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Feature Article

NATO Steps Up Modeling And Simulation Activities

by Harold Kennedy

With defense budgets around the world generally in decline, simulation and training manufacturers are scrambling more intently than ever for their share of the global market.

"Every week, budgets go down, and training requirements stay the same or get harder," said Ross Q. Smith vice president of sales and business development for Quantum3D, of San Jose, Calif. Quantum3D makes interactive three-dimensional (3D), personal-computer (PC)-based visual computing systems.

"There's a trend toward embedded training," Smith explained in an interview, at this year's International Training and Education Conference, known as ITEC 2000, in The Hague, Netherlands. "Instead of building a separate facility for training, we actually hook up our system inside the vehicle in which you're going to fight."

At ITEC, for example, Quantum3D was showing off its Thermal Sight Video Controller (TSVC), which it developed for use with Canada's Light Armored Vehicle (LAV) appended trainer. The TSVC produces video signals simultaneously for both the LAV commander and gunner display channels. Real-time 3D images "provide for the utmost realism in an appended training environment," Smith said.

There is a growing demand for increased realism in simulation, Smith said. "People want the real road, the real field, the real building. If you want to take out terrorists in a specific building, you can't train in a typical building. It has to be a real building."

Earlier this year, Quantum3D unveiled its Heavy Metal AAlchemy 4116–the first of a planned family of scalable, advanced, real-time 3D graphics systems for visual simulation and training applications. AAlchemy 4116 enables real-

time rendering of complex synthetic environments, rich in cultural features, free from distracting artifacts and at sustained frame rates, Smith said.

MultiGen-Paradigm Inc. (MPI), also based in San Jose, is touting "the first fully correlated sensor product suite on Windows NT," according to Brian Bartel, MPI's vice president for marketing. This group of products provides the ability to construct a single application that simultaneously renders correlated out-of-the-window, radar, night vision and infrared visuals, using a single material-classified database, Bartel said. The products include:

- SensorVision, which simulates electro-optical and infrared visuals, including night vision.
- SensorWorks, which imitate a wide range of sensor effects, such as night-vision goggles and FLIR sensors.
- RadarWorks, which copies imaging radar systems, including synthetic aperture radar, real-beam ground mapping and Doppler beam sharpening.

"We'd like to be the Henry Ford of database generation," Bartel told National Defense. "We're revolutionizing the way database generation happens."

The international marketplace is becoming increasingly important for MPI, Bartel said. "Fifty percent of our business is outside of North America," he said. "And 75 percent of that is European."

Another industry player, Evans & Sutherland (E&S), of Salt Lake City, is marketing its new Symphony line of products internationally.

A Wide Range

Introduced in 1999, the Symphony line includes a wide range of graphic products for simulation. Among them:

- The Harmony image-generator channel, designed for complex applications, such as full-mission rehearsals, helicopter and fast-jet training and networked simulations.
- Ensemble, the first true PC-based image generator system and one of E&S' newest.

E&S also exhibited its just-released simFusion, "the first and only PC-based visual system to offer real simulation features for under $20,000," E&S President James R. Oyler said in an interview.

In Orlando, Fla., last year, E&S "showed a simulator in a container, which could be deployed by ship or aircraft," Oyler said. The ability to deploy simulation technology can make a big difference in warfare, Oyler asserted.

"Compare Kosovo to Chechnya," he said. Russia's "destruction of Chechnya has been scandalous. The NATO assault on Yugoslavia was much more controlled and precise, with much less loss of life."

Logicon Inc., a Falls Church, Va.-based division of Northrop Grumman Corporation, has been promoting its Combined Tactical Training and Analysis System (CTTAS). CTTAS integrates two older Logicon products to provide a wider spectrum of naval tactical, war gaming, sensor simulation, virtual prototyping and interactive courseware development, according to Susan L. Panichas, a Logicon project manager, in Middletown, R.I.

The two older products are Logicon's Distributed Universal Simulation/Stimulation Trainer (DUSST) and Virtual Combat System Simulation (VCSSIM), Panichas said. DUSST provides generic combat-system operations, based on validated sensor and weapons modeling, battle-damage assessment, intelligent opposition forces and master control of the tactical scenario. VCSSIM performs a wide variety of accurate representations of real-world operations. The combined system facilitates all aspects of training, she explained.

Because all operations are software-based, existing hardware can be reconfigured instantly to any platform configuration, Panichas said. This, she added, means that a single client-server classroom can be used to train a variety of platforms–including aircraft and ground installations–without the need for individual hardware-based training devices.

Lockheed Martin Information Systems, headquartered in Orlando, is seeking expanded international sales for its Close Combat Tactical Trainer (CCTT), a distributed interactive simulation system now used by the U.S. Army.

More than 100 of these simulators are in use today, explained Walter J. Wojciechowski, a project engineer at Lockheed.

