Outcome of the EU Nuclear Safety Stress Tests

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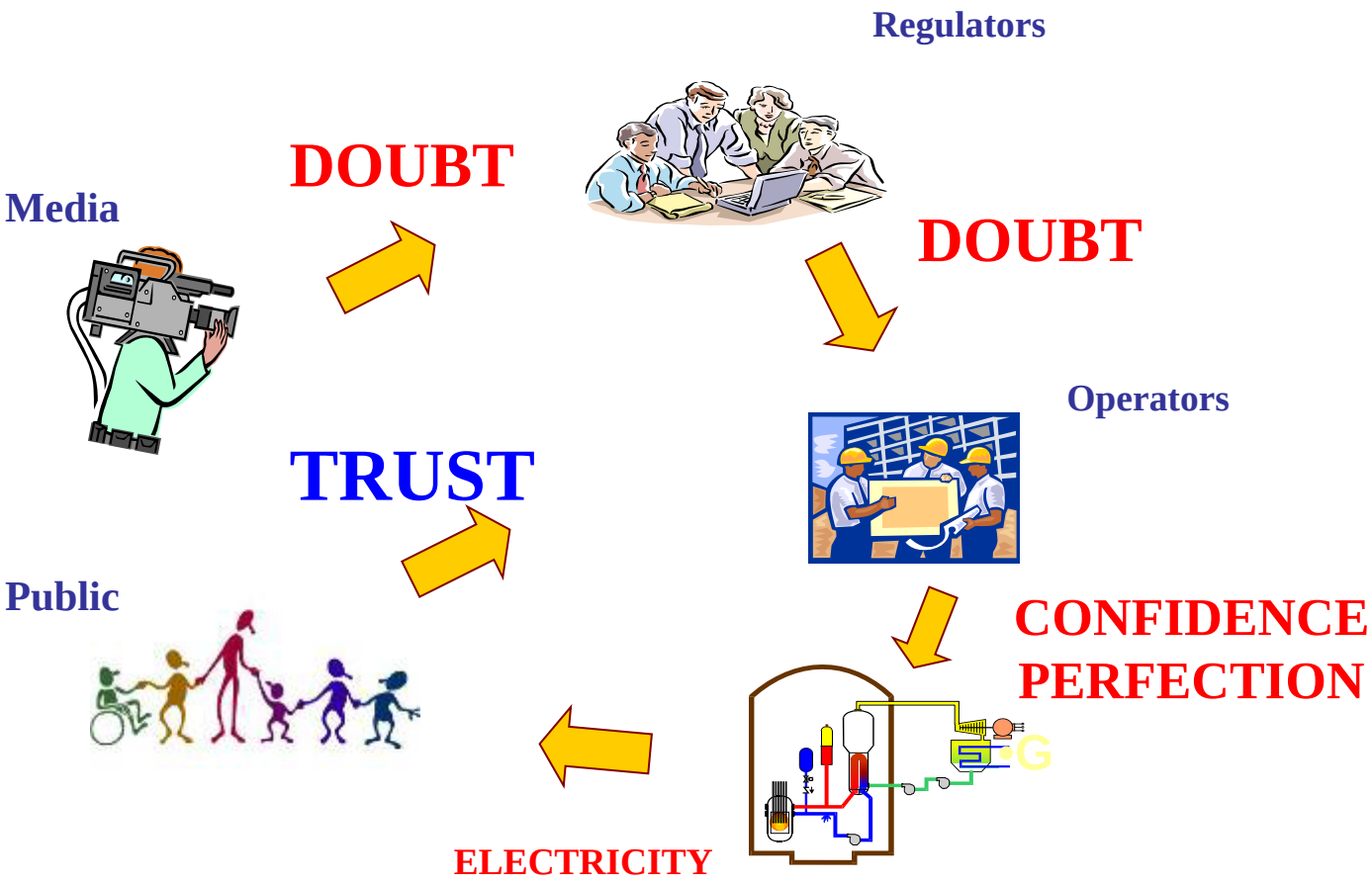
FUKUSHIMA:

- The feedback loop for assuring perfection has failed!
- Trust of the society was lost!



Stress Tests were about restoring confidence and looking for further improvements in nuclear safety

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Fukushima concerns

The main lessons learned from Fukushima were actually the main objectives of our Stress Tests:

- Did we properly take into account uncertainties of all potential external hazards?
- Are our plants robust enough, are safety margins big enough?
- Are we able to cope even with extremely low probability events?

