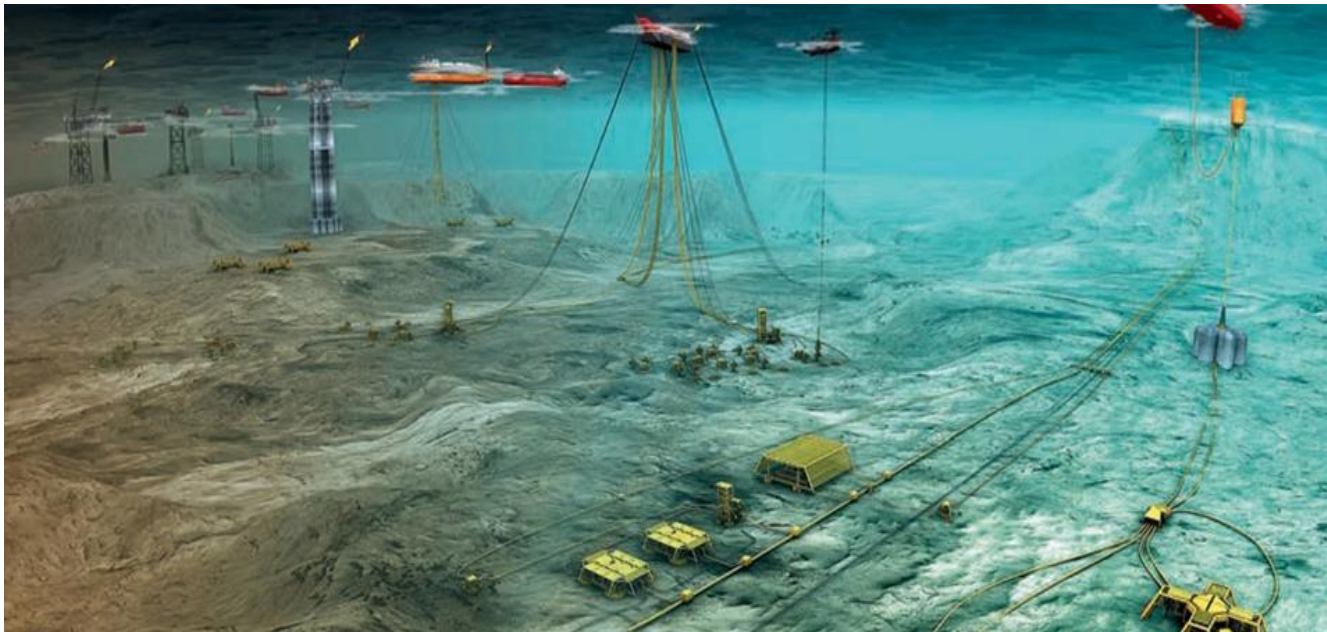


Efficient subsea operations by simulations based on gaming technology and machine learning

Develop a real-time subsea simulator for continuous onboard guidance and update of operating margins during the operations and to enable robotization and automation



Reduce vessel operation and costs

Objective:

Develop real-time simulations based on actual 3D subsea arrangement, physical behavior models and monitoring, rather than procedures.

This is crucial for deeper waters with more complex operations and bad visibility to be done much more effectively without low-level control of humans

Business idea:

