



Strål
säkerhets
myndigheten

Swedish Radiation Safety Authority

How can Nordic Countries Improve Cooperation on Nuclear Safety

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In Sweden

- Ågesta internal flooding and fuel damage
- Barsebäck event strainer clogging
- End date 2010 for nuclear power in Sweden
 - Reduced maintenance
- New regulations (SSMFS 2008:17) on separation
- Forsmark event
 - UPS and electrical system configuration



Events with large impact on safety and safety research

- ➔ **Brown Ferry**
 - Fire – separation of cables
- ➔ **TMI**
 - Reactor Safety Investigation – recommendations
 - Containment venting and severe accident management with filter installations
 - Knowledge of dynamic processes
 - PSA
- ➔ **Tjernobyl**
 - Knowledge about reactors in eastern Europe
 - Safety Culture
 - Nuclear Safety Convention

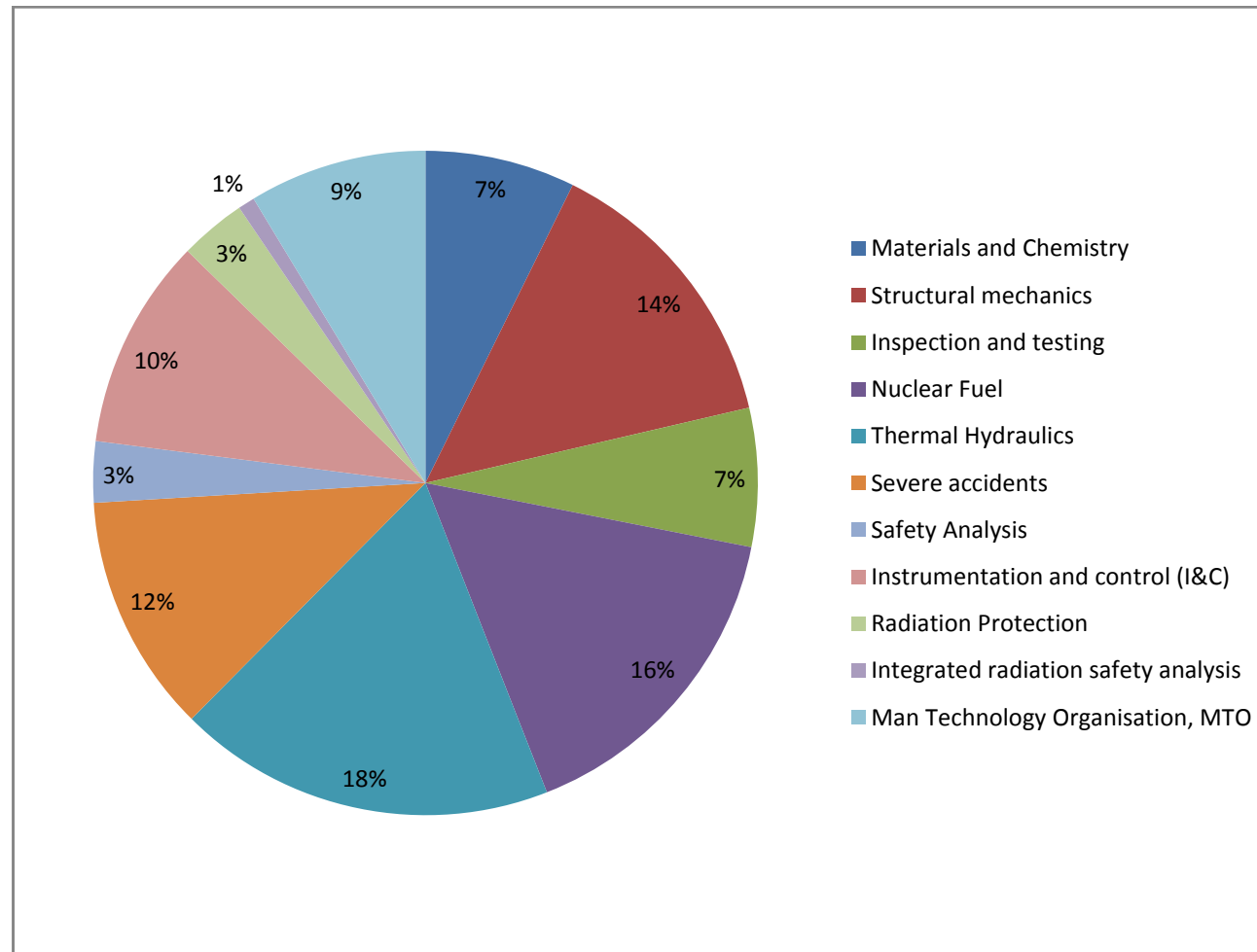


Development from an authority perspective

- To do the right things
- To do things right
- Important development:
 - Lessons learned from important events
 - Safety Culture issues
 - Systematic surveillance
 - Improvement transparency
 - Improved review methods
 - Improved analysis capacity
 - New regulations



Approximate allocation of budget between research areas





International projects OECD/NEA 1 (2)

- | | | |
|------------------|--|---------------------|
| – Halden project | Fuel and Materials, I&C, Human Factors | Norway |
| – CABRI | Fuel in RIA transients | France + Japan |
| – SCIP | Fuel integrity | Sweden |
| – PRISME | Fire Safety | France |
| – MCCI-2 | Severe Accident (Ex-Vessel) | USA |
| – ROSA | System TH | Japan |
| – PKL-2 | PWR SG heat transfer | Germany |
| – SETH-2 | Containment (CFD) | Switzerland, France |
| – THAI | Containment (H, I, Aerosols) | Germany |



International projects OECD/NEA 2 (2)

- | | | |
|--------------------|--|---------------|
| – BIP | Iodine chemistry | Canada |
| – SERENA-2 | Steam explosion | Korea, France |
| – SFP | Fuel storage safety | USA |
| – SCAP | SCC + Cable Ageing | Japan |
| – Databases | 1) Fire, 2) ICDE, 3) OPDE, 4) COMPSIS | |
| – SAFIR | | |



Forecast present fleet

- ➔ LTO
 - Ageing
 - Material, Components
- ➔ New equipment
 - Digital control systems
 - Verification, Validation
- ➔ Electrical systems design and analysis
- ➔ Analysis methods – PSA, Deterministic analysis
- ➔ Man – Technology – Organisation
- ➔ Research related to events



Fukushima 1 (2)

- Methods for evaluation of natural hazards
- Evaluation of hazards due to earthquakes, flooding and fire
- Reliability and robustness of electrical systems
 - Diversity
- Improvements of instrumentation during accident scenarios
- Improvements of mitigation systems
- Operators behaviour in stress situations



Fukushima 2 (2)

- ➔ Long accident scenarios
- ➔ Decisions and communication
- ➔ Defence in depths



How to improve Nordic research

➔ Constrains:

- Finnish and Swedish research.
- Availability of competent researchers.
- Common understanding of safety evaluation and need for certain research.
- Research capacity in the Nordic countries.
- Seminars on certain topics.