

ZRÍNYI MIKLÓS UNIVERSITY OF NATIONAL DEFENCE

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**THE POTENTIAL FOR THE APPLICATION OF
GLOBAL INFORMATION SYSTEMS AND
DIGITAL MAPPING DATABASES FOR
THE HUNGARIAN DEFENCE FORCES**

THESIS

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INTRODUCTION

The defence policy of the Republic of Hungary had to be revised following the political and social transition that began in 1989 and its accession to NATO. These new political, economic and military conditions substantially altered the nature of responsibilities and consequent impact of them upon the organisational and technological requirements that the Hungarian Defence Forces have to meet.

The security priorities of Hungary have gone through a significant transformation following recent events. This and our accession to the NATO alliance have also generated new challenges and demands upon the military application of computer science and spatial (global) information systems (GIS), to which the Defence Forces have to give a scientifically based response.

Reform of the Hungarian Defence Forces and addressing these new roles is in hand. In this reformation, in addition to their traditional role, the Defence Forces have to be prepared for entirely new challenges and address risks of a new, non-military nature. The changes in the duties that the defence forces have to fulfil and the new tasks thereby impose higher requirements on the leaders and the command system of the military forces and, as a consequence, on the computerised information system, including GIS systems, utilised by the higher command.

The Hungarian Defence Forces currently do not have a comprehensive up-to-date computerised information system based on integrated principals, operational order, technical apparatus and infrastructure to adequately support the command to the level required. The creation of an integrated and up-to-date computerised information system for the efficiency of the command hierarchy, the communication and co-operation with our allies is a task to be solved urgently.

Much of the information necessary for military command applications is or can be associated with geographical position. For its easier and more expedient management, it is practicable to pass such information to the users making use of GIS systems that are based on digital mapping databases. The GIS systems already existing have to be incorporated into the integrated computerised information system to be established, while the new systems will have to be created as its organic parts.

In creating these systems, the existent information bases should be taken into account and utilised as far as possible.

When developing GIS systems, the starting point has to be the present status and operational parameters of the application of GIS. On these foundations the areas needing GIS support most of all can be and should be established. At the beginning of the development process, after studying the main characteristics and features of the GIS systems, the requirements they have to meet will have to be specified.

The data quality of the digital military mapping databases and the GIS systems to be created in the future and, as a consequence, how long they can be

applied, is fundamentally determined by the data capturing procedures used during their creation and application. It is of paramount importance how these procedures are chosen and by what means the quality requirements are specified at the beginning of the development process to ensure that the mapping databases and the GIS systems are of the required standard.

As a member of the NATO alliance Hungary has a necessary duty to transform the coordinates of the upper and fourth order horizontal geodetic control point network, i.e. the geodetic basis of the mapping and GIS systems of the Republic of Hungary, into the WGS-84/ETRS-89/UTM¹, reference system and to publish a new Military Geodetic Point Catalogue.

The application of GIS systems in the field of defence is now crucial for the fast and effective solution of tasks now facing the Hungarian Defence Forces. One of the features of our times is the upgrading of the role of information. The answers given to the challenges evoked as a result of the revolution of information must be scientifically established so that we can meet the new requirements set forth for the Hungarian Defence Forces. The establishment or transformation of different level information and computerisation systems as well as the utilisation of the new achievements of GIS science is a pressing and imperative task to be met in the course of the conversion of the defence forces.

The transformation of our international relations, meeting our obligations originating from our membership in NATO and the need of communication with the organisations of NATO make it imperative to develop the computerised information background, and specifically, the GIS systems and the digital mapping databases of the Hungarian Defence Forces.

The recent military conflicts and the experience gained in peace-making and peace-keeping operations, the enlargement of the NATO and the reform of its military command system have raised new theoretical and practical issues in relation to the application of GIS systems and digital mapping databases.

The successful completion of the ongoing reform of the military forces, on one hand, necessitates the transformation of the order of command and the information system and, on the other, offers an opportunity that must not be let go by, to introduce the tools and the results of up-to-date computerised information systems.

The geometric reference systems of the topographic map system, the digital mapping databases and the GIS systems of Hungary and the Hungarian Defence Forces are different from the ones used in NATO.

The overall transformation of the map system will be the result of a long process. However, it is a pressing task to work out the principles and the technology of the transformation and updating.

