WNA CORDEL report – What can nuclear learn from aviation?

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World Nuclear Association

Why we did the comparison

- WNA CORDEL WG promotes reactor design standardization and harmonization of safety standards
- First investigation into aviation regulation in the context of the CORDEL Roadmap (published in January 2010)
- DCM (Design Change Management) Task Force deals with consistent design development across fleets of the same design after licensing
- Results of research about safety regulation in aviation reflected in DCM paper “Design change management in the regulation of nuclear fleets”, July 2012
- CORDEL WG decided to draft a dedicated paper on the comparison aviation-nuclear

How we did the comparison

- Scope of the report
  - Written by nuclear people for nuclear people
  - but based on expertise from WNA members active in both areas (e.g. Rolls Royce) and on advice from aviation experts
- Can aviation be a model for nuclear?
  - “NPPs can’t fly...” – it’s true...
  - ... but the common denominator is further development of safety in a highly regulated area within a strong international context
- Report to be published soon

Aviation report: contents

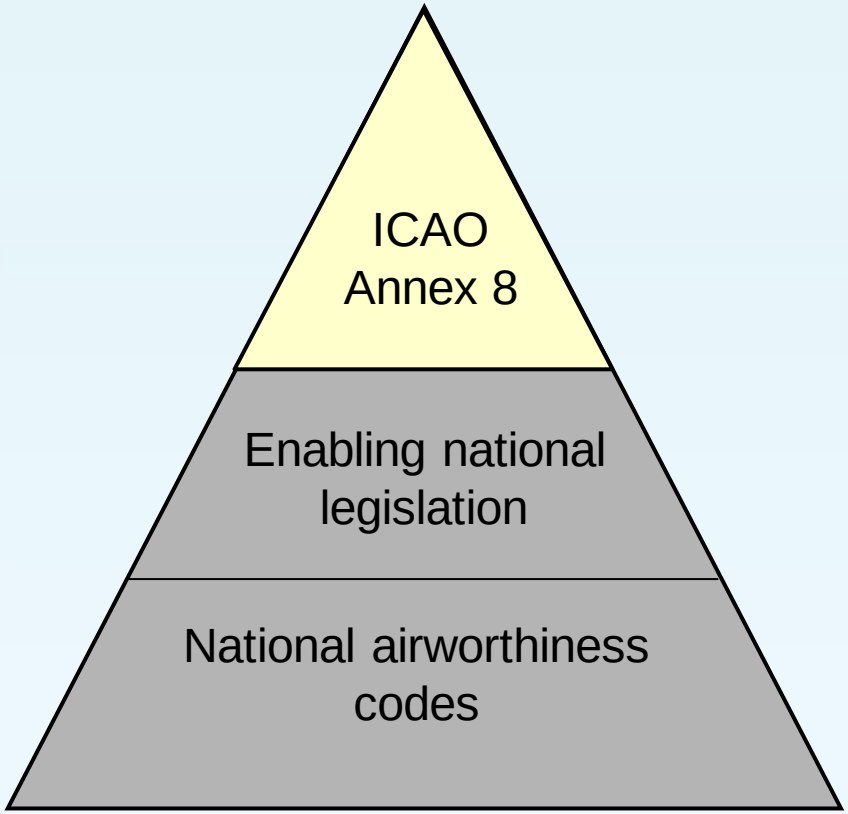
- Executive Summary
- I. Introduction
  - Scope of the report
  - Can aviation be a model for nuclear?
- II. The pillars of regulation in aviation
- III. The licensing of aircraft
- IV. Post-licensing aspects: continued airworthiness, design changes and repairs
  - Continued airworthiness
  - Design changes and repairs
- V. The special situation in Europe
- VI. Current initiatives and developments
- VII. Conclusion

The pillars of regulation (1)

