MDEP Codes and Standards Harmonization

Codes and Standards Working Group (CSWG)

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CSWG's Goal

To achieve harmonization of code requirements for the design & construction of pressure-retaining components.

What Is "Code Harmonization"?

**Harmonization = Convergence + Reconciliation**, where:

Harmonization: a process by which <u>convergence</u> or <u>reconciliation</u> of differences in code requirements can be achieved in order to ensure an acceptable level of quality and safety in nuclear power plants (NPPs).

Convergence: to establish the same or equivalent code requirements in order to reduce the areas in codes identified as "different".

Reconciliation: to accept or conditionally accept differences in code requirements by justifying their sufficiency in ensuring safety and reliability.

Is Code Harmonization Achievable?

- Theoretically, convergence is achievable in most of the code areas of technical differences, because:

    - ✓ The mechanism for component failure is universal
    - ✓ Code rules are all based on designing components to prevent a certain failure modes
    - ✓ Differences are only in design practices (such as, load combinations), analysis methodologies, material specification

- Convergence is not achievable in some of the code areas of programmatic differences, because they have strong background of culture and human performance that are different in each country.

- Code reconciliation is needed to resolve differences as fully code convergence is not possible.
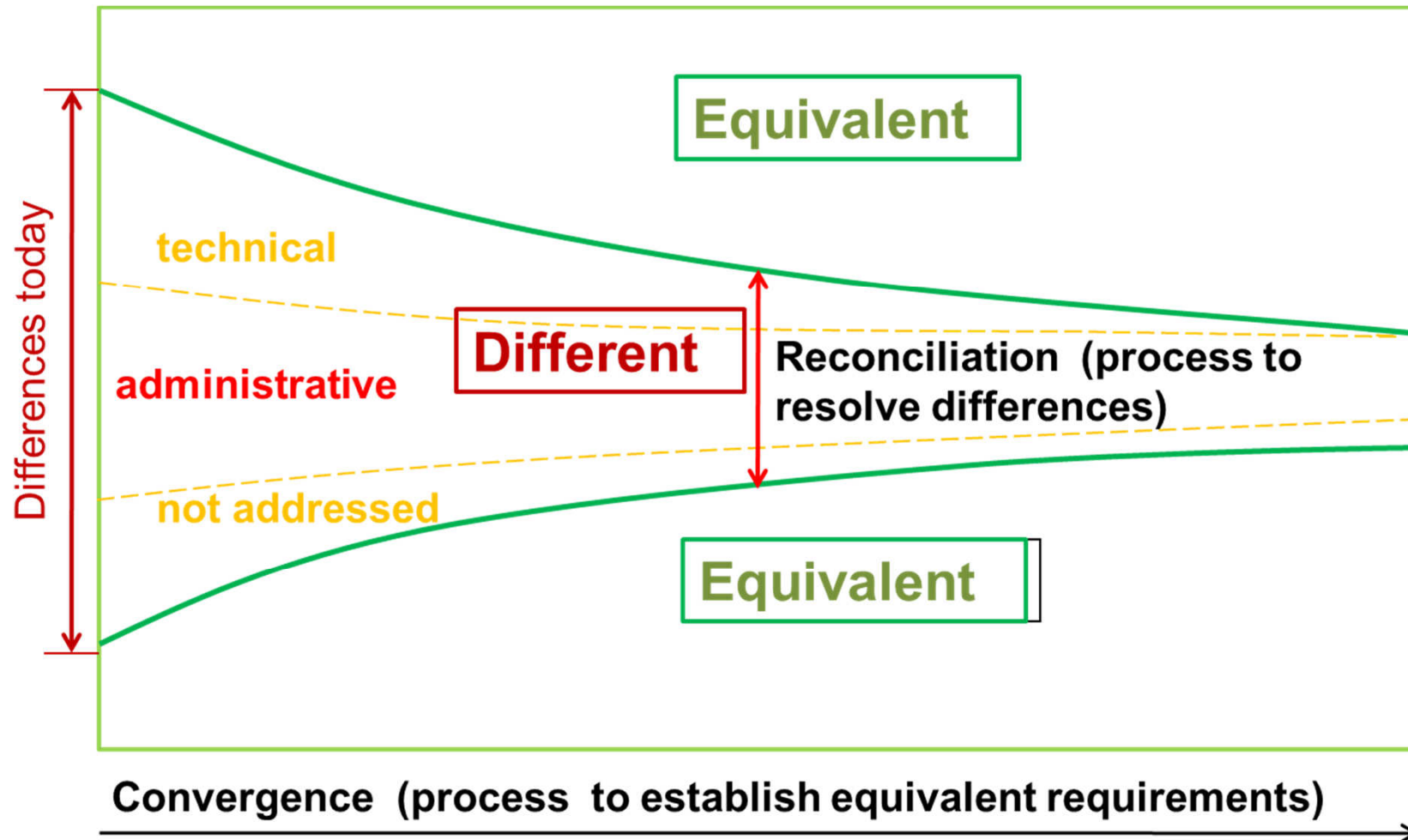
How Do We Harmonize Code Requirements ?

