

LWRSP

***Advanced Instrumentation,
Information, and Control
Systems Technologies***

R&D Program

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Performance-Based I&C Replacement Strategy

- I&C modernization is considered to be a critical need for the sustainability of the operating nuclear fleet
- Due to short-term operational focus, the US commercial nuclear industry could modernize its legacy I&C systems and still miss the opportunity to transform its operating model
- A national research program is needed to develop the transformative technologies and implementation roadmap for a performance-based I&C replacement strategy



Advanced II&C Systems Technologies

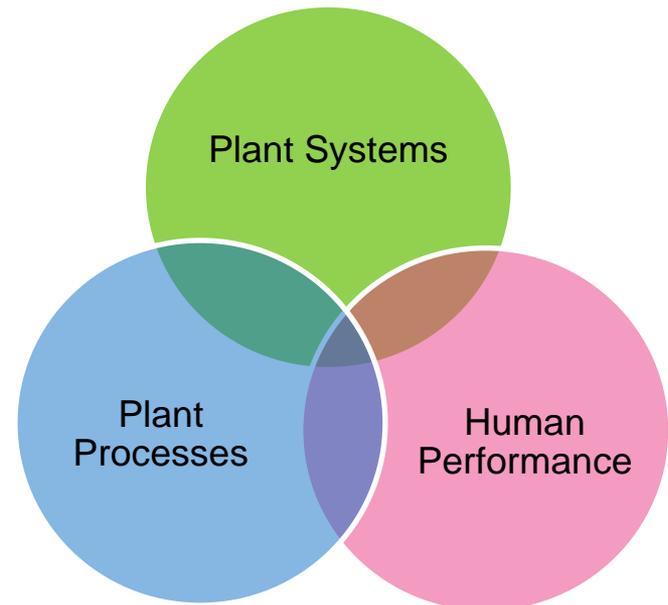
Technologies for and demonstrations of highly integrated control and display technologies that address long-term objectives of nuclear power plant operation, including the following:

- Fleet-wide management of asset information to support integrated operations
- Improved visualization and use of information to support decision-making and actions
- Greater automation of functions and availability of operator support systems to improve efficiencies and reduce errors



Engaging the Nuclear Power Industry

- Research and development of near-term beneficial technologies while building the digital work environment of the future
- Integrating plant systems, plant processes, and human performance
- In-kind contribution from industry – time, expenses, plant access, plant expertise, reference documents, and other resources (e.g. simulator)
- Industry hosts the technology demonstration and effectiveness assessments
- INL provides research & associated technologies, training & implementation, and research reports
- INL facilitates industry-wide adoption of new capabilities



Industry Working Group



- Composed of innovation leaders within these companies
- Provides critical input on industry needs and long-term vision of a future integrated digital environment
- Provides opportunities for pilot projects where there is alignment with innovation initiatives within these companies

Human Systems Simulation Laboratory

- *Reconfigurable Control Room Simulator*
- *Virtual Reality Cave*



Technology Building Blocks for a Future Digital Environment

- Heads-up information displays
- Wireless streaming of information & video
- Computer-based procedures
- Component status identification (bar code, RFID)
- Smart Board – large interactive display devices
- Wireless component position indicators
- Alarm management and display technology
- On-Line monitoring systems



Highly-Integrated Control Room

Pilot Projects

- Incorporating Digital Upgrades in an Analog Control Room
- Advanced Alarm Systems
- Control Room Computer-Based Procedures
- Computerized Operator Support System (COSS)
- Future Concepts of Operation



High-Automated Plant

Pilot Projects

- Digital Architecture for a Highly-Automated Plant
- Automating Manually-Performed Plant Activities
- Advanced Plant Control Automation
- Advanced Plant Control Algorithms



Human Performance Improvement for NPP Field Workers

Pilot Projects

- Mobile Technologies for NPP Field Workers
- Automated Work Packages
- Augmented Reality for NPP Field Workers



*Integrated Operations**

Pilot Projects

- Advanced OLM Facility
- Virtual Plant Support Organization
- Management Decision Support Center

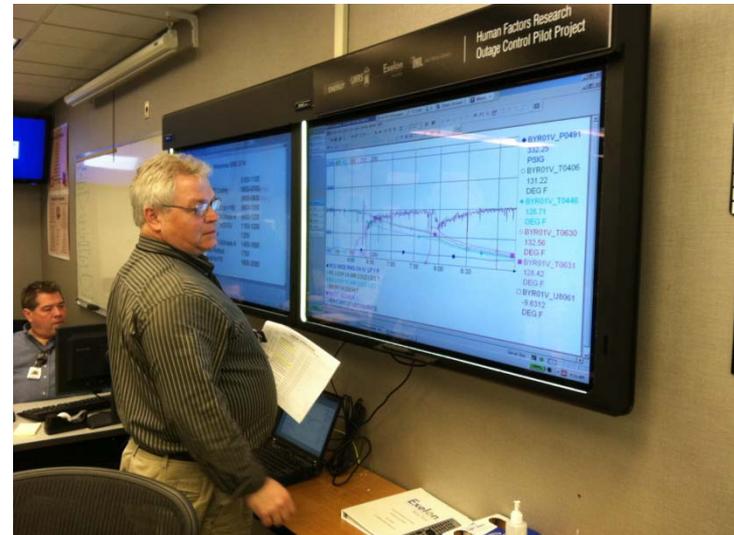


* Halden Reactor Project Concept

Outage Safety and Efficiency

Pilot Projects

- Advanced Outage Coordination
- Advanced Outage Control Center
- Outage Risk Management Improvement



Ten Year Technical Plan - Summary of Pilot Projects

