MEDICAL TRAINING IS GOING THE DISTANCE

WNSS brings immersive VTC experience to Dalhousie University.

BY DAN DALEY

Remote diagnostics and treatment is a growing trend in medicine, so it stands to reason that the training of doctors would benefit from the same concept. That's part of the premise for a remarkable example of distance learning that has taken place at Dalhousie University, the hub of a still-expanding medical education program that has extended beyond the classrooms at Dalhousie University in Halifax, Nova Scotia, Canada, and the "far site," as the receiving location is known at the University of New Brunswick (UNB) in St. John, NB, and that now also includes five regional hospitals in Canada's Maritime Provinces region.

The program was established in collaboration with the Government of New Brunswick and Horizon Health Network, and includes a system linking 19 locations at the two university campuses, including classrooms, theaters and videoconferencing rooms. The five New Brunswick hospitals joined the program last year.

Next Step

The concept is intended to take the notion of immersive educational videoconferencing to the next step, a seamlessly transparent connection between distant locations enabled by intuitive user interfaces and extensive video and audio coverage that allows participants to forget that there are more than 100 miles as the crow (or in the Maritimes, gull) flies, and closer to 300 miles by road around the Bay of Fundy, between the locations.

The main lecture theater at Dalhousie has three dnp 78"x140" Supernova Infinity projection screens illuminated by three Christie HD10KM projectors. The Dalhousie location and the two receiving classrooms at UNB in St. John share technologies including a Crestron DigitalMedia videoconferencing control system, NEC P521 52-inch main displays and P401 40-inch displays as confidence monitors for teachers through which they view their remote classes, Sony BRC-Z330 PTZ cameras that cover each classroom from the front and rear, Clockaudio

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C32E-RF gooseneck microphones for lecture podiums and Clockaudio CO12E-RF microphones on student desks managed by BSS Soundweb London BLU 160 and 120 processors, and JBL and Tannoy ceiling speakers.

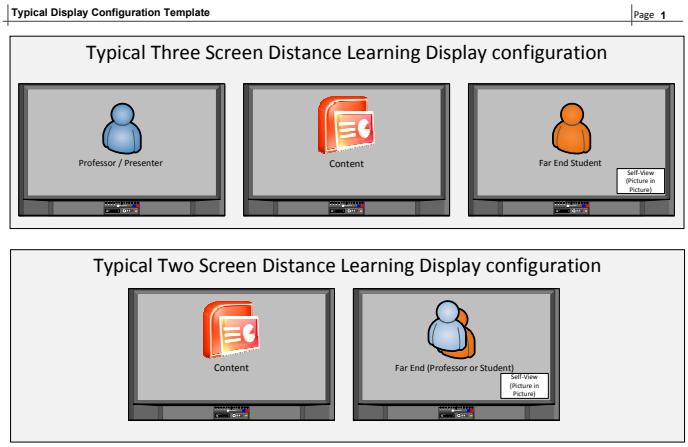
The identical technology, lighting and acoustical design of each connected space is only the beginning of a complex strategy of transparency, say the people from Engineering Harmonics (www.engineeringharmonics.com), the project's consultant designers, and Westbury National Show Systems Ltd. (www.westbury.com), the AV systems integrator.

"It doesn't feel like distance learning; it feels like you're in the same room as everyone else," said David VanVeldhuisen, Westbury's Project Manager, adding that the design is similar to that of corporate videoconferencing, with a Cisco/Tandberg codec delivering compressed video with embedded audio to the far-site locations, but with the added critical dimension of it being a closed-end broadband system dedicated to the single purpose of education. "That focus made a difference right from the start," he said.

