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Примљено: 29.07.2015.

Serious Gaming – Instrument for Addressing Global Threats

Abstract: *In the context of emerging global threats, the requirements for future practitioners in the field of national security will gradually encompass a wide range of competences. In the attempt to meet the standards of efficiency and performance imposed by the perpetual shifts of the external environment, the institutions responsible with training and educating future practitioners will have to adapt to the new parameters and implement innovative teaching methods, complementary to the traditional ones. Leading from this starting point, the paper addresses the issue of think-tanks, simulation and modelling, used as teaching techniques for creating complex decision-making patterns and identifying conflict resolution models. According to the constructivist learning theories, knowledge is created through experience while exploring the world and performing activities. Due to the last-decade developments in technology and software, serious gaming can contextualize the player's experience in realistic environments and replicate the real world interactions.*

Keywords: experiential learning, simulation, virtual reality, think tank, education, national security

Introduction

In a globalizing world, the military threats have gradually translated from traditional forms into asymmetrical, transnational and economic warfare. The fast-paced developments in technology place the current environment in the final phase of the technological utility, that of ubiquitous use, when the software and programs available filter through all levels of society. Cyclically, technological innovation propels society towards progress. Launching the personal computer in 1974, the emergence of the Internet and of the World Wide Web, the development of mobile technology are basic examples of how technology advancement went beyond mere business innova-

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tion, and changed thinking, relational and behavioral patterns within the society.

As it was perceived and understood until present times, the technological change provokes power shifts in the international system, conventional threats gain complexity and induce a higher degree of uncertainty. In the context of emerging global threats, the requirements for future practitioners in the field of defense and national security will gradually encompass a wider range of competences.

For attaining efficiency in preventing and counteracting national security threats, the future intelligence practitioners must develop certain skills and abilities that will allow them an accurate management of the risks implied. Leading from this premise, the paper is structured on three main areas of interest, related and interdependent, which all revolve around the idea of CHANGE: the dynamics of the security environment, the advancements in the technological domain, and the changes in the educational landscape. Somehow, the solution identified for enabling efficiency when it comes to managing national security threats can be found at the intersection of those three areas. Modeling and simulation, in the form of serious gaming are addressing both the technological developments – as risk generators and the needs of the Millenials – as they are shaped in the current educational landscape.

Part One: The dynamics of the security environment

The security environment, as we experience it today, is distancing itself from the theoretical paradigm within which we have analyzed it so far. The international system is becoming more anarchic, not in the sense of lacking a central authority, to which all entities subordinate, but in the sense the rules we established are no longer respected. The hot conflicts of contemporary history include insurgency and counterinsurgency movements, terrorist acts, cyber-warfare, political demands from non-state entities and revolutions led through social networking sites. The conflictual bipolarity of the Cold War was transformed, within the new parameters of the security environment, in asymmetrical ways of pursuing political, social, economic goals and conflicts gain complexity, becoming harder to manage than in any period of history.

The degree of uncertainty, deriving from infinite possibilities of attack, imposed changes within the security structures of the states. Thus, recent military studies focused on identifying the list of possible threats and manners to counteract them efficiently. But beyond mere taxonomies, the priority of the military structures with responsibilities in maintaining the security of the state and the welfare of the citizens resides in how traditional structures need to adapt to the realities of the security environment.

And for a long-term, sustainable development of the security architectural structure, the process of adapting to the exponential occurring threats must be a grass-root movement, focusing on educational institutions responsible with training future specialists and officers for security structures (naval, land forces, air forces, intelligence units).

Part Two: The advancements in the technological domain

The individual is the product of the environment he lives in and was influenced and shaped by the shifts in technology as much as the security environment has.

