WNA CORDEL Code Convergence Effort

The example of Harmonisation of NDE Qualification requirements

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Content

- **Current efforts in international convergence of code requirements**
- **Code comparison project**
- **Examples of Code Differences**
- **Convergence of non-technical issue: Certification requirements of NDE/T personnel**
- **Comparison with convergence effort for a technical issue**

WNA Board

Board Mentor for CORDEL is Aris Candris, CEO of Westinghouse

CORDEL Group

(representatives of 48 companies and organisations)

Steering Committee

Chairman, Vice Chairman

12-15 Representatives of Vendors and Utilities

Task Forces

- Design Change Manage-ment
- Licensing & Permitting
- **Codes & Standards**
- IAEA Safety Standards revision
- Probabi-lisitic Safety Goals

TF Chairs : experts from WNA member companies

Promotion of Harmonization of Standards and Codes: Current efforts

- **Industry: WNA CORDEL**
  - one of many stakeholder in the Industry sector
  - Interfaces with regulators, SDOs, vendors and industry experts
- **Regulators: MDEP**
  - MDEP working group on Codes and Standards
  - **MDEP work on mechanical codes : ASME III, AFCEN (RCC-M), KEA (KEPIC), JSME (S-NC1): 1st priority is the pilot project on mechanical codes**

Both support existing initiatives for comparison and towards harmonization of standards and codes

WNA CORDEL Mandate

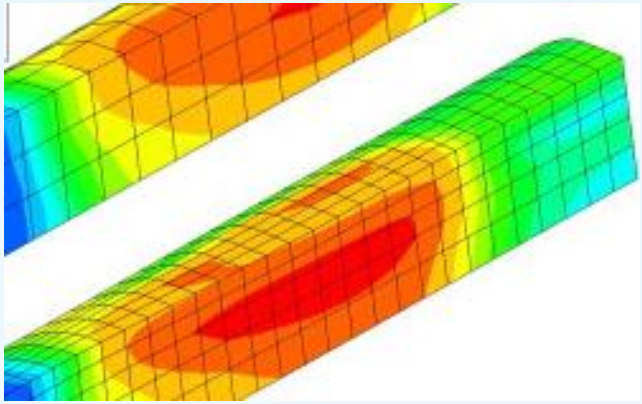
- **WNA CORDEL CSTF has the following mandate:**
  - Promote the ***international convergence of national nuclear codes***
  - Actively promote ***collaboration*** between ***SDOs***, ***national regulators*** and the ***nuclear industry*** on the issue of codes convergence
  - ***Limit future divergence*** of nuclear codes
  - Establish ***Equivalences***

Background to CORDEL CSTF code convergence effort

- **CORDEL CSTF builds on the MDEP Code comparison report written by SDOs**
  - Identification of the differences that would have an impact on the designing and manufacturing a component in one country and using it in another country
  - Line-by-line comparison of five national mechanical codes with ASME Section III : RCC-M, KEPIC, S-NC1, CSA, NIKIET
  - Requirements for class 1 components were compared,
    - *including requirements for pressure vessels, piping, valves and pumps*
  - The reasons for differences can be classified in two categories:
    - ***Technical requirements***,
    - ***Regulatory requirements***

Background to CORDEL CSTF code convergence effort

- **Selection of two subjects, one based on technical requirements and one based on Regulatory requirements:**
  - Requirements for NDT/E Personnel qualification
  - Design limits : Stress classification / Stress limits / Excessive deformation / Plastic Shakedown / non-linear analysis codified rules



CORDEL Codes & Standards Expert Group

- **WNA CORDEL CSTF Expert group represents an industrial perspective with state of the art knowledge**
  - Active participation of 18 subject experts from 11 companies.
  - Representation from all major nuclear companies and geographies…
- **It is recognised that all differences cannot be resolved but some progress towards convergence and mutual recognition could be achieved in the short- to medium-term.**
- **The need to harmonise does not imply non-compliance but should be considered as achieving equivalent status in other countries.**
  - Diminish trade barriers
  - Allow inter-operability of products, systems and services
  - Promote a common technical understanding

CORDEL Codes & Standards Expert Group

Select topics with input from:
- Industry (CORDEL)
- Regulators (MDEP-CSWG)
- SDOs (SDO Convergence Board)

