Preliminary Recommendations for Modernization of the NRC's Digital I&C Regulatory Infrastructure

Modernization Plan 4B Working Group

November 20, 2019

Background

The MP4B working group performed a strategic assessment to recommend ways to modernize the DI&C regulatory infrastructure that:

- Focused on the scope identified in the SRM to SECY-15-0106

- Reviewed existing efforts to avoid duplication of concurrent efforts and complete assessment in a timely efficient manner

- Solicited input from the public and the various DI&C stakeholder communities

- Focused on guidance improvements within the current DI&C regulatory infrastructure

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Purpose

- Present preliminary list of recommendations

- Discuss and solicit feedback on proposed recommendations

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NEI Identified Barriers to Efficient Use of Digital I&C Technology

- Common Cause Failure (e.g., BTP 7-19)

- Software Development Standards and Guidance (e.g., BTP 7-14)

- I&C System Architecture Development

- Limited Functionality I&C Devices

Concurrent Regulatory Improvement Activities

- Digital I&C Action Plan Tactical Activities

- IEC endorsement effort

- I&C Research Activities
  - Risk-informed approaches
  - CCF
  - Embedded Digital Devices

- Agency Wide Initiatives
  - SRP Modernization
  - Advanced reactor regulatory framework

Architecture

Recommendation: Consolidate and clarify review guidance and develop new licensing guidance for I&C architecture that supports meeting applicable requirements

Rationale: The I&C architecture is integral to demonstrating that safety functions can be adequately performed and defense-in-depth criteria are met. Currently there is limited review guidance and no licensing guidance on I&C architecture.

Benefits:
1. Improves efficiency when reviewing new I&C architectures
2. Clarifies the information needed for the I&C architecture to support demonstration of safety

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DI&C Regulatory Infrastructure

Recommendation: Update and re-organize DI&C guidance to achieve a simpler and more effective DI&C regulatory infrastructure

Rationale: Current regulatory guidance for DI&C is based on older consensus standards and practices resulting in potential gaps, overlaps, and inconsistencies in information for newer digital technologies. Licensing guidance does not exist for certain topics addressed in review guidance (e.g., BTP 7-19).

Benefit: Improved effectiveness, efficiency, and ease of use. Applicants will not have to rely on outdated standards and guidance to support licensing applications

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Interim Guidance

Recommendation: Incorporate interim guidance and lessons learned from the IAP modernization projects into durable guidance and minimize future use of interim guidance

Rationale: I&C interim guidance needs to be transformed into durable guidance as the long term use of interim guidance is inefficient

Benefits:
1. Reduces and simplifies guidance infrastructure.
2. Reduces level of effort required to develop or update guidance.

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Graded Approach for Software

Recommendation: Incorporate a graded approach for software based on the safety significance of the software into the:

1. Licensing guidance (e.g., RG 1.168)
2. Review guidance (e.g., BTP 7-14)

Rationale: Current guidance for software development outlines a number of activities without consideration of software safety significance

Benefit: Optimizes efficiency and effectiveness of software development and associated regulatory evaluations

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Next Steps

- Finalize recommendations

- Prioritize recommendations in consideration of industry feedback

- Implement approved recommendations

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Acronym List

- BTP   Branch Technical Position
- CCF   Common-Cause Failure
- DI&C   Digital Instrumentation and Control
- EDD   Embedded Digital Device
- IAP   Integrated Action Plan
- IEC   International Electrotechnical Commission
- MP4B   Modernization Plan 4B
- NEI   Nuclear Energy Institute
- NRC   Nuclear Regulatory Commission
- RG   Regulatory Guide
- SRM   Staff Requirements Memorandum
- SRP   Standard Review Plan