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Jan/Feb 2015

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Immersive learning
High-tech campus for USC

When InDesign were given the job to provide the AV systems for the University of the Sunshine Coast, they had a gargantuan task in front of them. Hurrairah bin Sohail reports.

Intensive education

The University of the Sunshine Coast (USC) is located an hour from the city of Brisbane on the Sunshine Coast in Queensland, Australia. The institute recently expanded with a three storey building: the Learning and Teaching Hub, which was a joint initiative between USC and the Australian Commonwealth Government.

The multi-tiered project included AU\$3.76 million for the provision of new audio-visual facilities which ranged from immersive spaces to videoconferencing and spanned across 50 rooms on five floors across two campuses. InDesign provided consulting, designing and project managing services for the project.

The objectives behind the investment were clear from the start. USC wanted to enhance the learning experience for its students

and provide them with real world environments. It also wanted to promote critical thinking amongst the research department through collaboration. The AV technology deployed was chosen with these objectives and future scalability in mind.

InDesign broke the project into five specific areas namely General teaching, Engage, Cave-immersive, Nursing simulation and videoconferencing.

General teaching

InDesign implemented a tiered teaching space where academic staff have the ability to move around the room and collaborate with the students. The main focus point is the new seating arrangement, which is

based around larger desks allowing workgroups of five to six students.

Each desk houses its own Lenovo PC, a 23in Dell monitor with touch overlay, a Crestron MPC-M5 control keypad and a Crestron 8 x 1 HDMI switch complete with six HDMI and one VGA input. This allows the students to collaborate amongst their group, sharing content from either the fixed PC or their own mobile devices on the local 23in monitor.

Every desk also has a dedicated input into the Crestron 32 x 32 DigitalMedia matrix and an Electro-Voice gooseneck microphone connected to the Electro-Voice NetMax N-8000 DSP which allows students to effectively share content and ideas from their group with the rest of the class.

Individual sessions are also recorded via the

“ We worked tirelessly to deliver this project on time, and within budget and the end result was certainly worth it. ”

- Peter Cowam, InDesign

Tech-Spec

Audio

Australian Monitor 2 x 6 distribution amplifiers

Bose speakers

ClearOne microphones and DSPs

Crestron audio amplifiers

Electro-Voice NetMax DSPs, Electro-Voice gooseneck microphones and ceiling speakers

Niles Audio 12 channel distribution amplifiers

Shure wireless microphone systems and receivers

Velodyne subwoofer

Williams Sound TX-75 infrared hearing augmentation transmitter and infrared body pack receivers





Mediasite HD lecture capture systems before being made available for viewing on the USC student portal. A Crestron lighting control system was deployed to ensure that teaching space was correctly lit for the various scenarios required.

Power protection was achieved through the APC UPS. To enhance the student experience, two Full High Definition (HD) projectors simultaneously show content from the lectern or from any of the 75 students.

Specialist spaces

The Engage Research Lab investigates and develops interactive technologies and boasts a variety of high-tech spaces designed for learning and collaboration. InDesign's Peter Cowam explains: "Top of USC's priority list was the ability to plug in a device and share the content anywhere.

"There were 80 inputs and outputs, which really necessitated a 64 x 64 matrix switch but the budget didn't permit that. We came up with an ingeniously simple solution which involved wiring all inputs and outputs back to a patch panel and a Crestron 32 x 32 DigitalMedia matrix. We categorized them into 'permanent' inputs and outputs and 'user definable' inputs and outputs."

The permanent outputs, such as projectors or displays, were patched into the matrix which left 20 user-definable points, located within floor boxes and on wall plates, which were only to be used occasionally. To make any of these points live simply requires a Crestron DigitalMedia transmitter or receiver to be connected at the outlet and the other end to be temporarily patched into the Crestron DigitalMedia matrix.

There are three roving Crestron transmitters and receivers, reserved for connecting user-definable inputs and outputs. InDesign also custom designed the floor

boxes to facilitate the installation of Crestron TX200 transmitters.

The primary requirement for the Cave-Immerse space was to create a technology 'blank canvas'. The caveat was that the installation had to be managed within the budget of AU\$145,000.

