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Air Force Highlights Innovation and New Directions in Training

This year's I/ITSEC includes a number of activities and exhibits that highlight some of the innovative approaches and new directions that the U.S. Air Force is embracing as it looks to the future of its simulator platforms.

According to Colonel John Kurian, Senior Materiel Leader, Simulators Division, Air Force Life Cycle Management Center, Air Force Materiel Command, Wright-Patterson Air Force Base, his office currently supports a portfolio that includes primarily fourth-generation simulators for fighters and bombers across various major commands.

"Many of our current simulators are perhaps decades old, and we're in the phase of trying to figure out how we should evolve our simulation capability to get to what General [Charles] Brown, Chief of Staff of the Air Force, is talking about in terms of preparing for the near-peer fight," Kurian said. "I believe we're at that inflection point of trying to modernize and get to the new capability, while at the same time trying to maintain this legacy infrastructure where it makes sense to evolve."

His perspective was echoed by Colonel Matthew Leard, Director of Pilot Training Transformation at Headquarters Nineteenth Air Force, Joint Base San Antonio.

"What I see as the state of simulation within the Air Force, or certainly within our portfolio here in Nineteenth Air Force, is that we have a pretty large portfolio of very high-end simulators that are becoming more and more costly to sustain over time," Leard began. "A lot of them are still extremely effective for what they were designed to do, but hard to upgrade and certainly very costly to enhance with the latest technology."

He explained that, at the same time the Air Force is looking at technology upgrades for those simulators, they are also exploring new directions, such as "low-cost simulators" and other immersive training devices that will allow shifting more activity to "the low end" of training.

The net result, according to Leard, would be a "spectrum of devices," ranging from "an individual immersive training device that an individual could use at the house to get repetition" all the way up to actual aircraft.

"What we should be able to do is have enough devices across various price points, where we can train the required competencies on the lowest-priced device. I think, historically, we've put a lot of those competencies in very high-end simulation. And that drives costs of sustainment and recapitalization up over time. But flying hours are only increasing on the actual airplanes, and the required high-end training that we need to do in those airplanes is only increasing. So we've got to push out the events that we don't

Continued on p4



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The Annual I/ITSEC 5K Run/Walk/Roll kicked off bright and early Wednesday morning, when more than 220 participants assembled for the 0645 start.

"This is our seventh one," said race coordinator Sean Osmond of this year's event, adding that it supports two charities – Tunnels to Towers and the I/ITSEC STEM Initiative.



"This is the 20th anniversary of 9/11, so we wanted to recognize the work of the Tunnels to Towers Foundation," said Osmond. The name comes from the charity 5K race they started, going through the tunnels in New York City, he explained. "They've expanded dramatically and have reps all around the country now. They do a lot of really good work in the community to help out first responders, EMTs, firefighters and service members."

The I/ITSEC STEM initiative works to get kids interested in STEM career fields to come into this industry, Osmond said, and to help show students the pipeline for success through college.

Osmond extended a huge thanks to the all-volunteer race crew, who began showing up at 0430 to set up for the participants' arrival starting at 0600.

"We had probably 30-plus people register onsite just this morning, which I think is a testament to the community," he said. "We actually ran out of shirts and medals, but they just came in wanting to donate to the organization. It was also really awesome having the service leads come out. Both the colonel from PM TRASYS and the captain from NAWCTSD came out to help us hand out medals and talk to the community members who were out there."

SHOWDAILY

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THURSDAY, DECEMBER 2

CONFERENCE HIGHLIGHTS

REGISTRATION HOURS

0700-1500 *(South Concourse)*

EXHIBIT HALL HOURS

0930-1500

SIGNATURE EVENT

1030-1200 **Talent Data** *(Room 310AB)*

FOCUS EVENTS

0830-1000 **Next Big Thing: Tech Vision – Innovation Megatrends** *(Destination Lounge)*

0830-1000 **Future of Army Training Enterprise Architecture** *(Room 320GH)*

1030-1200 **Research Foundations and Findings Supporting Augmented and Virtual Reality (AR/VR) Implementation in the Wild** *(Room 329)*

1030-1200 **Iron Dev** *(Booth 781)*

1030-1200 **Accelerating Change or Lose: How Airmen are Leading the Innovative Change Required to Secure our Nation Tomorrow** *(Room 330EF)*

1030-1200 **Joint Cyber Warfighting Architecture Cyber Panel** *(Room 320GH)*

1330-1500 **Digital Twin/Digital Engineering: Multinational Perspectives on Digital Engineering and the M&S Enterprise** *(Room 310C)*

1330-1500 **From the Trenches: An OTA Retrospective** *(Room 310AB)*

COMMUNITY OF INTEREST EVENTS

0830-1000 **NMSG and SISO Partnership in Simulation Interoperability Standards Development** *(Room 310C)*

0930-1430 **Air Force Gaming & Esports Across the Military** *(Booth 1084)*

1330-1500 **Sea Services Live Virtual Constructive Training Environment** *(Room 330EF)*

PROFESSIONAL DEVELOPMENT

0830-1000 **Paper Sessions** *(Rooms 320A-F)*

1030-1200 **Paper Sessions** *(Rooms 320A-D)*

1330-1500 **Paper Sessions** *(Rooms 320A-B)*

AWARDS

1300 **Serious Games Showcase and Challenge Awards Ceremony** *(Booth 2588)*

1800 **Hosted Reception Sponsored by Lockheed Martin Corporation** *(Hyatt Regency Windermere Foyer)*

1900 **Conference Awards Banquet** *(Hyatt Regency Windermere Ballroom)*

Editorial Correction: In Wednesday's *Show Daily*, the name of the Industry Keynote Speaker, Bob Pette, Vice President and General Manager, Professional Visualization, NVIDIA, was misspelled. We regret the error.

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Join us in Orlando for next year's I/ITSEC at the Orange County Convention Center, 28 November – 2 December, 2022, with the theme of ***Accelerate Change by Transforming Training: "It's Time to ACTT!!"***

Air Force... *continued from p1*

need to train in an airplane into simulation."

Kurian provided several examples of innovation as a foundation for future simulator efforts.

"I'm really excited about some of our innovation and SPARK Cell efforts that honor Dr. Roper's [Dr. Will Roper, Air Force Acquisition Executive] leadership for the past few years," Kurian said, highlighting the AFWERX SPARK process that is designed to leverage grassroots innovation to bring tomorrow's tools to the Warfighter today. The program is currently building a network of SPARK Innovation Cells on Air Force bases around the world.

Kurian continued, "In addition, within the Simulators Division here at Air Force Life Cycle Management Center, we have invested with small business over the last couple of years and currently have about 16 Small Business Innovation Research (SBIR) efforts, with some of these SBIR efforts moving toward Phase III. So I think it's really promising to be able to actually see the gap being bridged from just prototyping activities to really demonstrating capability. And then the next phase after that is really trying to kind of link up that capability into a major training system."



Along with these examples, Kurian highlighted the "Innovation Match Game" that was held earlier this week at I/ITSEC.

"That's another example of our strategy to draw more transparency to our investments, trying to get broader industry participation, including our big primes, into the tech base that we've been working on with small businesses," he said. "You saw at least nine companies in the Innovation Match Game process. We highlighted those technologies out there, and I'm really excited about that space."

He added, "And there are other elements, such as Pilot Training Next (PTN), where Colonel Leard is working on a lightweight training ecosystem. We see several of our major command customers moving in that direction in terms of seeking a smaller footprint and supplemental training devices for some of their tasks. We see that with Air Force Global Strike Command and also within Air Combat Command, specifically at Nellis, requesting different types of devices for their mission sets. That's not to say that we're moving entirely away from high-fidelity devices, but I see a market in terms of a variety of immersive-type devices that we expect to procure in the near future."

Asked whether the term "innovation" could be applied to these new immersive devices, Leard replied, "I think people often use innovation as synonymous with technology. And I just don't see it that way. I almost think innovation is more a problem-solving action; getting after whatever the problems are facing us. Some of that involves technologies, to be sure. But some innovation is just using a different way to solve the same problems that we've always had."

Leard continued, "Going back to what Colonel Kurian said about the Nineteenth Air Force, what's the problem that we're getting after? First, while we still and have always produced the world's highest-trained pilots, we know that won't be enough for the possible next fight. How are we going to go about that? And that requires us to have our training produce higher-quality pilots than we have historically. And a piece of that is: what training tools are we providing so that we can get better and more training into a certain amount of time? At the same time, we're not producing the number of pilots that we need in order to fill the cockpits to be able to win that next fight. So both of those efforts come together where we need to use innovation – some are technologies and some are just new programs – to bring in pilots in different ways."

