

NATIONAL UNIVERSITY OF PUBLIC SERVICE  
DOCTORAL COUNCIL

## **REVIEW OF THE DOCTORAL (PhD) DISSERTATION**

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### **THE ESTABLISHMENT AND USAGE OPTIONS OF THE HUNGARIAN DEFENCE FORCES' DEPLOYABLE AIR TRAFFIC MANAGEMENT COMPONENT**

the author's description and official reviews  
of the doctoral dissertation

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**Budapest**

**2019**

## **ACTUALITY AND REASONS OF THE THEMATIC CONCEPT**

The majority of armed conflicts in the world are going with assistance of the NATO (North Atlantic Treaty Organization) under umbrella of Article 5 operations committed nations to collective defence, and those ones that are not subjected to Article 5, like crisis response, peacekeeping and humanitarian operations. These areas of the world are usually accessible by air due to the ruined and missing infrastructure, so those airfields, that temporary or long term provide access to the region, complete their duties, and at the same time serve as a “gate” to other part of the Earth.

The first, temporary deployable airfields were established in the World War II. Due to the restricted range of the military aircraft supported land forces, it was necessary to designate an area for safe landing, departure and ground service, and in order to reach the theatre of operation (TO) in short time.

Till the end of 1980s the forward operating airbases dominantly belong to the USAF (United States Air Force) interest, which served for resettlement of forces, and owned permanently working and well equipped infrastructure and personnel. These airfields were offered within host nation support (HNS).

In those times, the mobile, deployable airfield capabilities served only humanitarian flights so that the military aircraft operated from the well built and equipped airfields. As the permanent airbases were closed one after another, an increasing demand appeared for the mobile, easily deployable airfields, from which the supporting flights may operate in the same way. There was an increasing need for the establishment of capabilities, which served as a station for a rapid and effective resettlement of forces. From the beginning of 1990s the supporting actions of foreign operations became one of the first missions of the United States. Since the start of the Golf War, both combat and supporting forces have been running their missions from forward airbases, so that the expeditional and deployable airbases became conventional. The United States had already operated only few permanent airbases by 2005. The remaining missions went on at remote places, usually was engaged from temporary, for long or short deployment provided airbases.

As the counterterrorism increased and became worldwide, the number of deployable airfields rose in all part of the Earth. Nowadays hundreds of different sized airfield and landing zone exists all around the world. The success of the expeditional missions lies in the context of “*light, lean and lethal*”, which means a rapid, precise interaction of the combat and

supporting forces. In order to increase the combativeness of the attacking air forces and to rise their mobility, the ammunition, residential containers, food, water reserves, transport capacity and fuel supply were warehoused in vicinity of the TO.

As the Cold War confrontation decreased, the standard long term deployment distinguished and the new atypical missions of military against terrorism made the importance of deployable airbase capability more transparent, mainly at bare airfields.

At the event of the NATO Chicago Summit in 2012, a decisive decision was made in favor for the Deployable Air Traffic Management Capability (DATM), because it get into the Smart Defence (SD) Program. The aim of this initiative was to encourage cooperation between NATO Member states and brought them closer to the defence industry. One of the initiative's projects is the deployable airbase activation modul (DAAM), within the member states pooling and sharing their forces in order to operate the airbase and the air traffic services. Hungary also was committed to take role in this project according to the prior concept with personnel contribution.

This offer generated by the experience of Hungarian Military Air Traffic Controllers (MATCO) gained after many succesfull missions in the TO. First time they served at the aerodrome of Pristina during the South Slav crisis. The Hungarian MATCOs took the local Air Traffic Controllers (ATCO) responsibilities, and served as Arodrome Controller (ADC) and Approach controller (APC). Next task was similar to previous, but far from Europe at Kabul Aerodrome, where Hungarian MATCOs served in different positions under umbrella of International Security Forces Afganistan (ISAF) from 2003 to 2009. Later they had chance to prob themselves in other Afghan airfields, like Mazar-I-Sharif, and Kunduz. This mission had gone till the February of 2018.

## **THE SCIENTIFIC PROBLEM**

The need for the establishment of NATO DATM capability already arised in 2004, when the North Atlantic Council (NAC) gave authorization providing Air Navigation Services (ANS) for civilian and military traffic who took part in NATO led missions, within well organized framework of services. The NATO DATM capability would mostly resort to national reseources, so that the NATO Air Traffic Management Committee (NATMC) in cooperation with the NATO military authorities established those minimum requirements are necessary for reaching the NATO ambition level. The Supreme Headquarters Allied Powers Europe (SHAPE) is responsible for strategic planning of DATM application. The DATM capability

covers an airfield with meteorological and air traffic services, that operated by multinational cooperation of the member states, and opened for civilian and military traffic all day of the year. The establishment of the DATM capability would locate in a place, which is safe and sufficient for aircraft landing and departure, and for ground movements without HNS. The readiness time of DATM capability is 28 days, which covers the time for deployment and reach the area of operations. The DAAM would hand over the DATM responsibilities after a 1 year period, and supplement it additional capability moduls, that would make the deployable airbase (NDAB) well equipped and long term operational.

