



Development of Digital Instrumentation and Control Interim Staff Guidance (ISG)

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Background

- November 8, 2006, Commission briefing
- December 6, 2006, Staff Requirements Memorandum
- January 12, 2007, memorandum established the Digital I&C Steering Committee
- Digital I&C Project Plan
- July 18, 2007, Commission briefing

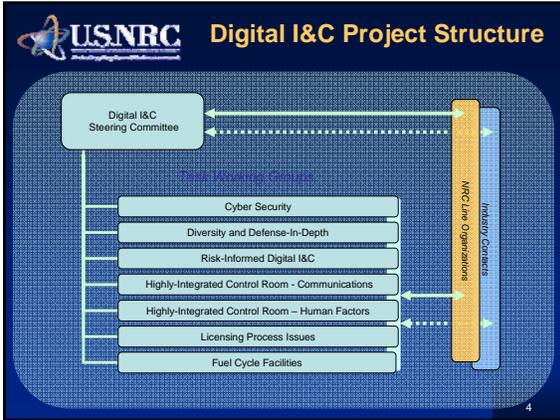
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Key Challenges

- Enhancing regulatory transparency and predictability and staff review efficiency and effectiveness through refined regulatory guidance
- Anticipating future needs
 - Evolving technology
 - New Reactors, Operating Reactors, Fuel Cycle Facilities
- Improving stakeholder interactions
- Maximizing value of domestic and international interactions

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- USNRC Task Working Groups**
- **Cyber Security**
 - Resolve inconsistencies within existing NRC and industry cyber security documents
 - **Diversity and Defense-In-Depth**
 - Identify acceptable diversity and defense-in-depth strategies (D3) and provide clarification on incorporation of D3 in digital safety systems that will provide more transparent and predictable reviews
 - **Risk-informed Digital I&C**
 - Provide guidance as to what is needed for digital system modeling in Part 52 licensing
 - Determine how and if risk-insights can be used to assist in resolution of key digital issues

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- USNRC Task Working Groups**
- **Highly Integrated Control Room – Communications**
 - Provide industry and NRC guidance that defines at a sufficient level of detail the expectation for inter-divisional communications independence
 - **Highly Integrated Control Room – Human Factor**
 - Provide human factors engineering regulatory positions, guidance, and acceptance criteria to address new aspects of digital control room displays and controls
 - **Licensing Process Issue**
 - Identify licensing process protocols for submittal and review new of digital technology applications
 - **Fuel Cycle Facilities**
 - Develop guidance for digital I&C for fuel cycle facilities



Diversity and Defense-in-Depth (D3)

- Adequate Diversity
 - Additional clarity is desired on what constitutes adequate D3. Determine how much D3 is enough.
- Manual Operator Actions
 - Clarification is desired on the use of operator action as a defensive measure and corresponding acceptable operator action times.
- Interim Staff Guidance
 - There is no distinction in D3 guidance for digital Reactor Protection System (RPS) designs for new/future nuclear power plants and current operating plants.
 - While CCFs in digital systems are beyond design basis, the digital RPS should be protected against CCFs.
 - A D3 analysis should be performed to demonstrate that vulnerabilities to CCFs have been adequately addressed.

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Diversity and Defense-in-Depth (D3)

- Interim Staff Guidance (cont.)
 - Where the protective action that should have been automatically performed by the system subject to CCF is required in less than 30 minutes to meet the BTP 7-19 acceptance criteria, an independent and diverse automated backup, achieving the same or equivalent function, should be provided.
 - This automated backup guidance does not apply to follow-on actions that are handled in a manual fashion.
 - In addition, a set of displays and controls (safety or non-safety) should be provided in the main control room for manual actuation and control of safety equipment to manage plant critical safety functions.
- Bases for 30-minute Operator Action Time
 - Minimizing operator burden under the conditions of a digital system CCF
 - Past regulatory decisions
 - Regulatory practices applied in the international community
 - Engineering judgment

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Communications

- Areas of Interest
 - Interdivisional Communications
 - Command Prioritization
 - Multidivisional Control and Display stations
 - Digital System Network Configuration
- ISG has one section for each of the first three areas, the last area is addressed in the sections devoted to the others areas

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Human Factors

- **Minimum Inventory**
 - Better describe the process for developing and the actual minimum inventory of alarms, controls, and displays
- **Interim Staff Guidance**
 - Applicable only to new reactors
 - Identifies
 - Selection criteria
 - Process development considerations
 - Verification
 - Two step process consistent with the design acceptance criteria concept
- **Computer-Based Procedures**
 - Develop review guidance and acceptance criteria for review of computerized procedures and associated soft controls
- **Interim Staff Guidance**
 - Paper and computer based procedures can be essentially the same
 - Computer-based procedures should not limit the control or situation awareness of the procedure user
 - Computer-based procedures can incorporate different levels of automation

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Moving Forward

- The ISGs will be formalized through Regulatory Guides, NUREGs, and/or SRPs
- NRC will continue to work closely with key stakeholders to address key high-priority issues in a timely manner
- Early and frequent interaction between the applicant and the NRC staff
- NRC staff will continue to engage with domestic and international nuclear community and other industries to gain relevant operating experience and to cooperate future activities in digital I&C

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