Integrated Environment for Enhancing of Security Sector Operations Training

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Abstract: The paper is considering an integrated environment for enhancing integrated security sector operations training (Basic low-cost Environment for Simulation and Training – BEST) and the challenges related to Security Sector Governance (SSG) in South East Europe (SEE) and Wider Black Sea Area (WBSA). BEST was successfully implemented in the newly established Joint Training Simulation and Analysis Center – Civil Security (JTSAC – CS) using the paradigm of serious gamming, e-learning and co-learning. JTSAC capabilities in education and training via Computer Assisted eXercises (CAX) and Operational Analysis (OA) are revealed in the context of BEST environment that also includes and quantitative measurement of the quality of training.

Keywords: Education, training, Security Sector Governance, CAX, OA, serious gamming

Introduction

The Security Sector Governance (SSG) is an initiative focused on critical elements of sustainable peace: developing security forces and supervising institutions that are effective, legitimate, apolitical, and accountable to the citizens they are sworn to protect. These activities are commonly referred to as Security Sector Reform (SSR).

SSR from another side is a concept to reform/rebuild a state's security sector that emerged first in the 90s of XX century in Eastern Europe. However in practice SSR is often reduced to "train and equip" programs that ignore supervisory institutions, while the SSG focuses on building of sustainable, locally owned institutions capable of supporting professional security sector.

As far as SSR is related to jurisdiction changes for providing security to the state and its people effectively and under democratic principles an inclusion of the modern understanding of security as an integrated sector is essential [1].

At present the "security" notion is going to be substituted by the "defence" one both in EU and in NATO community, talking at the same time for a more 'wider' and not so 'global' world.

Currently, in the security area for the next two decades an identification of threats/challenges and strategy for their meeting are being developed in both EU and NATO. EU has developed the ESRIA [2] and NATO is currently developing a New

Strategic Concept based on the Comprehensive Approach with relevant technological support [3] - [5].

However it should be noted based on the gathered recent military experience (e.g. in: Central Asia, Middle East and Balkans) in the context of the ideas for enlargement of NATO and EU that nowadays the common security is going to be more and more relying on civil-military integration/cooperation and building of closer partnerships with other international organizations (e.g. UN and other humanitarian ones) that have experience and skills in areas like: institution building, development, governance, judiciary and police for better SSG.

In Bulgaria SSR monitoring and its transition to SSG initiation is related to "Coalition for SSR" establishment in 2002, which encompasses both NGO and academic and aims on consolidating the work in the security area through periodic progress reports to the Parliament so it is a living process.

Further on the acceptance of recent changes (some preceding some following the country membership in NATO and EU) in key laws and strategies related to the integrated security sector are continuing the process from its jurisdiction aspect.

What however is extremely important is the research and analysis of SSR in order to get a working SSG.

Two good positive examples in this area are the established under NATO Science for Peace (lately changed to – Science for Peace and Security) Program centers [6]: Center of Excellence in Operational Analysis (established under NATO SfP 981149) and Center of Excellence in Defence R&D Management (established under NATO SfP 982063).

Both centers encompass the academic and educational communities from a wide scientific area including: social, natural and engineering sciences maintaining at the same time relations with NGOs.

Before considering the core of this paper, i.e. the integrated environment for enhancing of security sector operations training - Basic low-cost Environment for Simulation and Training (BEST) providing support the SSR/SSG research and analysis the Bulgarian position in SEE/WBSA related to SSG will be given.

1. Bulgaria in SEE/WBSA context

The right and reliable security and economic environment as well as the adequate strategic context is an important topic to be studied in order to get an adequate address and clear understanding about the SSG necessities related to South East Europe (SEE) and Wider Black Sea Area (WBSA).

A model of influences and dependences relations of the Bulgarian regional and political context [1] is presented in Figure1.

