

APPLICATION OF NETWORK-CENTRIC SYSTEM OF RESOURCES' MANAGEMENT OF EMERCOM OF RUSSIA

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ABSTRAKT

Článok prezentuje prístupy implementácie manažmentu modelu centrickej siete v prevencii a eliminácii mimoriadnych udalostí. Tento článok pojednáva o technickej stránke modu centrickej siete, o dôležitých vlastnostiach a jeho informačnom obsahu. Hlavná pozornosť je venovaná možnosti adaptácie modu centrickej siete v EMERCOM v Rusku.

Kľúčové slová:

model centrickej siete, sieť, informácie, autosynchronizácia, Manažment centrickej siete

ABSTRACT

The article presents approaches of implementation of the network-centric management model in the prevention and elimination of emergencies. The article discusses technical aspect of network-centric model, important properties and its informative content. The main attention is paid to the possibility of the network-centric model adapting in EMERCOM of Russia.

Key words:

network-centric model, network, information, self-synchronization, network-centric management

National security efforts of State become more and more difficult and complex. In this regard realization of network-centric management becomes more and more actual and priority orientation.

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The idea of network-centric management is coordination of actions of forces, applications of means, distribution of the purposes and tasks between them in space and trough time. This direction is initially connected with the military sphere where the term "network-centric warfare" for the first time was designated [1].

Realization of network-centric paradigm in relation to warfighting is to create branched network of well informed, but geographically remote forces capable to extremely effective actions at performance of assigned missions. Such model is directed on advantage creation over the opponent at information supremacy, instead of power superiority, due to more intelligent understanding of situation. Besides, this model confirms the provision of system analysis about necessity of complexing of centralized and decentralized control forces in operation.

The idea of network-centric management also is applied in many areas where high technologies are used, such as management of municipalities, organization of information and computing resources, etc. [2].

Distinction between military operations and operations for prevention and elimination of consequences of emergencies consists in actions of opposing side. In the first case this side is the rational subject oriented on the antagonistic objectives, in the second – environment which actions aren't predictable. Therefore their contents are explained by different scientific approaches: games theory and theory of stochastic processes respectively. Nevertheless, formally realization of strategies has similar character that is expressed in coordination of actions of distributed forces in interests of achievement of the consolidated purposes. Such situation allows to adapt the model of network-centric management (fig.) for the management of forces of Emercom of Russia in the conditions of emergencies [3].

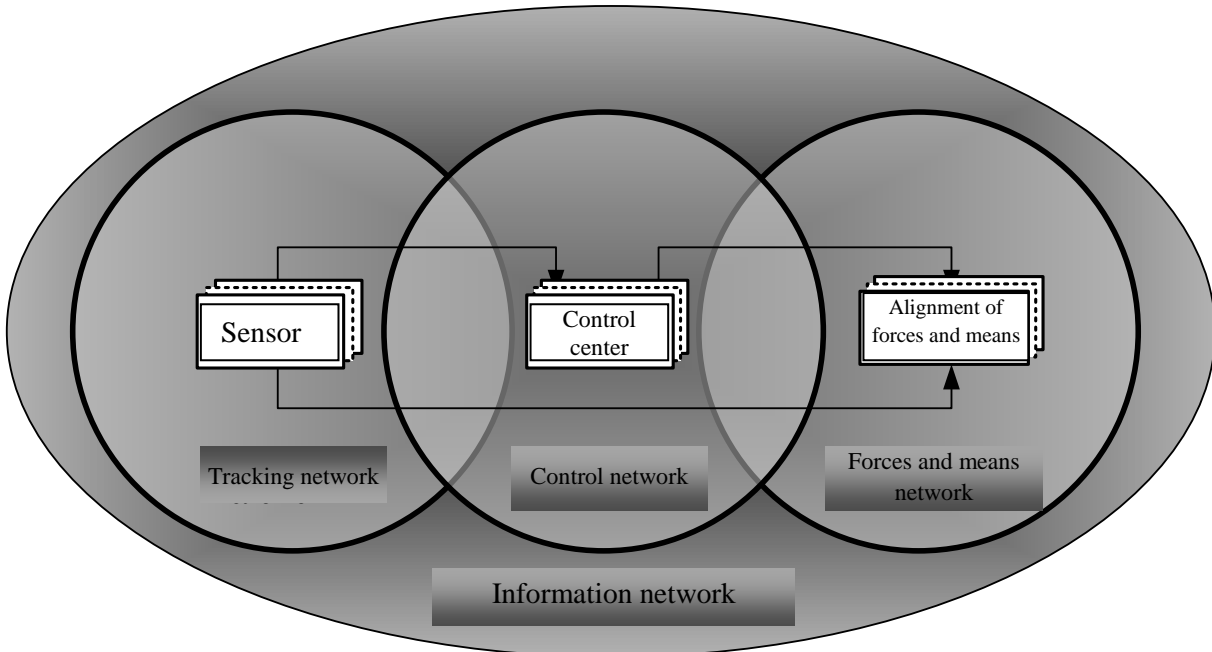


Fig. Network-centric model

The model contains the following four components.

1. The tracking network is intended for collecting and transmittal of information about a condition of objects of supervision (monitoring), consists of system of sensors which can be transducers, observers, informants etc. The network provides registration, selection and translation of values of parameters of observed objects.

