SUMMARY
OF SCIENTIFIC WORKS
of Associate Professor Dr. Eng. Rosen Stankov Iliev

The scientific works are presented in three categories:

I. Monographic works

II. Scientific articles and reports

III. Research and development

I. MONOGRAPHIC WORKS

1.1 R. Iliev **COLABORATIVE INFORMATION ENVIROUMENT**, Monograph, Edition of "Professor Tsvetan Lazarov" Defence Institute, ISBN 978-619-90024-2-1, Sofia, 2021, 221 pps. (Reviewers: Corr. Memb. Prof. Krassimir T. Atanassov, DSc, DSc, IBPhBME-BAS and Col. Assoc. Professor Eng. Nikolai T. Stoianov, Defence Institute)

The monograph is dedicated to modern technologies and software applications to support collaboration in the implementation of common tasks and the opportunities for building information environments for joint activities. It provides an analytical and critical overview of group work systems - their origin, nature and technological development, paying attention to some basic types: group software, computer support for collaboration, environments and systems for collaboration, systems for group support and group decision making, joint information retrieval, computer support of joint training, joint project management, etc. The modern technologies and solutions for supporting the joint work are considered, researches on the usefulness of their implementation for the organizations are indicated and software products for providing conferences, for sharing activities, for managing tasks, projects, etc. are presented, and some popular Microsoft collaboration solutions are analyzed, as well as guidelines for choosing such solutions.

The monograph presents original research for modeling the processes of collaboration, proposing an architectural approach to building an information environment for collaboration and a method for evaluating decisions in the choice of technologies and software products, based on the use of intuitionist fuzzy evaluations. A model of the decision-making process in building an environment for joint work through the use of a generalized net has also been developed.

An important place is given to the possibilities for building integrated information and communication environments to support the joint work of officials from different teams and an original model of an integrated information and communication environment for joint work is presented, with a practical focus on management. crises (developed for the needs of the Ministry of Defence and carried out under the guidance and with the participation of the author).

1.2 R. Iliev, A. Genchev **MODERN DATA CENTERS (REQUIREMENTS, TECHNOLOGY, BUILDING).** Monograph, Edition of "Professor Tsvetan Lazarov" Defence Institute, ISBN 978-619-90024-3-8, Sofia, 2021, 273 pps. (Reviewers: Professor DSc Veselin Tselkov, University of Library Studies and Information Technologies and Col. Assoc. Prof. Dr. Eng. Mario Angelov, Defence Institute.

The monograph examines modern data centers - the invisible to users of information and communication services a set of infrastructure, technologies, systems, software and computer devices. The book provides an overview of the historical development and stages that data centers go through, since the emergence of electronic computers, and attention is paid to the first data centers in Bulgaria (known under this name until the 90s). of the twentieth century). The development and the main types of modern data centers, their general architectural features, as well as the sequence of their construction are analyzed. The evaluation and conclusions of the research of the most used technological platforms for building data centers offered by Vmware and Microsoft, as well as many Linux-based solutions, such as Red Hat Virtualization, Xen Cloud platform, Proxmox virtual environment and others. Basic criteria for selection of a software platform for virtualization are proposed, such as cost of ownership, required number of virtual machines, supported operating systems, systems for ensuring high access to services and resources, assessment of the degree of workload and others.

The monograph presents the basic standards and good practices for building data centers, the requirements and recommendations of the American Telecommunication Industry Association (TIA) and its standard ANSI/TIA-942, aimed at the telecommunications infrastructure of data centers.

Some innovative solutions of companies in the field for the creation of different types of data centers - modular, mobile, environmental, and attention is paid to the rapid growth and construction of new data centers not only on land but also underwater. (Microsoft Experimental Data Center), especially after the expansion of the epidemiological situation in 2020 - 2021, when remote communication, learning and working from home was widely practiced.

An essential part of the monograph is devoted to the creation of a conceptual model for building a system of data centers for the needs of security and defence,

including a large number of operational, functional, technical, technological, informational, organizational and others. requirements for it.

The described model, requirements and technology of work on the implementation of the system of data centers are the result of research and experiments of the authors with popular software platforms for virtualization, as well as the experience with various hardware devices for system configuration, obtained thanks to their working prototype of a cloud data center at the Institute of Defence.