"I agree that innovation is not just purely a technology thing," Kurian added. "General Brown directed a letter to all the Airmen recently, where he defined innovation as evolutionary or revolutionary changes to existing processes, capabilities and mindsets. That's the way he defined innovation. And this letter basically talks about identifying problems, empowering decentralized solutions by individuals and teams and then infusing this ethos of innovation at all levels. And that's really dependent on creative individuals and supportive organizations. So that spans, I think, a lot of different areas beyond just technology."

As an example of new applications of existing technology, Kurian pointed to a new effort by Nineteenth Air Force called Remote Simulator Instruction (RSI). "Currently, the instructors are geographically located with the students in one location. And we're trying to be able to at least leverage our ability to network, with cyber-hardened solutions, to provide instruction from any location versus physically having to be in one location. That networking technology has been there for years, but in terms of this context with a high-fidelity simulator, that's something new for our portfolio."

Kurian summarized, "From where I'm sitting, the Air Force definitely has a culture that encourages innovation. And I think part of the broader challenge we have as senior leaders is really to take these innovative efforts that we see and figure out what that bridge is, in terms of acquisition tools that we have, funding, etc., to make that transition happen. Empowered Airmen is a clear part of that story. And we also have great leaders like General [Craig] Wills [Commander, Nineteenth Air Force], and I've really appreciated his vision of reimagining training for the Air Force at large. So I think that's been great to have those visionary leaders in terms of charting the way for us and giving us that sight picture of where we need to go."

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Marine Corps Needs Identified

During an I/ITSEC 2021 Signature Event described by RADM James Robb, USN (Ret.), President of the National Training and Simulation Association, as "a spectacular hall of heroes," the United States Marine Corps assembled a group of General Officers to share their perspectives on recent Marine Corps training advances and requirements for industry support in the future.

Major General Julian Alford, Commanding General, Training Command, opened the panel with an outline of the size and scope of his command, which trains more than 50,000 Marines each year.

"For me, the center of gravity of Training Command is the instructor," he explained. "We're putting a lot of effort into our 'train the trainer' program and how we turn an NCO or a young officer into a great instructor – what we're calling a 21st Century Learning Instructor. So we're working very hard on that and can probably use industry to help us a little bit."



As examples of early steps, he said that there are very few Marine Corps schools still teaching at the historic ratio of one instructor per 250 to 300 students, citing the example of the expanded 14-week Marine Infantry training program, introduced as a "pilot effort" earlier this year, which has one instructor per 14 Marines.

He noted that one consequence of the new approach is that classrooms once designed to hold 250 students are not conducive to teaching 14. In addition to smaller classrooms, he identified the ubiquitous need to provide WiFi throughout facilities.

"The simulators we have for aviation way outpace what we are doing for our infantry," he added. "But we're changing that. Some examples we're really focused on for infantry training are immersion training…where the Marine is having to operate under stress with loud explosions, lights going on and off and so forth. We're doing that with our infantry Marines. We've got two on the East Coast and one on the West Coast. That's something we will continue to ping industry on to make it more realistic."

Major General Austin Renforth, Commanding General, Marine Air Ground Task Force Training Command and the Marine Corps Air Ground Combat Center, highlighted the "outstanding job" that has been done by the training environment at Twentynine Palms "for replicating the operational environment that Marines were preparing to fight in."



However, he added, "As competitors' capabilities have evolved, and the Marines have turned to the Indo-Pacific, we are focused on ensuring the training environment keeps pace with the operational environment that Marines may potentially face in a future conflict."

As an example of some recent efforts, he described the development of force-on-force exercises called the MAGTF [Marine Air Ground Task Force] Warfighting Exercise (MWX).

"The MWX allows Marines to adapt to a thinking enemy and challenging environment, with an adversary force equipped with capabilities more consistent with the pacing threat," he said. "Additionally, out at Twentynine Palms, we have developed wargames to help identify challenges that commanders may face when conducting operations under future operating concepts."

Brigadier General Arthur J. Pasagian, Commander, Marine Corps Systems Command, elaborated on some of the materiel issues surrounding those concepts. In the case of the Marine Corps' *Force Design 2030*, for example, he said that he is frequently asked whether it is a noun, as in an end-state, or a verb, as in a process. He clarified that it is a verb.

"One thing that we need to focus on in all of this is the individual Marine," he said. "So what have we done there? The answer is, quite a lot. In the last 18-24 months, we have procured a new 5.56mm round, the Enhanced Performance Round. That's distributed Marine Corps-wide. The M27 Infantry Automatic Rifle is pure-fleeted across all of the Marine Infantry. Along with that are optics, suppressors, squad binos, night-vision goggles, personal protective equipment like body armor – I can go on and on. That stuff is not waiting for 2023. It's not waiting for any initial operational capability. It's available tonight! Fight tonight. Ready to go on this first of December, 2021. And that's important, because no matter where we go with force design, modernization has to be perpetual. It's got to be better today than it was yesterday and better yet tomorrow."

Brigadier General Matthew T. "Rush" Mowery, Assistant Deputy Commandant for Aviation, Headquarters, Marine Corps, explained a shift in Marine Corps thinking with the release of *Force Design 2030,* moving away from talking about platforms and focusing instead on talking about capabilities.

"Whereas in years past, we were very focused on something like the F-18 and making sure the F-18 was keeping pace with the threat, we now look at that more as a placeholder for that capability. And once a program or platform no longer meets the requirement for the capability or the need, then we're moving on to something else," he said.

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BAE Puts Wargaming in the Spotlight

BAE Systems [Booth 513] will be demonstrating its Pioneer wargaming capability at I/ITSEC 2021.

According to company descriptions, the integrated, forward-leaning Pioneer prototype is designed to meet the future wargaming requirements of U.S. government customers, providing automated, intelligent and trustworthy wargaming capability across multiple domains including land, air, sea, space and cyber. Pioneer utilizes cutting-edge, explainable artificial intelligence (AI) based on linguistic geometry, machine learning and predictive analytics to deliver a truly immersive environment with critical verified, validated and accredited analytics to provide military leaders with a competitive and information advantage.

BAE Systems has partnered with several industry experts (including ALEX-Alternative Experts, Bohemia Interactive, CAE USA, CESI, Covan Group, NetSimCo, PLEXSYS, Scalable Networks, Stilman Advanced Strategies, Stucan Solutions and 4C North America) to offer integrated technology and predictive analytics-based wargaming solutions that automate planning, execution and post-game analytics.

During I/ITSEC 2021, BAE Systems, together with its modeling and simulation partners, will demonstrate Pioneer's integrated capabilities, including a single-streamlined User Interface, M&S Tools such as LG Raid, EXata, ASCOT7 and VBS4, as well as integrated real-time data analytics. Demonstrations will start with data ingest utilizing the Velocity tool and will cover various wargame scenarios at the strategic, operational and tactical levels. Demonstrators will utilize LG Raid to model ground, air and space operations while EXata will model communications and cyber effects. ASCOT7 will be seen modeling air, sea and subsea operations while VBS4 will demonstrate first person "boots on the ground" battle graphics at the tactical level, tied together with the MSSV Scalable Framework, which enables the tracking of millions of entities. Wargame analytics and metrics will be produced by the Hive analytics tool and all displayed utilizing the integrated Exonaut user interface.

MSBAI to Demo Its All-New GURU Electric Vehicle Simulation Software

MSBAI [Booth 558] is applying its military-grade software technology to the EV market and will offer a demonstration for the first time at I/ITSEC 2021.

The company, which created the simulation accelerator software GURU, announced its application to the world of electric vehicle simulation design.

According to Allan Grosvenor, CEO of MSBAI, "The threat posed by climate change requires a similar effort, part of which will be to design an efficient and electric auto economy. GURU is crucial to the process of gas to electric that will unfold in earnest and reduces the time it takes to build simulations for car designers."

In addition to the electric vehicle market, company representatives add that applications for the new software can include both fighter jet and missile trajectory designs.



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Robb Reflects on I/ITSEC 2021

As I/ITSEC 2021 attendees continued to fill the conference rooms and exhibit hall, Rear Admiral James A. Robb, USN (Ret.), President, National Training and Simulation Association, took a first look back at this year's event, offering his thoughts about 2021 and his perspective toward the future.

