Workshop 11: Exploiting Commercial Games and Immersive Technology For Use in NATO

Technical Evaluator's Report

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SimIS Inc.

Summary of Proceedings

1.0 PURPOSE:

The purpose of this Summary of Proceedings is to document the NATO Modeling & Simulation Group (NMSG) MSG-113 Workshop on Exploiting Commercial Games and Technology for NATO Use. Through discussion and debate, attendees will acquire knowledge and experience in the possible topic areas. Technical and application briefings and demonstrations on selected commercial technology areas will help the attendees better understand the issues so that they may more properly aid in the development of the strategy for the NATO and the Nations to exploit these technologies. The workshop convened from April 16-18, 2012 at the University Genoa Italy:

University Genoa
Villa Cambiaso,
University of Genoa, Genoa, Italy.

2.0 OBJECTIVE OF THE WORKSHOP:

- How immersive technologies are being effectively employed in support of military training.
- Anthologies and/or guidelines that will help policy makers and trainers understand the immersive technologies and how their attributes map to specific training requirements.
- The application of immersive technology in support of decision-making training in kinetic and non-kinetic scenarios for small units.
- The application of immersive technology in support of the training of senior level decision-makers.
- How can instructional designers develop and integrate immersive learning into the formal structural development process for building education and training courses.
- What areas of education and training along with exercises can immersive learning fill, and how can we integrate that into SCORM.
- Creative applications of immersive technology that show promise in support of military training or education.
- Moving beyond training to use these technologies in direct support to operations (battlefield visualization, course of action analysis, mission rehearsal).
- Measuring the level of realism achieved and assessing the degree of immersion and ways to determine how much realism is required to meet specific training requirements.
- Understanding how immersive technologies can be considered as part of the training development process including training needs analysis.

- Cost-effectiveness and return on investment for immersive technology in support of military training and education.
- As with past workshops, this workshop facilitated the sharing of national experiences, exploration of commercial game technologies, understanding of best practices, and identification of barriers and solutions to further exploitation. Additionally, this workshop was reframed to focus on a future vision and begin to articulate a technology road map for the exploitation of commercial game technologies.

3.0 WORKSHOP AGENDA

Monday April 16, 2012

1300	Administration	Meet at Villa Cambiaso and wait for stragglers. University administration
1320	Chairmen	Welcome and Introductions
1400	Chairmen	Serious Games in NATO and the Nations: Sharing and Moving Forward
1440	Prof Agostino Bruzzone	Welcome to Simulation Team
1520	Administration	Refreshment
1540	Paul Thurkettle	ITI Smart Defence
1620	Chairmen	Daily Recap
1630	Daily Adieu	

Tuesday April 17th, 2012

0900	Welcome	Recap from Day 1
0910	Dr. Johnny Garcia	Automated Intelligent Mentoring System
0950	Coffee	
1020	Chris Brannigan	SCORM the final frontier - delivering Immersive Training Simulations and rich performance data TODAY via your LMS
1100	Paolo Busetta	Improving Immersion by Making NPCs Believable
1140	Keerati Jittrawong	Gamified Information Systems: Toward an Efficient Delivery of Information
1220	Lunch	
1330	Mr. Calogero Brucato, Mr. Marco Biagini, Mr. Bruce Joy	Understanding Social Immersive Technology - Emerging frontiers for Training and Educational (T&E)
1410	Mattia Crespi	Web 3D - Virtual Worlds - Interactive Simulations - Serious Gaming - 3D Learning
1500	Coffee	
1515	Steve Ewert	How to Create A Dynamic & Destructible Simulation Environment
1550	Prof Agostino Bruzzone	Tour Simulation Team Facilities
All	"Daily Recap	Daily Adieu"

Wednesday April 18th, 2012

0900	Welcome	Recap from Day 2
0910	Phaedra Boinodiris	Evolving Serious Games beyond Training
1000	Coffee	
1030	Chris Haarmeijer	Empowering the end user
1100	Chris Haarmeijer	The Dutch Approach to Dismounted Soldier Training
1140	All	Adieu

4.0 PARTICIPANTS

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5.0 EXECUTIVE SUMMARY OF PRESENTATIONS:

Tuesday April 16, 2012

5.1 Opening remarks by Stu Armstrong and Wayne Buck

Mr. Buck and Mr. Stu Armstrong gave an introduction and background of the series of the serious games workshops. There were many new faces in the crowd and this background provided a good platform and baseline for all of the new attendees. Mr. Buck provided background on the following workshops:

- MSG-074 Exploiting Commercial Technologies and Games for Use in NATO
  - May 09. Farnborough, GBR. Current technologies including virtual worlds.
- MSG-078 Exploiting Commercial Technologies and Games for Use in NATO
  - Sep 09. Suffolk, USA. Games standards, security, and VV&A.
- MSG-093 Exploiting Commercial Technologies and Games for Use in NATO
  - Oct 10. Rome, ITA. MMOG, augmented reality, mixed reality, and standards.
- MSG-108 Exploiting Commercial Technologies and Games for Use in NATO
  - Oct 11. Farnborough, GBR. Games, mash-ups, social networking and interoperability.
- MSG-113 Exploiting Commercial Technologies and Games for Use in NATO
  - Apr 12. Genoa, ITA. Immersive technologies.
- MSG-xxx Exploiting Commercial Technologies and Games for Use in NATO
  - Nov 12. Oslo, NOR. Simulation and social media.

5.2 Wayne Buck and Stu Armstrong - Serious Games in NATO and the Nations: Sharing and Moving Forward exploiting M&S to enable NATO transformation.

Mr. Buck provided an update to the audience on ACT happenings and ACT's role as NATO's leading agent for change - driving, facilitating, and advocating continuous improvement of Alliance capabilities to maintain and enhance the military relevance and effectiveness of the Alliance as shown in figure 1 below.

