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Dear Reader,

Please allow me to introduce myself. My name is Jiri Gajdos and I began my assignment as the new director of the Joint Chemical, Biological, Radiological and Nuclear Defence Centre of Excellence on 1 August 2012.

Many challenges affect our daily operations and only an effective and productive team like the JCBRN Defence COE can compete with these demands. I desire to contribute and to lead us to accomplishing our common goals and to be a beneficial part of the COE Community of Interest (COI). I believe our success depends on solid team building and highly motivated team work.

The JCBRN Defence COE represent the entire NATO CBRN Defence community and I stand before you as a very proud member of this organization. I think that in order to be considered a legitimate member of such an esteemed community I must first gain the respect of my co-workers and prove my worthiness for my position. It is not enough to be named the Director, I must earn it. I served in the CBRN Defence arena since 1982 and held every primary CBRN Defence positions within the Czech Armed Forces as well as within NATO. The great majority of my practical experience stems from operational assignments and my participation in real CBRN Defence Incidents in the Czech Republic.

As the new Director of JCBRN Defence COE, I offer to you what I consider the three main goals of our organization in the near future. I based these goals on my knowledge of the CBRN Defence capabilities of the Sponsoring Nations, my personal experience on the International Military Staff (IMS) and my vast experience in CBRN Defence area. These goals are:

1. Noticeable increase in international prestige for JCBRN Defence COE. The COE must be recognized as a highly respected workplace offering top-level expertise and experience.
2. Focused JCBRN Defence COE activity mainly to support strategic and operational capabilities. Understanding NATO and its needs plays a critical role in accomplishing this.
3. Develop a long-term strategy to obtain influential international positions at all levels in order to become a practical and effective military organization which will play a critical role in the area of CBRN Defence throughout NATO.

I am convinced that reaching these strategic goals is possible only by focusing the JCBRN Defence COE work on the following activities which must be in line with Sponsoring Nations’ willingness as approved by the Steering Committee:

- Provide CBRN advice and expertise
- Support strategic and operational planning, active participation in NAC WMD Seminars, CMXs and the Committee on Proliferation in Defense Format Program of Work
- Develop conceptual capabilities
- Support specific training and education activities, NRF; CJ-CBRND-TF
- Support of NATO CBRN WGs
- Develop cooperation with partners
- Develop civil-military cooperation on CBRN Defence and in the area of Crisis & Consequence Management
- Proactive support of CBRN Pooling and Sharing projects
- Support implementation of NATO’s CBRN RB&F Concept
- Effective use of the current M&S capabilities to support CBRN Defence
- Focus the work on editorial, analytical and informational activity in the area of the CBRN Defence
To achieve these proposed goals and priorities within the JCBRN Defence COE I consider it necessary to improve our systematic capabilities in the following areas:

- Education and deep specialization
- Project management
- Work with personnel
- Planning and approval process, task audit execution
- Relations between the JCBRN Defence COE and Sponsoring Nations CBRN Defence apparatus
- Economic efficiency

Although I have only served as the COE’s director for a very short time, it is my honor to present to you the fifth installment of the JCBRN Defence COE Newsletter. We divided it into three parts including a special section devoted to the CBRN Defence Functional Services designed to augment the new Command and Control Capability Package for the NATO Command Structure. Allied Command Transformation provided the article specifically for this audience.

The first part of the Newsletter focuses on our first practical experience with Tactical Network Topology – Maritime Interdiction Operations experiment. During the experiment sponsored by the U.S. Naval Post Graduate School, the JCBRN Defence COE served as the main Reach Back Element (RBE). The experiment achieved remarkable success and coordination among all relevant facilities as well as the important support and contributions of all partners involved. Even though this represents only some of the initial results of the RB&F experimentation, it demonstrated the ability to provide real time support to operations critical to non-proliferation efforts. The JCBRN Defence COE played a critical role during this experiment, always providing accurate subject matter expertise and support.

The second part of the Newsletter highlights the COE’s efforts to improve the Partnership involved in coordinating CBRN Subject Matter Experts involvement in the certification of the Combined Jointed CBRN Defence Task Force. It also examines how we succeed in the area of E-Learning and provides a way ahead for what we would like to offer to the NATO CBRN Defence community in the future.

The final part of the Newsletter includes several interesting articles. One of special note provides a technical description of the COE’s CBRN Modeling and Simulation capabilities. Additionally we discuss the advantages and disadvantages of M&S solutions that allow military formations to substitute a real world environment with a simulated one.

We live in a very complex and unpredictable world and NATO has dramatically changed over the last decade to meet these new challenges. These seismic transformations also affect the JCBRN Defence COE’s current and future work. I stand ready to lead this organization to accomplish the JCBRN Defence COE’s mission and I appreciate any advice and recommendations you can offer on how to improve the JCBRN Defence COE’s efficiency. I hope that you will soon consider me as a valuable member of the team to cope with these many challenges.

