

**OPERATIONAL REQUIREMENTS AND NEEDS TO  
COMMAND AUTOMATED SYSTEMS - EXERCISE  
EXPERIENCES IN NATIONAL DEFENCE UNIVERSITY**

**WYMAGANIA I POTRZEBY OPERACYJNE WOBEC  
ZAUTOMATYZOWANYCH SYSTEMÓW DOWODZENIA  
– DOŚWIADCZENIA Z ĆWICZEŃ W AON**

**Norbert Prusiński**

National Defense University

***Abstract:** The paper presents the requirements and needs to be met by automated systems of command at the command posts for the implementation of selected projects of the process of command, information exchange and the preparation and distribution of documents. The lecture presents the findings of the exercises conducted in the NDU with the use of such applications SZAFRAN and JAŚMIN system and other tools in support of the command procedures.*

***Keywords:** systems of command*

***Streszczenie:** W referacie zaprezentowano wymagania i potrzeby, jakie powinny spełniać zautomatyzowane systemy dowodzenia na stanowiskach dowodzenia na potrzeby realizacji wybranych przedsięwzięć procesu dowodzenia, wymiany informacji czy sporządzania i dystrybucji dokumentów. Wykład prezentuje wnioski z ćwiczeń prowadzonych w AON z wykorzystaniem aplikacji m.in. systemu SZAFRAN i JAŚMIN oraz innych narzędzi wspomagających realizację procedur dowodzenia.*

***Słowa kluczowe:** systemy dowodzenia*

## **1. Introduction**

One of the fundamental objectives of education and training students and courses participants of the National Defense University are learning and improving skills of individuals and teams working within the framework of functional command posts (CP). Theoretical and practical exercises on a number of such issues of preparation and conduct of military operations at the tactical level in cooperation with the military administration bodies and local government using automated command systems and applications supporting the process of command. In accordance with the doctrines of the Polish Armed Forces in the project carried out by officers in positions of command are executed within the process of proving that it is worth briefly characterized.

The Decision Making Process<sup>1</sup> (DMP) is defined as: all projects related to the command of the troops carried out by organizational, functional, and people in positions of command function in the single-conduction command system<sup>2</sup>. It depends on the continuous collection, analyzing and evaluating information, as a result of what is decided and a OPLAN. On the basis of the OPLAN are being developed prescriptive information - tasks, FRAGOs, orders which are then transferred to subordinates.

The other, shorter definition says that the DMP is: *performed in the situation by the decision maker's decision-making sequence of steps, on which are made up words (define) decision problem, the solution of the problem formulated and implemented the decision*<sup>3</sup>.

The Polish Armed Forces, from the operational point of view, the DMP is directed always repeating the cycle of thinking and action at all levels and in all areas of command, consisting of cyclically repeated phases, stages and activities carried out relating to relating to the individual tasks of DMP cycles.

## **2. Phase of the cycle of DMP**

**Assessment of the situation** is the first phase of the cycle of DMP, at the same time it is a continuous process carried out in all cells (teams and groups) of a command post. On receipt of specific tasks, however, is to intensify activities in the assessment of the situation, targeted at a new task. The aim of the assessment of the situation is to create a clear and transparent picture of the situation for commander. This phase is characterized by the acquisition, storage, cleaning, storage, valuation, comparison and presentation of all kinds of information relating to their own troops, the enemy and the conditions of operations.

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<sup>1</sup> DMP together with the organization of command and the means of command is the command system elements. [w] *Doktryna systemu dowodzenia Sił Zbrojnych Rzeczypospolitej Polskiej DD/6.1*, Sztab Gen., Warszawa 2009.

<sup>2</sup> J. Kręcikij, J. Wolejszo, *Podstawy dowodzenia*, AON, Warszawa 2007, page 16.

<sup>3</sup> M. Strzoda i inni, *Wybrane terminy z zakresu dowodzenia i zarządzania*, AON, Warszawa 2002.

