WANO Programmes at the present stage and their Impact on Safety

János Tóth, WANO – MC GB Chairman.

May 2016, Moscow.

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3. WANO after Fuhushima
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WANO – World Association of Nuclear Operators

- **WANO was founded in Moscow in 1989**
- **WANO – lessons learned from Chernobyl accident**
  - Experience exchange and mutual support
  - Personal and Collective accountability for Safety
- **The Head Office is situated in London**
- **WANO organized by regional principle**
  - Moscow Center
  - Atlanta Center
  - Paris Center
  - Tokyo Center

Mission

To maximize the safety and reliability of nuclear power plants worldwide by working together to assess, benchmark and improve performance through mutual support, exchange of information, and emulation of best practices.

global leadership in **nuclear safety**

WANO

WANO

- **125** Members
- **231** NPPs
- **435** Units
- **32** Units under construction
- **157** Units undergoing decommissioning

WANO Moscow Centre

- **23** Members
- **13** countries
- **14** Utilities
- **25** NPPs
- **58** GWe installed capacity
- **74 Units in operation**
  (57 VVER, 11 RBMK, 2 BN, 4 EGP-6
  + Atomflot: 4 Icebreakers)
- **15** Units under construction
- **17** Units undergoing decommissioning

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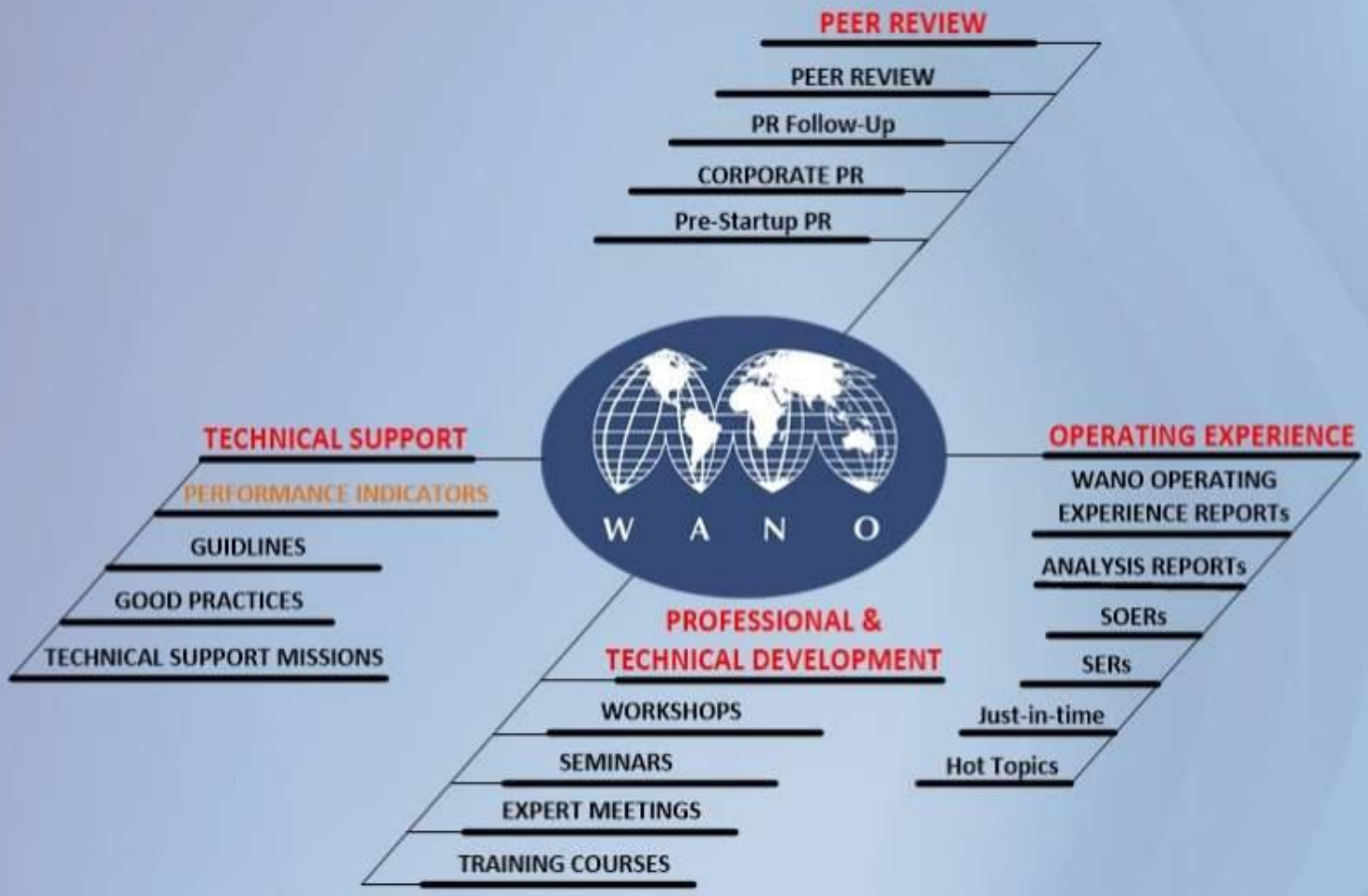
WANO Programmes

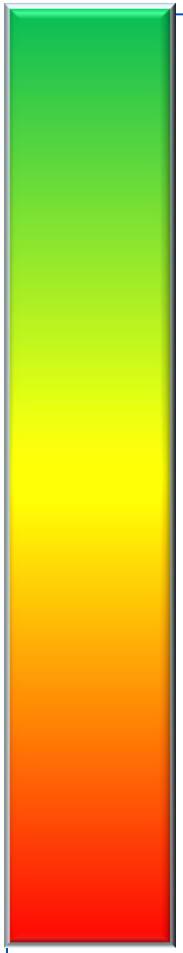
To support its members WANO offers them services through four main programmes:

- Operating Experience
- Peer Reviews
- Professional and Technical Development
- Technical Support and Exchange

WANO Programmes



WANO Criteria



Best world practices (WANO criteria)

IAEA standards

Company (Utility) requirements

Regulator requirements

Operating Experience

The goals of the OE programme are:

- To ensure **timely exchange of information** among the WANO members on events at nuclear power plants and provide an analysis of those events
- To draw attention of WANO members to events in order that they **take preventive measures** at their plants
- The use of operating experience is a proven method of enhancing operational safety at a nuclear power plant by learning lessons from events

WANO programme structures

Operating experience exchange programme:

- WANO event reports
- SOER
- SER
- Just-In-Time OE Reports
- Requests

Peer reviews programme:

- Full-scope peer review
- Pre-startup peer review
- Corporate peer review
- Follow-up

Programme of technical and professional development:

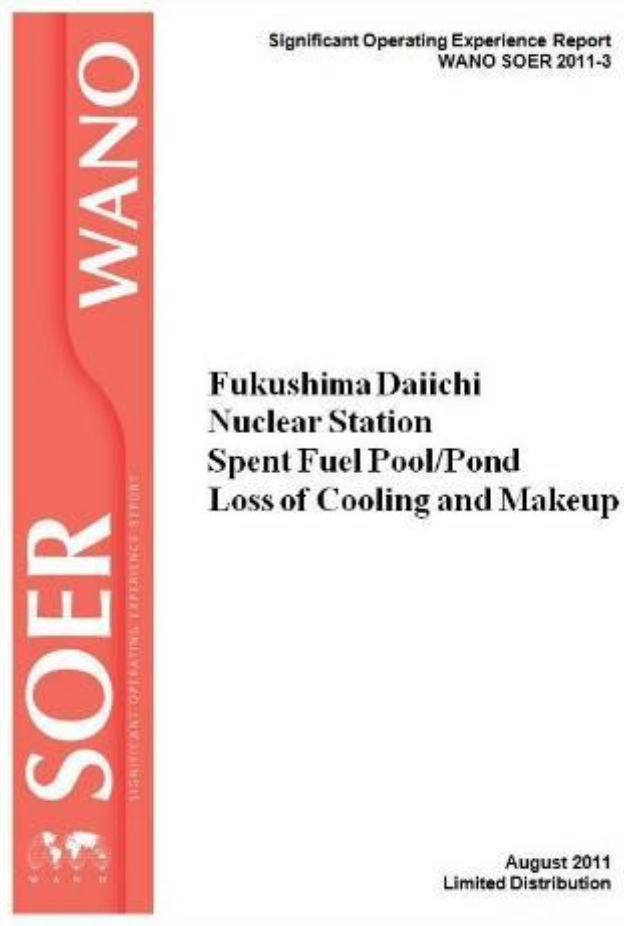
- Expert workshops and seminars
- Training
- Dissemination of information

Programme of technical support and exchange of technical information

- Technical support Missions
- Performance indicators
- Guidelines and good practices

Significant Operating Experience Reports (SOER)

- SOERs are provided for WANO members to inform them about significant events or trends and give them recommendations for identifying and implementing corrective actions to prevent a recurrence of events.
- SOER reports contain the following:
  - Summary
  - Training materials
  - Training presentations
  - Recommendations

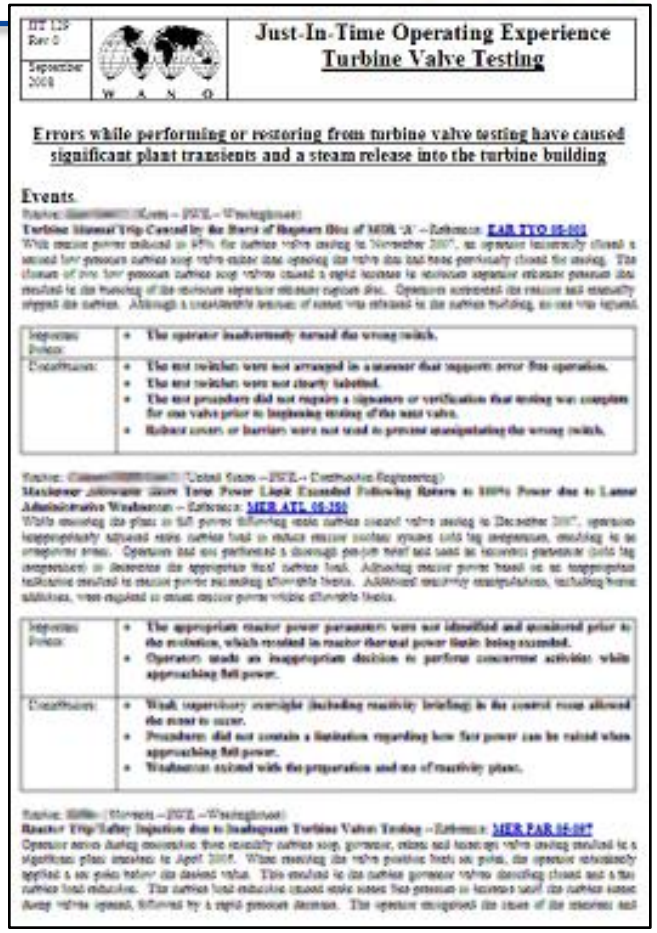


WANO Significant Event Reports (SER)

- The SER reports provide an **analysis of significant events** to identify and share lessons learned from the events.
- The SER reports contain the following:
  - Description of the event
  - Causes of the event
  - Event analysis
  - Lessons learned
  - Actions to prevent a recurrence of events.
- Training presentation are also provided

WANO Just-In-Time Operating Experience (JIT)

- JIT **pre-job briefings** are used by managers in preparing personnel to perform certain tasks which led to errors at other plants
  - Each JIT document contains an analysis of 3 to 4 events
  - Analysis of the causes
  - Questions which give the worker an idea of how the event can be prevented
- JIT documents are developed specifically for pre-job briefings



JIT 128
Rev 0
September 2008

W A N O

Just-In-Time Operating Experience
Turbine Valve Testing

Errors while performing or restoring from turbine valve testing have caused significant plant transients and a steam release into the turbine building

Events

Turbine Manual Trip Caused by the Burst of Rupture Disc of MSR 'A' – Reference: EAR TYO 08-001

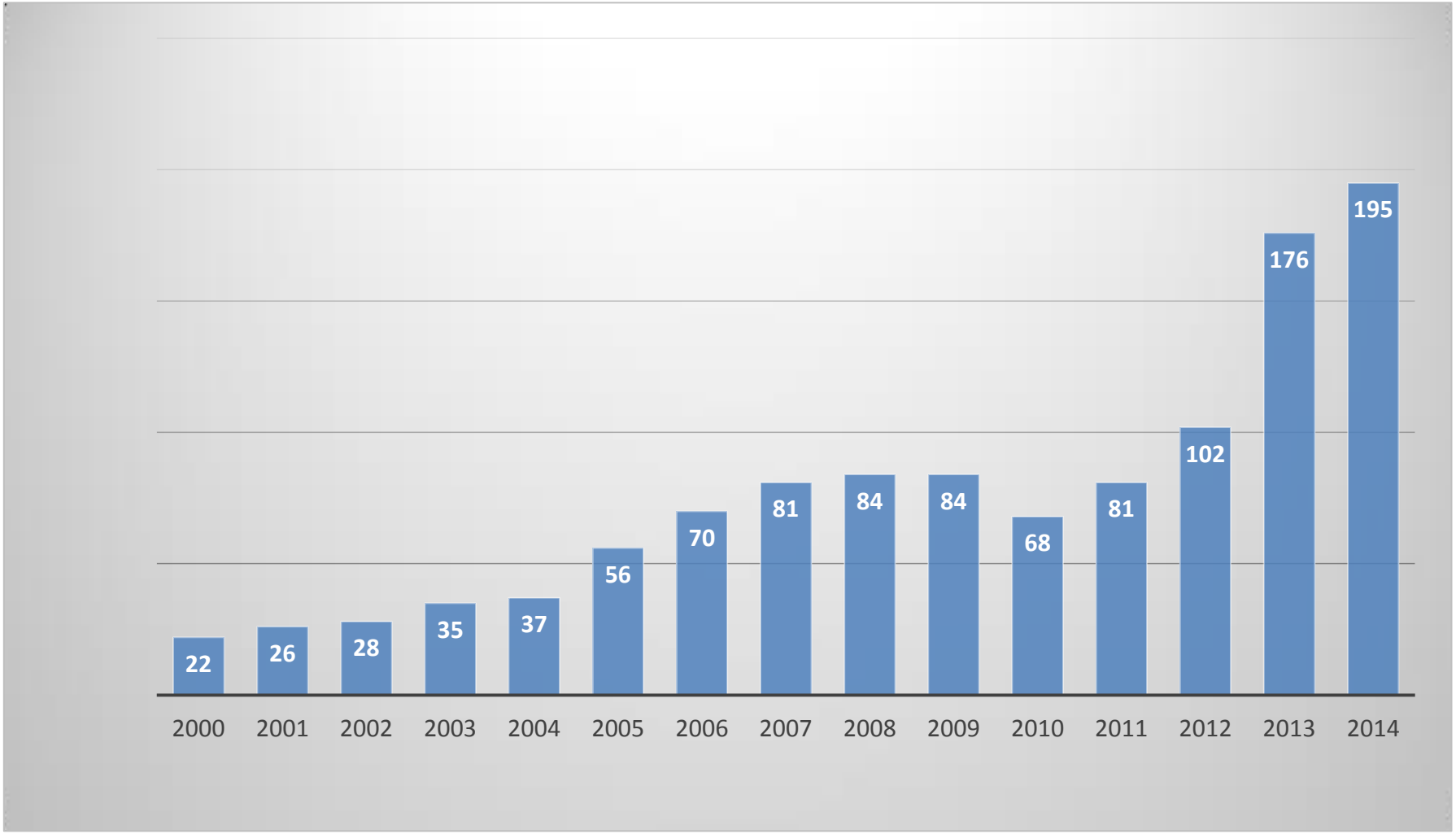
Improper Points:	• The operator inadvertently turned the wrong switch.
Contributors:	• The test switches were not arranged in a manner that supports error free operation. • The test switches were not clearly labelled. • The test procedure did not require a signature or verification that testing was complete for one valve prior to beginning testing of the next valve. • Reliance covers or barriers were not used to prevent manipulating the wrong switch.