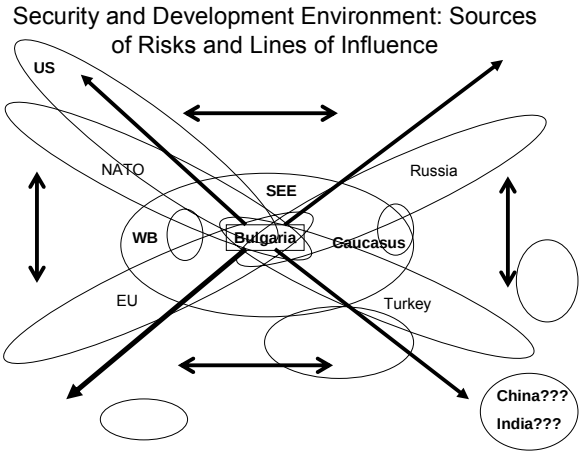


Figure1: Bulgaria and SEE in the center of powers' influences and their interactions.

Bulgaria has a unique position – both geographic and geostrategic in South Eastern Europe (to extend from Western Balkans to Caucasus with Black Sea in the middle). We are on the crossroad between EU and Turkey/Russia, between NATO and Russia, between "functioning core" and "gap of nonfunctioning good governance" and a lot of other dichotomies. The key influences are related to EU, NATO, US, Russia and Turkey, but we have to add many key bilateral relations between Bulgaria and NATO or EU countries as well as relations between these factors of influence. The country is surrounded by active conflict zones in Europe, Asia and Africa in the perimeter range of 1000-2000 km.

This environment and its dynamics is an important factor in planning for different security aspects for the next 20 years [1] - [5]. As a result of such an environment and dynamics of external (flows of: money, people, resources and security guarantees) and internal factors (majority in the Parliament of the Euro-Atlantic or Euro-Asian forces) Bulgaria has very interesting trajectory of transition during the last 20 years (see Figure 2).

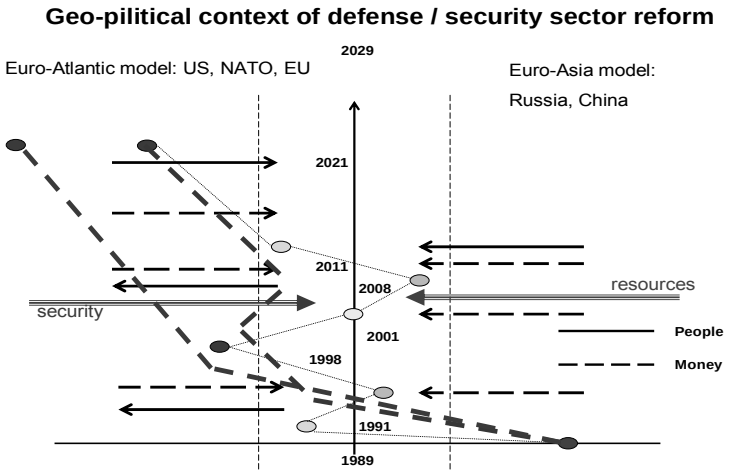


Figure 2: Trajectory of new NATO/EU members (left) and oscillations of Bulgarian transition (right line).

It is a unique situation in comparison to any other new member of NATO or EU for the last 20 years and very similar as model with the countries that are now in PfP in SEE and may be for other NATO partner countries outside of Europe. This internal dynamics of country "climate" is the key factor in shaping decisions on future security challenges.

The key point for the future is that Economy will be more and more integrated in the Euro-Atlantic community and political and security sector, as well as energy/infrastructure sector have to follow or may be, after certain time, to lead this transition in order to be effective and to keep integrity of the country and even - integrity of people at high political level.

So, the challenge is to achieve high level for integration [7] – horizontal (between deferent infrastructures and security services) and vertical – from policy and governance to management and command and control. The key instrument for such integration is the combination of Operational Analysis (OA) for concept development and decision making support together with Computer Assisted eXercises (CAX) for experimentation / training and deeper / larger understanding of the situation, concepts and plans validation, thus achieving an effective and explanatory SSG.