In matters of accessing information, the last decades have generated instruments that changed the parameters within which the individual acquires and acknowledges data and information. The last generations have experienced the process in ways different than either one before, shifting from public libraries, to personal encyclopedias, to personal computer and mobile technology. The distance between the individual and the informational space has significantly lowered, and technology became an important part of the everyday existence of young people. (Laufenberg, 2010)

The technological revolution became a continuous aspect of the era we live in, defined by a high degree of innovation and competitiveness. The software has become more complex and the machines smaller and more resistant, while moving from floppy disks to cloud storage online spaces. In matters of few decades, the entire world as we knew it changed radically, the technology reshaped the social interactions within the society and the means to achieve it. Currently, approximately 40% of the world's population has access to Internet, 78% of the Internet users coming from developed countries and only 32% from developing states. The number is estimated to exponentially grow; by 2050 97% of the global population is expected to have access to Internet. (McKinsey Global Institute, 2013)

Connecting the world in a global network, the Internet become the incubator for further development of applications and software, creating the framework for debates and discussions that will generate the greatest ideas of our times. At first, Internet, like any other revolutionary invention of the modern times, was perceived as a force of democratization, breaking barriers in places where conventional/offline efforts could not, capable of creating a basis for democratic political culture and of changing political regimes. However, the democratization power the Internet implies is still debatable, as it is a technology old enough to inspire idealism and offer hope, but still young to demonstrate whether the prophets were right.

The true revolution of the Internet is neither tweeted, nor organized on Facebook, but it is subtle happening every day. The technological advance-

ment has changed the balance of power, translating power from one part of the society to the other, in the absence of major adversities. The traditional forms of power are impugned – Tesla eliminates the necessity of an auto dealership, in order to reach to the consumer, 3D Printing "democratizes" the production, allowing anyone who has the necessary means to create a miniature factory, P2P platforms like Prosper and CommonBond, Bitcoins and apps like Boom Financial replace the need of a central bank, cards, exchange rates, transactioning fees and in fact, allow anyone who has access to Internet to get actively involved in the global economy. Highly controversial, modern technologies lay the premises for increasing the independence of the user, who, as an integrated part of the network, shares what he knows.

Part Three: The changes in the educational landscape

Digital Natives

Technology developed both horizontally and vertically, which means not only high-level software, applications and machines were designed and projected, but also they expanded on a large scale within the society. Marc Prensky described the process of ubiquitous exposure to technology and the volume of daily interaction with it as a main factor in reshaping mental patterns. He introduces a new taxonomy, dividing the population between digital natives and digital immigrants, emphasizing the discontinuities in the educational system. In fact, he explains the students have changed in ways that no longer allow them to adapt to the educational system as designed and implemented, and that the change comes as an inherent consequence of the constant exposure to technology the experienced so far. From his perspective, the Digital Natives start with the first generation to grow up with the new technology, while Digital Immigrants are people educated in the traditional conventional teaching paradigm that had to adapt to the new parameters of the modern environment. But in their case, like all immigrants, some adapt to the environment better, and retain in a lesser degree the "accent" (their foot in the past)(Prensky, 2001, 2).

Today's students have spent their entire existence surrounded by and using personal computers, videogames, CD players, webcams, mobile technology, mp3 players, bluetooth speakers, collaborative platforms, social networking sites, IM; spending less than 5000 hours of their lives reading, but more than 10000 playing video games and 20000 watching television (Prenksy, 2001, 1).

The difference in approaching and understanding the environment reflects in the way young people choose to access information, gather data and relate to it. The easiest way for them to educate themselves and learn something, in a manner that will allow them to use the information to guide new

learning or to apply it in reality is to exploit the entire palette of technological instruments available. They no longer limit to the linear exposure offered by textbooks, but prefer searching engines that facilitate sorting the information, searching by keyword, highlighting elements of utmost importance, hyperlinking information and usually acquire information with the support and assistance of games, wikis, blogs they create and/or access. Most of the times, the digital natives learn to use the computer and surf the web and obtain digital fluency before learning how to write properly.

Experiential learning

Another key feature of the educational landscape as we are experiencing it today comes as an inherent attribute of the digital generation. Consistent with the constructivist learning theories, according to which a learner builds his own knowledge through experience (while exploring the world and performing activities), the new educational paradigm emphasizes the need of the students to apply the theoretical basis in concrete situations, in order to understand the interactions existent within the environment and learn (Vigotsky, 1978, 83-89).