Cowam says: "The option selected included six edge-blended projectors that created a massive 19m wide image, that's 10,548 x 1,200 pixels (90:10 aspect ratio) providing viewers with 270-degree floor to ceiling video in Full High Definition."

The content for the projectors is driven from a six-headed video card PC located in the control room, whilst the Crestron 32 x 32 DigitalMedia matrix switch and supporting audio visual hardware is situated in the adjacent dedicated audio visual equipment room.

Edge blending the projectors was difficult as the individual projectors needed to be mounted with millimeter precision. InDesign also had to redesign the entire ceiling infrastructure to meet the strict mounting tolerances while avoiding existing building services.

Audio for Cave-Immerse is delivered via the Crestron HDXSP 7.1 High-Definition professional surround sound processor and the Crestron 210W per channel powered amplifiers.

Participant's behavior is monitored and captured via four Full HD cameras. These help to evaluate participant performance during a simulated scenario, which can be played back for assessment at a later stage. Crestron lighting control allows users to precisely configure the lighting to suit the room's usage. All of these scenarios are controlled via the Crestron 15in touch screen located within the control room.

This solution has also been integrated into the Engage AV infrastructure; which means it's capable of sharing and receiving content from any device connected to the DigitalMedia matrix, including the General Purpose Learning spaces.

A total of 12 links connect the Nursing Crestron 64 x 64 DigitalMedia matrix that allows them to push content through to the Cave-Immerse projectors.

The brief for the nursing simulation space included special mention of the fact that a reflective learning experience be provided where participants can review their performance in the simulated environment along with feedback from the facilitator.

Using Crestron 15in touch screens positioned within each control room, facilitators can select any combination of the 80 input devices and using the Crestron DigitalMedia matrix, route the signal to any of the 12 B-Line Medical capture servers across the two campuses.

The B-Line capture servers are purposely built for the medical environment, and as a result aren't cheap. But without the Crestron DigitalMedia matrix the installation would have required 23 B-Line capture servers to record the same spaces across the two facilities.

A facilitator can select any one of the four control rooms to view and record the simulation and using two-way audio visual communication he or she is able to issue instructions to the students via the control room. Students wear wireless lapel microphones so their conversations are recorded through the simulation as well. Feeds from both fixed and PTZ cameras are also being recorded and monitored. The facilitator is able to select and mix any of the microphones via the Crestron 15in touch screens and play them back through in-ceiling control room monitoring speakers.

The DigitalMedia matrix also enables both live and recorded content to be sent to a number of GPLs within the building so that students and facilitators can review and discuss simulation performances, both live and recorded.

It's important to note that a number of other simulation capture systems are IP based. While this

(L-R) InDesign delivered Polycom based videoconferencing; Cave-Immerse uses six edge-blended projectors to create a 19m wide image.

Tech-Spec

Video

AMX IS-XPT-2000 Inspired Xpert players

Atilona HDMI to composite converters

B-Line Medical simulation recorders

Blackmagic SDI to HDMI Convertors

Bluegum lectern

Crestron touch panels, Cresnet distribution hub and DigitalMedia scalers, transmitters and matrix switchers

Dell desktop PCs and 23in LCD touch screen

Elmo P30HD Digital visualiser

Epson HD short throw projectors and 4750 LCD projectors

Extron user & interconnect cables

InDesign Technologies swivel lecterns and MoCoW

Lenovo Tiny desktop PCs

Mediasite HD Lecture capture recorder

Panasonic HD cameras and controllers

Polycom Group 500 Video Conferencing codecs

Samsung LCD displays and Blu-ray players

may be the cheaper solution it has the downside of compressed video and increased traffic on the client's network. The solution provided by InDesign includes 47 Panasonic Full HD cameras and 64 Crestron TX transmitters which transmit uncompressed Full HD signals over dedicated AV cabling.

There are 31 wired microphone inputs plus 13 wireless microphones which use two transceivers that are also part of the installation. The Microphones transfer their signal over USC's network using Dante. Transceivers can be located anywhere on the USC network, enabling audio to be seamlessly routed between DSPs.

The benefit of this setup is that a Nursing facilitator at one facility could communicate with someone in a nursing simulation at another. They can also view the simulation over the internet as cameras can transmit over an IP network as well as output uncompressed HD signal locally.

