IMPLEMENTING OF THE MILITARY GEOGRAPHIC INFORMATION SYSTEM AT THE HUNGARIAN DEFENCE FORCES

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A KATONAFÖLDRAJZI INFORMÁCIÓS RENDSZER MEGVALÓSÍTÁSA A MAGYAR HONVÉDSÉGNÉL

Összefoglalás

Magyarországnak a NATO-hoz való csatlakozása megköveteli egy olyan egységes alapokon álló Katonaföldrajzi Információs Rendszer létrehozását, amely a különböző adatokat, információkat elsősorban a Magyar Köztársaságról és a környező országokról, szükség esetén a különböző válságterületekről biztosítja a katonai, valamint a politikai felső vezetés számára. A katonai tervezési, vezetési, műveletirányítási rendszerek fejlesztése érdekében elengedhetetlen a katonaföldrajzi információk tartalmának, csoportosításának egységes értelmezése, ezen információk gyűjtését, feldolgozását, tárolását és szolgáltatását biztosító Katonaföldrajzi Információs Rendszer létrehozása. A rendszer jelenleg a megvalósítás útján halad. 2002-ban elkészült az a Rendszerterv, mely biztosítja, hogy a meglévő és a jövőben beszerzésre kerülő adatbázisok felhasználásával megvalósítható legyen a széleskörű igényeket kielégítő Katonaföldrajzi Információs Rendszer. A jelenlegi tervek, a rendelkezésre álló digitális adatállományok és az elkövetkező három évre tervezett finanszírozási feltételek valamint a jól képzett szakmai állomány közösen teremtik meg azt a hátteret, amely a rendszer előállításához és működtetéséhez szükséges. Ebben a munkában széleskörű együttműködésre van szükség a katonai és polgári szervezetek között, hiszen a különböző adatbázisok más-más felelősségi körbe tartoznak, de csak azoknak egységes rendszerbe foglalásával lehet megvalósítani a kitűzött célokat.

Summary

Hungary's joining the NATO requires the creation of a coherent Military Geographic Information System that provides different data and information first of all on the territory of the Republic of Hungary, the neighbouring countries and, if necessary, the different crisis areas for the military and political high level leadership. In order to the development of the planning, command and operational control systems the unified interpretation of the content of the military geographic information and their categorisation as well as the creation of a Military Geographic Information System to collect, elaborate, storing and servicing these data is essential. The system is now being implemented now. A system plan that ensures the feasibility of the Military Geographic Information with the use of existing and future procured databases system was completed in 2002. The present plans, the available digital data files and the planned financing conditions for the next three years and the well-trained staff will jointly form the background necessary to the establishment and operation of the system. In this work, a wide cooperation will be needed between the military and civilian organisations since different databases falling in different scope of responsibilities, and the tasks set can only be implemented by a unified systematising of them.

Importance of the Military Geographic Information System

Upon Hungary's joining the NATO one of the most important tasks of the Hungarian Defence Forces was the establishment of interoperability in the different fields of its activities. Within this, collection, processing and provision of information for the combat environments have had a prioritised role. These tasks, however, could and should have been fulfilled first of all based on the results and by the means of military geography, military MC & G and the various intelligence services.

In order to the development of planning, command and operational direction systems the establishment of a *Military Geographic Information System* (MGIS) aimed at the coherent interpretation and grouping of the contents of military geographic information as well as the collection, processing and provision of these information is crucial.

The purpose of the MGIS is to provide the military organisations with real time digital geospatial information necessary to decision preparation. Its task is to support peace planning and preparation of the defence organisations in peacetime and during armed defence of the country in war. The Mapping Service of the Hungarian Defence Forces plans to operate MGIS via the intranet system of the Hungarian Defence Forces, As an essential requirement regarding the creation of military geographic databases it can be said that data capture, processing of data and the generated military geographic products must be in accordance with the provisions laid down in the various NATO STANAGs.

Basically MGIS shall support defence planning, preparation of the troops and the staffs as well as the activities of the troops and forces during the armed defence of the country. MGIS, by the use of standardised provisions and products shall ensure that the officers and soldiers of the Hungarian Defence Forces be given an appropriate knowledge in coalition operations. The above outlined general tasks and requirements can only be fulfilled by a modern, GIS based complex database system.

Antecedents

The theoretical foundation of the military geographic information system took place in 1996. By the completion of the DTA-50 digital base map an opportunity has been presented to the formation a modern, computer based information database. This, however, has also requested both the data suppliers and the data users to set up suitable technical conditions the implementation of which, even today, raises problems some times.