Manipulator Accidentally Shuts Turbine Power Limit Exceeded Following Return to 100% Power due to Lapse of Administrative Weaknesses – Reference: MER ATL 08-150

Improper Points:	• The appropriate reactor power parameters were not identified and monitored prior to the evolution, which resulted in reactor thermal power limits being exceeded. • Operators made an inappropriate decision to perform concurrent activities while approaching full power.
Contributors:	• Weak supervisory oversight (including reactivity briefing) in the control room allowed the event to occur. • Procedures did not contain a limitation regarding how fast power can be raised when approaching full power. • Weaknesses existed with the preparation and use of reactivity plans.

Reactor Trip/Safety Injection due to Inadequate Turbine Valve Testing – Reference: MER PAR 08-007

The amount of Event Reports at WANO - MC



WANO Peer Review Programme

The goal of a PR is:

To compare the plant's operational performance against the **WANO standards of excellence** through an in-depth, objective review of their operations by an independent international team of experts.

WANO Peer Review Programme

- Each plant hosts a **full-scale peer review** regularly
- A **prestart-up peer review** is conducted by a team of WANO members prior to the start-up of the plant to assess its readiness for safe operation
- **Corporate peer reviews** are conducted for utilities owning or/and operating one or more sites
- **Follow – up reviews** are conducted in the middle of the time period between two full scope peer reviews.

WANO Peer Review Programme

Performance objectives include 4 Areas:

1 – **Foundations** (Nuclear Professionals; Leadership)

2 – **Functional Areas**

- Operations
- Maintenance
- Chemistry
- Engineering
- Radiological Protection
- Training

Each peer review team includes at least one expert from each of the other regional centers of WANO

3 – **Cross-Functional Areas**

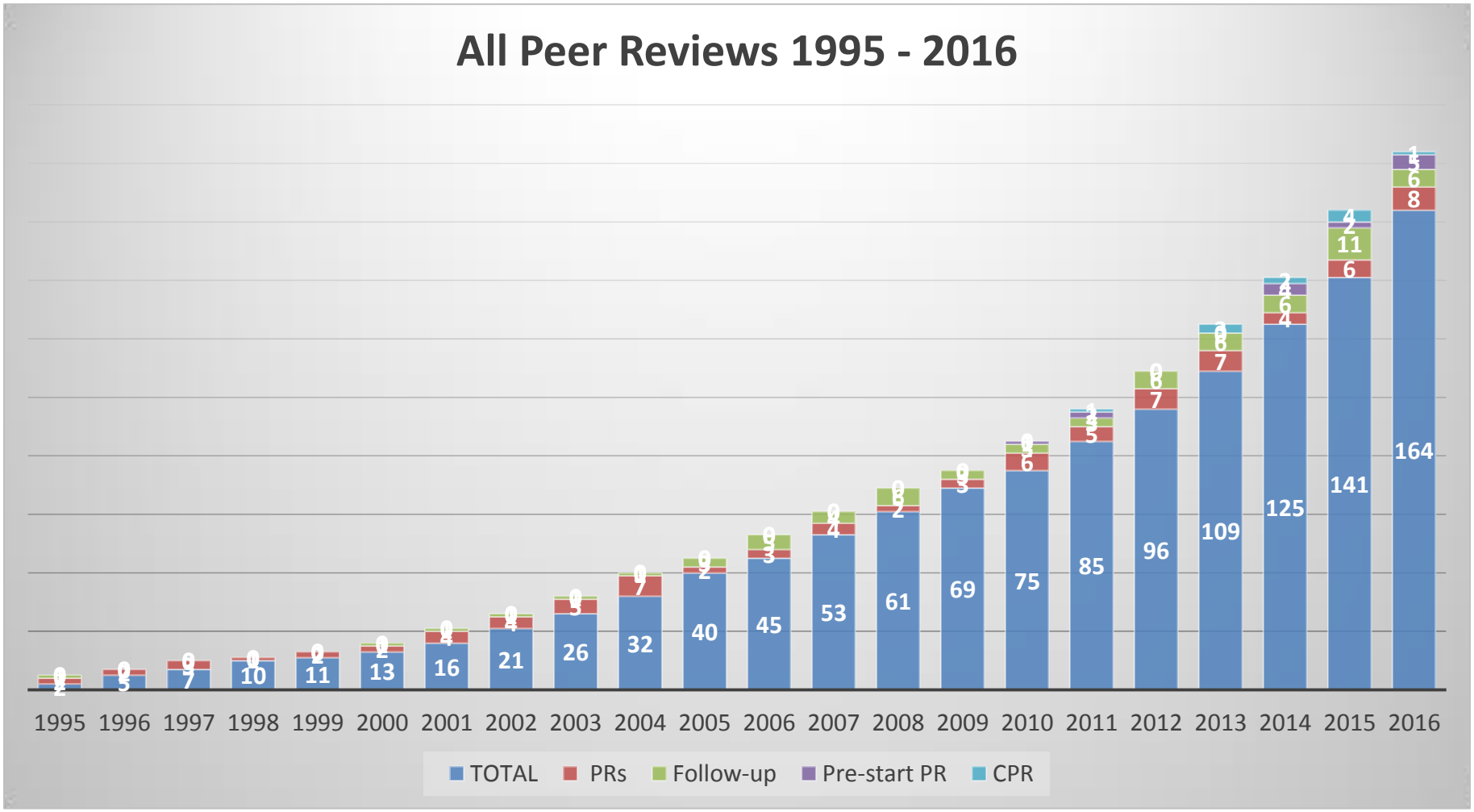
4 – **Corporate Area**

WANO Peer Review Programme

The cross-functional review areas include:

- Operational Focus
- Work Management
- Equipment Reliability
- Configuration Management
- Radiological Safety
- Performance Improvement
- Operating experience
- Organizational Effectiveness
- Fire Protection
- Emergency Preparedness

