

# **Multinational Design Evaluation Programme MDEP accomplishments**

**Gary Holahan, NRC, former STC Chair**

**Sophie Murlon, ASN, new STC Chair**

**MDEP Steering Technical Committee**

## What is MDEP?

A multinational initiative undertaken by national regulatory authorities of 14 countries to:

- Co-operate and share information on safety design reviews of specific designs in order to ensure a greater safety focus on the reviews in each country and
- Share information about national and international regulatory requirements and practices in order to explore opportunities for possible harmonisation or convergence of such requirements when safety enhancements may be realised
- A stated objective in the MDEP Terms of Reference is to enable and encourage safer global standardised reactor designs

Important aspect is that MDEP co-operation is being undertaken under currently existing regulatory frameworks and each national regulator maintains its sovereign rights and responsibilities to regulate nuclear safety in accordance with its existing national laws.

## Who is involved in MDEP activities?

### Regulators from

- Canada
- China
- Finland
- France
- Japan
- Republic of Korea
- Russian Federation
- South Africa
- U.K.
- U.S.A

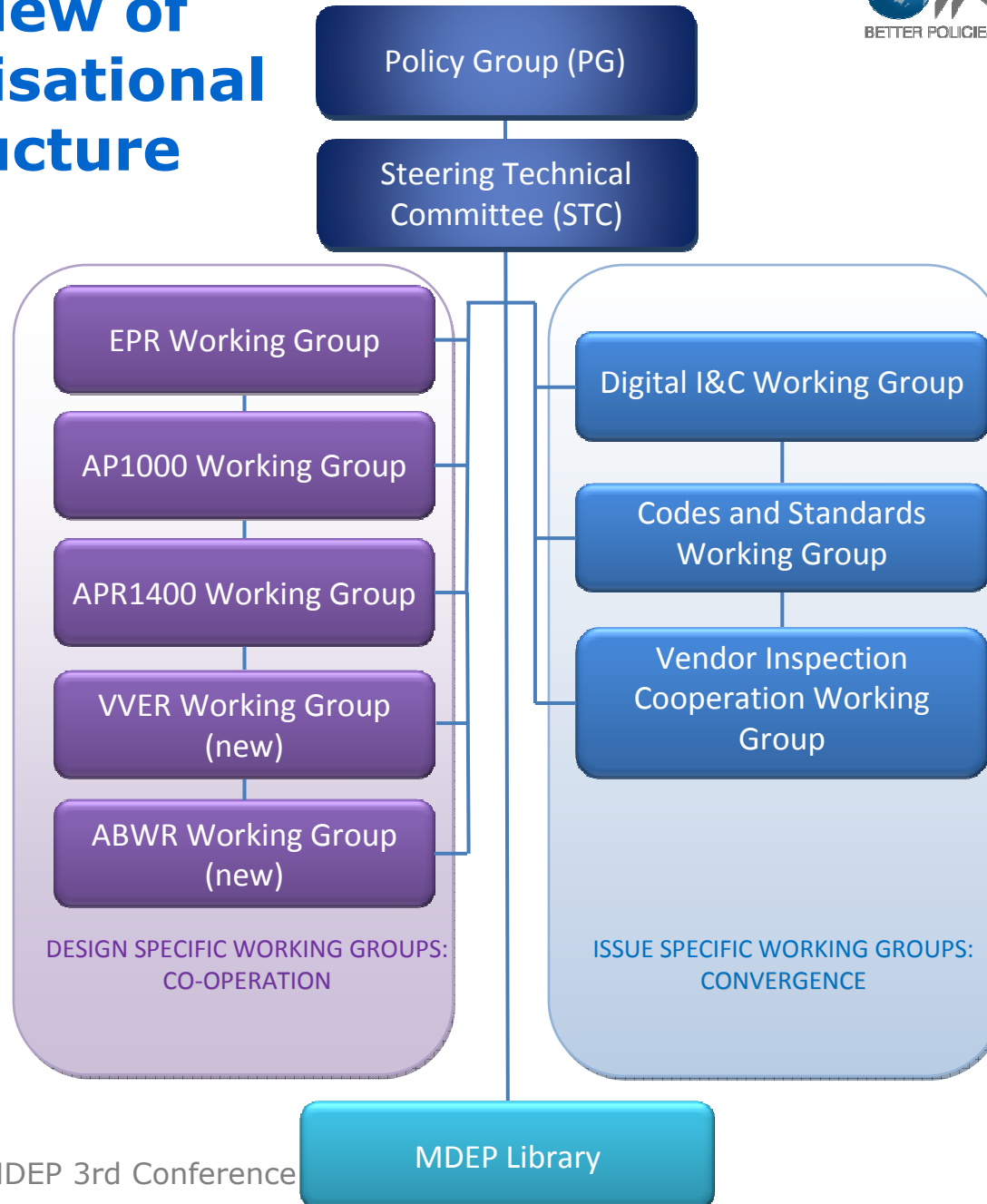


**Since MDEP  
inception in  
2006**

- India - Joined in 2012
- **United Arab Emirates - Joined in 2012 as an associate member**
- Sweden – Joined in 2013
- **Turkey - Joined in 2013 as an associate member**

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- NEA: technical secretariat
  - IAEA: takes part in generic activities
  - National technical support organisations participate if requested by the national regulatory authority.

