MDEP Activities and Accomplishments on Design Specific Working Groups

EPR Working Group

MDEP Conference on New Reactor Design Activities

Paris OECD 10.-11.9.2009

Petteri Tiippana

MDEP EPRWG Chair

General Objectives and Activities

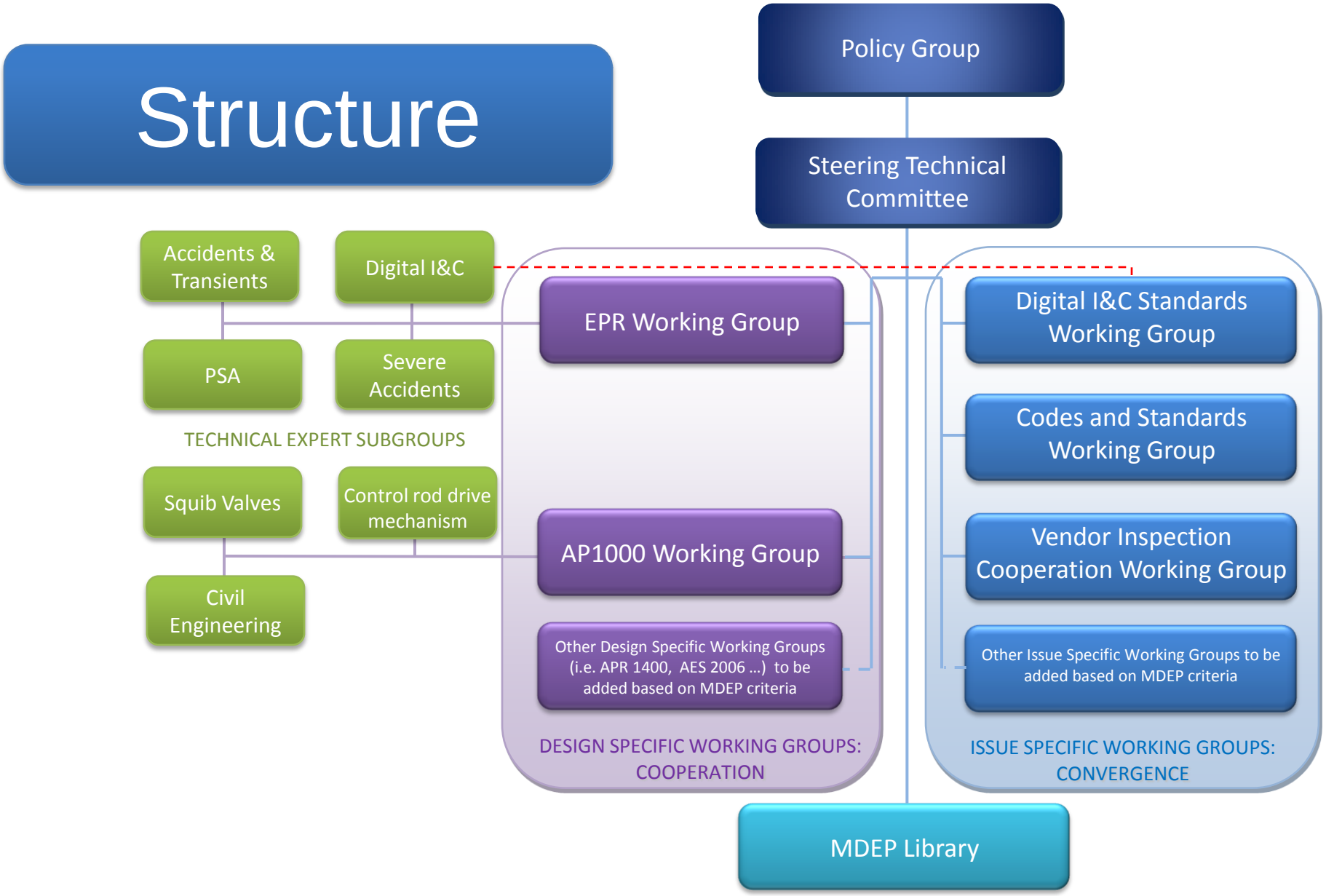
Objectives

The Multinational Design Evaluation Program (MDEP) is a multinational initiative to develop innovative approaches to leverage the resources and knowledge of mature, experienced national regulatory authorities who will be tasked with the regulatory design review of new reactor plant designs.