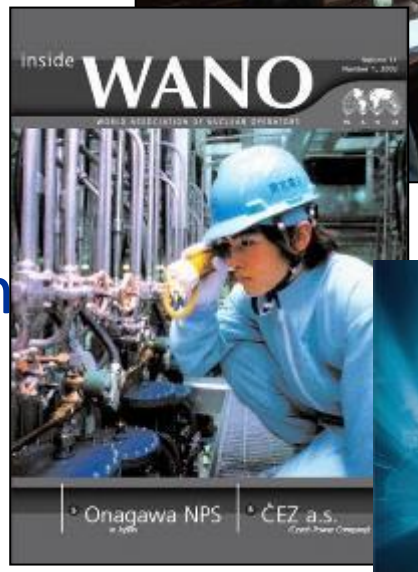
Peer Reviews
1995-2016



Professional and Technical Development Programme

This programme includes:

- Expert workshops and seminars
- Training
- Dissemination of information



Workshop for Peer Review Team Leaders

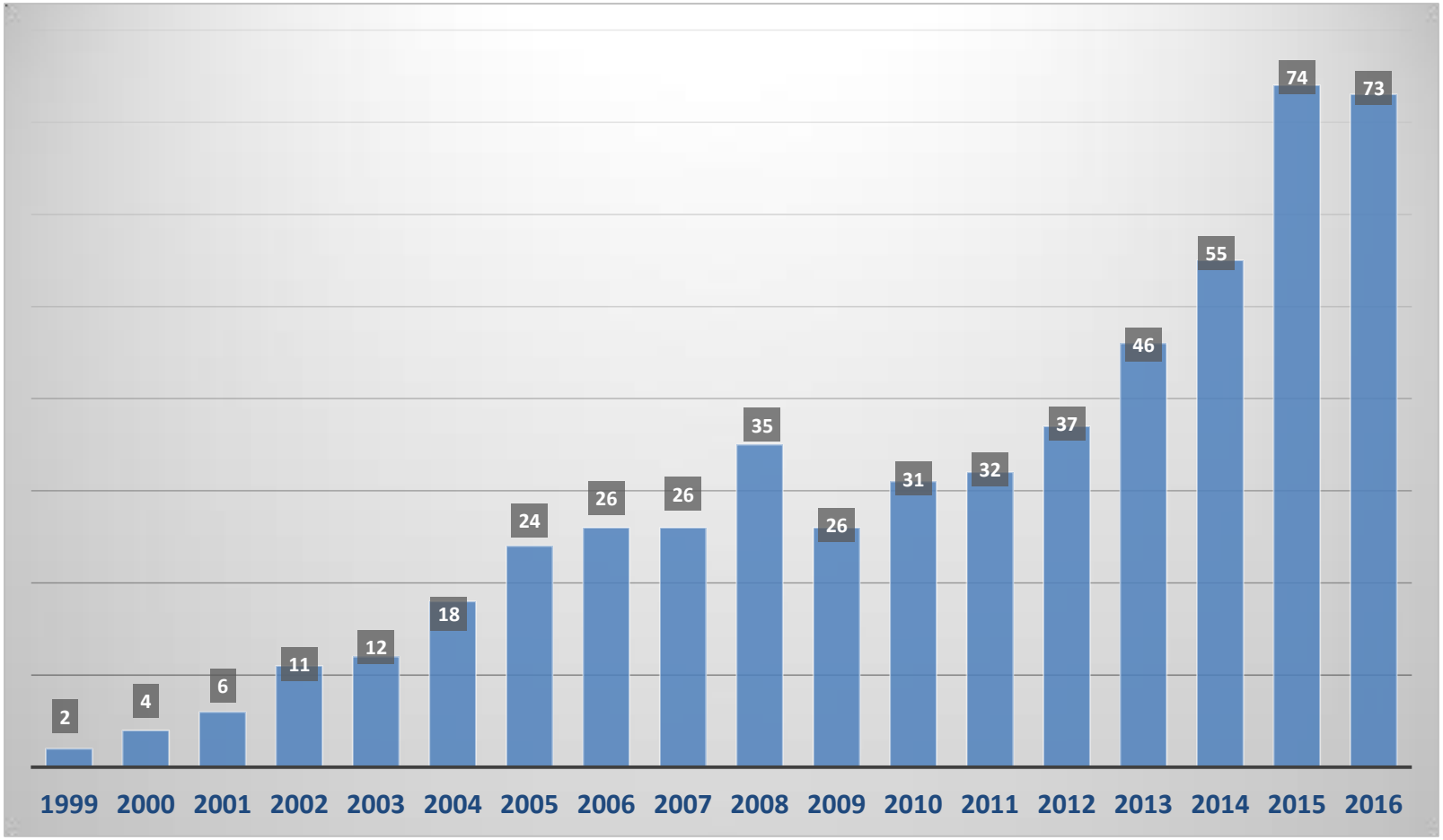
Technical Support and Information Exchange Programme

Three activities are integrated into the Technical Support and Information Exchange Programme

- Technical Support Missions (TSM)
  - A Technical Support Mission lasts from two days to two weeks.
- Performance Indicators (PI)
  - WANO **Performance Indicators** include 11 reference indicators
- Guidelines and Good Practices (GL, GP)

