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SURVEYS OF DEVELOPMENT NEEDS FOR LICENSING MODEL OF NUCLEAR INSTALLATIONS IN FINLAND MAIN FINDINGS AND RECOMMENDATIONS

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ABSTRACT

Licensing and regulation of nuclear installations have become very complicated and difficult processes to manage. Within EU many stakeholders have proposed clarification and harmonisation of the licensing process. In 2017 and 2018 two surveys, funded by the Radiation and Nuclear Safety Authority of Finland (STUK) were carried out to find out international and especially EU-level plans and projects related to licensing and harmonisation. Surveys were based on interviews within major Finnish stakeholders operating in the nuclear industry. This paper outlines the aim, scope, main conclusions and needs for further development.

In the first survey, the major emphasis was to evaluate the Finnish stakeholders' opinions and needs about the supply process and national licensing issues using interviews. In the second survey detailed feedback from the main actors of technology industry in Finland was collected. The focus was to compare regulatory practices in various safety critical technology areas for mapping development needs and problem areas in licensing and regulation.

Themes and questions were dealt with the licensing model and related processes in general, and specifically with main challenges and development needs in managing of licensing and supply process. The focus was on leadership and communication, management and configuration of the supply chain, knowledge of design and manufacturing as well as management of resources, and management of qualification process and conformity assessment.

As an outline summary of the surveys, the views of present status, major challenges and focus of further development areas were identified. In this paper more details of the surveys and their results and recommendations for further development work are presented.

BACKGROUND

To facilitate the competitiveness of nuclear power, EC has proposed enhanced collaboration between member states' regulatory bodies in harmonisation of licensing process and in increased use of common standards, especially concerning long term operation of NPPs (PINC COM report (2017)). In construction and modernisation of NPPs there is a need to ensure control of any new methodology and technology to satisfy safety requirements. In this process, the attention should be focused on the items important to nuclear safety.

Essential tools in developing the safety assessment approach are graded approach (IAEA-TECDOC-1740 (2014), risk-based methodologies (eg. EN 16991 (2018) and API 581 (2016)) and risk-

informed thinking or decision-making ((Reg.Guide 1.174 rev. 3: (2018)). Also, a new ISO quality management standard ((ISO 19443 (2018)) concerning supply chain of the nuclear energy sector pro-motes risk-based thinking.

IAEA document NP-T-3.21 (2016) provides guidelines for procurement engineering and supply chain including risk management. Procurement related activities have a key impact on nuclear safety. Graded approach allows utilities to focus efforts on critical equipment and ensure that supply chain processes do not adversely affect safe operation of a nuclear facility.

Licensing of nuclear installations has become very complicated and difficult process to manage. Within EU many stakeholders have proposed clarification and harmonisation of the licensing process.

Two surveys organised and funded by the Radiation and Nuclear Safety Authority of Finland (STUK) in the years 2017 and 2018 focused on the development needs for licensing model of nuclear installation in Finland. The main goal for the surveys was to increase the overall safety of nuclear installations through improving licensing process and procedures as an essential part of the STUK strategy for years 2018-2022.

In autumn 2017 a survey was carried out to find out international and especially EU-level plans and projects related to licensing clarification and harmonisation. Major emphasis, however, was to evaluate the Finnish stakeholders' opinions and needs about the national licensing issues (Rintamaa R. and Törrönen K. Luvike1 Project Report (2017)). The second survey organised in 2018 gave special information from the Finnish technology companies (Rintamaa R., Rintamaa K. and Törrönen K. Luvike2 Project Report (2018), Survey of the development of regulatory control – Interview of Finnish technology companies.

EVALUATION OF STAKEHOLDERS' NEEDS AND CHALLENGES

The major part of the first survey in 2017 was interviews of stakeholders' representatives. Top level persons were interviewed representing 14 different organisations including all major utilities and waste handling organisations, industrial associations, ministries and safety authorities as well as some independent experts. After each interview, a summary was prepared for approval of the interviewee.

Content of the interviews included five different areas: a) Stakeholders' views of the current status of licensing model and related processes, b) Main challenges/problem areas in licensing, c) Main development areas and proposals for licensing development, d) Proposals for development process models and funding and e) Other important issues. In addition, each area consisted of many specific topics.