Activities:

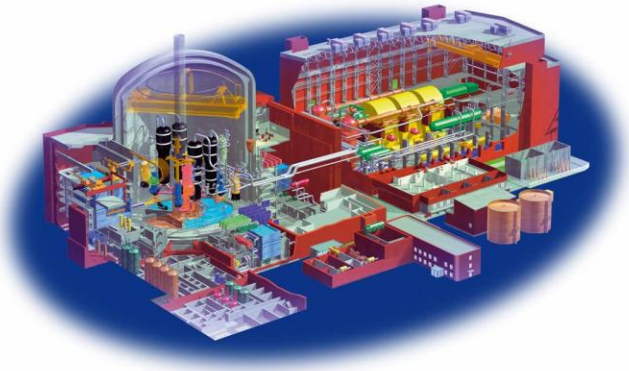
- Enhancing multilateral cooperation within existing regulatory framework.
- Increasing multinational convergence of codes, standards, and safety goals by establishing Reference Regulatory Practices
- Implementing MDEP products and regulatory practices to facilitate licensing reviews of new reactors, including those being developed by the Generation IV International Forum.

Structure


Policy Group
Steering Technical Committee
Accidents & Transients
Digital I&C
PSA
Severe Accidents
TECHNICAL EXPERT SUBGROUPS
Squib Valves
Control rod drive mechanism
Civil Engineering
EPR Working Group
AP1000 Working Group
Other Design Specific Working Groups (i.e. APR 1400, AES 2006 ...) to be added based on MDEP criteria
DESIGN SPECIFIC WORKING GROUPS: COOPERATION
Digital I&C Standards Working Group
Codes and Standards Working Group
Vendor Inspection Cooperation Working Group
Other Issue Specific Working Groups to be added based on MDEP criteria
ISSUE SPECIFIC WORKING GROUPS: CONVERGENCE
MDEP Library

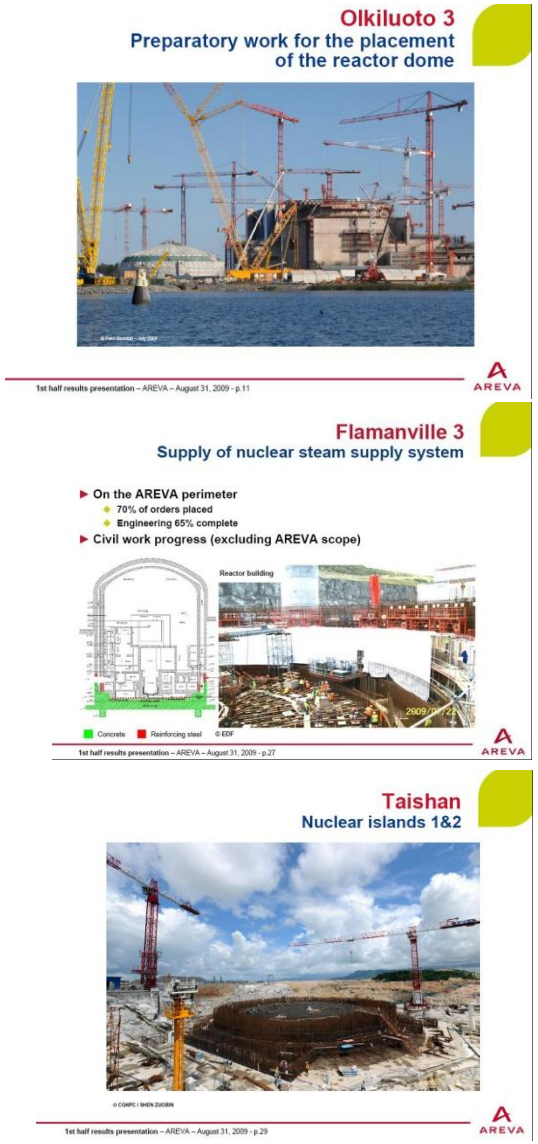
EPR Working Group - Goals

- Goal of the MDEP EPRWG is to share information and experience on design reviews and construction oversight in order to
  - leverage the technical evaluations completed by each of the participating regulators
  - leverage the resources and knowledge of the national regulatory authorities
  - develop consistency between regulators and/or to understand differences
  - develop joint assessment on specific subjects
- Make safety assessments more robust and increase the safety level of EPR



EPR Working Group - General

- Members of EPR WG are regulators from:
  - Canada,
  - China,
  - Finland (chair),
  - France (co-chair),
  - United Kingdom,
  - United States
- Countries where EPR is being licensed or constructed
- Group has been meeting regularly since early 2008