The main goal of the established in 2006 Joint Training Simulation and Analysis Center – Civil Security (JTSAC – CS), which together with the Center for Defence and Securiy Management are both ancestors of the Center of Excellence in Operational Analysis (established under NATO SfP 981149 at the Institute for Parallel Processing (now Institute of Information and Communication Technologies – Bulgarian Academy of Sciences) is related to exactly this challenge – to provide tools and test environment for OA and CAX in support of the SSG and its broader understanding as security sector change management.

Bulgaria being in the middle of Adriatic – Black Sea – Caspian Sea Bridge and being a member of NATO and EU with close cooperation with US (including joint military facilities) could support regional cooperation trough OA and CAX in JTSAC – CS in the transition period for the region.

Considering the disclosed context of the Bulgarian position in SEE and WBSA the role of OA/CAX implementation is inevitable by means of possible scenarios development, simulation and analysis that are related to Critical Infrastructure Protection (CIP) and Emergency/Crisis Management (EM, CM). This is based both on world known best practices for future situational analysis from one hand and from another – shows a great flexibility in the methodology.

Generally, CAX nature is multidimensional and in the most extreme, best case, allows combination of live, virtual and constructive simulation of the studied environment model.

In the next paragraph a description of JTSAC – CS organization, concept of training and capabilities for providing interdisciplinary approach to SSG research and education will be given.

3. Joint Training Simulation and Analysis Center – Civil Security

The Joint Training Simulation and Analysis Center – Civil Security (JTSAC – CS) is an academic Research and Development center founded in 2006 with the support of NATO, EU, Bulgarian Government and Bulgarian Academy of Science (BAS) as a

part of the Institute for Parallel Processing (currently Institute of Information & Communication Technologies – Bulgarian Academy of Sciences).

The center specializes in integrated Live, Virtual and Constructive (LVC) simulations for Computer Assisted eXercises (CAX) and Operational Analysis (OA).

Generally, JTSAC studies the application of OA, CAX and Information Technologies in the new security challenges of the 21st century.

Mission of JTSAC is to be a key partner of the Integrated Security Sector institutions planning and analysis process with the help of OA and CAX.

Vision focuses on the ability with high – professional team to support the complete life cycle of OA and CAX.

The strategy is based on Knowledge and Technology integration for better education and training.

The main objective of JTSAC – CS is to provide scientific and educational support to the Integrated Security Sector on the bases of OA and CAX, conducted jointly by subject matter experts, scientists from BAS and leading national and international high-tech companies from the security sector.

The organization in JTSAC – CS includes ten people – five of them responsible for the management (general, software, hardware, projects and knowledge), and five more supporting the center activities (see Figure 3).

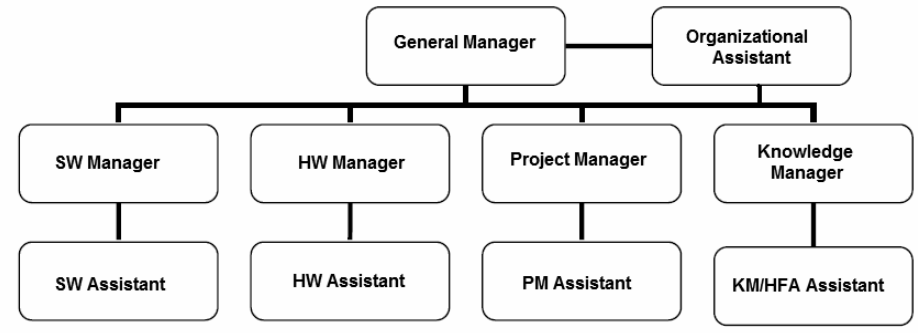
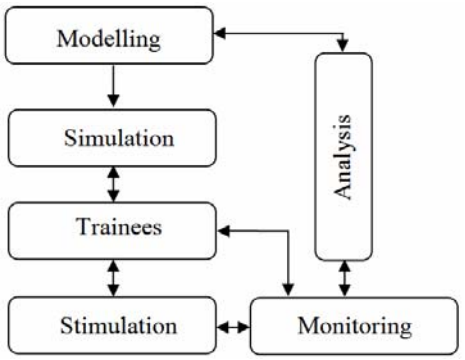


Figure 3: Organizational structure of JTSAC – CS.

