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FORMALISATION OF AUTOMATED CONTROL PROCESSES AT COMMAND POSTS THROUGH THE USE OF INFORMATION TECHNOLOGY

Анотація: Використання розробленого підходу формалізації дозволить на основі отриманих вихідних даних проводити формалізований опис логіко-аналітичної діяльності осіб, що приймають рішення, в процесі вироблення рішень на застосування вогневих засобів.

Ключові слова: формалізація, мережева модель, цільова установка, вогневий засіб, повітряна ціль

Abstract: The use of the developed method of formalisation allows on the basis of the received input data to conduct a formalised description of the logical and analytical activities of individuals, who make decisions, in the process of making decisions for the use of fire-fighters.

Keywords: formalisation, network model, target installation, fire-fighter, air target.

Ensuring the necessary level of automation of decision-making processes is complicated by the fact than is of course of combat work, individuals who make decisions use mainly their own knowledge and experience, which are formalised using well-known information technologies.

One of the promising areas of automation of decision-making processes is the improvement of mathematical and software of the complex of command post automation tools based on information technologies [1], which include, for example, modern network technologies, methods of distributed information processing, technologies of expert systems and so on.

It is proposed to use a network model of targets as a basic mathematical apparatus. The use of the network model of target installation provides that decision-making in difficult situation consists of in the formation of many relevant objectives, possible options for achieving them and in choosing the best set of action in a certain sense, which ensures the achievement of the objective set.

Objective formulation and setting is one of the main stages of objectives planning and management. In this context, the objective is characterized by:

тhe main area of interest – some problem to address which the objective must be formulated and achieved;

мany states of physical reality objects, the achievement of which ensures the achievement of the objectives;

мany states of physical reality objects that determine the direction of action to achieve the objective itself.

We will divide all the many objectives into basic, auxiliary and intermediate, as proposed in the works.

The main objectives determine the ways to solve the management tasks considered.

Auxiliary – objectives are those whose formulation is not directly included in the list of the objectives of the system, but their use is a prerequisite for the system to realize its functions or ensure the normal course of the computing process.

Intermediate objectives arise in the planning and implementation of actions to achieve the main objectives and express the necessary or sufficient conditions for obtaining the necessary or sufficient conditions for obtaining the necessary results of further actions.

The main and auxiliary objectives can, in turn, be permanent and operational.

Permanent objectives are formed regardless of the specific situation and are valid in relation to the whole variety of possible situation.

Operational objectives are an interpretation of permanent objectives according to the specific conditions of the situation that took place, their formulation indicates specific objects of the external environment or system. The final results are essential for the objective state. Each permanent objective can generate many operational objectives that must be achieved together. For example, the permanent objective “destroying an anti-radar missile” during the synthesis of solution options generates an operational objective to “destroy anti-radar missile carriers”, and the number of such targets is

determined by the quantitative characteristics of “Carrier storehouse” and “Detected anti-radar missile carriers”.

The basis for presenting the process of achieving management objectives is the network model, which is a heterogeneous functional network.

The physical meaning of the vertices (nodes) of such a network is to determine the objectives of logical and analytical activities of combat crew personalities, which are achieved during the interaction between the operator and the decision support system, and the debt is the relationship between them [1].

In general, a formalized description of objectives may include many expressions connected by logical relationship between disjunction and conjunction. The objective is conjunctive if it requires the fulfillment of all its sub-objectives (the objectives of the lower level of the network hierarchy).

The logical sequence of achieving objectives is determined by the relationship between them. In turn, these relationships can be divided into relations of subordination, provisions and action:

relations of subordination - this type of relationship determines the necessary and sufficient conditions for achieving the objective without wasting time and resources (means of focused influence on external environment);

relations of provision – this type of relationship determines the sequence of achieving the highest objectives of the system from the lower level objectives for a certain period of time not related to the waste of material resources.

relations of actions – characterize the actions of the system with many, which determines their transition from one state to another and are necessary conditions for such a transition. This relationship allows a certain reserve of resources to be spent over a certain period of time.

All types of relations between objectives are relations of strict partial order, that is, they have the properties of antireflexivity, antisymmetry and transitivity.

The process of achieving the objective is a number of consecutive actions. The sequence of achievement of objectives is determined by the level of hierarchy, and at one level of hierarchy the achievement of objectives takes place in parallel [2]. Initial conditions are output references, the initial stage of achieving objectives.

The decision making process regarding the purpose of firefighters for the destruction air targets is a chain of logical conclusions combined with the solution of algorithmic problems.

The analysis of the target installation apparatus, presented in the form of a network model, indicates that the formalization apparatus allows you to formalize only a logical task. The impossibly of formalized description of algorithmic and calculated problems has necessitated the development of a formalization method, which allows expanding the descriptive capabilities of the generalized network model.

This will allow to adapt the process of manufacturing the solution for the use of AAD of the GF to changes in the situation, to increase or truncate the hybrid network model of target installations when the composition of the initial condition changes.

LIST OF USED SOURCES

1. Tymochko A. I. Network models for the formalization of knowledge about resources in decision support systems for managing dynamic objects. *Science and Technology of the Air Force of Ukraine.* 2014. № 2(15). P. 150-153.

2. Gerasimov B.M., Diviznyuk M.M., Subach I.Yu. Systems of support for decision-making: design, application, evaluation of efficiency: monograph. Sevastopol: *Scientific Research Center of the Armed Forces of Ukraine "State Oceanarium"*, 2004. 320 p.

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