STRATEGY RESEARCH PROJECT

TRANSFORMING THE WAY NATO AND PfP COUNTRIES TRAIN FOR THE NEW ASYMMETRIC THREAT

BY

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ABSTRACT

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The terrorist attacks on 11 September have plunged the United States and the rest of the world into a new era. New coalitions are being formed, and old coalitions are being re-evaluated to determine how to prepare for this new type of conflict. NATO and the Partnership for Peace (PfP) countries will be key players in this new mission. A mechanism is needed to expedite and facilitate the preparation for combating this asymmetric threat. Modeling and simulation will serve as the key tool to accomplish the task. The method with which NATO and the PfP countries conduct training with modeling and simulations must be changed to battle the new terrorist threat. The purpose therefore of this paper is to highlight current training deficiencies, and recommend a course of action for a specific hardware/software solution to enhance the ability of all nations to train for anti-terrorist missions in a robust simulation environment. With the implementation of the recommended course of action, countries within both NATO and PfP will be able to prepare for future operations maximizing the potential for success in a Multi-national environment at a tremendous savings in resources and manpower.

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PREFACE

I would like to acknowledge the assistance of Mr. Dan Collins, and Mr. Jim Bolcar from the U.S. Joint Forces Command, Mr. Mike Baraniak and Mr. John Daniele from the U.S. Army Simulation, Training, Instrumentation Command, and Ms. Lana McGlynn from the Department of the Army. Their contributions were key to the success of not only this article, but also the continuation of modeling and Simulation interoperability efforts around the world.

LIST OF ILLUSTRATIONS

TRANSFORMING THE WAY NATO AND PFP COUNTRIES TRAIN FOR THE NEW ASYMMETRIC THREAT

The world we are living in is changing at a rate never before seen by man. The terrorist attacks on 11 September dictate that the United States is entering a new era. Coalitions are being formed to battle the new evil. Old and new coalitions such as NATO and the Partnership for Peace (PfP) countries are re-looking how to best organize to combat this new threat. President Bush stated that as for the United States:

> We will direct every resource at our command – every means of diplomacy, every tool of intelligence, every instrument of law enforcement, every financial influence, and every necessary weapon of war – to the disruption and the defeat of the global terror network.[1]

In order for NATO and the PfP countries to be able to deal with the myriad of items to be combined to help battle this new threat, a mechanism is needed to expedite and facilitate this preparation. Modeling and simulation will serve as the key tool to accomplish the task. "Modeling and simulation provide the opportunity to study a phenomenon relatively inexpensively, reproducibly and, by reducing the number of controlling factors, at a convenient level of abstraction".[2] However, current training capabilities, techniques, and so on preclude a rapid evolution to accomplish this effort. The method with which NATO and the PfP countries conduct training with modeling and simulations must be changed to battle the new terrorist threat.

MODELING AND SIMULATION BACKGROUND

In order to better understand the problem, the current status of modeling and simulation must be reviewed. According to Army Regulation 5-11 "Management of Army Models and Simulations", modeling and simulations are:

> The development and use of live, virtual, and constructive models including simulators, stimulators, emulators, and prototypes to investigate, understand, or provide experiential stimulus to either (1) conceptual systems that do not exist or (2) real life systems which cannot accept experimentation or observation because of resource, range, security, or safety limitations.[3]

As such, modeling and simulation affords a cost effective solution to train/develop new systems, major operations or tactics. Units that have never trained or operated with one another may now do so in a safe environment that can be altered to fit a specific scenario (terrain, weather conditions, vehicle types/characteristics, threat capabilities and so on). Additionally, units can conduct training on contingency operations, war plans, and branches and sequels to current

operations from distributed locations instead of absorbing normal training Operation and Maintenance (O&M) costs. Training events can be conducted multiple times at a substantial cost savings in operations and maintenance costs as well as wear and tear on personnel. Modeling and simulations are currently used to develop new weapon systems, aid in testing weapon systems, develop new tactics, techniques and procedures for a transforming Army, and training from the individual soldier level to the unit level above Corps. There is, however, a limitation in training with models and simulations. Models and simulations will only serve as a supplement to training. Actual training with new equipment and/or new units/tactics must be done to insure that the soldiers/units/leaders are trained adequately. It is important to note that models and simulations are developed to do different actions, and to properly represent a training event, several must be connected together to get the synergistic benefit. However, not all models and simulations can interoperate with one another. Interoperability is defined as "the ability of a set of M&S to provide services to and accept services from other M&S and to use the services so exchanged to enable them to operate effectively together."[4]Therefore, it is important to look at standards as modeling and simulation systems are developed to insure that the required amount of interoperability is present to accomplish the current mission, and set the stage for future interaction.