"We termed this year a 'recovery show,' based on the fact that we did a virtual show last year," he began. "Our expectation was about an 80 percent solution compared to our last live show in 2019. That was our planning factor."

Robb said that complicating factors on total attendance began with the fact that I/ITSEC decided not to bring in approximately 800 students who have attended in past years.

"Much of the student decision was COVID-related," he said. "We just didn't want to bring that entire group of students into this atmosphere."

He added, "We also took many of the STEM activities virtual this year, because that was a pretty successful part of last year's virtual show. In the process, we also believe that we were reaching more teachers and more students through the virtual / online approach. There is certainly a STEM group with expanded STEM activities here at I/ITSEC, but hopefully there is more STEM going on in sort of a virtual, parallel way. We're experimenting with that this year, and we're going to see what happens."

Robb acknowledged reduction in the number of international attendees present, noting that the traditional quantity of "around 1800" has dropped to approximately 1300.

"That is also to be expected," he said. "But the last time I looked, we still have representation from 48 countries here on site. So that's pretty dramatic. They didn't all get a booth. That's a business decision, and I understand that. But all in all, the core group that comes to the conference is here with full business as usual on the conference side."

In terms of "big pluses" this year, Robb immediately highlighted expanded participation by the government.

"You saw the Navy and the Marine Corps at an extraordinarily high level with a large number of people attending and spending time here," he asserted. "And, of course, we had the Commandant of the Marine Corps and the Chief of Naval Operations. That's a hallmark event for us. It's never happened before. And it surprised me in a time of COVID. That could have been a reason not to come. But the fact is that they both came here, enjoyed their experience here and went away inspired by the size of it. And they tended to say things like, 'I didn't know about this but now that I see it, it's really impressive – and we need to do more about this.'

"I was also excited to hear them say that training and readiness are number one on their list and that they are looking at ways to compete training and readiness with what we call 'the shiny objects,' or the new programs out there that tend to get a lot of spotlight. So we had a great time advocating training and readiness with them."

Another highlight identified by Robb was significant number of high-level panels and special events that took place throughout the week in a packed schedule that he credited to "the draw and the richness of the individuals within the planning committee."

"Our planning team and the execution team are about 300 people who are all volunteers and have done a magnificent job," he continued. "Many of them are new, but I haven't seen any balls hit the ground yet in terms of execution."

Looking ahead, Robb pointed to "some new dynamics" on the show floor, with the presence of what he described as "non-traditional companies" like Unity Gaming, NVIDIA and Microsoft.

"Those companies are normally in the background. They are enabling. And the fact that they have seen value to come here and participate on the show floor means a couple of things. First, they see a market here. Second, the government has demonstrated that they value what they have to offer. And what they have to offer is fairly leading edge. And that's great, since we want to try to motivate and influence the government to move out and take on these new capabilities."

> "The core group that comes to the conference is here with full business as usual on the conference side."

He noted that planning has already begun for I/ITSEC 2022, with hopes that the Air Force and possibly Space Force will participate at the same level as the sea services demonstrated this year.

Robb said that NTSA looks forward to the feedback from this year's attendees and urged exhibitors to consider getting their booths early.

"This week's sales for next year are extremely strong," he said. "We sold out this show floor in 2019, and I bet we do it again in '22."

He concluded, "Debbie Langelier and the extended staff have just done a magnificent job, and I can't thank them enough."

NCS and UCF to Deliver Navy STARBASE Central Florida

The National Center for Simulation (NCS) announced it was selected by the Naval Air Warfare Center Training Services Division (NAWCTSD) to lead the newly established Department of Defense (DoD) STARBASE Central Florida.

In collaboration with the University of Central Florida (UCF) School of Modeling Simulation, and Training (SMST), NCS will form Florida's third STARBASE – a DoD youth curriculum program to promote technological careers and environments modeled in the U.S. military and civilian workforce. This premier educational program gives students the opportunity to participate in challenging "hands-on, minds-on" activities in science, technology, engineering and math (STEM). Students will interact with military personnel to explore careers and observe STEM applications in the real world.

"Coming together as a region to build and host a STARBASE will help our community grow the talent needed in our high-tech industry and is a tremendous example of what we can accomplish by working together," said George Cheros, NCS CEO and President.

Working with Central Florida schools, Team Orlando will teach an established DoD curriculum and customized modeling and simulation program. This curriculum will be a joint effort from an extensive group of peers, which will include civilian, military, academia and modeling, training and simulation (MS&T) experts from the community. "I am proud that NAWCTSD is the first Navy command in 10 years to lead a DoD STARBASE effort and is doing so in collaboration with the National Center for Simulation and the University of Central Florida," said Capt. Dan Covelli, NAWCTSD Commanding Officer. "As a key component of Team Orlando, we are in a unique position to provide curriculum and mentors to program participants."

Grace Bochenek, Ph.D., Director of UCF School of Modeling, Simulation and Training, said, "The award of STARBASE Central Florida

"Coming together as a region to build and host a STARBASE will help our community grow the talent needed in our high-tech industry and is a tremendous example of what we can accomplish by working together."

is gratifying news as we focus on growing our future workforce and giving students the chance to consider a future for themselves in a STEM-related field. It's a critical need, and we are committed to our part at the University of Central Florida School of Modeling, Simulation and Training, to infuse technology and provide stimulating projects and learning opportunities for the next generation."

Central Florida STARBASE joins Jacksonville and the Space Coast as the STEM outreach effort expands across Florida. The program provides students with 25 hours of stimulating experiences at National Guard, Marine, Air Force Reserve, Army and Air Force bases across the nation.



ECS Delivers Haptics-Based VR Training for Burn Care Treatment

Engineering & Computer Simulations (ECS) [Booth 1235] has delivered "Advanced Haptics Development to Support Medical Simulated Training Environments" as part of a Phase II Small Business Innovation Research (SBIR) project for the Defense Health Agency. This project includes the design and development of haptics-based virtual reality (VR) training systems to support combat medicine within the U.S. Army's Synthetic Training Environment (STE) and allows for potential expansion to the broader medical community.

Led by Shane Taber, ECS Vice President of Operations, Orlando, this research project has been designed as an extension of Tactical Combat Casualty Care Simulation (TC3Sim) and has been implemented using the baseline of multimodal, haptic-based VR research scenarios developed from TC3Sim. The SBIR project features a multiplayer teleteaching capability for the synchronous training of students while an instructor can be observing and providing increasing levels of intervention to guide students on the procedure. The system also supports a single player experience for new users or those requiring refresher training.

"We are proud to provide this innovative medical training to our Soldiers within the Army's STE systems," said Waymon Armstrong, ECS CEO and President. "The integration with haptic devices offers a sense of touch and natural interactions within the immersive environment, which strengthens the quality of the training and the users' retention. When applied in almost any medical scenario, this enhanced training can provide all healthcare professionals – in the government or industry sectors – with the tools they need to potentially save more lives."



During the first year of the study, the ECS team worked with medical professionals at Mayo Clinic in Jacksonville, Florida, to perform a literature review and to design the scenario for instructors and students to address escharotomy, a critical burn-care treatment. ECS developed the scenario as a prototype system to demonstrate how learners can effectively collaborate using multiple modalities within the medical environment with support from haptics devices to learn potentially lifesaving techniques. ECS partnered with HaptX to integrate their DK2 haptic glove system into the VR-based training scenario for escharotomy. Upon completing development, ECS successfully conducted a usability study at Mayo Clinic Jacksonville for future research and development and to capture feedback on the technology and training approach based on a prototype training scenario.

Within the scenario, users are presented with a simulated burn patient, with which they can directly interact to perform the escharotomy. Running in a VR scenario including interaction with the patient's leg, marker, scalpel, iodine and cleaning pads, the trainee completes the procedure individually or with a live instructor's assistance. Next, the player may independently review their overall performance or while collaborating with an instructor regarding feedback and areas for improvement.

During the second year of the SBIR study, the ECS team will continue its research expanding the scenarios to the point of injury in the battlefield for Combat Life Saver and Care Under Fire training. This SBIR will culminate with a training effectiveness evaluation to determine the learning value and engagement for learners as compared to other methods of training.

"We're excited to contribute to this body of research related to human performance and training effectiveness for both the military and medical communities," said Taber. "By collaborating with HaptX and Mayo Clinic, this type of innovative work advances high-fidelity VR training by combining the state-of-the-art hardware and software solutions."

