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Nuclear Vision

Sandia National Labs Gets Monster Video Wall

by David Weiss

There's a secret weapon at Sandia National Laboratories' Interactive Design Center (IDC) in Livermore, CA, but it has nothing to do with the nuclear bomb scenarios that are simulated there. Instead, it has everything to do with a dazzling 35,000,000-pixel video wall that just may set a new standard for this type of install.

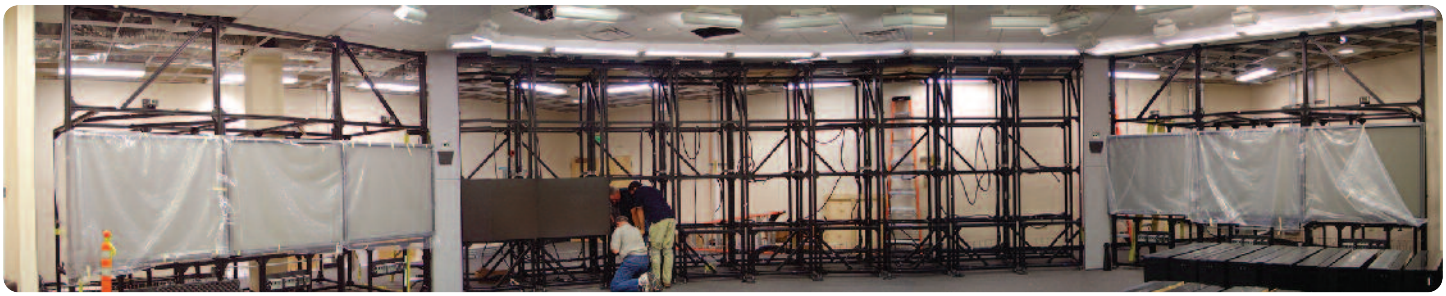
"They wanted the very best in collaborative communication technology," said Joseph D'Angelo, principal consultant at AV design firm, Charles Salter Associates (www.cmsalter.com). "The mission at Sandia is very important: They have to maintain and safeguard our nuclear weapons stockpile. In their previous version of the IDC, they had designed a room that was basically four walls and a bunch of plasma screens on every wall. When we started work on their new facility, I suggested, 'It doesn't make sense to do a high-end visualization with a bunch of plasma screens.'"

Working side by side with installer SPL Integrated Solutions (www.splis.com), the team left no doubt that Sandia's next-generation display would have the necessary resolution. In the awe-inspiring curved main video wall, a support structure holding 27 screen modules—a 9-wide by 3-high array of Christie Digital Reflex II Screen Can Assemblies—is lit up by 27 Christie Digital RPMS-500xe DLP projectors. With each projector sporting 1280 x 1024 pixel resolution at a 5:4 ratio, Sandia ended up with an image resolution up to the aforementioned 35 million pixels. Adding to the room's collaborative capabilities are six ancillary Smart Technologies SmartBoard 72-inch diagonal displays, which facilitate easy annotating and other collaborative activities for the giant screen. Located on either side of the video wall, each one is powered by a Christie Digital DS30W DLP projector.

The need for such an ambitious assembly at the Sandia National Laboratories' Interactive Design Center (IDC) in Livermore, CA was driven in large part by the video rendering firepower that Sandia has available for it. With each node connected to one of the 27 projectors, there's a one-to-one relationship between computer and projector.

The need for such an ambitious assembly was driven in large part by the video rendering firepower that Sandia has available for it. "What's really amazing is that they acquired a computer cluster of 150-200 computers," D'Angelo noted, "and their engineers will use every single computer to render content. Each part of the cluster is called the node, and there are 27 nodes in that cluster just dedicated to rendering for video. With each node connected to one of the 27 projectors, there's a one-to-one relationship between computer and projector."