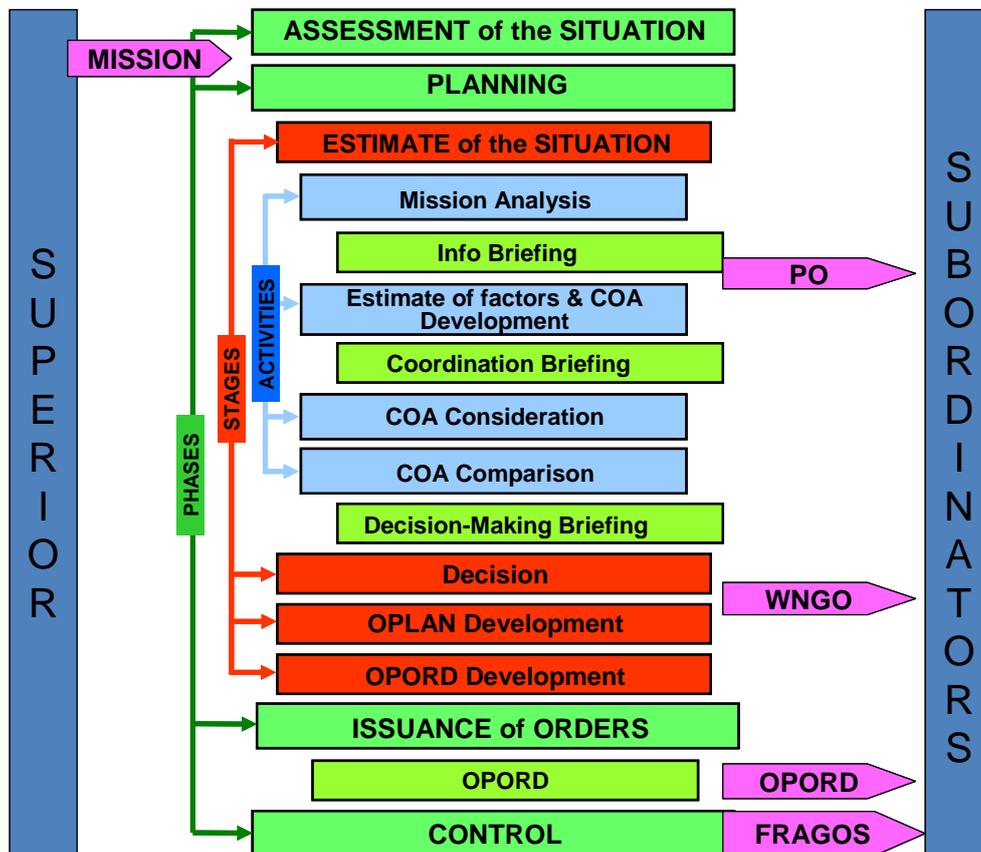


Fig. 1 Framework cycle of DMP

The second phase is **planning**. During this phase, detailed analysis and evaluations shall be obtained from the task manager and all the factors affecting its performance. In this phase, formed Courses of Action that are then considered in detail and compared in order to create the best conditions for the commander to make a decision. Under the plan, the decision is taken, formulated and announced by the commander as a commander's intent, also created is an OPLAN, as well as proving an essential command document - OPORD.

The planning phase is divided into four consecutive in the logical co-fluidity stages:

- estimate of the situation,
- a decision and announcing a commander's intent,
- OPLAN development,
- OPORD development<sup>4</sup>.

<sup>4</sup> J. Kręcikij, *Współczesne kierowanie wojskami*, AON, Warszawa 2002, page 95.

As the planning phase in the cycle of DMP, so step estimate of the situation in this phase is a special place. Activities carried out during the estimating of the situation are, in fact directly related to the analysis and evaluations problems with major impact on future military action of its own. The purpose of this step is a thorough understanding of the tasks received from the supervisor, his intention (including keynote), a detailed estimate of the factors affecting the perform tasks, development, consideration and comparison of Courses of Action (COS) and finally to create conditions for the decision.