Summary and the development areas for the proposed future work with high priority

In general, the current national licensing model was found good, however four main development areas were identified:

- Updating the current licensing architecture and hierarchy focusing on the identification of needs for the changes and their effects to the safety requirements and operational processes of licensing approach as well as operational processes of the supply chain.
- Application of Graded Approach in evaluation of safety issues, especially in fulfilling the safety requirements and in utilisation of fit for purpose -concept as well as in quality system development, e.g conformity assessment of safety class 3 systems, structures and components.
- Identification and evaluation of possible hierarchy levels and licensing areas, which could be harmonised at EU-level.
- Development of licensing model and procedures for Small Modular Reactors (SMR).

Concerning the present licensing architecture and hierarchy during the life cycle model three main areas were identified with high priority (Fig. 1):

- Clarification of interfaces between different licensing phases
- Specific challenges for radioactive waste materials handling during the plant operation and in the intermediate storage.
- How to develop conformity assessment of systems, structures and components during the whole life cycle?

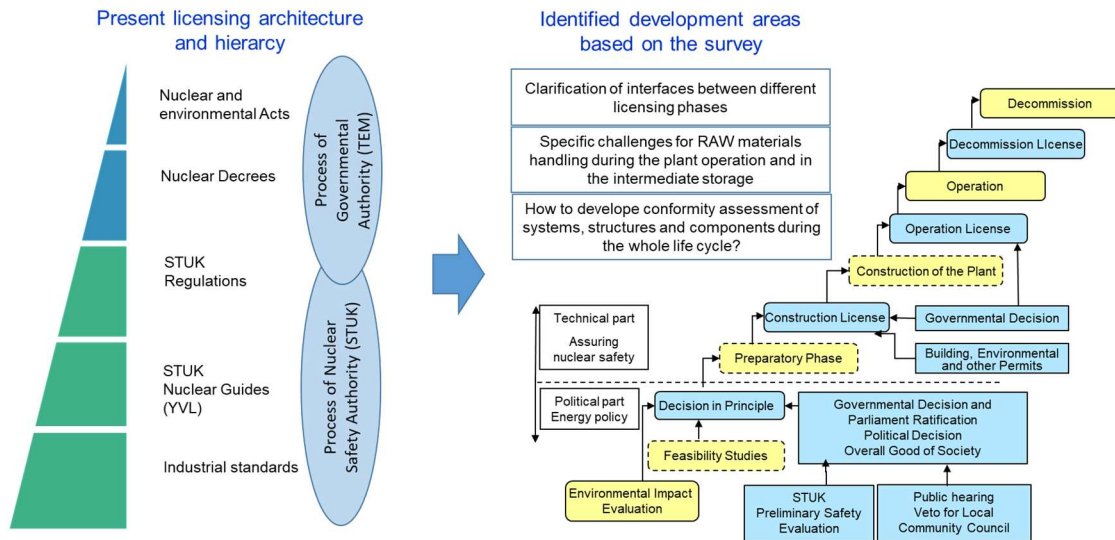


Fig. 1. Licensing architecture and hierarchy during the whole life cycle of a nuclear power plant.

EVALUATION OF TECHNOLOGY COMPANIES' NEEDS AND CHALLENGES IN THE SUPPLY CHAIN

The main focus of the second survey realised in 2018 was to gather detailed feedback from the main actors of technology industry and to compare regulatory practices in various safety critical technology areas for identifying development needs and problem areas in licensing. In the survey twelve technology companies were selected to represent wide product and service portfolio.

Companies were grouped in two categories: Companies representing designing and manufacturing of systems, structures and components; Companies representing designing, consulting and other services of systems, structures and components.

Content of the interviews included five different areas: a) Company's product and service activities and its role in supply chain, b) Functionality of nuclear regulation and procedures, c) Main challenges in utilisation of regulation and procedures, d) Main improvement targets and expectations for different actors, e) Proposals how to organise further development of regulation and procedures

Role of the companies in the supply chain is presented in Fig. 2. The role of companies in the supply chain varied very much depending on the equipment or product to be supplied to a client. They were: Main supplier, Sub-supplier, Member of the consortium or alliance to the NPP Licensee (i.e power company)