1.3 Bournaski, E., R. Iliev, L. Kirilov **COMPUTER MODELING OF HYDROLOGICAL PROCESSES AND RIVER BASINS MANAGEMENT.** Monograph, Prof. Marin Drinov Academic publishing house (in print), Sofia, 2021, 321 pps. (Reviewers: Professor DSc. Yavor Chapanov – Institute for Climate, Atmosphere and Water Research – BAS and Assoc. Prof. Dr. Elena Bozhilova, National Institute of Meteorology and Hydrology)

In the monograph for the first time in our country an attempt was made to compile model estimates of the river outflow of the rivers Mesta and Struma on Bulgarian territory and the tributary Sovolyanska Bistritsa, as well as their water balance. To achieve these goals, simulation models of the hydrological processes of the river basins specially developed by the author's team are used on the basis of ready specialized software systems, calibrated with data from the monitoring of the respective territories. The following tasks are considered with the computer models:

1. Modeling of hydrological processes "precipitation-runoff";

2. Modeling of water balance in a river basin;

3. Selection of an alternative with multicriteria analysis in water resources management and in particular water quality;

4. Supporting water management decision-making.

Modern information and communication technologies and available software products are the basis and significant facilitation for the specialists from the water sector to create the necessary for our practice simulation models of river basins and territories for resource assessment, hydrological processes, different scenarios for land use development. and the territories for ecological and economic analyzes and forecasts for future development. An information WEB-portal for exchange of information, documents and geographical data in water management and a generalized net model of the decision-making process in the water sector are offered.

The solution of the first two tasks is based on the freely available software systems HEC-HMS and WEAP with rich capabilities, developed by internationally known teams. The advantage of both systems is their continuous development and improvement with correspondingly very good remote support.

To solve the third task, the mDSS Mulino system was chosen, designed to support decision-making in water management using multicriteria analysis to evaluate alternatives.

The fourth task is based on the ProDec system, which provides the ability to build a decision tree and describe processes through rules such as "If". then... "by applying fuzzy numerical and linguistic estimates.

The approaches and simulation models of the precipitation-runoff process in a river basin developed by the authors on the basis of the HEC-HMS software allow to solve a number of applied tasks such as: continuous simulation for determination of water quantities in desired river sections, determination of the annual total runoff. assessment of the available resource and the anthropogenic load on the river outflow, reproduction of different scenarios of future climate changes, event simulation of intensive precipitation with tracking the magnitude of water quantities and propagation of high wave along the river, etc.

With the WEAP software for the first time in our country a preliminary model analysis of the water balance in the catchments of Mesta and Struma on Bulgarian territory has been made. The simulation models of these catchments provide an opportunity to solve a number of applied tasks for assessment and planning of the use of water resources.

With the help of the mDSS MULINO system a multicriteria task for improving the water quality in a section of the Mesta river catchment has been solved, and through ProDec solutions of several types of water management tasks are shown (in the Appendix).

The constructed original generalized net model of the decision-making process for water management and assessment provides an opportunity to simulate different situations and assess the impact of various factors, as long as precise values of the input parameters (net tokens) are set. The model also allows the use of intuitionist fuzzy estimates when setting the characteristics of selected input parameters.

The approaches and simulation models of our catchments developed by the authors demonstrate the real possibilities of computer modeling for solving various tasks for water assessment and management. Future development is improvement of the presented models and creation of new ones for other river basins on the territory of Bulgaria.

II. SCIENTIFIC ARTICLES AND REPORTS

3.44* Balabanov, S., R. Iliev. **INFORMATION CAPABILITIES - AN IMPORTANT ELEMENT OF INTELLIGENT DEFENCE.** Seminar (round table of AKIS), Materials of AKIS. Posted on http://www.atlantic-bg.org/files/aora_mod_akis_conf_programme_30_31_jan_2012_files/talks/20120131_Atlantik_balabanov_iliev_poster.pdf), 2012

* - The numbering corresponds to the list of works (Appendix 2, Section II – Scientific works 2012 -2021, arranged chronologically, for review)

The paper examines information capabilities as an important element of intelligent defence and related priority projects to increase the defence capabilities of the Bulgarian Army. The main directions for increasing the information capabilities are presented, as some priority projects for the development of the Armed Forces of Bulgaria are considered. Important systems providing modern information capabilities, such as C4I systems, network-centric, collaboration systems, etc. are considered.