As it seems from the above mentioned, to operate an airfield by only one nation is a strenous task, so that the DAAM encourages cooperating nations to offer equipment and personnel. The aim of NATO to establish and operate that deployable airfield without contractors, only with national offers.

According to prior experience, Hungary may contribute to DAAM common airbase operation with MATCO capabilities. In order to make realistic offer to NATO, firstly it is necessary to clarify and be aware of that what capabilities we have actually.

We should know exactly how the Hungarian Military Air Traffic Management (MATM) works and works together with airfield operator, how the whole system looks like and each element built one another, and finally the condition of technical equipment and conformity of the procedures. From this point of view the mentioned system have never been examined before, I did research work with scientific accuracy and depth analises. Knowing the results of analises, it would be exactly determinable under what conditions the offered Hungarian MATCO capability would be applicable, and what type of equipment would be contributed in order to serve at a deployable airfield continuously and whether they are compatible with the alliance's requirements.

The Working Group (WG) who was responsible for the planning and development of DATM, DAAM capabilities, identified three important milestone:

- establishment of capability moduls and the reaching the condition of readiness required by the NATO ambition level;
- Stanags and standards are related to the capabilities and in case of their absence to create them;
- training that make the capabilities sustainable.

In my dissertation I examined the following topics concerning the above mentioned milestones:

1. *According to the previously gained operational experience of airbases at TO – mainly by MATCOs in what section of the DATM, DAAM moduls would be the Hungarian participation applicable?*
2. *What kind of equipment would be preferable to contribute to deployable airbase ATC operations by Hungary?*
3. *The so called „in-theatre” training – as an additional offer – would serve and in what conditions may applicable the previously well functioning NATO ISAF KIA at field of target training ?*

## **RESEARCH PURPOSES**

My choice of topic was also strenghtened by personal involvement. Between 2008 and 2009, I served as ATC at the Kabul International Airport in Afghanistan, which that time particularely operated as a „civilian and military airbase” and was opened for the aircraft under authorization of ISAF and at the same time international airliners. From 2009 I was working in my recent appoinment at the National University of Public Service, Faculty of Military Science and Officer Training, Department of Airspace Controller and Pilot Training and carried out training of military air traffic controllers within the framework of higher education and special courses. In my work during the theoretical and practical training, I use my gained experience from Kabul. In favor for the development of our training methods and knowledge, I pay attention for the requests of my MATCO colleages, the changes and deficiecies. One of the tasks should be emphasize is the challenge that MATCOs face with when start working at airfields of remote countries. Because the ATC’s equipment, procedures, human aspects are in close conection to flight safety, it is important to train and prepare them proffessionally and menthally to be sufficient and effective in job and contribute to remaining flight safety at an acceptable level. The line of my research was influenced by two topic. One of them is aimed the initiative of the Ministry of Defence, which supported DATM project within the modernization of Military Air Navigtion Services (MANS). The goal of the program was to support the modernization of MATM system, support domestic and international professional trainings and plan the tasks referring to the occuring demands of NATO. Other way of my research was focused on a new technology of communication

and ATC systems, namely the appearance of Remote Tower System (RTS), which was applied successfully at civilian airport.

The question arised as a consequence of succesful civilian application, and drawn my attention to the examination of RTS in military enviroment.

My goals were to analize and understand the taskpersonnequipment content and create the model of capability referring to their logical conection. I did the detailed examination of the further three area:

1. *Analizes of the DATM, DAAM, NDAB elements and context. Compare them with the same way working and established expeditional capabilities of USAF. Finally determine and define, whether how the Deployable MATC capability would be applicable.*
2. *Apart from the offer of personnel, I examine the opportunities of the necessary equipment of ADC. As a recent technical solution, I draw particular attention to the RTS and its optional application at deployable airfields. This option was admitted by the NATO ATMC. Hungarian aspect of this initiative manifested at the field of the cooperation between the Ministry of Defence and Hungarocontrol, which let Pápa airbase visual display be connected into Remote Tower Center (RTC), Budapest. The project was supported by SESAR 2020. During the research, I examined the gained experience of civilian ATCOs, and those applications that may take the RTS compatible to military flight procedures, special flight manouvres, and alternatives of deployability.*
3. *In order to be able to say that the remote tower system meets the operational requirements of deployabilty, I compared it the frequently used mobile tower and its operational requirements.*
4. *The fourth aim of my research was to examine the conditions of deployable MATCO preparation in order to make the MATCOs' integration into changed working environment ease and facilitate the airfield data, traffic duration and procedures for the effective operation.*