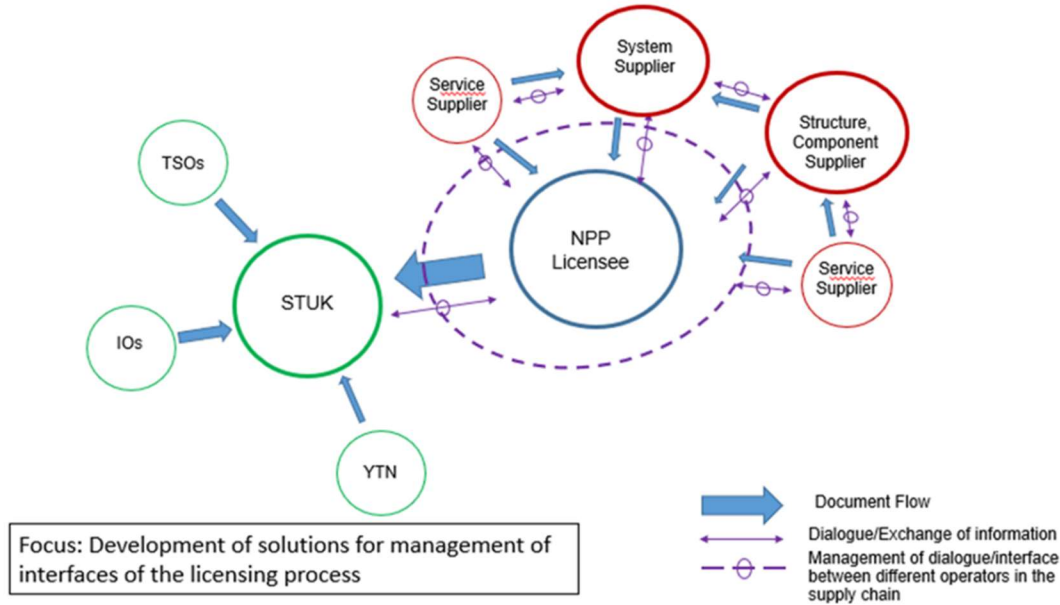


Fig 2. Role of companies in the supply chain.

Summary of the main challenges and needs for the proposed future work

Main results from the survey on technology companies have been divided into four different subtopics: Functionality of nuclear regulation and procedures, Utilisation of regulation and procedures overall, Improvement targets in regulation and procedures, Improvement targets in supply chain and co-operation

Regarding challenges and needs related to Functionality of nuclear regulation and procedures:

- Thorough knowledge of nuclear regulation and requirements is a prerequisite for functionality of procedures. Especially proper and consistent communication of requirement specification along the supply chain is a big challenge.
- Requirements posed to the supply chain should be harmonised and should be more system specific.
- Part of suppliers considers YVL-guides explicit and precise enough and little need to change them, and Graded Approach-concept should be more applied.
- Technical requirements are manageable, but problems arise in documentation and schedules, In addition a) There are no big differences in the technical requirements of nuclear area and other safety-critical industry, b) The biggest challenge is the unpredictability of supervision and inspection timing, which may introduce large delays in production

Regarding challenges and needs related to Utilisation of regulation and procedures overall:

- Management of the supply process and documents varies from supplier to supplier, and no shared management platform is in use.
- Specific requirements in nuclear sector have introduced significant differences in design, production and supply processes as well as in final products and their documentation compared to non-nuclear sector.

Main improvement targets in regulation and procedures:

- Harmonised safety regulation in EU and especially in Nordic countries is a well-grounded target. Harmonisation will benefit all stakeholders, it will facilitate and streamline operations, widen area of operation and decrease cost level.
- Clarification of requirements, reduction of interpretation error, improved guidance to fulfilling requirements and increased utilisation of standard products are needed: a) More distinct difference in practical supervision of components and structures between safety class 2 and 3. b) More Graded Approach -concept should be applied in supervision and inspection.

Main improvement targets in supply chain and co-operation

- Suppliers should have larger and more active role in planning and execution of the entire project: a) Continuous and effective co-operation from the very beginning of the project, clear guidelines and following them is essential, b) Turnkey supply with fixed delivery time and cost should not be used in nuclear projects.
- Consortium or alliance model at general level and mutual projects between interested suppliers in specific areas were foreseen as development targets: a) A new operation model is needed. b) Regulator should take part in developing this new model.

SUMMARY OF THE SURVAY – TECHNOLOGY COMPANY

Main results of the survey in 2018 for technology companies could be summarised as follows:

- Interviewed company representatives expressed their strong support to this survey as means to introduce their concerns and needs for developing regulation.
- Technical requirements in nuclear area can be managed and no significant differences exist compared to other safety critical industry areas.
- Technical requirements and safety classification of separate structures and components should be harmonised at EU-level.
- Major problems arise in document requirements, schedules and communication within supply chain: a) Biggest challenge is poor predictability of inspection and supervision activities; this may introduce long delays in production, b) Too extended requirements of documentation raise costs to a level, which hampers or even prevents commercial activities, c) License holder's role and responsibility in practical licensing process is emphasized

- Without major development of regulation and procedures there is a risk, some technology companies will pull out from nuclear area in Finland.