In Hungary, just like in other countries, GIS developments began without any central control. They appeared as an outcome of economic pressure but they were restricted by the economic conditions too. This is the reason why the different systems were made in diverse geometric reference systems, according to the presumed or real needs or the capabilities of the developers. Linking the

¹ World Geodetic System 1984/European Terrestrial Reference System 1989/Universal Transverse Mercator

applications created in different reference systems as well as transferring or receiving geometric data is only possible through the conversion or the transformation of the data.

It is very typical of military GIS systems that their data content is built up from the content of a number of databases. The reliability of the data is essentially determined by their place of origin and the method they were transferred from the original database.

Making use of existent databases is an unavoidable task and in order to meet the requirements and solve the tasks arising from the above factors it is necessary to introduce significant modifications and developments in the structure of military higher command and the computerised information systems supporting the higher command, as well as in the attitude of the leading and executive personnel.

The scientific study of the subject is important so that suitable and effective answers shall be given to the information challenges and the new requirements and so that well-established and farsighted decisions that take our national traditions and potentials into account shall be made.

Following from the above, the subject of my study, in general, is the military application of GIS systems and digital mapping databases.

The geometric basis of GIS systems is constituted by digital mapping databases. GIS systems, on the other hand, are generally subsystems of the computerised information systems of large and heterogeneous organisations of which army structure can be viewed as a sub set. Thus the research has extended to necessarily accommodate to the required degree the areas linked with computer information systems.

The analysis of the current condition and status of the application of digital mapping databases and GIS systems in the Hungarian Defence Forces is also a subject of this project. The study also covered the exploration of the operational characteristics and the justification of the need for the application of digital mapping databases and GIS systems.

The definition of the requirements towards digital mapping databases and GIS systems and the main characteristics of GIS systems has also been a subject of the study.

The data capturing procedures that can be used at the establishment, operation and maintenance of digital mapping databases and GIS systems have been analysed and the terminology and definitions regarding the quality of the data to be built in the systems have been studied.

In the project, the main features and parameters of the geodetic reference systems used in Hungary, serving as the basis of GIS systems, have been revealed and quantified. The reference system WGS-84/ETRS-89/UTM, generally accepted and used by NATO member countries, has been introduced.

The technology of transforming the upper and fourth order horizontal geodetic control point network of the Republic of Hungary into the WGS-84/ETRS-89/UTM reference system and the publishing of a new Military Geodetic Point Catalogue has also been investigated. Further issues are the data capturing procedures to be used in establishing and operating the digital mapping

databases and GIS systems of the Hungarian Defence Forces and the application potentials of digital mapping bases at the different command levels of the Hungarian Defence Forces.

Due to the subject being very extensive and the size of the present thesis being limited, the study cannot cover the special mapping and GIS needs of the services and specialised troops of the Hungarian Defence Forces. These can be the subject of a study in the future.

RESEARCH OBJECTIVES

The objective of the research: the definition of requirements and proposals based on scientific criteria for the up-to-date digital mapping databases and GIS systems to be created in the near future.

Intermediate objectives:

- To demonstrate the role of application of GIS in increasing the effectiveness of military command and prove the immediate need for development.
- After analysing and evaluating the status and conditions of applying GIS within the defence forces, to demonstrate the immediate need for development.
- To reveal the general characteristics of digital mapping databases and GIS systems and define the primary requirements that may be imposed on them. To check the data capturing procedures and the questions regarding the data quality of the digital mapping databases and GIS systems.
- To quantify the main features of the geodetic reference systems used in the digital mapping databases and GIS systems in Hungary.
- To develop the methodology of transforming the co-ordinates of the upper and fourth order horizontal geodetic control point network of Hungary into the WGS-84/ETRS-89/UTM reference system and the publication of a new military Geodetic Point Catalogue.
- To devise proposals for data capturing procedures usable in the establishment and operation of the digital mapping databases and GIS systems of the Hungarian Defence Forces.
- To determine the fields of activities of the Hungarian Defence Forces that primarily require the application of digital mapping databases and GIS systems.
- To define proposals for the application fields of digital mapping databases in the Hungarian Defence Forces.

RESEARCH METHODS

I have made a detailed analysis of the relevant published material from the research library of the Zrínyi Miklós University of National Defence, the Central Library of the Budapest University of Technology and Economics, the library of the Institute of Military Engineering of the Ministry of Defence, the library of the Mapping Agency of the Hungarian Defence Forces and on the Internet studying scientific articles, papers, regulations and essays in relation with the subject. In order to explore the literature basis of the subject matter in a wide range and to come to strongly founded conclusions after its analysis in depth.