# Review of Organisational Structure



**Goal:** to share information and cooperate on specific design evaluations and design-related construction oversight

## ➤ **EPR Working Group**

➤ Finland<sub>Chair</sub>, France<sub>Vice-Chair</sub>, China, India, Sweden, U.K., U.S.

## ➤ **AP1000 Working Group**

➤ U.S.<sub>Chair</sub>, China<sub>Vice-Chair</sub>, Canada, Sweden, U.K.

## ➤ **APR1400 Working Group**

➤ Korea<sub>Chair</sub>, U.A.E.<sub>Vice-Chair</sub>, U.S., Finland

## ➤ **ABWR Working Group**

➤ U.K.<sub>Chair</sub>, U.S.<sub>Vice-Chair</sub>, Japan, Sweden, Finland

## ➤ **VVER Working Group**

➤ Russian Federation<sub>Chair</sub>, Turkey<sub>Vice-Chair</sub>, Finland, India

# Issue Specific Working Groups

**Goal:** to benefit from other regulators' experiences and to encourage harmonisation in regulatory practices and requirements and in industry codes and standards.

All MDEP countries are invited to participate as well as the IAEA.

## ➤ **Mechanical Codes and Standards Working Group (CSWG)**

- Canada – Chair
- Japan – Vice-Chair

## ➤ **Digital Instrumentation and Control Working Group (DICWG)**

- U.S. – Chair

## ➤ **Vendor Inspection Cooperation Working Group (VICWG)**

- U.S. – Chair (temporary)
- U.K. – Vice-Chair

## ➤ **Multinational cooperation**

- Share information and design review results to be used within existing regulatory frameworks
- Communication protocol to keep members informed before regulatory decisions are official (latest: EPR digital I&C decision from STUK)
- Facilitate contact among regulators
- Shifting successfully toward cooperation on construction and commissioning activities

## ➤ **In-depth discussions on Fukushima related issues and impact on new reactors**

- EPRWG common position (revised in April 2014)

- **Harmonisation – standardisation – convergence of codes and standards**
  - CSWG triggered exhaustive code comparison from SDOs
  - Industry (CORDEL) mirrored CSWG to work toward harmonisation
  - 4 CSWG technical reports
  - VICWG encouraged discussions among SDOs on QA/QM standards harmonisation
  - VICWG technical report on common QA/QM criteria
- **Coordination of more than 50 vendor inspections (witnessed and joint)**
  - Supported by all members and an inspection protocol



- **Database of 6+ years of information regarding safety reviews and technical issues related to new reactors**
- **Coordination of member regulators views to propose a common view and facilitate adoption of IAEA revision of safety standards**
  - MDEP position paper on safety goals
  - MDEP common view on IAEA DS-367 “Safety Classification of SSCs”
- **12 common positions to reach a common understanding and give a single regulatory view on digital I&C issues**

## Digital Instrumentation and Controls Working Group

Generic Common Positions	Status	Lead
1. Treatment of Common Cause Failures Resulting from Software	Issued	U.S./Canada
2. Software Tools for the Development of Software for Safety Systems	Issued	U.K.
3. Verification and Validation throughout the life cycle of safety systems using digital computers	Issued	Japan
4. Data Communications Independence	Issued	Korea
5. Treatment of Hardware Description Language (HDL) Programmed Devices for Use in Nuclear Safety Systems.	Issued	France
6. Simplicity in Design	Issued	U.S.
7. Qualification of Industrial Digital Devices of Limited Functionality for Use in Safety Applications	Early stages	IAEA
8. Impact of Cyber Security Features on Digital I&C Safety Systems	Issued	U.S.
9. Design Principles for the Overall I&C Architecture	Early stages	IAEA
10. Configuration Management for Software	Early stages	Finland
11. Digital I&C System Pre-Installation and Initial On-Site Testing	Issued	Russian Federation
12. Use of Automatic Testing in Computer Based Systems as part of Surveillance Testing	Issued	Korea

- Following PG guidance to form a pilot project on commissioning activities → held commissioning workshops within the EPR and AP1000 working groups to begin considering how to cooperate on pre-operational testing and commissioning oversight;
- [\[EPRWG\]](#) Issued a Common Position addressing Fukushima related issues related to the EPR design
- Established VVER and ABWR design-specific working groups which held their first meetings in January 2014;
- [\[AP1000WG\]](#) Held video seminars between US NRC and CNSC on selected topics of CNSC's Phase 2 review to learn from the already completed NRC design certification review;
- [\[AP1000WG\]](#) Exchanged letters between US NRC and NNSA containing questions and responses related to design and construction issues for the AP1000 in each country;