5G Network Demonstration Links I/ITSEC Displays

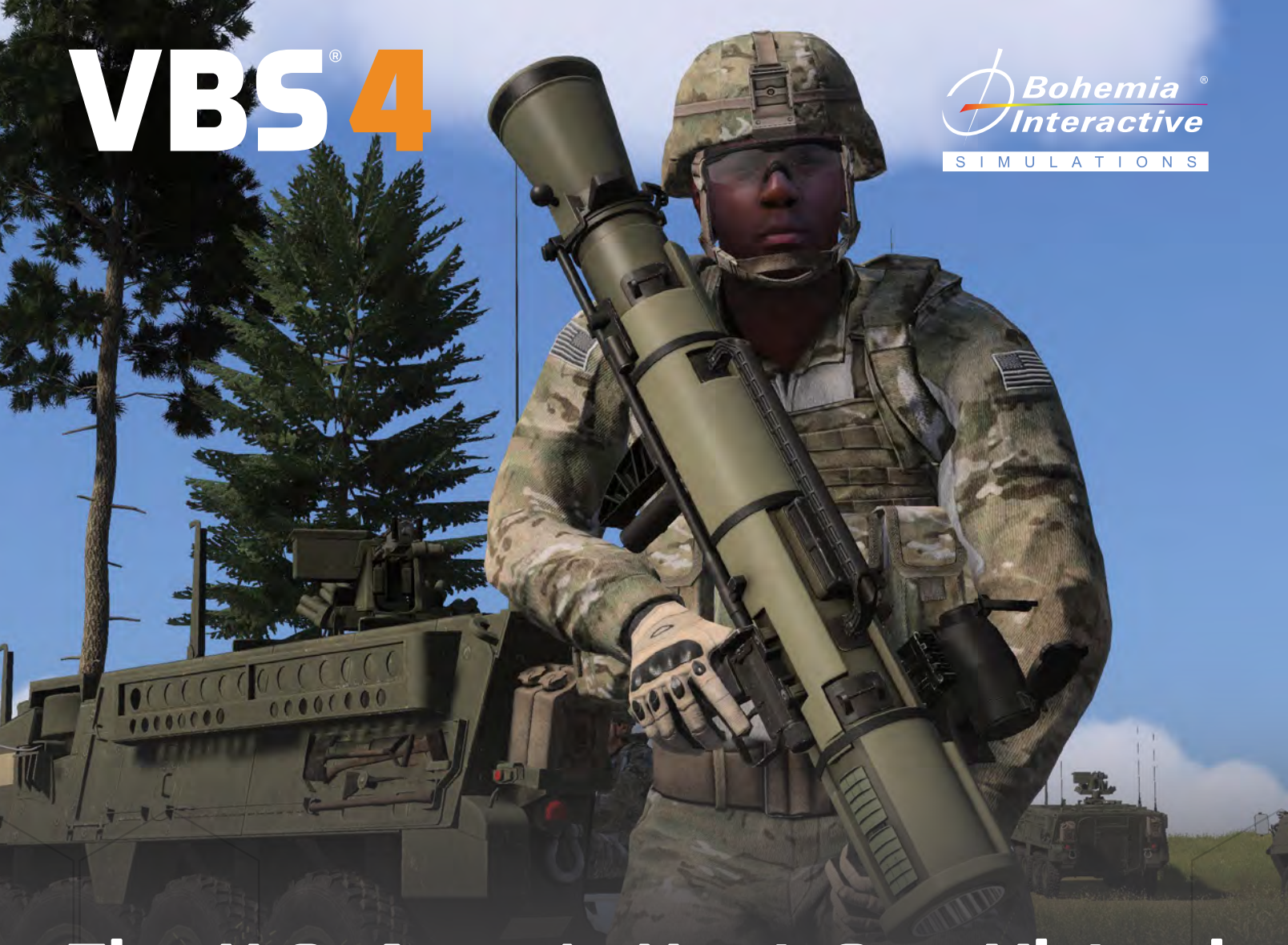
Kratos Defense & Security Solutions, Inc. [Booth 1322] is joining in a multi-domain, immersive training demonstration linking multiple vendor booths over 5G into a collective immersive whole. Real-world implications include the possibility of networking multiple components, each at its point of need, being networked together through 5G for joint training.

The I/ITSEC Exhibit Hall scenario involves a helicopter gunship directed by a ground-based forward observer pursuing a truck-mounted gunner adversary. Two immersive Holodecks in the Kratos booth – one for an UH-60 helicopter Aerial Gunner and one for a Forward Observer/Joint Terminal Attack Controller (JTAC) station – are connected to two partner booths; RTI [Booth 1307], where the UH-60 pilot flies the aircraft simulation in the Kratos booth, and Rave Computer [Booth 3018], in which an adversary truck-mounted gunner joins the collective training environment.

Kratos representatives say that the networking demonstration utilizes a Common Communications Architecture (CCA) that includes a Data Distribution Service (DDS) to integrate 5G Communications with its immersive training systems.

The capability for real-time distributed immersive training will be demonstrated across three booths at I/ITSEC, including partners RAVE Computer and Real-Time Innovations (RTI) [Booth 1307].

Company representatives describe CCA as a scalable, platform agnostic, data-centric architecture using open standards and a DDS to enable delivery of low latency, ultrareliable, secure communications across multiple networks, including 5G, satellite communications (SatCom) as well as public and private networks.



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With VBS4, any soldier can create high-fidelity virtual training. No experts needed.

VBS4 is a whole-earth virtual and constructive simulation that allows military units to create and run any imaginable military training scenario. VBS4 and BISim's other main products (VBS Blue IG and VBS World Server) have been selected for significant parts of the U.S. Army's overall Synthetic Training Environment, the next generation of collective training technology.

- **Train Anywhere -** VBS4 includes global terrain, enhanced with real-world metadata. Use as-is, enhance or import your own data.
- **Easier to Use & Faster -** Non-engineers can build missions 10-30x faster & edit terrains 10x faster in VBS4 vs. VBS3.
- **Train at Scale -** Simulate more dynamic & complex environments with thousands of friendly, OPFOR & civilian entities.
- **Improved Classroom Efficiency -** Start up VBS4 in seconds. Store and manage data centrally with VBS World Server.
- **Simplified Content Import -** Use industry-standard 3D tools to simplify the process & cut time for adding new VBS4 content.

See VBS4 @ I/ITSEC Booth 1071

Contact sales@bisimulations.com to learn more. **bisimulations.com**

MVRsimulation

Build your own networked training environment

Modular | Networked environment | Quick deploy

Build fully-deployable, networked training environments for JTACs, Forward Observers and fixed-wing aircrew with MVRsimulation's low-cost, portable simulator systems.



Above: The PTMT can be networked to function as an additional aviation role-player station as part of the DJFT, or function as the Aircrew station.

Opposite, top left: A DJFT Observer station JTAC trainee looks through the Varjo XR-3 headset at the VRSG scene displayed in the emulated SOFLAM. In the mixed-reality environment, users can interact with both the equipment and the virtual world.

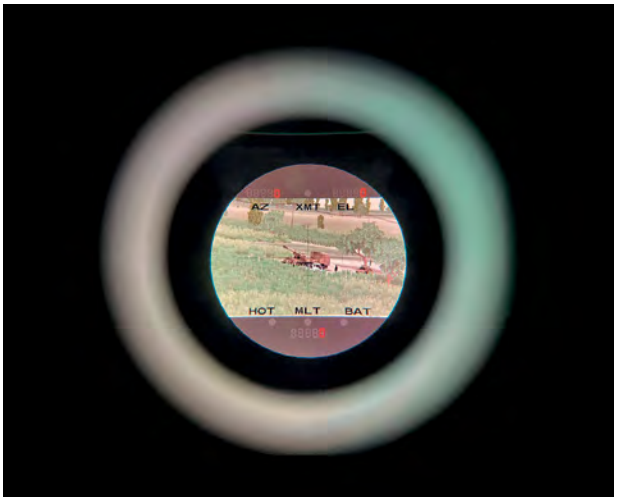
Opposite, top right: VRSG-driven view seen through the lens of the simulated SOFLAM of the DJFT.

