underground railway lines, types and basic features of their construction and layout,” *Műszaki Katonai Közlöny* (online) Vol. XXI. (No. 1-4) (2011) pp. 251-266. ISSN 1219-4166

*Anett Kasza*: „The development of civil protection, the establishment of sheltering, the shelter functions of the underground railway system” *Műszaki Katonai Közlöny* (online) Vol. XXI. (No. 1-4) (2011) pp. 229-250. ISSN 1219-4166

*Anett Kasza*: „The possibilities of using the underground railway system in collective defence” *Műszaki Katonai Közlöny* (online) Vol. XXII. (No. 1) (2012) pp. 223-237. ISSN 2063-4986

*Anett Kasza*: „The position, role of the Budapest underground railway system in the public transportation network of the capital” *Műszaki Katonai Közlöny* (online) Vol. XXV. (No. 1) (2015) pp. 131-137 ISSN: 2063-4986

*Anett Kasza*: „The possibilities of using the capital’s underground railway system in securing mass events” *Katasztrófavédelmi Szemle* Vol. 19. (No. 4) pp. 23-28. (2012.) ISSN 1218-2958

*Anett Kasza*: „The types of manoeuvres possible to be performed in the Budapest underground railway system, and the description of a civil protection manoeuvre for one sector in the operating underground railway system” *Műszaki Katonai Közlöny* Vol. XXIV. (No. 1) pp. 145-156 (2014.) ISSN: 2063-4986



### **Peer-reviewed foreign language presentation**

*Anett Kasza:* „The possible development strategy of civilian protection adapted to the altered nuclear threats of Budapest” 4th International Symposium „Engineering Management and Competitiveness” 2014 - Proceedings University of Novi Sad, Technical faculty „Mihajlo Pupin”, Zrenjanin, Republic of Serbia 2014. Session: Environmental and safety management systems. pp. 472-478. ISBN: 978-86-7672-224-2

### **Presentations in Hungarian language**

*Anett Kasza:* „The description of technical devices and equipment providing the shelter function of the capital’s underground railway system” *Repüléstudományi Közlemények* Special Issue: (2) Paper VII/12. 8 p. (2011) ISSN 1417-0604

*Anett Kasza:* „The law enforcement support concerning civil protection tasks during the usage of the capital’s underground railway system for defence purposes” *Pécsi Határőr Tudományos Közlemények* (No. XV.) Pécs, 2014 pp. 157-165. ISSN 1589-1674

*Anett Kasza:* „Comparative analysis of conventional shelters and the shelter facilities of the underground railway system” *Tavaszi Szél Conference*, National Association of PhD Students, Debrecen, (2014) pp. 464-472 ISBN: 978-963-89560-6-4

## 11. THE PROFESSIONAL-SCIENTIFIC RESUMÉ OF THE DOCTORAL CANDIDATE

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### Education

2010- National University of Public Service, Faculty of Military Science and Officer Training, Military Technical Doctoral School (pre-degree certificate: July 2013)  
2005-2010 Zrínyi Miklós University of National Defence, Bolyai János Military Technical Faculty, Defence Administration major, qualified defence administration manager  
1997-2005 Illyés Gyula Secondary Grammar School (eight-year program – Dombóvár)

### Professional activity

2012- Baranya County Disaster Management Directorate, Disaster Management Official Service, senior rapporteur-general and county Disaster Management spokesperson  
2012 Tolna County Disaster Management Directorate, Civil Protection Inspectorate, head rapporteur  
2011-2012 Tolna County Disaster Management Directorate, Civil Protection Inspectorate, senior rapporteur-general  
2010-2011 FM DASzK Vocational School Apponyi Sándor Agricultural Vocational School and Hostel, teacher

### Language skills

2013 Basic level complex type „C” state examination certificate in German language (TELC)  
2004 Intermediate level complex type „C” state examination certificate in English language (TELC)

### Qualifications

2015 Law enforcement officer course and training, Disaster Management Training Centre, Pécel

2013	Dangerous Goods Administrator (ADR/ADN)
2011	European Training Course on Nuclear Emergency Management, English-language course on nuclear emergency planning and management, organised by the National Nuclear Energy Office
2011	Emergency Exploration Group training, Disaster Management Training Centre, Pécel

### **Participation at scientific-professional conferences**

2014 June	<p>„The possible development strategy of civilian protection adapted to the altered nuclear threats of Budapest”</p> <p>„4th International Symposium „Engineering Management and Competitiveness” 2014 - Proceedings University of Novi Sad, Technical faculty „Mihajlo Pupin”, Session: Environmental and safety management systems. Zrenjanin, Republic of Serbia 20th June 2014</p>
2014 June	<p>„The law enforcement support concerning civil protection tasks during the usage of the capital’s underground railway system for defence purposes”</p> <p>„Security risks – law-enforcement responses”, International Scientific Conference in Pécs, Security theory examples section. 25th June, 2014</p>
2014 August	<p>„Professional closing conference evaluating the experiences of the Croatian-Hungarian international disaster management cooperation project”. Csokonyavisonta, 26th August 2014</p>
2014 March	<p>„The shelter facilities of the underground railway system or conventional shelters provide better security?”</p> <p>National Association of PhD Students: Tavaszi Szél Conference, Military and Law Enforcement Science Section – Military Science sub-section – Disaster Management. Debrecen 22nd March 2014</p>
2013 March	<p>„Conference on critical infrastructures in Pécs, within the DRAVIS 3 project”. Pécs, 28th March, 2013</p>
2012 November	<p>„Environmental Problems in the Carpathian Basin II.” International Scientific Conference, Pécs, 30th November, 2012</p>
2011 April	<p>„The description of technical devices and equipment providing the shelter function of the capital’s underground railway system”</p> <p>Aviation Conference, Military Technology Section Szolnok, 15th April, 2014</p>