3.45 Iliev, R., I. Atanassova. **REQUIREMENTS FOR DESIGN AND ESTABLISHMENT OF DATA CENTERS**. Scientific Conference with International Participation "MT&S-2013", Proceedings, pp. II-175 – II-180, Institute of Defence, 2014

The paper presents some basic requirements for the design and establishment of modern data centers as well as a methodology for building data centers having in mind their purpose, goals, services provided, etc. Attention is drawn to the fact that the construction of data centers must comply with the necessary standards regarding the infrastructure and services they provide, while reasonably balancing the planned investments and the expected results.

3.46 Iliev, R. **OPPORTUNITIES AND PERSPECTIVES FOR ESTABLISHING A SYSTEM OF DATA CENTERS FOR DEFENCE**. Scientific Conference with International Participation "MT & S-2013", Proceedings, pp. II-181-II-190, Institute of Defence, 2014

The paper presents some opportunities and perspectives for establishing a system of data centers for defence needs. There are some requirements for building of "cloud" infrastructure and proposals for the organization the construction of the system of data centers; presents some problems and possible solutions.

3.47 Iliev, R. **TECHNOLOGICAL ASPECTS OF MODERN DATA CENTERS.** International Scientific Conference "Hemus-2014", Proceedings, pp. II-138 - II-143, Plovdiv, 2014

The paper analyzes some technological aspects of modern data centers: virtualization, consolidation of resources and services, high availability, reservation and etc. A review of basic standards in the construction of modern data centers has been made and the possibilities for creating a "private cloud" of the Ministry of Defence (MoD) have been analyzed. The main requirements for the development of the departmental information system of the Ministry of Defence are presented, as well as some details of the prototype of the data center and the cloud platforms tested on it by the leading manufacturers.

3.48 Iliev, R. **MODERN DATA CENTERS FOR DEFENCE**. CIO Magazine, ISSN 1312-5605, pp. 53-54, July 2014

The article discusses the possibilities for building modern data centers for the needs of defence, based on cloud technologies and virtualization. An analysis of the basic requirements and standards that data centers must meet and provides some guidelines for building a system of data centers and development of the departmental information system. Part of the practical experience of the Institute of Defence in creating a prototype data center, for feasibility studies and testing of possible solutions related to the selection of a virtualization platform is presented.

3.49 Iliev, R. **TECHNOLOGICAL ASPECTS FOR THE DEVELOPMENT OF INFORMATION SYSTEMS IN DEFENCE**. CIO Magazine, ISSN 1312-5605, pp. 46-48, July 2015

The issues related to the processing of information and its provision to users upon request are considered, and the analysis is planned to be performed simultaneously with the data processing, and not as before - first the processing, and after data accumulation - and their analysis. In this aspect, an overview of the development of information technologies in defence over the last 15 years has been made and important stages have been outlined during which this development has taken place. Some challenges for the MoD to create a private cloud for defence and opportunities for cost optimization are presented.

3.50 Ivanov, I., R. Iliev. **PROSPECTS IN INFORMATION AND COMMUNICATION TECHNOLOGIES FOR ENCHACEMENTS OF SECURITY AND DEFENCE**. Scientific session at the National Military University "V. Levski", Faculty of Artillery, Air Defence and CIS, Proc., pp. 243 - 250, Shumen, 2015

New technologies are an important element for achieving military superiority and to ensure high defence capabilities. Technology trends survey is integral part in Defence Planning Process. The article examined the prospects in information and communication technologies and the possibilities for their application in priority investment projects of the Ministry of Defence and the Bulgarian Army.

3.51 Iliev, R., I. Ivanov. **MANAGEMENT SOLUTIONS FOR DATA CENTERS.** International Scientific Conference "Hemus 2016", Proceedings, III-275 - III-281, Plovdiv, 2016

The paper below presents requirements for the management of data centers in relation to their engineering, technical and information systems. Some solutions are

presented for building up modern data centers for defence purposes. The possibilities for construction of data centers of modern type and for modernization of the information infrastructure for the needs of defence are analyzed.