Although the above individual activities overlap and the boundaries between them are fairly fluid estimate of the situation stage can be divided into:

- mission analysis,
- estimate of factors and COA development,
- COA consideration,
- COA comparison<sup>5</sup>.

Another phase of the cycle of DMP is an **issuance of orders** (giving tasks for subordinates). The purpose of this phase is to bring performers of tasks resulting from the decision taken by the commander. It formally begins once development of a full OPOD with the necessary annexes. However, if chief of staff as a person responsible for work preparation, or commander personally considers it expedient to use WNGOs (Warning Order), then this phase will begin practice a little earlier - after preparing OPLAN, and (on the basis of) the WNGO.

**Control** is the last, fourth phase. At the same time it ensures the continuity of this process, because its results are the basis for updating the data available about the situation – assessment of the situation and implementation of subsequent phases of the cycle. The purpose of control phase is to determine the actual state, it is conditional ways, results, or the degree of implementation of tasks set, compared with the actual state designations (objectives) set out in the task (set), detecting the causes of nonconformities actual state with the designations, indicating the way to achieve efficiency and effectiveness by: identifying how to resolve the identified deficiencies and weaknesses, determine the necessary changes in the process of the task or tasks correction, an indication of positive measures, operations or results of operations, affecting the implementation of the task<sup>6</sup>.

This short description of the cycle of DMP shows that in the course of its implementation at every level command operates a number of studies, evaluations and calculations, draw a large number of planning documents, reporting and information and prescriptive. Furthermore, in order to receive and impart information, maintains continuous communication with superiors, subordinates, neighbors and other elements of the environment such as public administration, humanitarian organizations, media, etc.

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<sup>5</sup> There, page 95.

<sup>6</sup> *Planowanie działań na szczeblu taktycznym wojsk lądowych DD/3.2.5, DWLąd., Warszawa 2007, p. 25-26.*

It should be emphasized that the circumstances of realization of DMP can be complicated by very complex conditions of combat. The plant is that the modern actions can be carried out:

- the national, allied or multinational (coalition) defense system;
- with high intensity (war), or as part of crisis response (low or variable intensity);
- within their own country, abroad, including: the changing climate, terrain, in varying political, economic, cultural, religious, environmental and media;
- against the enemy, which are regular armed forces of the state or coalition, or a local opponent, which are national or transnational branches: paramilitary, guerrilla, rebel, criminal, terrorist or mercenaries without a clearly defined tactics, using unknown weaponry.

The above-mentioned factors affecting the entire spectrum of work commands makes it difficult nowadays to imagine an efficient and effective command of forces without the use of automated command systems. Observation of such exercises as "PIERŚCIEŃ", "ŚWIDER", "LATOWICZ" conducted in the National Defense University, or "ANAKONDA", "DRAGON", "GRANICA", "WIOSNA" in the Polish Armed Forces in the last ten years, can provide a lot of requests for requirements and operational needs to automated command systems.

### **3. Application for automating the DMP** (wnioski w zakresie wymagań i potrzeb operacyjnych wobec zautomatyzowanych systemów dowodzenia).

#### **Computer equipment**

The first and primary application for automating the DMP in positions of command posts, is fact that headquarter, **each functional organizational and functional person must be equipped with the necessary computer equipment**. Computer (laptop, tablet, PDA) should enable the realization of tasks resulting from standard operating procedures (SOP) and be included in the system of information exchange inside and outside the command post. In a situation of full computerization of the position of command and training to operate the system the entire staff of command, all officers up to use a command post in the planning and command subordinate elements militant groups, shorten the duration of many projects, increasing the speed of information flow, increase range of informative data used to create: COS, shorten development time and improve the documents proving ability to archive information.