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Main results of the Peer Review

General conclusion over Europe

- Significant steps taken in all countries to improve safety of plants
- Varying degrees of practical implementation

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Compliance with licenses

- Compliance with licensing bases is covered by regular safety assessments of operators and regulators
- National reports provided clear evidence of plants' compliance with current licensing basis
- Approaches vary with countries

Adequacy of the assessments

- Assessment of robustness
  - Topic 1**:** evaluation of margins and cliff edge effects generally **not consistent** with ENSREG specification
  - Topic 2 and 3: safety margins and cliff-edge effect determination was **generally in line** with ENSREG specifications

Measures to increase robustness of plants

- Examples of measures already decided or considered:
  - Additional mobile equipment
  - Hardened fixed equipment
  - Improved severe accident management with appropriate staff training
- Details available in country reports and main report

- Four general recommendations
- Additional national recommendations in national Peer Review Reports

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Recommendation 1: Assessment of natural hazards and margins

- WENRA, involving the best available expertise from Europe, should develop guidance
  - on natural hazards assessments, including earthquake, flooding and extreme weather conditions,
  - on the assessment of margins beyond the design basis and cliff-edge effects.

Periodic safety reviews

- Peer review demonstrated effectiveness of periodic safety reviews (PSR)
  - PSRs maintain and improve safety and robustness of plants
  - PSRs are specially relevant for protection of installations against external hazards

Recommendation 2: Periodic safety reviews

ENSREG should underline the importance of periodic safety review.

In particular, ENSREG should highlight the necessity to re-evaluate natural hazards and relevant plant provisions at least every 10 years.

Containment integrity

- Fukushima disaster highlighted once again the importance of the containment function
- Last barrier to protect people and the environment against radioactive releases
- Issue already considered as follow-up of previous accidents and possible improvements already identified

Recommendation 3: Containment integrity

Recognized measures to protect containment integrity should be urgently implemented

Consequences of accidents resulting from natural hazards

- Accidents resulting from natural hazards could result in:
  - Devastation and isolation of site
  - Event of long duration
  - Unavailability of numerous safety systems
  - Simultaneous accidents in several plants, including their spent fuel pools
  - Radioactive releases

Protective measures against accidents resulting from natural hazards

- Typical preventive measures:
  - Bunkered equipment including instrumentation and communication means
  - Mobile equipment protected against extreme natural hazards
  - Emergency response centers protected against extreme natural hazards and radioactive releases
  - Rescue teams and equipment rapidly available to support local operators

Recommendation 4:
Measures for prevention and mitigation of accidents resulting from natural hazards

Measures for prevention of accidents and limitation of their consequences in case of extreme natural hazards should be implemented

Follow-up

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- National regulators to develop national Action Plans by the end of 2012
- ENSREG Workshop to discuss national action plans in March 2013
- WENRA to develop guidance
- Improvements of Offsite emergency arrangements

Content on national Action Plans

- National regulator conclusions from their national stress tests
- Recommendations in the ENSREG main and country peer review reports
- Additional recommendations arising from the Convention on Nuclear Safety
- Additional activities derived from national reviews and related decisions

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WENRA Guidance

- To focus on developing actions in the following:
  - natural hazards
  - containment in severe accident
  - accident management
  - mutual assistance amongst regulatory bodies in responding to nuclear accidents in one of its Member States
- To a review PSR related Reference Levels, particularly with respect to external hazards.

Off-site emergency preparedness

- HERCA and WENRA to jointly develop improved guidance on mutual assistance between regulators
- European study should be performed to identify issues to be treated for improvement of emergency preparedness (beyond mutual assistance) at the European level.

Aircraft Crash

- Covered by Ad-hoc Group on Nuclear Security
- ENSREG to support eventual follow-up activities

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IAEA Action Plan

- ENSREG Action Plan will contribute to the IAEA action plan:
  - Assessments of new learning from Fukushima;
  - Emergency preparedness standards and guidance;
  - IAEA safety standards;
  - Communication and dissemination of information;
  - IAEA peer review process development and implementation
  - Research and development.

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Transparency

- All national Action Plans should be made public
- Results of the review Workshop in March 2013 should me made public

For the end:
Maintaining proper focus

- Stress Tests were about the
  - **design of plants** and
  - **mitigation of accidents**.

- Equally or more important is
  - **operational safety**.

The focus of operators and regulators must be properly balanced between these three cornerstones of nuclear safety!

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Japanese lesson

"What must be admitted – very painfully – is that this was a disaster "Made in Japan." Its fundamental causes are to be found in the ingrained conventions of Japanese culture:

- our **reflexive obedience**;
- our **reluctance to question authority**;
- our **devotion to 'sticking with the program'**;
- our **groupism**; and
- our **insularity**"

Kiyoshi Kurokawa, Chairman
Fukushima Nuclear Accident Independent Investigation Commission
June 2012

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- Each of us must keep looking for.
  - Weak *“ingrained conventions of our own cultures”*,
  - Weaknesses in our behavior or
  - Any other potential root cause of severe accidents
- Non-complacency and **continuous improvement** are prerequisites for the good **Safety Culture**