And although the technology advances at a fast pace and the mental map of the trainees and students was reconfigured, the institutional educational landscape remained anchored in the traditional paradigm, defined by the culture of one right answer. The traditional teaching methods focus on distributing the information as an input and requesting the students to replicate it in the exact same form, without demanding them to ask questions or to exploit their creativity and curiosity. In a rather passive form of teaching, the students are indirectly encouraged to follow routine algorithms rather than to ask questions. The educational inherited system favors standardization to the detriment of a wider range of alternatives and possibilities. So is this obtrusion of the right answer the most efficient way to learn?

Jennifer Moon considers a trainee learn from variation in the given learning situation (2004, 22). Consistent with the constructivist learning theories, as developed by Lev Vigotsky and Jean Piaget, David Kolb proposed a complex 4-stages model, through which he seeks to explain the inherent educational mechanisms triggered by modeling and simulation and how it can generate variations in the learning environment. The model, as thought by Kolb, leads from concrete experience and reflective observation to abstract conceptualization and active experimentation, stages within which the learner/trainee moves from personal involvement to everyday situations to understanding the environment. The learning process takes place only when the trainee experiments with changing situations in the setting. The added-value of this educational model is that, while traditional forms of education and

training fail to engage the student in everyday real consequences of the theories he acknowledged and learned, Kolb experiential learning model does exactly that. Mel Silberman (2007, 8) stated that experiential learning (Vigotsky, 1978) can be based either on real experiences or on structured experience that approximates real life.

Solution

In the attempt to develop an efficient solution for addressing and managing global threats, consistent with the realities of our time and with the needs of the student, one must exploit the inherent power of the Internet and the ability of the digital natives to use technological instruments, enabling their curiosity and creativity in developing efficient solutions for solving conflicts. Technology is changing the way education is experienced from one-dimensional (physical) to multidimenstional (physical, virtual), exploring a diversity of web-based resources for conveying messages and delivering information.

"No area within the scope of operations research and the management sciences has been affected more by advances in computing technology than simulation" (Nance and Sargent, 2002, 161). Without the rapid development of technology and software, modelling and simulation "could never have been a major problem-solving technique". Technological advancements allow the extension of instructional practice through the creation of spaces and resources within which the learning process takes place - modelling and simulation. Modelling, according to Maria (1997, 7) is the "process of producing a model". In other words, creating, experimenting and practicing with a replica of the external environment for a specific purpose. Modelling copies the environment and its inherent interactions, considered to be referential for the area of study, while simulation provides the experience and generates a practical exercise within the given environment (Chung, 2004, 17).

According to Maria (1997, 8) the development of an efficient simulation must follow 11 steps, starting with identifying the problem, or the learning objective of the exercise. When developing a simulation exercise, this is the aspect of utmost importance, the script and the exercise itself aiming at achieving the learning objectives established. After formulating the problem and what the exercise seeks to obtain, the designer should start collecting and processing real system data, based on which he will build the virtual environment and create the model. Based on a series of indicators (content, similarities, relevance, opportunity, experimental conditions, and so on) the model is validated and performed.

In accordance with constructivist theories of learning, technology can be used to replicate and create environments, objects and events, place the learner within the virtual reality setting and thus, encourage him to solve

problems and construct his own knowledge by active thinking and being directly involved in the problem managed. The learning process is no longer an exclusively passive mechanism, in which the instructor delivers the information and the trainee must acknowledge it and replicate it exactly, but a complex decision-making process. Using web-based resources in modeling and simulation allow the contextualization of the trainee's experience in realistic environments, in which he can exert his freedom – situated cognition. Thus, the evaluation is translated from a predefined list of items to evaluation of the decisions taken by the student (the rapidity of the decision, which indicators he took into consideration, did he apply the techniques and procedures taught, etc.)

Placing the student in a virtual reality environment for educational purposes creates the experience needed to correlate theoretical to practical knowledge. The trainee is allowed to learn by experience, or in some cases, by mistake, in real conditions of time pressure and geographical limitations to attain the mission, but with the possibility to observe the potential negative consequences of his decisions in a restricted controlled environment. Thus, modeling and simulation reduce the chances of failure, eliminate unforeseen bottlenecks and prevent under or overutilization of the resources available. In other words, it optimizes the real system performance (Maria, 1997, 7) by using serious games.