3.52 Radoeva, N., R. Iliev. **APPROACH FOR MEASUREMENT PROCESS MODELING CONSIDERING THE IMPACT OF THE SUBJECTIVE FACTOR**. International Scientific Conference "Hemus 2016", Proceedings, II-303 - II-315, Plovdiv, 2016

The paper reviews an approach for measurement process modeling considering the impact of the subjective factor. The mathematical representation of the measuring process allows for easier detection of regularities between the object of measurement, the input components, the subjective factor and the measurement result. The controllable and uncontrollable factors influencing the measuring process are reviewed. A measurement experiment has been conducted and the results obtained by different operators are compared with a result accepted as a reference.

3.53 Radoeva, N., R. Iliev. **GENERALIZED NET MODEL FOR MEASUREMENT PROCESS OF LENGTH MEASURES.** International Scientific Conference "Hemus 2016", Proceedings, II-288 - II-302, Plovdiv, 2016

The paper presents an original generalized net model of the process of measuring length measures. The model consists of seven transitions, and in the process of evaluation of the measured parameters the subjective factor is included, which plays a major role in the measurement process.

3.54 Radoeva, N., R. Iliev. **A MEASUREMENT PROCESS MODEL IMPLEMENTED BY GENERALIZED NET**. Proc. of 8th International IEEE Conference „Intelligent Systems", 574-578 DOI: 10.1109/IS.2016.7737482, September 3-6, 2016

The article examines an original generalized net model, simulating the interaction of resources, objects, subjects and activities forming the measurement process. This makes it possible to detectvarious patterns and relationships between sub-processes, objects, subjects and their states and to achieve intelligent control of the measurement process.

3.55 Iliev, R., K. Ignatova. **THERE ARE A NUMBER OF REQUIREMENTS FOR THE SYSTEM OF DATA CENTERS OF THE MoD AND BA**. CIO Magazine, pp. 58-61, July 2018

The article considers the possibilities for building a system of data centers in the Ministry of Defence and the Armed Forces through the prism of basic technical requirements regarding the equipment of the centers themselves. Some possible solutions for organizing the information infrastructure and server architectures, providing high availability of the provided services (High availability) are analyzed.

3.56 G. Velev, R. Iliev. **GENERALIZED NET'S MODEL OF ROUTE IN *MANETs* USING A HIERARCHICAL CLUSTER ALGORITHM**. International Scientific Conference "Hemus 2018", Proceedings, II-86 - II-98, Plovdiv, 2018

The paper presents Generalized Net's Model of the route in the Mobile Ad hoc NETworks (MANETs) using a hierarchical cluster algorithm m-AODV (modified AODV) to improve route searching by analizing of the status parameters in intermediate network devices. The model of route search in MANETs-networks using a hierarchical cluster routing algorithm is based on the use of the Theory of generalized nets.

3.57 Iliev, R., A. Genchev. **BUILDING DATA CENTERS SYSTEM FOR THE DEFENCE NEEDS.** International Scientific Conference "Hemus 2018", Proceedings, II-189 - II-195, Plovdiv, 2018

The paper examines some modern solutions for building data centers and analyzes various criteria for selecting platforms for virtualization and creating cloud environments. Possibilities for building a system of data centers for the needs of defence are presented and some possible solutions for implementation are proposed.

3.58 Iliev, R., D. Tsonev. **INTEGRATED INFORMATION ENVIRONMENT TO SUPPORT JOINT WORKING IN TEAM**. International Scientific Conference "Hemus 2018", Proceedings, II-142 - II-152, Plovdiv, 2018

The paper presents a historical overview of the information environments for collaboration, as well as their classification and some software implementations. An approach for the realization of the information environments for joint work in defence is presented, emphasizing three aspects: technical, systemic and functional. Some basic information services used for testing the developed information environment are described.

3.59 Genchev A., R. Iliev. **ACQUISITION OF SENSORY INFORMATION FROM UNMANNED AIRCRAFT IN A CRISIS SITUATION**. International Scientific Conference "Hemus 2018", Proceedings, II-153 - II-162, Plovdiv, 2018

The paper presents practical problems arising from the collection of sensory information from unmanned aerial vehicles (UAVs) in crisis situations and suggests ways and means to overcome them. The purpose of the study is to apply the solutions in the creation of a UAV prototype for collecting information from the area of the crisis situation.