With respect
Colonel Jiří Gajdoš
JCBRN Defence COE
Director
Functional Services for Command and Control of CBRN Defence – CBRN Defence Functional Service (CBRN FS)

Introduction

A long and painful process, especially for those of us working on this issue for a long time, seems to be finally coming to a happy end with the initial development of the CBRN Functional Service (CBRN FS) as part of a new Command and Control (C2) Capability Package for the NATO Command Structure (NCS). As with all new developments, the CBRN FS has a long history, which more than likely originated when the first ideas circulated about the use of computers and software in support of military operations. As a “birth-date” for the CBRN FS allow me to offer 10 April 2003. The date is significant as the NATO International Military Staff (IMS) forwarded to Nations under reference IMSM-307-03 the Mission Need Document (MND) outlining the requirement for and NBC Communications and Information System (NBC CIS). At this stage an explanation may be helpful, especially for those of us who are accustomed to screaming at the S6 when the telephones in the operations center don’t function properly. What exactly is a CBRN CIS or functional service, as it is now being called based on the adoption by NATO of the service orientated approach? A CBRN FS can be defined as an assembly of equipment, methods and procedures, and if necessary personnel, organized so as to accomplish conveyance and processing functions. So what is the need for a CBRN FS? A look in the MND provides the following answer: “Essentially the CBRN FS capability is needed to provide timely, accurate and appropriate information on a CBRN incident or incidents. Such information, combined with the modeling of options, provides a critical aid to CBRN defence decision making and enhances CBRN situational awareness during the planning and conduct of operations”. Although this understanding has evolved since 2003 with the shift of focus in CBRN defence to preventing the proliferation of Weapons of Mass Destruction and the development of “CBRN Reach Back and Fusion” the statement in principle still remains valid.

In the following article I intend to expand on specific issues in order to highlight the design and implementation of the CBRN FS. It is important for the understanding of the CBRN FS, however, not to limit the required services to warning and reporting software. This has been one of the main difficulties in the past probably best demonstrated in the often ideological battles over the best W&R software. In order to avoid these discussions hampering future success, ACT requested that JCBRN Defence CoE include within the 2013 Program of Work (POW) a commitment to act as the CBRN FS demonstrator and to become a clearing house for CBRN defence related software as well as provide recommendations to the NCS/NCIA on best solutions for required services.

Who are the users of the CBRN FS?

The “Functional Services for Command and Control (C2) of Chemical, Biological, Radiological and Nuclear (CBRN) defence capabilities” is funded from Project 0IS03078 contained within Capability Package 9C0107 “Functional Services for C2 of Operations” as one of 14 projects ranging from FS to support C2 of Air, Land, Maritime, Special operations and Electronic Warfare to Operational Planning, Education, Training, Exercises and Evaluation and Defence Planning. The scope of the project is to deliver C2 of CBRN defence capabilities, in order to facilitate CBRN defence operators, optimize their CIS support and ensure effective and efficient conduct of CBRN defence missions and tasks to all NATO Command Structure Headquarters and Centers eligible for NATO Common Funding. Essentially these will be SHAPE, the Joint Force Headquarters and the Allied Land, Air and Maritime Commands. However it needs to be understood in the context of the MC 586/1 – MC Policy for Allied Forces and their use for Operations that the CBRN FS once operational will have an indirect influence on national developments, especially for nations seeking standardisation and interoperability.

Which interfaces need to be considered externally and internally?

The CBRN FS will support peacetime, exercise, crisis response and contingency operations, and operate in static and deployed modes. Functional Services for C2 of CBRN defence capabilities will be implemented within and must utilize existing and planned capabilities of the Bi-SC Automated Information System (Bi-SC AIS) and draw on core enterprise services (CES) such as geographic and meteorological services. The need to exchange information between different nations, echelons and organizations requires the implementation of data interfaces, or organisational procedures in cases where no system interfaces should/need to be realised. Essentially these are the NATO Force Structure and NATO affiliated bodies and organisations (such as Intelligence Fusion Centre, NATO Reach Back and Fusion Centre, Health Diesase Surveillance Centre etc.). As the systems used by external actors will most probably not be able to be specified and will have to be identified mission dependent, the CBRN FS will provide for a generic interface to exchange data like email, FTP or web-portal. The connectivity of systems/networks must be analysed on a case by case basis (mission dependent). The CBRN part of the Common Operational Picture (COP) will be transmitted via webservices to be incorporated into tactical CIS systems. The CBRN defence operator in a HQ will be able to exchange data with the meteorological services. The interface will at least enable data transfer of up to 300 MB according to the WMO Standard for weather data in GRIB 2 format (NATO Standard 6022 for weather data defines sub format GRIB/GRIB2).

Which functionalities are required to support the operational activities?

