Status of I&C equipment Qualification in Finland

Experience and results of Finnish national KELPO project and further steps

Energiforsk ENSRIC COTS2 seminar

Fortum / Hannu Malmberg 19.5.2022

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Agenda

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KELPO project in general

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Background for KELPO project

- A cooperation project of TVO, Fortum and Fennovoima.
- STUK has participated as an observer and coaching commentator. STUK uses the results as an input in its regulatory development work.
- International co-operation and discussions with license holders in other countries .Aiming to learning from each other, sharing experiences and practices and harmonizing.
- The licensing and qualification processes are considered heavy which leads to difficulties in modernization of ageing systems and components.
- Existing plants require modernizations, but the original equipment is no longer available.
- The nuclear supplier network is thin and equipment supplier’s interest is to participate in nuclear projects is decreasing.
- Quality development in other fields of industry is not utilized in the nuclear field – the need for nuclear specific requirements has decreased in the past decades.

KELPO in a nutshell

Why?

- Ensuring nuclear safety and competitiveness in changing operational environment.
- Enable timely modernization and new build projects.
- Ensure availability of equipment - keep the established suppliers and attract new ones.

How?

- By enhancing nuclear license holders' co-operation in safety classified equipment and component qualification (approval process).
- Harmonizing nuclear industry way of working by clear and harmonized practices between the license holders – minimise overlapping work.
- By implementing Graded Approach.

What in practise ?

- From tailor made solutions towards utilization of high-quality serially produced industrial standard products in nuclear power plants.
- Approval of safety classified components according to joint procedures and requirement specifications, made on a co-owned Digital platform and at once for all license holders.
- Streamline license holder's, suppliers' and the authorities' work.

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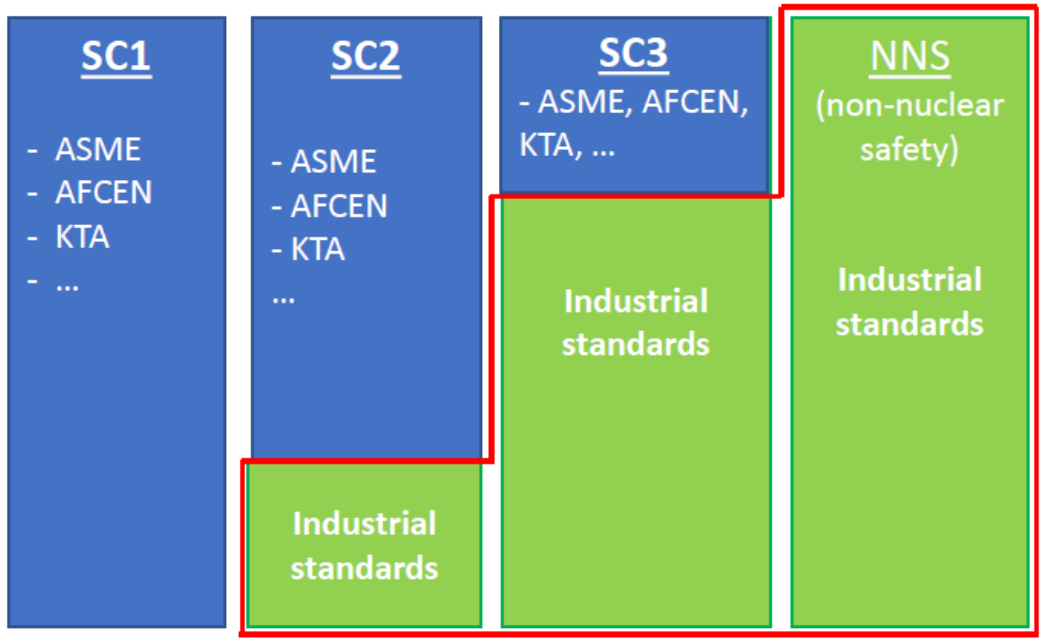
KELPO co-operation scope



- Equipment safety classification scope of KELPO includes SC3 and part of SC2 equipment
- Lower safety classes and non-nuclear safety equipment cover large proportion of equipment in a nuclear power plant.