I have participated in specialists' conferences. I have analysed and evaluated the information obtained from these sources and I have made use of the resultant outcome by systematising and interpreting it with my experience in the field in order to reach balanced conclusions.

I have taken part in professional talks and consultation and sometimes I have initialised them. I have analysed, evaluated and made use of what was said there.

I have used observation, analysis, synthesis, induction, deduction, adaptation and the rules of formal logic as research methods.

CONCISE DESCRIPTION OF THE ANALYSIS CHAPTER BY CHAPTER

In the *first chapter*, I have summed up the general characteristics and the terminology regarding GIS systems and the experience gathered in connection with the military application of digital mapping databases and GIS systems.

I have determined their position in the system of mapping support. I have analysed the role of applying digital mapping databases and GIS systems in the military command system. I have pointed out their character as a resource and their suitability of increasing efficiency.

I have revealed the current status, conditions and difficulties of the application of digital mapping databases and GIS systems within the Hungarian Defence Forces.

By showing some typical applications of digital mapping databases and GIS systems in international practice and at the organisations of the Hungarian Defence Forces, I have demonstrated that the changes in the duties of the Hungarian Defence Forces and the new tasks set higher requirements than earlier to the command of the military forces and the command system, and consequently, the computerised information systems and the GIS systems supporting the command.

I have also demonstrated that it is a matter of urgency that there be established an integrated up-to-date computerised information system including a GIS system for the Hungarian Defence Forces. It is important to reinforce the

areas of military information and GIS both in a technical and a human aspect. It is imperative to cease the overlappings in the leading and control of the information management and to increase the efficacy of the area and, additionally, to keep the number of staff at an optimum and their level of education at the highest.

When performing development of GIS systems, the starting point has to be the current status and conditions of applying GIS systems. Based on this, the areas that primarily require GIS support should be determined and, at the beginning of the development, the main characteristics and features of GIS systems will have to be revealed. The most important requirements for GIS systems will have to be determined.

In the *second chapter*, I have discussed the main characteristics of the data capturing procedures applicable in establishing and operating digital mapping databases and GIS systems.

After reviewing the data capturing procedures, it can be concluded that the method of data capturing has a very significant influence on the data quality.

I have shown that perhaps the most important elements of the effective application of digital mapping databases and GIS systems are the quality and reliability of the data stored in them. Accordingly, in the interest of the adequate data quality and long-term applicability of the military digital mapping databases and GIS systems to be created in the future, the data capturing procedures usable during their creation and operation will have to be clearly identified. In the course of designing digital mapping databases and GIS systems, the circle of data to be built in the systems, the circle of possible data sources and their fields of application have to be determined. The costs of building and maintaining a database is highly dependent upon the required quality of the data stored in them and thus on the applicable data capturing procedures.

I have quantified the main features of the geodetic reference systems applied in the Hungarian digital mapping databases and GIS systems. I have defined the possible and practicable application fields of different reference systems.

With particular reference to the point that in order to operate successfully in international cooperation and in the NATO alliance, it is advisable to choose the reference system of national and defence function GIS systems so that they comply with international requirements. The transformation of already existing systems should also be considered with a view to economic feasibility and reliability. It is necessary to establish in a book of regulations the parameters of the geodetic reference systems of the data in digital mapping databases and GIS systems and of relevant secondary data sources as well as the mathematical relationships of techniques and procedures used for the transformation and recalculation of geodetic data. These regulations would then have to be followed strictly and consistently.

In the *third chapter*, I have set down a system of the most important requirements for digital mapping databases and GIS systems and I have analysed

the characteristics and the factors that determine data quality and the source of most frequently occurring errors. A detailed examination of the characteristics of data capturing procedures has led me to the conclusion that the best quality data can be captured by primary procedures. At the same time it has to be emphasized that both over and under-planning data quality imply extra expense in the construction and operation of the system.

I have shown that in creating and operating digital mapping databases and GIS systems, the quality of the data should be specified according to their existing or planned field of application. In the case of multi-functional application, the highest requirements of the given fields have to be complied with.

I have identified and set out the mapping and GIS requirements arising from our NATO membership and European Union integration.

Hungary's membership in NATO and its approaching EU accession makes it necessary to transform the point coordinates of the national geodetic control network into WGS-84/ETRS-89/UTM reference system. A further task is to make our map system NATO interoperable.

In the field of mapping and GIS, while attempting NATO interoperability, it is important to modify the existent maps and mapping databases according to NATO standards and to create new, NATO interoperable mapping products and GIS applications for the Hungarian Defence Forces.