This, that time formulated modern, computer based information system was aimed to take over and process information from national and international databases, as well as to contribute and accelerate the military purpose application of them. The system has made available a more effective updating and reworking of existing military geographic evaluations as well as assisted the military organisations in geoinformation support of staff exercises and 3D evaluation of operational areas.

This detailed and thorough concept was built up on the basis of „traditional" principles and took the following military geographic elements in consideration:

- Geographic location;
- Natural factors;
- Society and political factors,
- Economical factors;
- Military factors.

A main deficiency of the concept was that it did not match the NATO requirements and that it reflected first of all the fulfilment of tactical (operational) needs and was less

engaged with the strategic level. Generally it can be said that these concepts were data oriented and the question of functionality was of a secondary interest only.

The processing, analysis, systematisation and comparison of data and information procured from various organisations belonging to the different ministries in different ways was not solved and thus, for compatibility reasons, they were useless for the Hungarian Defence Forces as a whole.

In the subsequent years many ideas have come to existence on the creation of comprehensive, operable and compatible information systems and databases serving national interests. These efforts, mainly because of some conflicts of interests between the ministries have not been fulfilled; what is more, no measures aimed at the practical realisation have been made at the MS HDF until 2000 either.

The present situation:

The users at the Hungarian Defence Forces do not possess information on data necessary for them, data collection already organised by others (and other places) and the system of metadata servicing is missing as well.

MGIS shall form an integral part of the unified information system of the Hungarian Defence Forces, thus, the order of data economy as well as the structural frames of the MGIS shall be developed according to the existing organisational structure of the Hungarian Defence Forces.

The possibility of the development of the MGIS has come to the front again in 2001. After a call for tender the structure plan of the MGIS of he Hungarian Defence Forces was developed by ESRI Hungary Ltd in 2002. This nearly 300-page plan includes:

- Prescriptions of the NATO standardisation agreements;
- Activities to be supported by the MGIS;
- Connections of the unified, integrated information system of the MGIS and the Hungarian Defence Forces;
- Functionality list of the MGIS;
- Database plan;
- Description of the processes;
- Implementation strategies;
- Elements of system safety.

According to the system plan the essential tasks of the MGIS is to support defence planning, preparation of the forces and staffs during implementation of defence tasks and, by the application of standard processes and products, to assure that the military organisations within the Hungarian Defence Forces have an appropriate knowledge base during operations executed in coalition composition.

Figure 1. Fields of application of MGIS

The base of the information system will be the DTA-50 digital topographic map with its database fully loaded, and later, a planned digital topographic database meeting the content and accuracy criteria of the 1 : 25 000 scale maps (Vtopo-25) will be used. This will be supplemented and made more complete by the digitised data of aerial (ground) video materials of the country increasing the usability of the database significantly. Another possibility may be the visualisation of the blueprint (3D) models of the digitised photographs of public buildings, facilities and objects.

A modern information infrastructure provides an incredible amount of information both in quantity and quality for the leaders of the armed forces of the 21st century. It makes the military leadership possible to „see" everything necessary to see on the battlefield (or, in a three or more dimensional theatre in the future), in real time or near real time.

Future plans

The principal development of the content and physical structure as well as the elaboration of the structure plan of the MGIS raises a number of essential problems from the point of view of the effective future operation. As a primary one, the strategy for the introduction and preparation for use of the MGIS should be mentioned.

When compiling the introduction strategy four main processes, and within them, sub-tasks shall be formulated as follows:

- The process of preparation:
  - Formulating the legal background and decision preparation necessary to it;
  - Sharing the tasks in connection with the introduction between the Mapping Service of the Hungarian Defence Forces, the branches, the different levels of leadership and the contractors involved in the elaboration;
  - Creating staff, technical and technological conditions.

- The process of introduction:
  - The direction of the introduction by levels (low to high or high to low);
  - At the levels, simultaneously or by parts.

- The process of loading and conversion of data:
  - Formulating the infrastructure of implementation and verification;

- The process of data servicing:
  - Defining the scope of data providers;
  - Temporary and continuous data provision;
  - Mandatory and contract based data provision.

Resources requirements

The resources requirements of the system include:

- The necessary; software
- The necessary hardware as well as connecting the Mapping service of the Hungarian Defence Forces into the GIS base net of the Hungarian Defence Forces completed in 2005;
- Human resources requirements for development, running and operation;
- Cost requirements for system development and running. The MGIS was included in central planning process for three-years.

For development, a close cooperation between the experts of military geography system managers and programmers is necessary.

The result of the extension of the future joint theatre is the tangential and overlapping arrangement of the functional operational theatres of the special branches. This far reaching construction of the operational theatre shows an image of a fully integrated, all dimensional space for the joint commanders of the future, making possible the simultaneous reconnaissance and destruction of the different targets, taking into consideration the influences of the field and the weather on the operation.