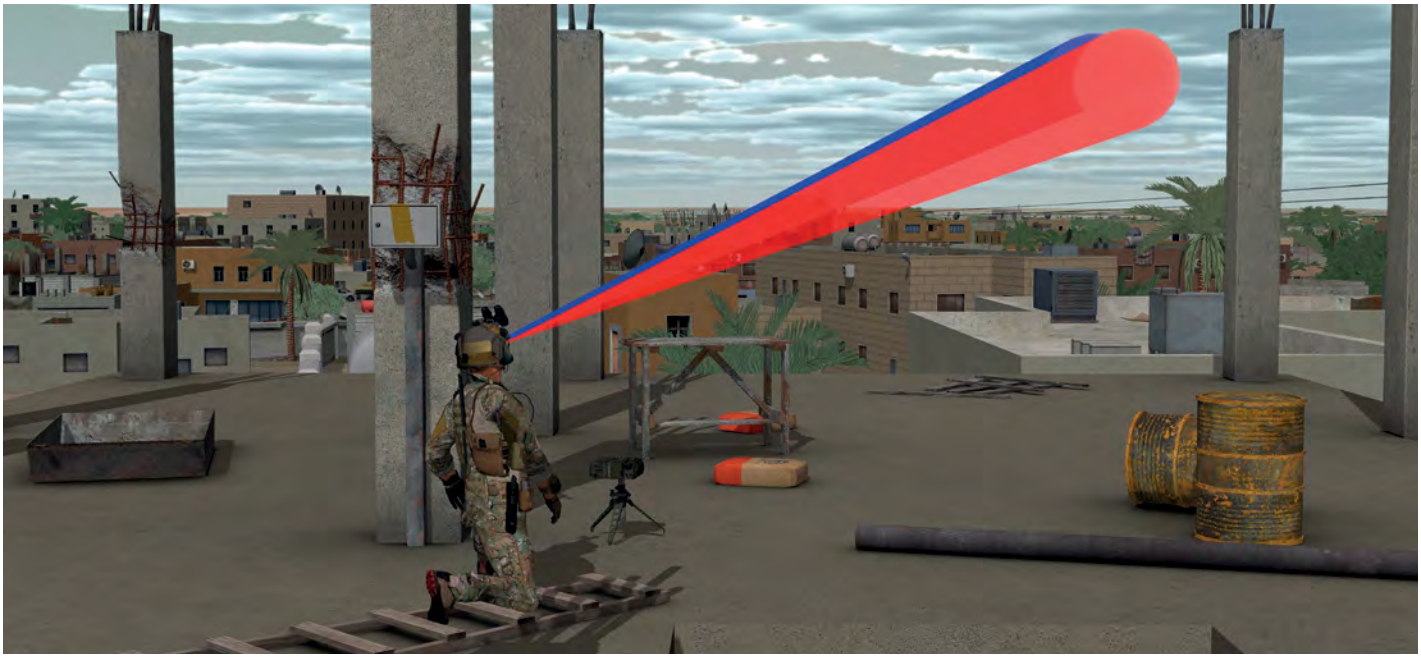
Opposite, bottom: The JTAC trainee's eye gaze captured by the Varjo XR-3 helmet and rendered in VRSG as a 3D, color-coded cone.

MetaVR has changed its name to MVRsimulation to align more closely with its growing suite of simulation products.

MVRsimulation







Mixed reality | Plug-and-play | Self-contained

Virtual Reality Scene Generator (VRSG) creates a 3D, geospecific world in which users can conduct joint training operations using the Deployable Joint Fires Trainer (DJFT) networked with the Part Task Mission Trainer (PTMT). Delivered in reusable, ruggedized cases/crates and containing all notional equipment, hardware and software (including Battlespace Simulations' MACE), users can build mix-and-match capability to run dynamic mission training scenarios anywhere, any time.

See the PTMT in the Varjo (#3010) and Battlespace Simulations (#1049) booths at I/ITSEC 2021.

www.mvrsimulation.com

The MVRsimulation logo and Virtual Reality Scene Generator™ © 2021 MVRsimulation Inc.



Scenes from I/ITSEC 2021

















Panel Explores Paradigm Shift in Military Training

An impressive panel of training experts addressed a range of evolving training challenges during a Wednesday afternoon I/ITSEC 2021 Signature Event, titled "A New American Way of Training."

As outlined by moderator Christopher Dougherty, Senior Fellow, Center for a New American Security (CNAS), the panel was designed to "discuss the challenges posed by China and Russia and opportunities presented by new technologies.

"We really think it has opened up a paradigm shift in military training," he said, noting that many of the panel findings reflected a yearlong CNAS study exploring a rethink of the way the United States trains its armed forces.

Jennifer McArdle, CMSP, Adjunct Senior Fellow at CNAS and Product Strategist for Improbable, opened the panel with a review of some of the historical military training shifts that occurred during the Cold War, from the Navy's "Top Gun" School, to the Air Force's "Red Flag" exercises, to the Army's Combat Training Centers and force-on-force training opportunities.

Looking toward the future, McArdle posited six issues that she said could "serve as starting points for training reform."

The list included training for degradation dominance, training for lack of sanctuary, training for contested logistics, training for protraction, training for lack of all-domain dominance and training across all instruments of national power.

In the case of training for protraction, for example, she offered, "The Pentagon has begun to think very deeply about how we may prevail in the opening stages of a conflict against Russia or China. But wars between great power competitors rarely end up with the first battle. So the DoD must prepare for a grinding, multi-theater conflict that could drag on for months or even years. So this requires us to inculcate a certain mindset in the joint force, one of resilience but also adaptability."

Another panelist was Admiral John Richardson, USN, (Ret.) former Chief of Naval Operations, who drew on his own extensive military command and training background to present a visual training environment represented by "three adjustable knobs." The first knob represented the degree of fidelity in the training scenario, with the caution that the higher end of fidelity usually translates to higher cost. The second knob reflects the number of people being trained or the scope of the training theater. The third knob translated to the difficulty of the actual training scenario.

In addition to those three knobs, Richardson described the recent addition of a fourth knob in training, reflective of the growth of artificial intelligence.

Additional panelist perspectives were provided by General Paul Funk, USA, Commanding General, U.S. Army Training and Doctrine Command, General Mike Holmes, USAF (Ret.), Former Commander, Air Combat Command and Kimberly Jackson, Deputy Assistant Secretary of Defense for Force Readiness.



NTSA 2021 Modeling & Simulation Award



NTSA 2021 Lifetime Achievement in Modeling & Simulation in Government

Richard Grohs

ACC/A5T TEST AND TRAINING DIVISION

Richard Grohs, Air Force Veteran, Deputy Division Chief, and 25-year I/ITSEC Subcommittee Member has spent five decades influencing DoD-wide synthetic training to enable combat readiness. From his early years as a simulator technician, to building the CAF Distributed Mission Operations Network, and leading efforts to 5th Gen Live-Virtual-Constructive training, Rich is the expert in Air Force Operational Training Infrastructure. His words and actions have contributed significantly to the advancements in training to meet Warfighters' needs.



NTSA 2021 Lifetime Achievement in Modeling & Simulation in Industry

Andre Elias

LOCKHEED MARTIN CORPORATION

Andre Elias shepherded the future of simulation to improve military training throughout his 40-year career in the modeling and simulation industry. His contributions increased concurrency between platforms and simulators to create the most effective training programs – bringing about a revolution in how military personnel train for the fight. His life's work increased the mission readiness of countless service personnel worldwide.



Education and Human Performance

CK Team

CONFLICT KINETICS CORPORATION

Conflict Kinetics (CK) is a patented human-performance company specializing in small-arms simulation and the elevation of the Human Weapon System, backed by data for the life of the trainee. CK is rooted in decades of HPO and data, delivering extensive readiness and talent management data processes. USMC's MCOTEA assessment of CK's ASALT found that CK's training methods produce trainees capable of handling increased cognitive load and emotional modulation, thus delivering trainees 116% more lethal than advanced live-fire training.



Training Systems Acquisition

Study and Analysis Squadron's Training Requirements Analysis Team

AIR EDUCATION AND TRAINING COMMAND STUDIES AND ANALYSIS SQUADRON, UNITED STATES AIR FORCE

The Training Requirements Analysis Team, Air Education and Training Command Studies and Analysis Squadron, Joint Base San Antonio-Randolph, Texas, is the Air Force's sole training systems requirements analysis team advancing Air Force weapon systems acquisitions valued at more than $189 billion. During this period, the team implemented innovative approaches to determine training requirements, services and acquisitions of training modalities required to train Generation Z/Alpha maintainers on six weapon systems critical for the future operational environment.

Winners Announced at I/ITSEC 2021



Training and Simulation

Detachment 24, Pilot Training Next

NINETEENTH AIR FORCE

Detachment 24 serves as the heart of innovation and is the driving force behind multiple U.S. Air Force innovation efforts. It has delivered a lasting and widespread impact in the aviation industry and will continue to do so into the next generation of flight training.