Convene group of experts from the industry to work within CORDEL CSTF

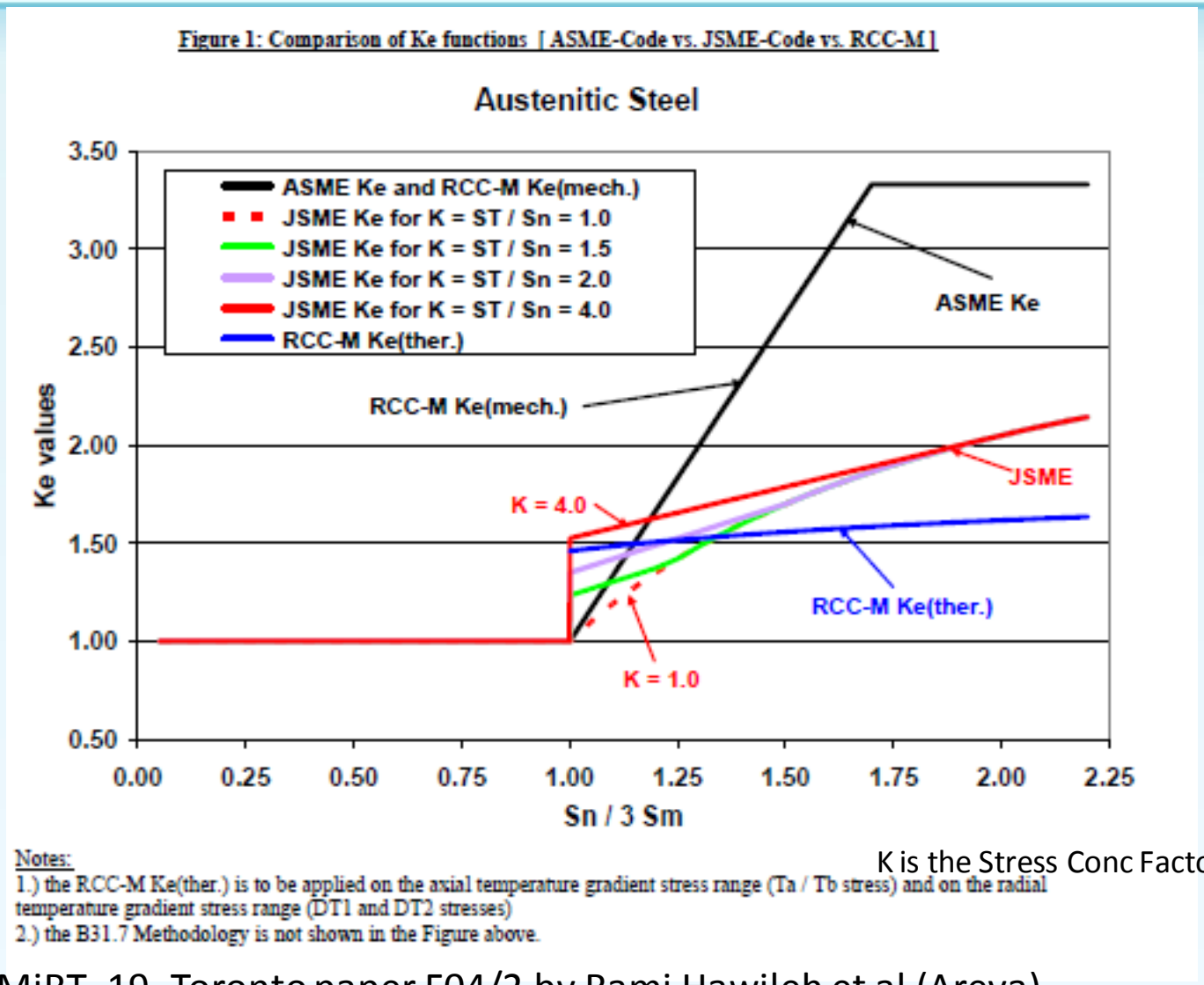
Report current status of codes

propose harmonised rules

Define common Code Case

EXAMPLES OF CODE DIVERGENCE

Example: Variation in the Ke Factor for Fatigue Assessment in Different Codes



K is the Stress Conc Factor

Taken from SMiRT -19, Toronto paper F04/2 by Rami Hawileh et al (Areva)

