

The US DOE Workshop  
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# International perspective on Fukushima accident

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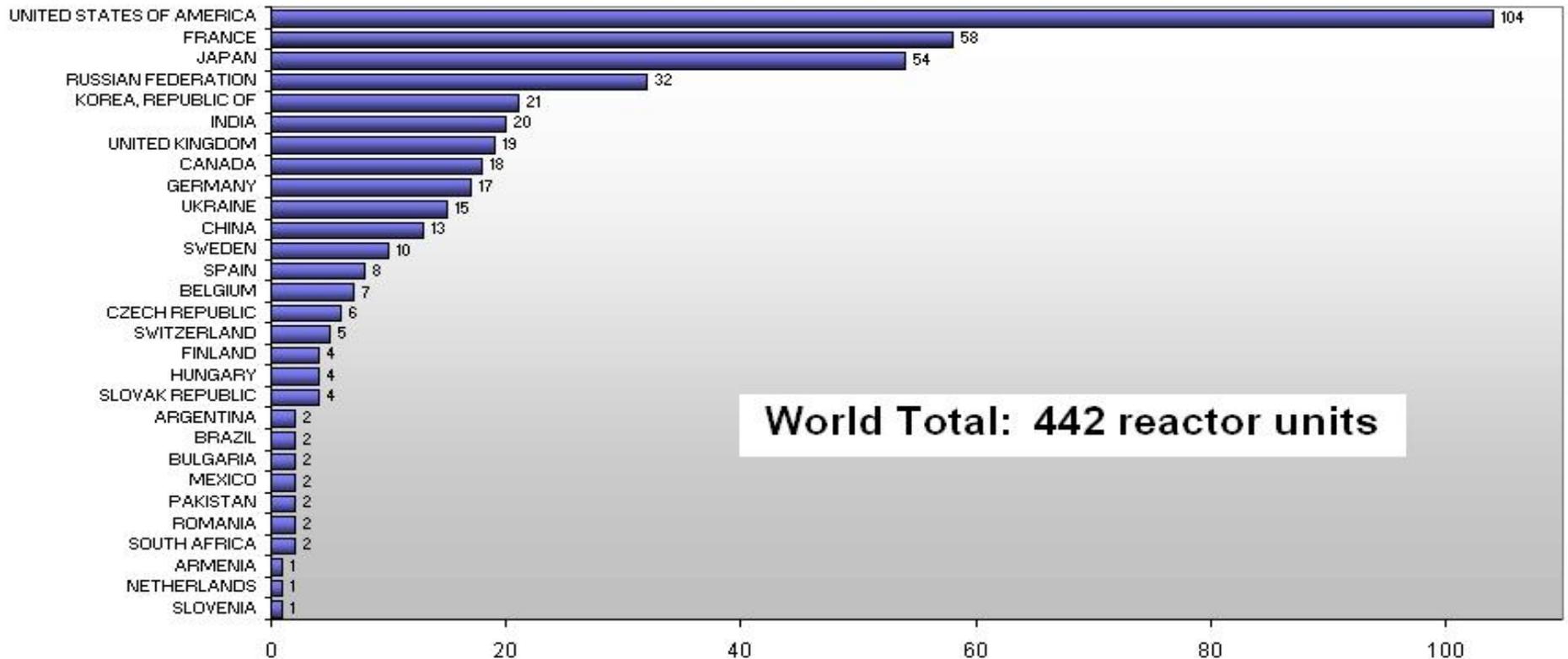
International Atomic Energy Agency

# Content

- The IAEA before Fukushima –Severe accidents management
- The IAEA actions after Fukushima
- The IAEA Action plan on nuclear safety
- Measures to improve operational safety
- Conclusions

# THE IAEA BEFORE FUKUSHIMA

## Number of Reactors in Operation Worldwide



World Total: 442 reactor units

Note: Long-term shutdown units (5) are not counted

# IAEA Safety Standards

**IAEA Safety Standards**  
for protecting people and the environment

**Fundamental Safety Principles**

Jointly sponsored by  
Euronorm FAO IAEA ILO IMO OECD/NEA PAHO UNEP WHO



**Safety Fundamentals**  
No. SF-1



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International Atomic Energy Agency