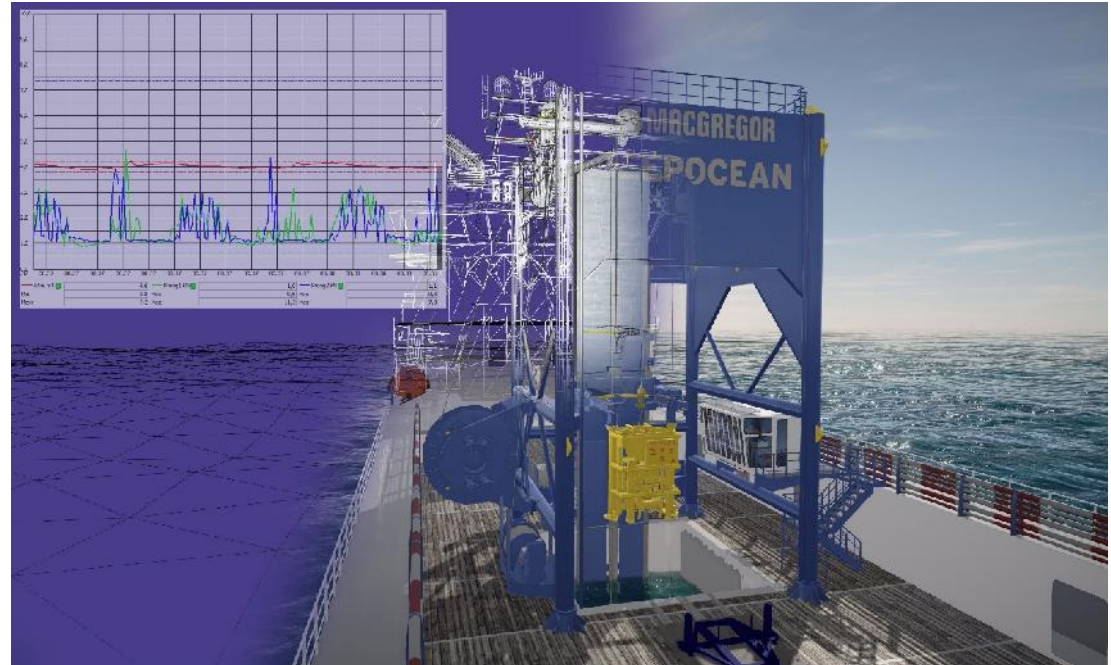
Develop a Digital Twin simulator of the actual subsea operations:

- Training before the actual operation
- Onboard training in parallel with the real subsea operation
- Real-time simulation of operation margins incl. visualization
- Planning of operations and testing of new solutions

Example from Kongsberg Seatex ECOSTEPS proj.:

MacGregor HOW simulation tool

- Based on Unity gaming platform and Blender
- Onboard simulator with real-time dynamics based on real forces and real-time monitoring
- User friendly user interface
- Only 1-5 days to generate a new simulation scenario
- High quality 3D visualization with VR



Main development work

Generation of 3D models and complete subsea world

- Develop improved scanning methods and transfer competence from gaming industry
- Develop automated methods to generate a 3D world of available data

Physical behavior models

- Develop new methods to generate physical models describing accurate forces and behavior of individual components
- Integrate all components to simulate the real-time behavior of the total subsea system

Reinforced Machine learning

- The digital twin simulator itself learn to operate ROV system from calculations, monitoring and analyses of operations
- This enable increased automation of both subsea, drilling and well simulation operations

Transfer knowledge from drilling and well simulation

- It has been done a lot in digitization of drilling operations
- Iris has already developed a web based «OpenLab Drilling» simulator to be transferred and further developed as a collaboration platform for the subsea industry

Self-driving cars require self-driving simulators

Transfer use of gaming technology and reinforced machine learning from the automotive industry



In the automotive industry, car factories use an open source UNITY gaming platform and reinforced machine learning to develop and test autonomous cars. In cooperation between Ansible Motion, Udacity, Grand Theft Auto (GTA) and Google Deep Minds, an open source autonomous car simulator platform has been developed.

- The users enter their own landscapes and detailed models of their own cars
- The users then drive cars in the simulator and afterwards the simulator itself drive the cars and avoid various challenges by reinforced learning. After short time the simulator drive much better than people.

Further plans and contact information

Further plans:

1. Start pre-project to discuss and plan for main projects
2. Prepare for NFR applications in Sept./Oct. to Petromaks2, Demo2000 and/or «Havteknologi».
3. Prepare Innovation Norway «Miljøteknologi» application for prototype development
4. Horizon 2020 applications

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