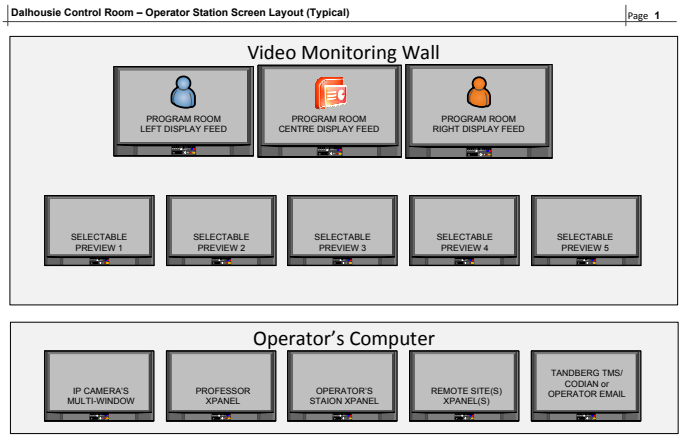
Focus Groups

The process began well before the project installation started in 2010. Engineering Harmonics initiated a series of focus groups in which Dalhousie professors were shown digital "wire-frame" renderings of a user interface on Crestron touchscreen devices in order to get insight into how they would integrate them into their teaching approaches. Meanwhile, the company also did sightline studies on the proposed classrooms and theater, looking for the angles at which viewing would be the most natural, both for the main LCD and projection displays and for the confidence monitors arrayed in front of the instructors that would show distance locations.

Acousticians were brought in to



Distance Learning Classroom Screen Assignments



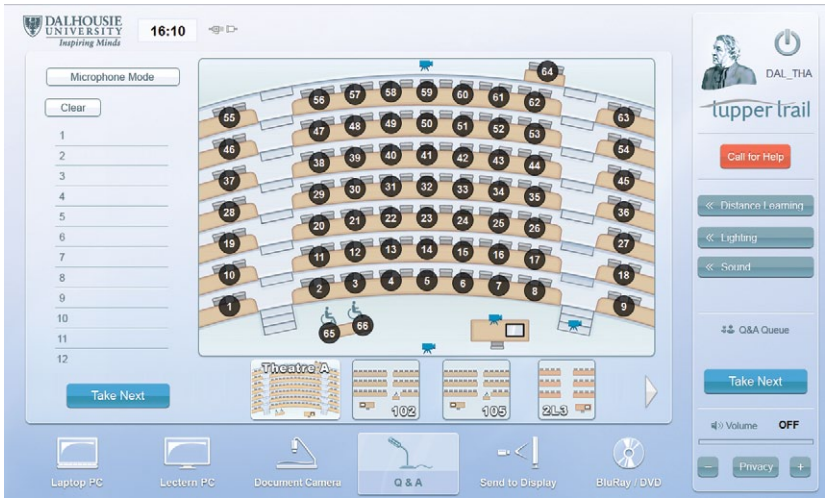
Typical Dalhousie Control Room Operator Station Screen Layout

create similar ambient environments in both school locations; lighting was designed for the same effect, and mill-workers fabricated the same furniture and finishes in all connected spaces. The replication of the spaces was so authentic and detailed that VanVeldhuisen said there was no need to go beyond the 720p resolution of the video. "I can tell the difference between 720 and 1080 if I look closely, but most of the people using the AV in these spaces will not," he stated. "That's how good the reproduction of these environments is."

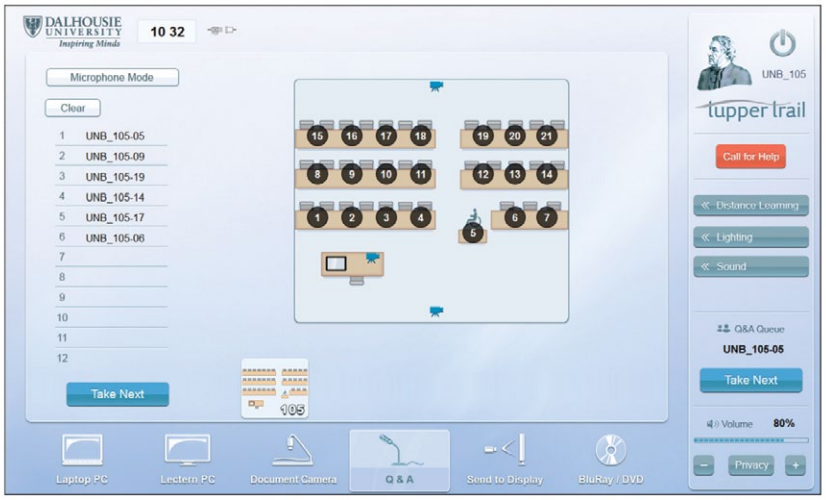
Another step was the inclusion of Ambit Consulting (http://ambit-consulting.com), a Vancouver-based company brought in to coordinate the entire project, including the AV integrator, the design consultant and the school's budget. "This was definitely unusual but it turned out to be a life-saver," said Brock McGinnis, Sales Manager at Westbury. "They made sure that there was ample time for instructor training on the system before it was ready to go, and the focus group's input was included in that training. Usually, as an integrator on an education project, we find that we have two to three weeks to finish the project before school starts. On the Dalhousie project, we had two to three months. Ambit kept everybody on track and the project actually under budget."