**IAEA Safety Standards**  
for protecting people and the environment

**Safety of Nuclear Power Plants:  
Commissioning and Operation**

**Specific Safety Requirements**  
No. SSR-2/2



IAEA  
International Atomic Energy Agency

**IAEA Safety Standards**  
for protecting people and the environment

**Severe Accident Management  
Programmes for Nuclear Power Plants**

**Safety Guide**  
No. NS-G-2.15



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## General Safety Requirements

**Part 1 Governmental and  
Regulatory Framework**

**Part 2 Leadership and Management  
for Safety**

**Part 3 Radiation Protection and  
Safety of Radiation Sources**

**Part 4 Safety Assessment**

**Part 5 Predisposal Management  
of Radioactive Waste**

**Part 6 Decommissioning and  
Termination of Activities**

**Part 7 Emergency Preparedness  
and Response**

## Specific Safety Requirements

**1. Site Evaluation for  
Nuclear Installations**

**2. Safety of Nuclear Power Plants**

**2.1 Design and Construction  
2.2 Commissioning and Operation**

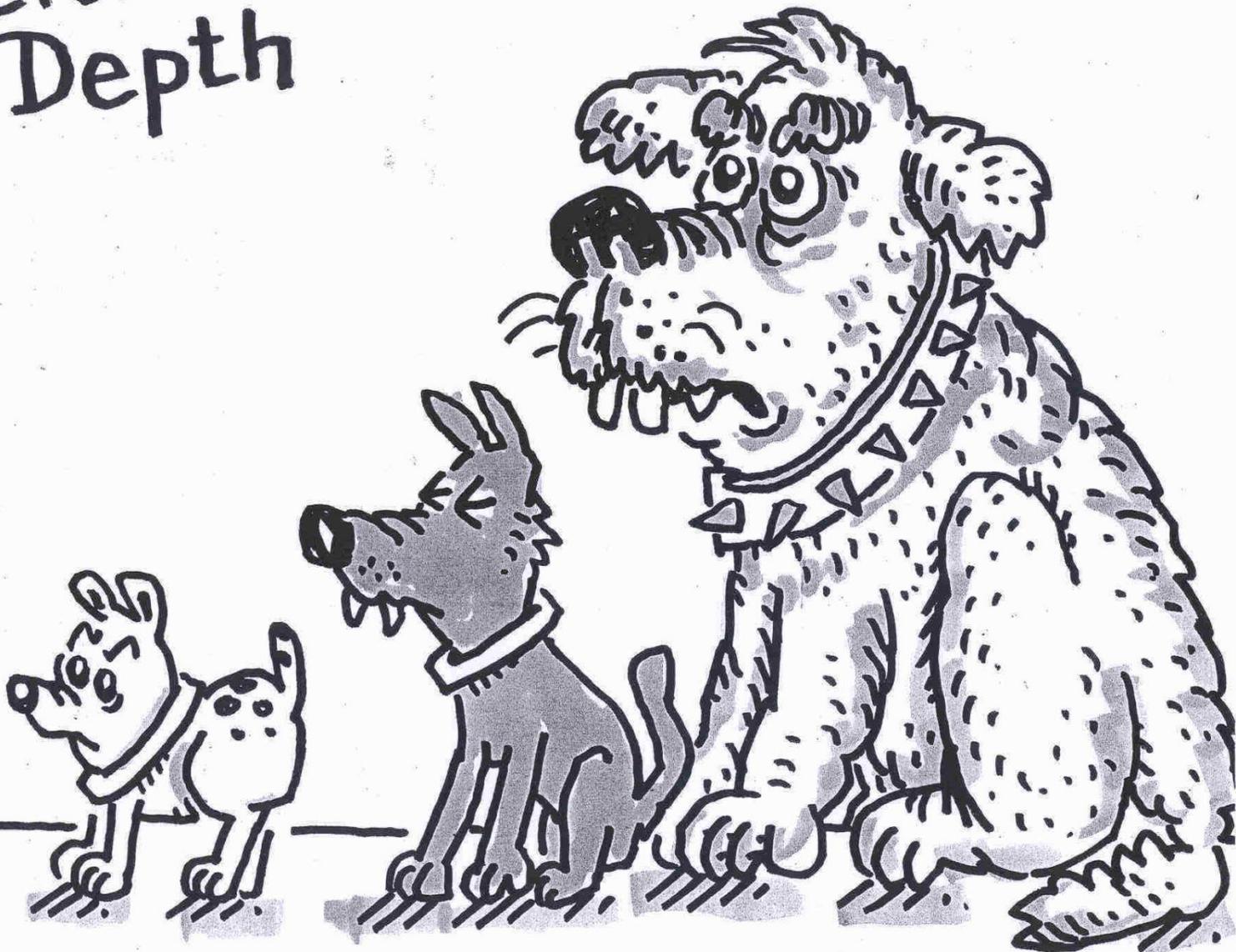
**3. Safety of Research Reactors**

**4. Safety of Nuclear Fuel  
Cycle Facilities**

**5. Safety of Radioactive Waste  
Disposal Facilities**

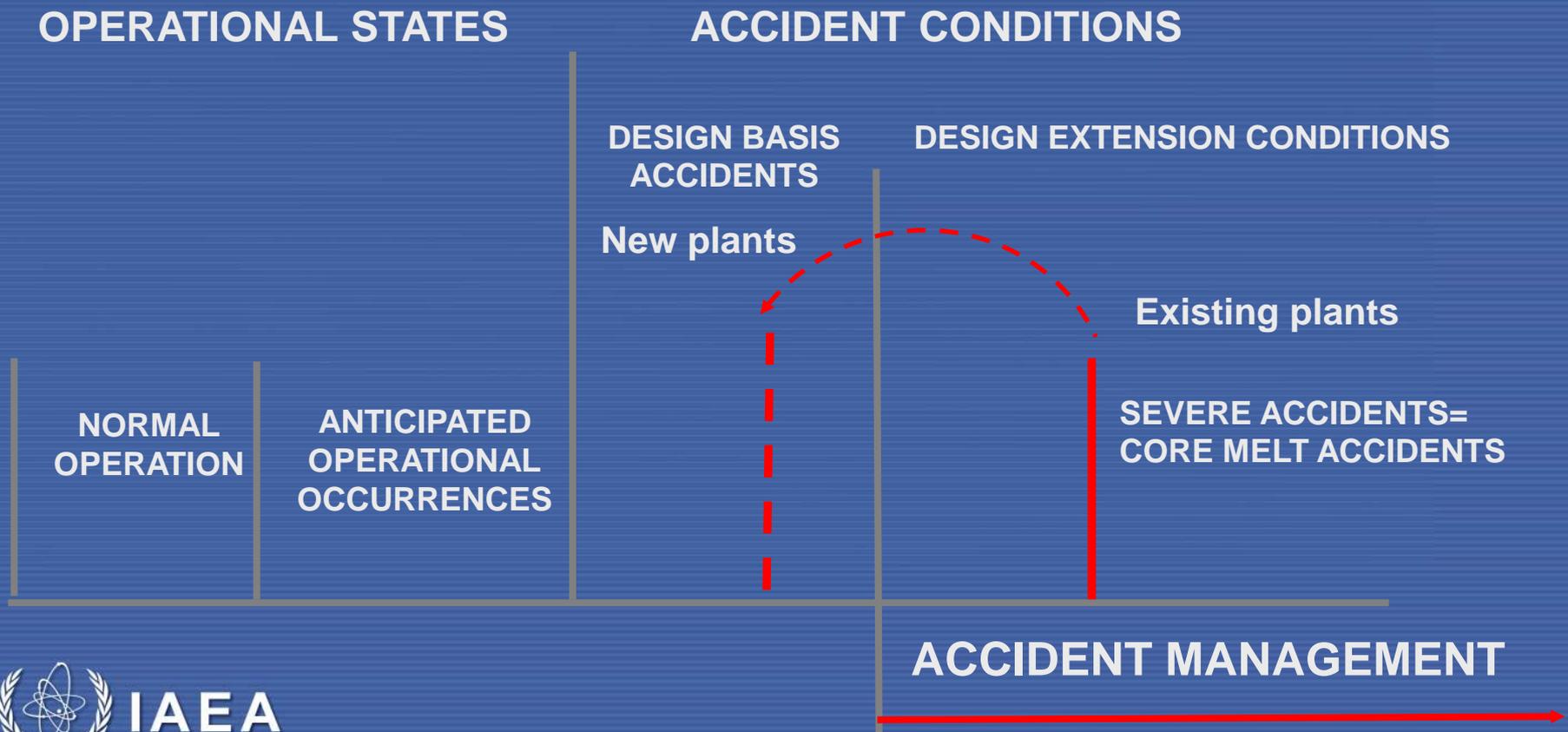
**6. Safe Transport of  
Radioactive Material**