## **HIPOTHESES OF THE RESERCH**

Based on the statements made so far, I set up the following hypotheses:

1. *The Hungarian deployable MATCO capability can be offered to the mobile airport models with its ADC capability*

2. *In the application of RTS at the military airfields due to the traffic specialities requires different display than in civilian airport had.*
3. *The RTS as a deployable system, does not meet those requirements, that may make it applicable to adapt into TO.*
4. *Targetted preparation of Hungarian MATCOs is necessary for the effective work at airfields in TO , which refers to the standards of International Civil Aviation Organization (ICAO), in order to make MATCO licenses agreed to the recommendations of NATO STANAG 7204.*

## **METHODS OF RESEARCH**

The following research methods I used in my dissertation:

- research of the national and international literature, which involves the examination of the ICAO standards, recommendations, documentations;
- examination and adaptation of the NATO and Hungarian Military Legislation;
- collection and analization of traffic statistic from two Afghan and two Hungarian aerodrome;
- reexamination of former analyzes with the usage of analytical geometric methods;
- with compering examination of deployable RTS and MOTS and presentation in “event tree” model;
- summary and usage of the pieces of experience I gained during service in national and NATO ISAF appointment;
- composition of a Hungarian and English language questionnaire and analizises of the results;
- interviewing the distinguished Training Methodology Specialist of the Hungarian civilian ATCO training;
- participation in regulation development activity;
- elaboration of the research results, their summary and publication for scientific purposes.

## **SHORT DISCRPTION OF THE COMPLETED EXAMINATION**

In the first chapter of my dissertation I introduced the process leading to the establishment of the deployable air base, its stages and elements from the appearance of

each air traffic management element of DATM, DAAM until the theoretical realization of the complete deployable airbase capability. In this chapter I clarified the terminology and concepts relating to the topic. Since the NDAB under development phase of the potential implementation concepts during the research and writing of my thesis, I made a comparison with the USAF's expeditionary airport capability directives. During the comparison I was looking for the identities and differences between the potential implementation of NDAB and the already tested and functioning airbase capability. Since the Hungarian party was invited to the participation in NDAB, I examined in the following parts of my dissertation, whether what role of ATC group should be taken, leading or supporting nation.

In the second chapter I defined the potentially offered deployable MATCO capability on the basis of military capability. After that I examined, in what position the ATC group standing in the framework of the Hungarian Defence Forces (HDF), and whether this model how deeply showing similarities to the NDAB organization. In order to determine what role of capability the complete ATC or partial should be ambitiously offered, I wanted to prove through comparison of four airfields. Among four airfields were two are located in TO and two national military ones. During analysis of airfields, their equipment facilities, characteristics of the manoeuvring area and annual movement were examined.

In the third chapter I examined that beyond personnel offer, whether what type of equipment would be suggested. As a first step of analysis I compared the ICAO and NATO standards, Stanags and recommended practises, in order to be aware that the equipment requirements of the Aerodrome Control Tower are the same, or consist differences. In the examination of the deployable capabilities, I introduced the features, working methods and operational requirements of the MOTS and RTS application. As an additional research, in this chapter I examined whether what type of display version of RTS is the most appropriate for military use. This research based on the typical and special military flight profiles and their visual detection from the ATC eye level. In the analyses of the MOTS and even the RTS as deployable capability those priorities and criteria were determined which are necessary for the provision of minimum safe service. In this chapter I made recommendation that among two possible solution which one is suggested to apply at deployable airbase of TO.



In the fourth and at the same time last chapter, I examined the features of training that necessary for MATCOs to be able to easily adapt the challenges of changed working environment and to improve the ability of effective work within international group. In this chapter through an English questionnaire I asked MATCOs of nations with whom the Hungarians served together at airbases in TO. The purpose of the questionnaire was to strengthen the reasons for target training, and to provide information for its optimize structure. My research additionally extended to examine and transform the recent target training structure and methods in basis of ICAO competence based training directives.

## **SUMMARY OF THE CONCLUSIONS**

In the establishment of Hungarian Deployable MATCO capability, in particular the ADC personnel offering would be worthwhile. Among the reasons it is worth to emphasize, that in national military airfields which at the time of my dissertation authorized only for military use the majority of traffic is military. However the agreements that the operator of military airfield tied with airliners and flight clubs, make it possible to accept civilian traffic. So that experience available concerning the handling of civilian traffic, but in fewer proportion than they occur at airfield of TO. The other reason in favor of ADC offering is the distribution of the flight rules of the traffic, which mainly follow VFR than IFR and finally that fact should be take into account that at the airfields of TO the Approach Control Service (APS) is mostly procedural than provided with surveillance equipment. The Hungarian MATCOs have restricted experience in procedural APS.