How to proceed – Outline proposal for next steps

Outline proposal has been presented in Fig 3. It covers mainly for different topics for development which are as follows:

- Digital conformity assessment and document handling system to all three operators Regulator, Licensee and Supplier
- In the interface between Regulator and Licensee - Application of Graded Approach –concept in safety requirements
- In the interface between Regulator and Supplier - Regulator’s supervision and inspection process
- In the interface between Licensee and Supplier – a) Requirement specification, supervision and inspection plans often incoherent, b) Poor predictability of supervision and inspection timing, c) Conformity assessment process inefficient, d) Amount of work related to documentation versus complete supply too extensive.

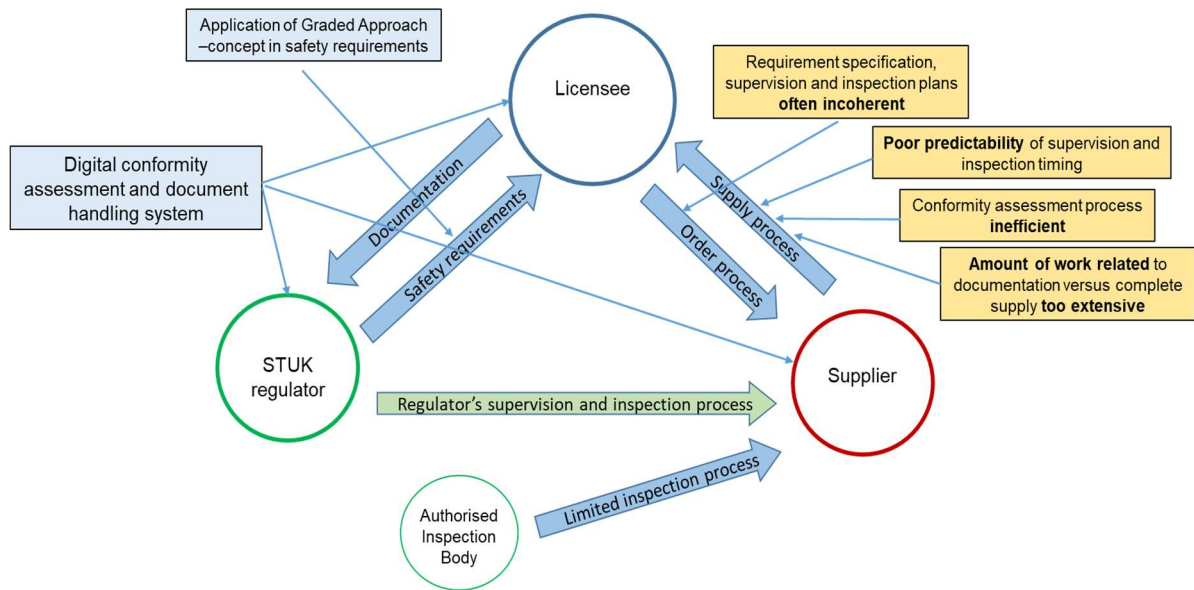


Fig. 3. Outline proposal for the next steps – Challenges and focus of further development topics in the order/supply process.

CONCLUSIONS

As an outline summary of the surveys, the following views of present status, major challenges and focus of development areas were identified:

- Need to update the current licensing architecture and hierarchy was generally proposed. Different phases of the licensing process should be more clearly defined. License holder’s role and responsibility in practical licensing process was emphasized.

- Technical requirements in nuclear area can be managed and no significant differences exist compared to other safety critical industry areas. However, major problems arise in document requirements, schedules and communication within nuclear supply chain.
- Biggest challenge in the nuclear supply process is too extended requirements of documentation and poor predictability of inspection and supervision activities; this may introduce long delays in production and raise costs in the supply chain.
- Technical requirements and safety classification of structures and components should be harmonised at EU-level. In this context, application of Graded Approach –concept is strongly proposed. Harmonisation will be crucial in the development of licensing process for getting new NPPs and especially SMRs competitive.

The following development activities have been started in Finland:

- License holders have initiated a joint project to develop a model how standard and serially manufactured components could be utilized in safety classes 2 and 3, and especially for components in SMRs. This project includes also the development of a common procurement process and related IT platform.
- Ministry responsible for nuclear energy has started to update the current nuclear legislation and Nuclear Safety Authority (STUK) launched the reform of nuclear safety regulations and guidelines to tackle most of the above identified development needs.

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