The CBRN FS will provide as a minimum the following functional services:

J1: tracking of CBRN exposure to personnel.
J2: Demographic factors; Political factors; Socio-economic factors, including for ex-
ample industrial sites; Population; threat activity; geo-info and meteorological data.

J3: CBRN defence relevant information of the current situation.

J4: CBRN defence relevant logistics and medical information.

J5: CBRN defence relevant data for operational planning (CONOPS, OPLAN etc.).

J6: CBRN relevant CIS requirements and networks.

J7: CBRN lessons identified/learned data commonly with operation wide lessons identified/learned.

J9: CBRN relevant data with NGOs, IOs, and GOs e.g. submit warnings.

What data sources must be realised/considered?

Functional Services for C2 of CBRN Defence capabilities will focus on CBRN defence specific information services and benefit, to the maximum extent possible, from available communications, infrastructure, core, common and community of interest information services. Given that interoperability with Nations is essential the Target Architecture shall include interface to national information sources. It is important that the target architecture is designed as adaptive and flexible as possible in order to enable interface of additional specific National functionalities.

How will the CBRN FS be implemented?

On 13 April 12 HQ SACT ACOS C4ISR&NNEC signed the project mandate and forwarded the document to NCIA as the host nation. The project mandate is the initiating document for further project related activities. Most importantly, the project mandate makes recommendations that a demonstrator must be available to

End-Users to validate the functionality prior to IOC. Again, ACT recommended the JCBRN Defence CoE as the location for the demonstrator due to their existing expertise and the vital role they play in CBRN capability development throughout the Alliance. NCIA (former NC3A) provides governance over the project as the host nation for the project. The NCIA will establish an Integrated Project Management Team (IPMT) with representatives from all key project stakeholder organizations and provide the project management (contract administration, direction vis-à-vis performance, deliverables, and accountability) of the implementation.

Author: LTC Frank Kämper

HQ SACT Staff Officer Plans and Policy
WMD/CBRN

"Real-Time CBRN Reach Back: Solution Out of the Box"

COE Contribution to TNT MIO Experiment 2012

Radiological RB&F Network

Background

For several years the NATO CBRN Community worked on identifying and defining the operational and technological parameters of a future CBRN Reach Back & Fusion (RB&F) capability. The general requirement for CBRN RB&F is specified in the MC 0590 NATO Chemical, Biological, Radiological and Nuclear Reach Back and Fusion Concept (2010). Based on this, the JCBRN Defence COE Steering Committee tasked us to explore the Capability requirements and possible ways and means for the future implementation of this new NATO capability. Therefore the COE Programs of Work for 2012, 2013 and 2014 include support of RB&F Element experimentation as a high priority effort.

RB&F key factors

A proper RB&F capability should be based on three main factors:

1. The availability of "valuable" CBRN technical and intelligence data/information.
2. A 24/7 availability of a qualified level pool/network of subject matter experts and scientists.
3. Timely response. "Customers" expect "answers" and support to be delivered in real time if possible (not within hours like legacy processes) and at an appropriate level of detail.

The COE approached the problem by trying to innovate and explore new ideas and solutions during current RB&F experimentation in order to ensure the proper implementation of the above specified conditions.

Demonstration of a near real time RB&F capability

In June 2012, the JCBRN Defence COE participated in the Tactical Network Topology (TNT) Maritime Interdiction Operation (MIO) experiment organized by the US Naval Postgraduate School (NPS).

The TNT-MIO experimentation focused on the technical and operational challenges of searching and interdicting small watercraft and large cargo vessels which may be illegally transporting nuclear and radiological threats. The JCBRN Defence COE participated as the main Reach Back & Fusion Element (RB&FE), accomplishing the task of assessing radiological threats from spectroscopic and other related data sent (real time images, videos, instant messages... ) from Special Operations Forces Boarding Teams. Utilizing the NPS provided collaborative software available at all critical internet work spaces we achieved true global collaboration between remote and geographically dispersed partners which enabled real time near real time exchange of tactical data such as operator position, status reports, sensor data and observation reports, real time images and videos sent from boarding teams and swimmers. For the purpose of this experiment, the JCBRN Defence COE's RB&F Element cooperated with different Military scientific organizations via a dedicated internet cloud, in order to respond as fast and accurately as possible to the requests for information. Those organizations were the Czech Military Technical Institute of Protection, Brno. (VTU), the Joint Centre for Studies and Military Application (CISAM), Hungarian Defence Forces, NBC Area Control Centre and the US National Nuclear Security Administration (NNSA). The scientific advice and support represents the enabling component for any RB&F capability. The above mentioned centers provided technical advice and subject matter expertise in real time facilitated by live footage and images provided by boarding teams via the collaborative software suite. These images allowed scientific experts to provide immediate technical advice on the types of hazards present, appropriate protective measures required and
a host of other information exchange requirements that allowed vital interaction between scientific reach back and the operators in the field. The most promising results demonstrated the ability to respond and provide a complete assessment of the radiological threat, energy of the source and related protection measures in less than 2 minutes and to send a detailed report to the boarding team in approximately 9 minutes. The experiment marked a new milestone in RB&F capability and produced a number of critical lessons identified for incorporation into the overall RB&F experimentation process. It was a resounding success due to the exceptional organization of the NPS, the remarkable coordination of the NMIOTC as MOC and provider of all relevant facilities and the important support of all partners. This effort represents only the initial step in the long process of developing a CBRN RB&F capability for NATO. The JCBRN Defence COE’s ability to provide a real time RB&F capability symbolizes a paramount achievement for NATO and the CBRN Community. The experimental RB&F provided accurate technical and scientific support to a variety of military and civilian organizations throughout a globally dispersed maritime environment. Next year the NPS intends to include chemical scenarios into the experiment and the JCBRN Defence COE hopes to play an even more role in this on-going endeavor potentially utilizing the CBRN RB&F prototype element to provide even more robust scientific and technical advice to operators in all domains.