Example: Assessing Pressure Vessel to American ASME and Russian PNAE G 7-002-86

Sizing Related:

Russian Nominal Allowable Stress = [σ] = Minimum (σUTS/2.6,σYS/1.5)
ASME Design Stress Intensity = Sm = Minimum(σUTS/3,σYS/1.5)

Pri. Membrane Russian

For NOC < [σ]
For AOO < 1.2 [σ]
For DA < 1.4 [σ]
Hydro Test < 1.35 [σ]
UTS

Pri. Membrane ASME

For Level A < Sm
For Level B < 1.1 Sm
For Level C < 1.2 Sm
For Level D < 2.4 Sm or 0.7

Hydro. Test < 0.9 σYS

Example presented by Dr Vaze of BARC

Estimating VVER1000 RPV Thickness

RPV Thickness Calculation using ASME NB and PNAE G 7-002-86

- Russian Nominal Allowable Stress

[σ] = Minimum(539/**2.6, 441/1.5)** = **207.3 Mpa**

- ASME Design Stress Intensity

Sm = Minimum(539/**3, 441/1.5)** = **179.7 Mpa**

– ASME: Minimum thickness required = **214 mm**
– PNAE : Minimum thickness required = **185 mm**
– Actual thickness provided = **192.5 mm**

- Although actual thickness is less than the minimum required by ASME: **Is design less safe ? May or may not be**

Should we apply ASME equation to Russian design?

