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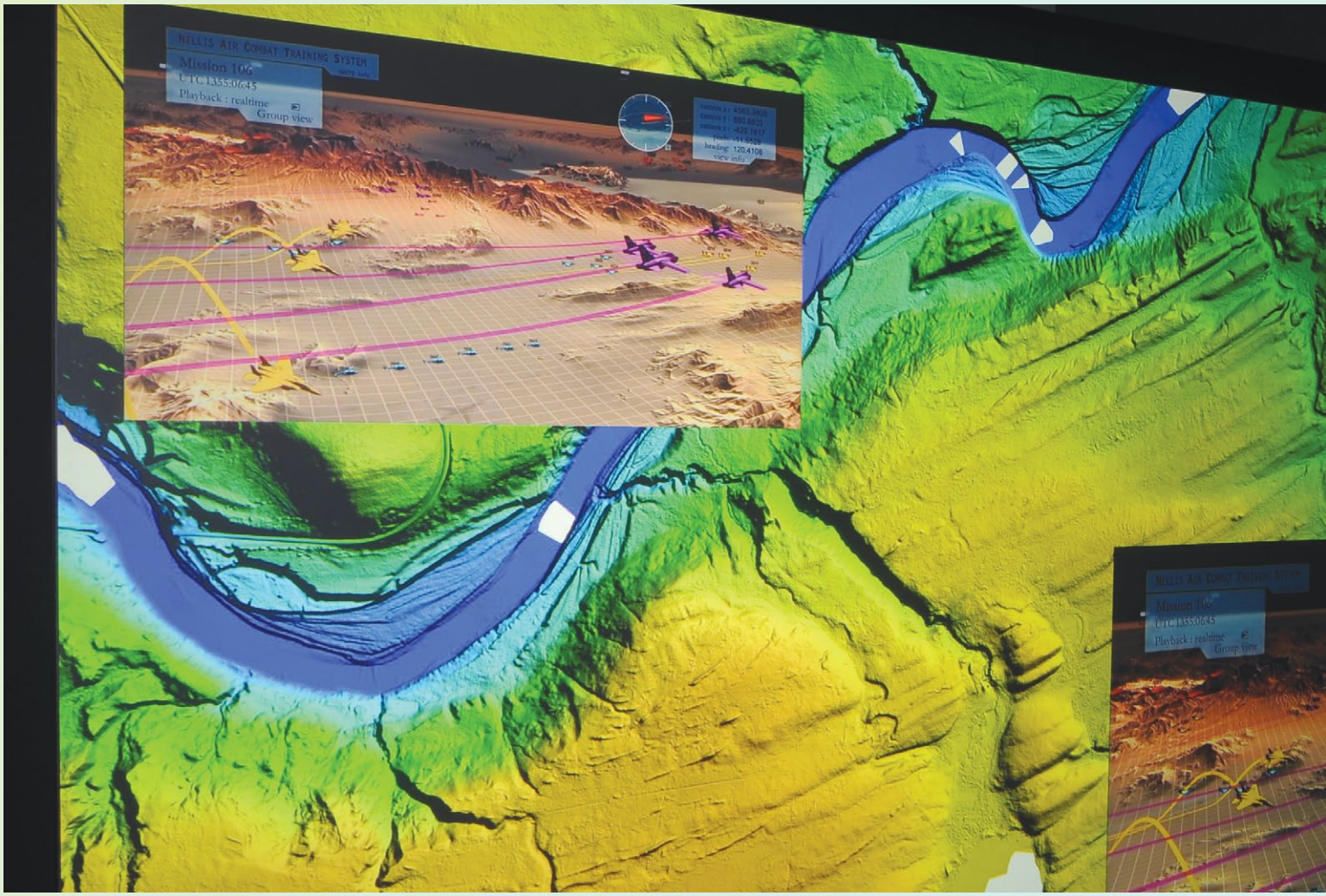


NAVAL COMMAND

NUWC and SOUTHCOM collaborate with 4K.

BY JIM STOKES

Anchors Aweigh! We set sail to explore the highest resolution AV visualization used by the US Navy. On board and charting the course will be an accomplished filmmaker and multimedia producer along with the president of an integration company known for its advanced visualization applications.

Through a partnership of three key Naval organizations (US Southern Command, Naval Undersea Warfare Center and the Naval Postgraduate School) IGI (Immersion Graphics Inc., www.werigi.com) of Detroit, has integrated multiple advanced visualization systems to enhance collaboration between departments and change the way high-resolution visual data is interpreted.