The basic JTSAC – CS capabilities are integrated around the development of an Integrated Environment for Enhancing of Security Sector Operations Training, called also: Basic low-cost Environment for Simulation & Training – BEST that will be considered in 3.2.

3.1. Concept of training in JTSAC – CS

The concept of training in JTSAC – CS encompasses five key processes: modelling, simulation, monitoring, analysis and stimulation (see Figure 4).



Figire 4: Concept of training in JTSAC – CS.

The modelling process in the security area has a complex nature, which usually is difficult to be practically validated. Nevertheless one of the reliable ways in doing this is the security studies on project base [1] and practical activities like SSR/SSG. Apart of this, it should be noted that the trainees and subject matter experts' discussions, round tables and brainstorming sessions are also useful for the modelling development and/or adaptation.

Further on the simulation process is important for the model testing and validation. Generally, the simulation could have different projections in accordance with the implemented tools, starting from Top Table exercises, continuing with computer simulations and ending with real military/non-military operations.

Regarding the simulation process application in security training, it is important to note that the ICT technological boom is closely related to today's computer simulation wide usage.

An important easy accessible and low-cost part of the simulation process real implementation are the different kind of technological solutions for single and multi-players games. These solutions start from complete virtual worlds (e.g. Second Life), continue with role games (e.g. World of Warcraft), social networks games (e.g. Mafia Wars, FarmVille) and end with military tactical first-person shooters (e.g. Project I.G.I. - I'm Going In, Counter-Strike, Call of Duty, HALO 3, Virtual Battle Space 1&2).

These game solutions in combination with the concept of serious gamming, e-learning and co-learning open a vast area of Concept Development and Experimentation in the field of security education and training process.

Generally, 'serious games' are games, associated with the development of computer games for educational purposes, in different areas of human knowledge, not just for fun and entertainment but for learning [8]. What is also interesting about 'serious games' is their role in simulations via Computer Assisted eXercises with different useful applications for training [9].

This drive us to the idea to follow the concept of 'serious gamming' which already has proven its applicability and great flexibility in many other areas as a basic fundament in JTSAC – CS training organization combining in this way live, virtual and constructive simulation (fully integrated CAX) with multiaspect (economic, risk, defence, operational, etc.) analysis both local and distributed amongst different participating institutions from the Integrated Security Sector in national/international scale.

Finally, we have also discovered a gap in the education and training process related to nowadays lack of clear measurement and analysis of the trainees achievements by means of their psycho-physiological nature, i.e. a quantitative measurement of the training process quality. So, we have also adopted and developed a special module for monitoring and stimulation providing psycho monitoring of the trainees (via questioners) and communication channel observation [10], [11]. This module is including also some physiological neuromonitoring.

The stimulation of the trainees during the simulation process is related to their performance improvement via time control and neurofeedback for low-level operations training.

Finally, a detailed analysis of the achieved trainees' results and model adequacy to the reality is performed by using experts' support and list of criteria of success evaluation.

In the next paragraph a description of the revealed concept for training will be disclosed by means of its practical ad-hoc implementation.

3.2. Training environment in JTSAC – CS

The training environment in JTSAC – CS – BEST (Basic low cost Environment for Simulation and Training) represents in fact an Integrated Environment for Enhancing of Security Sector Operations Training.

BEST has been developing since 2005 within a series of projects and tested with the EU TACOM SEE 2006, NMSG-049, Struma 2008 and in 2010 will be part of Phoenix 2010 exercises.