Crucial For Success

Russ Noble, Manager of the software department at Engineering Harmonics, offered that what was done in advance of the actual system integration was



Theatre A (the largest lecture theater) with several other rooms connected within the conference: The thumbnail image of any connected room is displayed below the image maps, and the map will change based on the selection from the thumbnail browser bar. Directly pressing the round microphone button activates the mic, regardless of its position in the queue.



This illustrates the practical usage of Room 105 at University of New Brunswick (the extension of Dalhousie Medical), where microphones are shown in the queue.

crucial for the success of the control software for the project. Focus groups were conducted with key faculty members to test the user experience design of the interface that presenters—both staff and visiting—would have to adapt to and hopefully quickly become comfortable with. Engineers and staff watched as teachers dove into the touchscreens with no prior instructions to see what they intuitively gravitated toward. "They had to be able to access everything they required—turning lights on and off, lowering screens, activating microphones—all from the same page," Noble explained. "We had to streamline the user interface for a very shallow learning curve."

The goal was to have the software programmed so that, whatever environment an instructor in the Dalhousie theater wanted to establish—lights dimmed for video presentations or document camera activated to show live content material, for instance—it would also produce the identical outcome in the remote locations...to have them act as extensions of the host learning space.

This was more than just a professional aspiration. The Canadian Department of Education has established strict standards for distance education; in order to receive appropriate accreditation, the connected environments have to offer what John Robertson, Dalhousie's Director of Academic Computing Services and Med IT, and the school's liaison for the project, described as a "comparable learning experience" to that of a conventional classroom or lecture hall. "So, whether the student is sitting in Saint John or in Halifax, or anywhere else for that matter, that student must have the same access to the educational content, the same quality of information and the same ability to interact with the lecturer or classmates in other locations," he said. "The challenge is to achieve that objective of comparability."

"What we did was to use software design to break down the walls and escalate the idea of a shared environment," said Noble. "We had to break down every move, asking ourselves, 'how does the user experience the system?, how the professors present, how they share content.' We used the same nomenclature as in videoconferencing but we took the education process apart in the focus groups and built it back up, coding it piece by piece."

Software-Based Control

That outcome manifested itself in the software. For instance, there is one desk-mounted microphone for every two students, for total of 66 microphones between both main classroom locations. The Crestron control system provides flexible microphone queuing methods using the BSS processing system. There are four operational modes that instructors can choose from: first one is all off, with no one but the instructor's voice through the 18 Tannoy CMS801DC-PI ceiling speakers; mode 2 allows students to turn on a microphone by touching an activation button on their desk that puts that microphone alone on the instructor's queue list; the next mode activates that first student microphone immediately for an urgent question and also allows other students to enter the queue; the final mode allows multiple student microphones to be activated simultaneously (the default number is six, but instructors can change that to suit their needs, for classroom give and take).