The CCTTs provide training for crews of Abrams tanks, Bradley fighting vehicles, M113A3 armored personnel carriers and high mobility, multi-purpose wheeled vehicles, or HMMWVs, he said. They also can be used to provide training for units as large as battalions. In the future, he noted, they might be able to accommodate even regimental-size groups.

Simulation firms throughout Europe, Canada and beyond are competing aggressively with U.S. companies for their own piece of the global pie.

For example, SEOS Displays Limited, of Burgess Hill, in the United Kingdom, unveiled its Mercator digital distortion-correction system at ITEC. Mercator is a PC-based technology designed to correct the image distortion found in the liquid-crystal displays (LCDs) used in many portable computers.

"Mercator digitizes the video stream at full 24-bit color depth, 'warps' the image and delivers it on to the display," explained Owen Wynn, SEOS

managing director and chairman.

SEOS, Wynn said, is the world's leading supplier of simulation visual display systems. "We are the people who provide the view at the windows," he told National Defense.

More than 80 percent of the 15-year-old firm's business comes from exports, more than half of that to North America. For this reason, Wynn this year moved to Orlando, to head up SEOS operations in the United States for a three-year stint. While in Orlando, he will retain his leadership positions in the firm.

Joint Venture

Alenia Marconi Systems (AMS)–a Welsh-based joint venture by Finmeccanica of Italy and BAE Systems of the United Kingdom–is marketing a Reconfigurable Naval Classroom Trainer.

In the trainer, two different warfare scenarios were demonstrated at ITEC. In one, two hostile task groups were depicted carrying out anti-submarine operations against a friendly submarine. In the other, sensor and weapons simulations were combined to present the control room of a friendly submarine operating against a shore-based target, while an enemy ship prowled on the surface.

The trainer is a generic system that combines modern, powerful, commercial, off-the-shelf (COTS) hardware with the latest modeling tools and reusable software, according to David Jarrett, AMS account development manager. The system can be configured easily into an equipment or a platform environment and can represent any system or subsystem that uses computer technology, Jarrett said.

Reconfigurable

"It's as reconfigurable as they want to make it," he explained. "In some armed forces, that is an issue."

AMS, Jarrett explained, has divisions in Italy and the United Kingdom, operating in the fields of ground and naval radar, missile systems, air traffic management, command and control, simulation and synthetic environments, engineering, software design and manufacturing.

Thomson Training & Simulation, a division of Thomson-CSF, located just outside of London, is seeking new customers for its new TRUST (Truck Simulator for Training). The first two TRUST simulators were put to use in January by two major European truck-driving trainers–AFT-IFTIM, of France, and VtenL, in the Netherlands–according to Thomson's communications manager, Mark Rouson.

TRUST reproduces every detail experienced by truck drivers in real driving

TRUST reproduces every detail experienced by truck drivers in real driving conditions, Rouson said. The simulator features:

- A real Renault VI Premium cab.
- A visual system with a 180-degree field of view.
- Accurate movement and driving sensations.
- A real sound environment.
- A realistic simulation of road conditions.
- An instructor station with advanced training software.

The system is catching on in Europe, especially with gasoline prices at record high levels, Rouson said. Earlier this year, he said, Thomson was producing 11 TRUST simulators for three leading European training organizations.

Saab Training Systems AB, headquartered in Huskvarna, Sweden, is promoting several products:

- The BT 46, a two-way, laser-based training system for precision gunnery and force-on-force exercises, was adapted to meet the requirements of the U.S. Army's Tank Weapons Gunnery System/Precision Gunnery System (TWGSS/PGS).
- The BT 47 Lightweight Personnel Detection Device (LPDD) and Small Arms Transmitter (SAT), a laser engagement and response system, replicates most battlefield effects, including simulated direct hits, near misses, wounds and first aid.
- The BT 61 multi-purpose gunnery trainer can be used with a wide variety of weapons, from combat vehicles and helicopters to 40 mm machine guns.

"These systems won't let you cheat," said Saab representative Jerker Johansson. As an example, he cited the BT 47. "If you get killed [in a simulated fire fight], your transmitter won't work, and you're out of it."

A total of 95 percent of Saab's business is in exports to 20 countries, including the United States, the United Kingdom, Germany and Canada.

Siemans Switzerland Ltd., based in Zurich, is offering a new mapping software, called MapTool. The software allows simple and flexible map reading on personal computers, according to retired Swiss Army Col. Franz Lötscher, a Siemens consultant.

MapTool makes it possible to combine digital maps, digital height models and vector data and to supplement the computer map with aerial photographs,

Lötscher said. A map produced with it shows not only towns, villages, streams, rivers and contours, but also individual objects, such as vegetation and houses–all in three dimension.

The software currently operates with the digital maps of the Swiss Federal Office of Topography, said Lötscher. The Swiss now are creating a digitized map of all of Switzerland, he noted. Computerized maps, he said, will enhance Switzerland's ability to maintain a high state of readiness, even though its defense budget is declining.