Author: LTC Romeo Tomassetti (ITA)

1 CBRN Reach Back is defined as a process by which deployed forces may be provided with timely, coordinated, authoritative and detailed advice on CBRN and other CBRN hazards and preventive countermeasures, drawing upon remote expert sources of information. Effective CBRN Reach Back should support the whole spectrum of NATO response to WMD proliferation, protection and recovery.

2 CBRN Fusion is a process for collection, analysis, evaluation, and assessment in support of situational awareness and operational planning. Such information is a primary tool in support of CBRN Reach Back. Sharing CBRN related information throughout the Alliance is critical to support CBRN related intelligence.

3 This experiment involved also other NATO and national co-operating institutions:

Institutions and organizations involved: NATO organizations: Allied Commander, Transformation (ACT), NATO Special Forces Headquarters (SFHQ), NATO MIO Training Center (NMIOTC), U.S. Government: Department of Defense (DoD), Office of Homeland Defense, Office of the Secretary of Defense (OSD), USECOM, USSOCOM, US Department of Energy (DoE); Lawrence Livermore National Laboratory (LLNL), DOE Radiological Assistance Program, National Nuclear Security Administration (Observer), US Department of Homeland Security (DHS); US Coast Guard (USCG), Domestic Nuclear Detection Office (DNDO), Homeland Security Science and Technology Office, State of California (CA), DA Department of Health, Radiological Branch (CADH), San Francisco Police Department (SFPD). Partner Nation Agencies: Norwegian Marine Jeger Kommandoen (MJK), Canadian Special Operations Forces Command (CJRU), University of Bundeswehr (UoB), Munich, Germany.

NATO held the exercise from 3-15 May 2012. Unlike previous Steadfast events, no NRF forces were actually certified. Instead, members of the designated NATO HQs tested a new NATO Deployable Concept for the Operational Joint Headquar- ters (DJHQ). The SFJT12 task force was composed of elements from JFC HQs Lisbon and Brunssum, NCS units from Heidelberg, Izmir, Munster and Naples. The Operational Planning Directorate (OPD) also supported the exercise and took responsibility for the Concept evaluation. In addition, various Centres of Excellence (COE) provided members to the JWC Training team that assisted the Training Audience (TA) in meeting the SFJT 12 training objectives.

As already mentioned one of the most critical changes introduced during the exercise was the new NATO Operational Concept. A critical aspect of the new concept eliminates the requirement for the deployment of the Deployable Joint Staff Element (DJSE) from the NCS into theatre and commanding the operation from the JHQ peace time location. From a practical perspective, this means all operational HQs (up to 500 troops) are incrementally deployed and directly commanded within the Joint Operational Area (JOA).

The CBRN Joint Assessment Team (CBRN JAT), the CBRN Battalion Response Cell (CBRN Bn RC) and the JCBRN Defence COE represented the NATO CBRRN community. The CBRN JAT served as the only active CBRN member of the TA and collected information pertaining to the WMD capabilities of the belligerents and Toxic industrial sites in JOA in order to provide the NATO Interim Military Forces (NIMFOR) Commander with recommendations on possible CBRN threats. The CBRN Bn RC acted as part of the Exercise Control (EXCON) and maintained coordination with other NIMFOR units and earmarked the CBRN Bn assets for the Joint Components of the NRF. The JCBRN Def COE assisted the JWC TT and orchestrated the “story board” while closely interacting with...
E-Learning as a Future NATO Training Tool

The use of modern technology in support of traditional training methods represents one of the fastest developing areas of NATO’s education and training capabilities. Electronic learning (e-Learning) serves as a new tool to deliver education, training and knowledge to personnel from NATO and partner countries (PfP) in a very cost-effective way.

“e-Learning is education and training that is delivered electronically through a computer or other device”

E-Learning includes technologies such as Advanced Distributed Learning (ADL), Computer-Based Training (CBT), immersive learning, mobile learning (m-learning) and collaborative learning.

