

RIC 2014  
Digital Instrumentation and Controls:  
Considerations of Embedded Digital  
Technology in Plant Equipment

## Embedded Digital Devices: *Suggestions for an Improved Regulatory Framework*

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### General Problem Statement

- Draft Regulatory Guidance on Embedded Digital
  - Informs licensees that many new Instrumentation and Controls (I&C) and electrical components now contain embedded digital devices
  - Reminds licensees of the compendium of regulatory guidance applicable to digital devices
- Draft guidance does not define how a licensee can proceed with embedded digital devices
  - However, the inference is that a formal license amendment is required

*When can one make a change without prior NRC approval and when must one receive a licensee amendment?*

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### Implications

- Current digital regulatory guidance for digital license amendments was developed for major protection system retrofits
  - Document intensive
  - Time consuming
  - Expensive
- The wrong process can cause licensees to delay or forego plant improvements

*I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail.*  
Abraham Maslow, 1966

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### Suggestion for Improved Tool 1

- Focused approach with better criteria for 'simple' devices to make a change without prior NRC approval
  - Idea comes from recently approved efforts in NEI 13-10 to address cyber security issues 'simple' devices with a focused approach
- Industry efforts to improve NEI 01-01 should consider lessons learned from NEI 13-10 to provide a focused regulatory approach for 'simple' devices

*Goal would be clear guidance for installation of 'simple' digital devices without prior NRC approval*

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### Suggestion for Improved Tool 2

- Simplify digital license amendment process outlined in DI&C-ISG-06 to define information necessary to address 'limited functionality' digital devices
  - Idea comes from simplified process used for one license amendment for reactor trip breakers with embedded digital devices and IAEA Draft Safety Guide DS-431
- Industry workshop approach could be used to tailor DI&C-ISG-06 using US and international experience

*Goal would be simpler process would allow one to process license amendments in shorter time with less resource commitments from all*

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### Suggestion for Improved Tool 3

- Develop NRC-approved generic assessment process for 'smart' devices with third party certification
  - Idea comes from similar generic guidance in EPRI-106439 and European efforts with third party certification processes as basis for regulatory acceptance
- Coordinated industry effort to develop criteria for acceptance of third party certification for 'smart' devices in commercial grade dedication

*Goal would be generic Quality Assurance program element for adoption by licensees for commercial grade dedication without prior NRC approval*

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### Suggestion for Improved Tool 4

- Revise 10 CFR 50.59 to reflect graded approach for 'simple/limited functionality/smart' digital devices
  - Idea comes from last change to 50.59 when PRA technology advances made the 'no increase' language impractical to manage (The famous Diaz 'Zero Factor' RIC speech)
- Industry and NRC tackled the challenge from Commissioner Diaz to find a practical solution

*Goal would be to revise 50.59 language for 'failure modes' to better address 'simple/limited functionality/smart' digital devices*

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### Summary

- Technology changes are always forcing us to reconsider old paradigms and embedded digital devices are just one more driver of change
- Other people in our industry are addressing embedded digital devices in a variety of ways
- A good incubator of ideas exist to help us address embedded digital devices in a practical manner

*We are all faced with a series of great opportunities brilliantly disguised as impossible situations.*  
*Charles R. Swindoll*

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