Meanwhile, the experience of the exercises in NDU show that a command posts organized using modules of mobile command posts, buses or tents staff, are not always adequately prepared for all staff jobs. This includes the important people such as the commander function for which the commander's module there was no computer on the equipment. This solution makes it necessary to constantly pass the commander of the main monitor to monitor the planning or command team to see a situation map, and assess current situation to make a decision. The ability to view

*Operational requirements and needs to command automated systems...  
Wymagania i potrzeby operacyjne wobec zautomatyzowanych systemów dowodzenia...*

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a specific situation on your own computer within the workplace for themselves how could significantly improve the work of the commander.

In a number of exercises is also a noticeable lack of computerized workplaces for all staff. Hence, there are situations that an officer waiting in line for the computer to send or receive information, make a document of command, analyze the situation and make operational and tactical calculations. It also happens that the officer is working on a non-network, and then moves generated material in electronic form to another job and distributes according to the separator. Such situations, though not disadvantage the automated systems of command, but rather technical capabilities available to the commander, can not in positions of command post take place.

### **Software**

Another requirement to the automated systems of command is to equip computers on the command post (including the function of personal computers) in the appropriate software utility. From the observation exercise shows that the software should provide a command to exercise all the functions, and above all allow for:

- graphical presentation of operational-tactical situation - current and planned;
- development (planning, prescriptive and reporting - news) documents proving;
- preparing operational -tactical calculations;
- conducting simulation activities;
- reception and transmission of various forms of information within a command post and on the outside and interacting with subordinate command posts and other actors involved in the action;
- the collection and storage of information necessary for a given command post for the execution of the decision-making cycle process command (database).

In order to discuss requirements in relation to the headquarters of software applications used in the automated systems of command as an example of exercises carried out at this point it is worth to draw attention to some aspect of the functioning of the command posts.

From the observation exercise "PIERŚCIEN" conducted in the years 2004-2011 in NDU shows that the work the authority of command takes place in parallel (two tracks) that is part of leadership engaged in planning future activities, and other activities of the current show that is acting as a control over the task organization elements pursuing tasks they undertake as a result of previously conducted planning (phase control of the previous decision cycle).

### **The structure of command**

Grouping of the officers around these two features resulted in the adoption of the exercises conducted in the NDU, the main body of command posts structure was divided into two teams: **Planning Team and Command Team**. The work of these teams coordinated by the chief of staff, who were subject to direct all organizational and functional cells of command post, and activity is determined

from the people to support the function of command team leader and head of the planning team. The internal structure of both groups were similar to each other, that sought to ensure that each team as far as possible all the cells were representatives of the command.