In the *fourth chapter*, I have summarised the main features of the geodetic control network of the Republic of Hungary and the main parameters of the reference systems IUGG-67/HD-72/EOV² and WGS-84/ETRS-89/UTM.

I have made a proposal for the contents and the technology of preparing and publishing the new military Geodetic Point Catalogue.

I have determined the transformation methodology of the co-ordinates of the national geodetic control point network from IUGG-67/HD-72/EOV reference system into WGS-84/ETRS-89/UTM.

My purpose has been to further the creation of a new geodetic point catalogue which contains the co-ordinates and vertical data of the first to fourth order control points of the national geodetic control network at geodetic accuracy so that the troops, the artillery, anti-aircraft, radio-engineering, engineering and other active units of the Hungarian Defence Forces can make extensive use of it in a wide range in realising their duties. Naturally, the Geodetic Point Catalogue will be available for carrying out various military geodetic and mapping tasks as well.

The new military Geodetic Point Catalogue will be published before the end of 2003.

In the *fifth chapter*, I have elucidated for consideration some proposals for data capturing procedures applicable to the creation and operation of the new mapping system, digital mapping databases and GIS systems of the Hungarian

² IUGG-67/HD-72/EOV: International Union of Geodesy and Geophysics-1967 / Hungarian Date / Egységes Országos Vetület

Defence Forces. I have specified factors having influence on the choice of data capturing procedures.

I have identified and highlighted the most important properties of the mapping products to be prepared during the realisation of the military segment of the Hungarian Topographic Programme (MTP). In the future the above mentioned mapping products may be the fundamental digital mapping databases of the Hungarian Defence Forces, from which foundation the mapping products, the digital mapping databases and the GIS systems that are necessary for the effective operation of the Hungarian Defence Forces, the police authorities, other armed forces, disaster prevention forces, administrative organisations and civilian users can be produced.

In the *sixth chapter*, I have listed the application areas of digital mapping databases on the different command levels of the Hungarian Defence Forces where, in my opinion, their application is indispensable. In my work I have taken as my starting point the general information demand of the managerial and command information systems on the different command levels, which is determined by the functions of the given information system.

I have developed proposals regarding the application fields of digital mapping databases and GIS systems in the Hungarian Defence Forces.

I have specified the potential fields of application of digital mapping databases that are linked to the general information need of the information systems of the individual command levels.

I have summarised the mapping needs of the different command levels and named the areas where the application of digital mapping databases and GIS systems efficiently supports the command and executive activities.

I have specified the potential main areas of applying digital mapping databases in the realisation of the traditional and new tasks of the Hungarian Defence Forces.

In the interest of the efficient realisation of the duties of the Hungarian Defence Forces, I have made proposals for the most important conditions and the possible areas of applying digital mapping databases effectively.

CONCLUSION AND SUMMARY OF THE RESEARCH RESULTS OF THE STUDY

The purpose of my study has been to set up a system of scientifically based requirements and to make proposals for the establishment of up-to-date digital mapping databases and GIS systems for the Hungarian Defence Forces. I have intended to contribute to the development of the digital mapping databases and GIS systems of the Hungarian Defence Forces by means of scientific research work.

My research objectives have been achieved through my research work. My research methods have proved efficient in demonstrating that my study hypothesis was grounded. They have played a part in the achievement of the results of scientific research aiming at assisting the creation of the new digital mapping databases and GIS systems of the Hungarian Defence Forces and the modernisation of the already existing databases. They have successfully served the appropriate completion of the research.

My research has shown that Hungary's membership in NATO has generated challenges and requirements new in quality in the field of the applications of military computerised information and GIS systems. A part of the new challenges arises directly from joining the NATO alliance. The other part, however, follows from the changes in our security circumstances, the role and focus of defence and the operational conditions of the Hungarian Defence Forces. The Hungarian Defence Forces will have to give scientifically based responses to these issues in the near future.

The research has demonstrated that the changes in the duties that the defence forces have to fulfil and the new tasks impose higher requirements on the leaders and the command system of the military forces and, as a consequence, to the computerised information system, including GIS systems, supporting the higher command.

The study of the subject has reinforced the opinion that the Hungarian Defence Forces currently do not have a comprehensive up-to-date computerised information system based on integrated principals, operational order, technical apparatus and infrastructure to support the command structure required. The creation of an integrated and up-to-date computerised information system for the efficiency of the command, the communication and co-operation with our allies is a task to be solved urgently.