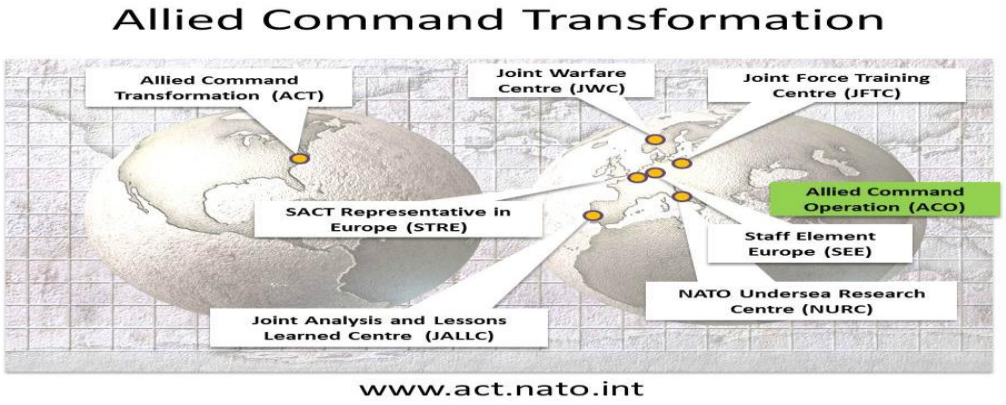


Figure 1: ACT as NATO's leading agent for change.

Mr. Buck further discussed areas that are benefiting from immersive technologies like:

- NATO Defence Planning Process
  - High level and typically dealing with difficult/expensive solutions
- Concept Development and Experimentation process
  - Mid-level and typically dealing with already existing solutions being applied to NATO
- Cross domain solutions investigated under an R&D or other umbrella
  - Serious games

Mr. Buck further discussed the need for M&S outreach and sharing with ACT and NATO partners as it relates to serious games supported event in 2012 and beyond:

- Simulation in Support of Current NATO-Led Operations
- Computer Assisted eXercises Architecture
- Human Factors in Military Training
- Interoperability Requirements for Immersive Environments
- Exploiting Commercial Technologies and Games for Use in NATO

Mr. Buck provided a summary of Commercial Technologies and games as shown in figure 2 below.

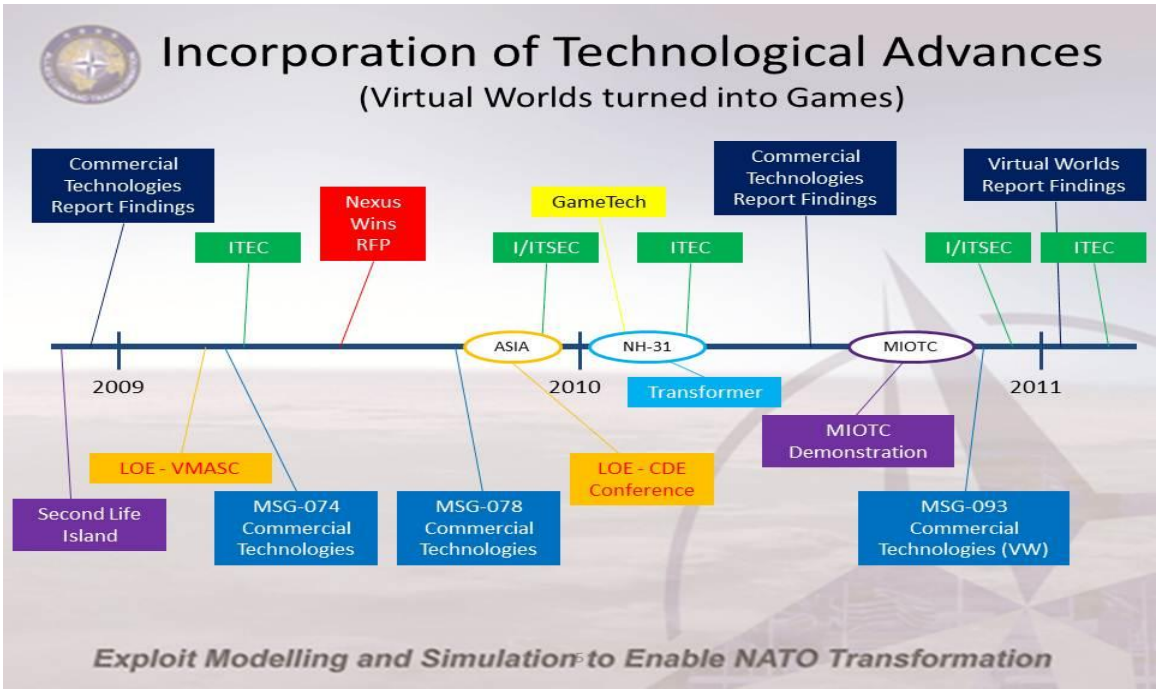


Figure 2 Virtual worlds turned into Games

Mr. Buck presented Virtual development of the HQ SACT is investigating technologies that may be used to augment or replace existing technologies for education and training as well as capability development. One of the investigative streams is in virtual worlds as shown in the examples below. To the right and below are the entrance and foyer area of NH-31. Below are screenshots of some of the existing conference rooms. These conference rooms have been constructed in detail so that when staff uses them virtually for meetings the surroundings will feel familiar.

Mr. Buck further discussed areas that are benefiting from serious games like:

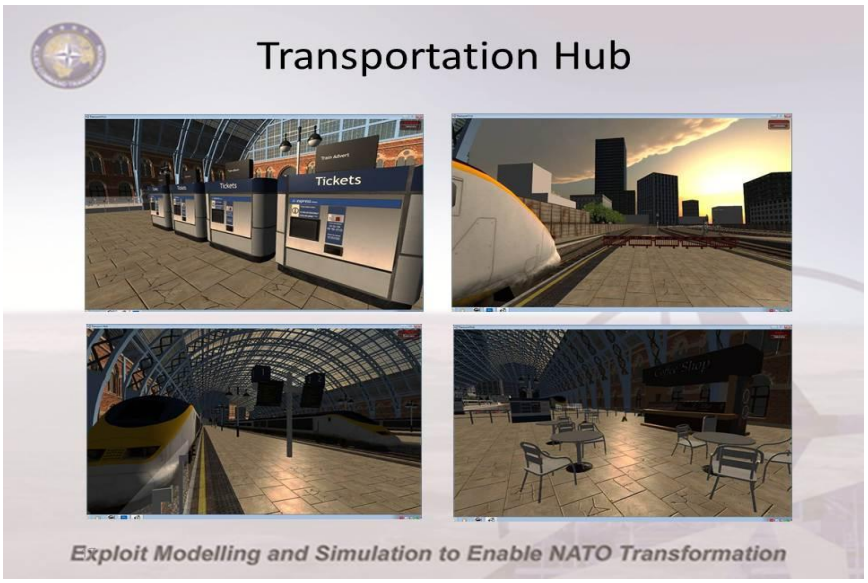
- Meeting & Collaboration
- Rapid Prototyping
- Training & Education
- Skill building
- Data Visualization & Analysis

Outreach

He further discussed Village Survey, Virtual Worlds and Borders Ahoy as well as D54 Incorporation of Technological Advances through Modeling and Simulation strategic Decision making Training through games. Mr. Buck further discussed the need to leverage MSG-113 as a forum to continue collaboration and he plans to conduct one more workshops in Oslo Norway in November 2012.
Mr. Stu Armstrong provided a presentation on Research Areas that QinetiQ and the United Kingdom is conducting as it relates to serious games he gave a quick review of the following:

Mr. Armstrong discussed that Synthetic training could save £100-600 million each year. He further discussed the need for MOD to have plug and play architecture as it relates to simulation and gaming.