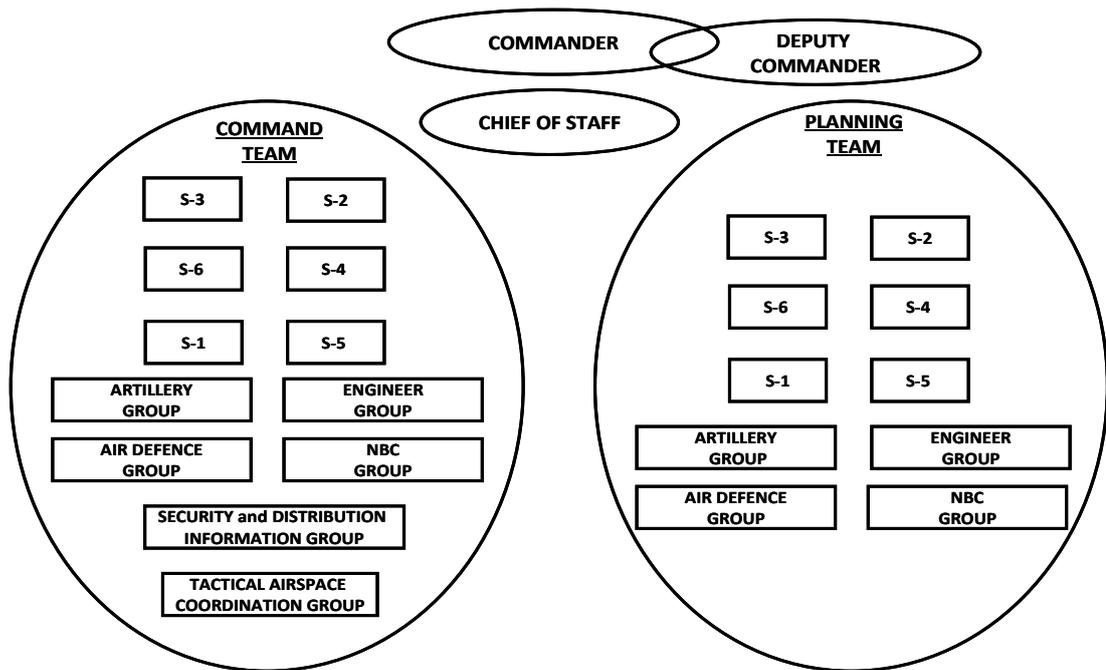


Fig. 2 The structure of command authority in the exercise "PIERŚCIEN"

In such a structure outlined the main tasks of command authority planning team was:

- the collection of information from all sources;
- conducting continuous and comprehensive analysis and assessment of the situation;
- creating COS, their consideration and comparison;
- preparatory POs, OPLANs, WNGOs and OPORDs in accordance with the commander's decision;
- detailed planning and alternatives;
- preparatory synchronization matrixes;
- overseeing the planning sub-levels of the conformity of their plans with the objective of the action and the keynote of the commander of the parent;
- monitoring the current situation in terms of its impact on planning of activities.

*Operational requirements and needs to command automated systems...  
Wymagania i potrzeby operacyjne wobec zautomatyzowanych systemów dowodzenia...*

In this team were located representatives from S1 to S6, artillery, air defense, engineering, NBC, army aviation and air force groups.

However the main tasks of the team command (control measures) include:

- monitoring the situation in all elements of task organization - receiving SITREPs from subordinates and neighbors;
- conducting situational maps and LOGBOOK;
- conducting continuous assessment of the current situation and comparing it adopted to implement the OPLAN;
- solving operational-tactical problems arising in the conduct of activities and situations different from the plans and schedules;
- preparing FRAGOS;
- coordinating and synchronizing activities in accordance with the decision of the commander;
- preparing and submitting reports to the supervisor<sup>7</sup>.

Like the planning team, so in command team were representatives from S1 to S6 and other army specialists.

Presented structure of command authority into two teams and tasks assigned to them meant that decision-making cycle described above conducted in brigade command post ran with a clear division of individual phases, stages and activities between planning and command team.

The planning team realized phases: assessment of the situation determining for a new task, planning and putting tasks, while the control phase command team. Coordination of activities carried out the two teams at all briefings at Headquarters, attended by representatives of both teams always, and by the chief of staff, and directly by the heads of the teams. Exchange of information enabled the internal computer network, and above all continuous direct personal contact officers.

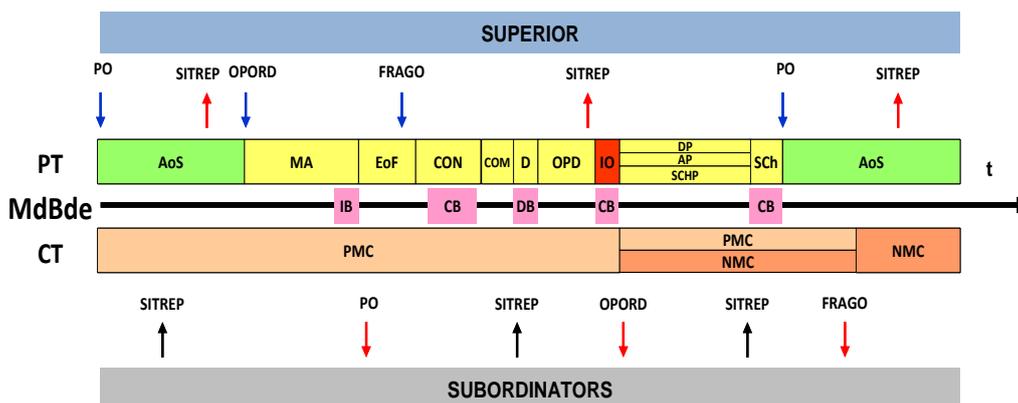


Fig. 3 Scheme of DMP in exercise „PIERŚCIEN”

<sup>7</sup> N. Prusiński, *Metody i treść pracy zespołów funkcjonalnych na stanowiskach dowodzenia wojsk lądowych: ćwiczebne struktury dowództw i stanowisk dowodzenia*, Warszawa 2005, page 24.