My research has shown that much of the information necessary for military command is or can be associated with geographical position. For its easier and more expedient management, it is practicable to pass such information to the users making use of GIS systems that are based on digital mapping databases. The GIS systems already existing have to be incorporated into the integrated computerised information system to be established, while the new systems will have to be created as its organic parts.

In creating the new computerised information and GIS systems, the existent information bases should be taken into account and utilised as far as possible.

In the research, it has been verified that in developing GIS systems, the starting point has to be the present status and conditions of the application of GIS. On these foundations the areas needing GIS support most of all can be and should be determined. At the beginning of the development process, after studying the main characteristics and features of the GIS systems, the requirements they have to meet will have to be specified.

With my study, I have demonstrated that in order to achieve the appropriate data quality of the digital military mapping databases and the GIS systems to be created in the future and, as a result, their long-term applicability,

the data capturing procedures to be used during their creation and application has to be determined.

In the course of the research I have shown that being a member of the NATO alliance makes it necessary to transform the coordinates of the upper and fourth order horizontal geodetic control point network, i.e. the geodetic basis of the mapping and GIS systems of the Republic of Hungary, into the WGS-84/ETRS-89/UTM reference system and to publish a new Military Geodetic Point Catalogue.

According to the objective of my study, in my work I have revealed the position, conditions, general characteristics and role of applying GIS within the defence forces in increasing the efficiency of the command. I have listed the most important characteristics of data capturing procedures of digital mapping databases and GIS systems and the main features of the geodetic reference systems applicable in their creation and operation.

I have defined the most important requirements for GIS systems.

Relying upon these, the scientific findings of my research work are the following:

NEW SCIENTIFIC FINDINGS

1. Revealing the status of applying GIS within the defence forces and its condition, general characteristics and role in the command system, **I have justified the immediate need for development and determined the areas of the activities of the Hungarian Defence Forces that primarily require the application of digital mapping databases and GIS systems.**
2. Revealing the general characteristics of digital mapping databases and GIS systems, **I have determined the requirements for them, I have analysed their data capturing procedures and worked out proposals for improving their data quality.**
3. I have analysed the main properties of geodetic reference systems used in digital mapping databases and GIS systems in Hungary, and as a result **I have worked out the technique of the transformation of the co-ordinates of the upper and fourth order horizontal geodetic control point network into the WGS-84/ETRS-89/UTM reference system and the publication of the new Military Geodetic Point Catalogue.**
4. **I have worked out proposals for the potential applications of digital mapping databases in the Hungarian Defence Forces and the data capturing procedures in the creation and operation of the digital mapping databases and GIS systems of the Hungarian Defence Forces.**

PROPOSAL FOR THE UTILISATION OF THE RESEARCH FINDINGS

I consider the results of my research work applicable in elaborating the new theoretic bases of military mapping and GIS support i.e. the mapping doctrine and the different specialised mapping and GIS directives.

My study can be useful auxiliary material for the experts responsible for preparing and making decisions on the development of map supply, map making, computerised information and GIS systems of the Hungarian Defence Forces. It can successfully support the founding and making of their decisions.

My paper can efficiently and usefully serve the further scientific study of the subject. The objective of further research may be the definition of the actual information needs, the requirements for data sources and data quality of the special individual military fields.

Further research will be necessary to determine or reveal the actual information need of the individual command levels along with the data sources related.

The elaboration and definition of the structure, scope of duties and authority, the organisational relations and the operational mechanism of organisations that efficiently operate the GIS systems is a further task to solve.

THE APPLICABILITY OF THE RESEARCH FINDINGS IN PRACTICE

I believe the results of my research work are applicable in the planning, establishing and maintenance of the digital mapping databases and GIS systems of the Hungarian Defence Forces and other organisations as well. They may be useful for the users in applying, maintaining and, possibly, in further developing digital maps, digital mapping databases and GIS systems.

Based on the fourth chapter of my study, at the beginning of year 2003, the transformation of the co-ordinates of the upper and fourth order horizontal geodetic control network of the Republic of Hungary into the WGS-84/ETRS-89/UTM reference system was carried out and the publication of the new military Point Catalogue is in progress and will be finished by the end of the current year.

My thesis can be used as auxiliary material in teaching military mapping and GIS studies at the Zrínyi Miklós University of National Defence. It can serve the students' self-education and assist in treating the subjects of applying digital mapping databases and GIS systems.