Military and intelligence taxonomy of serious gaming defines three types of simulation training: live (real humans operate real equipment), virtual (real humans operate simulated equipment) and constructive (simulated people operate simulated equipment), through which military structures deliver their trainings and instructing modules (Sokolowski, Banks, 2012, 15). Modeling and simulation are important tools for exploring real-world phenomena and prepare trainees for the challenges inherent to a position in the military field, building a discipline with its own body of norms and knowledge, theories and methodologies. The technological advancements available in the field of virtual reality and replicating real environments have added value to the nature of the exercises developed within military institutions. However, in matters of training air, naval and land forces, serious gaming developed from battleship and airplanes to sophisticated video games, without drifting away from the fundamental principles guiding the training. The war has not changed its rules, only its capabilities of force deployment.

The dynamics of the security environment are constantly changing the game parameters in matters of obtaining and protecting intelligence. The interactions of the political powers have gained with the end of the Cold War and the rise of nationalism more complexity. Territorial frontiers no longer limit one nation, and usually the coherence of the space is given by cultural and identity-related elements rather than political ones. In order to understand

the interactions and the frictions within a given space, one must contextualize areas within frameworks that highlight the production of history and explore the intersection of cultural and geopolitical spaces. From this perspective, modeling and simulation work in the same way intelligence does, by providing relevant information, thus creating a situational awareness map that can be used in the intelligence organization for various purposes: prediction (identify political, cultural patterns and their future development, assign probability to certain events or situations based on the evolution of the status quo), explanation (describe past and present phenomena), hypothesizing (explore various possibilities, identify arguments and evidences), partial analysis (observe how a certain phenomenon unravels in long periods of time), cooperation (develop team-work skills, acknowledge and implement procedures and techniques in communicating with co-workers and reporting to higher hierarchical ranks), management (overview perspective, resource management/deployment in crisis situations, under time pressure).

Depending on the learning objective set, the modeling and simulation exercise can be designed in such a manner that will efficiently attain it.

Conclusion

Tell me and I'll forget. Show me and I'll remember. Involve me and I'll understand (Carter et. al, 1986). The main problems identified in the current educational landscape is that traditional forms of teaching can no longer meet the expectations and respond the requirements of the digital natives. Exploiting the technological advancements, the present paper pleads for serious gaming used as an innovative learning method, leading from the premise it enables contact with the learning environment and exposes the trainee to processes with a high degree of uncertainty and unpredictability. Pursuant to traditional linear forms of teaching, experiential learning comes as a final stage of the learning process and reinforcing the idea of applicability of theory in real situations.

But even further, when discussing about the dynamics of the security environment, the status quo is described in terms of uncertainty. Hence, the requirements for future practitioners in the field of national security grow and it is becoming a highly professionalized domain. Serious gaming, in the form of modeling and virtual simulation, can be successfully employed in the education and training of future military practitioners, as being an efficient instruments in exploring phenomena and systems (international, regional systems) and can generate the support for innovative and integrative decision-making patterns.

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Озбиљна игра – инструмент за одговор на глобалне претње

Апстракт: *У контексту настајућих глобалних претњи, захтеви који се постављају пред будуће посленике на пољу националне безбендости постепено ће обухватати све шире компетенције. У покушају да се задовоље стандарди у погледу ефикасности и делотворности које намеће стална променљивост спољашњег окружења, институције одговорне за опбуку и образовање будућих професионалаца мораће да се прилагоде новим параметрима и примењују иновативне методе у настави, које су комплементарне са старим методама. Полазећи од овога, рад се фокусира на питање коришћења труста мозгова, симулације и моделовања примењених у настави као техника за стварање сложених ситуација за доношење одлука и идентификовање модела за решавање конфликата. Према конструктивистичкој теорији учења, знање се стиче искуством док истражујемо свет и изводимо активности. Захваљујући развоју технологије и софтвера у протеклој деценији, озбиљне игре могу да*

контекстуализују играчево искуство у реалистичном окружењу и да реплицирају интеракције из реалног света.

***Кључне речи**:* експериментално учење, симулација, виртуелна стварност, труст мозгова, образовање, национална безбедност.