**Explanation:**

MdBde	Mechanized Brigade	D	Decision
PT	Planning Team	OPD	OPLAN & OPORD Development
CT	Command Team	IO	Issuance of ORDERS
PO	Preliminary Order	DP	Detailed planning
SITREP	Situational Report	AP	Alternative planning
OPORD	Operational Order	SChP	Synchronization preparation
FRAGO	Fragmentary Order	SCh	Synchronization
AoS	Assessment of the Situation	PMC	Previous mission control
MA	Mission Analysis	NMC	Next mission control
EoF	Estimated of factors & COA Development	IB	Info Briefing
CON	COA Consideration	CB	Coordination Briefing
COM	COA Comparison	DB	Decision-Making Briefing

Observing the work of practitioners in the above exercises could be observed that the support systems of command, which had headquarters in the broader support of the team headquarters. This applies especially to exercises of a system of JAŚMIN. Headquarters were able to track the actual position of subordinate units on the maps that were displayed on monitors, could track their maneuver and change the position in real time. "Illumination" sign of the unit allowed to obtain basic information about current number of personnel and essential measures to combat so far been prepared in the lab database.

In addition, communication with subordinates, superiors and neighbor in the "chat" allowed to exchange information with many elements in parallel in real time. What confirms a below photograph, on which are shown side by side two monitors with the brigade command team during exercises "PIERŚCIEN 11" with a total of seventeen open dialog boxes. It was a place of work a night shift officer. Thanks to this command by putting a short task, the transmission of commands or signals due to the prearranged plan, synchronize, so characteristic of command during the battle, was very smooth.

Definitely more difficult situation was in planning teams practicing command posts, because their needs for automation of the implemented projects are much greater, and systems used meet them in a very limited extent. This resulted from the absence of a specific software or exercise of the limited possibilities of application used in the system. Observation of the planning teams and their comments during and after exercise, have provided many interesting applications in the area of requirements and operational needs of automated command systems. The first fundamental problem, which drew particular attention to the practitioner is a graphical presentation of combat situations. The most common exercises used for this purpose was the "Package graphics operations (PGO)", which the practitioner as the duration of the exercises used a more efficient and thus saw a series of needs to improve it.

*Operational requirements and needs to command automated systems...  
Wymagania i potrzeby operacyjne wobec zautomatyzowanych systemów dowodzenia...*



*Fig. 4 Work place of officer from Command Team In exercise „PIERŚCIEN 11”*

There is no doubt that the graphic portrayal of combat situations is designed to graphically plan for future action and the conduct of situational maps on command post by using primers mapping software. Practitioner students repeatedly stressed the need to create opportunities to move the selected or the whole situation on the battle map sheets printed with the behavior of the scale. Such a function would allow to make a detailed analysis of the situation on the battle system supervisor for one or two levels of command above. Conduct activities such as evaluation of options against the background of the region, belt or region of interest of the command. Graphic preparation of other documents such as orders, or arrange of FRAGO on overlay, and usually in order to carry out certain checks outside the module of mobile command posts.

Another proposal in this area is to have the system capability to transmit situational maps and their fragments to specific recipients, and preparing and sending other graphic documents. This feature would prepare and submit timely SITREPs, operational reports per night fighting, allow transfer to other command posts: OPLANs, risk assessments or terrain.