# Defense in Depth



Stoiber

# Overview of NPP states according to the IAEA Safety Standards





NORMAL  
OPERATION

DESIGN-BASIS  
ACCIDENT

BEYOND  
DESIGN-  
BASIS ACCIDENT

WAY  
BEYOND DESIGN-  
BASIS ACCIDENT

Stoiber

# IAEA Safety review services-AM

- Design review
- Review of Accident management programme RAMP
- OSART with module Accident management 2009 (169 Missions)
- OSART Missions in USA- Seabrook 2011, Arkansas 2008, Brunswick 2005

# The IAEA ACTIONS AFTER FUKUSHIMA



# IAEA Response to Fukushima

- Incident and Emergency Centre activated
- Director General formed Fukushima Accident Coordination Team (FACT)
- DDG, Nuclear Safety & Security Department
  - Fukushima Nuclear Safety Team (FNST)
  - Fukushima Radiological Consequences Team (FRCT)
- IAEA Assessment and Monitoring Teams
- IAEA Fact-Finding Expert Mission
- Ministerial Conference on Nuclear Safety

# Briefings of Member States

- **Written Briefs for Member States:**
  - From 14 March till 15 April- daily including Saturday and Sundays
  - From 18 April till 5 May daily during working days
  - May weekly
- **Presentations to Member States:**
  - From 14 April till 1 March daily during working days
  - In April: weekly
  - In May: weekly

# ACTION PLAN ON NUCLEAR SAFETY



Board of Governors  
General Conference

GOV/2011/59-GC(55)/14  
Date: 5 September 2011

General Distribution  
Original: English

#### For official use only

Item 3(b) of the Board's provisional agenda  
(GOV/2011/46)  
Item 14(b) of the Conference's provisional agenda  
(GC/55/1, Add.1 and 2)

## Draft IAEA Action Plan on Nuclear Safety

*Report by the Director General*

#### Summary

- In accordance with paragraphs 23 and 24 of the Declaration adopted by the Ministerial Conference on Nuclear Safety held on 20-24 June 2011, the Director General was requested to prepare and present to the Board of Governors and the General Conference at their September 2011 meetings a report on the Ministerial Conference and a draft Action Plan, building on the Ministerial Declaration, the conclusions and recommendations of the working sessions of the Ministerial Conference and the expertise and knowledge available therein, and to facilitate consultations among Member States on the draft Action Plan.
- The attached draft Action Plan is the result of an extensive process of consultations with Member States and responds to the request contained in the Ministerial Declaration.

#### Recommended Action

- It is recommended that the Board approve the Action Plan and that the Board recommend that the General Conference endorse the Board's decision.