NATO MODELING AND SIMULATION

From a conceptual standpoint, the vision of modeling and simulation for NATO is very close to our own.

> Modeling and simulation (M&S) will provide a readily available, flexible and cost-effective means to enhance NATO operations dramatically in the areas of defense planning, training, exercises, support to operations, research, technology development and armaments acquisition. This goal will be supported by a NATO-wide co-operative effort that promotes interoperability, reuse and affordability.[5]

To effectively implement and control the use and facilitation of modeling and simulations, NATO has established a series of working groups to control the effort. The mission of the NATO Modeling and Simulation Group (NMSG) "is to provide readily available and effective means to dramatically enhance NATO operations in the applicable areas of defense planning, training and exercises, support to operations and modernization. This goal will be accomplished by a NATO-wide co-operative effort that promotes interoperability, reuse and affordability."[6] The focus of much of what this group does is to work on standards, and setting the framework for future efforts. Unfortunately, there are no established standard simulations per se as many of the nations within the Alliance have and use their own simulations. Although NATO is working

on standards, interoperability is still a problem within NATO. "NATO and national M&S resources are not harmonized to foster reuse across various NATO and national application areas and between disciplines."[7] In an effort to help solve this problem, NATO has begun a concerted effort to formalize standards. Dealing with an ever growing Alliance, trying to get consensus on anything can be difficult. However, in order to get the interoperability required, maximize limited resources and to preclude duplication of effort standardization must be accomplished.

> The following standards are in use in NATO nations and organizations: Distributed Interactive Simulation (DIS), used primarily in tactical level, human-in-the-loop, real-time simulations; the Aggregate Level Simulation Protocol (ALSP), used in discrete event simulations primarily at the operational level; and the High Level Architecture (HLA), which is broadly applicable but is only in the early stages of use in the Alliance.[8]

This effort from NATO is definitely the step in the right direction, but much more effort still remains. Just building a simulation utilizing a specific protocol does not automatically provide interoperability. Work is required to insure that databases align and so on to insure that true interoperability exists. "NATO has not yet begun to harness the full potential of M&S to improve Alliance operations. Uses are rich and diverse, but a common strategy to educate potential users and facilitate interoperability and reuse, a key to cost-effectiveness, does not exist within the Alliance."[9] Many nations are waiting to join NATO, and have a lot of potential to add to the Alliance. PfP nations are also available to add their expertise to the development effort, but as of yet, have not been included. As you can see, work is happening at the macro level, but no work has as yet been focused on the terrorist threat that has burst onto the world scene.

PARTNERSHIP FOR PEACE EFFORTS

PfP countries have been active in working with modeling and simulations as well. The basis of the effort relate to a presentation made by Secretary of Defense William Cohen on the 12th of June 1998 to a Euro-Atlantic Partnership Council.

> Titled "Towards a Cooperative Security Network for the 21st Century", the Secretary's intervention urged establishment of an array of cooperative efforts to be approved by the time of the April 1999 Washington Summit. It featured the PfP Consortium of Defense Academies and Security Studies Institutes, the Partnership for Peace Exercise Simulation Network and the Cooperative Network of PfP Training Centers as the three major initiatives.[10]

Integral to the comments of the Secretary of Defense was the Partnership for Peace Exercise Simulation Network. Sweden took the lead on the development of the PfP Simulation Network, with it's specific objective identified as "enhance the ability to conduct operations within the PfP

framework through designing, demonstrating, and implementing an improved Computer Assisted Exercise Program".[11] Sweden established a five year program with inherit goals of standardizing modeling and simulation capability, standard architectures and equipment, and focusing on identifying doctrine, tactics, techniques and procedures on a variety of Peace Support, Humanitarian Relief, and other related PfP missions.[12] Based upon these designated objectives, PfP countries would be able to conduct distributed exercises. Sweden took the lead in the first of these exercises, Viking 99, conducted in Nov 99.