He gave more ideas on other capabilities within gaming as it relates to game theory, cultural training and how to use training and transformation architectures. Mr. Armstrong further discussed the support of web enabled immersive environments like avatars levels of interoperability and training application for augmented reality – live fire against virtual targets. He also provided an example on the uses for transportation



5.3 Professor Agostino Bruzzone, University of Genoa, Simulation Team Welcome

Dr. Bruzzone discussed what the University of Genoa is doing as it relates to simulation and members of the group as shown in figure below.

Figure who we are

Dr. Bruzzone gave a history of the University of Genoa which is one of the oldest in Italy and in the World (founded in 1471 AD); it is located in middle of Italian Riviera. He gave a further description of DIPTEM which was founded in 1997 as evolution of the Institute of Technology and Industrial Management (ITIM) that was operative from 1960.

In 2011 DIPTEM evolved in DIME and it is currently composed by about 80 faculty members, 15 technicians and administrative, plus several PhD Students, external Researchers and Consultants. DIME teachers are involved in Undergraduate, Postgraduate and Professional activities in Engineering, Management. The Department staffs is in touch world-wide with the simulation community and is active in conferences, exhibitions and working meetings with the major Associations, Agencies and Companies as well as spin off and start-ups.

Dr. Bruzzone further described the role of The Liophant Simulation which involves over 120 Scientists and Technicians working in Companies and Academia. The Liophant develops Advanced R&D Projects for Real Applications.

He further discussed the role of Simulation of an Intelligence Board for Interactive Learning and Lofty Achievements (SIBILLA) which is a multiplayer web strategy game that simulate Terrorist Actions organized by different organization directed by IA that plan, prepare and execute attacks on specific:

1) Location
2) Site
3) Time
4) Threat Type

- The intelligence reports are distributed among the players based on their capabilities and shared by a stochastic engine.
- The identification of the attacks in time is the key for individual success; the players cooperate and compete for budget and success.
- Threat missed to be identified generate terrorist attacks that reduce global trust and support to intelligence agencies.

Dr. Bruzzone further described the Serious Games for Training in Strategic Decision Making (SGT-SDM) as a R&D Project to investigate the use of Serious Games for Training in Strategic Decision Making (SGT-SDM). The project involves an international team including ACT, NATO Defense College, M&S COE, Simulation Team, MISS DIPTEM University of Genoa and MAST.

He gave more examples of projects that the University of Genoa is leading. Here are more of those examples:

- Space Interoperable Refilling and Advanced Logistics Simulator (SPIRALS) - federate are in charge of the inventory management, the operations & logistics in the Moon Base.
- Interoperable Simulation of a Protection solution based on light Interceptor Tackler operating in Outer Space (IPHITOS) - This project is devoted to create a federate for Smack down, the initiative led by NASA & sponsored by several companies, devoted to diffusing and advancing the HLA culture by creating a distributed HLA Federation of a Moon Base.
- Cooperative/Competitive Utility for Management and Advanced Networking skill Acquisition - CUMANA is a Web Multiplayer Game that provides the opportunity to play interactively a cooperative/competitive game, in a distributed environment where different "Managers" operate concurrently with benefits and penalties connected to both common and individual objective achievements related to their role in their Corporation.
- Pandemic Dynamic Objects Reactive Agents (PANDORA) - PANDORA addresses the dynamics of the spreading of a Pandemic and experiments are on-going on H1N1 Influenza A virus by a joint simulation project involving USA, European and Australian R&D Centers (MISS DIPTEM, Dartmouth College, CRiCS).

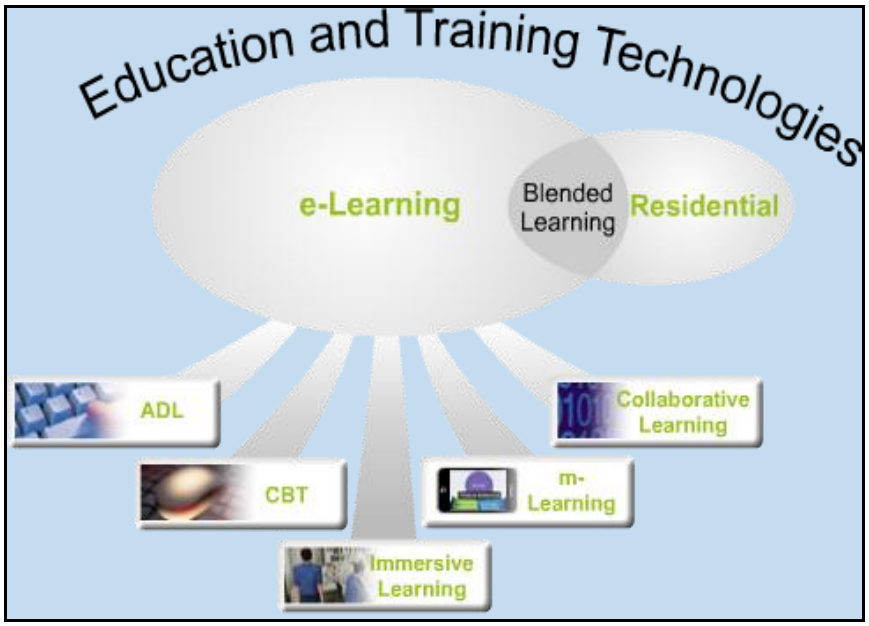
Dr. Bruzzone provided a numbers of working prototypes that shows the uses of serious games and modeling and simulation in support of operations that his simulation team is acting at the international level as a reference point between users and providers in simulation area. The integration of experts and technicians is providing very good results on real case studies and complex projects. An active area of development is related to distributed simulation and web-based modeling for extending the impact and exploitation of these proposed systems.