E-Learning opens a new space for students to experience a convenient learning opportunity according to their own studying pace, independent of location, whenever and wherever they are.

Key intentions of NATO’s e-learning:

• Effective, efficient and affordable: deliver education and training globally through multiple methods with little investment (low cost policy with the same quality outcomes)
• Improved nation and partner engagement: enable personnel to get the knowledge and the experience to enhance their effectiveness to the NATO mission
• Incorporated guidance: Education and Training Facilities have an access to standards and guidelines for e-Learning capability development

Using e-Learning ensures NATO and PfP staff accessibility to high-quality education and training which can be easily modified to suit the individual needs of the student. NATO chose Allied Command Transformation (ACT) as a leader and an administrator of e-Learning and currently it offers over 300 hours of education and training based on the e-Learning system.

ADL functions as one of the most common forms of e-Learning in NATO provides education and training courses via a network using a standard web browser. NATO offers ADL courses on its two major networks, one which offers complete access to the internet. ADL follows a standard and specification known as the Sharable Content Object Reference Model (SCORM). This enables the courses in ADL to be uploaded with minimum adaptation to any other SCORM Learning Management System with the same version of SCORM. ADL courses include various components such as multimedia (video lectures, pictures etc.), syndicate sessions, templates, interactive content and chat rooms.

In January 2012 JCBRN Defence COE made a decision to participate in the e-Learning program and to establish an ADL team with responsibility for preparation of ADL courses. The ADL team members traveled to the NATO School Oberammergau (NSO) to undergo the initial training required for development of their own courses. NSO provided information on how to operate the SCORM editor, which is the essential tool for course creation. Shortly thereafter, the ADL team began development of the first JCBRN Defence COE course based on a web browser application. With the first phase of course development (filling databases) complete, the ADL team focused on phase 2 (course testing). The team made outstanding progress so far and strongly believes that the pilot course remains on track for September 2012 unveiling. They hope it will soon be available to NATO and PfP training audiences on the SACT web pages at http://jadl.act.nato.int. This first ADL course ensures future students of Advanced Warning and Reporting Specialist course obtain the minimum knowledge base required prior to the start of the course.

The JCBRN Defence COE activities in the field of ADL open new opportunities for our contribution to the NATO education and training system and enhance knowledge distribution throughout the Alliance. As such, ADL would serve as a platform for CBRN course distribution among NATO and PfP nations particularly within the current fiscally constrained environment.

Due to the worldwide increase of access to modern technologies, the JCBRN Defence COE ADL team believes future e-Learning represents one of the most important innovations in education within NATO. Therefore, it serves as a great opportunity for the JCBRN Defence COE to follow NATO’s education and training trends and be a pioneer in this respective discipline.

Author: LTC Jaroslav Borek (CZE)
In the previous installment of this article we described the importance of M&S and its impact on training and experimentation. We discussed common M&S terms as well as the advantages and disadvantages of their use. Additionally we attempted to explain the basic definitions and clarified the differences between live, virtual and constructive simulations. The article also mentioned an example of how the JCBRN Defence COE M&S Section uses the work of the MSG-096 (Consequence / Incident Management for Coalition Tactical Operations) to contribute to NATO. The entire M&S Section staff actively participates in these efforts and plays a critical role in the development of CBRN models and simulations as well as the integration of CBRN functionalities into existing ones.

In this segment I would like to elaborate on the JCBRN Defence COE's M&S Section's efforts concerning the NATO Education and Training Network (NETN) and the associated Federates. This serves as the cornerstone of the work of MSG-106 (Enhanced CAX architecture, design and methodology), especially the technical part, and many other NATO M&S Groups.

Historical background and program of MSG-106

In 2007, HQ-SACT initiated the NETN project, which later became program Snow Leopard, to establish a persistent, joint NETN capability at the strategic, operational, and tactical levels by leveraging existing national capabilities. MSG-068 developed initial technical solutions to enable distributed training and exercises. A final Stand Alone Experiment (SAE) showed the technical feasibility of a network of distributed simulations. A demonstration during I/ITSEC 2010 elicited strong interest from numerous nations for a reference architecture and community standards. However, the initial technical capability is insufficient to support the full vision. MSG-068 recommended additional technical development and noted the lack of an established long term process for the maintenance of the initial reference architecture and standards and also noted the absence of provisions for improvement. Finally, MSG-068 was unable to more closely link or assess its capabilities against the operational support requirements. So, they defined the follow-on objectives of MSG-106 as follows:

1. Provide guidelines for Exercise Control (EXCON) and Simulation Control (SIMCON) in performing Computer Assisted Exercises (CAX).
2. Update the NMSG-068 reference federation architecture and FOM design document to improve and extend it based on tested technical solutions.
3. Support the NMSG-106 products for:
   • Recommendations for the governance and maintenance of products;
   • Standardization, dissemination, quality assurance, risk management;
   • Coordination and collaboration with external bodies.