PfP Simulation Network at Use: Viking 99/01

Within Viking 99, Sweden served as the host of the computer model TYR, with battalion-sized response cells located in Finland, Latvia, Germany and Denmark connected with video teleconferencing and remote work stations. [13]This exercise, while connecting several distributed sites, was built on the premise that the main computing system was run from Sweden, and participants were to be response cells. This is a step in the right direction, but it still does not fully integrate modeling and simulations in the partner countries. Following Viking 99, Sweden conducted another exercise Viking 01 in Dec 01, with locations in Sweden, Finland, Bulgaria, Switzerland, and Estonia. "The purpose and aim of Viking 01 are to enhance the interoperability for Peace Support Operations, including civil-military co-operation. Viking 01 is also going to show the possibilities with Computer Assisted training and distributed Peace Operations Exercises as well as promoting communication and information between the PfP nations."[14] As with Viking 99, Sweden utilized the same simulation, and again ran the exercise distributed with response cells. What can be accomplished with this setup is the following. A brigade headquarters (or CJTF) from country A can operate on "digital" terrain with battalion response cells from countries B, C and D. Each of the elements could participate from their homestations, logging into the central hub ran by Country A. In theory, this sounds good, but there is a lack of flexibility, and potentially a political problem with who gets to "maintain" that central hub. Several of the PfP countries are establishing their own facilities, and as such need to have their own modeling and simulation capability without depending on another nation for support. One example is the work recently conducted by the United States Army Simulation, Training and Instrumentation Command which installed, and is supporting simulation centers at two sites in the Slovak Republic. One site is located at the Air Force Academy, while the other is located at the Ground Forces Academy. The purpose of these facilities are to develop doctrine, prepare for future operations (peace keeping and so on), conduct training in a virtual

environment, and assist Slovak military personnel in distributed learning. The Slovak Ministry of Defense also plans to use these sites for distributed exercises with other nations.

Regional Engagement Nework

The concept of a PfP SIMNET has been further refined by an enterprise effort composed of members from the United States Joint Forces Command, the Naval Air Warfare Training Systems Division, the Army's Simulation, Training, and Instrumentation Command, and the Air Force Electronic Systems Center. Based on Advanced Distributed Learning (ADL), the concept to establish Regional Engagement Networks (REN) has begun.

> RENs are "regionally-based data services networks that will facilitate, through Advanced Distributed Learning, the implementation of coalition-based education and training opportunities on a world-wide basis. This will enhance the CINCs' Theater Engagement Plan (TEP) and ability to work with coalition partners while fostering regional peace and interoperability.[15]

Prior to the establishment of the REN, the different agencies making up the REN were approached to provide services ranging form the Enhanced International Peacekeeping Capability (EIPC) from the Navy, to National Military Command Center from the Air Force, to Security Assistance activities from STRICOM.[16] Through the guidance and direction of the US Joint Forces Command, the REN was established to prevent duplication of effort, maximize the resources, and provide a synergistic benefit by all participants. The REN would utilize a standard set of computers, and communication gateways that would enable the receiving country the ability to participate in all of the aforementioned activities. However, distinctly missing from the list of standard devices, and software, was a standardized set of training tools, and simulations. The REN is continuing to grow and improve, and provides an outstanding ground work for future modeling and simulation efforts.

WHAT ARE THE REASONS TO CHANGE?

If NATO has a Modeling and Simulation Working Group, and if the PfP nations are working some exercises under the Viking concept, and the Regional Engagement Network is beginning to take place, why is change needed?

Army Transformation

Through the years, the Army has undergone several transformations brought about by changes due to technology and other catalysts. The advent of the rifled gun, the machinegun, the tank, and most recently, digital communications have had a profound affect on the military. These changes have been grouped into what is referred to today as Revolution to Military Affairs or RMA.

> "An RMA involves a paradigm shift in the nature and conduct of military operations which either renders obsolete, or irrelevant one or more core competencies of a dominant player, or creates one or more new core competencies, in some new dimension or warfare or both."[17]

Under the direction of the Chief of Staff of the Army (CSA), the Army is in the process of transforming. This transformation process will affect all aspects of the Army as it changes to become more "responsive, deployable, agile, versatile, lethal, survivable, and sustainable."[18] These changes will encompass threats across the spectrum of conflict from high intensity to peacekeeping operations. The CSA clearly articulated his vision for the transformation of the Army at the Association of the United States Army (AUSA) Convention in October 1999. The changes that the Army makes will be ground breaking, and require "out of the box" thinking to bring about the dynamic changes required. Another "out of the box" approach the Army is using to transform is SMART, or Simulation and Modeling for Acquisition, Requirements, and Training.

> The Simulation and Modeling for Acquisition, Requirements, and Training (SMART) concept capitalizes on modeling and simulation (M&S) tools and technologies to deal with system development, operational readiness, and life cycle cost. This is accomplished through collaborative efforts of the requirements, training, operations, and acquisition communities."[19]