- [VICWG] Cooperated on twelve witnessed vendor inspections and one joint inspection;
- Issued Technical Reports on
  - [VICWG] Common QA/QM Criteria for Multinational Vendor Inspection;
  - [CSWG] Regulatory Framework for the Use of Nuclear Pressure-Boundary Codes and Standards in MDEP Countries;
  - [CSWG] Lessons Learnt on Achieving Harmonisation of Codes and Standards for Pressure Boundary Components in Nuclear Power Plants;
- [CSWG] Issued a common position on “Findings from Code Comparisons and Establishment of a Global Framework towards Pressure-Boundary Code Harmonisation”;

- **[DICWG]** Issued Four common positions on digital instrumentation and controls for new reactors in the areas of :
  - Treatment of Common Cause Failures Resulting from Software
  - Treatment of Hardware Description Language (HDL) Programmed Devices for Use in Nuclear Safety Systems
  - Digital I&C System Pre-Installation and Initial On-Site Testing
  - Use of Automatic Testing in Computer Based Systems as part of Surveillance Testing
- **[MDEP]** Interacted with the Generation IV International Forum, WENRA, CORDEL, and CNRA/WGRNR on issues of common interest

# Activities

## Design-Specific Working Groups

### EPR Working Group

- The working group currently includes four technical experts' subgroups that are addressing specific technical issues: Accidents and Transients, Digital Instrumentation and Controls, Probabilistic Safety Assessment, and Severe Accidents
- Is developing a common position addressing Fukushima-related issues for the EPR that identifies common approaches to address potential safety improvements for EPR plants as related to lessons learned from the Fukushima Daiichi accident
- Is cooperating on oversight of plant “commissioning” (pre-operational and start-up testing)

# Activities

## Design-Specific Working Groups

### AP1000 Working Group

- Is sharing information on construction oversight and preparations for commissioning
- Is discussing technical topics such as:
  - Squib valves design and factory testing
  - Containment condensate return to the IRWST design change
  - Reactor coolant pump testing
- Is drafting a common position on how the AP1000 design addresses the findings from the Fukushima accident

# Activities

## Design-Specific Working Groups

### APR1400 Working Group

- Established one technical expert subgroup on Severe Accidents
- Comparing Post-Fukushima Actions and design differences

### ABWR Working Group

- 4 different ABWR designs under consideration by the WG members: GE-Hitachi, Hitachi-GE, US Toshiba and Finnish Toshiba
- Identified the following topics for immediate action: Fukushima lessons learned, instrumentation and controls, and severe accidents

### VVER Working Group

- The major areas of technical discussions for this newly formed group will be severe accidents, reactor vessel and primary circuit specificities in VVER designs, and safety systems



# Activities

## Issue-Specific Working Groups

### Codes and Standards Working Group

- Is finalizing common position on Essential Performance Guidelines of Pressure-Boundary Components
- Coordinate with the standards development organisations and WNA/CORDEL regarding harmonisation efforts

### Digital Instrumentation and Controls Working Group

- Is working on three remaining common positions from initial programme plan
  - Qualification of Industrial Digital Devices of Limited Functionality
  - Safety Design Principles for the Overall I&C Architecture
  - Configuration management for software

# Activities

## Issue-Specific Working Groups

### Vendor Inspection Cooperation Working Group

- Is coordinating witnessed and joint inspections to learn about each others requirements, procedures, and practices for inspecting vendors → minimum 2 joint inspections per year
- Is preparing the first multinational vendor inspection for 2014
- Is maintaining inspection planning table
- Is sharing inspection reports of key reactor component vendors

## Commissioning activities

- EPRWG and AP1000WG began cooperating on oversight of plant “commissioning” (pre-operational and start-up testing)
- Main purpose: to understand vendors’ overall commissioning programmes and to share regulatory processes in relation to commissioning
- EPRWG Workshop held June 2013 in China with participation of industry representatives (EPR Family)
- AP1000WG Workshop held July 2013 in China with participation of AP1000 industry representatives
- Other groups are considering to engage into commissioning activities

## Issue-Specific Working Group completion strategies

- Codes and Standards
  - Products completed by end of 2014
  - Continue meeting with CORDEL and SDOs through 2015 on harmonisation efforts
- Digital I&C
  - Products completed in 2015
  - After 2015, reduce meeting frequency
- Vendor Inspection Cooperation
  - MDEP to continue witnessed and joint inspections and begin multinational
  - Possible transfer of inspection practices work

- Design-specific working groups are effective forums for regulatory cooperation and are appropriately expanding their scope to reflect the changing status of the projects.
- Issue-specific working groups are making progress towards completion of their objectives. Working groups are productively influencing standards organisations.
- MDEP has successfully incorporated new members into the existing working groups.
- Outreach to other organisations is being expanded.
- Issues for the future of the Programme...