Specifically, these systems have been integrated into the high security facilities of the US Southern Command (SOUTHCOM) in Doral FL and the Naval Undersea Warfare Center (NUWC) in Newport RI, which we'll detail here. Our interviewees are David Bellino, AV multimedia content producer and technical specialist at NUWC (www.navsea.navy.mil/nuwc), and IGI President Pat Hernandez (for more details, see sidebar, "About NUWC and SOUTHCOM").

From Rolling Stones To Undersea

Currently, David Bellino is immersed in producing digital multimedia and providing technical expertise for NUWC. In fact, he has an engineering background and has honed his skills in the entertainment field, which included projects for the Rolling Stones, BMG Music, Hasbro Interactive, MCA Records and Universal Pictures, among others. As a director/producer, he has received international film festival awards.

Sound & Communications Contributing Editor Jim Stokes has been involved in the AV industry as an AV technician and writer for more than 30 years.

The PowerWindow 4K, an enclosure incorporating a screen and projection equipment, was designed and fabricated in IGI's Michigan facility, then broken down and shipped to the client's location.

"One of my roles is to create short films or apps to explain what the Navy does to mitigate those types of risks," he explained. Simulation modeling of marine mammals is also part of the process for which NUWC is well equipped. Bellino stays pretty much on the same cutting edge of 4K very high resolution digital cinema that's used in the entertainment industry today.

Bellino happened to meet Commander David Harris with the National Maritime Intelligence Agency, whose goal was to set up a collaboration center using high resolution, advanced visualization within the intelligence community. "I talked to him at length about what I was doing using that same technology in the storytelling arenas." IGI became the integrator for this new capability, which Pat Hernandez will discuss later.

Spearhead The Strategy

However, Commander Harris was moving onto his next position and away from the responsibility of actually pulling together the collaboration center using 4K. "He asked me to sort of spearhead the strategy for how we do this," Bellino pointed out. "We

"Most of my current work is in producing multimedia projects for education, information and training, as well as being a technology specialist," explained Bellino. "I'm pretty much dual-hatted. I help build content to help Navy customers as well as our internal engineers and folks in the research lab. So, I'm a content producer and a technical person, as well."

An OPNAV 45 (operational Navy) project, which is concerned with environmental impact for Navy testing and training, is an example of a high level project of Bellino's. He's involved in a production campaign regarding how the Navy goes about environmental protection for marine mammals.

The control system, which offers custom control capable of multi-window manipulation, is accessed through a 55-inch touchscreen and two 17-inch touchscreens.

The custom control system of NUWC's 30-foot PowerWall 4K allows multi-window manipulation.

determined that NUWC in Newark, SOUTHCOM in Miami and the Naval Postgraduate School in Monterey [CA] would have the best combined capabilities provided for the Navy." It was getting together an operational command (SOUTHCOM), a research lab (NUWC) and a tie to academia where officers are trained (in Monterey). It was not so much the equipment, which is cool and helps, it really helped us look at how we develop partnerships between organizations that may not have worked that closely be-

About NUWC And SOUTHCOM

The following are formal descriptions of the two sites. NUWC Division Newport (www.navsea.navy.mil/nuwc), is one of two divisions of the Naval Undersea Warfare Center. It's part of the Naval Sea Systems Command. NUWC Division Newport's mission is to provide research, development, test and evaluation, engineering and fleet support for submarines, autonomous underwater systems, undersea offensive and defensive weapons systems, and countermeasures. NUWC's other division is located in Keyport WA.

NUWC Newport employs 2800 federal employees and about 1500 contractors. It operates as part of the Navy Working Capital Fund activities. There is no federal budget; all income is provided by customers, primarily from the US Navy. Therefore NUWC operates like a business but without profit incentive.

US Southern Command (SOUTHCOM, www.southcom.mil/aboutus), located in Doral FL, is one of nine unified Combatant Commands (COCOMs) in the Department of Defense. SOUTHCOM is responsible for providing contingency planning, operations and security cooperation for Central America, South America and the Caribbean (except US commonwealths, territories and possessions). The command oversees the force protection of US military resources at these locations. SOUTHCOM is also responsible for ensuring the defense of the Panama Canal and canal area. SOUTHCOM is a joint command comprised of more than 1200 military and civilian personnel representing the Army, Navy, Air Force, Marine Corps and several other federal agencies.