Another requirement for graphics is the ability to use in the planning of aerial and satellite imagery. This thesis is confirmed by the officers involved in the Polish Military Contingents in Iraq and Afghanistan.

Requirements are a separate group exercisers observations concerning the operation and capabilities of the current situation and spreadsheet data in graphical situations. The fundamental of these are:

- data visualization and fluid-sensitive adaptation to the changing tactical map scale;

- simplified to a minimum (dragging, "a one mouse-click") the use of signs, their deposition, moving, merging, splitting, rotate, save, delete and annotate;
- the possibility of using a whole range of tactical character, their modification and the ability to create and save new notation;
- creating complex objects (elements of militant groups) such as tactical groupings, subunits reinforced other types of troops - artillery, engineers, logistics, etc.;
- obtain basic data for calculation at the time of drawing such as:
  - a) about the area - to draw the distribution areas, proprietary and other surface facilities;
  - b) length - for drawing the border, the demarcation line, phase, and others;
  - c) a range fire of basic weapons - to draw certain individuals in positions of fire;
- receive when you select a character of basic data such as topographic coordinates, state of equipment or the duration of the prohibition of fire, etc.;
- the possibility of calculating the combat potential by checking the combat units of data;
- the ability to select a specific area in which individuals are opposing sides (blue - red) while receiving the relative strengths in this area in the people and the essential equipment in combat or operator-defined organizational units (platoons, companies/ batteries, battalions / squadrons etc.);
- the possibility of calculating the marching units and maneuver elements in the grouping of activities carried out, the roads and across country with proposing ways to a designated area;
- signaling by a system of collisions on busy roads or region by task organization elements in a given time, signaling the restricted areas, zones or limited ban on firing or activities, etc.;
- transfer data from the graphical situation to other documents;
- signaling changes units/subunits position on the screen;
- the possibility of adapting the work of thematic layers (assigning rights to their creation, modification and viewing) in accordance with accepted principles of operation described in the SOP of the unit.

According to the practitioners opinions, the automated systems would include possibility to let commander of the analysis tasks more efficiently, accelerate the analysis because of a superior, or define your own job action restrictions. Facilitate the planning team to create COA, especially planning the march, and maneuver elements in the area, waist and rear area. Types of military officers to facilitate the selection of the place of deployment emplacements different types of troops, an indication of possible areas for special classes of elements of combat groups, determine the elements of command and coordination, the coordination of action in space or on other types of armed forces.

The above-mentioned options also allow the system quickly calculate potential combat the enemy on his own and set the borders or in objects, keep the calculation

of the relations of forces to consider COA and their simulation. Would give the opportunity after the admission decision quickly draw up a OPLAN, or decision support overlay or synchronization matrix.

A very important part of the automated systems of command, which significantly increase efficiency of the planning team is **a program to simulate the action**. As of today, such action as to consider the options for action simulation is organized in the headquarters very rarely, we can even say that in recent years, only the exercises in the NDU. The main reason for this is the large amount of time required to prepare and conduct the simulation of actions and not always appropriate knowledge of officers.

A program to simulate the action would consider alternatives to achieve the objective, or identify the strengths and weaknesses of different options of COA in a confrontation with a probable COA of the enemy, would make the calculation of risk in individual COA and gave rise, or COA can be accepted if it modify or even reject it.

The simulator would give the basis for conclusions as to cross terrain, the possibility of using certain types of troops on the specific fields or in specific objects. This would help assess the feasibility subunit maneuver or a fire in a bar fight. Moreover, while driving the simulator operations would take decision in the shortest time to select the most optimal variant to react to remedy the situation unplanned on the battlefield.

Another software necessary for automated systems of command is **the program for the development of command documents**. There is no doubt that such a program should allow for the use of text editors and spreadsheets to produce documents and provide an opportunity to combine documents with their own organizational documents of other cells-functional command posts in the types of forces and services, as well as enable their record keeping and archiving.

