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INTELLIGENCE PREPARATION OF THE BATTLEFIELD AS A PART OF KNOWLEDGE DEVELOPMENT

Pavel SKALICKÝ, Tibor PALASIEWICZ

University of Defence, Brno, The Czech Republic
pavel.skalicky@unob.cz, tibor.palasiewicz@unob.cz

Abstract: *The aim of this article is to introduce an approach to intelligence preparation of the battlefield (IPB) as a part of knowledge development in conditions of the Army of the Czech Republic (ACR). Numerous of NATO publications and Stanags has been analyzed as well as Czech national documents. Based on results of the analyses and personal experience of authors, the current state of IPB applied in ACR has been outlined and main imperfections of this process have been emphasized such as a disregard of dynamic changes of terrain in time and so on. It the closing section of the article a few possible ways of IPB development have been suggested. Those suggestions show possible form of this process for needs in 21st century.*

Keywords: military engineering support, intelligence preparation of the battlefield, knowledge development, terrain, land slide

1. Introduction

A terrain analysis has a long history in the military and basically goes back to its beginning. Already commanders in antiquity and the middle Ages chose a convenient place to build their defensive positions and sought appropriate communication to move its own troops. The Analysis of an operation area played, play and will play an irreplaceable and key role in leading any military operation.

2. Basic terminology and principles

Knowledge development (KD) is a continuous, adaptive and networked activity carried out at strategic, operational and tactical levels of command. It provides commanders and their staff with a comprehensive understanding of complex environments, including the relationships and interactions between systems and actors within the engagement space[1].
This space we can term as an operational environment. A method PMESII-PT analysis is used for description of the operational environment. It means that we analyse the engagement space in P - political, M - military, E- economic, S- social, I - information, I- infrastructure - P - physical terrain, T- time domains. In this step, respective commanders and staffs encounter with the evaluation of a terrain for the first time. This evaluation is further elaborated in a process Intelligence Preparation of the Battlefield (IPB). Outputs from this process are crucial for commanders during the Operational Planning Process and mainly for their intelligence requirements.
The IPB process consists of four steps [2]:

- Define the Operational Environment/Define the Battlespace Environment.
- Describe Environmental Effects on Operations/Describe the Battlespace Effects.

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- Evaluate the Threat/Evaluate the Adversary.
- Determine Threat COAs (course of actions)/Determine Adversary COAs.

Description of the Environmental Effects or Battlespace Effects on Operations is primarily a task for military engineering.

3. Analysis of current state

Physical terrain, we can imagine as a set of technical data and information. Members of engineer intelligence are responsible for management of the relevant information.

The Czech document Pub-31-17-01 (Joint Operations and Engineer Intelligence matters) is based on alliance publications. This document delimits following groups of engineer information in relation to terrain [3]:

- geographical information;
- geological information;
- roads (routes);
- watercourses, rivers;
- railway;
- airports and landing points;
- barriers information;
- resources for water supply;
- engineer resources;
- equipment local infrastructure available on the battlefield;
- ability of forces (allied forces, enemy, Host nation).

Stated survey of areas contains two main sets of information, information important for command and information important to support.

Information important for command includes data which are crucial for the direct conduct of combat operations. It includes an overview of natural or man-made phenomena that constitute barriers for our troops, or they can identify possible manoeuvre of the enemy.

Information important to support is particularly important for the engineer staff officers. There are contained sources of raw materials, energy, potential production capacity and possible supply routes. Generally speaking, this includes all information essential for the sustainability and support of allied forces.

We will focus just on information important for command in the following work.

The simplified process of terrain analysis is indicated on the figure 1. Each layer (X1, …, n) represents particular phenomena such as watercourses, forests, slant of slope, bearing capacity, etc. Evaluation is done either directly to paper maps or using of digital maps. After completion of individual phenomena evaluation, all layers are overlaid (summed) and the final product gives a comprehensive picture of obstacles or impassable terrain. It serves as a basic layer in a common operational picture.

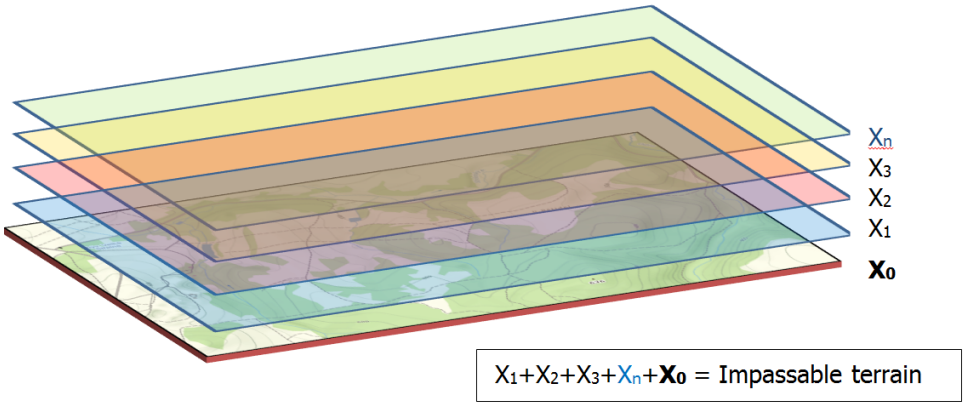


Figure 1 Simplified process of terrain analysis

During implementation of the terrain analysis there is usually done one mistakes in many cases. The terrain is in fact considered as a static object. It is generally known that many factors occur in real life let alone in the battlespace, which change