2. The control network represents system of control centers in which executive control bodies' officers work. Purpose of this network is on decision-making according to situation on the ground and their bringing to performers.

3. The forces and means network is intended for direct performance of the tasks facing system as a whole. Direct performers and providing structures (actors) enter into this network.

4. Information network provides access of elements of other networks to all necessary information.

Information streams can circulate traditionally: "sensors – control centers – forces and means", and in some cases to go on a route "sensors – forces and means". The last variant not only reduces time of bringing of information to performers, but also endues them with responsibility for choice of actions variant. In the limiting case forces and means can independently work, being guided to the available data obtained from information network [2].

The network-centric model in its adapted variant proposes the following substantial content of the main networks.

Elements of information accumulation (tracking network) have to be formed by such components, as system of monitoring, laboratory control and forecasting systems, operators of United operations control duty desks "EDDS-112", interfaced sources of information of other ministries and departments (The Ministry of Defence, the Ministry of Internal Affairs, the Ministry of Energy, Rosatom (Russian Federal Atomic Energy Agency), Roscosmos (Federal Space agency of the Russian Federation), Roshydromet (Federal Service of Russia on Hydrometeorology and Monitoring of the Environment), etc.).

It is necessary to include into structure of intellectual elements: emergency management centers (EMC) of various levels of hierarchy (National EMC, EMC of the Regional Centers of Emercom of Russia, EMC of General Directorates of Emercom of Russia on subjects of the Russian Federation), united operations control duty desks of municipalities, united operations control duty desks of objects, fixed control stations for work in crisis situations and elimination of big fires, etc.

Actors (a network of forces and means) are completing by staff of fire protection service and search and rescue service, military rescue units, specialists of psychological service, involved voluntary formations, supply agencies, etc.

Information network is represented as result of integration of the automated information-management system of State united system of prevention and elimination of emergencies, the automated system of emergency management (the automated system of EMC), information systems of EDDS, etc.

Network-centric approach considers new way of development directed on increase of system effectiveness. This way is caused by transition to mass creation of the means which were less sensitive and intellectual separately, but at that providing

demand level of intellectual opportunities of system as a whole by means of their collective use.

One of characteristic properties of functioning of network-centric systems is [1]:

1. Dynamic change of structure of the system's elements that means change of quantity and opportunities of sensors and actors, a re-deployment or appearing of additional divisions, change of conditions of their application etc. "Any element of combat formation should to have opportunity to be included to network quickly or to be disconnected in the course of its functioning without negative consequences for self and a network working capacity" [4].

2. "Self-synchronization" is possibility of ensuring the greatest efficiency both the own actions, and actions of other parts and divisions on the basis of their mutual coordination. The main condition of its achievement is the availability of rules of actions' coordination which have to be guided not on the traditional hierarchical principle of management and on the result of coordination of management problems taking into account really developing situation.

The organization of actions at emergencies includes complex of complicated problems, such as: decision-making, problem definition for elimination of emergencies, rescue of people and their property, organization of interaction, providing and planning of actions for various divisions, etc. But the greatest complexity is the questions connected with need to make decisions quickly in the conditions of uncertainty, high dynamics of happenings, unpredictability of development of a situation when in the course of decision-making it is necessary to consider a set of the interconnected factors.

Solving of such tasks demands development and application of essentially new methods and means of situational resource management for ensuring of fast reaction in emergencies.

For this purposes the development of specialized intellectual system of coordinated resource' and divisions' management on the basis of multiagent technologies, and also navigation GLONASS/GPS is provided [4].

The system provided to development is urged in automatic mode to react on unplanned events, to carry out planning of mobile resources (via mobile phone or other means of communication), to conduct monitoring of plans execution and to initiate their revision, in case of a divergence with the facts.

This system also will allow modeling the various situations (for example, to place and connect objects on district) and to assign basic scenarios of actions in them (types of operations connected by certain relations of temporary following) in so-called knowledge bases.

Basis of proposed tasks solution method is networks of needs and opportunities of divisions of Emercom of Russia, assign in the knowledge base. For example, for immediate transporting of forces and means of Emercom of Russia different resources (plane, helicopter, waterborne transport, motor transport etc.) can be used, but for delivery by helicopter the specialized platform or a glade requires; motor transport – matched roads, means of transportation etc.

Within the created system it will be possible to create concrete problem situations and modeling the deployment process of considered above scenarios in the conditions of emergencies (the new operational task, inaccessibility or resource damage etc.) during which working off the system will construct and in the same way will change plans of the coordinated work of mobile resources of various divisions, showing "collective intelligence" adaptive [5].

The system can be realized with use of the most progressive means, Internet and electronic cards, means of GLONASS/GPS navigation and also opportunities of modern mobile phones which will provide means of dual sided dialogue during planning and execution of considered plans.

In end it should be noted that the essence of network-centric approach in management is an advancing in obtaining of information about possibility of various emergencies, decision-making on optimum use of forces and means – moving-out to the scene by optimum route, deployment, massing of forces and means on the decisive direction and maneuver by them, carrying out of rescue accident works, that is in all that makes an essence of emergency response.

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