Observation of practice, and evaluation of documents proving especially prepared in the course, the way they create, transmit, display and archiving leads to the conclusion that the most important elements of the subsystem of document exchange database servers working document in positions of command. They should ensure that:

- databases store documents produced on its own slot, orders, notices and other documents sent by the supervisor, the cooperating units and by subordinates;
- protect access to the databases of documents;
- sending documents to the levels of the parent, subordinate, peer,
- tracking the movement of documents and forwarding of reports;
- transfer confirmations of receipt by the addressee of the document and the document is opened;
- archiving documents.

However officers at their work stations in this area expect from automated command systems to enable the system:

- to initiate the process of creating a document;

- filling in forms of documents stored in the database of documents;
- gave the possibility to use the information contained in the databases of other command post's cells, and other positions in accordance with the received permission ("gave a hint");
- linking parts of documents produced in different cells or a complex document sharing document into fragments directed to the appropriate functional cells;
- transmit documents or their fragments characteristics of address;
- sending documents;
- accounting documents;
- protect parts of the document (encoding, encryption, restricted access, etc.) in the case there is such a necessity;
- display documents on a display screen or printer in a fixed form;
- archiving sent (received) documents proving.

It should be emphasized that the use of the officers during the exercise word processing, receiving and sending electronic documents makes the least problems. The rules work on documents, maintain their proper format and editorial use of established standards, are usually rapidly absorbed and observed. A bigger problem for officers is always an appropriate template to fill substantive content.

The final software, which I will discuss shortly, and which has a significant impact on the staff work are **automated databases**. They should allow collection and storage of information necessary for the current operation and future tasks.

The structure of the database, its development and management plays an important role in the information system of command posts. This is perfectly visible on the exercises on the third day of their commencement, when practicing leadership have already developed quite a large number of planning documents, adopted and sent a large number of command documents and reporting and information across all functional areas of the unit. Without a specific place and the principles of data archiving begins in the commands produce a situation in which it becomes increasingly difficult to find the necessary information to plan activities to mark another layer to the option of whether to find (determine) the location of such artillery "as of 20.00 of yesterday."

Therefore the system software and database structure should be uniform for the entire command and the same horizontally and vertically, it means, with subordinates, the superior and neighbors. On each command post should apply the procedures for pre-determined and archiving of data, information, and cataloging rules be appointed administrators of databases. Compliance with these requirements greatly facilitate the work of command post, not only during exercise, but primarily in the performance of combat tasks.

Presented requirements and operational needs to automated command systems, which result from exercises conducted in the NDU clearly show the increase in the use of various applications of these systems by personnel on command post. Achieved results in the form of selected projects to accelerate the implementation cycle of DMP, increasing the speed of information flow, facilitating the preparation of graphic and

*Operational requirements and needs to command automated systems...  
Wymagania i potrzeby operacyjne wobec zautomatyzowanych systemów dowodzenia...*

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descriptive documents proving to drag people to your site the most conservative and tied to the traditional (paper-based maps and overlays) DMP.

Should also be aware of the fact that these systems are not yet at a level of technical sophistication that can be observed in the richest of NATO armies, or who are known for their application programs commonly available on the market for computer software. Approximate in the paper requirements and needs for those programs are the clearest example, because the officers who are not so long reluctant to technical innovations in a few exercises were able to present their observations and insights and directions for improving automated command systems.

We also can not forget that the introduction of automated systems for military command will be associated with the change (reduction) headquarters organizational structures, changing operating procedures, and perhaps will require a generational change in the military as training in their use will not bring the intended results.

All this does not take place without adequate funding, which has to pay you for the modernization of the armed force.

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**pplk dr Norbert Prusiński**, adiunkt – Kierownik Zakładu Systemów Dowodzenia Akademii Obrony Narodowej. Absolwent Wyższej Szkoły Oficerskiej Wojsk Zmechanizowanych we Wrocławiu oraz Akademii Obrony Narodowej w Warszawie. Doktor nauk wojskowych w specjalności dowodzenie. Autor podręczników i artykułów z zakresu systemów dowodzenia wojsk lądowych.