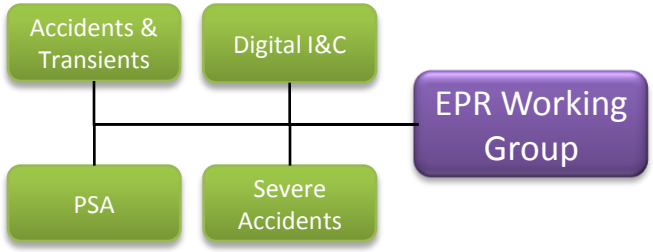


Source: Areva 1st half results presentation 31.8.2009

EPR Working Group - Activities

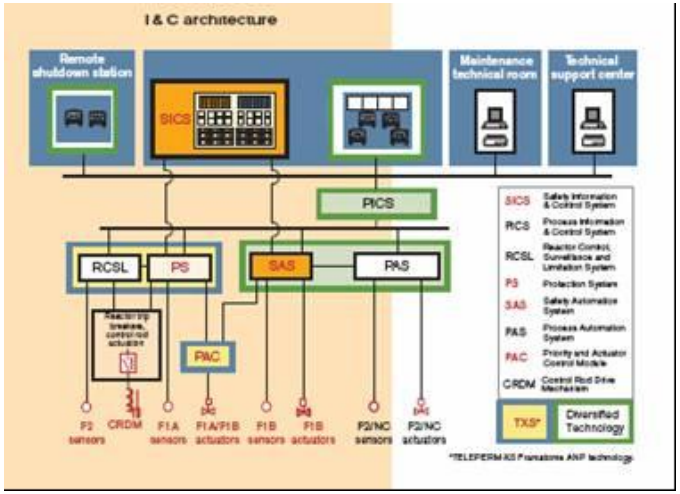
- General meetings on the status of each EPR project
  - discussions on the status of design review, construction
  - goal to identify new items for in depth discussions in the group
- Specific task groups for
  - instrumentation and control
  - probabilistic risk assessment
  - accidents and transients
  - severe accidents
- Issue specific meetings, teleconferences/net meetings and email exchanges on specific topics

Source: TVO, Hannu Huovila



EPR Working Group - Instrumentation and Control

- I&C architecture
  - defence levels - independence, diversification, separation
  - requirement specifications for the I&C
- Specific design topics
  - priority actuation modules, operating interfaces, “black boxes”
- Information Security
  - mechanisms and processes in the I&C design to ensure information security
- Software verification and validation
- Testing of the I&C



Source: Areva EPR Brochure March 2005

EPR Working Group - PSA

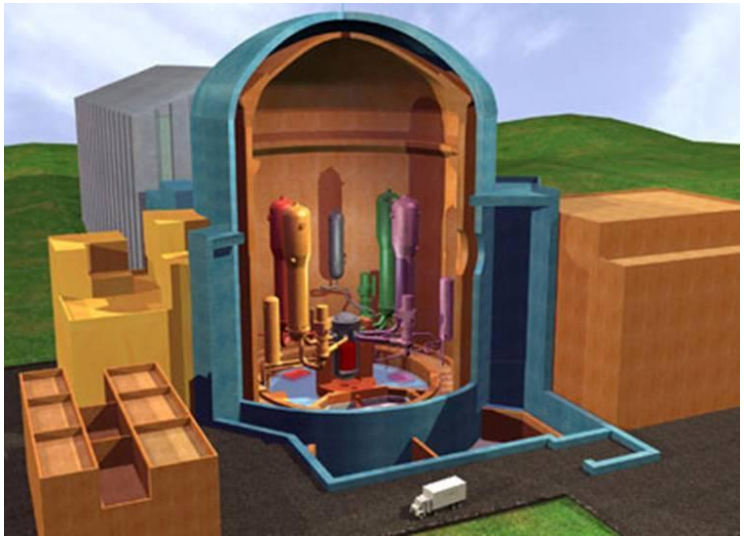
- PSA analyses and modeling
  - requirements,
  - main results and risk profiles - differences identified, causes studied
- Co-operation with other task groups
  - Insights from Level 2 reviews
  - Modeling of I&C
- Internal and External events
  - Layout and Fire protection
- Design difference between EPRs
  - causes for differences
  - risk significance and modeling