The ADC offer seemed complete with the personnel and the necessary equipment for the provision of service in NDAB ATC group. The MOTS appears as an applicable solution for the support of ADC recent times, because the RTS, as deployable capability requires such an equipment and data link conditions that are not available in Hungary.

Due to the geographical features and the nature of traffic uses the airfields of TO, and in favor of the changed working environment it is reasoned to take target training for MATCOs who apply for the service. The necessary training infrastructure is partially available, the most missing equipment is the tower simulator that makes possible to display many airfields view. According to the EU and EASA requirements the National Aviation Authority (NAA) is responsible for the examination and authorization of the instructors, and the also host instructors by their licenses, the structure of the training organization, its infrastructure supply, and thematic. In that case the licenses of instructors, and the thematic of training

meet the standards and recommended practices of ICAO, they would not be accredited by the NAA, because as an EU member state's authority, it is committed to apply EU regulations. The only solution for the international acceptance of that target training is the accreditation by NATO.

## **NEW SCIENTIFIC RESULTS**

### **1. Thesis**

I examined with different type of analysis the military air traffic management system of the HDF, in order to realize what pieces of capabilities exists and can be offered for NDAB. I confirmed, that among the deployable MATCO capabilities the aerodrome controller personnel should be offered for the air traffic service at airfield of TO.

### **2. Thesis**

In order to confirm my assumptions about the optimize display view of the remote tower system in military airfields I complete an aerodrome specific analyses. After elaborated and analyzed data I proved that due to the special procedures of military flights and their geometry, the 360° panorama view is necessary to comply the safety conditions for the provision of service.

### **3. Thesis**

For testing the vulnerability of ADC service equipped with MOTS, I set order, the main elements of the system. I examined each element by using ICAO Safety Management Matrix (SMM) and proved, that the view from tower and the two-way radio communication take the first places among priorities that necessary for the provision of service. Both elements are essential for the maintaining the safe and continues air traffic service

### **4. Thesis**

After the analyzation of the airfields movement statistics, I demonstrate that due to the quantity of movements, the distribution of the military and civilian traffic, the proportion of VFR and IFR flights for the offering of Hungarian MATCO capability, the special target training is necessary. I carried out statistical data processing in an international expert environment, reviewed the conditions of the contribution of training, and revised the thematic of training. It was confirmed that the recent training could not be accredited by EU regulation, but its training methods, thematic and structure relatively easy convertible according to the ICAO standards and could be offered to other NATO member states.

## APPLICABILITY OF THE RESEARCH RESULTS

The aim of my research was to serve as a special, gapfilling literature for decision makers in the field of military air traffic management future planning, development and training of military air navigation services.

1. *The conclusions and findings of my dissertation can be used for the latter MATCO training, offering for NATO missions and elaboration of expertise.*
2. *I suggest to take conclusions of my dissertation into account and use them in creation of practical guides of training, annotation of the State Aviation BsC faculty, airspace controller specialization, additionally for the preparation of training courses to NATO accredit.*
3. *It would be preferable the use of competency-based training methods, evaluation principles, and milestone-oriented training structure involved in my thesis, in the training of state- aviation training courses.*
4. *I suggest the military airfields to use the presented version for the unified management of traffic statistics, which can facilitate the risk analysis of the airfield, airspace structure and ATM system, as well as the review of MLAT.*

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- S2 Vas, Tímea: 4. Légiforgalmi tájékoztatás, In: PALIK, Mátyás; BOTTYÁN, Zsolt; DUNAI, Pál; FEKETE, Csaba Zoltán; GAJDOS, Máté; SÁPI, Lajos; VAS, Tímea - A repülésirányítás alapjai, Budapest, Magyarország: Dialóg Campus Kiadó-Nordex Kft, (2018) pp. 93-104.

### *Publications in Hungarian language in domestic academic journals:*

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- S8 ZUBORNYÁK, Barna; VAS, Tímea: TRM, vagyis légiforgalmi irányítói kompetenciák fejlesztése és annak lehetséges hasznosulása a többnemzeti együttműködések során, Repüléstudományi közlemények 26: 2 pp. 171-179. , 9 p. (2014);
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  - TÁMOP-4.2.1.B-11/2/KMR-2011-0001 „*Critical infrastructure defense research*” „*Data integration*” sub program „*Safety aspects of unmanned aerial vehicles*” researcher
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  - KÖFOP-Concha Győző Doctoral Program for PhD students 2017
- Conferencies:
  - Resercher’s night 2017;

- Slovakia Liptovsky Mikulas: Akademia ozbrojenych síl generála Milana Rastislava Stefanika 2013;
- Romania, Brasov National Defense University 2012;
- Szolnok Conference on Aviation Science 2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,
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