5.4 Paul Thurkettle Education & Training Technologies Section Joint Education Training & Exercises - NATO e-Learning Programme

Mr. Thurkettle provided a brief on the e-Learning Vision of ACT NATO Coherent approach

> *"e-Learning as an innovative and powerful method of teaching and learning that is directed, coordinated and promoted by ACT at the strategic level, whilst delegated to the most appropriate ETF to produce, develop, deliver and maintain effective, relevant and high quality courses"*

He mentioned that NATO e-learning can be delivered as standalone or residential based courses as shown on figure below.



Mr. Thurkettle showed some examples NATO e-learning through ADL, immersive learning, collaboration, CBT and mobile learning as being employed on NATO e-Learning Online System.

Mr. Thurkettle further described the use of Immersive Training Environments to encompass a "wrapper" over serious games, virtual worlds and other technology which provides a simulated or replicated environment for the trainer. He mentioned the extensive use of VBS 2 and its value to NATO with over 18 NATO nations using it. He gave examples of the uses of VBS 2 ongoing projects as they related to:

- Scripted Immersive learning capability by the Instructional Designer
- Import assets developed in other programs
- Easily developed into a game or task driven training
- Cultural training, CIS, security,
- Exported to LMS, IOS device, computer, Android system

Mr. Thurkettle described the approach of using Smart Defence as "a way to enhance the efficiency with which Allies, together, field critical capabilities, allowing them to do in cooperation what they could not do efficiently, if at all, alone.".

Mr. Thurkettle presented some challenges for the Immersive Learning Smart Defence:

- Discuss E&T applications for Immersive Learning
- Discuss how nations can work with NATO on distributed training
- Smart Defence/Work with GBR
- Valued-added metrics, proven advantages of ITE over standard e-learning or class based training
- Discuss Instructional Designer challenges and techniques for sound ISD development
- "Smart Defence" Industry reactions – "working together" - "is that possible?"
- Delivery methods – LMS, Mobile (what mobile?)
- Shared development – working together

In conclusion, Mr. Thurkettle mentioned we need to call serious games "immersive training", because senior leaders prefer it versus "gaming environments". He also mentioned in closing that the UK has committed to be the focal point to implement and develop a center to drive virtual worlds signed off by the Prime Minister.

Tuesday April 17th, 2012

5.5 Recap of Day 1

5.6 Johnny Garcia Automated Intelligent Mentoring System (AIMS).

Dr. Garcia gave a presentation on the uses of gaming platforms to conduct for teaching and assessing procedural clinical skills. Unlike current simulation training models, our technology provides audio-based procedural instruction and active visual cues coupled with structured and supported feedback on the results of each session. This system greatly enhances the ability to support direct, standardized "expert" mentorship for health professional as they learn and acquire new procedural clinical skills or are assessed in their proficiency in performing these skills.

Dr. Garcia further discussed the three-part aim for AIMS: satisfy the growing needs of defense medical community, provide a product to attain procedural mastery and effectively improve skills, and increase interest in simplified methods of training by providing a smart return on investment. AIMS is leveraging patent pending technology to create an automated intelligent mentoring system, primarily a software package that addresses procedural training needs within the health care community. The basic plan is to design a cloud-based training system – Software as a Service (SaaS)—that provides live feedback and detailed comparison of the user's results with curriculum mandated standards. With feedback and unlimited opportunity to attempt the procedure, the learner can achieve the expected proficiency at their own pace. AIMS is a cost-effective way to eliminate inconsistencies in training methods and to reduce mounting demands on expert clinical educators. This is achieved through low cost hardware and a software subscription package from our custom, web-based environment.

AIMS provides healthcare professionals, students, and practitioners a way to learn and perfect key skills they need to attain course objectives, recertification, or skills maintenance. This technology enhances deliberate and repetitive practice necessary to achieve skill mastery, accelerates skill acquisition since supervision and scheduling are minimized, and provides uniformity in training and competency assessments.

The figure below illustrates a template for user feedback. With feedback, the learner can repeat the task until achieving a measured level of proficiency. Without the need for supervision and allowing unlimited tries to reach proficiency means that learners can proceed at their own pace of learning and fitting their own scheduling needs. All this is accomplished with little or no teacher supervision, taught in a uniform manner, and according to the individualized needs of the learner.

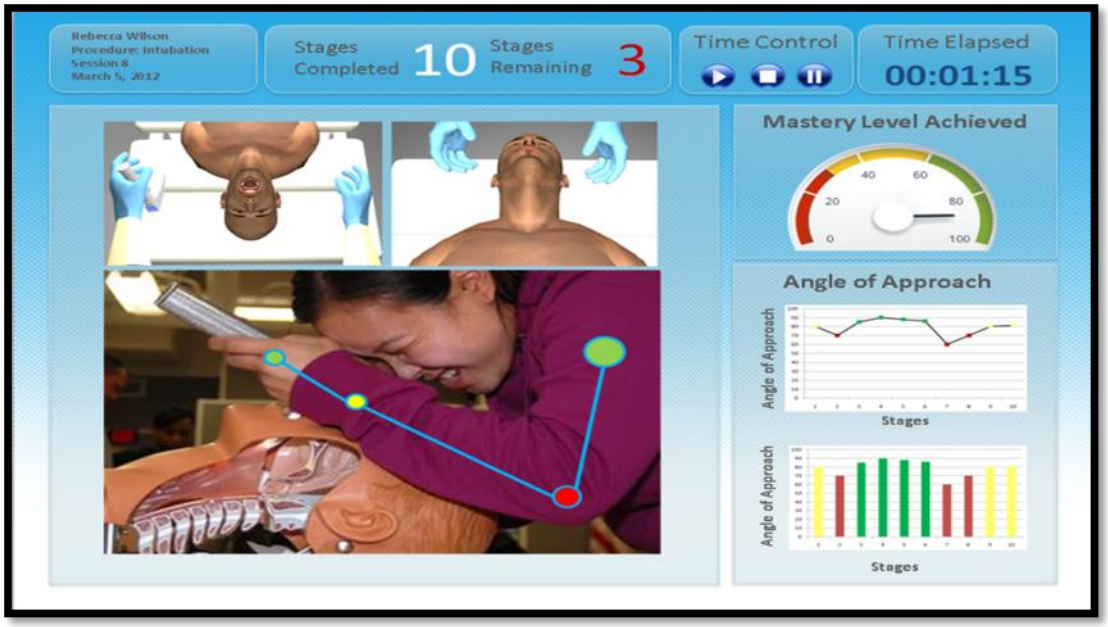


Figure Perfecting skills through perfect practice.