Contribution of the JCBRN Defence COE

MSG-106 operates in three separate subgroups: Operational, Governance and Technical. All of them closely cooperate together and also with other M&S Groups and NATO and industrial organizations (Figure 1). The JCBRN Defence COE primarily focuses our efforts in involvement in the Technical subgroup. Maintaining situational awareness of the current progress of NETN and Real-Time Platform Reference Federation Object Model (RPR FOM) requires additional resources to enhance the M&S Section's capabilities if we truly desire to influence their development. In June 2012, the JCBRN Defence COE became a member of the CBRN FOM Tiger Team of the Technical subgroup. The UK assumed the lead of this Tiger Team and assigned the JCBRN Defence M&S Section to investigating methods for communicating between its SW tools Battle Command and CBRN Sim Suite where the CBRN interoperability issue is already partially solved. The aim is to generalize, describe and publish the findings. The Tiger Team presented its initial results during CAX Forum 2012 in Italy.

Author: MAJ Lubomír Chylík (CZE)
ArcGIS Desktop Applications in CBRN Modeling & Simulation (M&S)

In a previous issue of the JCBRN Defence COE Newsletter we introduced our readers to some very basic information about what M&S is all about and discussed several of the advantages and disadvantages of its military application. We also talked about how the JCBRN Defence COE M&S section contributes to a variety of NATO activities.

In this article we intend to inform our audience about a specific application of M&S called the Geographic Information Systems (GIS) software products. GIS represents a technology platform designed for processing and preparing geographical data and it serves as the basis on which many M&S systems operate. Generally, GIS provides M&S with the working environment indispensable for fulfilling all of its tasks.

One of the great advantages of M&S solutions is that they allow operators to substitute a real world environment with a simulated one. This usually provides a much cheaper and more easily modified virtual environment created by computer software and interfaced to the user mostly by means of some type of visual display. In military simulations - war games, the simulation represents a virtual reproduction of the battlefield area. A raster or vector geographical model, usually in form of digital map, normally identifies the element contained in computer software which depicts the real world and recreates as many of its attributes and peculiarities as possible. Maps in one form of another existed for centuries and have been linked to military operations throughout recorded history. Only until recently, however, with the development of computers could they be used in a digital form to create structures that reflect the essence of the real environment, called models and used for modeling and simulation.

A) Geographical data (maps) can be divided into two basic groups:

- Raster data, which exist in form of bitmap pictures, are composed of an array of equally sized cells (pixels) arranged in rows and columns and placed into a matrix, where each cell contains a value representing information such as elevation, temperature, or land-cover, e.g. CADRG maps (Compressed ARC Digitized Raster Graphics), seamless raster database with broad use in planning of military operations, content is reduced, format - CADRC, other are: GeoTIFF or TIFF

- Vector data, where every shape is formed by two basic elements: a point and a line connecting two points. The position of these two elements in a space is described by mathematical formula of x, y, and z coordinates, e.g. VMap1 (Vector Instant Map Level 1), covered by STANAG 7163, DTED (Digital Terrain Elevation Data Level 0-2), covered by STANAG 3809, in grids 0-30x30, 1-3x3, 2-1x1 contains matrix of elevation data

In addition to digital maps, other forms of geographical data exist to include flying and navigation charts, orthophotomaps, satellite maps, anaglyfs and world magnetic models just to name a few. Most of them have only a limited value in use for CBRN programs.

B) The Depiction of geographical data in proper form for its application in modeling and simulation remains a demanding and sophisticated problem. To solve the problem and prepare geographical data for relevant simulation programs, we use the software developed by the US company ESRI, named ArcGIS Desktop version 10. ArcGIS 10 is a powerful and complex tool whose applications are used in almost all branches of human society. It allows us to create, edit, convert, analyze and store in databases different types of geographical data. ArcGIS generally provides a framework for gathering and organizing spatial data and related information, so that it can be displayed and analyzed. Seeing the data on a map powered by GIS instead of a spreadsheet allows for faster and better decisions in CBRN operations.

ArcGIS Desktop 10 comprises two integrated applications:
- ArcCatalog - ArcCatalog is the data management application used to browse datasets and files on one's computer, database, or other sources. In addition to showing what data is available, ArcCatalog also allows users to preview the data on a map and provides the ability to view and manage metadata for spatial datasets.
- ArcMap - is the application used to view, edit and query geospatial data, and create maps. The ArcMap interface has two main sections, a table of contents on the left side and the data frame(s) which display the map. Items in the table of contents correspond with layers on the map

C) ArcGIS as a database tool
ArcGIS 10 offers many ways to perform GIS data management which involves creating, storing, and editing data. The primary data storage mechanism in ArcGIS is the geodatabase. You can create and edit various data types, such as feature classes, raster data, and tables. In addition, there are other data storage options available to use with ArcGIS, such as coverages, CAD files and shapefiles. There exists tabular information of geographic features designed to store geographic data for CBRN requirements. This allows you to visualize, query, and analyze the data. Tabular information is in the form of dBASE table which accompany shapefile formats. DBASE tables can be made up of thousands of rows and columns, and all rows have the same columns. In ArcGIS, rows are known as records and columns are fields. Each field can store a specific type of data, such as a number, date, or piece of text, e.g. in form of HTML PopUp link as is shown in Figure 1. There is one limitation, however, as the dBASE table and the corresponding shapefile cannot exceed 2 GB. The total size for all the component files can exceed 2 GB. ArcGIS allows us to associate records in one table with records in another table through a common field, known as a key.