relief of terrain but those factors are neglected. For the most striking factors we can state:

- combat action (destroyed buildings, dams, bridges, roads…);
- effects of nature and natural disasters (floods, landslides, sand storms, ...);
- seasons and weather conditions (snow, changing vegetation, ...);
- underground spaces;
- slope instability.

4. Natural factors and their influence on changes of terrain

Changes in terrain caused by combat operations cannot be predicted very well, so we will not consider them further in the following text. We will focus on the effects of nature and state some practical examples of changing terrain that can affect the performance of operational tasks or some Joint Functions - Manoeuvre, Force Protection, and others.

The first types of factors are atmospheric phenomenon such as storm, sand storms, torrential rain, rainfall etc.

a b

Figure 2 Terrain affected by natural disasters (a – torrential rain, b – sand storm)

The effects of these phenomena are shown in real photographs (Figure 2) from operations MFO (Multinational Force and Observers) running on the Sinai Peninsula.

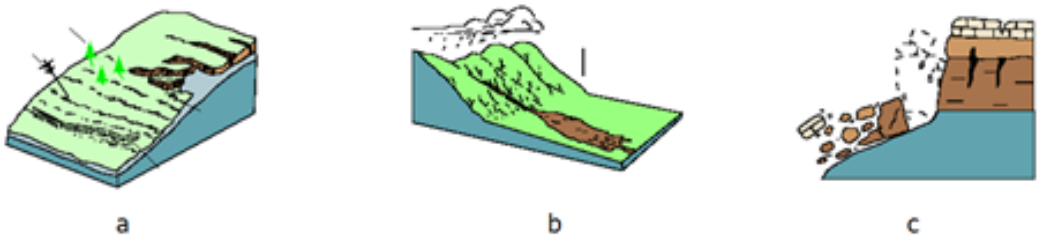
Next natural factors which can change terrain features are landslides. The literature states four basic groups of this movement [4], [5]:

Creep is the imperceptibly slow, steady, downward movement of slope-forming soil or rock. The velocity of this movement is approximately from 1 millimetre to 10 meters per year.

Slide is a movement similar to creep. The most significant difference is in the velocity of the slide which is measured from, approximately meters per day to meters per hour.

Flow; there is large number of types of this movement such as mood flow, debris flow, earthflow and another. The most important information concerning flow is against its velocity. For example the velocity of mudflow is approximately 25 kilometres per hour. We have to highlight that avalanche includes into this phenomenon too, and its velocity can approach more than hundred kilometres per hour.

Topple is the fasters type of landslide. The speed of this movement can be close to Free fall velocity. It means approx. 9,81 meters per second in our geographic position.



a b c

Figure 3 Types of Landslides (a – creep, slide; b – flow; c – topple)

Landslides occur most frequently in mountainous and hilly terrain.

On this issue it is necessary to recall the catastrophe that took place in 2007 in Afghanistan, where one Czech soldier was killed and two were seriously injured in the landslide while executing operational tasks.

Less tragic experience with landslides we have from the deployment of Czech soldiers in KFOR, too. There were landslides which interrupted the supply routes in the mountainous areas of the Balkan.

The last mentioned types of phenomena that belong to the changing terrain factors are underground spaces. Those spaces are possible to divide in two groups:

- Natural underground spaces (caves, cave complexes)
- Artificial underground spaces (tunnels, mines, wells, storage facilities etc.).

Underground spaces will have a significant impact on the conduct of ground operations. They will directly affect the bearing capacity of the ground (Figure 4); also can be used as enemy caches in the framework of insurgent activities, or IED chain. From history of conflict we know that underground space can serve as an additional dimension of the battlefield (such as tunnels during the Vietnam War or cave complexes in Afghanistan.

5. Possibility of development

According to information provided in previous chapters, it is obvious that the current state of the terrain analysis process is not on level, which requires the battlefield of the 21st century. In real practice it depends on experience and diligence of analysts - staff officers, how they conduct the terrain analysis and what information outputs submit. Manual evaluation of terrain is also time consuming relatively. The most suitable solution seems to be special software either to support or directly for analysing of terrain. For the commander and his staff it is very important to realize spatial depth of the Battlefield both in direction above the surface and below the surface – Figure 4.