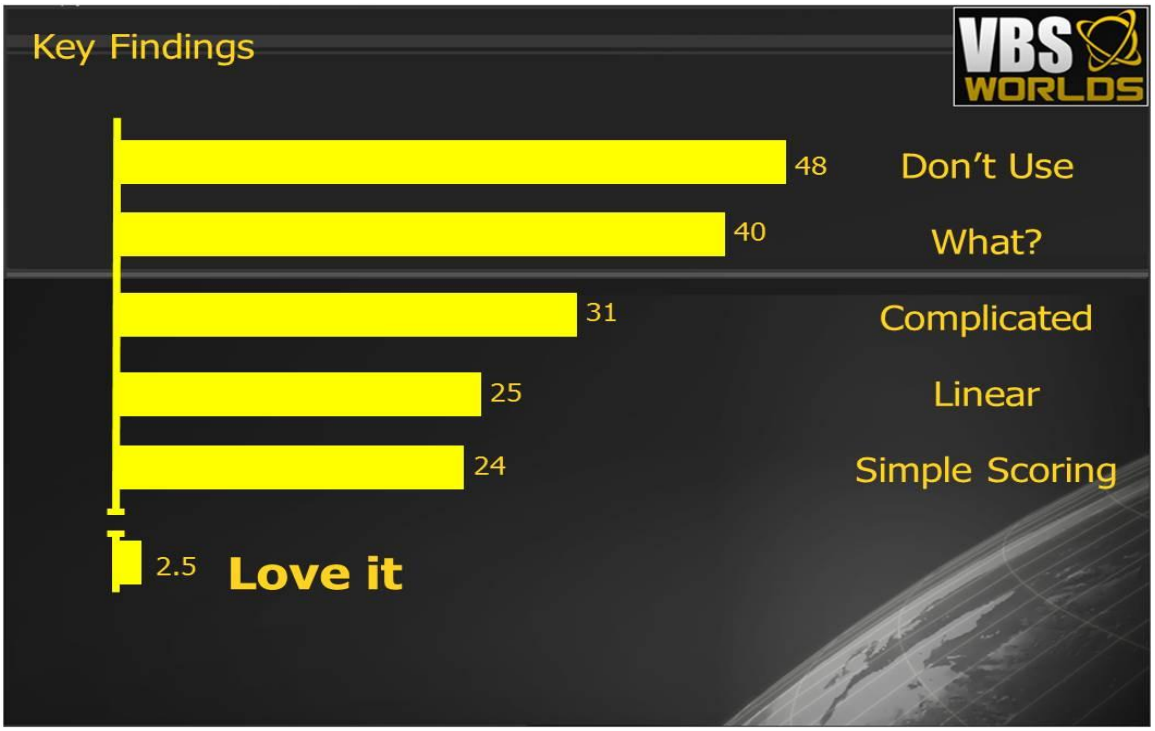
In conclusion, Dr. Garcia's presentations showed how gaming technology can be perfected for teaching and assessing endotracheal intubation and potentially expand it to include a variety of additional procedures

5.7 Chris Brannigan: SCORM the final frontier - delivering Immersive Training Simulations and rich performance data TODAY via your LMS

Mr. Brannigan gave a presentation on SCORM "Shareable Content Object Reference Model" (reference model for Shareable Content objects). He explained that SCORM is technically a "virtual" model (reference model), which is a collection of specifications that allows, primarily involving the exchange of digital content in platform-independent manner. He further explained what SCORM is good for - Online learning - SCORM is the de facto industry standard for interoperability, and it allows organizations to enhance their Learning Management System (LMS) – which is basically a content management system or a database for storing content and a means to present and interact with that content. SCORM is a set of protocols and API's that is wrapped around a course or lesson so that it can be managed and presented by the LMS.

He further discussed the need for SCORM in distributed simulation to get to hundreds of thousands of users. Mr. Brannigan described a survey of 51.5 randomly selected immersive training /simulation developers and users at I/ITSEC & Game-Tech conferences. The survey asked the question of what does SCORM mean to you?

Figure below show the results of the survey.



He discussed the findings as disturbing especially people who don't use SCORM, but then equally disturbing was the second response where they either did not know what it was or had a very poor understanding of it. This is reflected in the third highest response that was about complexity. There were issues about browsers, LMS and the files and protocols. It just seemed outside of their comfort zone. A number of respondents talked about linear content and not being suitable for simulation and the fact of simple scoring.

There is some good news. 2.5 respondents loved it. Admittedly, he thinks two of these worked for ADL in some shape of form and the .5 were under the influence. He further gave some examples of using SCORM within game engines that are played through a web browser that can leverage SCORM.

5.8 Paolo Busetta: Improving Immersion by Making NPCs Believable

Mr. Busetta gave a presentation on Realistic Human Behavior Models for use in operational assessment, training and experiments. These Virtual actors must:

- Respond dynamically to events
- Model cognition and emotion
- Have subtle perception and action

AOS Autonomous Decision making software was motivated to developing a SME-friendly representation, principled cognitive architecture and needed to be moderated by Physiology and Affect.

AOS has developed CoJACK to provide:

- Procedural knowledge
  - graphical plans
- Declarative knowledge
  - belief sets

- Goals and triggers
  - Events

CoJACK uses a graphical plan representation to encode the agent's reasoning capability (procedural knowledge). A graphical plan defines the context in which it is applicable and the various steps that must be followed for it to deal with the situation. In addition to its procedural knowledge ("knowing how to do something"), CoJACK agents have declarative knowledge ("knowing about"). In the figure, knowing that the squad leader has been killed is an example of declarative knowledge. Declarative knowledge is stored in belief sets within the agent. Mr. Busetta further described the constructs of CoJACK Plans – are procedures that define how to respond to events. When an event is generated, CoJACK computes the set of plans that are applicable to the event. These plans are subjected to a process of deliberation, where the agent selects the plan that will form its next intention. Plans have a body that defines the steps to be executed in response to the event. Non-deterministic choice allows the agent to try alternative plans to achieve the goal.

Events – are the central motivating factor in agents. Events are generated in response to external stimuli or as a result of internal agent computation.

Belief sets – are used to represent the agent's declarative beliefs in a first order, multiple-based relational form. Belief sets are analogous to the Working Memory (WM) of a production system.

Intentions – are the currently active plan instantiations, i.e., the plan instances that the agent is committed to. Plans are abstract entities that describe potential patterns of thought and action. A plan becomes an intention when the agent instantiates it with symbolic references to concrete entities in the environment and commits to its execution.