3.60 Genchev A., R. Iliev. **INFORMATION PROTECTION AND CYBER SECURITYOF CORPORATIVE INFORMATION SYSTEMS**. International Scientific Conference "Hemus 2018", Proceedings, II-163 - II-173, Plovdiv, 2018

The paper provides an overview of possible modern cyber attacks, methods and means of protection against them, applicable to corporate information systems. Schemes for protection of corporate systems from different types of impacts by applying existing monitoring software products are proposed.

3.61 Iliev, R., K. Ignatova. **IMPLEMENTATION OF CLOUD TECHNOLOGIES FOR BUILDING DATA CENTERS IN DEFENCE AND SECURITY**. Information & Security: An International Journal 43, no. 1 (2019): 89-97, https://doi.org/10.11610/isij.4308

This article presents an analysis of cloud technologies as key current trend in the development of IT infrastructure, their main characteristics, security levels and the increased requirements they must meet when considered for defence and security applications. It provides an overview of main standards and requirements that modern data centres have to meet to ensure a high level of availability of the provided IT services. Specific requirements have been formulated for building a sustainable system of modern data centres for defence and security needs, and attention has been paid to data protection when using cloud technologies. A solution is proposed for implementing cloud technologies and an approach for building an integrated data centre system for defence and security needs in organizing collaborative work between officials within the organization.

3.62 Iliev, R. **SENSORS AND SENSOR SYSTEMS IN DEFENCE**. CIO Magazine, ISSN 1312-5605, pp. 80-84, July 2019.

The article discusses the possibilities for using sensors and modern sensor technologies for the needs of defence. Various solutions and modern means for obtaining sensory information are presented, as well as their applications in the military field. Attention is paid to the introduction of different types of sensors in drones and their increasing distribution as a means of obtaining visual information from the visible spectrum and beyond. The architecture of a system for extraction and visualization of sensory information, developed at the Institute of Defence, in connection with the implementation of a research project for obtaining visual sensory data from the area and the use of drones in detecting people buried in disasters.

3.63 Iliev, R., K. Ignatova. **CLOUD TECHNOLOGIES FOR BUILDING DATA CENTER SYSTEM FOR DEFENCE AND SECURITY**. T. Tagarev et al. (eds.), Digital Transformation, Cyber Security and Resilience of Modern Societies, Studies in Big Data 84, 13 – 24, ISBN 978-3-030-65721-5, Springer 2020, https://doi.org/10.1007/978-3-030-65722-2

This chapter provides analysis of cloud technologies as a current trend in the development of IT infrastructure, to focus on their main characteristics, their security levels and the increased requirements they must meet when used in defence and security. The main standards and requirements that modern data centres have to meet to ensure a high level of availability of the IT services provided are considered. Specific requirements have been formulated for building a sustainable system of modern data centres for defence and security needs, and attention has been paid to data protection when using cloud technologies. A solution is proposed for implementing cloud technologies, along with an approach for building an integrated system of data centre for the needs of defence and security in organizing collaborative work between officials within the organization.

3.64 Iliev, R. **TECHNOLOGICAL DEVELOPMENT AND APPLICATIONS OF UNMANNED AIRCRAFT SYSTEMS**. CIO Magazine, ISSN 1312-5605, 100-104 pages, April 2020

The article presents technological and economic aspects of the development of unmanned aerial systems (drones), as well as an overview of the seven generations through which their technological development passes. An analysis of the future technological development of important structural elements of their architecture - batteries (for electric drones), cameras, sensors and others. A solution for the

development of a visual-sensory system for obtaining and presenting real-time information on emerging crisis situations and visualization of information in a crisis center under a project of the Institute of Defence is briefly presented.

3.65 Iliev, R., A. Genchev. **POSSIBILITIES FOR USING UNMANNED AERIAL VEHICLES TO OBTAIN SENSORY INFORMATION FOR ENVIRONMENTAL ANALYSIS**. Information & Security: An International Journal 46, no. 2 (2020): 127-140, https://doi.org/10.11610/isij.4609

This article presents some possibilities for obtaining sensory data from the environment (such as meteorological data, pollution level, night vision, etc.), using unmanned aerial vehicles. Attention is paid to some specific requirements to UAVs used as flying platforms for sensory data acquisition. The process of creating a prototype of a system for collecting and transmitting data in real time from the site of a crisis event using UAVs is analysed. The authors propose to use a specialised neural network tuned to identify halfhidden (half-buried by disaster) people when analysing images received from UAV-borne sensors.