The amount of WANO - MC TSMs

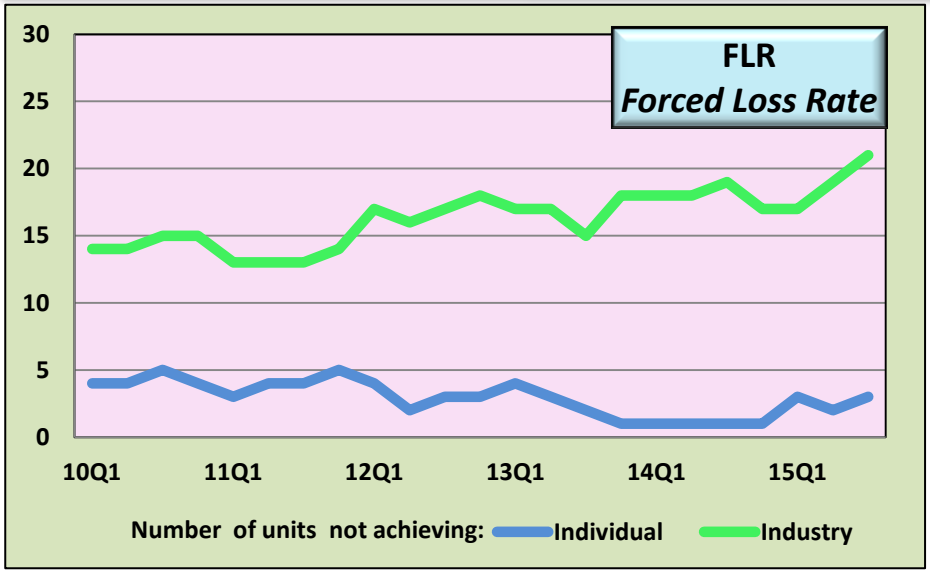
1999 - 2016

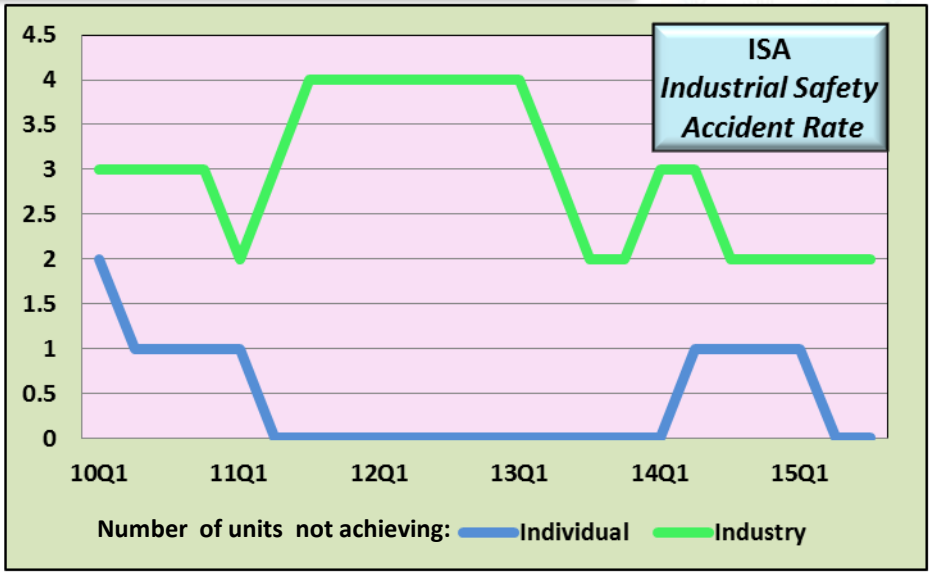


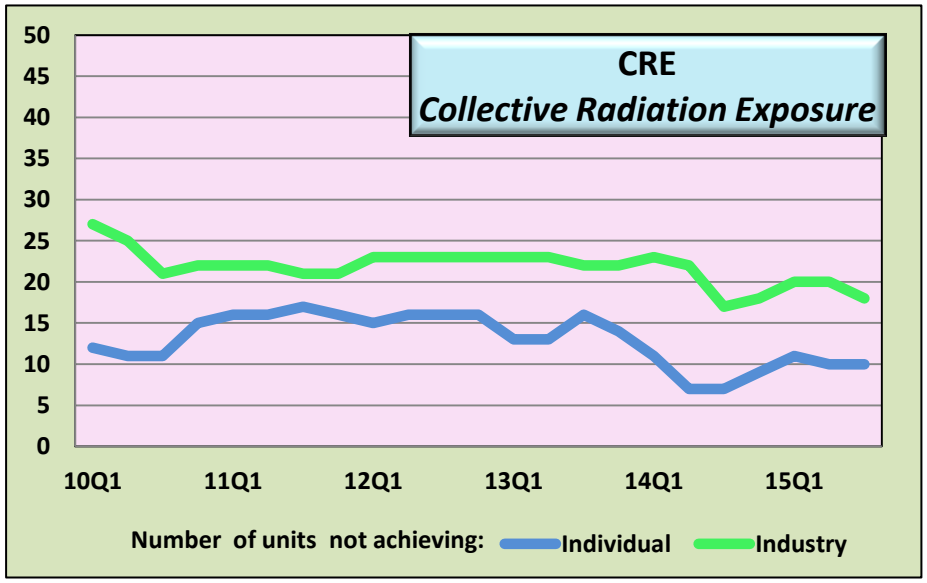
Performance Indicators

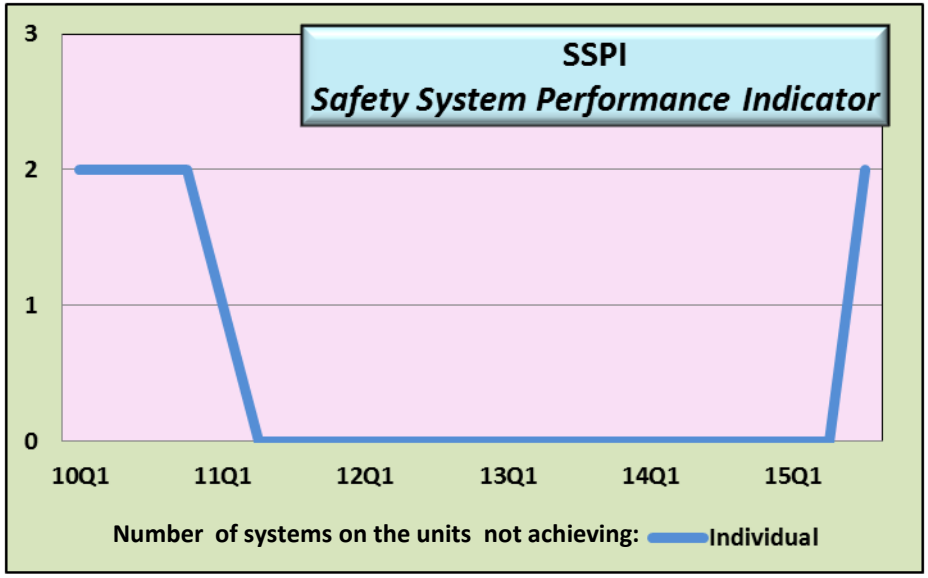
- quantitative indication of plant performance
- use by nuclear operating organisations to monitor performance and progress,
- set challenging goals for improvement
- consistent comparisons of nuclear plant performance
- *WANO announced long-term performance targets for selected performance indicators established for individual plants or units, and for the overall industry. The values were selected to be challenging and achievable by 2015*.