Equipment

NUWC

PROJECTION

3 APC SUA2200RM2U 2U, 1980W 2200VA rackmount UPS
1 BTX BTX-RK2585 custom jack panel
1 Christie Spyder X20 processor w/16 inputs/8 outputs, 8 DVI inputs, 8 video/HDSDI inputs
1 Corning custom 80' plenum multimode fiber
1 Corning custom 100' plenum multimode fiber
1 Corning custom 150' plenum multimode fiber
12 Extron 6' copper DVI cables
26 Extron 3' Copper DVI cables
4 Extron USB twisted pair extenders
2 Extron RGB-DVI 300 RGB to DVI scalers
1 Extron HDMI audio De-embedder
4 Furman PL-PRO C power conditioners
1 Lightware MX--FR33 DVI modular matrix chassis
1 Lightware MX-DVI-OPT-IB-SC 8-input fiberoptic card
3 Lightware MX-DVID-IB 8-channel DVI-D Input cards for matrix frames
2 Lightware MX-DVID-OB 8-channel DVI-D output cards for matrix frames
14 Lightware DVI-OPT-TX110 DVI to fiber transmitters
6 Lightware DVI-OPT-RX110 DVI to Fiber receivers
2 Middle Atlantic ERK-RR44 44-space rear rail kit w/accessories
1 NVIDIA VCSQ7000TK Quadro Plex 7000 graphics processor
1 OPPO BDP-93 Blu-ray player
1 Sony SRXT110 T-110 SXRD 11,000 lumen projector (4096x2160)
4 Tripp Lite U026-016 active USB extension cables

CONTROL

2 AMX FG2257-61RGB NXT-1700VGRGB 17" Modero VG tabletop touchpanels w/RGB video, speakers, mic.
1 AMX FG2105-06 NI-4100 NetLinx integrated controller
2 AMX FG2023 NXC-IRS4 4-port IR/S cards for NI-4100 controller
1 Cisco SR216T-NA 100 Series 16 port unmanaged switch, 10/100, rackmount
1 Xantech AC1 power control interface

AUDIO

1 Crown CTS8200A 8-channel amp
1 Extron SSP 7.1 surround sound processor
2 JBL Control 5 2-way compact control monitor speakers
1 JBL Control 25 5½" 2-way vented shielded speaker
2 JBL MTC51 wall-mount brackets
1 JBL Control SB210 dual 10" subwoofer
2 Polycom SoundStructure C16 16-channel AEC

VIDEOCONFERENCING

1 Cisco CTS-INTP-C40-K9 telepresence system Integrator Package w/dual display, premium resolution, 4-way individual transcoding multisite options
1 Cisco CTS-PHD-1080P12XS Precision1080P 12x camera
2 Vaddio 999-9550-000 OneLINK camera extension systems

4K VIDEO WORKFLOW

1 Adobe Production Premium Software
1 ProMax FX8 24TB SAS storage
1 RED Rocket 4k video card
1 RED Rocket breakout box
1 Seventh Sense Delta media server

SOUTHCOM

PROJECTION

1 BTX BTX-RK2257 2RU custom jack panel
1 Christie X20 1608 Spyder X20 processor w/16 inputs/ 8 outputs, 8 DVI inputs, 8 video/ HDSDI inputs Corning custom 80' plenum multimode fiber
6 Extron 12' copper DVIcables
24 Extron 6' copper DVI cables
18 Extron 3' copper DVI cables
2 Extron RGB 109XI computer interfaces w/audio
1 Extron HDMI audio de-embedder
6 Extron USB extender twisted pair extenders for USB peripherals: transmitter
6 Extron USB extender twisted pair extenders for USB peripherals: receiver
1 Lightware MX-FR33 DVI modular matrix frame
4 Lightware MX-DVID-IB 8-channel DVI matrix input cards
2 Lightware MX-DVID-OB 8-channel DVI-D single link output cards w/ DVI-D connectors, signal reclocking
10 Lightware DVI-OPT-TX110 DVI to fiber transmitters
10 Lightware DVI-OPT-RX110 DVI to fiber receivers
1 Lightware HDMI-OPT-TX200R HDMI to fiber transmitter
1 Lightware HDMI-OPT-RX200R HDMI to fiber receiver
5 NVIDIA VCSQ7000TK Quadro Plex 7000 graphics processors
1 Sony SRXT110 T-110 SXRD 11,000 lumen projector (4096x2160)
3 Sony LKRI005 DVI input card w/HDCP
1 Sony BDP-S470 Blu-ray player
4 Tripp Lite U026-016 active USB extension cables

