



NRC Workshop: Evaluating NEI's Digital Instrumentation and Controls Recommendations for Accelerating NRC Reform

Jason Paige, NRR
Calvin Cheung, NRR

February 13, 2026

Purpose: Expectations for the Workshop

Discuss specific topics to reform the NRC's instrumentation and controls (I&C) regulatory framework in support of the staff's evaluation of the Nuclear Energy Institute's (NEI's) recommendations.

- Familiarize stakeholders on the NRC's existing I&C regulatory framework
- Facilitate deep-dive discussions on information presented during the January 14th, public meeting
- Continue to foster a collaborative environment to gain the broader perspectives of meeting participants
- Concentrate on future-focused discussions on proposed revisions to the I&C framework



Agenda

- Defining Success
- Licensing Framework Overview
- Discussion Topics*
 - Common cause failure (CCF).....9:30am
 - Licensing guidance (i.e., focused licensing reviews).....11:00am
 - Codes and standards.....1:00pm
 - Human factors engineering (HFE).....2:00pm
 - Expanded Performance-Based Review Methods.....2:45pm
- Next Steps.....3:30pm
 - Summary of follow-up actions

*Each topic includes an NRC presentation, industry presentation(s), and open discussion



Defining Success of Regulatory Reform

Reform the I&C regulatory framework to enable the safe and efficient implementation of I&C systems

- Continue to support digital upgrades to low safety significant safety-related systems without prior NRC approval (e.g., RIS 2002-22 Supplement 1)
- Identify and address perceived inefficiencies or barriers to enabling digital upgrades to high safety significant safety systems
- Focus the scope of licensing reviews for digital upgrades
 - The goal is to make licensing reviews of digital I&C installations and upgrades more efficient, predictable and timely.

Enable the efficient deployment of digital technology while preserving safety and security

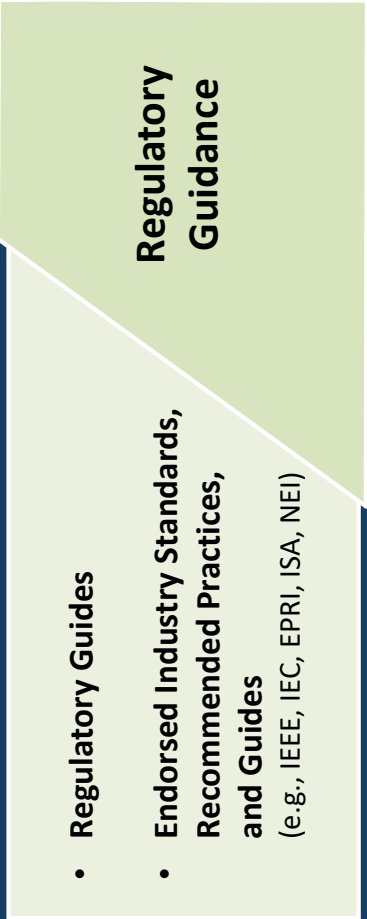


Protecting People and the Environment

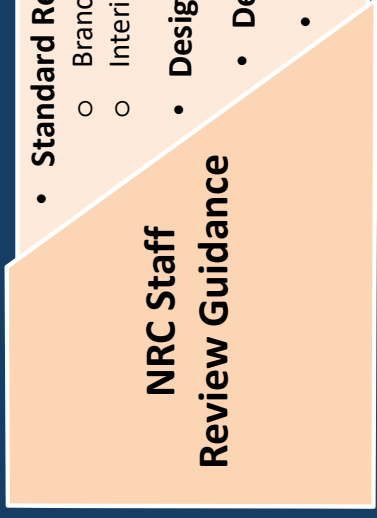
Licensing Framework Overview



- **Regulations**
 - Title 10, Code of Federal Regulations (10 CFR)
- **Staff Requirements Memoranda (SRMs)**



- **Regulatory Guides**
- **Endorsed Industry Standards, Recommended Practices, and Guides**
(e.g., IEEE, IEC, EPRI, ISA, NEI)



- **Standard Review Plan (SRP)**
 - Branch Technical Positions (BTPs)
 - Interim Staff Guidance (ISGs)
- **Design Specific Review Standard (DSRS)**
- **Design Review Guide (DRG)**
- **NUREG-1537 - Non-power Production and Utilization Facilities (NPUFs)**



U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Discussion Topics



Common Cause Failure (CCF)

Existing Framework

- Existing methods for addressing systematic CCFs in digital I&C systems and components typically fall within the following categories:
 - Eliminate the potential of CCF from further consideration (prevention)
 - Mitigate the consequences of a CCF (diverse means/risk informed approaches)
 - Evaluate and find the consequences of a CCF to be acceptable (low consequences)

Goal of Reformed Framework Discussions

- Support addressing CCF during the design of digital I&C safety systems.



Licensing Guidance

Existing Framework

- NUREG 0800, Chapter 7: provides guidance for staff review of the I&C portions of: (1) applications for nuclear reactor licenses or permits and (2) amendments to existing licenses.
 - Includes Staff Review Guidance BTP 7-19 which provides multiple alternative pathways for reviewing and determining how the licensee/applicant may be found to have adequately addressed CCF
- ISG-06: provides an overall licensing roadmap for applying key guidance documents under both the traditional review process and alternate review process.

Goal of Reformed Framework Discussions

- Further improve the NRC staff's evaluation of digital I&C systems by focusing on safety significant aspects that support a reasonable assurance finding



Codes and Standards

Existing Framework

- The criteria in IEEE Stds 279 and 603 are incorporated by reference (IBR) into 10 CFR 50.55a(h)
- Licensees and applicants have the option to use proposed alternative standards via 10 CFR 50.55a(z)

Goal of Reformed Framework Discussions

- Gain a common understanding of industry's concerns related to Codes and Standards (related to an ongoing Petition for Rulemaking (PRM))



Human Factors Engineering (HFE)

Existing Framework

- NUREG 0800, Chapter 18 - HFE Considerations for License Applications, Design certifications, modifications and important human actions
- NUREG 0711 – HFE Program Review Model
- NUREG 0700 – Human-System Interface Design Review Guidelines
- NUREG 1764 – Guidance for the Review of Changes to Human Actions
- NUREG 1852 – Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire
- NUREG 1220 – Training Review Criteria and Procedures

Goal of Reformed Framework Discussions

- Improve clarity on implementing suite of HFE guidance in digital I&C applications. For example, how to apply HFE considerations when using the alternate review process in ISG-06.



Expanded Performance-based Review Methods

NRC Ongoing Research Activities

Provide technical basis to support performance-based reviews with improved efficiency			
Hazard Analysis (STPA)	Build capability to evaluate an STPA-informed submittal	Model-Based Systems Engineering (MBSE)	Enable analytical evidence from earlier stages of development "Correct by Construction" related evidence
Safety Assurance Case (SAC)	Enable organizing different kinds of evidence & their logical integration to demonstrate safety	Systems Engineering	Enable goal-driven, holistic, interdisciplinary, risk-informed approach in regulatory reviews
			On Line Monitoring
			Allow AI/ML-enabled Condition-Based Monitoring

Goal of Reformed Framework Discussions

- Consider leveraging ongoing research activities to further enable the use of performance-based methods for NRC staff's evaluation of digital I&C systems



Next Steps

Summary of Action Items