# IAEA Action Plan on Nuclear Safety 12 Actions

✓ *Strengthen*

✓ *Enhance Effectiveness*

1. Safety Vulnerabilities

2. Peer Reviews

3. Emergency

Preparedness and  
Response

4. Regulatory Bodies,

5. Operating  
Organisations

6. IAEA Safety  
Standards

7. **Legal Framework**

8. Embarking countries

9. Capacity Building

10. Protection of People  
and Environment

11. **Communication**

12. Research and  
Development



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*Actions for:*

*IAEA Secretariat*

*Member States*

*Other Relevant Stakeholders*



# 1. Assessment of safety vulnerabilities

## Action Plan

- MSs to promptly undertake a national assessment
- IAEA Secretariat develop a methodology
- IAEA Secretariat, provide assistance and support to MSs



## Key Achievements

- IAEA Methodology – October 2011
- Support and advice to Member States
- International Expert Mission to Bulgaria and Japan
  - ✓ **December 2011, January 2012**



# 2. Strengthen IAEA peer reviews

## Action Plan

- IAEA Secretariat to strengthen peer reviews
- Provide information on where and when IAEA peer reviews done
- Member States to provide experts for peer review missions

## Key Achievements

- IRRS and EPREV
  - ✓ Dedicated 'Fukushima' Modules
- OSART Operational Safety Review Team
  - ✓ Accident Management module
  - ✓ Corporate function review
  - ✓ New methodology
- Publish peer review results



*Increase in demand for  
IAEA Peer Reviews*

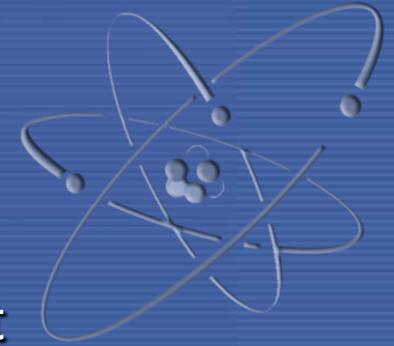




# 4. Strengthen the effectiveness of National Regulatory Bodies

## Action Plan

- MSs to promptly review regulatory bodies
- IAEA to enhance the IRRS
- Each MS with nuclear power plants to voluntarily host an IRRS



## Key Achievements

- IRRS International workshop USA Oct 2011
- IRRS - more systematic assessment of national regulations and guidance, including a Fukushima module
- Effective Nuclear Regulatory Systems



# 5. Strengthen the effectiveness of operating organizations

## Action Plan

- Strengthen IAEA/WANO links
- Member States to:
  - ✓ Improve management systems, safety culture, human resources, tech. capacity in operating organizations
  - ✓ Host OSART in next three years



## Key Achievements

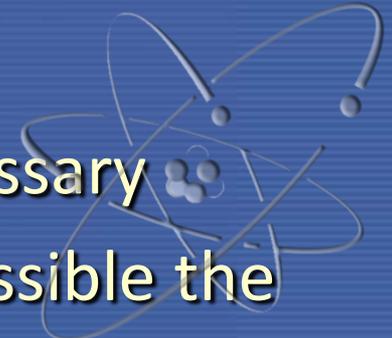
- Accident Management module in OSART
- **Cooperation with WANO**
  - ✓ DG Amano - WANO BGM 2011
  - ✓ Coordinate Peer Reviews, Safety Standards, OE, Embarking Countries
  - ✓ New MoU



# 6. Review and strengthen IAEA Safety Standards

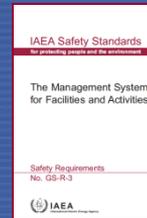
## Action Plan

- IAEA Secretariat to review, and revise as necessary
- MSs to utilize as broadly and effectively as possible the IAEA Safety Standards



## Key Achievements

- Systematic Review Requirements for NPPs
  - ✓ No Gaps, some enhancements needed
- Streamline Review Process
- Report to IAEA Director General - June 2012



# 7. Improve the effectiveness of the International legal framework

## Action Plan

- States parties to consider enhancing the effectiveness of CNS and other Conventions (Joint, Notification, Support)
- MS encouraged to join and effectively implement these Conventions

## Key Achievements

- International Expert Group on Nuclear Liability (INLEX)
- Nuclear Law Institute (NLI)
- CNS Extraordinary Meeting Aug 2012