3.66 Iliev, R., N. Radoeva. **GENERALIZED NET MODEL OF THE METROLOGICAL PROVISION PROCESS IN THE STRUCTURES OF THE MINISTRY OF DEFENCE**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 68 - 80, Plovdiv, 2020

The paper describes the processes of organization of the metrological provision of the technical equipment used for the needs of the defence, through a proposed generalized net model. By simulating different situations with the model, it is possible to optimize the activity of employees related to the measurement process.

3.67 Kochankov, M., R. Iliev. **CHALLENGES AND DIRECTIONS FOR DEVELOPMENT OF COMMAND AND CONTROL SYSTEMS**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 81 - 87, Plovdiv, 2020.

The paper presents directions and approaches for development of current command and control systems. Type of services that have to be provided by the system to ensure reliable and constant command and control of units. Interoperability between national systems that enables exchange of battlespace information with coalition partners in multinational exercises and operations.

3.68 Mircheva-Ivanova, D., R. Iliev. **ONLINE LEARNING PLATFORMS AND THE OPPORTUNITIES FOR THEIR USE IN AN EPIDEMIC**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 88 - 96, Plovdiv, 2020

The paper presents a study of the opportunities for online learning caused by the impact of the global pandemic situation in 2020. The impact on global education and some of the most commonly used online learning platforms, their main characteristics and advantages that they must have in order to be able to meet the needs for their practical use.

3.69 Mircheva-Ivanova, D., R. Iliev. **ANALYSIS OF ONLINE TRAINING IN A PANDEMIC CONDITION.** Proceedings of the International Scientific Conference "Hemus 2020", pp. 97 - 105, Plovdiv, 2020

The article presents an analysis of online learning, Covid-19's impact on global education and some of the most commonly used cloud platforms, their essential features and advantages which the educational organisations should look for before choosing one.

3.70 Iliev, R., M. Kochankov. **SELECTION CRITERIA OF COMMAND AND CONTROL SYSTEM**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 114 - 121, Plovdiv, 2020

The paper proposes some basic criteria for selecting a command and control system (C2) to meet the needs of the army. Guidelines are presented for the evaluation of various C2-systems in the process of searching for the most appropriate of them in terms of its practical application in the army.

3.71 Iliev, R., K. Ignatova. **SOFTWARE TOOLS TO SUPPORT COLLABORATION**. Proceedings of the International Scientific Conference "Hemus 2018", II-132 - II-141, Plovdiv, 2018.

This paper identifies the most appropriate tools for collaborative work and cooperation in view of their possibilities to achieve these objectives. An analysis is made of some of them that could be used in the field of defence.

3.72 Kochankov, M., R. Iliev. **DECISION SUPPORT IN COMMAND AND CONTROL SYSTEMS APPLYING ARTIFICIAL INTELLIGENCE**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 106 - 113, Plovdiv, 2020

The paper presents basic description of Artificial Intelligence and Deep Learning, directions and approaches of how can we use them in Command and Control Systems and military applications. Main benefits of this are critical system support when time is limited or when the number of alternative choices is too large for people to be able to analyze them.

3.73 Iliev, R. **ANALYSIS OF HYDROLOGICAL MODELING AND MANAGEMENT SYSTEMS FOR RIVER BASINS**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 134 - 143, Plovdiv, 2020.

The paper analyzes some software systems for hydrological modeling of river basins and for water resources management and water use. For some of the more widely used systems, brief characteristics are given, as well as a description of the possibilities for their application for compiling hydrological models and for water resources management.

3.74 Iliev, R. **GENERALIZED NET MODEL OF A DATA CENTERS SYSTEM**. Proceedings of the International Scientific Conference "Hemus 2020", pp. 122 - 133, Plovdiv, 2020.

The paper proposes a generalized net model of a cloud-based data center system that provides communication and information services. By using different types of tokens in the net, an attempt was made to describe the processes of the system and to provide an opportunity to simulate different situations, thereby helping the process of finding critical points in its operation for their easier removal.

