Advanced Instrumentation, Information, and Control Systems Technologies Overview

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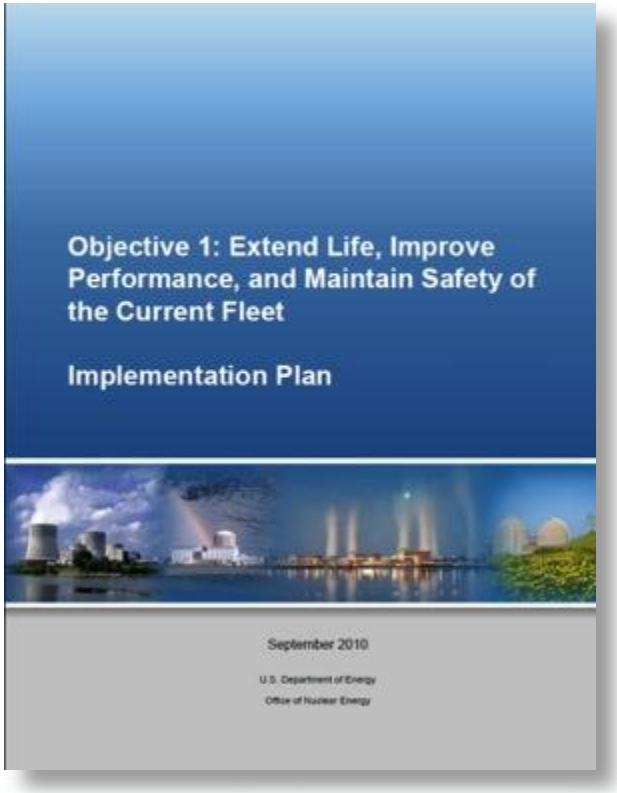
Light Water Reactor Sustainability R&D Program

Light Water Sustainability Program Goals and Scope

- Develop the fundamental scientific basis to understand, predict, and measure changes in materials and structures, systems, and components (SSCs) as they age in environments
- Apply this knowledge to develop and demonstrate methods and technologies that support safe and economical long-term operation of existing reactors
- Researching new technologies that enhance plant performance, economics, and safety
- Scope
  - Materials Aging and Degradation
  - Risk-Informed Safety Margin Characterization
  - Advanced Instrumentation, Information and Control Systems Technologies
  - Reactor Safety Technical Support



LWRS Light Water Reactor Sustainability

Mission & Motivation for II&C Pathway

- Current technology for I&C is not sustainable – could become a limiting factor for continued operation.
- Recent replacements and modernizations using digital technologies are perceived as unsuccessful.
- Regulatory uncertainty and a risk-averse industry reinforce the status quo of outdated and antiquated analog I&C.
- ALWR licensing will not change current I&C limitations for existing plants.
- DOE as the leading organization for national nuclear R&D is leading research to support the transformation to modern I&C technologies & solutions.
- Asset owners and vendors recognize that the needed change is not occurring and is not likely to occur without substantial federal involvement.
- A federally funded R&D initiative can draw upon capabilities of universities and national laboratories, vendors, asset owners, other research organizations and engage the regulator to achieve the outcomes of this program.

Advanced Instrumentation, Information, and Control R&D Pathway's mission:

•Address long-term aging of existing instrumentation and control technologies and develop and test new technologies.

•Establish a strategy to implement long-term modernization of I&C systems.

•Develop advanced condition monitoring technologies for reliable plant operation and develop the means to monitor aging degradation processes.