WANO - MC Key Indicators Performance

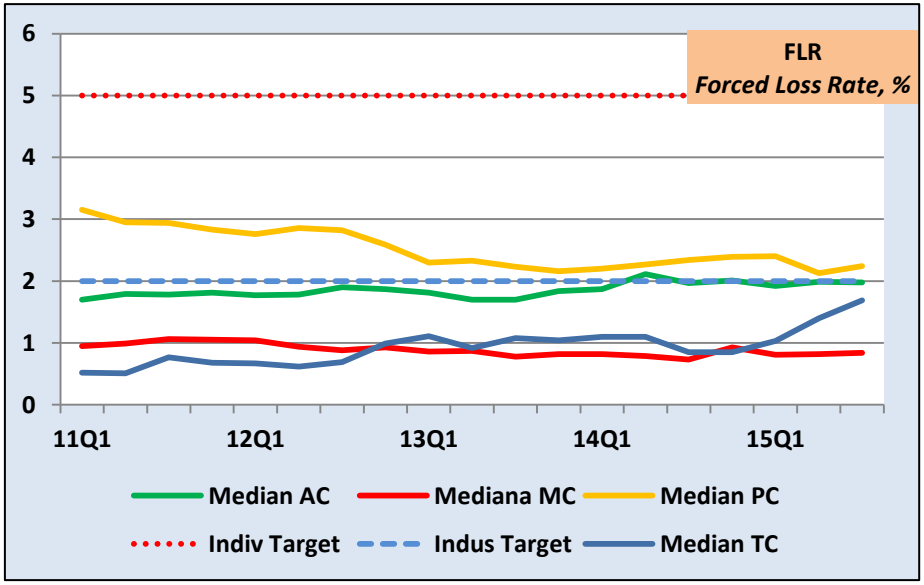


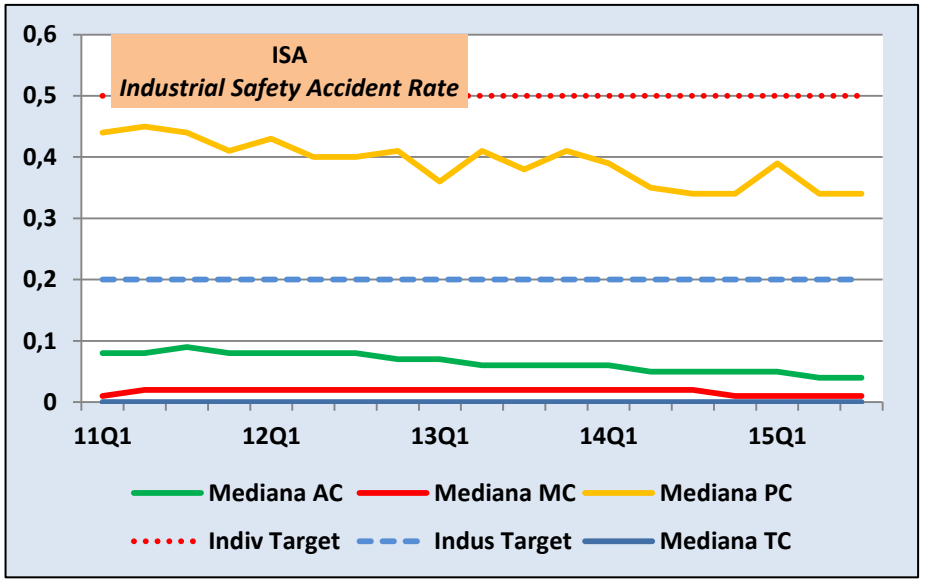


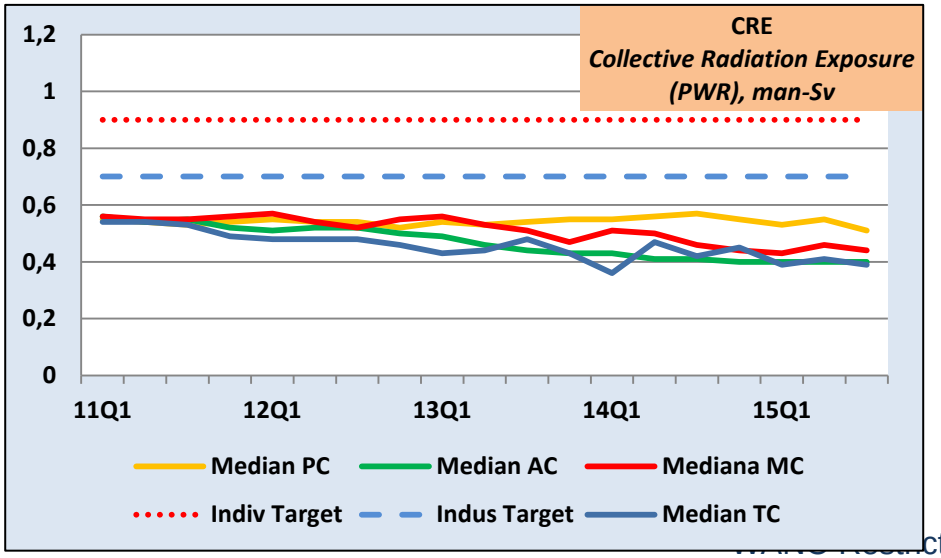


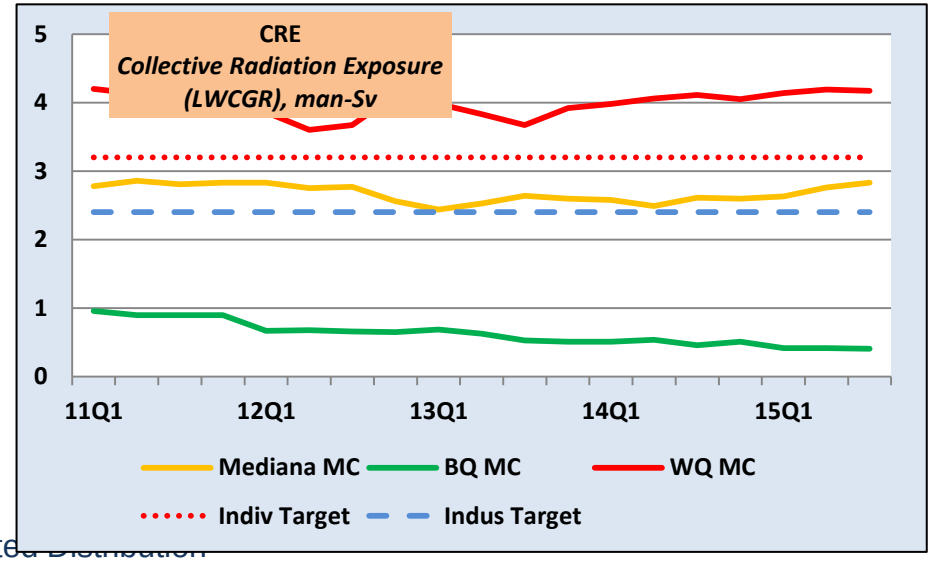


WANO Key Indicators Performance trends









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Post-Fukushima stage of WANO reformation

- WANO Biennial General Meeting in Shenzhen 2011 –
  start of the post-Fukushima stage of WANO reformation

✓ 5 recommendations of WANO post-Fukushima commission:

- WANO performance expansion
- Creating the response strategy to events of the industry
- Increase of WANO credibility
- Strengthening of WANO authority and openness
- Increase of internal consistency

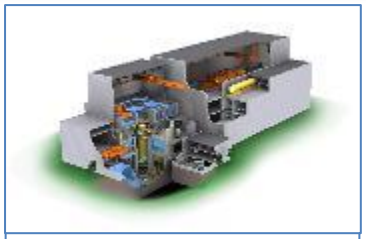
✓ Implementation of 12 post-Fukushima WANO projects

