The following is a response to the request for statement from the Nuclear Energy Committee on how Dassault Systèmes can contribute to building and operating nuclear power plants in Norway.

Foreword

Dassault Systèmes is a global software company with a large footprint in the Nordics, which supports the delivery of complex projects through our 3DEXPERIENCE platform. The 3DEXPERIENCE platform is a collaborative environment that empowers businesses to innovate in entirely new ways, by modelling and simulating in a virtual world before physical development. Our platform provides organisations with a holistic, real-time view of their business activity and ecosystem, connecting people, ideas, data and solutions together in a single virtual environment.

Nuclear infrastructure projects are among the most complex in the world, involving high capital investment, significant risks, strict safety standards, and zero tolerance for error. We recognize several key challenges in delivering new nuclear projects - such as cost overruns, delays, workforce and environmental impacts, and the need for innovation - which are also common across other industries we serve. With 40 years of pioneering 3D modelling, Simulation, Product Life-cycle Management and Digital Twin capability in the manufacturing sectors (aerospace, automotive), we are now applying that same proven approach to the energy and infrastructure sectors, including nuclear and we believe we can provide a unique insight to help guide both future policy and regulation in this area, but also to support a faster deployment of nuclear power plants in Norway.

The challenge ahead

There are many barriers to overcome to develop new nuclear projects, including project financing, design, research, recruitment and project management. As a trusted partner in digital transformation, Dassault Systèmes focuses on the challenges relating to design, testing, project management and construction.

Using modern digital technologies such as the 3DEXPERIENCE platform can reduce the total cost and timeline of nuclear projects in turn increasing investor confidence and supporting new technologies to get to market. The Norwegian government should therefore look to ensure that all nuclear projects use digital twinning, in turn ensuring that new nuclear projects are well-planned, able to deliver on time and keep costs down.

The benefits to nuclear projects of digital twinning and data management are best understood through the three key challenges they solve. These can be summarised as:

1. Providing traceability and demonstrating adherence to nuclear regulation and standards throughout the entire lifecycle. The design, construction, operation and decommissioning of nuclear builds is rightly underpinned by robust health and safety and environmental standards, but the process of meeting and validating processes against these standards can be made much less onerous through better data management.

2. Deploying knowledge and coordinating learnings from complex engineering methods. Nuclear technology is constantly advancing, new methods and learnings need to be shared and supported (across workforces, and across organisations) through a properly integrated data system, sometimes referred to as a ‘digital thread’.

3. Managing large infrastructure projects more efficiently by connecting the supply chain. Nuclear builds should be seen as fundamentally similar to other significant infrastructure projects – and if managed poorly they can be costly, with long lead times. The creation of 3D models (or digital twins) represents an extremely effective way of visualising the challenges associated with these kinds of projects and avoiding duplication and mistakes.

There has been some early recognition of the potential benefits of digitisation by nuclear operators, who want to move faster and learn the lessons from previous projects. However, there is a much larger potential for regulators and governments to encourage the use of technology and data management to accelerate the deployment of nuclear projects, as we move into an era of new nuclear technologies.

USE CASE: Managing large nuclear infrastructure projects through digital transformation

Delivering digital twins of nuclear power plants, as part of a 20-year global partnership with the leading European energy firm with expertise in nuclear power, EDF

What? A strategic partnership was set up in 2018 between Dassault Systèmes and EDF in order to support EDF in the digitalization of its plant engineering projects with the view to strengthen plant performance and overall competitiveness of nuclear power; which represents a major step in accelerating the digital transformation of the nuclear industry as a whole. The 3DEXPERIENCE platform is being used across the design, construction, maintenance, and decommissioning of various power stations globally.

How? The 3DEXPERIENCE platform is designed to standardize, harmonize and modernize processes and engineering methods. Therefore, this interactive and evolutive tool will be used by nuclear businesses to access real-time project data. It will also be used to design the digital twins of nuclear plants whether they are at the design, construction or operational phase.

Why? The delivery of a digital representation of the plant provides users with a comprehensive visualization and associated data throughout all stages of the plant's lifecycle. This digital model can be adapted and reused to monitor changes, identify issues, and manage the plant setup more effectively. It also enables remote management of testing and health and safety procedures, ensuring full traceability and a complete operational history. By creating a common data and project environment, all stakeholders gain oversight across the entire project lifecycle. This facilitates early identification of design or management challenges, supports regulatory compliance, and improves decision-making. Aggregated data allows for responsive scheduling, replication of successful processes, and ultimately enables clients to reduce costs and timelines when developing future plants. In practical terms, tasks such as construction, testing, or repairs can be virtually simulated before being carried out, increasing efficiency and reducing risk.

Conclusion

The use of the 3DEXPERIENCE platform for nuclear infrastructure projects has really transformed a sector that was still recently using paper-based documentation, working in silos, and for which digital transformation enabled:

- Using 3D models to design, develop and test the project before construction commences
- Keeping costs down by updating technical specifications digitally so that they can be embedded in project management from an early stage, and throughout the lifecycle
- Allowing project teams to review progress in real time in order to proactively manage risk
- Enabling collaboration and consistency for the many different partners working across a project by working with the same data and therefore having a single version of the truth across the project – avoiding duplication of activities and rework

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Link to press release:

https://www.3ds.com/newsroom/press-releases/edf-dassault-systemes-and-capgemini-partner-digitally-transform-edfs-nuclear-engineering