LIST OF PUBLICATIONS

Articles published in periodicals:

- 1) The Applicability of Digital Maps in the Hungarian Defence Forces,
(Nemzetvédelmi Egyetemi Fórum, Issues 7-8, 1999)
- 2) The Tools and Methods of Data Collection in Digital Map Making,
(Nemzetvédelmi Egyetemi Fórum, Issue 9, 1999)
- 3) Military Computerised Information Systems and GIS Systems, Part 1,
(Térinformatika, February, 2000)
- 4) Military Computerised Information Systems and GIS Systems, Part 2,
(Térinformatika, March, 2000)
- 5) Thematic Maps of Transport Applicable in National Defence,
(as co-author, 50%, to be published)
- 6) The Reference Systems of Geometric Data in GIS,
(to be published)
- 7) New Military Maps Under Way at the Ministry of Defence Mapping
Company,
(to be published)
- 8) The Data Quality of GIS systems,
(to be published)
- 9) From the Care of Stock of Cartographic Documents to Virtual Private Map
Collections
(as co-author, 50%, to be published)
- 10) The status and condition of applying GIS in the Hungarian Defence Forces
(Térinformatika, Issue 100, to be published,)

Presentations:

- 1) Operative Map Production,
(Hungarian Geodesy, Cartography and Remote Sensing Society /MFTTT/,
Congress, Pécs, 7th January, 1999)

- 2) Computerised Information Systems and GIS Systems in the Hungarian Defence Forces,
(9th National GIS Conference, Szolnok, 23rd September, 1999)
- 3) Military Maps After World War II
(MFTTT Trade History Section, MFTTT Head Offices, Budapest, 22nd November 2000,)
- 4) Operative Technologies in Military Mapping / An Example of the Application of Up-to-date Digital Technologies at the Mapping Agency of the HDF
(„The Role of Space in Modern Warfare, General Staff Level Conference, ZMNE, 5th December, 2000,)
- 5) Reference Systems in GIS
(Hungarian Geodesy, Cartography and Remote Sensing Society /MFTTT/ GIS Section, MFTTT Head Offices, Budapest, 7th January 2001)
- 6) The Services of the Ministry of Defence Mapping Company
(11th National GIS Conference, Szolnok, 27th September, 2001)
- 7) Production Management and Information Servicing at the Ministry of Defence Mapping Company
(Ministry of Defence Mapping Company, Annual Professional Conference, Visegrád, 5th October, 2001)
- 8) New Products of the Ministry of Defence Mapping Company
(Hungarian Geodesy, Cartography and Remote Sensing Society /MFTTT/ Topography Section, MFTTT Head Offices, Budapest, 22nd January, 2002)
- 9) Transformation into the WGS-84/EUREF/UTM Geodetic Reference System, The Transformation of the Co-ordinates of the National Control Point Network
(The Society of Military Science, Mapping and Military Geography Section, 30th April, 2002)
- 10) Production Management and Servicing in Enterprise Activity: Ministry of Defence Mapping Company, 2002.
(MoD Mapping Co., Annual Professional Conference, Tök, 27th September, 2002)
- 11) Ideas on the Servicing and Use of State Topographic Basic Data
(12th National GIS Conference, Szolnok, 14th November 2002)

12) From the Care of Stock of Cartographic Documents to Virtual Private Map Collections

(as co-author: Dr Plihál, Katalin – Mihalik József, Hungarian Geodesy, Cartography and Remote Sensing Society /MFTTT/ Topography Section, FÖMI Council Hall, Budapest, 28th January, 2003)

Other Publications:

- 1) Operative Technologies in Military Mapping, / An Example of Applying Up-to-date Digital Technologies at the Mapping Agency of the Hungarian Defence Forces,
(“The Role of Space in Modern Warfare” Publication at the General Staff Level Conference, Zrínyi Miklós University of National Defence /ZMNE/, 5th December, 2000)
- 2) Military Topographic Maps After World War II,
(Millennium Exhibition, “A Thousand Years of Hungary on Maps”, Budapest, 2000, Exhibition Guide Book, p. 48-52)

Studies:

- 1) The Status of Applying Computerised Information Systems and GIS Systems in the Hungarian Defence Forces
(1996, 29 pages, Library of the Mapping Agency of the Hungarian Defence Forces)
- 2) GIS Applications at the Mapping Agency of the Hungarian Defence Forces; Potential Directions of Development
(1998, 11 pages, Library of the Mapping Agency of the Hungarian Defence Forces)
- 3) Data Capturing Procedures Applicable at Establishing GIS Systems
(1998, 19 pages, Library of the Mapping Agency of the Hungarian Defence Forces)
- 4) Digitising Still Images
(Research to Survey the Hungarian Cultural Public Property / A Study by Order of the Ministry of Information and Telecommunication / Technology Working Group, Digitising Still Images, as Co-author, in progress, Deadline of Completion: 30th 11. 2003)

Other Scientific Activities:

As one of the production managers of military mapping, since 1996, I have taken part in the work of a number of working groups, whose activities have successfully applied the approved transformation of our military map system and mapping products to meet NATO requirements.