1. Perform code comparison to identify the extent of similarities and differences among each country's code (*ASME Report STP-NU-051*)

2. Develop higher level documents to guide code harmonization (*TR-CSWG-03 and TR-CSWG-04*)

3. Harmonize code requirements, which includes **convergence** and **reconciliation** of code differences, and **minimization of further code divergence** (*CP-CSWG-01, TR-CSWG-02*)

4. Compare the regulatory practices in using codes (*TR-CSWG-01*)

Hierarchy

(Framework of Code Hierarchy)

Top Level — Fundamental Attributes

- Establishes overarching requirements (fundamental attributes) for the design and construction of nuclear power plant pressure-retaining components.

Middle Level — Essential Performance Guidelines

- The Essential Performance Guidelines are developed through:
  1) Evaluating codes similarities, and identifying common essences;
  2) Analysing codes differences, and identifying underlying common aspects;
  3) Assessing codes differences, considering the requirements of other code provisions and/or referenced standards, and then identifying actual common aspects.

Bottom Level — Codes and Standards

- Converge code differences – stepwise approach

  1) Trial convergence: identify a few code requirements where differences have the most impact and are easier for achieving convergence; converge these identified differences;
  2) Incorporate the converged portion into codes;
  3) Increase the areas of code convergence step-by-step.

- Prevent/minimize further divergence

- Reconcile code differences, and establish a process to use foreign codes

What Are The Accomplishments To Date?

1. General Approach and Activity Plan

- Established general approach for code harmonization; established regular communication process for information exchange and discussion.

2. TR-CSWG-03 - Fundamental Attributes

- Developed through "top-down" approach, and provides overarching requirements for NNP design and construction

3. TR-CSWG-04 - Essential Performance Guidelines

- Identifies common code aspects through "bottom-up" approach based on SDOs' code comparison results.
- Recommends for a minimum set of design and construction rules to be included in codes, and provides guidance for code harmonization

4. **TR-CSWG-01 - Regulatory Frameworks for Use of Codes & Standards in MDEP countries**

- Describes the regulatory practices in each country in using codes
- Provides insight on the flexibility of the regulatory framework of MDEP countries in using foreign codes.

5. **TR-CSWG-02 - Lessons Learnt on Achieving Harmonization of Codes & Standards**

- Provides CSWG's preliminary findings on achieving code harmonization, and provides general guidance on using foreign codes.

6. **CP-CSWG-01 – Findings from Code Comparisons and a Global Framework towards Code Harmonization**

- Proposes a hierarchy structure of three levels as a global framework for code harmonization.
- Documents CSWG common positions on code harmonization.

What Are The Challenges To Code Harmonization?

Convergence is the most preferable way of code harmonization. However, it is very challenging, because:

- ✓ Code is very comprehensive; an provision usually is related to, or conditioned on, many other provisions. Code needs to be considered as a whole package;
- ✓ Code considers all safety aspects, and balances or optimizes all safety requirements. *"The better, the safer"* is not always true in reactor design;
- ✓ Code references many other industry standards which are different from country to country.
- ✓ Code has the background of culture and human performance, which are different in each country and are not fully documented;
- ✓ Regulatory requirements can result in code variation, and also supplement code requirements. Each country has a unique regulatory system;
- ✓ The industry gets used to the way they are doing work.

What Is The Path Forward ?

The vendors, SDOs and regulators continue working closely on:

1. **Prevent further code divergence**
   - Limit further code divergence;
   - Develop universal code requirements on the issues with international interest but not currently addressed in codes.
   - Minimize potential differences between new codes and existing codes.

2. **Converge code differences**
   - Code convergence is the most preferable but difficult to achieve.

3. **Reconcile code differences**
   - Technical differences
   - Differences not addressed in one Code
   - Administrative differences

Conclusions

- The CSWG has established a general approach for achieving code harmonization. Five CSWG documents are completed or close to completion.

- Code harmonization is a very valuable but challenging and long-term process.

- Successful harmonization is strongly dependent on global cooperation and voluntary technical support by SDOs and vendors (CORDEL).