All award winners pictured with Rear Admiral James A. Robb, USN (Ret.), President of the National Training and Simulation Association.





Spotlight Shifts to Personnel Data

In the aftermath of Tuesday afternoon's Chief Data Officer Special Event, this morning's I/ITSEC spotlight shifts to the implications surrounding personnel data in the management of human talent [Signature Event: Talent Data, Thursday, 2 December, 1030-1200, Room 310AB].

"In Tuesday's Chief Data Officer panel, we explored the criticality of modernizing our data systems," explained Dr. Sae Schatz, Ph.D., Director of the Advanced Distributed Learning Initiative and moderator for both special events. "Similarly, the digital modernization needed to support that is applicable across every functional area. Now, let's take a step back and look at how that applies within the personnel space. Across all of our talent management, how do we better leverage data to get to that human capital readiness?"

She continued, "If you look at our workforce today, not just the DoD workforce but also any company or university, it's really tough to find good talent. And part of the reason is that the expectations for most of our people are just expanding."

To illustrate the point, she offered a military example where an individual is no longer expected to simply move, shoot and communicate but also possess knowledge of cybersecurity, basic casualty care and possibly a second language.

"Similarly, we're asking everybody to have a lot more sophistication of their capabilities," she asserted. "It used to be, 'Hey, I need to have good decision making.' But now it is 'I need to have good strategic decision making, I need to have cultural awareness, I need to have jointness,' all of these much higher levels of competency required. This is also true on the technological piece – so not just being able to use a computer, but data and digital literacy and understanding the basics of AI. These are all becoming common requirements for a lot of jobs. And, similarly, all of those specialty areas are constantly evolving."

Offering parallel examples across industries, Schatz added, "If we can start to be more data driven in what the different jobs are and where the open billets are, then we can start to leverage automation to help us make those decisions."

She pointed to the members of today's panel, highlighting expertise ranging from DoD to the U.S. Chamber of Commerce.

"This is not just a DoD problem," she said. "This is a society-wide problem: talking about how we can better leverage data, and all the things that necessarily go with it, for this talent space."

MODERATOR

- **Sae Schatz, Ph.D.**
  Director, ADL Initiative

PANELISTS

- **Lora Muchmore, SES**
  Chief Innovation Officer, Office of the Department of Defense Chief Information Officer
- **Lieutenant Colonel Kristin Saling, USA**
  Chief Analytics Officer, Army Talent Management Task Force and Acting Director, Army People Analytics
- **Chief Master Sergeant Erik C. Thompson, USAF**
  Command Chief, Air Education and Training Command, Joint Base San Antonio – Randolph
- **Jason R. Weiss**
  Chief Software Officer, Department of Defense
- **Naomi O. Szekeres**
  Principal, Pensarus, Senior Advisor, Public Consulting Group

The Netherlands Acquire Enterprise License for VBS4

Bohemia Interactive Simulations (BISim), [Booth 1071] a global developer of advanced military simulation and training software, announced at I/ITSEC 2021 that the Netherlands MOD acquired an enterprise license of VBS4. The enterprise license provides the Netherlands' military forces across the country and at their international locations with full access to BISim's easy-to-use, whole-earth virtual and constructive desktop trainer and simulation host.

The Netherlands' military has long been on the leading edge of virtual training, having first purchased an enterprise license of VBS2 in 2011 after several years of deploying the software on a smaller scale. They continued to expand their use of virtual training with an upgrade to VBS3, including several extensions of their enterprise license and maintenance through the years. The Netherlands also contracted BISim to develop new specialized 3D content and capabilities in support of its training requirements.

Increasing VBS3 usage within the Netherlands military led to VBS3 being secured within the Dutch Defense IT infrastructure via a specially set-up internal project. Using decentralized server elements, VBS3's implementation was optimized, and the Dutch MOD's project team is looking forward to implementing VBS4 into the IT infrastructure as well.



VBS4 is packed with capabilities to support large-scale, combined-arms virtual scenarios and hundreds of authentic military training uses. It allows users to create and run a vast range of military training scenarios anywhere on Earth.

The enterprise license also provides the Netherlands with access to BISim's VBS Simulation SDK, which includes a library of application programming interfaces and source code that allow developers to customize virtually every aspect of VBS4 to produce custom applications. Additionally, through the enterprise license, Netherlands' military users have access to BISim's VBS4 Bundle, providing additional modules to enhance VBS4's capabilities.

Norxe Releases Full Suite of 4k Projectors for the Simulation Display Market

Norxe [Booth 2208] has continued to innovate and invest in their true solid-state, high-brightness projectors, leading to the release of a suite of three 4k projectors that enable the widest types of simulation and displays in myriad military training environments. The company has worked closely with its clients, both industry and military, to incorporate their requirements into the latest releases.



Company representatives note that the 4k projection ranges, P50, P60 and P65, are at the spearhead of LED and laser technology, with low maintenance and superior colors built into compact form factors. They are perfect for physically demanding applications and difficult installations where system stability is key and maintenance and re-calibration need to be reduced to a minimum. The Norxe 4k series is also designed to support 4k applications now, and then 6k and 8k in the future.

The first, and only, scheduled maintenance on the whole 4k P-range occurs after 50,000 hours, and the 5-year standard warranty can be extended up to 10 years. Further to this, the entire series is included in Norxe's 24/7 warranty, providing the customer with superb peace of mind when delivering operationally critical training either in the field or in the classroom.

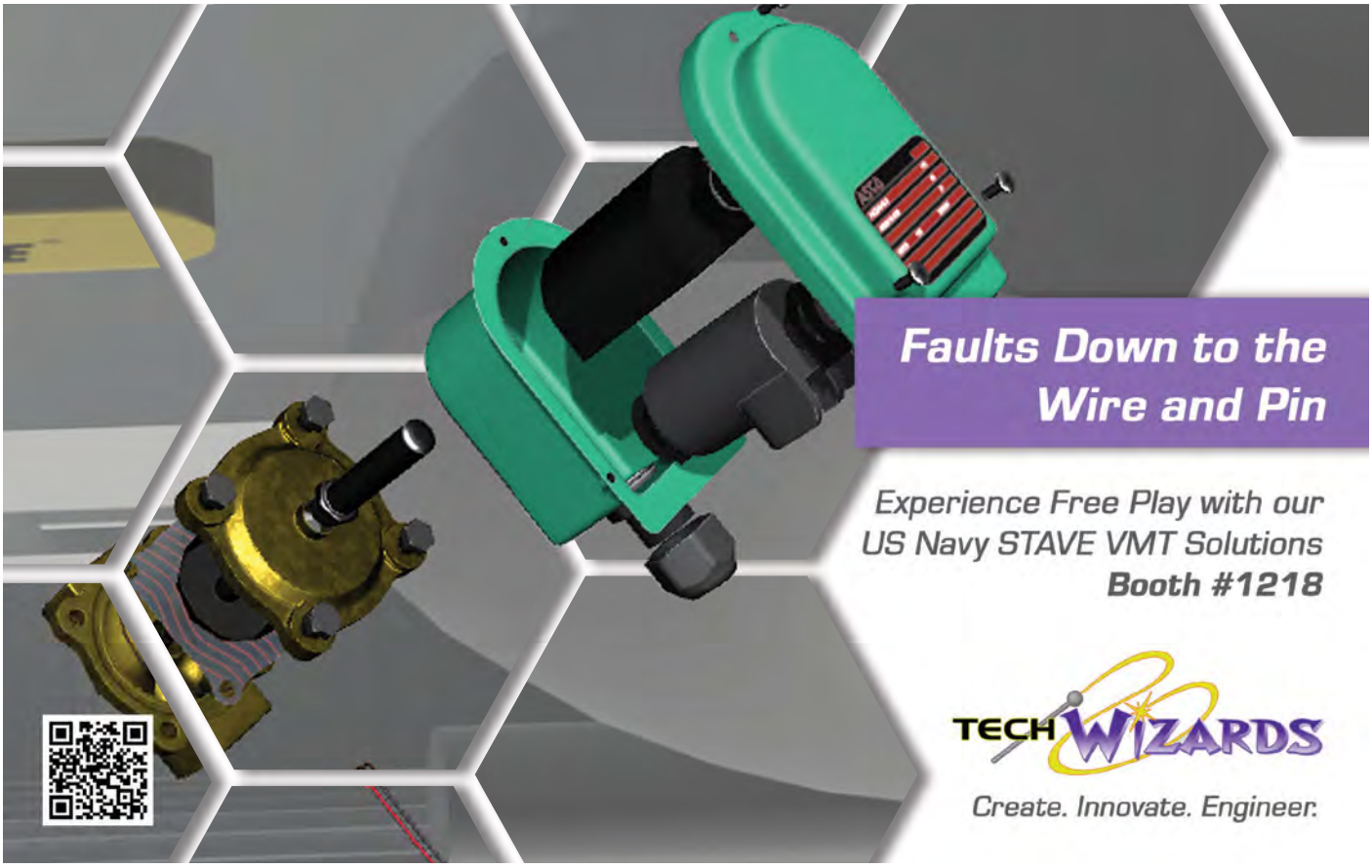
A sneak peak at the 4k P50, P60 and P65 collection highlights:

The P50 is the world's smallest native 4K DLP projector, weighing only 18.5kg/41lbs, making this projector suitable for the most awkward of training environments while still being driven by the new UnifyTM electronics platform, 2,500 RGB lumens, with a quad DP1.4 interface. Unify electronics offers embedded warp and blend and support a refresh rate up to 240Hz at full Native 4K resolution.