SE Swiss Electronics Enterprise Corp, based in Bern, and C.O.E.L., of Wedel, near Hamburg in Germany, have joined together to develop the Combined Arts Direct Fire and Area Weapon Training System (CODARTS). "It's like MILES (the laser-based marksmanship training system used by U.S. troops)–only on a larger scale" explained Nancy Buchanan, SE marketing and project manager.

CODARTS can be used by units as small as squads to those of several hundred soldiers and combat vehicles, Buchanan said. Opposing forces use state-of-the-art tactical-engagement simulators.

"Unlike MILES, CODARTS is a two-way system," Buchanan said. "Simulators measure the distance between shooters and targets. There are different codes for tanks and infantry. There's no confusion."

Training can take place in open terrain or in built-up areas, Buchanan said. An exercise-control center monitors the entire training, controlling, coordinating and recording everything that happens for after-action review, she explained.

The Swiss Army has contracted with SE and C.O.E.L to develop simulators for its vehicle-mounted machine cannons and guns by the end of 2001, Buchanan noted.

"Switzerland is not a member of NATO," she noted. For centuries of European wars, it has been neutral, she said, but the Swiss also are determined to maintain their independence. "They take their military training seriously."

Krauss-Maffei Wegmann, or KMW–the new German military technology conglomerate–is marketing training products for armored vehicles. KMW was created in 1999, from the merger of two of the country's leading defense manufacturers, Krauss-Maffei and Wegmann & Co., explained Stephan Straube, a KMW representative.

At its factories in Munich and Kassel, the combined company makes a number of armored vehicles, including the Leopard family of main battle tanks and the PzH 2000 Self-Propelled Howitzer. Nearly 8,000 Leopard 1 and 2 tanks have been fielded by 16 nations on three continents. In Europe, Straube said, the Leopard 2 is in use from the Arctic Circle to Gibralter.

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KMW provides training and simulation products for its customers in the areas of driving, maintenance, gunnery, and other combat skills, Straube explained.

Air Defense

"One of our biggest projects is the air-defense gunnery and combat simulator, the ASF/PLT-V," said Straube. "It is used to train commanders and gunners of our Gepard and Cheetah Self-Propelled Anti-Aircraft Guns (SPAAGs)."

This simulator, Straube said, recreates the vehicle's battle stations in a "highly realist manner." Up to seven simulator cabins can be networked together, he said.

CAE Electronics Ltd., of Quebec, is focusing on tactical training systems. One example is its three-channel, image-generating system, dubbed Medallion. Exhibited at ITEC, this simulation showed a pilot's eye view of a training scenario involving a military helicopter on a U.N. mission to protect refugees in a Kosovo-like setting.

The scenario was played out on three large screens, providing attendees–and the pilot at the simulation controls–a panoramic and detailed view of events. In the scenario, the helicopter comes upon a small contingency of white U.N. vehicles about to be overrun by hostile armor.

Real Terrain

The rolling, hilly terrain being portrayed is real, said the simulator's pilot, Mike Couch, a researcher at the U.S. Army Research Institute at Fort Rucker, Ala. It is about 30 kilometers from Saint Tropez, near the French Mediterranean.

"The [simulated] movement is very slow and boring," Couch said. "That's the way it should be. We like to sneak in, hit our targets and sneak out."

Virtual Prototypes Inc. (VP)–a Montreal-based supplier of software-development tools–has been promoting its Sequoia Integrator for High-Level Architecture (HLA). Integrator is the first product of VP's Sequoia family of development tools for simulation applications, explained Yvan Legacé, the firm's marketing director.

"Everybody's looking at HLA," Legacé told National Defense. Integrator for HLA, he said, is aimed at military organizations and simulation-system developers who own older simulation systems and are looking for a simple migration path to HLA.

The product consists of middleware software and tools for integrating existing simulation applications within an HLA environment, Legacé said. It provides a visual-model editor, a data exporter-importer and runtime support.

In general, Legacé said, interest in simulation is picking up. "Last year, for the first time," he said, "more than 50 percent of our sales were in simulation."

Some exhibitors complained that this year's ITEC wasn't as dynamic as previous years. "It's been kind of slow," said Legacé. "There's not been a lot of visitors–especially from the defense ministries and military services."

Visitors might have been put off by a persistent band of demonstrators holding forth at the entrance to the conference site, the Netherlands Conference Centre. Waving large banners with slogans such as "Weapons Trade in Disguise" and "ITEC War Traders–Top Criminals," protesters accosted people entering and leaving the conference. They stained a pool outside the centre blood red.

Many attendees, however, said the protesters had no idea what the conference was really about.

"The protesters thought this was an armaments show," said John Mills, ITEC's public relations and marketing director. "Mind you, we can simulate death and destruction, but our products don't actually kill anybody."

In any case, ITEC 2000–the 11th of its kind–was the last to be held in The Hague, the medieval royal capital of the Netherlands and seat of the United Nation's International Court of Justice. ITEC 2001 will be held in Lille, a major industrial city in the north of France, midway between Paris and Brussels.