Inavate

LIFE Kolossalen 360 - Learning
Show Title: Klima Show

BRINGING SCIENCE TO LIFE

AV & multimedia technology deployed to captivate & educate STEM students

The rack room at LIFE is one of the attractions of the building

LESSONS FOR LIFE

A new campus in Denmark is using killer content and multimedia technology to captivate young people learning about STEM topics. **Anna Mitchell** pays a visit with integrator and consultancy Stouenborg.

Solving skill shortages requires massive foresight and early investment and in order to secure a skilled and homegrown talent pool of future scientists, Denmark's Novo Nordisk Foundation has acted decisively.

In 2020 it set up the non-profit LIFE Foundation tasked with engaging and inspiring Danish school children in science subjects through enquiry-based science education. An army of scientists and education professionals were employed to devise LIFE Courses on a range of subjects relating to the STEM disciplines (Science, Technology, Engineering and Mathematics). LIFE Kits, comprising teaching resources and materials, are sent out to schools to help teachers take their classes through the topics in five-week courses. Children are then invited to continue the course either in a LIFE mobile laboratory at the school or at the educational centre LIFE Campus.

And that's when the fun really starts.

The LIFE Campus is based in Lyngby, situated near the Technical University of Denmark. Accessed via a winding path through a natural landscape, 96 solid oak columns flanking the building echo the surrounding backdrop of trees and fan up around the entrance to reveal an opening on one corner of the rectangular structure.

This 5,400 sq m learning centre was designed by Vilhelm Lauritzen Arkitekter and built under client advice from Rambøll. Danish consultancy and integrator Stouenborg was tasked with design and installation of all AV, lighting and media technology.

The interior design makes extensive use of more wood and bare concrete walls and in the generously proportioned foyer, two Panasonic PT-RZ120 projectors fire onto a wall facing double height, floor-to-ceiling windows. In the evening and at night, visuals can be seen by both those within the building and visitors approaching.

Throughout the general areas, foyers, laboratories and corridors of the LIFE Campus, audio is delivered by 44 Meyer Sound Ashby-8C ceiling speakers with processing and control from Yamaha. In the foyer, Stouenborg provided a Shure ULX-D digital wireless microphone system for presentations and orientation.

Groups of up to 30 children at a time enter the campus building and head straight down to the basement where they can leave coats and bags in cloakrooms. Before they get there, they'll walk past the AV racks which, in an unusual twist, are deliberately on show.

At LIFE, it's not just the end points that are visible indicators of Stouenborg's work. Behind glass, that acts as an overlay offering some explanation on the kit, sits all the equipment that powers AV across an auditorium space and three laboratories. In a facility specifically designed to inform and inspire children in sciences it's a nice touch to show off the blinking lights, intricate wiring, switches and controls that make up the technical equipment.
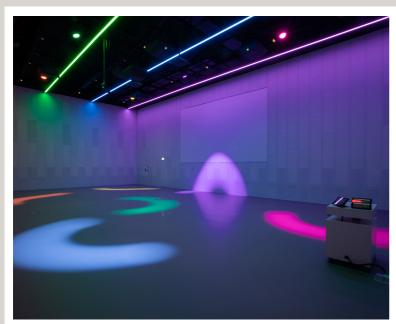
Four of the five racks contain Iiyama 21.5-in Prolite monitors delivering information on system status or holding slides, depicting the laboratory spaces for example.

Energy efficiency was paramount to the foundation and the systems are powered down each evening and when not in use. Stouenborg deployed Eaton power distribution units to ensure the equipment is turned off correctly. Power surge protection was also a necessity as the flat landscape surrounding the building makes it particularly vulnerable to lightning strikes.

Stouenborg's installation at the LIFE Campus is completely network based in a vast AV-over-IP deployment.

The Kolassalen is made up of a 360-degree immersive space [left], and a presentation area with tiered levels

Most of the campus is connected across a single network and Crestron DigitalMedia NVX is used as the backbone of the AV-over-IP system with around 100 DM-NVX units deployed across the building, while traffic is managed by Netgear switches. Signal distribution in small meeting and huddle areas is kept local and signal distribution is handled by Atlona.

