The $6 million renovation of the agency's existing control room was prompted by a number of factors, including outdated display technologies and poor lighting. In this case, brighter screens allow for better overall workplace lighting because ambient lighting no longer has to be kept low in order to see the screens.

KEEP IT FLOWING

Massachusetts DOT upgrades MBTA control center

BY DAN DALEY

There are plenty of variations on the aphorism, "That's no way to run a railroad!" (The actual source quote is from a 1932 political cartoon in the humor magazine *Ballyhoo* and is, somewhat archaically, "Tch, tch! What a way to run a railroad!") Nonetheless, the sentiment remains ubiquitous in urban transportation: There has to be a better way to manage what has become a massive logistical, control and security challenge as urban cores become more densely populated and rely more than ever on public transportation.

MassDOT's MBTA OCC

On the seventh floor of the Massachusetts Department of Transportation (MassDOT) headquarters in Boston,

the Massachusetts Bay Transportation Authority's Operations Control Center (MBTA OCC) thinks they've conquered that challenge. There, a combination of AV and IT technology and design has brought the newly renovated OCC to life, with a huge new videowall and much deeper integration between AV and IT systems designed to keep Greater Boston's transportation hubs more secure and efficient.

The $6 million renovation of the agency's existing control room, paid for through grant funding from the Department of Homeland Security, was prompted by a number of factors, including outdated display technologies and poor lighting. But its main drawback was an inability to display information and data from a wide array of sources, such

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as other state systems for transportation, security and other functions, in a coherent and quickly actionable manner.

"The existing systems didn't give them the flexibility they needed to make decisions quickly and accurately based on the available data," explained Jim Ferlino, one of the principals of Vistacom (vistacominc.com), the Allentown PA-based AV systems integrator who took on the project. The installation commenced over the summer on a 10-week compressed timeline after a 10-week demolition of the room's old systems.

Cumbersome System

For instance, Ferlino said, the city's transit system has more than 10,000 video cameras, but trying to bring up specific ones in a timely manner was cumbersome and could have led to minutes lost during an emergency, a caution not lost on the city in the wake of the 2013 Boston Marathon bombings. "There were ways to get other types of data into the control room, like weather reports and traffic information, but not in a way that made sense, that could be used to make informed, comprehensive assessments of unfolding situations," he explained.

Some of what the OCC needed was obvious, such as better imagery and improved workspace lighting. But before they could begin to plan out the upgrade, they had to understand the nature and dynamics of this particular control room culture, offered Dan Gundry, Vistacom's Control Room Team specialist. "We had to take the time to understand MBTA's particular concept of operations there, how they needed to share information with other stakeholders in the building and elsewhere, as well as how they took in information from other sources, and what their protocols were for making decisions and action. I can't emphasize enough how important it is to understand how they wanted the systems to operate."

Videowall

The display wall is what draws the initial attention upon entering the OCC. About 100 feet across, for the preceding 10-plus

The entire project had to fit into the same footprint as the existing room, including the videowall. Sixty 70-inch video cubes are configured in three horizontal rows of 20 displays each, arrayed in a 9° arc, left to right.

The cubes are stacked row upon row horizontally, starting with the floor base. This process called as much for carpentry as AV, requiring tools such as squares and plumbs, as well as multiple lasers to measure the alignment.

years, it had featured dozens of projectors lighting up acrylic screens in front of the recently installed custom-made Winsted Encompass-2 workstations. This video approach tended to be dim, and that forced keeping the overall level of illumination in the room low, in order to better see the displays, which in turn hindered other work in the room. It also produced pronounced seams between images, which undermined the view when multiple projections were combined into a single image. "A very old-school approach," said Ferlino.

The entire project had to fit into the same footprint as the existing room; that applied to the videowall, as well. The solution for this comprised 60 Barco 70-inch video cubes configured in three horizontal rows of 20 displays each. These are arrayed in a 9° arc left to right. Cabling the screens to

the head-end processing rack was straight-forward, but aligning the screens physically was trickier. Ferlino said they went at it row upon row horizontally, starting with the floor base. "We had to make sure that the alignment between cubes was perfect, to make sure that any way they wanted to put images up there, they would be accurate," he stated, calling the process as much carpentry as AV, using tools such as squares and plumbs, as well as multiple lasers to measure the alignment. "Then, they had to be bolted to each other to keep them that way. This needed to happen before any of the electrical work took place."