3.75 Genchev, A., R. Iliev. **USING UNMANNED AERIAL VEHICLES FOR COLLECTION AND TRANSMISSION OF DATA IN REAL TIME FROM THE PLACE OF CRISIS EVENT**. SPRINGER 2021 Communications in Computer and Information Science (series), ISSN: 1865-0929, 2020 (for print)

The paper analyzes the possibilities for using Unmanned Aerial Vehicles (UAVs) to obtain sensory data from the place of a crisis event by assessing their flight, communication and sensory capabilities. An approach is proposed for the use of UAVs for prevention and assistance of rescue teams in assessing the crisis situation through equipment UAVs with a suitable system of sensors, communications, means for primary data processing and more. The paper proposes to use a specialized neural network to be used to identify halfhidden (half-buried by disaster) people after analyzing their images, and presents some of the results obtained.

3.76 Iliev, R. **GENERALIZED NET MODEL OF THE DECISION-MAKING PROCESS IN BUILDING A COLLABORATIVE INFORMATION ENVIRONMENT**. Journal 'Advanced Studies in Contemporary Mathematics', South Korea, 335/839(39.9%) in the category of mathematics (The 2011 SJR in SCOPUS for Advanced Studies in Contemporary Mathematics is 0.043 with a ranking) (for print)

The paper presents a Generalized net model (GN-model) of the decision-making process in building a collaborative information environment using a six-transitions aggregate net. When evaluating the parameters of the individual tokens, the possibility of using fuzzy and intuitionistic fuzzy values is envisaged.

3.77 Iliev, R., A. Genchev. **GENERALIZED NET MODEL OF THE DECISION MAKING PROCESS IN THE CRISIS MANAGEMENT.** Journal 'Advanced Studies in Contemporary Mathematics', South Korea, 335/839(39.9%) in the category of mathematics (The 2011 SJR in SCOPUS for Advanced Studies in Contemporary Mathematics is 0.043 with a ranking) (for print)

The paper presents a common Generalized Net model (GN-model) of the decision-making process in crisis management using a five-transitions aggregate net. By verifying the feasibility of the solution in the last transition, the fact is taken into account that all crisis management solutions generated cannot be successfully implemented. When evaluating the parameters of the individual tokens, the possibility of using fuzzy and intuitionistic fuzzy values is envisaged.

3.78 Iliev, R. **GENERALIZED NET MODEL OF THE WATER RESOURCES ASSESSMENT PROCESS AND WATER USE MANAGEMENT**. Information & Security: An International Journal 49 (2021). https://doi.org/10.11610/isij.4609

The assessment of water resources and the determination of the water balance is one of the main tasks of water management, and in view of climate change, water security is becoming of increasing concern. To support decision-making, this article presents an original model for assessing water resources and the respective water management process. The model is realized through a generalized net with four transitions and allows to determine the estimates of the individual characteristics by using fuzzy and intuitionist fuzzy values.

3.79 Ignatova, K., R. Iliev. **ANALYSIS OF SOFTWARE TOOLS FOR COLLABORATION**. Proceedings of the International Scientific Conference "ARTDef 2021", Varna, 2021 (forthcoming)

Analysis of modern software applications that are most suitable for collaboration work. They have been chosen depending on their application in information and cloud technologies. Some aspects are considered of information-communication environment for collaboration that were based on the proposed approach.

III. RESEARCH AND DEVELOPMENT

Opportunities for using open source office suites in the Bulgarian Army

The aim of the study is to examine and test various software office products (with free licenses) to be used in the Bulgarian Army. The document includes: identification of software packages with a freeware license, which should be alternatives to commercial office packages; analysis of compatibility with Microsoft Office in terms of user interface and file formats; analysis of the general functionality of the applications; stability testing; study of the ways in which the prospects for development of each of the products are maintained; analysis of the experience of EU countries and proposals for future research.

Educational and methodical works

This includes educational and methodological works related to the author's participation in the development of technical and economic reports, tactical and technical assignments, programs and methods for testing and acceptance of automated information tasks, complexes, subsystems and systems, as well as other source documents necessary for the acquisition of computer products for the needs of the MoD and their subordinate structures. A total of 23 documents developed during the period: 1990 - 2020.