I have developed the technological specification for the preparation and publication of the Addendum to the Geodetic Point Catalogue currently applied. (Mapping Agency of the Hungarian Defence Forces, Budapest, 1999)

Using for reference the foreign maps that can be found at the Mapping Supply Department of the Mapping Agency of HDF, I have analysed the methods used by other countries for depicting significant military and civilian objects. The Chief of the Mapping Agency of HDF has accepted my conclusions and suggestions summarised in a report. Furthermore, my suggestions have constituted the basis of agreement with civilian mapping organisations in the above subject. (Mapping Agency of HDF, Budapest, 2000).

I have prepared the technological specification for the new Geodetic Point Catalogue to be published in the course of the transformation of our military map system. (Ministry of Defence Mapping Company, Budapest, 2001).

Public Activities:

I have participated in the activities of the joint working group of the Ministry of Agriculture and Rural Development, the Ministry of Defence and the Ministry of Finance as a member of the subgroup representing the Ministry of Defence. The task of this working group was to prepare Act 76th of 1996 on Surveying and Mapping Activities and the related Ministry Decrees.

I have taken part in a number of instances in the work of working groups to elaborate modifications to ministerial decrees.

I participate in the work of the Mapping and Military Geography Section of the Society of Military Science. Since 1979 I have been a member of the Hungarian Society of Surveying, Mapping and Remote Sensing. I take part in the activities of the topographic, geodetic, GIS and the trade history sections on a regular basis.

CURRICULUM VITAE

My name is József Mihalik. I was born in Szerencs on 1st September 1961.

I accomplished my secondary school studies in Miskolc, at the Surveying Branch of No. 3 Vocational Secondary School in 1979. For one year, until August 1980, I worked at the No. 4 Surveying Department of the Cartographic Company in Miskolc. I took part in the testing of the second modification (in the planning stage at the time) of the F3 Surveying regulation as a member of a surveying group.

In 1979 I was admitted to the Geodetic Section of the Geodetic and Cartographic Association, (known now as the Hungarian Geodesy, Cartography and Remote Sensing Society), and I have been a member ever since.

In 1980 – after a successful entrance examination – I proceeded with my studies at the Surveying and Land Reallocation School of the University of Forestry and Wood-Industry, in Székesfehérvár.

After graduating in 1983, I returned to the Cartographic Company and worked as a head of section. I took part in the large scale surveying of four villages and a few industrial geodetic duties. At the same time I prepared the calculation programme for geodetic point interpolation for the newly procured PTK-1096 type calculator. The No. 4 Surveying Department used these programmes for years.

I started my military service as a conscript in Kalocsa on 2nd February 1984, where I was posted for a reserve tank-officer training course. After successfully completing the course, I was detailed for a one-year troop exercise to the Mapping Institute of the Hungarian People's Army. During the troop exercise, I worked as a geodetic surveyor at the Topogeodetic Department of the Institute. I carried out the large scale survey of several military objects and took part in other geodetic support missions as well. (airfield objects, shooting ranges and geodetic support of airfields.)

Having done my regular military service on 1st September 1985, I became a civil servant as a geodetic surveyor at the Mapping Institute of HPA after a transfer from the Cartographic Company. Simultaneously, I applied to be taken on the professional staff register.

From 15th December 1985 to 1st December 1986, I was a surveying field-officer at the Topogeodetic Department of the Mapping Institute HPA, with the rank of lieutenant performing geodetic support tasks.

On 1st December 1986 I was transferred to the newly formed Military Geodetic Department of the Astrogeodetic Station of HPA in the position of a surveyor field-officer. There I had the opportunity to take part in laser observation of satellites and Doppler measurements. We regularly discussed our observational experience with the experts of the Satellite Geodetic Observatory at Penc and engaged further in collaborative research using the results of our previous work. During our scientific cooperation, we carried out a number of surveying campaigns of national size and significance.