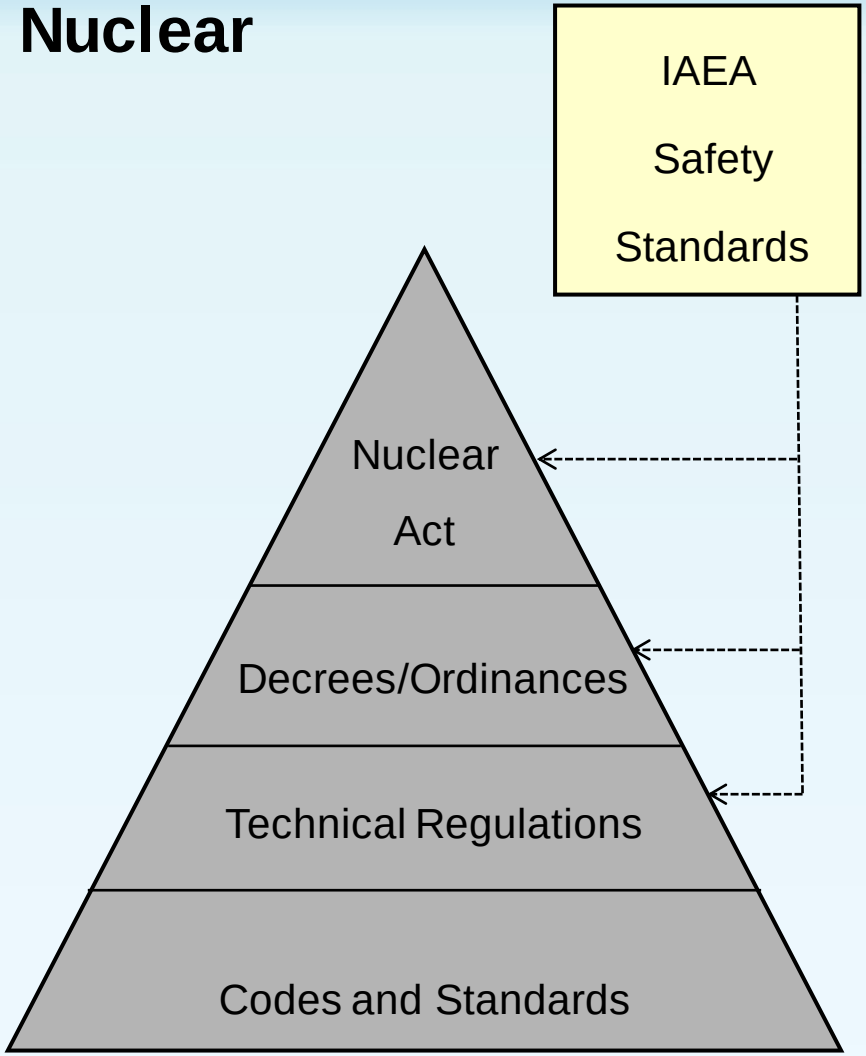
AVIATION	NUCLEAR
1944 Chicago Convention. The Convention created the International Civil Aviation Organization (ICAO). ICAO is empowered to adopt and amend standards.	No single convention with the broad scope of the Chicago convention. IAEA and some topical conventions. Convention on nuclear safety is an incentive convention. IAEA broadly similar to ICAO…
ICAO standards on aircraft design safety (Annex 8 to the Convention) are binding	… but IAEA standards are not binding
ICAO USOAP as mandatory auditing tool	IAEA peer reviews are voluntary

The pillars of regulation (2)