Based upon cognitive parameter values, the architectural constraints add latency to the current intention's reasoning steps and to memory access. CoJACK also affects the choice of beliefs retrieved in response to a memory access attempt; this includes effects such as: failure to retrieve a matching belief, retrieval of a belief that only partially matches, and retrieval of an alternative matching belief (i.e., not the one that CoJACK would have chosen first). A similar mechanism affects the selection of the next intention to execute. Thus the agent can choose an unanticipated intention or even fail to retrieve one of its current intentions. The cognitive parameters can be moderated at runtime, leading to further variation in behavior. For example, a caffeine moderator could be added that decreases the time taken to perform reasoning steps, leading to shorter response times.

He described the uses of fear and morale models - A currently used and appropriate way to model fear is to represent it as a reservoir. When fear is triggered in the behavior model, the amount of fear is used to initialize the level of the fear reservoir (instantaneously). The level of fear in the reservoir then decays over time with a half-life that is provided as an input to the moderator. This approach appears to be consistent with data on the effect of suppressive fire. This provides a robust implementation, and one that can be expanded and modified as additional data and needs arise. Variability between agents can be provided by varying the uptake and decay of fear constants as well as the base level. Variability with time is provided by the decay of fear. This approach is useful as a first step, as we want the models to be more complex but we also need them to not be too complex and difficult to understand, modify, and debug.

Mr. Busetta provided a demonstration/video of examples of UK research in cloud computing, crowd modeling and fear modeling

In conclusion, Mr. Busetta provided uses for other applications:

- Counterterrorism
  - Modeling of crowd and terrorist behavior

- Rules of Engagement (ROE)
  - ROE represented as meta-plans that constrain the selection of tactics
- Safety training
- High fidelity entities in crowd simulations (CAPIRE)

5.9 Keerati Jittrawong Gamified Information Systems: Toward an Efficient Delivery of Information

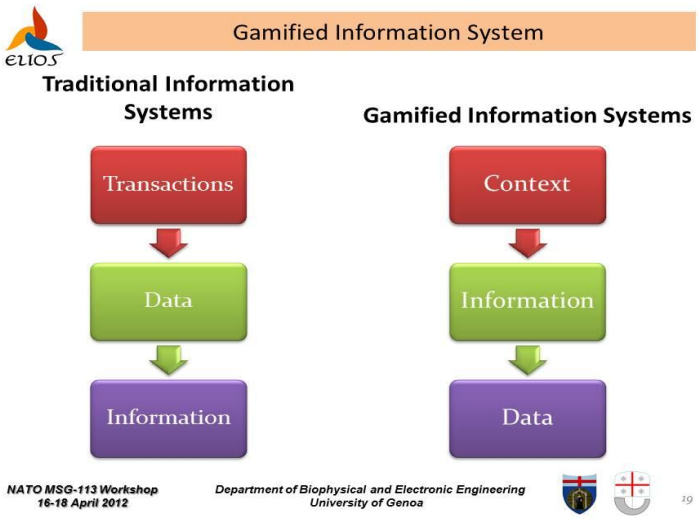
Mr. Keerati Jittrawong from the Department of Biophysical and Electronic Engineering University of Genoa gave a presentation of his thesis on Gamified Information Systems: Toward an Efficient Delivery of Information. His presentation was very enlightening as it brought the uses of games as an information platform allowing users that play games the ability to consume game information and making decision in a fraction of a second.

Mr. Jittrawong explained the importance of game information and interactive entertainment so that an audience can consume more information in less time.

He further discussed the need for underlying principles that enable efficiency (VIC):

- *Visual* - utilizes human preconscious information processing power
  - *Graphics uses for efficiency- a picture is worth a thousand words*
- Intuitive - eliminates abstract layers of information processing
  - Virtual worlds - intuitive information processing is unconscious You can do it without consciously thinking about it
- Contextual - makes it effortless to obtain appropriate information for the task at hand
  - Requirement for instantaneous and continuous decision making

He gave some examples of the used of the VIC principles in his Gamified Information Systems approach as shown in figure below.



He showed that using his research enables efficiencies than traditional information systems using context. He also provided a proof of concept where information is provided in a visual manner by replicating a container terminal into a 3D virtual world, and users can obtain information from the associated 3D objects. The most important information is displayed and enables the context for the training.

In summary, Mr. Jittrawong showed that the uses of his VIC principles enables efficiency, less error and it frees up conscious processing power.

5.10 Mr. Calogero Brucato, Mr. Marco Biagini, Mr. Bruce Joy Understanding Social Immersive Technology - Emerging frontiers for Training and Educational (T&E)

The gentlemen gave a presentation on immersive technologies and how it is used to provide T&E environments. They first defined an immersive experience as the use of multiple human senses to gain an experience not strictly related to a real environment. They further gave a great example of where you could have at your disposal the most immersive high-tech platform but if the content delivered is not involving the user, maybe the experience will not be so immersive.

They further discussed the Training and Educational environment as a frontier:

1) Last Frontier
    a) Current tools are faced with a few constraints
    b) Not yet fully cross platform
    c) Most require the client machine to install a software plugin or application
    d) Lacks immersion / Limited sense of participation
    e) Stovepipe environment (not interoperable with other apps including web-based media services
2) Next Frontier
    f) Web-based cross platform applications/mash-ups (users can dynamically choose from an extensible palette of media cloud services)
    g) More simultaneous participation supporting the e-learning “many to many” paradigm
    h) Automatic systems to provide evidences of personal skills and knowledge interacting with web services able to catch evidence of users T&E paths

They further discussed the need for crowdsourcing where better decisions are made by a few informed (from a filtered crowd) decision makers who than enable (the crowd) to decentralized actions where:

1) Independent vs. Biased sources
2) Diversity vs. Uniformity of advice
3) Decentralization vs. Centralization

They gave a demonstration of VastEvents which is the latest innovative 2.5D social network environment for crowdsourcing applications.

They gave a demonstrtion of VastCOMMAND – which implement a suite of tools built-in VastPark VP2 technology platform to enable basic and advanced features to operate a new concept of distributed command.

The main applications of VastCOMMAND are:

- Events Center
- Virtual Sand-Box

The Events Center is a 2.5D multimedia environment designed to enable remote collaboration and to support distributed decision making process using a web based suit of tools.

In conclusion the gentlemen showed the need for these environments for:

- High fidelity distributed T&E environment, High scalable across different web media services
- Reusability of immersive virtual simulators and immersive tools from training to support to operations
- Objective assessment of users through the adoption of SCORM 2, next generation LMS, that will be able to catch, evaluate and store transcripts of the learner's immersive experiences including decisions made during scenarios (i.e. via an XML cascade schema including ScenarioML, IMML, CBML and MSDL)

Immersive T&E experiences ***depends on contents*** and then on the technology delivered (2D, 2.5D, 3D, 4D).