COMPONENT RACKS

3 APC SUA2200RM2U 2U, 1980W 2200VA rackmount UPS
2 Furman PL-PRO C power conditioners
2 Middle Atlantic ERK-4425 44-space (77"), 25" deep standalone racks w/accessories

CONTROL

1 AMX FG2105-08 NI-3101SIG - Signature Series Integrated Master/NetLinx controller. 8 IR ports, 8 I/O ports, 8 relays, 6 RS232
1 AMX FG2257-61RGB NXT-1700VG 17" Modero VG tabletop touchpanel w/RGB video, speakers, mic
1 AMX FG2275-112 TPI-PRO-DVI Total Presentation Interface w/DVI
1 Cisco SR216T-NA 100 Series 16 port unmanaged switch, 10/100, rackmount
1 CyberTouch E5280U 52" wide screen 1080P USB touchscreen LCD panel
4 Xantech AC1 power control interfaces

AUDIO

2 Crown CDI1000 Cdi Series 2-channel amps
2 Polycom 2200-33160-001 SoundStructure C16 16-channel AEC/noise canceller/feedback reduction w/auto mic mixing, matrix mixer
2 Polycom 2215-23809-002 white spherical HDX ceiling mic array

VIDEOCONFERENCING

2 Cisco CTS-INTP-C60-K9 C60 Integrator Package (C60 codec, PrecisionHD 1080P camera, mic, NPP) w/premium resolution, multisite options
2 Vaddio OneLINK camera extension system for Cisco/Tandberg PrecisionHD cameras, 1080P

List is edited from information supplied by IGI.

The racks and custom projection structure for the PowerWall 4K.

fore. That is probably the fundamental punch line, and the technology allowed us to do that."

Regarding challenges, Bellino said, "A lot of the challenge has been to really show people in different areas, whether they're in sonar, combat systems or whatever, how they could benefit. Another challenge is the new technology, where it's not that easy to understand how this all works. So, just from an engineering installation perspective, it's IGI's job to get all this working because it's very new. It's not as simple as connecting some basic home theater equipment. Another large challenge is that the data or content has to be of a whole other level of quality to take advantage of this kind of visualization. It's 'big data,' which is very large images in gigabytes."

Integrator's Perspective

"We feel fortunate to work with our nation's military," declared Pat Her-

About IGI

IGI (Immersion Graphics Inc., www.werigi.com) provides large-scale, ultra-high-resolution projection systems for advanced visualization applications. These state-of-the-art solutions are the culmination of the company's industry experience in delivering leading-edge technologies. Creating mission-critical value for corporations and organizations in conducting their core operations, IGI systems are suited for high demand applications, such as automotive engineering and design, military collaboration and intelligence, oil and gas exploration, command and control room, feature film post-production and more.

Since IGI's founding in 1998, the company has designed, built, installed and serviced some of the largest and most complex systems, including an award-winning room featuring a 120-foot-wide screen displaying more than 52.8 million pixels on a 24/7 operation, for dozens of customers nationwide.

IGI is based in Commerce MI, near Detroit with engineering and sales offices in Indianapolis and Los Angeles. (This profile was based on IGI's company description.)

nandez, President of integrator IGI, Detroit. "This application of 4K, which is four times the resolution of 1080p high definition resolution, improves upon image color sampling and dynamic range, which will change the way the US Navy can experience and process military intelligence."

The simple to use graphical user interface is slightly different for SOUTHCOM and NUWC.

He further noted that the Navy will use visualization solutions for numerous intelligence requirements. The following are some examples: aid in detecting, tracking, and localizing Self-Propelled Fully Submersible (SPFS) targets; aid in research, modeling and simulation for sensor and combat systems development, as well as foreign undersea warfare capability assessments; further assist with exploring new and innovative ways to apply this technology.

"We've always done work for the military because the military has been focused on advanced visualization technologies, such as virtual reality (VR)," said Hernandez. Some examples of military systems provided by IGI include White Sands Missile Base and the National Maritime Intelligence Center, as well as the two Navy systems detailed here. "The system that we provided for NUWC was not necessarily a VR system," clarified Hernandez. "It was more of a 'visualization' system."