Apart from the above, after adapting the Soviet specification for the geodetic support of airfields issued in 1986 and developing and defining the parameters of the new technology, in the 1987-1988 campaign period, a four-member surveying group under my authority carried out the geodetic support of all the airfields used by the Hungarian People's Army at the time. On the territory of the Astrogeodetic Station, we determined reference bearings by astronomical measurements for the establishment of the constant of gyrotheodolites. As Officer Commanding the Geodetic Subdivision, I took part in the exercise of the Szolnok Mapping Battalion and the Astrogeodetic Station. During the training of the reserves called in, I presented lectures on the subject of military geodesy.

In 1989 I was admitted to the Astrogeodesy faculty of the Kuibisheff Military Engineering College. In the 1989-1990 academic year I attended an intensive course in Russian at the Zrínyi Miklós Military College and completing it I gained an advanced level certificate in Russian. Due to the political changes in 1990, I did not have the chance to go to the college in Moscow.

In 1990, on the recommendation of my superiors, I was transferred to the Phototopographic Department of the Tóth Ágoston Mapping Institute of the Hungarian Defence Forces in the position of an assessment field-officer. I participated in the planning and preparation of the flights for aerial photography necessary for the design of the M0 and M3 motorways.

In the 1990-1991 academic year, at request of the subject secretary, Major Pál Kaszai, I held lectures at the Zrínyi Miklós Military College for artillery students in the subject of geodetic support.

In 1992, I was appointed to the post head of the Archives Subdepartment of the Production Department of the Tóth Ágoston Mapping Institute of HDF. Under my direction, the staff of the subdepartment developed and implemented the new computerised system of map registry, which worked efficiently until the enactment of the Law on Accounting. Simultaneously, at my suggestion and under my direction, the film-registry system of the Aerial Image Library of the Mapping Institute, which is still in use, was prepared.

In 1993, I was admitted to the specialised training of Mapping Military Engineering as a regular student at the Surveying and GIS Engineering Branch of the Civil Engineering Faculty of the Budapest University of Technology.

In 1996 I passed the exam and got an intermediate level certificate in English. Following a successful state exam in November 1996, I was appointed to deputy head of the Production Department of the Production Directorate of the Mapping Agency of the Hungarian Defence Forces.

From November 1996 to February 1997, in addition to fulfilling the requirements of my post, I took part in the work of two working groups together with specialists from the Ministry of Agriculture and Rural Development to prepare the enacting clauses of Act 76th of 1996 on Surveying and Mapping Activities.

From 1996 to 1999, I prepared four studies in the subject of GIS, of which I held presentations to students on training practice or an educational visit at the Mapping Agency. I took part in the preparation of the publication introducing the

Mapping Agency. Every summer I have assisted in the training of students on industrial practice at the Mapping Agency.

From 1st September 1998, owing to the permanent absence of the head of the Production Department, the Director General of the Mapping Agency appointed me to the post of the acting head of department (production deputy director) with full executive powers.

In 1999, as a member of a working group, I participated in the preparation of the internal publication called "Handbook to the large scale surveying of military objects" and the new "Regulations to the calculating of production cost" of the Mapping Agency. I played a role in the joint working group of the Mapping Agency of HDF, the Ministry of Agriculture and Rural Development, Institute of Surveying (FÖMI) and the University of Technology preparing the realisation of the "Hungarian Topographic Programme".

In September 1999 I was promoted to be head of Production Department of the Mapping Agency of HDF. My duties entailed the direct management of the production tasks of the Mapping Agency.

As a result of reorganisation, from 1st January, 2001 I became the head of the Servicing Department of the Ministry of Defence Mapping Company. My duties have been to directly manage the production and servicing tasks of the MoD Mapping Co. At the same time I have fulfilled the duties of the technical deputy director.

In 2001 I prepared the technology specification of the new Geodetic Point Catalogue to be published during the transformation of our military map system, based on which the publishing of the Point Catalogue will be finished before the end of year 2003.

I am an active participant in the activities of the Mapping and Military Geography Section of the Hungarian Society of Military Science. Since 1979 I have been a member of the Hungarian Geodesy, Cartography and Remote Sensing Society. I regularly participate in the activities of the Topography, Geodesy, GIS and Trade History Sections.

My objective is to attain a PhD degree and to advance in my professional and scientific career.

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Made in Budapest, on August, 2003

(Major József Mihalik, Eng.)