The implementation of the SMART concept will focus on reducing acquisition timelines, will allow the concurrent fielding of both the weapon system and the associated training device, and it will improve the life cycle cost and development effort. This effort is becoming more readily received by not only commercial firms, but also academia as well as Army organizations responsible for the development of not only requirements for new weapon systems, but also doctrine writers, and developers of new organizations. A real world example currently underway is being performed by the United States Army's Simulation, Training, Instrumentation Command for the 101st Air Assault Division. The 101st Air Assault Division required "A training package configured to support simulation and collaborative mission planning and rehearsal through a networked capability."[20] Because of events of 11 September, the 101st Air Assault Division was

looking for a capability that would greatly reduce mission planning and rehearsal times by as much as 50%. Modeling and simulation would be used in conjunction with the Mission Planning and Rehearsal System. The basic component features of the new system would be an semi-automated forces to represent the friendly and threat forces, an exercise monitor and after action review system, and a PC visualization system coupled with an exercise planning system.[21] These components would allow this mission planning and rehearsal systems to maximize the efficiencies afforded by modeling and simulation through the use of tools to rapidly plan, and execute the plan on a synthetic battlefield to test the validity of the plan.

The ability to use modeling and simulation in a mission planning rehearsal mode is just one feature that can be used to combat the new terrorist threat, another reason to change.

Current World Situation

With the end of the Cold War came a realization that not for the foreseeable future will the United States face an opponent on an equal footing in a military engagement. Operation Desert Storm proved the most recent example of the inability of an enemy to combat not only the forces of the United States, but their allies as well. A new term emerged to the forefront as the watch word of the future, "asymmetric threat". An asymmetric threat is "a broad and unpredictable spectrum of military, paramilitary, and information operations, conducted by nations, organizations, or individuals or by indigenous or surrogate forces under their control, specifically targeting weaknesses and vulnerabilities within an enemy government or armed force".[22] Although this term has been around along time, it has re-emerged in importance as one of the key threats to the United States and their allies. In fact, the United States Armed Forces focused on this specific point in Joint Vision 2020.

> In the face of such strong capabilities, the appeal of asymmetric approaches and the focus on the development of niche capabilities will increase. By developing and using approaches that avoid US strengths, and exploit potential vulnerabilities using significantly different methods of operation, adversaries will attempt to create conditions that effectively delay, deter, or counter the application of US military capabilities.[23]

The first true example of an "asymmetric attack" occurred on 11 September with the two passenger aircraft striking the World Trade Center towers acting as weapons of mass destruction. Even though the attacks were in the United States, the impact was global. Figure 1 shows the countries that were affected by the terrorist attack.