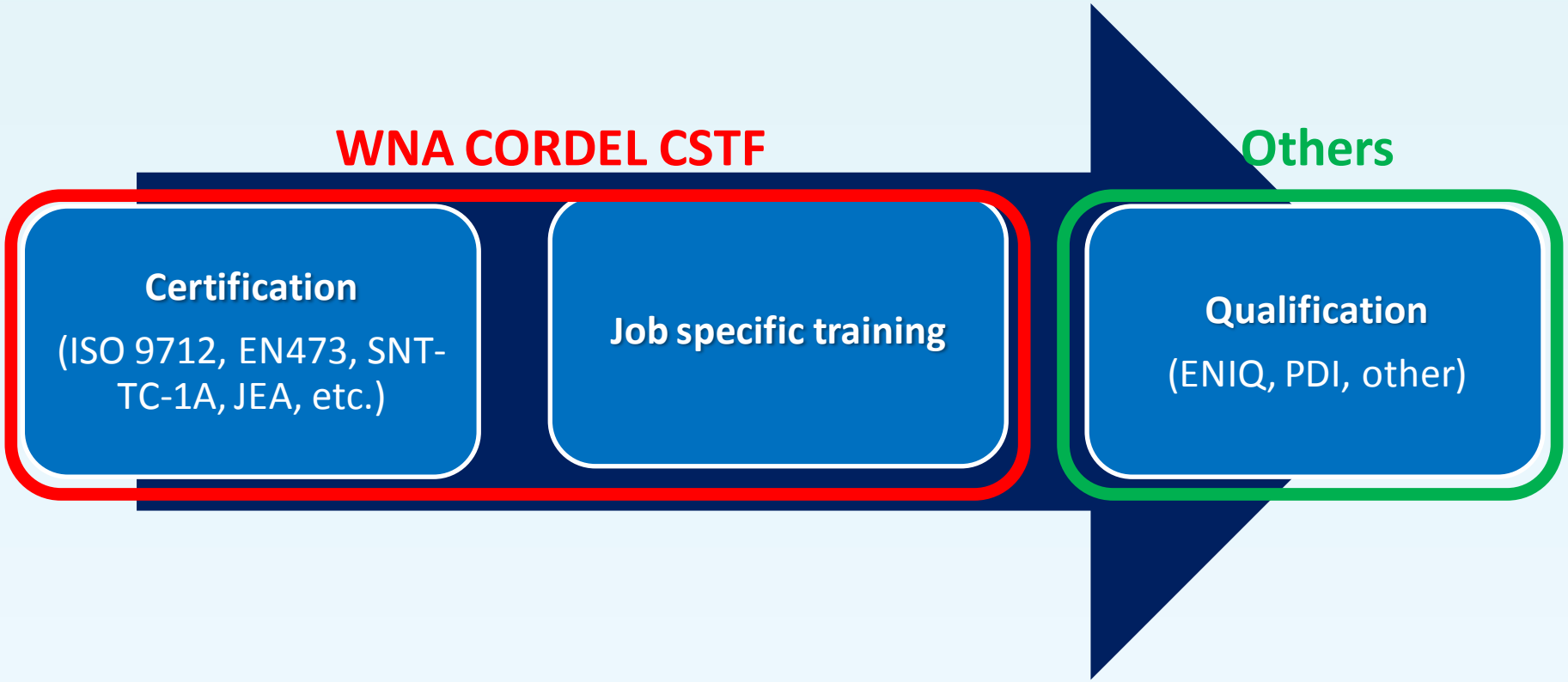
Harmonization of Safety Levels

- **Failure modes and the knowledge of Mechanics used are universal**
- **But code rules differ because of**
  - Regulatory Requirements and Limitations
  - Local Industry Practices
  - Qualifications of welders, NDE/T personnel and professional Engineers
  - QA and compliance requirements
  - Scope Differences

Example of and International code convergence effort:

NDE PERSONNEL QUALIFICATION

NDE Personnel Training



NDE Certification requirements divergence : Is there really an issue?

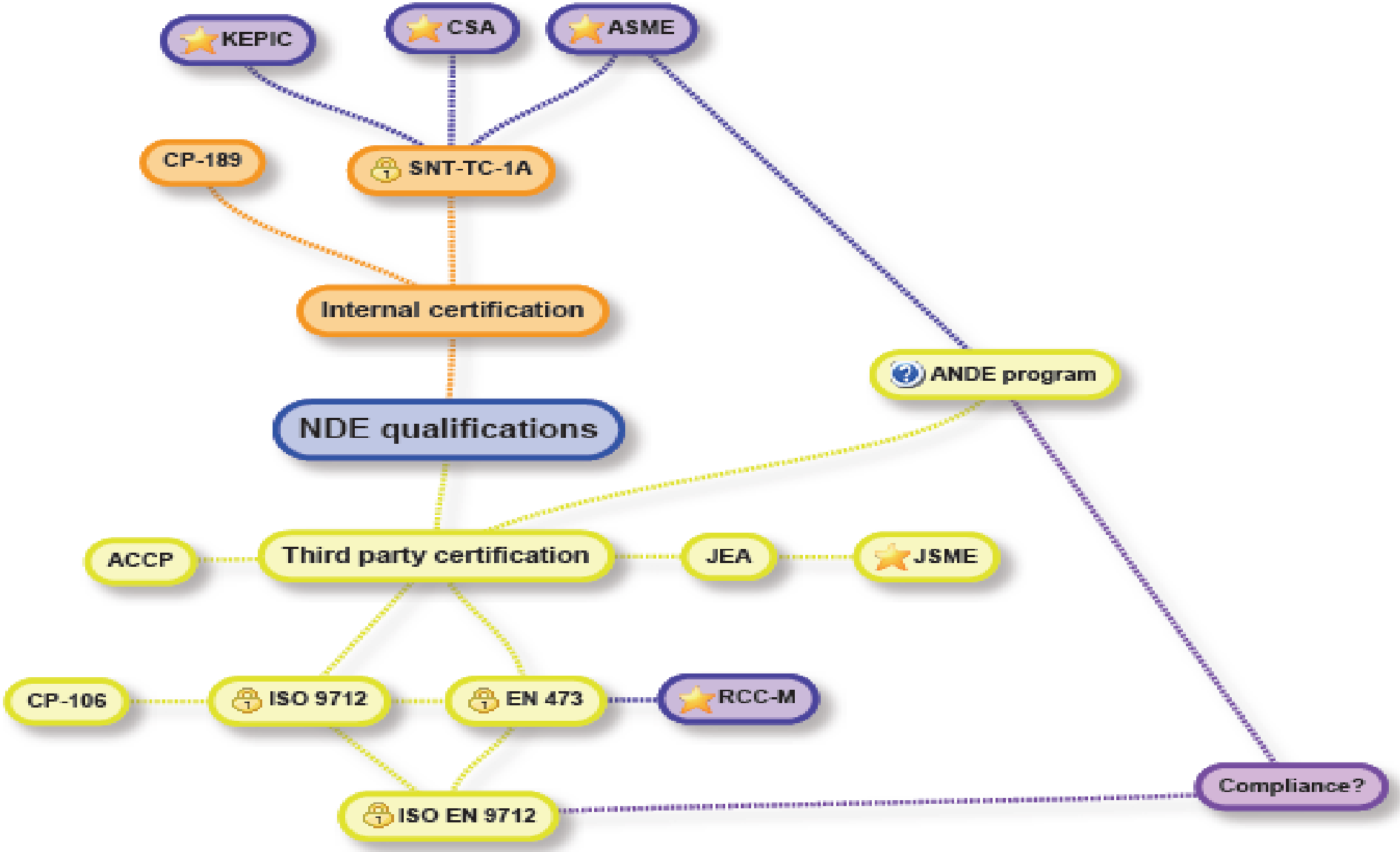
- **Certification Codes are currently being used in a range of industries.**
- **Certification requirements for NDT Personnel defined in design codes as well regulatory bodies. This can lead to a number of issues:**
  - International manufacturing of components
  - Competition between code and regulatory requirements
  - Mobility of the work force
- **Convergence efforts should be taken collaboratively between the national regulators and the Standard Development Organisations**
- **Manufacturing supply chain is global and so it is key to have confidence that the level of NDE is of a minimum standard wherever it is performed.**
  - There has been much debate in industry of the management of SNT-TC-1A certification and also how different countries have interpreted EN 473
  - NDE harmonization or base-lining will go some way to alleviate these concerns.