Aviation



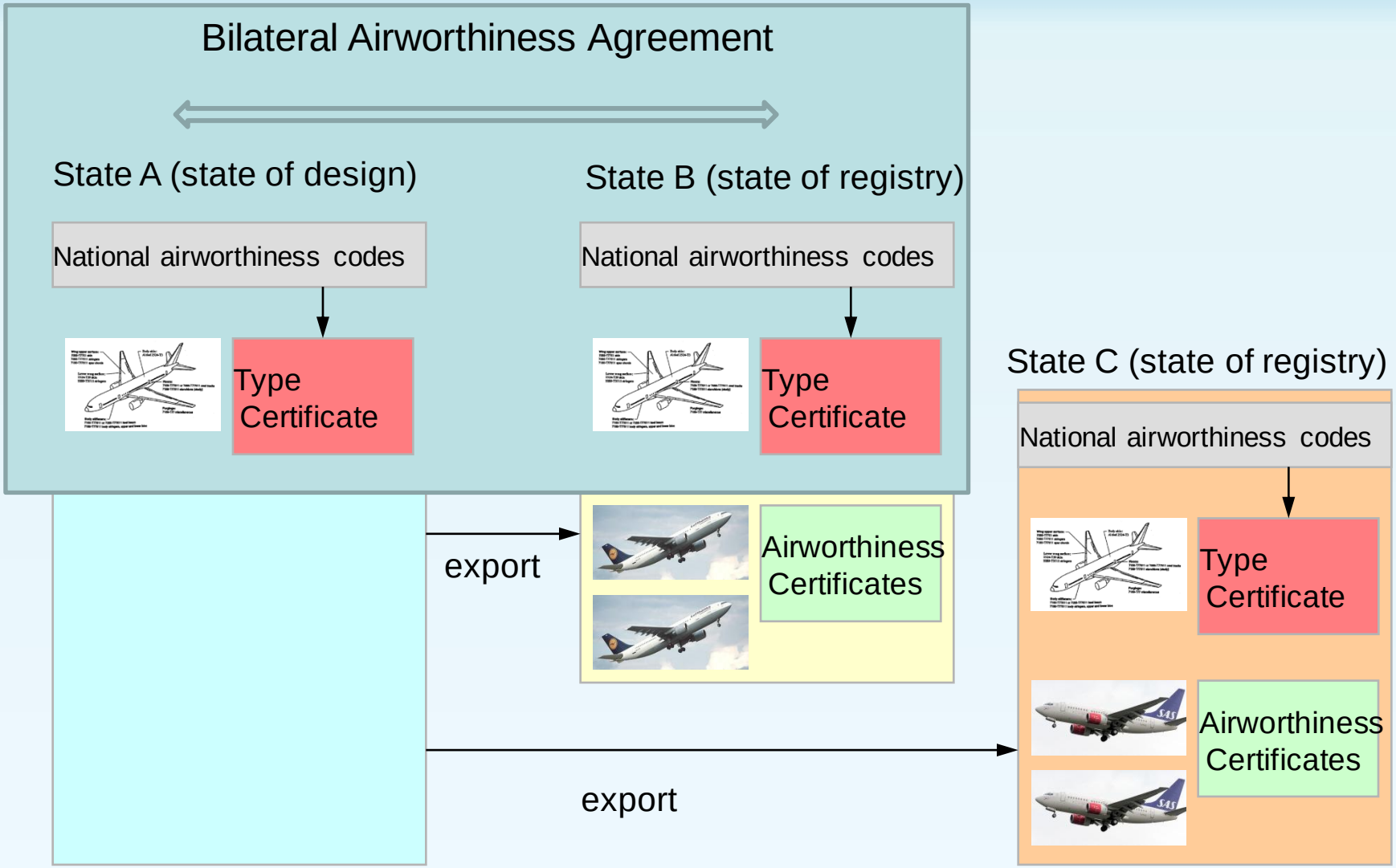
Nuclear



The licensing of aircraft

AVIATION	NUCLEAR
Internationally standardised form of licensing of designs: Type Certificates (Annex 8)	No common standard, varies from country to country. Some countries have a generic design approval, others don‘t
Type Certificate: State of design first	Reactor design licence: State where FOAK is built
Each country needs its own TC…	Each country has its own full licensing process
… BUT: Mutual acceptance of TCs through Bilateral Airworthiness Agreements	No parallel in nuclear. No cross-border validitiy of design approvals

International licensing



Continued airworthiness

AVIATION	NUCLEAR
Reporting system assigning clear responsibilities to all parties and centering on designer and State of design	Several reporting systems (on regulator and operator side) but not as systematic
Systematic way of dealing with design improvements: Airworthiness Directive	No systematic approach, each regulator draws his own consequences
Important role of designer: continuing design responsibility	Prime responsibility for safety rests with the operator (licensee)

Strong link to the report of Design Change Management Task Force!

Special situation in Europe

- Creation of EASA in 2002
- EASA cannot be taken as a benchmark for nuclear (too ambitious)...
- ... but the history is instructive: Joint Aviation Authorities (JAA) and Cyprus arrangements 1990
- Cyprus arrangements could be a blueprint for an agreement between nuclear regulators:
  - enhanced cooperation,
  - gradual alignment of standards and
  - acceptance of joint licencing procedures
  - while at the same time safeguarding the sovereignty of national regulators and ensuring their compliance with national legislation

Current initiatives and developments

AVIATION	NUCLEAR
Global Aviation Safety Roadmap and Global Aviation Safety Plan: reducing the accident risk in a context of growing air traffic	Post-Fukushima initiatives: enhancing the safety of NPPs but, as it seems, no reform of the international regulatory framework

In our view, the issue of strengthening nuclear safety requires bolder decisions which should go in the direction of stronger international cooperation of all stakeholders in a system of balanced and clearly attributed responsibilities and with some mandatory elements. **The regulatory system in aviation could be a useful benchmark.**

Benchmark for nuclear

- A system of licensing with a Type Certificate of the same scope issued in all countries
- Safety requirements based on common international minimum standards
- A system of mutual cooperation of regulators respecting the full sovereignty and competence of national regulators and allowing them to discharge their responsibilities
- A formal, internationally agreed system of safety upgrades to a fleet of like designs in all countries that operate that design
- An enhanced role of the designer/vendor in maintaining detailed design knowledge of the aircraft and in developing the design further, especially for safety significant aspects