

## What if you could . . .

**WORK WITH LEADING EXPERTS** to improve plant safety by reducing human error? **TEST, DESIGN AND VALIDATE** control room designs without building an expensive simulator? **BUILD INTEGRATED CONTROLS SYSTEMS** such as computerized adaptive procedures and alarms?

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## INL Human Systems Simulation Laboratory

# With Idaho National Laboratory, you can.

Expertise.  
Innovative Facilities.  
Research Capabilities

**EXPERTISE.** INL scientists have long been at the forefront of studying and designing more effective ways for humans to operate machinery that also improve performance, reliability and safety. Their research has served as the technical basis for the Nuclear Regulatory Commission's regulations for safe power plant operation and led to several technology innovations.

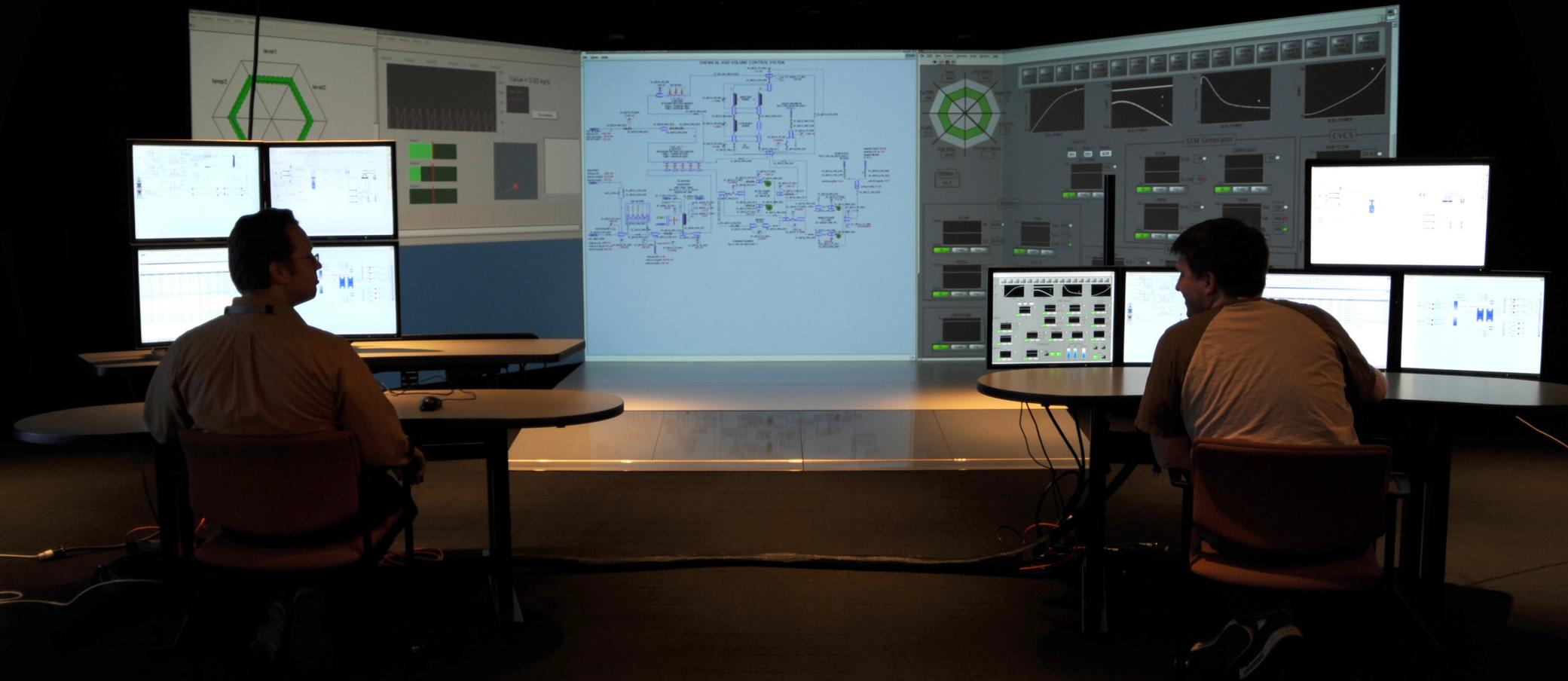
INL's approach is to adapt technology to humans not mold humans to technology.

**FACILITIES.** INL has built a virtual test bed that can be configured to simulate various control room layouts and is compatible with all major software platforms in use at power plants today.

Known as the Human Systems Simulation Laboratory, this innovative facility is the only one of its kind in the United States.

Key components include:

- Two Dell rack-mounted operator workstations, each capable of driving up to eight 30-inch monitors.
- A four-walled computer-assisted virtual environment – or CAVE – capable of displaying 3D images.
- A workstation that records audio, video and physiological responses including heart rate, breathing skin conductivity. The data can be synced so researchers can identify stress, fatigue and other precursors that lead to operator errors.



- Two eye-tracking systems that collect data about an operator's physiological responses and what he or she looks at most on a display.

## DATA COLLECTION AND DESIGN.

INL researchers collect an array of data on operators and their responses to different control room situations and use it to develop new designs or to test proposed layouts.

They are experienced in working with experimental mock ups as well as research design, analysis and recommendations.

INL's human factors experts have decades of experience in control room design, display and testing of a variety of operator aids.

**SUCCESS STORIES.** INL researchers have worked with operators at the lab's Advanced Test Reactor (ATR), industry and the Nuclear Regulatory Commission to implement design and technology changes that improve efficiency and reduce the risk of human-induced errors.

Their successes include:

- Studying, designing and testing several control room – and simulator – ~~several~~ upgrades at ATR.
- Developing an alarm system that combines elements of analog annunciator tiles with digital alarm lists.
- Understanding the conditions that can be modified to improve the overall safety and efficiency of outage control at nuclear facilities by accessing the delivery of information.

*Caption about the control rooms at right, modern and old.*