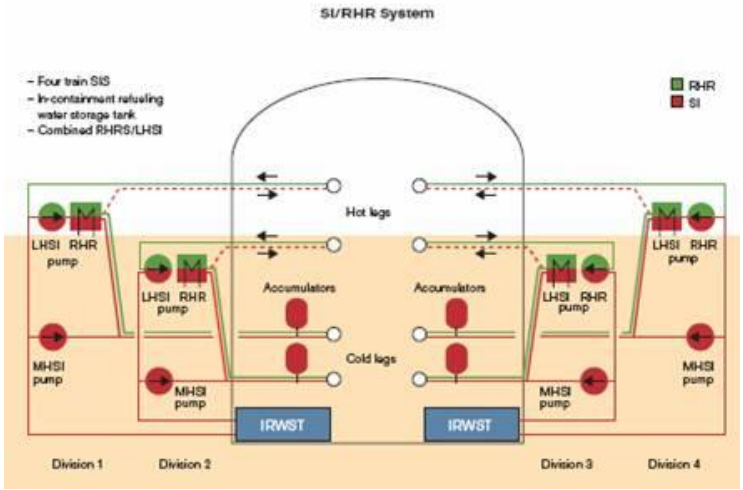
Source: Clipart

Source: Areva EPR Brochure March 2005

EPR Working Group - Accidents and Transients

- Containment issues
  - long-term mass and energy release to containment
  - two room concept and mixing
  - leak tightness of containment
- Methodologies for accident and transient analyses
- LOCA issues
  - sump design and tests,
  - debris and downstream effects
  - NPSH for emergency core cooling systems
- Criticality safety
  - management of boron dilution
  - criticality control during outages

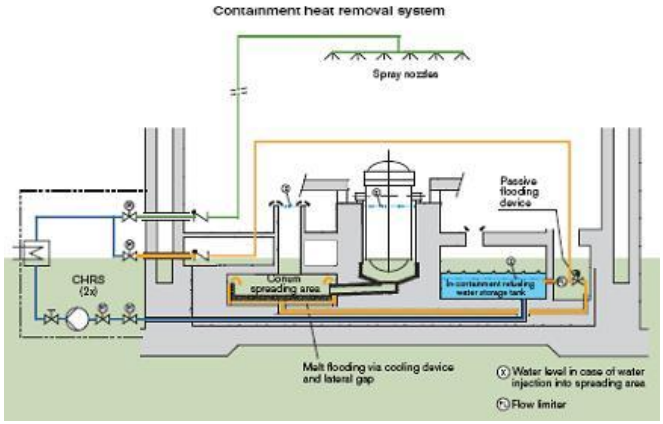


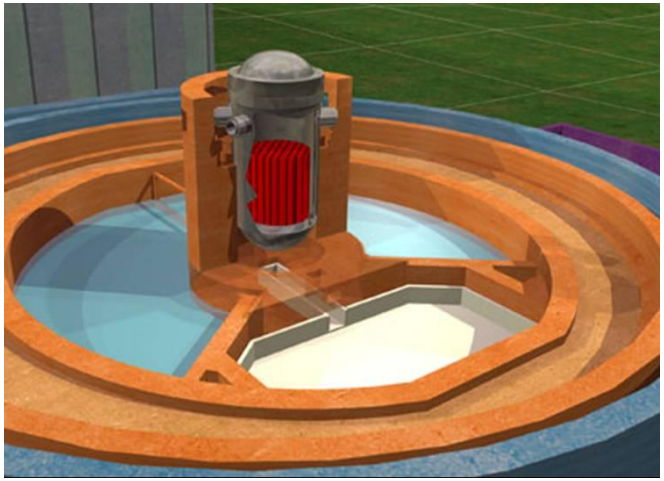


Source: Areva EPR Brochure March 2005

EPR Working Group - Severe Accidents

- Hydrogen management in two room concept
  - several analyses made by different codes and models (independent from vendor's codes and models) - good compatibility, good reliability
- Cooling of the molten core
  - design of the cooling system
  - structure of the spreading area
- Severe accident instrumentation
  - Scope and qualification
- Operating strategies for severe accidents





Source: Areva EPR Brochure March 2005

EPR Working Group - Specific topics

- Discussed
  - Safety classification and related QA requirements
  - Fire protection requirements, analyses and design issues
- Need to be discussed
  - Radiation Protection
  - Grouted tendons
  - Operational safety issues
  - Human factors engineering

EPR Working Group - Accomplishments

- Sharing results of the design reviews
  - have resulted in identification of common safety concerns
  - have made national safety assessments more robust
  - have made it possible to understand differences in e.g. accident analyses methodologies
  - have helped participants to anticipate future issues
- Discussions on the design differences have resulted in
  - understanding of the differences in safety requirements
  - identification of harmonisation areas
  - design changes
- Networking the experts on different technical disciplines
  - easy to contact - ask questions, share information