Both description of the geographic environment and the visualisation of the terrain include visualisation of natural and artificial features as well as an evaluation of the impacts they make on the speed of the vehicles, maintenance requirements, passability, manoeuvring, forces river crossing etc. Information serving the visualisation of the terrain helps the commander's activities during the course of the entire operation.

Taking into consideration the present tasks of the Hungarian Defence Forces as well as the plans regarding the future applications its is worth to separate the application of the MGIS into two, connecting, but built upon each other as well, levels:

- Operational level and
- Tactical level.

At the *operational* level the extension of the MGIS is Hungary and its immediate environments. At the level of operations the support by the MGIS of an analysis of the transportation network and an analysis of the natural obstacles must have a high priority. At the operational level the MGIS shall make possible the compilation of military geographic evaluations (general operational information). These military geographic evaluations must include:

- Data regarding the overall geographic situation;
- Natural geographic circumstances;
- Parts of terrain and obstacles suitable for attack and defence;
- Areas suitable for housing of troops;
- The transportation system;
- Data of the population
- Dangerous objects;
- Health installations
- Diversion (landing) possibilities.

At the *tactical* level the MGIS shall make possible the evaluation of the influences by the terrain and the weather on field activities as well as the implementation of terrain evaluation. Within this, terrain evaluation must comprise:

- Surveillance and firing possibilities;
- Security and masking;
- The obstacles;
- Parts of the terrain of key importance;
- Approach roads and corridors of movement;
- Complex evaluation of the influence of the terrain.

It is the task of the Mapping service of the Hungarian Defence Forces to provide this image made of the terrain upon which the user will be able to visualise the terrain. Technical ensuring the visualisation of the terrain will include the collection of the necessary data,

elaboration, analysis, visualisation and servicing of the data as well as maintenance and running the databases. With the 2006 procurements an opportunity will be presented to the evaluation of the MGIS as well as the procurement of the databases.

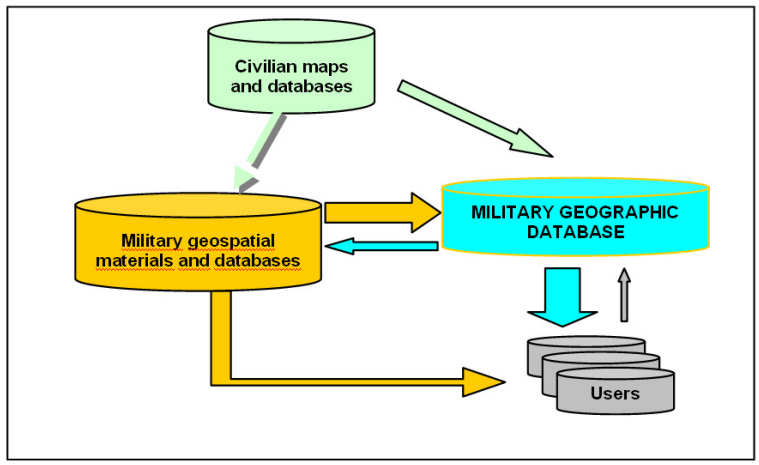

Figure 2. Interconnection among the elements of MGIS

The available databases at present are:

Vector databases:
- DTA-50;
- DTA-500;
- DTA-200; DTA-200 2k2;
- DDM-200;
- DDM-50;
- DDM-10;
- ERM;
- SABE;
- MKH;
- Geodetical Point Catalogue.

Raster bases:
- 1 : 1 000 000 scale maps (Hungary, ONCs);
- 1 : 500 000 scale maps (Hungary, TPCs, LFCs);
- 1 : 25 000 – 1 : 250 000 scale maps;
- 1 : 10 000 scale maps (with local projection and sheet designation)
- Military town maps;
- Digital satellite images;
- Aerial photographs.

Textual bases:
- Military geographic evaluations;
- Descriptive part of multimedia materials.

In the future the procurement of the following databases are planned:

- A surface coverage data file containing up-to-date information regarding the vegetation and its existence;
- A digital database with the soil types of Hungary;
- A database on the meteorological data of Hungary.

Based on an MGIS system plan completed by ESRI Hungary in 2003 the project with he completion of the tasks as laid down there can be feasible. The implementation in the coming three years should be planned as follows:

- Year 2006: Development of military geographic applications necessary to the support of the tasks at the operational level;
- Year 2007: Development of military geographic applications necessary to the support of the tasks at the tactical level;
- Year 2008: Introduction of the applications at the staffs and the troops.

Should central financial funds be available for the implementation of the planned tasks the MGIS will be feasible, introducible and applicable in tiers in the defence sphere during the next three years.

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