Audio in the OCC is delivered through Crestron EXCITE IW6 in-wall speakers. Ferlino offered that sound was a minor part of the upgrade, but that there has been discussion about routing some of the audio

Equipment

2   Action Rental 5593 safety harnesses w/lanyard
60 Barco OverView OLF-721 fully redundant full HD 16:9 LED videowalls
2   Barco 64-channel unistream input nodes
12 Barco DVI encoders
16 Barco Transform N output nodes
2   Barco CMS servers
1   Barco CMS application server (for SCADA map)
2   Chief MCSU flatpanel display ceiling mounts
    Crestron EXCITE IW6 in-wall speakers
1   Crestron CP3 processor
1   Crestron XPanel web application
6   Extron SI 26W in-wall speakers for control room
1   Extron DMP 64 audio DSP (source select and volume)
2   Gefen EXT-DVIKVM-ELR KVM extensions
1   Genie GS1930 lift
15 Kramer Electronics 616R/T dual link DVI-over-MM fiber extender sets
2   Middle Atlantic MRK4431 ganged equipment racks w/accessories
1   QSC CX254 4-channel power amp
60 SF Cable DV11-05 DVI dual link patch cables
2   Sharp Aquos LC55LE643 55" HD flatpanel displays
1   Tripp Lite B040-008-19 8-port KVM w/RM monitor/keyboard/mouse
1   VidSys PSIM software platform
60 Vistacom curved connections for Cubes

List is edited from information supplied by Vistacom.

alerts that the various software packages used in the OCC are capable of through the room's speakers. "We considered bringing speakers down to the workstation level, but the client chose not to at this time," he said.

All of the content coming into the OCC, including workstations, train track maps and video cameras, is streamed, with displays fed from the Barco head-end processing rack over Cat6 shielded cabling to multiple Barco TransForm N universal streaming-video input processing nodes. However, although the videowall is a complete proposition on its own, it's also part of a larger network, a node on a LAN that runs throughout the building, and part of an even more comprehensive WAN that can extend out to other agencies and locations.

"It's a switch on the network," said Gundry. "It's not enclosed, but rather a part of the MBTA network architecture, so we can natively pull up those 10,000 camera feeds. It represents the difference between what came before and what we do now. Before, we would have needed a 10,000-input router for all of those cameras; now, we plug into that world with a switch."

Better access to all of the video sources means there had to be better management of those sources. That required a software solution, in this case Barco's CMS-200 control room management suite, in conjunction with Barco NGP-200 devices used to render video to the wall. The software suite includes the Sidebar application, which expedites system searches and browsing, and lets images be moved onto and across the displays with a drag-and-drop motion, as well as letting workstation operators build scenes on the display using multiple sources simultaneously.

In addition to the Barco software, the videowall and its operation is further inte-grated with a Crestron CP3 Processor and Crestron XPanel web application, which manages the transport control of sources such as cable and broadcast television news channels and weather information: up to four television sources simultaneously. "The intent is for anyone at their workstation not to have to leave their seat to control something," said Ferlino.

Physical Security Software Platform

Atop all of this is a VidSys physical security information management (PSIM) software platform. The PSIM software rides over the other software packages in the system, acting as what Gundry calls "the software glue" between them. A version of it had been in place before this renovation; Vistacom upgraded that platform to the most recent version and integrated it with the other systems for the new videowall. This, said Gundry, might have been the most time-consuming and intricate part of the entire project: getting the various software aspects to interact properly to achieve the ultimate goal of organizing incoming data in a coherent way and allowing the staff to create software scenarios ("rules" for possible events such as emergencies) that would let some of the initial responses to them be automated, to speed response time.

That took the integrators even deeper into IT matrix. The network architecture and integration brought Vistacom into contact with a number of different stakeholders, including security, IT, the in-place SCADA (supervisory control and data acquisition) system and operations. "As you can expect," said Gundry, "each stakeholder has its own priorities. When you bring a number of different stakeholders to the same table, you [can] wind up with competing agendas, such as a security department that may not want some data shown that another operator wants access to." When that happened, a human arbiter, in this case Randy Clarke, MassDOT's Senior Director of Security, was the referee (through the auspices of Dagle Electrical Construction Corp., the renovation project's main contractor).

Other elements that reflect the IT-centric nature of the project were the extensive use of Linux OS versus Windows for some specific applications, such as fail-over servers and SMTP monitoring. "Linux is more purpose-built for these kinds of video applications scripting," said Gundry.

Require More IT Understanding

In the end, Gundry continued, operators of control centers today require far more understanding of networked IT architecture than in the past. "The MBTA OCC deploys multiple networks over various firewalls and it has to stretch across entire enterprise systems," he said. "It requires a different knowledge set than simply AV."

Lots of software did not detract from the fact that the OCC was a big physical job. It required more than 25 tractor-trailer loads of equipment; getting that delivered and unloaded in downtown Boston meant police had to block off streets at certain times, Ferlino recalled. Vistacom also used its in-house test lab to pretest the display connections so that didn't have to be done as part of the installation process, to keep to the tight 10-week schedule. But in the end, it's the virtual aspect of the newly revamped OCC that will produce the benefits of a more IT-centric control center.

Looking at it from above, MassDOT's Randy Clarke commented, "This is the brains of the entire operation. We gave it a brain upgrade. The people in here are what make the brain work, but we gave them more technical and software capabilities for how to handle emergencies and regular service." ∎