SC = Safety Class

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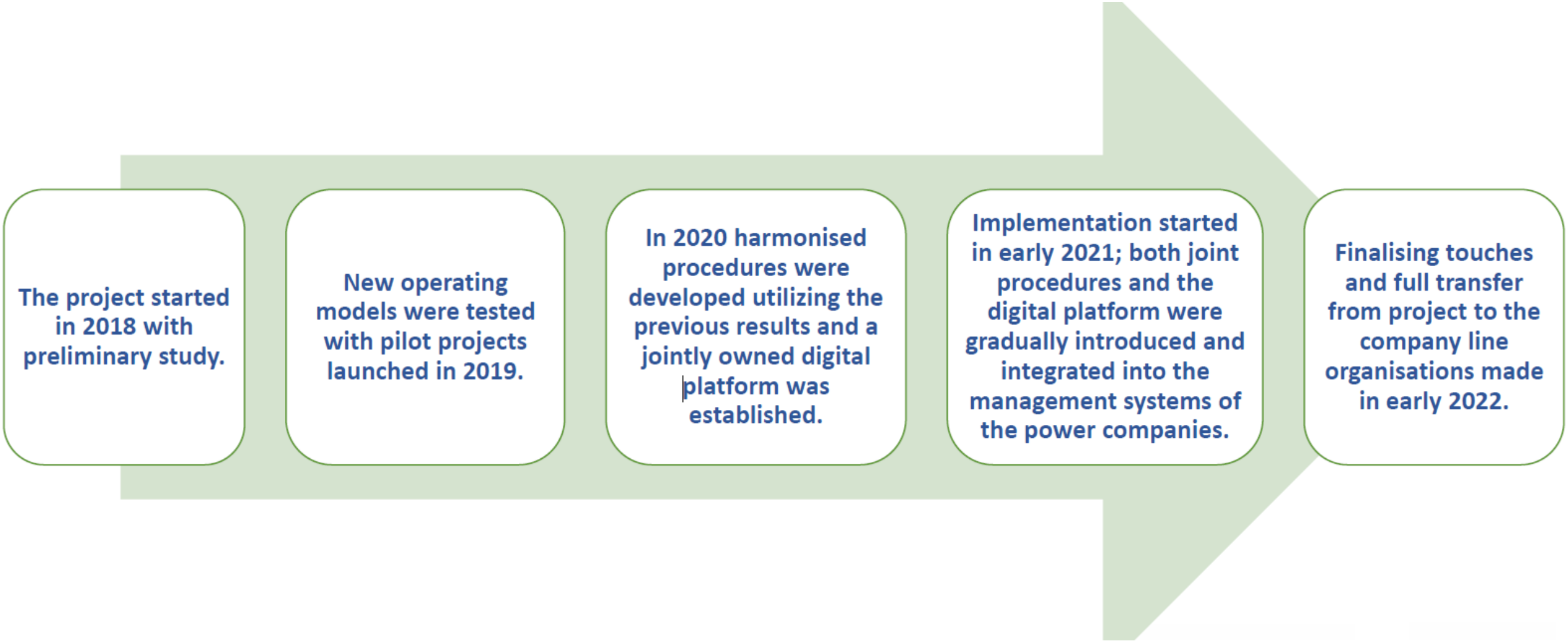
KELPO project steps and progress



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KELPO experiences

- Synenergies achieved by doing together in a harmonized way has improved quality and effectiveness. Co-operation has enchaed knowledge and promoted learning.
- Interaction between the licensee holders and nuclear safety authorities is important.
- New approeach – a cultural change – early improvement of experts and communication is crucial.
- Pilot projects as a practical development approach is a success factor,
- Positive feedback received.

KELPO – I&C pilot

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KELPO - I&C Pilot case

- KELPO I&C pilot project work was done during 2019-2020 and pilot project was coordinated by Fortum. All Finnish nuclear power companies participated in actual work.
- A normal industrial pressure transmitter (Rosemount 3051S pressure transmitter), which was originally used for NS purposes, was selected as an KELPO I&C pilot case.
- Following principles were followed in the project:
  - Essential requirements from Fortum and TVO (current licensee holder companies in Finland), were gathered for requirement specification of the pressure transmitter
  - Pressure transmitter was qualified for SIL class 3 (according to IEC61508) and SIL safety manual (so called black box qualification) was used for equipment qualification,
  - In addition to qualification work an exception to YVL-guides was applied from STUK for document handling (which are originally required in YVL guides).
  - During the work it was also created a common processes for equipment qualification.
- Qualification documentation was sent for authority for approval (approval was received on 11/2020).

KELPO – I&C - Lessons learned

- In the beginning of the project, it was discussed a lot of common document templates, which all power companies should be using. During pilot project it was found out that a real place to reduce amount of work (and cost) is to utilize qualification work itself (including qualification evidence). This means in practice:
  - When power company identifies a need for a new type of equipment, already done equipment qualification should be utilized as much as possible,
  - If there will be decided to start qualification for new equipment, cost for work shall be divided and results of qualification shall be shared between power companies -> this requires pre-discussion and common need in the very beginning.
  - Pre-condition for common equipment qualification is that information of previous qualification works and equipment in use, shall be commonly available.
- Preparation and use of common documentation can be utilized, but only in limited cases. Restriction are coming from power companies' / licensee holder's own quality systems and because companies very rarely have same qualification need at the same time.
- Most effective and simple way for co-operation with power companies is to share regularly information about coming and already done equipment qualification. When suitable cases for co-operation are found out, further steps shall be decided always case by case (lessons from Finland).

Further steps in COTS qualification in Finland

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Further steps

In Finland following further steps in COTS equipment qualification can be identified:

- Creating a standard qualification process for I&C (and also other technical area) equipment. This process shall fulfill/contain following features:
  - Process is higher level description, which steps/activity power company /customer shall take
  - Detailed description of qualification work done by technical expert is not necessary (these will be very likely ordered from third party inspection company) -> Description shall concentrate on methods (especially in the case of software assessment),
  - Process is reasonable to be created by all stake holders within nuclear business,
  - Qualification process shall enable the use of several different methodologies (e.g. Black and white box qualification, assessment, testing etc.) and it shall be applicable for different technical areas
- IEC61508 SIL-certified equipment are allowed to be used quite extensively according to the Finnish YVL E.7-guide. Following issues need further clarification and investigation to enable wider use of these equipment:
  - Use of SIL-equipment is based on calculation of reliability of functional loop, and this require data for all components in the loop. In old nuclear power plant he data for old field equipment and actuator may lead to conservative estimation -> There is need to find suitable way and level to define needed data;
  - Processes used for SIL equipment are created and suitable for normal industry where authority role and handling is very different and in smaller role compared to nuclear industry. There is a need to adapt sufficient ”Nuclear SIL –process” which is needed to Pilot is suitable case.

Thank you!
Any questions?

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