Sources of tabular information
There are many sources of tabular data, and ArcGIS can take advantage of many formats. Tabular information could be stored as tables in folders or databases, text files, queries on databases, etc. In addition, in case of spatial data, there are tabular attributes that describe those geographic features accompanying data itself.

Tabular information includes the dBASE tables, the format used with shapefiles, INFO, the format used with coverages, text files, such as those created in a text editor and delimited by commas or tabs and other sorts of tables, including those generated in other programs, such as Microsoft Excel.

ArcGIS makes it possible to perform queries on these tables with attribute data which helps to perform spatial queries and analysis to create new tables. The Make Query Table tool, for example, allows application of a SQL expression to one or more tables.

There are many mapping, analysis, and data management tasks we can perform using tabular data. Tables allow users to map and visualize CBRN data, e.g. we can classify or categorize attributes to symbolize a layer, specify that a different color be used to represent pieces of land affected by CBRN agent or perform other spatial modifications to indicate variations in the CBRN environment.

D) ArcGIS as a digitizing tool
M&S uses ArcGIS as a digitizing tool which allows to create and edit several kinds of data. Digitizing is the process of converting features in raster format into a digital
format (raster-to-vector data conversion). This way we can perform conversion of geographical data represented by raster maps, an aerial photograph, satellite image, or orthophotograph as a basemap in a jpg, gif, tiff or bmp format into digital format, usually a shapefile, accompanied by dBASE table, which can store additional attributes or infos.

By means of several types of shapes i.e. point, line, polyline, polygon, multipatches, and multipoints we can draw layers showing roads, rivers, urban and industrial areas, forests, lakes etc. Layers, representing particular features, can be displayed individually or together until the whole map is shown.

E) ArcGIS as a georeferencing tool
Raster data is commonly obtained by scanning maps or collecting aerial photographs and satellite images. Scanned map datasets don’t normally contain spatial reference information (either embedded in the file or as a separate file). With aerial photography and satellite imagery e.g. from Google, the location information is missing, or, if delivered with them, is inadequate, and the data does not align properly with other data available for that particular geographic location. This is true for CBRN programs e.g. HPAC (Hazard prediction assessment capability). Thus, to use some raster datasets in conjunction with other spatial data, we must align or georeference them to a map coordinate system. A map coordinate system is defined using a map projection (a method by which the curved surface of the earth is portrayed on a flat surface).

Georeferencing the raster dataset means define its location using map coordinates and assign the coordinate system of the data frame. Georeferencing raster data allows it to be viewed, queried, and analyzed with other geographic data. All the elements in a map layer have a specific geographic location that enables them to be located on or near the earth’s surface. The ability to accurately locate geographic features is critical in both mapping and GIS.

F) Map formats used by CBRN programs

HPAC - accommodates a variety of of imagery, geospatial data and map formats
- CADRG map products (raster data)
- Geospatial data in ESRI shapefile format (vector data in .shp format)
- Imagery formats, i.e. JPEG, TIFF, GIF, BMP (raster data)
- Point feature data in .CSV format (for the exchange of tabular data, with EXCEL)

NBC Analysis – many map formats can be easily converted into its own .gst format
- ADRG/CADRG (Compressed Arc Digitized Graphics)
- VPF (Vector product format)
- VMAP1 (Vector data)
- CIF (Raster data)
- ESRI (shapefile data in WGS-84 system)

CB Sim Suite - requires geographical data in format with extension.C7L. The format is a special one, which requires expensive software, Terra Sim, for conversion of Geographical Data to C7L. In that case we cannot use ArcGIS.

Battle Command – utilizes its own internal data format with extension .mtd. The program uses special software TDB Tool for conversion of common geographical raster and vector formats into mtd. BC can work with formats as CADRC, Shapefile, VPF, TIF, GDB, DTED etc

ArcGIS Desktop 10 is a versatile and powerful tool for geographic data management and its employment in CBRN M&S is indispensable for fulfilling tasks represented by the JCBRN Defence COE Program of Work.

Author: Mr. Miloslav Šír (CZE)

Warning & Reporting Course in Serbia

Through bilateral visits and contacts between representatives of the Republic of Serbia and NATO’s contact embassy (currently represented by the Czech Republic) a Mobile Education and Training Team (METT) from the JCBRN Defence COE Vyskov executed a one week course at the Serbian Armed Forces CBRN Training Center (SAF CBRN TC) in KRUSEVAC Serbia from 22 to 28 April 2012.