Similar protocols are set up for vid-

Equipment

Videoconference Facilities
LECTURE THEATRE A
Display
6 Chief Fusion series flatpanel tilting monitor mounts
3 Chief VCM93C/CMA projector ceiling mounts
3 Christie Digital HD10KM HD Data/video projectors
3 dnp 78x140 Supernova Infinity screens w/custom frame
3 NEC P401 40" confidence monitors
3 NEC P521 52" front wall monitors
3 RP Visual custom angled wallmounts for fixed projection screens
System Switchers, Signal Processors
1 Crestron DM 32X32 video matrix switch
3 Crestron DM-TX-100 fiber transmitters
1 Crestron DM-TX-300 fiber transmitter
10 Crestron DM-RMC-100 fiber receiver
1 Crestron QM-RMC controller
1 Crestron MTX-3 handheld remote
Lecterns
1 APC Smart UPS 1000VA standalone UPS for lectern devices
1 Clockaudio C36E/RF long gooseneck mic
1 Crestron QM-RMC small controller
1 Crestron MTX-3 handheld remote
1 Extron AAP mounting plate w/AAP inserts
1 Pioneer BDP-V6000 Blu-ray player
1 SMART Technologies SMART Podium ID422W interactive pen display
1 WolfVision VZ-9plus3 document camera
PTZ Cameras
6 Sony BRC-Z330 HD PTZ cameras w/ HD-SDI output card
1 Tandberg Precision HD PTZ camera
Audio
1 AKG WMS450 cardioid handheld, lavaliere wireless mic system
3 BSS BLU160 Soundweb London BLU-160 networked signal processors
3 BSS BLU120 Soundweb London BLU-120 networked signal processors
18 BSS BLUAEC-IN 4-channel acoustic echo cancellation (AEC) input cards
66 Clockaudio C012E-RF student desk mics
4 Crown CTs 4200 4-channel 70V amps
1 QSC CX702 2-channel speaker amp
1 Renkus-Heinz SGX41 professor foldback monitor
1 Sennheiser IR 10 Kit-MO IR hearing assist system
2 Tannoy V12 Main program speakers
14 Tannoy CMS801DC-PI ceiling speakers
Control
1 Crestron AV2 processor
1 Crestron V15 touchscreen
2 Vaddio StepVIEW pressure mats
Help Desk Intercom
1 Digital Acoustics IP7-ST-110 IP Help Desk intercom interface
1 Digital Acoustics PNL-CIS4 IP Help Desk intercom panel
IP Camera
1 Panasonic BB-HCM581 IP PTZ camera
Racks
3 Middle Atlantic WRK-4432 44RU gangable equipment racks w/accessories
Videoconferencing Codec
2 Tandberg C60 HD videoconferencing codecs

ROOM: UNBSJ-102
Displays
3 Chief MTMU flat-panel monitor mounts
3 NEC P401 40" confidence monitors
3 Panasonic TH85PF12U 85" front wall monitors
3 Peerless PANA-85WM flat-panel monitor mounts
System Switchers, Signal Processors
1 Crestron DM 32X32 video matrix switch
3 Crestron DM-TX-100 fiber transmitters

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One of the meeting spaces in the Halifax location.

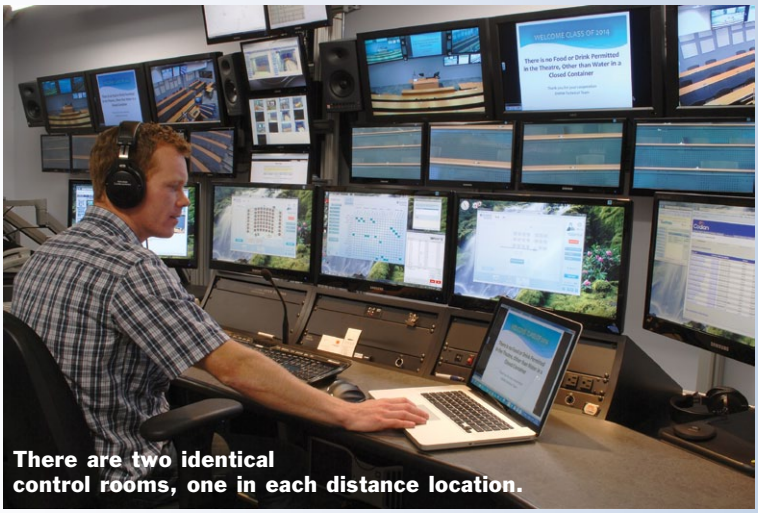
eo and projection system activation, and lighting and other functionality. And, pursuant to the accreditation mandate for a "comparable learning environment," a button push on the far-end touchscreen enables students to share material with the entire class without becoming the host, allowing them to come to the "front" of the far-site classroom to present papers or to put materials in front of the WolfVision VZ-9plus3 document cameras, whereas an additional one-button action can turn the receiving site into the host site, allowing the student to control the microphone queue and field questions from other students, creating what Noble calls "a truly collaborative educational experience."

