

# Special session on *Advances in Well Engineering Reliability, Integrity and Risk Management*

**ESREL SRA-E 2025  
15-19 June 2025, Stavanger, Norway**

**Description:** This special session welcomes papers that bring up innovative solutions for reliability, integrity and risk management, specifically within the Well Engineering field, which includes different aspects in each phase of a wellbore development (specially, subsea wells), from well construction and operation to abandonment. Scientific approaches and practical studies are expected, encompassing autonomous and remote offshore activities, real time integrity management and electrification. This special session is the 4<sup>th</sup> edition in a row of a forum that puts together experts on Well Engineering at Esrel to discuss advancements in Well Engineering Reliability, Integrity and Risk Management.

**Motivation:** The world energy balance has been changing, and the oil and gas industry is facing an ultimate challenge: how to be sustainable, resilient in the next years with deep cost reduction and almost zero environmental impact and human exposure? In this scenario, Well Engineering (especially, subsea) needs to be reinvented and pushed for developing brand new, disruptive solutions in all activities. This comprises autonomous and remote offshore tools by using digital twins for production management, development of robots for unmanned operations, prognostic and health management for predictive maintenance, real time integrity management, and electrification. Indeed, the latter is an enabler for the adoption of most of the other initiatives due to its potential cost reduction. All those efforts are linked to digitalization in the oil and gas industry allowing for data availability and integrated databases to improve well design, technical specification, maintenance, and operational decisions.

Given that, reliability and risk management play an important role to address the abovementioned challenges. Indeed, machineries, which are installed in deep water oil wells, are typically exposed to quite harsh conditions such as high temperature and high pressure. Despite that, they need to be fit to function without failures for long time periods. Otherwise, the maintenance costs are exorbitantly high in a way that it may even result in the early abandonment of faulty oilwells. These challenges are commonplace for most of the oil and gas operators around the world and then are of special interest for scholars and reliability practitioners who have dealt with them.

**Scope:** Given the abovementioned challenges in Well Engineering reliability, integrity and risk management, we encourage authors to present innovative approaches to deal with issues related to:

- **Reliability and integrity management throughout the well life cycle:** assurance of well integrity from drilling to abandonment.
- **Real-time monitoring and diagnostics for drilling and completion:** exploration of continuous monitoring technologies, such as fiber optic sensors and other smart tools, that allow real-time data collection during the drilling and completion phases, ensuring greater reliability and security.
- **Operational risk management in drilling and well completion:** assessment of risk modeling and scenario simulation techniques to mitigate the hazards associated with drilling and well completion, considering the conditions found in deep waters.
- **Technology for development and qualification of drilling and completion equipment:** focus on reliability and integrity.
- **Resilience and safety in well abandonment processes:** technical and regulatory challenges of well abandonment, focusing on the application of new permanent isolation technologies, assessment of barriers and risk management associated with safe and sustainable well abandonment.

- **Well control systems and resilience in extreme conditions:** analyses on the advances in well control systems that ensure the safety and resilience of operations in critical conditions, such as high temperature and pressure environments, and at all phases of the well cycle well life.

Papers considering the following topics in the context of well engineering are also welcome:

- Well reliability and risk modelling;
- Well integrity and environmental risk analysis;
- Design for reliability of new equipment;
- Accelerated life and/or degradation testing;
- Reliability allocation;
- Reliability growth analysis;
- Reliability demonstration;
- Reliability in manufacture;
- Reliability management;
- Reliability data collection;
- Reliability degradation of mechanical systems;
- Electronic systems reliability;
- Expert opinion;
- Digital twins to assist decision making;
- Bayesian methods for aggregation of different sources of data;
- Probabilistic physics of failure models;
- Computational simulation in structural reliability;
- Uncertainty and sensitivity analysis, similarity theory, stochastic processes, etc;
- Organizational factors and safety culture;
- Human factors and reliability;
- Probabilistic risk assessment;
- Models for effective fault detection;
- Indicators for assessing sustainable operations;
- IoT – based solutions;
- Fault diagnosis and prognostic of failure of critical equipment;
- Risk-based inspection;
- Safety of decommissioning oil & gas wells.

**Please submit your abstract by October 1<sup>th</sup>, 2024**

Please submit your abstract through the conference [website](#).

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