BEST is integrating CAX simulation via CAX-ENVironment (CAX-ENV) and six additional modules (see Figure 5).

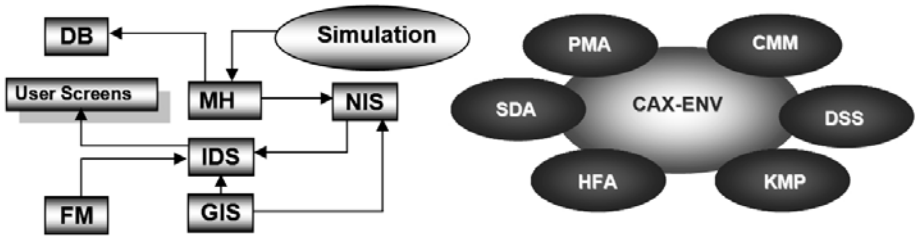


Figure 5: CAX-ENV and other BEST modules.

CAX-ENV is an element of BEST that encompasses a network system for: Message Handling and Instant Messaging chat (MHS or MH); Integrated Display System (IDS) for displaying different fused information about simulated events': geographical, seismological and meteorological information (via Geographical Information System (GIS) – ESRI Arc Info 9.2® and Google Earth®), exchanged messages log via a Web Information System integrated into a Network Information System (NIS) that allows remote Field Modules (FM) integration for mobile C2 Center construction, including WAN, LAN and satellite TCP and VoIP communications assurance and video surveillance (including usual and night vision cameras); Finally the completed simulation is archivated in to a Data Base (DB) for After Action Review and Post Mission Analysis.

A detailed implementation of BEST methodology [12] is shown in Figure 6.

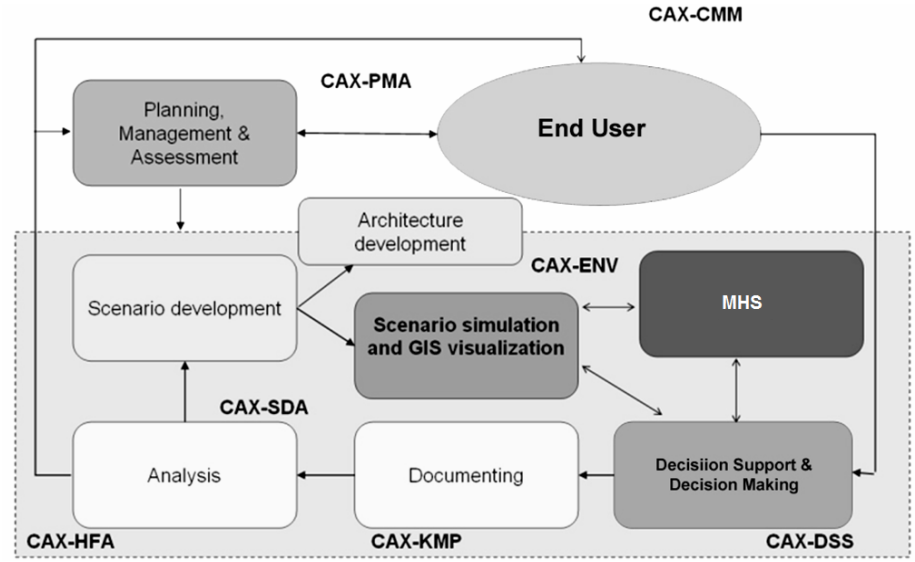


Figure 6: JTSAC – CS BEST methodology.