On Command

All of these functions are performed immediately on command, without any authorizations or logins required. In fact, no access authorizations are required for any of the rooms or systems, with the sole exception of when the system is to be used for administrative videoconferencing, which requires a temporary password; this is a collateral benefit of having a school full of studious, responsible (and Canadian) 20-somethings. Noble, who recently completed programming for a similar system project at the University of Toronto, said, "This model of authorization is not suitable for every system."

As intuitive as the distance learning system is, it has a pretty sophisticated support mechanism in the form of a pair of identical control rooms, one in each distance location, which constantly monitor the process and can intervene if a problem arises. Both control rooms can observe their connected classrooms via IP PTZ cameras mounted in the rear of the rooms; the St. John site has the added advantage of a window facing directly out onto the classroom.

In the Dalhousie location control room, the main video monitoring wall has three NEC LCD3215



Jim Clarke

There are two identical control rooms, one in each distance location.

(continued from page 56)

1 Crestron DM-TX-300 fiber transmitter
6 Crestron DM-RMC-100 DM-CAT receivers
1 Crestron DM-RMC-100-F fiber receiver

Lecterns
1 APC Smart UPS 1000VA standalone UPS for lectern devices
1 Clockaudio C36E/RF long gooseneck mic
1 Crestron QM-RMC small controller
1 Crestron MTX-3 handheld remote
1 Extron AAP mounting plate w/AAP inserts
1 Pioneer BDP-V6000 Blu-ray player
1 SMART Technologies SMART Podium ID422W interactive pen display
1 WolfVision VZ-9plus3 document camera

PTZ Cameras
4 Sony BRC-Z330 HD PTZ camera w/HD-SDI output cards
1 Tandberg Precision HD PTZ camera

Audio
1 AKG WMS450 cardioid handheld, lavaliere wireless mic system
1 BSS BLU160 Soundweb London BLU-160 networked signal processors
2 BSS BLU120 Soundweb London BLU-120 networked signal processors
7 BSS BLUAEC-IN 4-channel acoustic echo cancellation (AEC) input cards
3 BSS BLU-BOB2 Soundweb London 8-channel output expanders
21 Clockaudio C012E-RF student desk mics
3 Crown CTs 4200 4-channel 70V amps
1 QSC CX302 2-channel speaker amp
2 Tannoy i9 Main program speakers
14 Tannoy CMS501PI ceiling speakers

Control
1 Crestron AV2 processor
1 Crestron V15 touchscreen
2 Vaddio StepVIEW pressure mats

Help Desk Intercom
1 Digital Acoustics PNL-CIS4 IP help desk intercom panel
1 Digital Acoustics IP7-ST-110 IP help desk intercom interface

IP Camera
1 Panasonic BB-HCM581 IP PTZ camera

Videoconferencing Codec
2 Tandberg C60 HD videoconferencing codec

VC SUITE

Displays
3 Panasonic TH85PF12U 85" front wall monitors
3 Peerless PANA-85WM flat-panel monitor mounts

PTZ Cameras
2 Tandberg Precision HD PTZ cameras

System Switchers, Signal Processors
1 Crestron DM 16x16 video matrix switch
2 Crestron DM-TX-200 DM-CAT transmitters
1 Pioneer BDP-V6000 Blu-ray disc player

Table Devices
1 Extron Cable Cubby 800 table box
1 Gefen USB extender

Audio
1 AKG WMS450 cardioid handheld, lavaliere wireless mic system
1 BSS BLU160 Soundweb London BLU-160 networked signal processor
1 BSS BLU120 Soundweb London BLU-120 networked signal processor
2 BSS BLUAEC-IN 4-channel acoustic echo cancellation (AEC) input cards
8 Clockaudio CS1-RF Boundary mics
2 Crown CTs 4200 4-channel 70V amps
2 JBL CBT50LA main program speakers
1 QSC CX302 2-channel speaker amp
5 Tannoy CMS501PI ceiling speakers

Control
1 Crestron AV2 processor
1 Crestron TPMC-8X touchscreen

Help Desk Intercom
1 Digital Acoustics PNL-CIS4 IP help desk intercom panel
1 Digital Acoustics IP7-ST-110 IP help desk intercom interface