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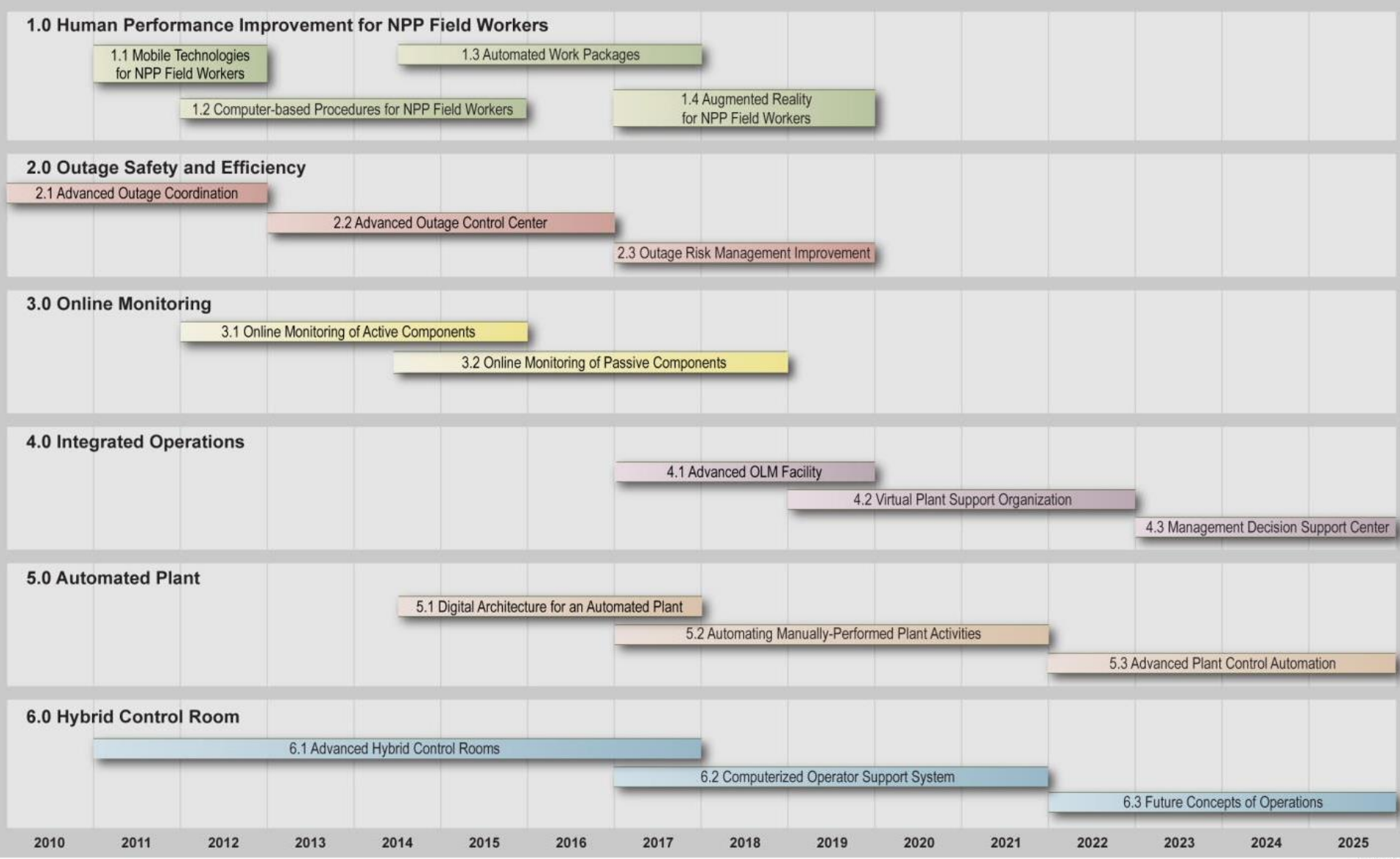
II&C Plan – Roadmap to Deliver on Strategy



Industrial Engagement

The purpose of the Working Group is to define and sponsor research projects that will collectively enable significant plant performance gains and minimize operating costs as part of the larger national effort to ensure long-term sustainability of the LWR fleet. The Working Group Charter is as follows:

- Develop agreements with host utilities to demonstrate near-term beneficial digital applications that improve performance at lower cost.
- Obtain funding for projects through LWRS program funding and industry cost-sharing.
- Coordinate project development among research organizations associated with the U.S commercial nuclear industry, to the degree practical, to minimize duplication of effort.

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Summary

- Pilot projects implement the plan to deliver on the vision of the pathway.
- Strategy emphasizes research demonstrated and tested in plant settings.
- Objective is to develop and document processes for advancing use of digital technologies.
- Tests and results made available to entire Utility Working Group and industry, as well as vendors and public.
- Systematically addressing areas of key uncertainty: technical, experience, regulatory.
- For more information visit: http://www.inl.gov

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