"Right T&E content + Right T&E Technology = Maximum T&E performance"

5.11 Mattia Crespi: Web 3D - Virtual Worlds - Interactive Simulations - Serious Gaming - 3D Learning

Mr. Mattia Crespi provided the conference with a great presentation on the uses of virtual environments for risk training. His presentation gave examples of the new learning paradigms from books to tutorials and has the following benefits:

1) Safe environments
2) Creates unlimited hazards
3) Synchronous & collaborative training
4) Cheaper than real life
5) They can run on the web

He gave a context of the training as it would be executed in a construction yard for construction workers, architects, engineers and safety specialist to:

- Reduce training costs
- Raise courses participation
- Raise learning performance
- Enable new, more efficient learning methods

They used a mix of 2D learning tools with a 3D immersive environment to enhance the learning experience that was:

- Idiot proof
- Didn't force 3d some things are better done in 2d
- Monitor responses and analytics.
- Validate the simulation as a testing tool.

The solution of this approach was a virtual construction yard that finds risks, evaluate risks and enables operators to respond and act on danger. It furthermore provides a risk free environment to simulate hazards and monitor data effectively for measuring learners response. The part of the presentation that was a key factor to the success of this approach is how it was validated that he described in detail. They tested 800 learners, 400 in traditional approaches and 400 in virtual environment, where:

- User tested on specific complex procedures with tests, after 30 days from the official test.
- 3D simulation learners scored on average 32% more than standard learners.

In conclusion, this presentation showed that the use of virtual construction yards saves time and money and is a good example for risk reduction enhancements.

5.12 How to Create a Dynamic & Destructible Simulation Environment

Specific military approach Game technology needs support.

Steve started his presentation by mentioning that Havok is a wholly owned subsidiary of Intel ® Corporation and that it recently acquired Trinigy, a leading 3D game engine provider. The integration of Havok technologies with the Vision Engine is providing a powerful and customizable platform that enables teams of all sizes to deliver compelling content and experiences across multiple devices and operating systems. Steve discussed a Havok's robust global customer support infrastructure and its business model that includes professional services and/or licensing through standard annual support & updates, and single or program-based deployment.

Steve referenced breakthrough AI in such games as LA Noire and how its behavior tool facilitates a custom character behavior tool in which discrete events can be prototyped, controlled and scripted.

He then demonstrated several live demos of Havok products including: Havok - Physics, Destruction, AI, Animation, Behavior and Cloth. Ewart concluded by mentioning how it is working with partners such as Presagis, Terrasim, Calytrix, Rocketbox and others to implement DIS/HLA interoperability and terrain generation.

See: www.havok.com and www.trinigy.net

5.13 Tour Simulation Team Facilities University Genoa

Dr. Bruzzone provided a great presentation on the uses of serious games for homeland security. He gave the workshop a brief description of who the research team is from a range of Universities, Research Centers and Companies operating worldwide in synergy for developing Innovative Solutions with a particular focus in Modeling and Simulation.

Dr. Bruzzone further gave demonstration of gaming tools coupled with human behavior in serious games:

- Serious Games usually have a stronghold in graphics, usability, interfaces and multiplayer capabilities.
- Games frameworks needs to guarantee proper fidelity and correct models for their specific purpose
- The potential application areas usually introduce the necessity to add Artificial Intelligence (AI) able to add realism by introducing Human Behaviors and Intelligent Agents (IA)

He further discussed human modeling challenges as they relate to rational decision making and instinctive and emotional behaviors. He also defined human behavior simulation is the reproduction of the humans by using computer models. Usually this requires simulating aspects related to Emotions, Rational Thinking, Psychology, Ethology and Sociology with the detail required by the specific Modeling & Simulation Project.

Dr. Bruzzone provided more information and demonstrations on the use of Multiplayer Games introduce new opportunities for Serious Applications integrated with Intelligent Agents:

- Human Behavior Models enhance this potential providing new opportunities
- There is a great potential in using Serious Game as technology enabler to enlarge installations, user community and utilization modes
- It critical to define reference baseline for fidelity and detail level that characterize Serious Games considering the expected benefits and use modes.

Wednesday April 18th, 2012

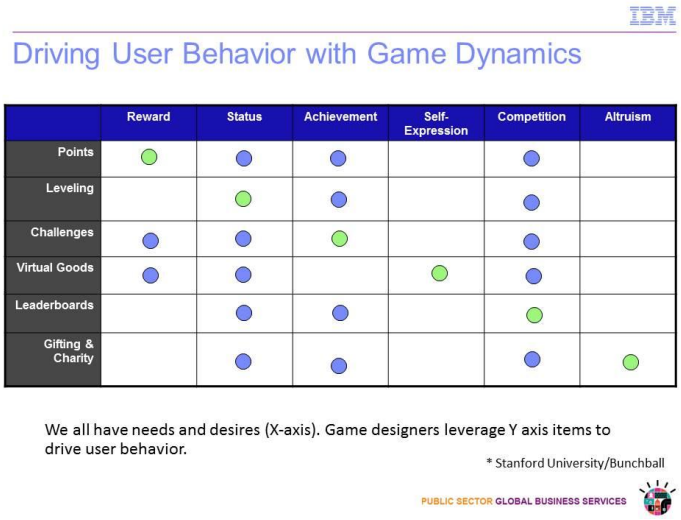
Recap of Day 2

5.14 Phaedra Boinodiris: IBM Evolving Serious Games beyond Training

Mrs. Phaedra Boinodiris gave a wonderful presentation on the evolution of games in commercial and government evolution, from the evolution of process optimization to complex problem solving. She gave a brief history on where she came from as the founder of women gamers to the development of gaming environments for IBM. Mrs. Boinodiris provided that the average age of the gamer today is 37. 43% of PC gamers and 38% of console gamers are women. 67% of US heads of households play videogames regularly. These are our logisticians, our analysts, our partners. These gamers are not playing simple games; they are playing extremely complex games. Games today are more sophisticated than ever- supporting thousands of players at a time playing simultaneously against sophisticated AI engines. Collaborative play, user driven content, and in-game currency are now the norm.

She provided us examples of sophisticated games like Achron shown below where the use of real time strategy game is utilized using a 4 dimensional strategy.