Two factors that had major impacts on the complexity of the signal path were the need for two kinds of separate-but-equal computing clusters, as well as the discovery of connections that would allow the clusters to be placed much further away from the projectors than originally planned. "The 27 cluster computers, of which there are both stacks of classified and unclassified, are connected directly via fiber-optic connections to the DVI input of the projectors," said Don Jenkins, design engineer of SPL. "Both classified and unclassified sources are installed next to an Extron Matrix 6400 AV



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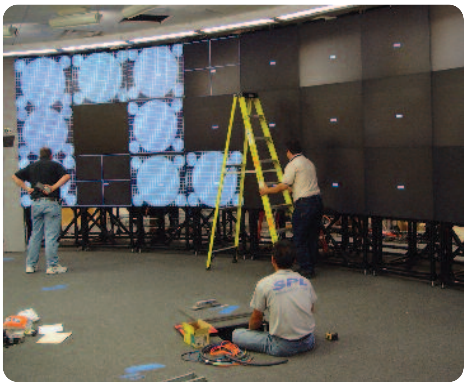


switcher and a Jupiter Fusion 980 video processor, the latter of which is responsible for integrating and displaying all the computer and video sources in multiple, scalable display windows.

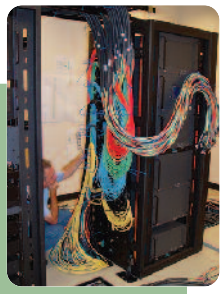
"The client actually shopped around and discovered the DVI-over-fiber arrangement, namely the 30M Pacific Cable fiber-optic DVI extenders, which are significantly longer than the typical copper configuration. The typical limit is 5 meters, but what we ended up using were various lengths of 10 to 30 meters. When the distance from the computer to projector was no longer a limitation, we decided to stage the cluster computers in server rooms. That had a domino effect on the rest of the servers, to the extent that the AC requirements changed in the facility as a result, which then meant moving the plumbing water supply and overrun drains. All of those infrastructure changes basically delayed the start of the AV systems by about two months."

With collaboration between Sandia's Livermore and New Mexico facilities a top priority, videoconferencing required especially meticulous planning. "The videoconferencing system, which features five Sony cameras fitted with Fujinon lenses, is unique to the extent that it makes use of two codecs—one for unclassified sessions via ISDN, and another for classified sessions on the Labs Classified Network," Jenkins said. "These are interconnected to the camera/display system through a Wireworks 2000 Series multi-pin connector 'panel with whips' supporting all video and audio connections on three sets of panel connectors, with three classified and three unclassified 'whips' which plug into the panel."

Audio is also well attended to, with a 5.1 surround system supplying sound to the approximately 50- x 45-foot display theater, intended to comfortably seat 25 people. Front, center and rear surround KEF speakers are ceiling-mounted, along with three Tannoy subs. "We used a lot of Symnet, since the audio matrix we used is pretty big," D'Angelo explained. "They wanted ultimate flexibility, and they've got true 42 inputs by 7 outputs. Amps were QSC, which I always recommend because I've never had one break on me—ever—and the representation on QSC in that area is second to none."

Overall control of the technology in the facility is provided by an advanced Crestron control system with two Crestron color touchpanels.

For those at Sandia charged with the extremely no-nonsense task of planning for and simulating WMD-sized disasters, they can rest assured that their display is an equally well-thought-out force. "During the dotcom days, a lot of these video walls were just eyewash," D'Angelo said frankly. "This is a very serious installation. In fact, I think it's safe to say that it's the most advanced video wall that has ever been installed."



Classified Vs. Unclassified

One of the most daunting levels of complexity at the Sandia National Laboratories' Interactive Design Center (IDC) installation stemmed from the fact that both classified and unclassified activities take place there.

"If you have a classified videoconference, for example, that means it goes over Sandia's classified ATM network via IP, so the codec and wires attached to the equipment become classified," Joseph D'Angelo, principal consultant at AV design firm, Charles Salter Associates, explained. "Therefore, two systems are required. The way it works is classified devices have got to be at least 6 inches away from unclassified, and classified wires need to be two inches away. It really got crazy when we realized in the design that some wires could be 'either/or,' so instead of building classified or unclassified conduit, we have to have a separate cable labeled, 'either/or.' A $2 million job where every wire has to be two inches away from the other is a big deal! Don Jenkins, design engineer of SPL, was able to pull it off, however, and he really deserves some major credit on that."

"Most of the cabling is run under a raised computer floor with 2- x 2-foot removable floor tiles—in this case, concrete filled," Jenkins added. "The physical installation required a lot of effort and attention to detail to assure that we were meeting the lab's security guidelines."