IP Camera
1 Panasonic BB-HCM581 IP PTZ camera

Videoconferencing Codec
1 Tandberg C60 HD videoconferencing codec

Racks
2 Middle Atlantic SRSR-4-14 credenza equipment rack w/accessories

CONTROL ROOM

Displays
16 Samsung 2243SWX 22" LCD monitors for preview, PC, control monitoring stations
6 NEC LCD3215 32" preview monitors
1 TBC Systems monitor mounting frame, control consoles

Video Switching, Processing
1 Crestron DM 32x32 video matrix switch
16 Crestron DM-RMC-100 HDMI receivers

Intercom
1 ClearCom MS702 service intercom power supply, main station
1 Digital Acoustics Talkmaster-EE Intercom Management Suite

Audio
1 BSS BLU160 Soundweb London BLU-160 networked signal processor
2 BSS BLU-BOB2 Soundweb London 8-channel output expanders
1 Fostex 6301 Control room monitor speaker
2 JBL LSR 4326P monitor speakers (pair)

Central Controller, Control Devices
1 Crestron AV2 processor
1 Crestron RoomView Server Edition software

Panels and Racks
5 Extron DVI 201 TX/RX transmitter/receiver sets for control monitors
12 Middle Atlantic WRK-4432 44u gangable equipment racks w/accessories

Out of Band Content
2 Tandberg C20 HD videoconferencing codecs

Cables
Belden, Crestron, Delco

List is edited from information supplied by Westbury National Show Systems Ltd.

32-inch monitors showing the same program content as the classroom's three monitors. Below these are five Samsung 2243SWX 22-inch displays that allow operators to call up selectable previews of any content or camera. Each operator also has five computer displays showing the instructor's own touchscreen and one of the remote site's control, a quad display of the IP cameras, a status display for the Crestron XPanel control of the RoomView Server automation, and one display dedicated to the Tandberg codec control and operator email. The St. John control room has three NEC LCD3215 32-inch selectable program preview screens and three computer monitors.

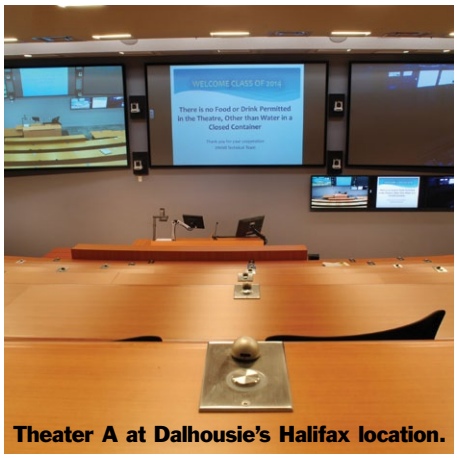
Limitations

As sophisticated as the system is, there are a few policy-dictated limitations. For instance, instructors are not allowed to use their personal laptops as part of distance-learning sessions; school policy mandates that all educational content has to be vetted by the school first to ensure proper playback of the content followed by distribution to the far site, should the videoconference be lost during a class. Thus, presenter VGA and HDMI ports are disabled during distance-learning sessions.

In a related issue, Crestron's DigitalMedia system is programmed to manage copy-protected content embedded with formats such as Extended Display Identification Data (EDID) or High-Bandwidth Digital Content Protection (HDCP). Creston DigitalMedia matrix switchers featuring QuickSwitch HD technology preauthorize and maintain a constant HDCP connection when switching sources, so there are no dropped signals and there is virtually no latency. The switchers also test and quantify how many keys each source can accept.

David VanVeldhuisen pointed out that Apple products engage HDCP even when protected content isn't playing. "We're trying to anticipate the kinds of copy-protection issues that the system can face in the future."

The system has experienced what Brock McGinnis said is 99% uptime since it went into service originally in 2010, and that record has been maintained as the system was extended to five teaching hospitals since then. "There's a lot of redundancy designed and built into the system. It operates like a television station, with its own control rooms that make sure the content gets through, no matter what. That's because the specification that this replicate face-to-face instruction as faithfully as possible was the highest requirement. It's kind of its own medical miracle." ■



Theater A at Dalhousie's Halifax location.