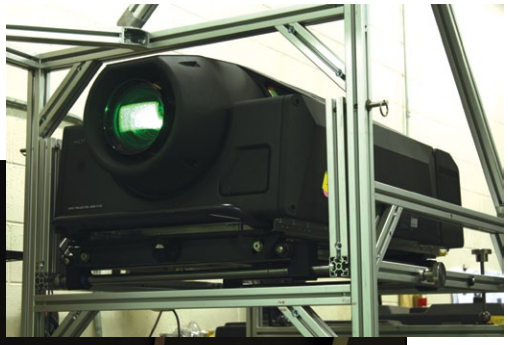
Same Hardware

The AV hardware is essentially the same for the SOUTHCOM and NUWC sites, although there are some differences in equipment count, as indicated in the two equipment lists. Although the AV hardware is similar, the viewing environments developed by IGI differ between the two locations. "The Southern Command has one of our products called a PowerWindow," explained Hernandez. "It has essentially the same functionality as the PowerWall at NUWC. However, the PowerWindow is a completely enclosed structure we designed and completely fabricated in our Michigan

facility. We then break it down, ship it and install it into a room."

Hernandez pointed out the PowerWindow's complete enclosure encompasses everything: the screen and all the projection equipment are inside. The enclosure is fabricated out of welded aluminum, and then the sides are skinned with a very tightly stretched fabric material. In contrast, the PowerWall is just literally a screen with a large structure that the integrator bolts into place within a room in an existing facility.

"One of the things that we've learned over many, many years of doing business is that, if we do not build it 100% in our facility, there often will be challenges," stated Hernandez. "And when our customer has a facility that cannot be taken down for very long, it's extremely important that we get everything installed and up and running in the shortest amount of time."



The 11,000 lumen 4K projector sits on a custom-built structure.

4K Images

Now, let's detail the gear. On the imaging side, high resolution video images are acquired via a RED Digital Cinema 4K camera. A Sony 11,000 lumen 4K resolution projector fires on an IGI custom rear screen. NVIDIA Quadra Plex 7000 graphics processors put out the 4K signals. A Christie Spyder X20 provides video processing combined with routing/switching. Each system uses a CyberTouch 55-inch multi-touch panel that displays a 4K image. IGI wrote software that allows the user to mimic what's on the PowerWall. All connectivity is via a Lightware digital fiberoptic system. The control system is via an AMX 20-inch touchpanel.

Bellino explained that content can come from a camera or be generated by a computer. "Our system pretty much includes everything you need for 4K acquisition, from a camera to CGI generation, all the way to switching it: having multiple images and sources on the screen at the same time, all the way through to projection."

The NUWC setup has the new 4K projection, as well as an existing Legacy three-panel screen. "We left all of the original legacy projection system and all the analog equipment because we wanted to make sure that, if someone wanted to use the room the way it was before, it would look exactly the same," explained Bellino. "So we have the older projectors that have rear projection, as well, with three side-by-side images using analog VGA. The other good part about that is that some of the older equipment still works well. It's fine for certain purposes. We basically have a dual system now."

Exclusive Staff

He noted that NUWC has a media support staff that supports only the PowerWall room, which has 50 comfortable seats. They have workstations with input/output sources in front of them, as well. As a result, it's a combination of theater-style tier seating with workable inputs/outputs at locations, and a control room at the rear of the viewers.

A Cisco TelePresence videoconferencing system is in place. A Polycom Soundstructure is the DSP for videoconferencing and for managing all the audio, microphone level and the speakers. Audiowise, the room is capable of running 7.1 surround sound with JBL speakers driven by a Crown power amplifier. The audio/video media support staff techs this 4K room and several other rooms across the campus. They do all the scheduling and operations for the rooms.

"We work closely with the Naval Postgraduate School on a number of things, from a development side of doing testing and experimentation," said Bellino. "It's also a great benefit to have Navy students help us with projects. We're going to be working together at USCSD San Diego. One of the things we're working on is very high speed 10 gig networks to be able to push content like 4K over a network. If we had these networks available, we would have the Monterey school and NUWC connecting to move big data."

And that's the story. We're back on shore. As the familiar Navy song lyrics go, "Until we meet once more, here's wishing you a happy voyage home." ■