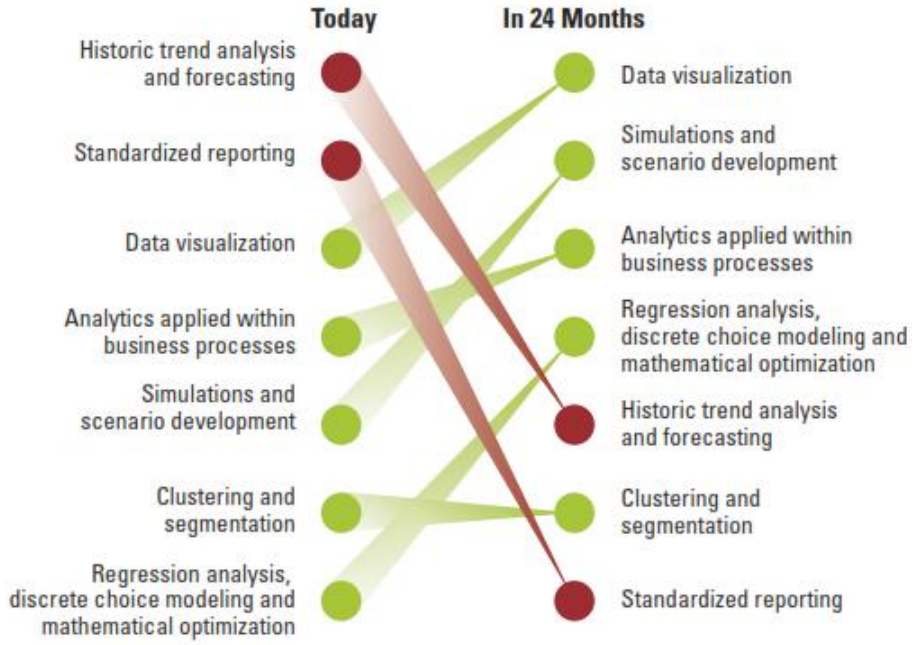
She mentioned that today we know that serious games are being used by the military, by healthcare, and now by businesses to teach and even to solve major problems. What is driving user behaviors with game dynamics figure below?



It shows that the user's needs and desires (X-axis). Game designers leverage Y axis to drive user behavior.

She provided some key factors and studies that are using data visualization; simulations and scenario development will be the most valuable techniques to analyze all the data.

The figure below provides what the new paths are headed.



"Organizations expect that the ability to visualize data differently will be the most valuable technique in two years [Fall of 2012]. Other technique and activities that are current delivering value today will still be done, but will be of less value."

With the confluence of technology there is an opportunity to extend what games can do and IBM is positioned to leverage processes in smarter serious games where Games in the context of data exploration, and Serious Games in the context of process optimization for ROI.

She mentioned Ender's Game a book by Orson Scott Card is about a young boy who becomes the world's greatest military leader by playing games. But the cool part about the book is that unbeknownst to him, he is directly affecting the battlefield by his gameplay. She expressed, "This is the Art of the Possible. This is where serious games are going."

She gave an example where a process model can be transformed for an organization that is responsible for logistics across multiple agencies into something that is contextual and motivates people to iteratively play; the by-product of the gameplay is a newly optimized model. This will lead to a broader value chain that will be **motivated** to **collaborate** and optimize the visually represented system with flows of REAL DATA.

Based on information, by 2015:

> "More than **50 Percent** of organizations that manage innovation processes will GAMIFY those processes." -- Gartner

She gave more examples of using the transformation of data into visual representations that enables better decision support tools.

1) Using Serious Games for Optimal Modelling *FOLD-IT* for Folding Proteins
2) Find where the music sounds off key in order to teach a compiler how to better annotate security problems in code
3) ACTUV Simulator
4) Watson - an adaptive analytics application

She provided a great keynote to the conference, and she concluded with some actionable task for the audience:

Where to start – Fun vs. Flow – "beware of the chocolate covered broccoli"

1) ROI
2) Learning/Pain Points
3) Puzzles/Experience to Teach & Motivate
4) Genre
5) Platform

She mentioned to the audience that we are all gamers and that Games can be extremely adept at explaining complex systems. When designed well, they can be used to collaboratively solve very complex problems, whether the players actively realize it or not.

Recap from Wayne Buck, Stu Armstrong and Professor Agostino

Discussed the Oslo, Norway event for fall 2012 and opened up the floor to the audience.

Ten Ideas for structure of future workshop

1) Generate more ideas and issues/uses to work on like structure design and metrics for planning – have more time for syndicate groups.
2) What about mobile?
3) Validation of the gaming applications
4) Helps to close the gap between understanding the problem to solve the problem this workshop puts the context of operations in use of gaming as it relates to academia.

5) More technical discussions in future workshops
6) Continue to push the idea of serious games as a capability
7) Would like to know who is the main provider of serious games
8) Aid the Military in how to manage this technology to create an educational path in order to use serious games
9) How to use serious games in Concept development and experimentation.
10) Recommended other speakers to the workshop.

6.0 CONCLUSION AND RECOMMENDATIONS

During the course of the workshop, several themes or "hard questions" were identified including:

- Business Models – What are the business models that governments will use to procure commercial games and technologies? What is the appropriate business model for industry?
- Workshop intent and purpose – What will the NATO nations do to exploit new technologies and commercial games that they learn about at the workshop?
- Large vs. small business – What are the roles for the larger prime companies and the roles of the smaller games vendors? How do they best work together?
- Changing environment – The focus on the use or potential use of new technologies is changing, but how are the governments and industry going to adapt?
- Workshop plug-up – There is a desire for the government to see working demonstrations and a desire for industry to meet a plug-up challenge.

6.1 Conclusion

Participants and workshop organizers assessed this session of MSG-113 as a success. The workshop met its objectives:

- provide demonstrations and presentations to explore uses of commercial games and technologies in support of decision support, training, educational concept development and experimentation
- provide updates on the nations' current application of commercial technologies
- provide capability briefings

NATO partner nations currently use commercial games and technologies. The workshop participants concluded that a need and to continue pursuing commercial game technology solutions. This may require review of existing acquisition and procurement guidelines.

Finally, NATO and ACT enjoy an organizational infrastructure and innovative partners to facilitate these types of workshops in the future. They should continue to do so.

6.2 Recommendations

As noted in the closing discussion, gaming technology has been proven to enhance operations. The workshop focused on providing examples of these transformational changes in NATO nations and organization and shows that serious games are the future, and the workshop has provided value and should and will continue to do so.