Beckhoff is used to control everything that is controlled by relay switches including motorised projection screens, window blinds and everything controlled over DMX and DALI protocols.

A Onelan powered info-screen system runs throughout the building with Onelan NTB media players and five Sharp 65-in displays deployed. The Onelan system also feeds the two projectors in the foyer which are part of the info-screen system.

The Kolassalen

At the heart of the building is the Kolossalen, or translated into English, Colossal Hall.

The description doesn't disappoint. This cavernous space can be divided into two with the use of partition walls. At a glance the material on the walls looks like a metal loudspeaker grille which can be projected onto with 11 Panasonic projectors.

"The arrangement of the small perforations in the wall surfaces had to be extensively tested and created to avoid moiré patterns when the projectors are on," says Jørgensen.

Surfaces were also considered with acoustics in mind with Jørgensen's team discounting LED in favour of projection early in the project. "We have a 0.8 second reverb time in here, using LED videowalls and the hard surfaces they would have added would have made the acoustics very tricky," he says.

One half of the space has tiered levels descending toward one of the long-sided walls where a 7.5 metre-wide Da-Lite Da-Snap 1.1 projection screen can be lowered. This half uses four Panasonic projectors (two PT-RCQ10B and two PT-RZ120) to cover three sides and deliver 180-degrees of immersive content. The grille-like surfaces cleverly conceal Meyer Sound CAL 96 column array speakers.

When the tiered space is used as a traditional presentation area, the second room can offer additional audience space to the rear. Events have already been held here including a recent prize-giving for teachers celebrated by the Novo Nordisk Foundation.

The other half of the room has a flat floor. When the partition is closed it becomes an enclosed box and, with the help of six Panasonic PT-RZ120 projectors, it can be transformed into a fully immersive space with 360-degreee projection on all walls. A seventh projector was deployed to fire on to a main Da-Lite Da-Snap 6.5 metre-wide projection screen.

A Meyer Sound Spacemap Go system delivers powerful spatial sound to the immersive space with Stouenborg cleverly integrating a hidden cinema surround sound system using HMS-10 surround speakers, UP-4slim speakers and MM-10XP miniature subwoofers mounted in the walls and ceiling.

Several "shows" have been created to run in the space, specifically designed to fit in with the six-week lesson plans that are sent out to the schools. The content is created by the in-house team and with such a powerful immersive canvas at their disposal the team is experimenting with 360-degree recording methods to use the space to its full potential.

Christine Antorini, CEO of the LIFE Foundation, explains: "We can show children and young people scientific phenomena in completely new ways - from extreme weather as a consequence of climate change to atoms or lunar landscapes. The multi-room gives us absolutely extraordinary opportunities to support our teaching process visually and auditorily."

Prepared shows are played by six Brightsign HD2254 I/O players. More advanced and dynamic experiences, games and presentations can be run through a Christie Pandoras Box server.

There is a possibility that in the future interactivity that could power XR and VR experiences can be added to the space.

> The multi-room gives us absolutely extraordinary opportunities to support our teaching process visually and auditorily.

Christine Antorini, LIFE Foundation

[Clockwise from above] An info-screen system runs throughout the campus; a suite of offices, meeting rooms and huddle spaces were delivered for LIFE Foundation staff; a full production suite supports content creation

"This was one of the reasons for picking Pandoras Box," explains Jørgensen. "Microsoft Kinect systems can be used together with Pandoras Box. Very simply you could just take four camera outputs from Unity to create a VR experience. But, what is really interesting for us is to use XR in conjunction with the walls, creating triggers so that when you are touching the wall, or come close to the wall, there is some kind of effect on the content.

"All the cabling and the kit is ready to make this happen but the experience has not been developed yet. As soon as that's happened, the team just need to purchase the right kind of Kinect and they are good to go."