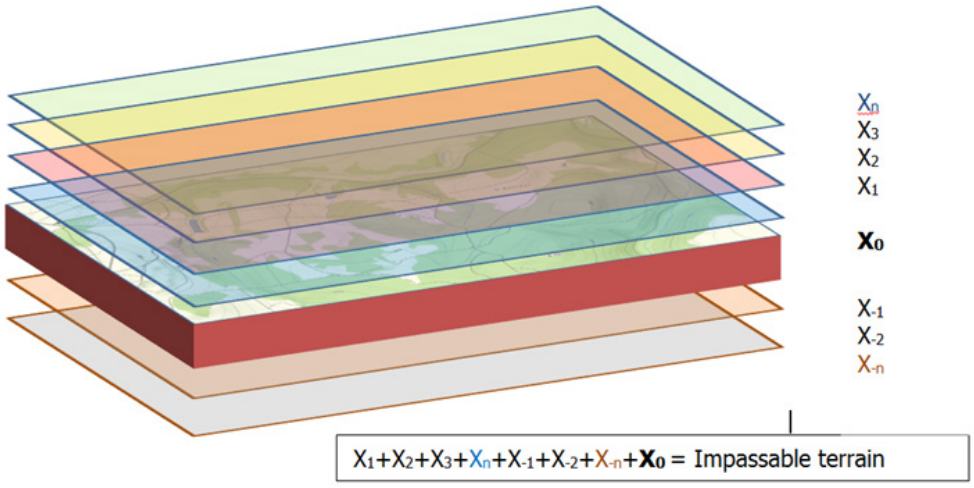


Figure 4 Proposed model of terrain analysis

Comprehensive digital maps with advanced applications are ways to better understand and comprehend characteristics of the area of deployment. The commander, who has crucial information, first, is advantaged.

Based on the experiences and authentication by method Brainstorming, they were defined possible branches and institutions to participate in this project. In the next step abilities, skills or experience of individual actors were determined. It was important for the definition how they can contribute to real implementation. In conclusion part of the method, we have proposed certain areas of activities and actions for involved actors. The whole procedure and a graphical representation of the used method are presented in Figure 5.

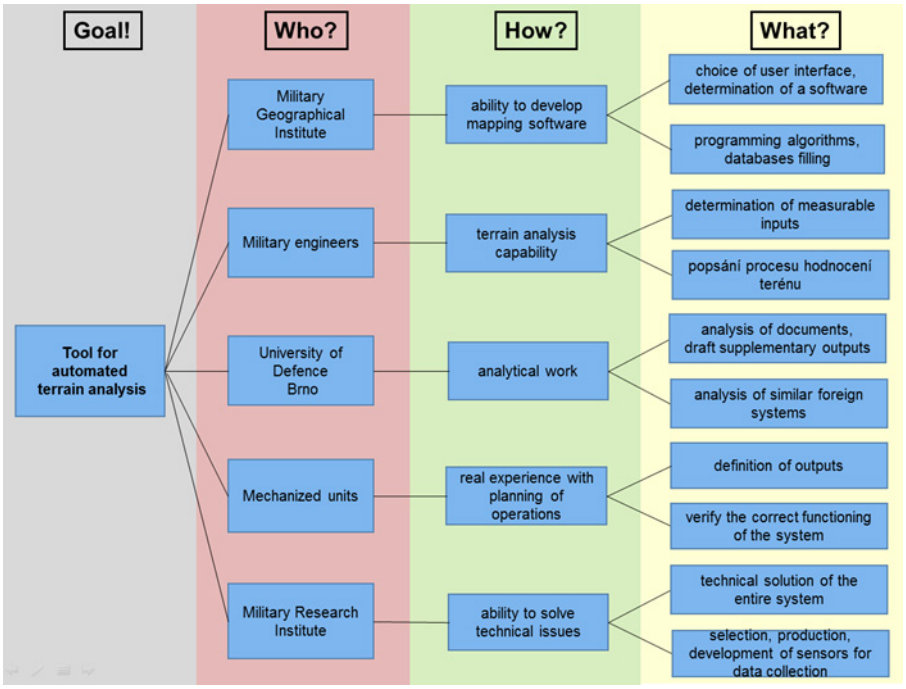


Figure 5 Proposed solution using method Impact mapping

6. Conclusions

From the text is obvious that area of operation is not just a static flat surface. When we want to be successful in operations we have to revise our approach to terrain analysis as a part of IPB. Only timely and comprehensive information about an evaluation terrain can provide a realistic picture of a situation in the area of interest and contribute to achieving of operational tasks.

Any time we have to keep in our heads that information is the most effective weapon on a contemporary battlefield.

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