PFC Projects

1 Emergency Preparedness

2 Severe Accident Management

3 On Site Fuel Storage



4 Design Safety Fundamentals

5 Peer Review Equivalency

6 Emergency Support Plan

7 Early Event Notifications

8 Visibility & Transparency

9 Internal Assessments

10 Corporate Peer Reviews

11 Peer Review Frequency

12 WANO Assessment

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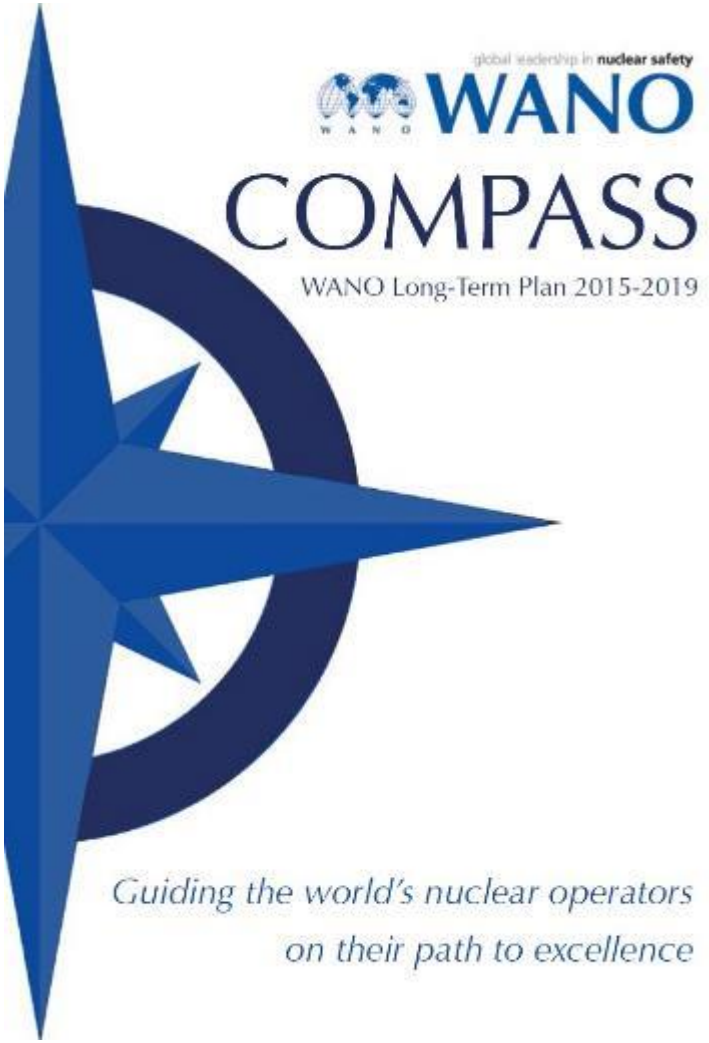
Post-BGM period

- Compass → Long-term plan
- WANO Programs development
- WA→Plant of Focus→ Harmonized Process→ Assistance
- New Members
- Young Generation
- Human recourses, rotary, training


BUSINESS PLANS
ATLANTA
LONDON
MOSCOW
PARIS
TOKYO
WANO
LONG
TERM
PLAN
COMPASS
W A N O

Compass Objectives

- Provide the strategic direction of WANO for the next five years.
- Align activities within London Office and Regional Centres.
- Be a communication vehicle for WANO staff, member staff and our external visibility.



OUR PLAN

1. Continue to support and set the standards of high performance of the world's existing fleet.

2. Build and maintain a highly-trained, professional workforce in WANO.

3. Forge a stronger WANO through consistent, credible products and programmes, including providing nuclear leadership training for our members.

4. Instil superior standards among new industry entrants and maintain them for plants approaching end-of-life, life extensions and decommissioning.

New elements

- New entrants
- Design Informed Peer Review
- Process of assessment, and support of NPPs' safety
  - WANO assessment
  - Plant performance monitoring
  - Categorization and assistance (continuous safety enhancement)
  - Process of activity relocation to the sites of NPPs (Onsite Rep)
- Regional Crisis Center

New entrants

Objective: Provide support to members in WANO activities with new built reactors not having developed nuclear infrastructure

- Engage new entrant companies and countries earlier …
- Strengthen cooperation with IAEA regarding new entrants
- Expand WANO's OE database to include construction and start-up
- Develop a programme to ensure that countries looking to become members of he nuclear community are provided information and the context of their responsibilities

Design-Informed Peer Reviews

The Project was implemented after the Governing Board of 2011 as a response to recommendations of post-Fukushima WANO action plan.

Review of the design management not the design basis itself

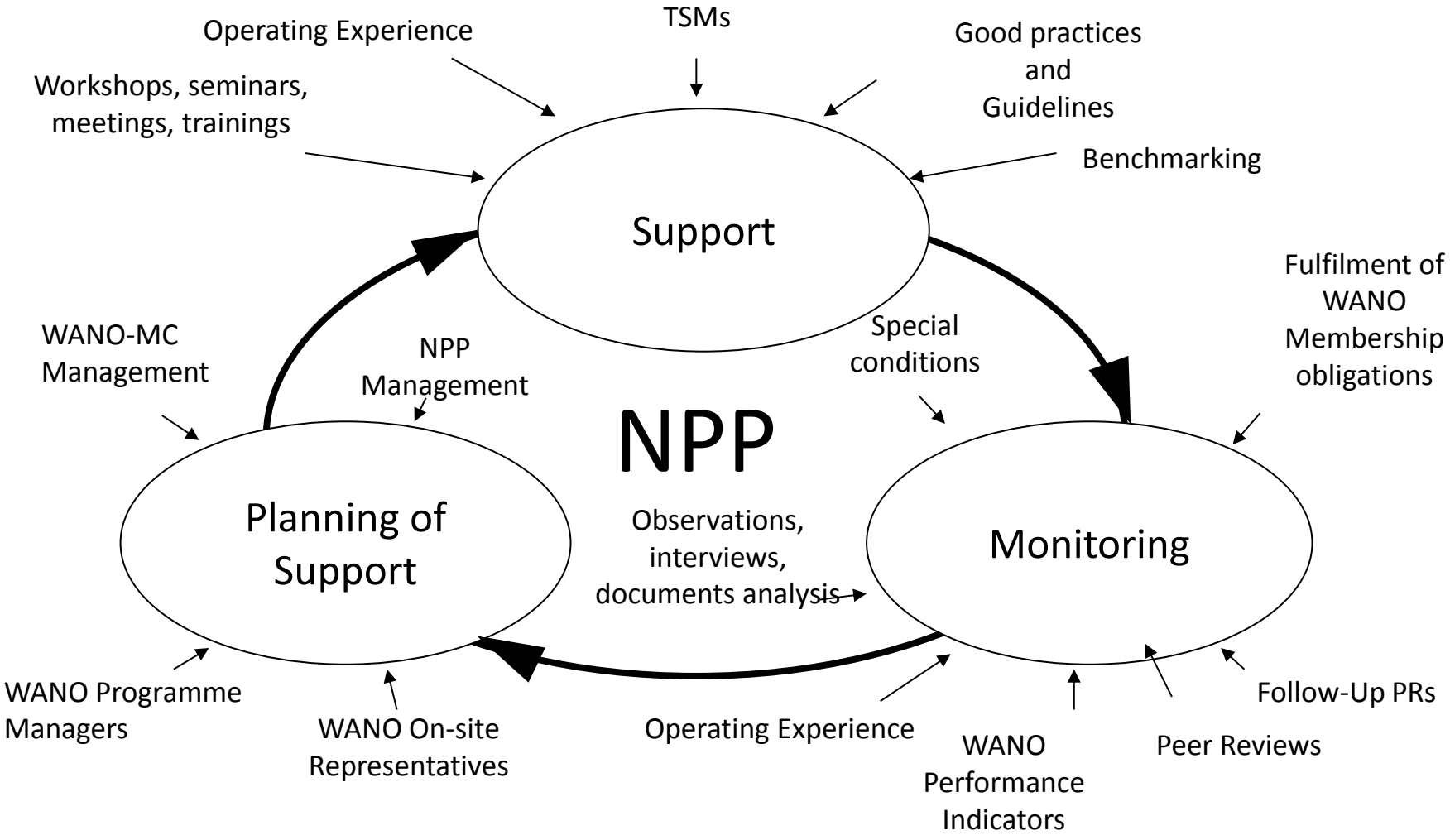
The methodology has already been developed, tools are developed and tested, pilot reviews are in progress.

