



NRC engagement with the international Task Force on Safety Critical Software for nuclear reactors

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THE NUCLEAR ENERGY INSTITUTE (NEI), INDUSTRY, AND THE U.S. NUCLEAR REGULATORY COMMISSION (NRC)
PERIODIC UPDATE MEETING ON DIGITAL INSTRUMENTATION AND CONTROL (DI&C)
August 19, 2015

Outline

- TF SCS evolution
- TF SCS scope and purpose
- Content of TF SCS report
- Extent of NRC review so far
- New TF SCS work
- Future NRC work planned

TF SCS Evolution

- 1994-1997: 4-party [EC].
- 1998-2000: 7-party task force [EC]
- 2000-2007: 7-party task force [WENRA]
- 2008-2013: Standalone task force
{UK; Sweden; Finland; Spain; Belgium; Germany}
- 2014: Addition of Canada
- 2015: Addition of S. Korea

**USA: Engaged with TF SCS since 1994, inconsistently ,
and consistently since 2007**

TF SCS Scope-Purpose

Consists of regulators & their TSOs.

Purpose:

- Exchange technical information
 - Issues
 - Technical basis to address the issues
- Develop consensus on technical basis
- Publish report of common position

Value to NRC:

- Learn from others' experience
- Consistency in technical basis
- Use TF SCS report as one of many sources for technical basis

Contents of report

<http://www.onr.org.uk/software.pdf> :

- Part 1: 14 chapters - general
- Part 2: 8 chapters – by lifecycle phases
- References
- Bibliography

Report ToC Part 1

PART 1: GENERAL

1.1 Safety Demonstration

1.2 System Classes, Function Categories and Graded Requirements for Software. **X**

1.3 Reference Standards

1.4 Pre-existing Software (PSW)

1.5 Tools

1.6 Organisational Requirements

1.7 Software Quality Assurance Programme and Plan

1.8 Security. **X**

1.9 Formal Methods

1.10 Independent Assessment

1.11 Graded Requirements for Safety Related Systems (New and Pre-existing Software). **X**

1.12 Software Design Diversity

1.13 Software Reliability. **X**

1.14 Use of Operating Experience

1.15 Smart Sensors and Actuators

Report ToC Part 2

PART 2: LIFE CYCLE PHASEWISE

2.1 Computer Based System Requirements

2.2 Computer System Architecture and Design

2.3 Software Requirements, Architecture and Design

2.4 Software Implementation. **X**

2.5 Verification

2.6 Validation and Commissioning

2.7 Change Control and Configuration Management

2.8 Operational Requirements

Typical chapter structure

1. Rationale
2. Issues
3. Common positions
4. Recommended practices

NRC review: extent so far

1. Rationale sections excluded
2. Issues sections excluded
3. **Common positions**
4. Recommended practices sections excluded



Selected chapters

Impending publication of NUREG/IA

NRC review: extent so far

Common positions - chapters not reviewed:

1.2 System classes; graded requirements

1.8 Security; also clauses 2.1.3.2.2 and 2.3.3.1.1

1.11 Graded requirements

1.13 Software reliability; also

1.5.3.1, 1.5.3.2,

1.6.3.4,

1.10.3.2,

1.15.3.5, 1.15.3.8 through 1.15.3.8.12,

2.1.3.2.2,

2.6.3.1.15,

2.7.3.1.5

2.4 Software implementation



New TF SCS work - examples

Topic

Security chapter

Programmable logic devices

Third party certification

Platform qualification

Hazard analysis

Status - May 2015 meeting

Revision proposal under discussion

New chapter draft evolving

New chapter – Issues drafted

New chapter – early stage work

New chapter idea accepted

NRC will continue reviews of changes and new content

Future NRC work - examples

Continue review of TF SCS report for technical soundness

1. Content previously excluded
 - Linked to international harmonization of standards
2. Changes to previously reviewed content
3. New content

Map TF SCS content clause-by-clause to current NRC guidance

1. Evaluate if an item offers improvement. If so:
2. Recommend change for consideration in future revisions:
 - Entails change requests to respective standards referenced.

TF SCS May 2015 meeting summary

Slide	Topic discussed
3	TF SCS added new member - Korea
9	NRC will publish 2014 TF SCS report in NUREG/IA
11	Security chapter revision – work in progress
11	PLDs - work in progress
11	Third party certification – work in progress
11	Platform qualification – work in progress
11	Hazard analysis – idea of new chapter accepted
12	TF SCS requested NRC to review previously excluded subsections of reviewed chapters.