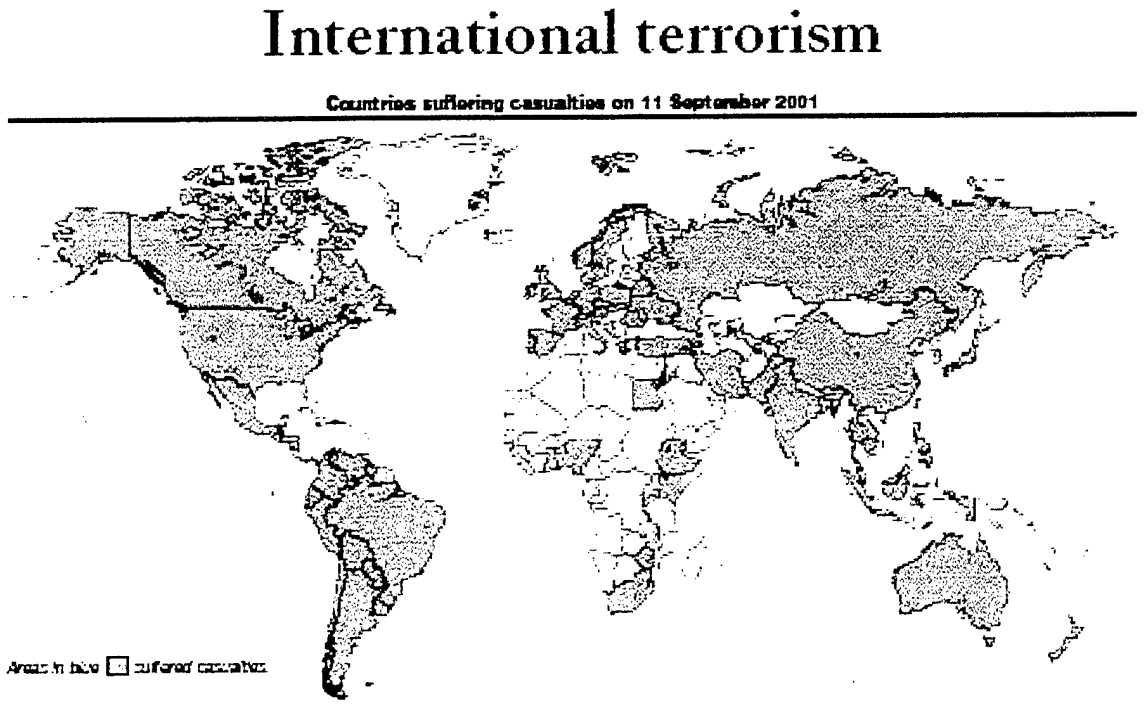


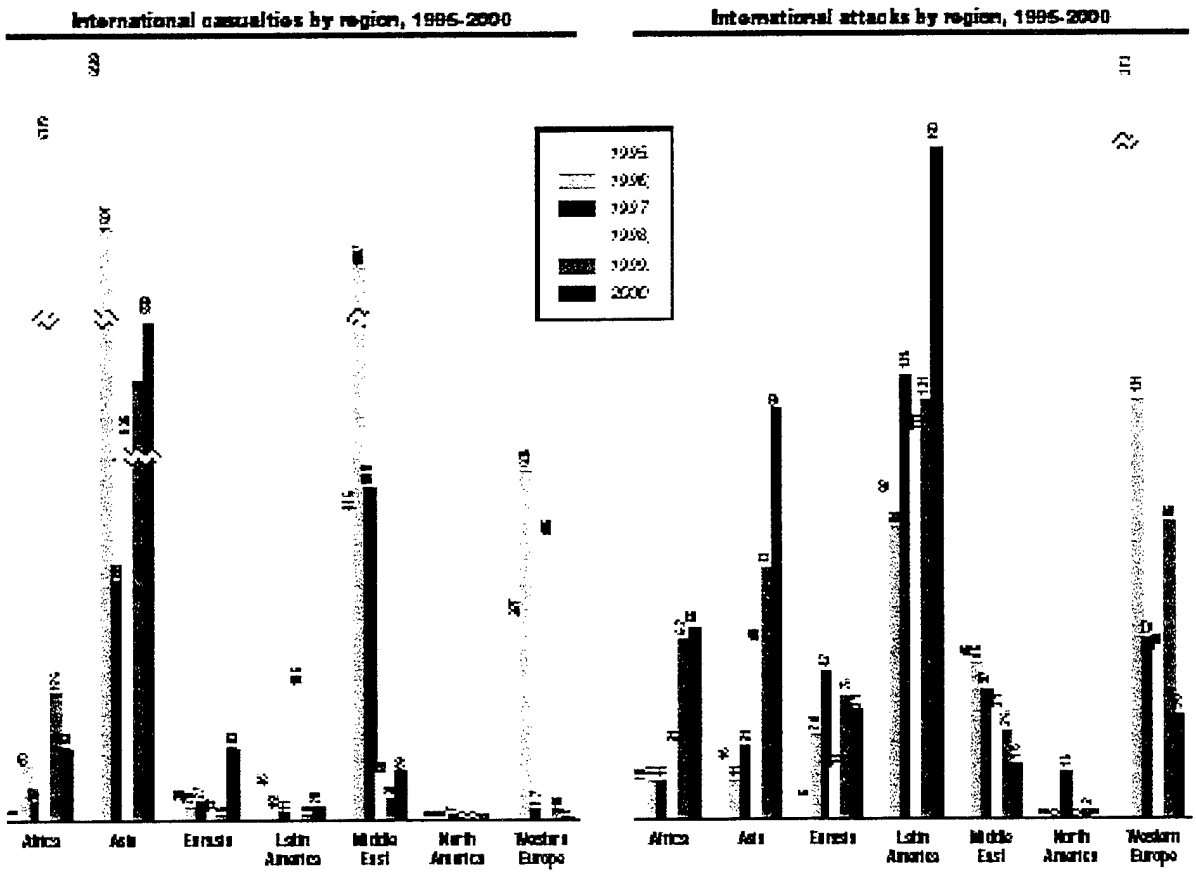
FIGURE 1 COUNTRIES AFFECTED BY 11 SEPTEMBER ATTACK

The attack on 11 September was the most catastrophic terrorist event, but there have in fact been several terrorist events which have produced casualties across several nations. Figure 2 depicts the number of international attacks and casualties by region. Reacting to the attacks on 11 September, President Bush threw down the gauntlet.

> "The message to every country is, there will be a campaign against terrorist activity, a worldwide campaign. And there is an outpouring of support for such a campaign. Freedom-loving people understand that terrorism knows no borders, that terrorists will strike in order to bring fear, to try to change the behavior of countries that love liberty. And we will not let them do that."[24]

President Bush was not the only one to take up the call to action. This call to action was one that rang out across the globe. An editorial from the Jerusalem Post read on 12 September "Terrorism is a global scourge that must be fought...If the democracies do not unite to defend themselves, our world will become as tragically unrecognizable as the New York skyline."[25]

NATO also took up the challenge, and in a historical moment, invoked Article 5 of the Washington treaty. Clearly as the NATO AWACS flew over the United States, the need to prepare for such an event in the future was highlighted even more with a press release from NATO headquarters.