The P60 at 4,500 RGB lumens, provides an outstanding display for all but the very highest of display demands in training delivery. Like all other P-series projectors, it is illuminated by the company's new Dual NXLTM hybrid light source. The P60 is perfectly suited for both front and rear projected systems. It's a true solid state illuminated product and designed for fixed and motion-base applications.

The P65 is the only native 4K single chip DLP projector on the market with direct RGB laser illumination. Boasting 5,500 RGB lumens and a near REC.2020 color gamut, the image produced by Norxe P65 is extremely vivid.

Espen Olsen, Vice President and Co-Founder, explained, "We are quietly very proud of our team, our continued determined innovation and the delivery of this key suite of 4k projectors after the most trying of years."



Lockheed Martin Introduces New F-35 Trainer

With the much-anticipated resumption of a live, in-person I/ITSEC this year, the Lockheed Martin exhibit [Booth 1748] is highlighting technologies that showcase the depth and breadth of its portfolio with more than 10 demonstrations.

And, for the first time, visitors can experience the new F-35 Mission Rehearsal Trainer (MRT) – Lightning Integrated Training Environment (LITE) – a portable, low-footprint trainer prototype that can be configured to meet multiple-use cases to include a desktop version or a cockpit for higher fidelity training at the point of the need, according to Chauncey McIntosh, Vice President, Lockheed Martin Training and Logistics Solutions.

"This simulator does not sacrifice realism or capability for a reduced footprint, and can use Distributed Mission Training capability to connect with other simulators for integrated training," he said. "In fact, in our I/ITSEC exhibit, we will have land, flight and maritime trainers integrated in a multidomain battlespace."



Other booth highlights include containerized training solutions (Reconfigurable Vehicle Skills Trainer) and Extended Reality systems (Tactical Decision Kit and F-16 Pilot Training Aid).

McIntosh attributed the selection of these technologies and capabilities to spotlight at I/ITSEC 2021 to user feedback. "The input we are receiving from our customers reflects the importance of joint operations, providing connectivity as well as concurrency, and the ability to reconfigure the asset at a lower cost solution," he said. "To be responsive, we focused on technologies that demonstrate the range of the Lockheed Martin portfolio: from preparing pilots and maintainers to train as they fight, to increase mission readiness for joint operations, to enabling Soldiers, Sailors, Airmen and crews to quickly pivot as the threat environment changes. Our mission is to provide our customers with innovative training solutions that take full advantage of these emerging technologies."

Emphasizing the importance of returning to a live I/ITSEC, McIntosh said, "We welcome this opportunity and look forward to engaging with our customers, suppliers and partners at this important event. Guests to the Lockheed Martin exhibit can experience the future of training across all domains." Expanding on that message, he offered, "The future of training is integrated systems, and Lockheed Martin is the world's leading provider of total weapon systems that span the platform, training and sustainment. When it comes to Lockheed Martin aircraft, such as the F-35, F-16 and C-130, and our Sikorsky rotary-wing portfolio, there's no better option than Lockheed Martin training."

McIntosh added that for all Lockheed Martin products, they believe they are the right training solution due to their integration and relationships across the company, providing proven capabilities quickly and affordably through the integration of transformational technologies to meet customers' specific needs. Citing the F-35 MRT – LITE as an example, McIntosh said, "Based on the customer's feedback, Lockheed Martin rapidly prototyped a portable, small-footprint trainer and matured a system that can grow with the customer's needs and ever-expanding missions."

McIntosh underscored the company's commitment to innovation. "Distributed mission training; augmented, virtual and mixed reality; artificial intelligence; digital twin and other transformational training initiatives increase training and sustainment effectiveness," he said. For example, he added, "Lockheed Martin is the largest land-training simulator provider to the U.S. Army, delivering the most advanced live-fire ranges and solutions for more than 20 years. We're continuing to advance our technology and partner with the U.S. Army to modernize its training capabilities such as virtual vehicle training and digital ranges, and are developing Next Gen live and virtual solutions."

Continuing his message, McIntosh concluded, "Additionally, across our business, Lockheed Martin is transforming with urgency to deliver the speed, agility and insights our customers need to stay ahead of rapidly evolving threats. Through new innovations and partnerships, we're accelerating 21st Century warfighting capabilities to support our customers' national security missions."

Veraxx Wins $46M Marine Corps Aviation Distributed Virtual Training Environment (ADVTE) Unrestricted Contract

Veraxx Engineering Corporation [Booth 1801], a provider of high-fidelity training devices and solutions for U.S military and international pilots and aircrew, has won a $46M contract to provide technical upgrades and enhancements for the Marine Corps Aviation Distributed Virtual Training Environment (ADVTE). This contract was competitively awarded from an unrestricted competition.

The ADVTE is a persistent, closed-loop, network-customized training solution that enables geographically dispersed training systems to participate in integrated and networked virtual training events. In addition to providing technical upgrades and enhancements, Veraxx will also sustain ADVTE equipment including network exercise control centers, common virtual training areas and other related aviation training equipment. Work will be performed in North Carolina, South Carolina, California, Florida, Arizona, Hawaii and Japan.

"Veraxx has provided technical support for U.S. Marine Corps' networked and integrated training for more than 20 years. We are proud to have earned this opportunity to continue enhancing and evolving ADVTE and will continue to work closely and collaboratively with the Marines and our acquisition community teammates in doing so," said Chris Conrad, CEO of Veraxx.

Vcom3D Launches IMPACTT Immersive Modular Patient Care Team Trainer

Vcom3D [Booth 2081] announced the launch of its IMPACTT medical simulation product line, which enables learners to train in-person or join training sessions from remote locations using their own PCs.

IMPACTT products are designed to fill gaps in team training by improving communication and collaborative decision-making skills necessary for patient management, delivering high-fidelity, low bandwidth, virtual simulations for medical teams training in austere to definitive-care environments, including emergency room and prolonged casualty care.

IMPACTT On-Site Team Trainer is a commercially available product that seamlessly integrates Vcom3D's Compact Core (Blue Box) with a PC-based Virtual Patient System and ten Android tablets for learner participants, medical equipment simulations, lab reports, and instructor control and assessment. Learner tablets enable students to perform such roles as physician, nurse, technician or respiratory technician, and carry out more than 150 interventions with results displayed on both the learner tablets and a large-screen shared view.

IMPACTT Remote (Virtual) Team Trainer seamlessly links geographically remote sites to train participants as a team. The software application includes the same capabilities as the IMPACTT On-site system, but is PC based for all participants.



General Dynamics Mission Systems Continues Forward-Leaning Strategy

Representatives for General Dynamics Mission Systems (GDMS) [Booth 2348] are quick to highlight the company's strategy, program progress, supporting investments and remaining challenges as I/ITSEC transitions to a post-COVID environment.

"We were somewhat forward leaning and thinking when we did I/ITSEC in 2019," observed Roger McNicholas, Vice President of the Training, Testing and Efficiency Solutions Business Area within the Ground Systems Line of Business of GDMS. "We had that show in the end of '19 and everybody went home for Christmas, but they didn't come back, because of COVID."

Highlighting this year's return to the live I/ITSEC venue, he added, "The people have now come back, but we have a completely different group of people in many positions. And, as a result, one of the dilemmas that we face is one of education. There are folks now who don't really even know how the MILES [Multiple Integrated Laser Engagement System] stuff works, how our software plays in that environment and many of the things that we've been doing with leading-edge technologies."