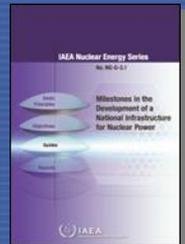
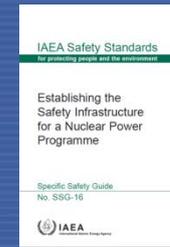
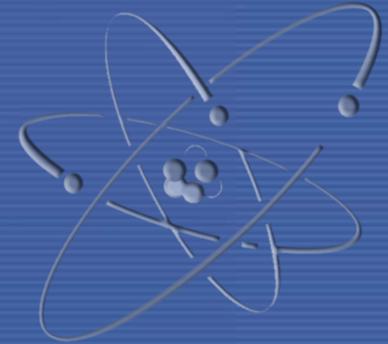


THE IAEA ACTION PLAN

# 8. Member States embarking on Nuclear Power programme

## Action Plan

- Member States - appropriate infrastructure
  - ✓ IAEA Safety Standards and
  - ✓ Other relevant guidance
- IAEA to provide assistance
- Member States to host INIRs



## Key Achievements

- Infrastructure Workshop Jan 2012
- Several INIR Missions
- Safety Infrastructure Guide SSG-16



IAEA ACTION PLAN

# 9. Strengthen and Maintain Capacity Building

## Action Plan

- MSs with NPPs and those embarking to strengthen, develop, maintain and implement their capacity building programs
- IAEA to assist as requested

## Key Achievements

- IAEA Guidance on capacity building,
- Self-assessment, including
  - ✓ Human resources,
  - ✓ Education and training,
  - ✓ Knowledge management and networks



**Training**  
Knowledge  
useful abilities  
backbone of c  
quired for a t



# 10. Protection of people and environment from ionizing radiation

## Action Plan

- Member States, IAEA Secretariat and relevant stakeholders to facilitate use of information/expertise for:
  - ✓ Monitoring, decontamination and remediation
  - ✓ Removal of damaged nuclear fuel and the management and disposal of radioactive waste, and
  - ✓ Share information regarding the assessment of radiation doses and impacts on people and the environment
  - ✓ IAEA to assist as requested

## Key Achievements

- International Expert Mission Remediation
  - ✓ Japan Oct 2011
- Models and Data for Radiological Impact Assessment (MODARIA)



# 11. Communication and dissemination of Information

## Action Plan

- Strengthen the emergency notification system
- Enhance the transparency and effectiveness of communication among operators, regulators and various international organizations
- Review application of INES scale as a communication tool
- Organize international experts meetings (IEMs)

## Key Achievements

- IEMs
  - ✓ Reactor and Spent Fuel Safety March 2012
  - ✓ Enhancing Transparency and Communication Effectiveness June 2012
  - ✓ Extreme Earthquakes and Tsunamis September 2012
  - ✓ Remediation and Decommissioning March 2013



# 12. Research and Development

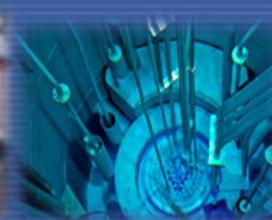
## Action Plan

- Relevant Stakeholders with IAEA support to conduct research and development
- Establish a Forum for organisations dealing with research and development
- Relevant Stakeholders with IAEA support to utilize the results of research and development and to share them, as appropriate, to the benefit of all MSs.



## Key Achievements

- Technical and Scientific Support Organization (TSO) Forum to strengthen scientific and technical coordination and collaboration among Member States
- Steering Committee January 2012