WANO Assessment process

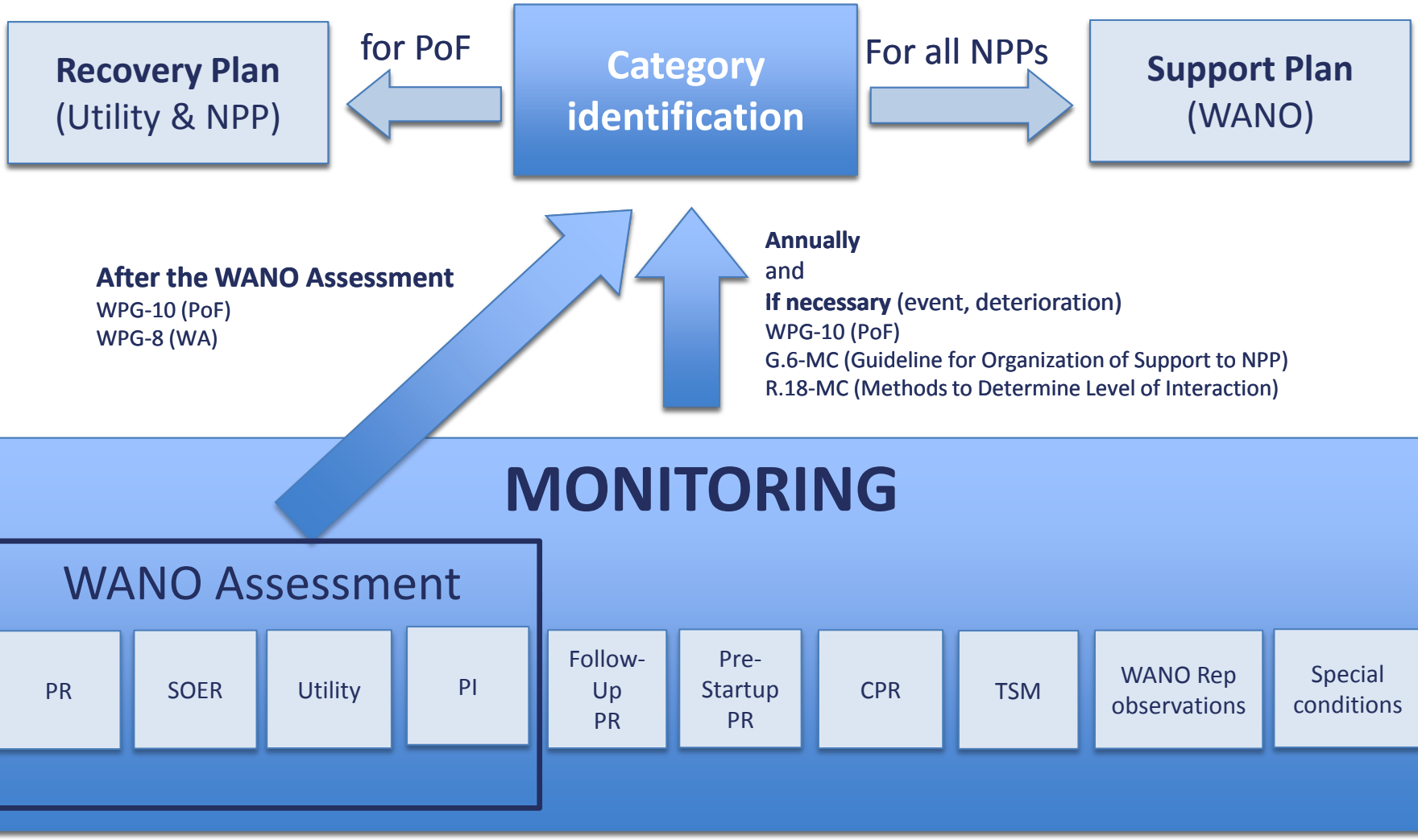
WPG08 «WANO Assessment»:

- WANO Assessment – is an overall assessment of plant's performance, carried out straightforwardly after the peer review; The assessment process comprises consideration of the peer review results, operating events and the plant's performance indicators since holding the previous peer review, as well as SOER recommendations implementation status.

Process of continuous safety enhancement, (monitoring categorization, support)



Focus identification and NPPs support process



Communication of WANO Assessment Results

- The Assessment results are announced privately to Operating Organization Leader by WANO RC Management Responsible Representative at the PR Exit Meeting
- Assessment results distribution over a region are presented to the regional GB at private meeting
- Assessment results distribution over all regions are presented to WANO GB at private meetings
- During every BGM, starting with 2015, all WANO Assessments distribution will be presented to Nuclear Industry Company Leaders at private meetings

- The assessment results are confidential

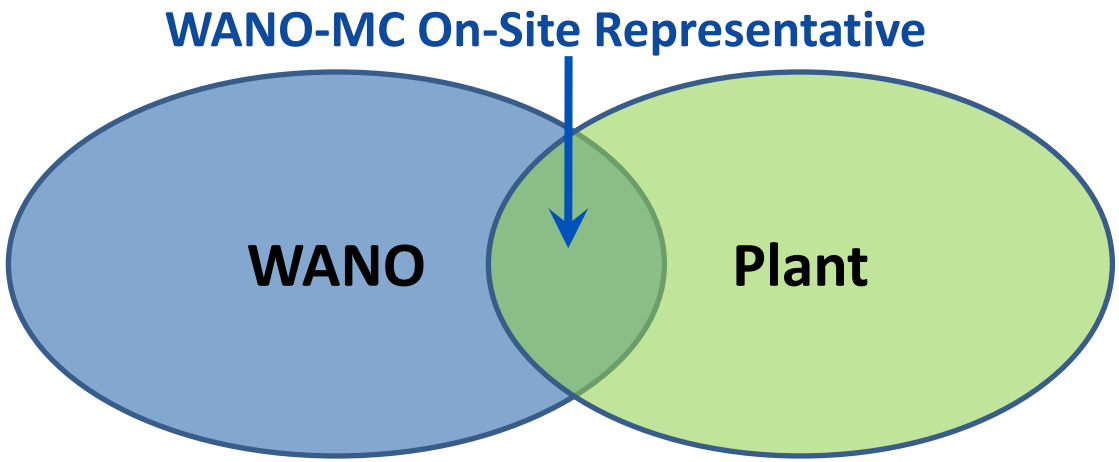
  THE DISTRIBUTION IS RESTRICTED

  - List of WANO personnel, having access to WANO Assessment results, is restricted

Mission of WANO-MC On-Site Representatives

Make WANO more demanded, efficient and visible in assisting its' Members in their efforts to maximise the safety and reliability of nuclear power plants by relocation of WANO missions and support activities to NPP sites

- **Monitoring and support** – analysis of performance, planning and organization of support, monitoring of progress, targeted observations, communication to plant management
- **Participation in WANO Programmes**
- **Individual and collective responsibility for WANO goals**



WANO activity relocation to the NPPs' sites. OSR.

Establishment – **2012**.

2013÷2015 – development and full-scope operation.

Regional Crisis Center

- ❑ 8 emergency drills and exercises
- ❑ 24 messages on plant safety significant events
- ❑ 1 RCC working group meeting
- ❑ 1 training course for RCC personnel
- ❑ RCC formats update

Conclusion

- WANO Programs to date are important tool for operational safety enhancement
- Scope and Methodology of support and services is being expanded
- The process of continuous operational safety enhancement is being implemented

BUT!

- the WANO principles and approaches have significantly changed, more rigorous rules introduced
- The principle of “collective responsibility” has been given high priority

WANO – Moscow Center

Thank You for Your attention!