A representative of the NATO’s contact embassy accompanied by representatives of the Serbian Superior Training Command HQs and Colonel M.Sc. Slobodan SAVIC, CBRN TC Commander opened the course. Colonel SAVIC stated: “The CBRN Warning and Reporting (W&R) System Manual Procedure Course is only going to be the beginning of the relationship defined by the bilateral agreement between the Republic of Serbia and NATO signed in the beginning of 2012. It represents a new realization in the field of CBRN Defence and, as such, the training holds significant importance for SAF in implementation of NATO STANAGs and in support of SAF projects for Regional SAF CBRN TC”.

15 students, ranging from 1st Lieutenant to Lieutenant Colonel (OF1 to OF4), from the Serbian General Staff, Air force, CBRN Training Center and CBRN battalion
received a tailored module of the NATO CBRN Warning and Reporting System Manual Procedure Basic Course. The intent was to train students to be qualified in manual operating procedures & staff cooperation in the CBRN warning and reporting system, and to introduce the Automated Data Processing systems utilized by NATO for CBRN Defence. Instructors placed the emphasis on the appropriate procedures for handling and processing of CBRN Defence information. The students considered the course very valuable. The lectures were well received by the group, especially, the CBRN practical exercises and the individual exercise and learning module. In general, the students highly appreciated the JCBRN Defence COE instructor’s approach, their experience and subject matter expertise. Student surveys confirmed that most participants considered this course excellent preparation for future jobs and placed a high value on the training.

At the end of the course, the CBRN Commander informed the audience that in order to increase and strengthen regional cooperation, the Serbian MOD offered CBRN TC to serve as the Regional CBRN TC in accordance with NATO’s Non-Binding Guidelines and Minimum Standards for CBRN First Responders. The main idea of the Regional CBRN Center would be specialized training and education for civil and military responders, development of CBRN defence capabilities and doctrinal principles from countries in the Balkan region. In this context, CBRN TC celebrates 80 years of its existence in September 2012 and Col SAVIC expressed his appreciation that the JBRN Defence COE intends to conduct a “CBRN Warning and Reporting System Manual Procedures Advance Course” at SAF CBRN TC during that period.

The JCBRN Defence COE also expects to conduct a "Crisis Management after a CBRN Accident Course” for SAF and Serbian National Crisis Response Centre in November 2012. This strategic level course provides unique opportunities for Serbian strategic planners to develop a familiarity with NATO’s approach towards CM and assists in their efforts to become interoperable with NATO for mutual cooperation in case of natural or manmade disaster.

Author: LTC Zdeněk Vrábel (CZE)

JCBRN Defence COE’s Courses 2012

CBRN Unit Evaluator’s Course (17 – 21 September 2012)

The course will be an advanced level extension of original CREVAL Course aimed at providing CBRN SMEs with additional information for proper evaluation of CBRN Units. The prescribed NATO Capability Codes & Statements as well as SHAPE specific requirements will be the subject of the course. The JCBRN Defense COE conducts the five-day course utilizing a variety briefings, discussions and syndicate work.

Expected Outcomes:
- Participants are familiar with CBRN Units Capability statement and evaluation procedures IAW AFS Volume VII and FOR/OPD specific requirements;
- Participants are prepared to conduct the evaluation over a broad spectrum of CBRN Units.

Minimum level of English language skills: 2222
Classification: NATO RESTRICTED
Audience: NATO/PfP countries

CBRN Warning and Reporting Specialists Course / Pilot Course (15 – 19 October 2012)

The JCBRN Defense COE developed the NATO CBRN Warning and Reporting Specialist Course as a week long course for qualified personnel involved in NATO CBRN W&R System. They placed the emphasis on detailed CBRN procedures for the handling and processing of CBRN Defence information. Practical exercises utilizing the CBRN Warning and Reporting system along with various CBRN W&R centres serves as the most important part of the course and constitutes a culminating event that allows students to demonstrate their ability to apply the skills taught during the course.

Expected Outcomes:
- Students demonstrate the requisite ability to report all chemical, biological or radiological attacks and nuclear detonations and resulting contamination;
- Participants display the ability to predict hazardous areas and provide warning to affected units;
- Students accurately assess CBRN information in order to complete the common operational picture for the commander;
- Audience becomes familiar with Warning & Reporting (W&R) Organization and Responsibilities.

Minimum level of English language skills: 2222
Classification: NATO UNCLASSIFIED
Audience: NATO/PfP countries

For more information and initial registration visit www.jcbrncoe.cz. You can also contact the Project Manager directly at MAJ Radek Tomáš (phone: +420 973 452 868, E-mail: tomasr@jcbrncoe.cz).
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