EC Project ‘Modernisation & Optimisation of European Nuclear Supply Chain’

Oliver Martin

NEA Nuclear Supply Chain Management Workshop, November 5-6, 2018, Boulogne-Billancourt
Origin of Project

- Study accompanied Phase 2 of CEN Workshop 64 ¹)
- Idea for project came largely from Vattenfall (= contributor to CEN WS64 P2 and feasibility study), as European utilities face increasing challenges on their supply chain.
- Annex 6 of study contains first outline of project with background information on why it is needed.

Project aims at modernising European nuclear supply chain according SAHARA Principle without compromising nuclear safety (could even improve safety of European NPPs).

¹) project running from 06/2014 – 06/2018 with aim to provide recommendations on further evolution of AFCEN codes & required underlying research
Utilities are required to invest continuously in their plants to maintain & even increase nuclear safety level.

While doing so they face **increasing challenges on supply side:**

- **Challenge 1, Obsolescence issue:** OEM suppliers of SSC equipment currently installed in nuclear facilities do not exist anymore or have stopped producing specific SSC equipment according to original design (mandated by original equipment qualification).

- **Challenge 2, Difficulty to find new SSC equipment suppliers:** Potential new suppliers offer SSC equipment to nuclear vendors / utilities with an added risk-premium or chose not to sell to them at all.

- **Challenge 3, Existing suppliers lose interest to re-perform qualification processes.**
Consequences:

- Heavy qualification processes are postponed and therefore timely replacement of SSC equipment due to obsolescence issues is avoided, although better similar state-of-the-art SSC equipment is in principle available (but not similar enough for a like-for-like replacement based on the old qualification).

- Large efforts for procurement of new SSC equipment according to old legacy requirements in order to avoid equipment qualification uncertainties and risks.

- Thus mending of currently installed SSC equipment is preferred way forward in many countries with considerable efforts (cost + personnel).
Challenge 4, Formal strict quality assurance documentation requirements (methods & procedures predating ISO 9001) on SSC equipment (in particular for safety class 3 SSC or lower), because:

- “Spill-over effects” (more or less same level of quality assurance documentation for a SC3 SSC as for SC1 / SC2 SSC, because it is to be used in a nuclear facility);

- Uncertainty about level of quality assurance documentation needed, resulting in a tendency of doing too much, e.g. more than is actually needed;

- Conservatives in practice;

- Industrial protectionism;

- A prevailing attitude of nuclear exceptionalism;

- ...
Challenge 5, General difficulty to receive approval for using modern state-of-the-art technology for SSC equipment in nuclear facilities, because:

- National nuclear regulation does not allow it;
- Established nuclear design standard (normally used) does not cover the modern state-of-the-art technology;
- Conservatives in practice;
- ...

Key to overcome supply challenges is to clarify (and possibly re-define) link between nuclear safety requirements (WENRA, IAEA, etc.) and industry practice to manufacture, select & procure SSC equipment for nuclear facilities.
Project Objective 1

Project aims to make it possible to generally use standard non-nuclear industry equipment (manufactured according to ISO, EN, ...) in nuclear facilities (in particular, for SSC of SC3 and lower) without any additional nuclear specific regulations.

Support systems EPR

Standard non-nuclear industry equipment with (if required by usability factors) additional tests to meet environmental & seismic requirements should be preferred practice and fully sufficient.
Project Objective 2

Allow use of ANS SSC equipment in nuclear facilities (current & new build), i.e. allow general use of SSC equipment manufactured according to nuclear design codes & standards different to ones normally used in country in scope.
Replacement of Pressuriser Safe-Ends at Ringhals Unit 3 (Westinghouse PWR)
Successfully performed to highest standard by MHI using machine welding!

- Initially MHI proposed manual welding, because it had been successfully performed 21 times in Japan.
- However, Ringhals requirements and current Swedish nuclear industry praxis prefers machine welding.
- If MHI had been able to qualify their Japanese standard manual welding praxis, work would have been accomplished for significantly lower cost (based on the Japanese experience, on an ANS).
- Thus resulting Ringhals 3 Safe-Ends solution became a high risk & cost First-of-a-Kind (FoA-K) engineering design.

Safety Improvements, because of

- Avoidance of high risk & cost FoaK designs;
- Allow suppliers use standards & manufacturing methods they are most familiar with. This guarantees highest SSC equipment quality & functionality;
- Reduced possibility of common cause failures due to possibility to deploy commonly used SSC equipment with good & long-term experience from other industries and to use different designs for redundant systems more easily if approval process is simple enough.
- Makes timely correct replacement/maintenance of SSC equipment easier possible and thus allows repair and re-use of replaced SSC at another place more easily.
- Reduced number of unexpected shut downs as SSC equipment can be more easily replaced in time.
In addition for utilities

- Increases pool of potential suppliers;
- Reduces efforts for quality assurance documentation for SSC equipment;
- Cost reductions.

**Project scope:** Gen II – IV Reactors
Project Partners

- **European utilities** (problem owners): Vattenfall, Uniper, Fortum, TVO, Fennovoima, EDF-Energy, Tractebel-ENGIE, EDF, Iberdrola, CEZ, Paks 2, Nuclearelectrica, Energoatom (answers pending from Kozloduy NPP, Horizon (UK); requests to be sent to Krsko NPP, EPZ)

- **National atomic / nuclear fora**: Swedish Atomic Forum, Finnish Nuclear Forum, SwissNuclear

- **Nuclear industry associations**: FORATOM, WNA, WANO;
- **ETSON**;
- **CEA** (to cover Gen IV);
- **EC-ENER** (project driver + WENRA/ENSREG contact);
- **EC-JRC** (project driver + project secretariat).

Throughout project interaction with **EPRI**.

Reaching project goals most probably requires changes in licensing practices of SSC equipment in European countries, so interaction with regulators is needed & envisaged (how is under discussion).
Current status

- Kick-off meeting on June 13-14, 2018 in Brussels
- Agreed to issue report (1st project deliverable) summarising nuclear supply chain situation and assessing to what extent standard non-nuclear industry equipment and ANS for SSC equipment can be used in European countries.
- EC-JRC currently drafting this report based on info from presentations at kick-off meeting and answers from questionnaire sent to utilities and nuclear fora involved in project.
- Publication envisaged for 1st half of 2019.
- Afterwards agreement on next steps (e.g. technical studies, methodology and/or roadmap development)
Supply Chain Situation in Participating Countries – Quick Summary

Received answers from questionnaire confirms that

- Utilities of nearly all participating countries are affected by SSC equipment obsolescence, in particular for I&C.
- Finding new potential suppliers is difficult in European countries as they do not understand nuclear requirements or perceive them as too challenging and/or see nuclear market as too small.
- Mending of currently installed SSC equipment is preferred path forward.
- In some countries (e.g. Belgium) supply chain situation is becoming increasingly challenging, but practice / regulation provides more flexibility to respond to challenges.
- Only France (EDF) not affected: Sufficient number of suppliers to supply SSC equipment to desired quality (advantage of large fleet?).
Thanks

Any questions?

You can find me oliver.martin@ec.europa.eu