The above map and statistics come from the web site of the US Department of State: www.state.gov

FIGURE 2 INTERNATIONAL CASUALTIES AND ATTACKS BY REGION

"Efforts to improve NATO's ability to respond to terrorism must be an integral, albeit urgent, part of the more general ongoing work to improve Alliance military capabilities. There has been some progress in this wider regard since our last meeting, but a great deal more needs to be done."[26] This improvement to NATO's ability to combat terrorism is a task that must, as worded in the press release be done urgently. A method that can be used to assist in that training, both for the individual units and the commanders involved is modeling and simulation.

IS CHANGE POSSIBLE?

The changes to technology are occurring at an exponential rate. The visual systems have gone from simple to Forward Looking Infrared (FLIR) to a second, and third generation. The Army is digitizing to provide situational awareness from the corps commander down to the platoon Sergeant. Maps, and compasses now have become things of the past as the Global positioning system gives you your exact position. In order for modeling and simulations to keep up with these types of changes, they too need to manifest significant improvements. Two laws that impact the most on modeling and simulation are Moore's Law, and Metcalfe's law. Moore's law is "a prediction by Intel founder Gordon Moore that every eighteen months, for the foreseeable future, chip density (and hence computing power" would double while cost remained constant, creating ever more powerful computing devices without raising their prices."[27]Computers that used to be the size of a room (or even a small car) and cost millions of dollars became obsolete in a manner of months. The new computer system that you purchase for your home desktop will now run faster, and have more memory that even some "super computers". If your simulation requires a lot of mathematical calculations, or storage of terabits of digital terrain, all that is required is "time", to wait for the impact of Moore's Law. The other law that has a significant impact on modeling and simulation was proposed by Robert Metcalfe, the founder of the 3Com Corporation.

> Metcalfe's law values the utility of a network as the square of the number of its users, and can be easily appreciated by considering the impact of standard railroad gauges, Morse code, and standardized electrical outlets in the last century and telephones, fax machines, and the Ethernet and Internet protocols today. Once a standard has achieved critical mass, its value to everyone multiples exponentially.[28]

Modeling and simulation contains a significant amount of networks. In fact, distributed training use a large number of networks, and achieve the exponential value added. Modeling and simulation also have benefited from the technological increases in digital communications capabilities, to include the size of the bandwidth that can now be passed. The commercial industry side of modeling and simulations are also assisting in the efforts to create realism within simulations, as seen with the rapid growth of the electronic gaming industry. So where will the individual computer be in 2020 to assist in the training against the asymmetric threat mentioned in Joint Vision 2020? According to Ray Kurzweil, author of 'The Age of Spiritual Machines':

> By the year 2020, "it is reasonable to estimate that a $1000 personal computer will match the computing speed and computing speed of the human brain...As this book is being written, IBM is building a supercomputer base on the design of

> Deep Blue, its silicon chess champion, capable of 10 teraflops (that is 10 trillion calculations per second), only 2,000 times slower than the human brain. Japan's Nippon Electric Co. hopes to beat that with a 32 – teraflop machine. IBM then hopes to follow that with 100 teraflops by around the year 2020."[29]

As computer systems continue to grow, and develop, the software components and architecture that models and simulations are built with also has seen extensive development

Simulation Component Development

Simulations by and large exchange data from within a network to provide the visualizations and representations you see on a computer screen as a part of virtual or 3D representation, or within a constructive simulation. This exchange of information is based upon a set of communication standards.

DIS VERSUS HLA

The legacy standard which most simulations are built upon is Distributed Interactive simulation, while the future of simulations is looking to High Level Architecture (HLA) via the Run Time Infrastructure (RTI).[30] DIS communicates through the use of Protocol Data Units or PDUs. The PDUs are packets of information that flow on the network. Typical types of information include entity state, or where an object is on the synthetic battlefield, or fire and detonate PDUs which designate direct and indirect fire from weapon systems. Within DIS, communication travels from simulation to simulation. An example of a simulation built upon DIS is the Close Combat Tactical Trainer, or CCTT. It is interesting to note, however, that CCTT and other DIS simulations have developed migration plans to the new High Level Architecture.

"HLA establishes a common high level simulation architecture to facilitate the interoperability of all types of simulations and models among themselves and with other Command, Control, Communication, Computer and Intelligence (C4I) systems as well as to facilitate the re-use of M&S Components."[31] HLA breaks down the simulation applications into groupings called federations, and manages the flow of information to the various applications via the Run Time Infrastructure. This greatly facilitates the ability to combine disparate simulations, and greatly enhances the ability to simulate a specific object within a simulation. HLA is a relatively new development, and in fact the vast majority of legacy simulations are built DIS. A great deal of effort is required to transition a simulation or even a component of a simulation (such as a radio model) into HLA. Another major concern when talking about simulation components is interoperability.

