

DI&C Regulatory Framework Big Picture Concepts & Issues

NEI DI&C RIFG

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Key Concepts/Issues

- There are three key “big picture” concepts that need to be addressed to improve the digital instrumentation & controls (DI&C) regulatory framework:
 - Inappropriate Treatment of Digital as “Special”
 - Excessive and Unnecessary Complexity
 - Practical Application of Regulatory Guidance

Treatment of Digital as “Special”

- Design and Licensing Process Interaction
 - Recommended Principles/Goals
 - The licensing process for DI&C projects should be fundamentally consistent with that used for projects involving other disciplines (e.g., electrical, analog I&C).
 - The licensing process for DI&C projects should focus on review of the regulatory required design attributes.
 - Execution of later project phases (e.g., implementation, testing) should be addressed via the inspection process.

Treatment of Digital as “Special”

- Digital Equipment Quality
 - Recommended Principles/Goals
 - Quality of “out of the box” digital equipment (hardware and base software) is not a concern unique to nuclear; quality of digital equipment application to plant SSCs is a concern unique to nuclear.
 - Regulatory guidance should not “reinvent the wheel” on “out of the box” digital equipment quality; it should rely on industry standards.

Excessive/Unnecessary Complexity

- Industry Guidance Documents
 - Recommended Principles/Goals
 - For a given topical area, there should be one guidance document written primarily for licensees and one guidance document written primarily for NRC staff.
 - These licensee and NRC staff guidance documents should be fundamentally consistent.
 - There should be a minimum of different guidance document types (e.g., RG, NUREG, RIS, ISG, SER, etc.) across the various DI&C topical areas.

Excessive/Unnecessary Complexity

- NRC Staff Endorsement of Industry Standards
 - Recommended Principles/Goals
 - With few exceptions, nuclear specific standards should be endorsed without exceptions, caveats, etc., to prevent the RG process from undermining achievement of industry consensus.
 - Endorsement of non-nuclear standards should account for the need to tailor application of these standards to nuclear industry processes and practices (i.e., a “verbatim compliance” approach may not work).

Excessive/Unnecessary Complexity

- NRC Staff Endorsement of Industry Standards
 - Computer Engineering Standards Trend
 - IEEE software engineering standards have been/are being revised to take a systems engineering approach.
 - EPRI research is investigating application of a systems engineering approach to nuclear DI&C projects.
 - NRC staff endorsements of these standards have lagged behind, and a standard taking a systems engineering approach has not yet been endorsed.

Excessive/Unnecessary Complexity

- Operating Plant vs. New Build Guidance
 - Recommended Principles/Goals
 - The same DI&C regulatory guidance documents should be used for both operating plants and new builds, with differences in guidance specified only when necessary.
 - If separate guidance documents are deemed necessary, then their regulatory goals should be fundamentally consistent.

Practical Application of Guidance

- Clarity and Level of Detail
 - Recommended Principles/Goals
 - Two different technically competent engineers should be able to obtain similar results when applying regulatory guidance to their designs.
 - Competent engineers should be able to apply regulatory guidance to their designs with reasonable confidence that competent NRC staff will reach similar conclusions regarding design acceptability.

Practical Application of Guidance

- Generic vs. Licensee Specific Documents
 - Recommended Principles/Goals
 - All DI&C related regulatory guidance should be available in generic publications.
 - Regulatory guidance should not exist solely in a licensee specific document.