A range of lighting options can change the feel of both spaces that make up the Kolossalen and suit a range of environments and uses. Ljusdesign neo Fresnel – WDMX lights create a warm atmosphere, while Martin Mac Aura XB LED washlights offer a full stage lighting set up to enhance presentations and performances. RGB LED strip lights can be used to change the colour of the space.

Each room has a movable lectern offering control via Crestron TSW-1060 touchpanels. Additional control in both spaces can be accessed via wall-mounted Crestron Cameo keypads.

Users of the room can share and stream content using the Mersive platform with each room containing a Mersive Solstice Gen3 Pod. A Shure ULX-D wireless microphone system is provided as well as Shure Microflex Advance ceiling arrays and three ceiling-mounted Vaddio RoboShot 30E HDBTcameras are installed across both spaces. Panasonic 50-in displays are provided to act as feedback and preview monitors for presenters.

A control room serves the Kolossalen where technical professionals can monitor systems and proceedings with a bank of eight monitors: two Dell 24-in and six Samsung 28-in units. Control functions can be accessed via Crestron TSW-1060 10-in touchpanels. Genelec 4010A speakers deliver an audio feed within the control room. A Behringer Xenyx 502 mixer is supplied and QLab software is used for control and routing of audio both within the space and to route sound out. Thanks to the AV-over-IP system, it is easy to share content across the LIFE Campus and inputs can be routed from the laboratories for presentation within the Kolossalen.

Mogens Laursen was hired by the LIFE Foundation to head up AV operations. With a strong background in theatre, Laursen's appointment sends a clear message that one of the key aims of the LIFE Foundation is to make science subjects fascinating and engaging.

From the lighting to the audio, there's a strong element of theatre in both the technologies deployed and the approach in disseminating content and Laursen works with in-house content creators to bring the topics to life. The LIFE Foundation has built a formidable creative team that can develop video, graphic and audio content that makes the upmost of the powerful tech stack they have at their disposal.

"The audio-visual content delivered to groups visiting LIFE Campus is a result of collaboration between LIFE's teachers and technical professionals," says Laursen. "We listen to what they need to convey and invent methods for getting it across with powerful content."

Laursen says many of the principles are the same as theatre, but the biggest difference is attention isn't simply focused on the stage. The Spacemap Go system means that he can really make audio work in the immersive

> There are around 600 products connected to the network via 1,120 IP addresses so that gives us an idea of the scale of the project.

Anders Jørgensen, Stouenborg

Ninety-six solid oak columns flank the building

space and he says "as a sound designer that's a lot of fun".

A choice between advanced and basic modes of operation mean that the full potential of the powerful technology stack can be taken advantage of by technical operators, but the space can still be used effectively by less technically-skilled staff.

Teaching laboratories

Six state-of-the-art teaching laboratories are found on the ground floor, which can be combined into three separate spaces.

Teachers can deploy dropdown Projecta Elpro Concept screens and fire up Panasonic projectors (two PT-VMZ60 units per space) to deliver visuals in each laboratory.

The labs are visible from the outside through glass walls overlaid with fun graphics in keeping with the visuals used across LIFE Campus. "We opted for projection over LED to maintain the view into the laboratory when the screen is not in use," explains Jørgensen.

In each laboratory three ceiling mounted Vaddio RoboShot 30x zoom cameras can capture action in incredible detail. In what Jørgensen describes as one of the project's "inventions", Stouenborg has also developed a unique mobile, robust camera that can roam 50m while sending a feed back for viewing in the laboratory.

There's also ceiling mounted GLP impression FR1 TM LED

moving head lights to place spotlights on specific areas of the lab. "It adds a bit of theatre," notes Jørgensen.

Audio is captured by Microflex Advance ceiling arrays as well as a Shure wireless microphone system and headworn microphones for teachers, while audio is delivered via Meyer Sound Ashby-8Cs.

Each laboratory contains specialist furniture, custom built from antibacterial material, to house the equipment needed to control the space. Most of the AV kit and environmental controls can be managed via Crestron TSW-1060 10-in touchpanels with one wall mounted and one available on the table in each laboratory. The tables also have Beetronics 13-in monitors. Simple controls can be accessed via Crestron Cameo keypads with two installed per laboratory.