INTEROPERABILITY

Interoperability is "the ability of a set of M&S to provide services to and accept services from other M&S and to use the services so exchanged to enable them to operate effectively together."[32] It is very important to note that having two simulations that were built using DIS does not mean that they are interoperable. The simulations may be compatible, but in order to have true interoperability work must be done so that the systems recognize the data that the other is sending, they define components in a similar fashion, and utilize the same rules. Examples of what might occur include ground vehicles seen as "flying" in one simulation, may be moving over the ground correctly in another. Likewise object models in one simulation may not show up in another, such as vegetation. Representation of the environmental database is difficult, particularly with simulations developed differently. One means that is being used to address this problem is Synthetic Environment Data Representation Interchange Specification or SEDRIS.

> Since its start, SEDRIS has maintained several fundamental objectives. The most notable of these are: (a) to provide a powerful methodology for articulating and capturing the complete set of data elements, and the associated relationships, needed to fully represent environment data; (b) to provide a standard interchange mechanism to distribute environmental data and to promote database reuse among heterogeneous systems; and (c) support the full range of applications across all environmental domains that span ocean, terrain, atmosphere, and space.[33]

SEDRIS is a mechanism that will help facilitate interoperability between simulations, so that as the computer generated forces (CGF) or the Semi-Automated Forces (SAF) will properly replicate the situations necessary to conduct effective training. SAF development has also greatly added to interoperability. The OneSAF or One Semi-Automated Force development is a program initiated by the Army in January 1996 with the purpose of combining the best features of the current CGFs, and focus development on a single SAF, precluding duplication of effort and maximizing the limited resources.[34] Up to this point in time, several different semi-automated forces had been developed, most of which were not interoperable with one another. One of the basic reasons for the lack of interoperability was because the SAFs had been developed for different purposes, some for training, some for testing, some for development of new weapon systems. The concept behind OneSAF is as follows:

> OneSAF will be a composable, next generation CGF that can represent a full range of operations, systems, and control processes from the individual combatant and platform level to battalion level. Unit behaviors will be modeled to the battalion level for selected units, and command entities will be modeled to the

brigade level. OneSAF will have a variable level of fidelity that supports models and simulations (M&S) domains.[35]

Simulations will be able to use OneSAF and compose it to have the exact behaviors required for their particular need. Vehicle characteristics, dismounted infantry, weapons effects, and tactics are just some of the features that OneSAF will bring to the simulation community. When one looks at the growth of individual computers, and the extensive development effort within the modeling and simulation community, changing the way we train is most certainly desirable and possible.

WHAT IS REQUIRED?

After investigating the current state of NATO and PfP modeling and simulations, the reasons for change (Army transformation, RMA, Current world situation), and the possibility of change within the state of the art of modeling and simulations, the question remains. What is the modeling and simulations requirement necessary to meet this new global terrorism threat?

Standardization

The first step in the process of defining what is required is to discuss standardization. The facilities where the simulation events are to occur should be standardized. Not all the building will be constructed similarly, but the components must be. The number and function of hardware systems must be the same.

HARDWARE AND SOFTWARE

Looking back at Moore's law, it is not cost effective to think that specifications to processing speed and memory can be standardized. However, designating a specific number of systems for a specific player cell function is. Likewise specifying communications connectivity is also required. The goal with standardization is interoperability, whether that is in the Ukraine, the Czech Republic, Slovenia or Germany. The functions are replicated the same way. When exercises are conducted, participants know exactly what the capabilities of the participating elements are, and their equipment. In like manner, the software must be standardized as well. The standardization of software will revolve around the specific software to be used for international, or intranational training events. A standard set of hardware will be maintained to specifications agreed to and maintained by the NATO Modeling and Simulations Working Group. Version/change control will be maintained at this level to insure interoperability.

Note, this does not preclude the countries that maintain a simulation facility from working with other software/programs, but it does give them a good set to start with, and it also gives them an interoperable framework from which to begin. The efforts within the development of the Regional Engagement Networks is a great place to start.