NDE Certification requirements divergence : Is there really an issue?

- **Two main certification procedures are employed**
  - Company based programs such as SNT-TC-1A
  - Third Party certification programs such as ISO 9712 and EN 473

Code	ASME	RCC-M	JSME	KEPIC	CSA	NIKIET
NDE Certification standard	SNT-TC-1A CP-189 CP-106 ACCP	NF EN 473	JIS Z 2305 (ISO 9712 MOD)	SNT-TC-1A (MOD)	SNT-TC-1A / CGSB	PNAEG-7-010-89

Scope of the NDE Issue



How is convergence achieved?

- **Working on convergence of topics important to Industry and Regulators**
  - Convergence of ISO 9712 and EN 473 has already been achieved
  - Development of third party certification program in ASSME (ANDE)

- **Collaboration with code developers and code users**
  - Discussion with ANDE development committee regarding compatibility with harmonised ISO EN 9712
  - Providing comparisons between ISO EN 9712 and ANDE Drafts
  - Participation in exploratory meetings on NDE Qualification developments (ASME)
  - Discussion and collaboration with a range of SDOs
  - Keeping the discussion going with regulators (MDEP)

Leading the drive to code convergence

- **Promote the inclusion of third party certification in ASME code**
  - Talks with EPRI to develop a draft code proposal to include third party certification into ASME
  - Promote the same inclusion in codes based on ASME code

- **Work with international and regional NDE bodies**
  - Identify the similarities and differences between the ANDE and ISO EN 9712
  - Promote compatibility of the two codes and MOUs between certification bodies

- **<u>Changes must come from code developers, promoted by code users and supported by regulators</u>**

Phased approach: non-technical topic

Convergence of NDE Certification codes

- Close collaboration with the ASME NDE Qualification Code development committee
  - Provide independent comparison between ANDE and ISO EN 9712
  - Raising awareness of international practices and codes

Inclusion of Third party certification within section V

- Section V will serve a repository of the requirements for third party certification
- Referenced by other code sections

Working with international bodies for the recognition of equivalence of major third party certification

- Discuss with countries that follow ISO 9712 codes
- Discuss with international bodies promoting harmonisation of requirements such as EFNDT and ICNDT

Going forward: technical topic

Status / proposal with technical background document

Presentation of Document to SDO Board of Convergence

Presentation of Document to MDEP-CSWG

Conclusions

- **Convergence of Codes promotes safety and reliability of components as well as reducing trade barriers, allowing inter-operability of products, systems and services and promoting common technical understanding.**

- **Convergence of Codes can only be achieved through the collaboration between regulators, code developers and code users**

- **There is a strong industrial and Regulators support for code convergence**

- **Regulatory and technical divergences can be overcome!**

Any Questions?

THANK YOU FOR YOU ATTENTION!