# OPERATIONAL SAFETY IMPROVEMENTS



# OPERATIONAL SAFETY IMPROVEMENTS

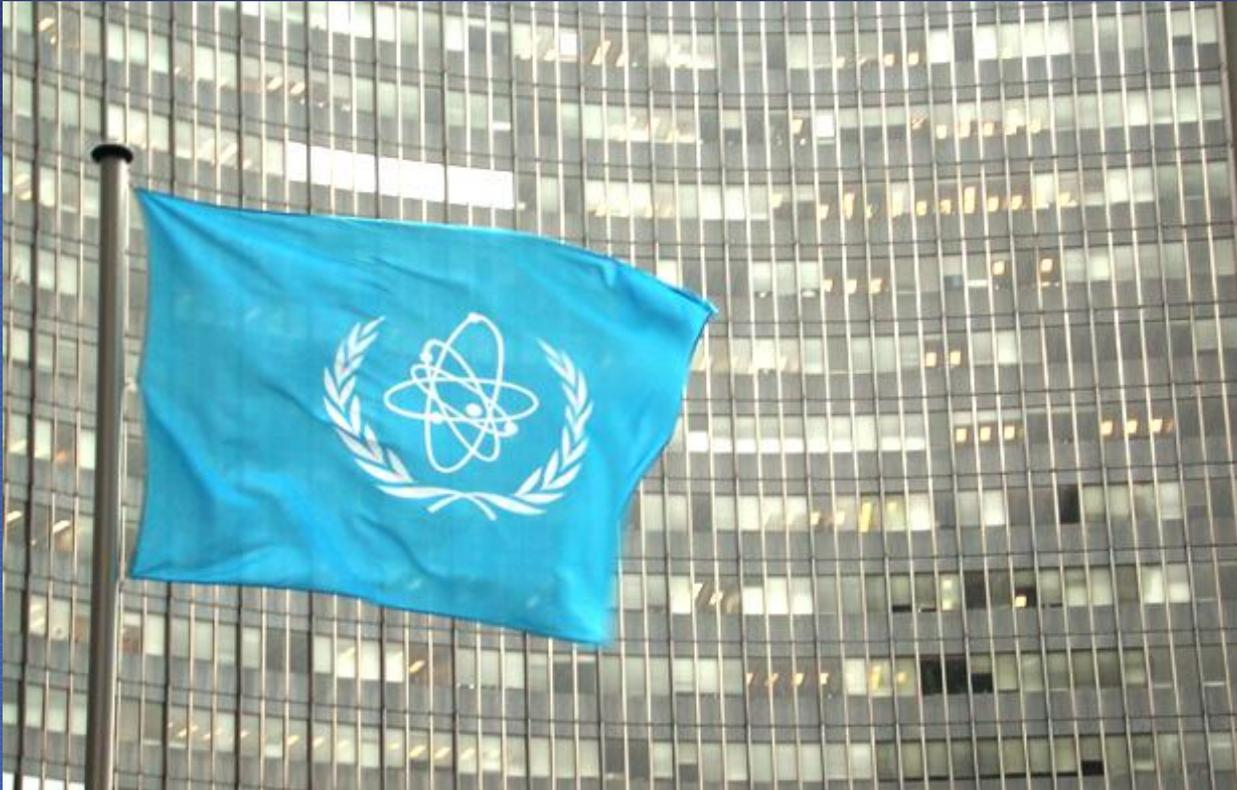
- **MSs to ensure improvement of management systems, safety culture, human resources, and scientific and technical capacity in operating organizations; the IAEA to provide assistance**
- **Each MS with NPPs to voluntarily host at least one IAEA OSART during the coming three years, with the initial focus on older NPPs. Thereafter, OSART missions to be voluntarily hosted on a regular basis.**

# OPERATIONAL SAFETY IMPROVEMENTS

- 2012 OSART missions with AM module:
  - China, Brazil, Mexico, India, Switzerland, France, Bulgaria, Czech Republic
- Practical arrangements between the IAEA and:
  - China Nuclear Industry 23 Construction Co.
  - INPO (under preparation)
  - JANTI (under preparation)
  - RINPO (under preparation)

# Conclusions

- Prior to the Fukushima accident the IAEA had Peer review services and had set of Safety requirements and Safety guides documents related to nuclear safety, in particular NS-G-2.15 dealing specifically with Severe accident management
- Implementation of the IAEA Action plan on nuclear safety will further improve safety of nuclear power plants



*...Thank you for your attention*  
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