

Changes in the content of topographic maps in relation to their use in the history

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Abstract:

Since about the 18th century, the use of topographic maps has been mainly in support of military activities. Therefore, their content was usually adapted to the way of conducting combat activities so that they provide adequate information for direct activities of soldiers in the field, as well as for planning combat operations and coordinating the movement of units before and during combat actions. In the history of military topographic mapping, examples can be found of how the content of military topographic maps has changed depending on selected factors that reflected and still reflect military strategy and tactics, as well as how the appearance of maps has changed depending on the technological possibilities of cartography and map printing. Changes can be considered in terms of development, functionality and map features.

As basic *factors of development* influencing the content of military topographic maps were considered:

- the general influence of the method of warfare on terrain knowledge requirements,
- dynamics of combat operations,
- the influence of the mechanisation of combat activity after the World War I,
- the development of joint ground and air force operations,
- the impact of the spatial extent of operations and the way of the command and control of units,
- the influence of military doctrines and the implementation of the strategic plans,
- the impact of the accuracy and effectiveness of weapon systems,
- the effect of navigation systems and their accuracy.

These factors may also be reduced or supplemented and the list is therefore not necessarily final. When considering the influence of individual factors on the content of topographic maps, it is usually necessary to consider them in complexity and not in isolation.

The influence of these factors on the content of military topographic maps can be assessed by studying old maps, focusing on military map works of the Austrian Empire, Czechoslovakia between World War I and World War II, Czechoslovakia after World War II, and the Czech Republic since 1993.

In the assessment, the *basic functions of the map* were considered, which according to (Miklošík, 1997) are the following:

- information function, i.e. the ability of maps to provide the required information about the landscape in which military activities have taken place and are taking place,
- model function to study geometric and other relationships between the objects and phenomena depicted,
- the function of the basis for planning and designing spatially oriented activities,
- the function of a means for managing the implementation of projected or planned projects,
- the function of a basis for illustrating the communication of information relating to the territory depicted,
- the function of a basis for deriving other types of maps and digital cartographic products.

The functionality of the maps can be assessed based on the success rate of solved tasks over the maps, focusing on typical tasks from the armed forces environment, as well as on guided discussions with the main users. This approach was used in the 1980s and 1990s to provide the basis for map functionality analysis and is currently being applied to the functionality analysis of upcoming NATO-standard military topographic maps. For the old maps, the analysis was based on expert estimation.

In terms of *map features*, the following factors were evaluated:

- legibility of the map content,
- the amount and character of details,
- the way in which the map frame is expressed for reading point coordinates,
- method of expressing content elements in relation to military activities in the field and in relation to the planning of combat and non-combat activities,
- the extent of the area of responsibility that is shown on the maps.

To illustrate the above procedure, the influence of the factor of military doctrines and the implementation of the strategic plans of the powers is briefly described, as well as an outline of the evaluation of changes in the detail of the content expression depending on the way of conducting the battle.

In assessing *the influence of the factor of military doctrines and implementation of strategic plans of the powers*, two basic moments are noticeable in the assessed period - the involvement or non-involvement of a given state in a military-political bloc. The Austrian Empire was not part of any military-political bloc and therefore it secured only its own territory for the needs of its armed forces. The situation was the same in Czechoslovakia between the world wars and after the World War II until the establishment of the Warsaw Pact. During this period, topographic maps were again provided only from its own territory. During the World War II, the German Reich also produced maps for the armed forces outside its own territory, including the occupied Protectorate of Bohemia and Moravia. Similarly, standardized topographic maps were provided in the framework of the Warsaw Pact doctrine for the anticipated military operations on its own territory and westwards across Europe to the Atlantic Ocean. After the collapse of the Warsaw Pact, the armed forces were again provided topographic maps only from its own territory. After the accession of the Czech Republic to NATO, topographic maps were produced from assigned and agreed areas of responsibility outside the territory of NATO countries in addition to its own territory, and these maps were and are used to support international missions.

Changes in the *detail of content expression depending on the method of combat* can be documented on the example of the depiction of roads and their close surroundings. For the infantry units, which essentially formed the core of armies until World War II, it was important to show the location of roads and their spatial structure. At the same time, it was important to show as many landmarks along these roads as possible - tree lines, religious symbols, isolated houses, etc. After the widespread introduction of motorized and mechanized troops, it was no longer enough to show only details for orientation, but it was also necessary to gradually show the information necessary to assess the characteristics of roads and the critical points on them for the purpose of vehicle movement on roads. At first, information on road widths was displayed, and later on the width of bridges and their load-bearing capacity. This information was initially in the form of added thematic information, but later became part of the standard content of the maps. Currently, there is a shift from expressing the technical characteristics of roads to their performance characteristics (DGIWG, 2020). At the same time, the colours used have changed to ensure better legibility even in low light conditions. The information obtained from the examination of the relationship between the content of topographic maps and their main use will be used in the preparation of the new military topographic maps of the Army of the Czech Republic created according to NATO standards (Talhofer, Bělka, & Dohnal, 2021).

Reference

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