As it is clear from Figure 6, BEST consists of the following elements:

The Change Management Model (CMM) is giving the context of the security sector transformation related also to SSR/SSG testing through CAX and OA [1], [13]. In this sense, CMM provides also the link with the end-user community;

The Project Management and Assessment (PMA) implements tools and methods for economical evaluation planning and control on the bases of COTS like: MS Project®, QPR Balanced Score Card® and own ad-hoc developed software solutions;

The Scenario Development and Assessment (SDA) implements a four step process: morphological analysis, system analysis (both developed within own ad-hoc software solution – I-SCIP), dynamic risk forecasting (developed with the COTS Powersim Studio®) and agent based simulation (assured with NC3A software for agent based simulation – GAMMA®);

Following developed scenarios requirements a CAX ENVironment (ENV) architecture is designed via System Architect, OpNet (for communications), ARIS and NAF, DoDAF principles.

The Decision Support Systems (DSS) package provides a set of distribution tasks solvers for emergency delivery of resources (water, food, medicines, blankets, clothes, etc.), people evacuation, rescuing and network (electrical, water or road) distribution problems;

The Knowledge Management Package (KMP) is providing an integrated space for archivation of results in electronic form, from ongoing or already passed CAXs, available in a WWW environment (see: http://www.caxbg.com/);

Finally, the Human Factor Analysis (HFA) gives a possibility via questioners fill-up, battery of psychological tests (including: alertness, attention, stress, fatigue etc.) and neurofeedback tracking for evaluation in a qualitative manner the real involvement of the trained participants in CAX and for improvement of their results/performance,

i.e. an ability to learn and improve their knowledge and reactions for hypothetical, plausible scenario based hypothetical/future situations, i.e. SSR models, operations.

Here it should be noted that biofeedback is a well-known method through which a measured physiological parameters and values are returned in person in real time. In the general context, it is assumed that we are learning by the principles of biofeedback. The trained achieved not only a better self-control but also developed the ability to better adaptation in novel situations. The implemented in our BEST environment biofeedback is an EEG neurofeedback technology based on the ELMIKO®, Poland COTS solution. Currently, the neurofeedback is applied experimentally for improvement of the result in training through virtual CAX [10] with possible application in soldiers' expenditure mission preparation.

Conclusions

In the present paper we have briefly revealed the problem related to SSR and SSG in SEE/WBSA, which is basically related to the necessity of systematic view achieved through security area research and analysis.

Nowadays it is inevitable to talk about security and not to mention the integration in this sector because of the new character of the irregular threats and unknown complex future challenges. Apart of this, a national attempt for improving SSG with the development and testing of an Integrated Environment for Enhancing Integrated Security Sector Operations Training – Basic low-cost Environment for Simulation and Training (BEST) in the framework of Joint Training Simulation and Analysis Center – Civil Security is also given. BEST was successfully applied in Plan 2015 for Bulgarian Armed Forces transformation and within a number of national and international security projects [1]. The implementation of BEST in CAX is starting with a large scale EU TACOM SEE 2006, continuing with Struma 2008 and in 2010 will be part of NMSG-049 efforts in Phoenix 2010 exercises.

Currently the environment is extending in its educational part though several national/international applications in this area, to mention: National Security Strategy Project, Republic of Bulgaria, 2007/2010; NATO ASI "Security Sector Transformation in the Wider Black Sea Area", Bansko, Bulgaria, 2007; NATO ARW "Developing Conceptual and Policy Considerations on National and Regional Strategies in South-East Europe Based on Scenarios", Skopie Macedonia, 2008; NATO ASI "The Role of the Security Sector Governance for the Democratic Transition of the Western Balkans", Plovdiv, Bulgaria, 2009; NATO C3 Agency International Conference for Chief Information Officers, Sofia, Bulgaria, 2010; George C. Marshall Center for Security Studies Civil Security Community of Interest Event "Interagency Biological Restoration Demonstration - European Case Study", Garmisch-Partenkirchen, Germany, 2010.

Finally, it should be noted that since 2010 three bilateral framework agreements signing between Bulgarian Academy of Sciences, Ministry of Defence, Republic of Bulgaria and NATO C3 Agency in the context of New NATO Strategic Concept preparation, both JTSAC – CS and BEST are going to be better integrated in the security co-learning national/international activities.

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