When turned on the AV kit powers up quickly and is intuitive and simple to operate. Sources can be selected and shown on the screen via simple drag and drop operation, cameras have pre-set positions so can quickly be pointed at each table in the lab. Several templates support the selection of differing screen layouts such as PIPs or split screens.

Users have a lot of control over the lighting in the room but presets help teaching staff quickly select the best lighting for regular tasks. Other handy tools include a

stopwatch and countdown that can help the teachers set timed tasks and keep lessons moving.

Each laboratory control table houses a Mersive Solstice Gen3 Pod and BYOD content sharing is supported by the Mersive collaboration platform. A PC, mouse, keyboard and monitor housed in the room offers access to Teams and Zoom meetings, while content filmed and created in the lab can also be streamed out to a host of video providers using OBS software.

Office suite

On the first floor are a suite of offices and meeting and collaboration areas for approximately 80 LIFE Foundation staff. "Our aim here was to make everything as simple to operate and control as possible," says Jørgensen.

Three mobile whiteboard, communication and collaboration units can be used throughout the space. These consist of trolleys that contain 65-in Sharp Big Pad touchscreens, Vaddio ConferenceShot cameras and TableMic microphones and Neets Sound Bar SB1s. Basic controls can be accessed using Neets UniForm keypad controllers.

In three corners of the office level, project rooms are set up for team collaboration. Across these Stouenborg installed ceiling mounted Vaddio ConferenceShot cameras and CeilingMic microphones as well as Neets

The audio-visual content delivered to groups visiting LIFE Campus is a result of collaboration between LIFE's teachers and technical professionals.

Mogens Laursen, LIFE Foundation

One of the teaching laboratories [left] and the main rack room

UniForm keypad controllers.

Two smaller rooms have 65-in Sharp Big Pad touchscreens, while in the largest of the project rooms a Panasonic PT-FRZ50W projector fires onto a Projecta Elpro Concept screen and audio is delivered from Meyer Sound Ashby-8C ceiling speakers. A Mersive Soltice Gen3 Pod is provided for content sharing and streaming. Stouenborg also installed an Interspace Industries PC Balance Box to balance the audio signal out of the projector so it can be run for a longer distance to the speakers.

Six smaller meeting rooms are fitted with Vaddio HuddleShot cameras, Panasonic 55-in EQ series displays and Atlona ATDISP-CTRL display controllers.

Stouenborg has integrated a huddle space and presentation area for ad hoc meetings in the canteen. Staff can connect to displays using wired or wireless routes via Mersive with two Gen3

Pods installed in the canteen and simple set up and operation can be managed by Neets UniForm keypad controllers.

For larger presentations in the canteen a Panasonic PT-FZ50W projector and Projecta Elpro projection screen are supplied with an Interspace Industries PC Balance Box. In the other smaller huddle space a Vaddio HuddleShot all-in-one conferencing camera is paired with a Panasonic 65-in display.

Audio in the canteen is delivered by a Meyer Sound MM-10ACX miniature subwoofer and two MM-4XP miniature self-powered loudspeakers.

Also on this floor is a production suite containing Neumann microphones and Dynaudio loudspeakers. The complete studio set-up was delivered for recording and editing of video.

"We have an audio podcast room which is tied up to the AV rack in the basement so you can

use tielines for connecting the rest of the house together with that production suite," adds Jørgensen.

After listening carefully to the aims of the LIFE Foundation, Stouenborg has integrated an impressive array of multimedia and AV tools at the LIFE Campus. That powerful technology line-up combined with the creative and scientific brainpower of the staff recruited by the LIFE Foundation is a formidable combination.

As Christine Antorini, CEO of the LIFE Foundation, explains: "The purpose of the LIFE Foundation is to enhance children and adolescents' understanding and fascination of the natural sciences. At LIFE Campus pupils really get the opportunity to study science in state-of-the-art laboratories as well as in our AV multiroom."