SIMULATIONS

A standard set of simulations should be designated as well. The determination of which simulations to use will be determined by the specific mission sets that the participating country has already agreed to (an infantry battalion for a peacekeeping mission for example) or one in which they would like to expand into. Likewise, simulations that incorporate the ability to "drive" or "fly" the terrain must also be included, if, the country wants that capability. The simulations chosen should be DIS because of the substantial number of simulations developed with it. However, the simulations chosen must be closely scrutinized to insure that interoperability is maintained. A pathway to the future must also be established to insure that the simulations chosen will be capable of migrating to HLA, or any future architecture. An integral component of the simulations chosen will be the semi-automated forces used. These forces should be composable such that the vehicle/personnel look and act like forces from that particular country. Additionally, the SAF should be able to replicate the behavior of all types of terrorists as well as replicate "white" forces or noncombatants. Graphic User Interfaces (GUIs) should be flexible enough to change languages based upon who the particular operator was, irregardless of what country he or she was in.

The designation of the layout of the facility, hardware/software/simulation requirements should then be formalized in a NATO STANAG, as well as a formal PfP agreements in order to maintain control.

ADDITIONAL FEATURES

The asymmetric type attacks that will occur from a terrorist threat will require that the facilities being constructed are very flexible. One type of simulation alone will not be sufficient to incorporate all the possible terrorist threats. Also, to make the facility more "user friendly" to the country, it should be able to use a variety of simulations. Therefore, the facility must be able to "plug and play" different simulations. This capability will allow the country to select the simulation that it needs for a specific scenario. The plug and play features will be built into the simulation facility through a standard set of exercise control software that will also incorporate an After Action Review capability. Additionally, the facility will need to be able to utilize a wide

variety of digital terrain from an open desert, to a cruise ship, to an urban environment with very specific characteristics as in an embassy. The capability to rapidly generate terrain databases will be required. SEDRIS as mentioned early will assist in setting the conditions for making the interchange of data easier.

WHAT ARE THE RESULTS?

The synergistic benefits from the development of the required facility establish a cost effective, state of the art modeling and simulation facility. The country would be able to conduct distributed exercises not only within their country, but internationally. Preparations can be made for deployments to a training center, or for an actual anti-terrorist mission. Tactics, techniques and procedures and standard operating procedures can be practiced on the actual "digital" terrain the forces are going to have to operate on thus facilitating international mission planning, rehearsal, and course of action development. The semi-automated forces will be able to be modified to incorporate behavior for any country involved, whether or not live participants are used. Different threats can be rapidly developed and practiced. Common terrain will be available as well for all participants. The facility will have the capability to operate in either an HLA or a DIS environment depending on the simulations used. . The components within the facility will be developed such that a pathway to future modeling and simulations may be easily integrated.

ALTERNATIVES

NATO and the PfP countries have several alternatives to chose from as they look at how they will combat the terrorist threat. The first alternative is just to maintain the status quo; Continue to use their own facilities, simulations and training methods. However the lack of a standard solution to fight this elusive threat, does not make this a feasible option. Another viable option is to utilize the "Viking99/01" setup for exercise management. Within this setup a central country will maintain the simulation server capability on so on. Participants will utilize only work stations, and maintain contact via video teleconferencing. This option does not allow the participating countries the flexibility of conducting their own exercises, nor the ability to modify the elements within the game. There is a dependence on a single country to maintain the simulation and participate in all events potentially causing a scheduling problem. Additionally, the country would not be able to use the facility for other types of events such as language training or Advanced Distributed Learning. The final option is the modular development facility described above. This option does have some upfront costs with regards to facility work, and some simulation development, as well as getting NATO to buy in as the

controlling element via the Modeling and Simulation Working Group. However, the long term benefits provide for a more flexible, state of the art facility to combat the scourge that is terrorism.

RECOMMENDATION/IMPLEMENTATION

Although terrorist acts have been around for many years, never have the consequences been as high as they are now. The possibility of a weapon of mass destruction in a highly populated area is beyond comprehension. The ability of the terrorists to asymmetrically attack, airports, nuclear power facilities, landmarks, government facilities requires that the world change accordingly. The required change is a modular facility with the flexibility to rapidly prepare for any situation, on any terrain with either a single or composite force. NATO must take the lead in the leadership of this effort. The PfP countries must be brought into the fold to combine the benefits that these rapidly developing countries can provide. The PfP countries are just as vulnerable as are the NATO countries. The more the world is prepared to combat this new threat, the better we will become at not only defeating any attack that might occur, but also being proactive in the pursuit of the terrorists in their lairs.

> The Alliance must adapt its capabilities to these changes in the conditions of security and stability. We fully endorse the recent statement on terrorism by Alliance Foreign Ministers. As Defense Ministers, we are especially concerned to ensure that the Alliance's military concepts evolve in keeping with our clearer appreciation of the menace posed by terrorism and that its defence capabilities are adequate for the demands they will face, including military responses to terrorism.[36]

The time to act is now. We must radically adjust to the changing situation around us, and prepare for the events that the future will bring.

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