

Harvard JFK School of Government Decision Science Laboratory

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Using the World's Only High Definition Touchpanels to Study the Science of Decision-Making

Since its founding in 1936, The Harvard John F. Kennedy School of Government has evolved into a preeminent research institution for social and political sciences. Graduates include presidents, prime ministers and other world dignitaries. Home to fifteen research centers and institutes and 27,000 alumni from 137 countries, the university's study of public policy has worldwide reach.

Advancing its research innovation, the Harvard Decision Science Laboratory (HDSL) was recently completed and opened its doors to researchers focusing on the emerging field of decision science. Using innovative data acquisition and analysis applications, researchers examine the factors affecting judgment and decision-making in public policy through a variety of models and lab experiments, drawing primarily on psychology and economics to examine emotional, behavioral, cognitive and biological systems.

“Utilizing a Crestron solution allowed us to take a very complex design, simplify it, and provide HDSL researchers and staff with an interface that’s easy to understand and easy to use.”

To create the ultimate laboratory facility for HDSL, MindWare Technologies, Gahanna, OH, whose advanced human physiological monitoring technology is the lab's cornerstone application, retained Crestron dealer, Premier Network Solutions (PRENET), Cincinnati, OH, to integrate their solution with a sophisticated multimedia AV control system.

A fully integrated Crestron control solution, which includes the world's first and only high definition touchpanel, was selected to handle the demanding collaborative implementation.

The Lab Setup for Hi Tech Decision-Making Experiments

Experiments utilize stimulus criteria in various forms including verbal, using headsets, person-to-person negotiation viewed in real time on a monitor, watching a video and responding using a keyboard/mouse, or written and interview-based surveys with participants.



“In order to understand the complex requirements for the laboratory, we held weekly meetings with key individuals responsible for the lab. Through this process, as well as additional communications during various phases of the installation, we were able to create the system,” explains PRENET president and chief programmer, Steve Immerman.

The first phase of the project provided testing cubicles for 12 experiment participants, commonly referred to as “subjects”. Each cubicle is outfitted with two computers with LCDs – a stimulus PC for subjects to respond and a PC which processes and records physiological data – a modified quick-response keyboard/mouse, hidden CCTV camera, and headset for two-way communication. Additionally, cubicles contain individually controlled dimmable lighting and soundproofing for optimal isolation.

“Having the opportunity to create a prototype lab in the first phase, allowed us to identify things that could be done more effectively for the final system,” says Immerman.

As a testament to the success of the ground-breaking project's charter phase, a second phase was completed and includes a newly remodeled space, tripling lab capacity - adding 24 cubicles for a total of 36 - configured into three sections of 12 with an examiner station at each section. Foldout soundproof walls provide isolation for each section.

From a 46" touchpanel, examiners control lighting throughout the lab space, select AV sources displayed at the examiner station and control audio and video distribution to each cubicle. Lighting levels within each cubicle are also controllable to vary conditions during experiments.



A powerful PRO2 Professional Dual Bus Control System with Ethernet rack mounted at each of the three examiner stations integrates AV, lighting, computers, DVD/VCR players and cameras within that section, while a fourth PRO2 serves as the master control system, distributing and routing custom programming instructions to each of the three sections. Installation was simplified with QuickMedia™ technology and substantially reduced the tremendous cabling requirements and costs, delivering HD video and digital audio signals over a single CAT5e cable.

The complex routing configuration was simplified using a QM-MD 16x16 matrix switcher for each section. Combined with a QM-MD7x2 distribution center and QM-RX receiver installed at each cubicle, signals may be routed to the displays, the “Stimulus PC” and subject headsets. An additional QM-MD16x16 switcher is shared to enable the “virtual examiner configuration”, combining the three sections.

Mega High Definition Touchpanel, Total Control

Examiner stations serve as the central command, administration and monitoring center for experiments, providing full touchpanel control of the testing system. To facilitate the cutting-edge experiments, each section is equipped with a Sharp 46” LCD monitor, with a Display Werks overlay for touchscreen functionality. The large touchpanels are the focal point of the system and were needed to provide sufficient screen size for the multi-window interface necessary to achieve control of all lab operations.

Crestron DVPHD-PRO-QM High-Definition Digital Video Processor enables simplified configuration of a complex multi-window GUI required by the HDSL and the Mindware testing software. Powered by an embedded Crestron 24-bit Isys™ graphics engine, the DVPHD provides pure digital HD video and 1080p output, delivering the world's only high definition touchpanel.

The mega touchscreen allows one-touch control across any combination of the three sections, giving examiners the ability to monitor a study by individual or group. Fingertip control of the source media in use, lighting, communication between examiner/subjects, and subject-to-subject communications for group negotiations, enables instant execution of desired testing conditions.

“The DVPHD's provided the touchpanel capability along with multiple video window support on a single display. This dramatically simplified the user experience, which was an important client requirement on this project,” said Immerman.

The Control and Monitoring Challenge – Connecting the Examiner to the Subjects

The DVPHD enabled Immerman to divide the 46” display into eight simultaneous active viewable windows, with several sub-windows, each with pure digital signal output and high definition full-motion video capability.



At top left, the window displays “Experimenter Sources” which enables access and control of the examiner laptop, PC, VCR, DVD, interview rooms, data server, web server and a security DVR for instant playback of security camera recordings. In the center, “Cube View” displays three active video windows. Two of the video windows display content from the “Stimulus PC” and “Physio PC”. The third window displays video from a pan/tilt camera. A “keyboard” preset allows the examiner to actually “take over” the selected PC.

The “View” button allows the examiner to view the computers and video feed from the selected cube. The “Listen” button allows the examiner to listen in on what the subject is hearing or saying. “Cube Light Control” displays presets, enabling lighting to be adjusted for any individual cubicle, all cubicles and by group. Each scenario has sub-presets for lighting levels of 68%, 50% and 22%, in addition to manual dimming options.

At top right, “Camera Viewing” utilizes three video windows, enabling simultaneous camera viewing for any three lab areas. The control section includes buttons for controlling cameras in interview rooms, building security cameras in the lobby and hallways, and the area behind cubicles. The “Send To” buttons route selected cameras to one of three windows, enabling multiple viewing combinations with a few button presses. “Monitor Control” gives examiners command of the dual cubicle monitors, plus the examiner’s own touchscreen.

The result is an easy-to-use interface that enables combinations of display and stimulus options, while streamlining the process of conducting multiple experiments for various group sizes.

Simplified Lighting Control with Crestron Green Light™

Providing a robust, cost-effective lighting solution, the PAC2M Professional Automation Mini Control System and CNLFDB-4 Fluorescent Dimming Module control general sectional lighting, giving examiners touchpanel control to instantly adjust testing conditions and ambiance. CNX-B4 4-button designer keypads in each section enable local lighting control. Multiple DIN-8SW8 Din Rail High-Voltage Switches and DIN-A08 Din Rail Analog Output Modules control individual cube lighting.

A Collaborative Effort Proves Successful

To integrate MindWare’s complex physiological testing application and HDLS lab procedures into an easy-to-use AV and lighting control system required a total and open collaboration from several teams. Ultimately, the design exceeded HDLS expectations and delivered a simplified process for administering their progressive experiments.

Immerman sums it up, “Utilizing a Crestron control solution allowed us to take a very complex design, simplify it, and provide HDLS researchers with a user interface that is easy to understand and easy to use.”