Those aims have truly been met here with AV technology adding the theatre and spectacle to bring these topics to life. 🌐

Tech Spec

Audio
Behringer Xenyx 502 mixer

Dynaudio loudspeakers

Meyer Sound MPS-488HP power supplies, Galileo Galaxy 816 processors, Ashby-8C, CAL 96, HMS-10, UP-4slim and MM-4XP loudspeakers and MM-10ACX subwoofer

Neumann microphones

Genelec 4010A installation speakers

Interspace Industries PC Balance Boxes

Neets Sound Bar SB1s

Sennheiser XSW 1 portable wireless microphone systems

Shure ULX-D wireless microphone systems and Microflex ceiling arrays combined with MVX

Vaddio CeilingMic and TableMic microphones

Yamaha MRX7-D signal processors

Control and distribution
Actassi patchpanels

Apple Mac Minis and Mac Pro

Barco Clickshare CSE-200

Beckhoff control

BlackBox Wizard SRX KVM extenders

Crestron DM-NVX encoders and decoders, DIN-APC 3-series control system, TSW-1060 touchpanels and Cameo keypads

Eaton EMAH28 power distribution units

Intel NUC i7-8809G

Lenovo ThinkCentre M920q PCs

Mersive Solstice Gen3 Pods

Neets switching relays and UniForm keypads

Netgear GSM4328PA and GS305EPP switches

TVOne 1T-SX-654

Vaddio AV Bridge 2x1s

Yamaha DCP4V4S-EU digital control panel

Lighting
GLP impression FR1 Tm moving head lights

Ljusdesign neo Fresnel zoom spotlights

Luminex lighting control

Martin Mac Aura XB LED washlights

Pharos LPC 2 controller

Video
Atlona ATDISP-CTRL display controllers, HDBaseT extender kits and AT-RON-442 distribution amplifier

Beetronics 13-in monitors

Brightsign HD224 and LS424 I/O players

Christie Pandoras Box dual and quad players

Da-Lite projection screens

Dell P2418HT monitors

Hikvision Pro series cameras

Iiyama T2236MSC monitors

Onelan CMS-PA-25 and NTB media players

Panasonic TH-65CQ1 and TH-55EQ1W displays and PT-RCQ10B, PT-VMZ60, PT-RZ120 and PT-FRZ50W projectors

Projecta Elpro Concept screens

Samsung U28E850R monitors

Sharp PN-HW651 and PN-65 displays

Vaddio RoboShot 30, ConferenceShot and HuddleShot conferencing cameras

On the road

In order to reach students across all of Denmark, visits can be arranged for one of the five mobile LIFE teaching laboratories to travel to a school. Smaller versions of the laboratory spaces have been integrated into lorries. When the truck arrives at its destination, its trailer increases in size by extending from the side to accommodate the students.

"The whole box moves in and then moves out so it's very difficult to have cables running from a centralised rack to the units," says Jørgensen. "Laying out those cables is really crucial and when you have laid them out, that's what you've got. You don't have a chance to put in more cables because the truck is built around it. We built everything in our workshop, tested everything, laid it out,

then handed over to the truck company to install."

Each truck contains six workstations, each offering an Iiyama 32-in ProLite interactive display, Intel computer and Logitech mouse and keyboard. Signal switching is handled by a TVOne switcher.

Content sharing is managed by a Barco Clickshare CSE-200 system and a Sennheiser XSW 1 portable wireless microphone system is supplied. Audio is delivered with Genelec 4010A speakers. Vaddio PTZ cameras can capture action at the stations or for demonstrations from the teachers. Hikvision Pro series cameras were also deployed for surveillance.

Jørgensen says making sure the installation was robust enough to face the challenges of the road was vitally

important as they couldn't risk a truck turning up to a school and something not working.

"If you look at the broadcast industry there's a lot of products built for this type of environment, but that's not the case with the technologies we needed to deploy," he says. "We had to consider the installation carefully and all cables and all connectors are glued into the products with warm glue."