Cowam says: "The other advantage of this solution is the 12 links (6 inputs + 6 outputs) between the Nursing's Crestron 64 x 64 DigitalMedia matrix and the Engage Crestron 32 x 32 DigitalMedia matrix located at opposite ends of the building. This is particularly critical given that the Nursing briefing room is physically located within the Engage space. These links also allow Nursing to utilize Cave-Immerse, enabling Nursing users to view and record any or all of the cameras within Cave-Immerse from any Nursing control room."

Videoconferencing

The University of the Sunshine Coast is spread across two campuses, the new Gympie campus being located an hour's travel north of Sippy Downs, and videoconferencing provides a link.

Cowam says: "Possibly the most challenging requirement was to provide microphone coverage for all participants in the lecture theatres, and to keep it within budget." USC's videoconferencing requirements encompassed two existing lecture theatres and two GPL's, across the two campuses.

The Polycom Group series videoconferencing



[Top to bottom] A typical meeting room; Nursing Simulation space; and a lecture theatre

platform was chosen as the University's standard. Both lecture theatres required AV switching upgrades to a Crestron 16 x 16 DigitalMedia matrix.

LT7 (the older and larger of the two lecture theatres) required a complete overhaul which saw the installation of two Epson Full HD short throw projectors, two Panasonic HE60 Full HD PTZ cameras, two Samsung 55in LCD confidence monitors and the addition of a Crestron lighting control system complete with dedicated Philips VC lighting fixtures.

Cowam says: "The most significant aspect of this installation was the audio. How do you provide adequate fixed microphone coverage for over 250 students? We specified the ClearOne Beamforming solution. The 6 x 24 element microphone arrays provided the answer and ClearOne DSP's, Shure ULXD and EV lectern microphones were chosen for all four VC spaces." Bose MA12 line-array speakers were deployed.

The Gympie lecture theatre was only six months old when the University selected a videoconferencing venue. InDesign was responsible for the previous design and hence knew the venue well. As the space was new, it required less upgrading. A Crestron 16 x 16 DigitalMedia matrix, a Panasonic HE60 Full HD PTZ camera, two Samsung 55in LCD confidence monitors,

a ClearOne DSP and six microphones were installed.

Both spaces saw the inclusion of a Crestron DMPS-300, Epson Full HD short throw projectors, Panasonic HE2 and HE60 Full HD cameras, ClearOne DSP's and tri-element microphones, Bose DS40 speakers and Crestron 10in colour touch screens.

Challenges

Right from the start, InDesign encountered the common problem of lack of space. After being engaged the integrator sat down with the architect to create dedicated AV rooms. This talk resulted in three spaces being allocated for the AV infrastructure and also resulted in the communications room doubling in size. InDesign also specified the power, data, cooling, lighting, security, and flooring for each of these spaces ensuring that it catered for USC's audio visual requirements.

Technical challenges were also faced. The first was the un-documented microphone input limitation on the Electro-Voice NetMax N-8000 DSP. InDesign's initial design consisted of the first DSP being allocated for 32 microphone inputs, with the second DSP being configured solely for audio output. However it was soon discovered that the NetMax N-8000 DSP cannot provide phantom power to all 32 microphone inputs within the one chassis being limited to handling just 24 inputs. Fortunately Bosch provided an additional DSP at no charge to rectify the situation.

In certain scenarios, InDesign found that ready-made equipment to meet the requirements of the installation was not available. One such instance was for the AV trolleys to be used in teaching spaces. InDesign custom designed a wireless Mobile Computer On Wheels – or MoCoW as the integrator likes to call it.

Another product custom designed by InDesign is the Swivel Lectern aimed at saving space. The design incorporates an 18RU equipment rack complete with lockable door, power rails and adjustable stopping points.

Special consideration has also been taken to ensure upkeep is not a hassle. Support staff can track device and room usage, schedule routine maintenance, receive instant alert notifications, and provide real-time technical support for any room, at any time, from anywhere via the Crestron Fusion enterprise management platform.

Cowam sums up: "Our philosophy is that regardless of how complex the system is, if it's not engaging, functional, reliable and simple to use, then nobody will use it. A projects success should be measured not by the size, but on the user experience." 