To illustrate his assertion, he offered the representative example of Common Training Instrumentation Architecture (CTIA), one of the three architectures defined by the U.S. Army's Live Training Transformation (LT2) product line and used by LT2 products to define interoperability standards among live training applications to support force-on-force and force-on-target training.

"There are some people who don't know that CTIA is government-owned software," he said. "Literally, some people believe that it is proprietary."

McNicholas shifted from the challenges of educating a restructured workforce to identify a number of company changes and milestone accomplishments since the last live I/ITSEC gathering in 2019.

"At that time, we were in competition for the re-compete on PEO STRI's [U.S. Army Program Executive Officer for Simulation, Training and Instrumentation] Consolidated Product Line Management program (CPM)," he said. "We won that very early in 2020, and we've been working with all those developers at their desks at home to finalize and further our progress in taking all that software and making it what we call 'cloud native,' so that it is fully capable and ready to run on the latest Amazon GovCloud, etcetera, so that we can run training events from anywhere in the world and to anywhere in the world."

He also identified several new products and capabilities that are on display in the company's booth at I/ITSEC 2021, such as new training capabilities for indirect fire systems, like the M320 grenade launcher.

"We believe that one of the most significant problems with MILES, as it sits today, is that half of the Army's training systems can't be used in the training event; they don't fire in a direct line, so you can't use the laser. So, by adding the 'e-bullet' capability and continuing to work on that and refine its accuracy and its abilities, we can now start to look to those devices and realize that vision of adding all those other weapons systems into the training event that they could never do before," he said.

In another example, he highlighted the company's efforts, working together with Cubic Corporation, to port newly developed open software into current MILES hardware to create a hybrid solution of existing and new training hardware options to provide customers with more choices.

Also in the booth is the company's Real Time Casualty Assessment capability, a "life model" with mobile application that improves the accuracy of weapon systems and simulated casualty effects, based on the integration of things like One World Terrain objects.

"Today, at the beginning of an exercise at the Combat Training Centers, participants are handed a 'casualty card' that they stick in their back pockets," said Brandy Castle-Ges, Director of Strategy and Business Development for the business unit. "They're not supposed to look at the card, but of course some do. And they know that, if they get hit, either they're 'killed' or they get 'resurrected.' So this brings much more realism and forces them to continue playing out what would really happen on the live battlefield."

Looking toward the future, McNicholas said, "I think some of the things that you'll see from us reflect the fact that we've been listening very carefully to the customer relative to how we start to add augmented reality into the battlefield to allow the incorporation of new weapons. For example, if you're going to use an M320 grenade launcher, how do you see where the grenade landed? How do you 'walk it' onto the target?"

"There's really more than meets the eye when you come to our booth," Castle-Ges concluded. "What GDMS really offers to our partners and our customers is a long-term relationship where we're invested in successfully achieving that mission to deliver to the Warfighter. And, to that end, we've been investing in that architecture. Architecture isn't something you can walk into our booth and see. But you see it in our ability to quickly and economically deliver capabilities."



MVRsimulation Integrates Part Task Mission Trainer with Varjo XR-3 Headset

MVRsimulation has integrated the Varjo XR-3 mixed-reality headset into the fixed-wing Part Task Mission Trainer (PTMT), increasing suspension of disbelief for military fixed-wing pilot training. The PTMT with integrated Varjo XR-3 headset is being demonstrated at Varjo [Booth 3010] and at Battlespace Simulations [Booth 1049] at I/ITSEC 2021.

MVRsimulation designed and built the PTMT to provide a very low-cost, quick-deploy cockpit training solution to fill the gap in current in-use mission tactics training systems for military fixed-wing pilots. The system aims to maximize suspension of disbelief for trainee pilots as they practice mission tactics and coordination in joint, networked environments. It can also operate as a standalone training solution.

The PTMT comprises an all-welded aluminum structure fabricated in the United States, a fully integrated cockpit shell, a curved display and notional aircraft hardware represented by touchscreen displays for pilot interaction. The PTMT can be configured for training for 3rd and 4th generation combat aircraft currently used by NATO nations, thanks to its specially designed, patent-pending flight control stick that can be easily adjusted between side-stick and center-stick positions.

When integrated with the XR-3 headset, pilots are fully immersed in the real-time, 360° virtual world created by MVRsimulation's Virtual Reality Scene Generator (VRSG) high-resolution, geospecific terrain and 3D models, while still being able to interact with physical equipment in the real world. Computer-generated/semi-automated forces are managed via integration with Battlespace Simulations' MACE [Modern Air Combat Environment], allowing solo or networked trainees to practice mission tactics in peer and near-peer complex training scenarios, such as penetrating advanced adversary air defenses, air-to-air/air-to-ground engagement and achieving and maintaining air supremacy.



The XR-3 integration also enables a real-time, pilot-eye gaze tracking facility. VRSG harnesses the XR-3 headset's built-in, real-time 200 Hz pupil-tracking capability that can precisely capture even the smallest eye movement of the wearer when training in virtual reality and mixed-reality environments. VRSG then exports this data via DIS as a PDU log at the end of the training mission, and visualizes the pilot's head position, orientation, and gaze vector (with the gaze of each eye depicted as a color-coded cone) over the events.

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For more information, please visit **NSTA.org/CMSP** or contact Carol Dwyer at **cdwyer@NTSA.org**

DARPA Selects SoarTech to Measure Human – AI Trust

SoarTech's [Booth 239] TrustMATE technologies for data collection, autonomous systems, speech recognition and intention interpretation, and modeling and simulation were used in its Phase I efforts on the Defense Advanced Research Projects Agency (DARPA) Air Combat Evolution (ACE) program.

Specifically, Technical Area 2 (TA2), ACE – Trust and Reliability in User-System Teaming (ACE-TRUST) implemented an experimental methodology for modeling and measuring pilot trust in dogfighting autonomy, as well as tested a novel human-machine interface (HMI) communicating AI trustworthiness.

The unmanned intelligence (UI) developed by Dynetics and SoarTech will enable pilots to perform a mission commander task, but the focus of ACE-TRUST is on the pilot's trust of the dogfighting autonomy.

Trust levels in the AI is dynamic over the human-agent interaction. This trust interaction needs to be measured, modeled and calibrated for optimal human-AI teaming for successful warfighting.

"It is easy to think that a technology will be used, but user acceptance is actually a lot harder, especially when safety and critical task execution is required," said Lauren Reinerman-Jones, Ph.D., SoarTech Senior Scientist. "Calibrating human-system trust enables the appropriate levels of reliance on autonomy. Accurate measurement of trust that is fieldable is essential for using autonomy – the right amount at the right time. Our methods and models are contextually relevant and operationally ready."

Based on pilot interactions with the system combined with physiological data, pilot trust was measured and modeled. The next step is to assess that trust against the capabilities of the autonomy, and work deliberately to calibrate the pilot's trust appropriately to the capabilities of the dogfighting algorithms.

Trust in the autonomy will allow operators to multi-task with confidence. The idea is to capture the model for human trust.

SoarTech was the lead for Phase I of the research, with support by Collins Aerospace, University of Iowa Operator Performance Laboratory and Raytheon.

"We will be transitioning our accomplishments on DARPA ACE to an AFRL [Air Force Research Laboratory] Phase II SBIR to expand our objective trust-modeling capabilities by capturing the dynamic nature of trust throughout the lifecycle of Human-Autonomy Teaming," said Reinerman-Jones. "The vision for this work is to have a robust objective model of trust that can be adapted by the trustworthiness of the autonomy. We will use system trustworthiness to develop explainable and transparent human-machine interfaces using visuals, sounds or even touch to calibrate the operator's trust. AI that is trusted is the future for legal, moral and ethical autonomy."

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- First choice of booth space (during I/ITSEC)
- 10% discount on booth space for I/ITSEC (Maximum discount = $5,000)
- Seat on Executive Committee and Invitation to M&S Awards Dinner
- Additional exposure at I/ITSEC

Regular
- $1,250 to $2,500 in dues (depending on # of employees involved in training and/or M&S)
- Second round of booth space selection (in early to mid-February)
- 5% discount on booth space for I/ITSEC (Maximum discount = dues amount paid)

Associate
- $500 in dues; designed for smaller companies
- Third round of booth space selection (in late February)
- No discount on booth space for I/ITSEC

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Visit our booth (#1734) during I/ITSEC in Orlando, Florida from November 29 – December 3, 2021 to learn more about CAE's modeling and simulation expertise to support training and critical operations.

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