3.8 Integrated Operations background for Agentic AI



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Integrated operations for field development and operations – a holistic approach

The period from **2001 to 2015** was transformative in the evolution of upstream oil and gas operations. In this period, the industry made a significant effort on how to change work processes to break down the established barriers and silos between the different disciplines within the value chain in the oil and gas industry. Focus on oil companies' integration between onshore, offshore and suppliers.

Norwegian Oil Industry Association (OLF) IO program

The Norwegian Oil Industry Association (OLF) organized a significant IO Collaboration Program for its member companies from 2004 to 2007, organized in several committees, each with a secretariat: 1) Quality Information Strategy, 2) Digital Infrastructure Offshore (DIO), 3) Integrated Work Processes, 4) Integrated Information Platform, 5) Value Potential of IO on NCS. The governance work for integration of several offshore fibers systems on the Norwegian Continental Shelf, "Digital Infrastructure Offshore (DIO) has been fundamental to later Digitalization and Integrated Operations. The Value Potential Report concluded if oil and gas companies integrated their operations, they could increase their revenues from the shelf by about US$ 40 billion. Figure 1 from the OLF period.

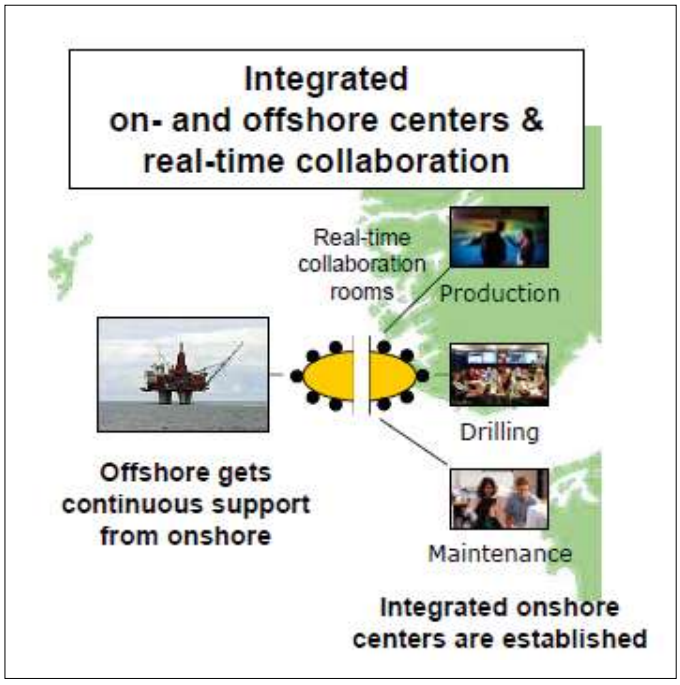


Figure 1: Integration of onshore & offshore centers and suppliers

International Oil and Gas industry cases

The international oil and gas industry developed at the same time similar work maturing into enterprise-wide operational philosophies:

- **Intelligent Energy:** SPE Global Forum
- **Integrated Operations**: Statoil & OLF
- **Smart Operations:** Petoro
- **eOperations:** Hydro & NPD
- **Field of the Future:** BP
- **Smart Fields:** Shell
- **i-Field:** Chevron
- **Digital Oil Field of the Future DOFF:** CERA
- **Real Time Operations:** Halliburton
- **Smart Wells:** Schlumberger

The key elements are broadly the same: the wide-spread use of advanced information and communication technology (ICT) and real-time data, the introduction of new work processes based on real-time access to that data, organizational change, in particular the migration of functions and personnel from costly offshore sites to consolidated onshore locations. By integrating their operations oil and gas companies would be able to accelerate and increase production, reduce operating costs, improve safety and extend the life of their oilfields.

Industry Academy Program

NTNU, SINTEF and IFE, established IO Center together with 13 industrial partners and Norwegian Research Council (NFR), a successful R&D and innovation program, with an annual budget of about NOK 40 million/year from 2007-2014. The Annual International IO Conference became a unique international network with 250-300 participants every year.

Integrated Operation Decision loop

The classic decision loop in Integrated Operations is illustrated in Figure 2.

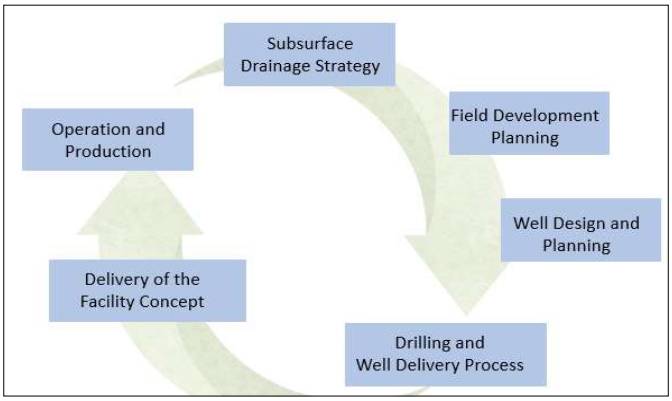


Figure 2: Integrated Operations Decision Loop

Next step IO through Agentic AI

To succeed in the development of hydrocarbon potential in mature areas on the Norwegian Continental Shelf (NCS), cross-discipline collaboration is the key. Digitalization in combination with AI technologies, digital twins, and real time data, will be used to reach the defined well target. Agentic AI is expected to play an important role, by presenting the most likely solutions to the domain experts for final decisions. Figure 3 illustrates how the different disciplines are embedded in each other, from subsurface to decision quality and production optimization, in one integrated decission loop.

Agentic AI will play an important role in the future work, influencing decisions across the entire value chain. The effect of changes in the reservoir or the geological model will automatically be avialable in the design of the well delivery process and capabilites for the facilities. The drilling plan will automatically be updated from updates of the subsurface model. The balancing of well design against reservoir uncertainty and other uncertainties and risks.

The challenges for prospects and assets in a mature area require a completely different approach for exploring and developing the remaining resources. To succeed in this, cross disciplinary integration is a key. A greater level of precision is required than before.

3D/4D seismic is increasingly important to find new well targets, including update of the geological model based on the drilling process, thus ensure to reach the well target. Examples of the service companies activites: SLBs DrillPlan, DrillOps and FDPlan. Haliburton's DecisionSpace 365 and Digital Well Program® Suite. Baker Hughes Kantori - Well Construction Process, LeucipaTM - Automated Field Production Solution and CordantTM - Asset Performance Management. There are also similar activities at smaller entrepreneur companies. OSDU consortium makes data available for seamless integration across the ecosystem, enabling digitalization and Agentic AI to be adopted quicker.

AI Ecosystem Innovation Hub – Academy Industry Collaboration

A collaboration between the UiS, the Entreprenur/ Service Companies and the end users Oil and Gas Companies, will be a catalyst achieving this ambitious goal. The competence within emerging AI technologies and Agentic AI at UiS, together with UiS deep technical domain competence in collaboration with Entrepreneur/ Service companies and O&G Companies use cases, shall be an important player for producing future solutions. Establishing AI Ecosystem Innovation Hub will speed up the development of new technology applications.

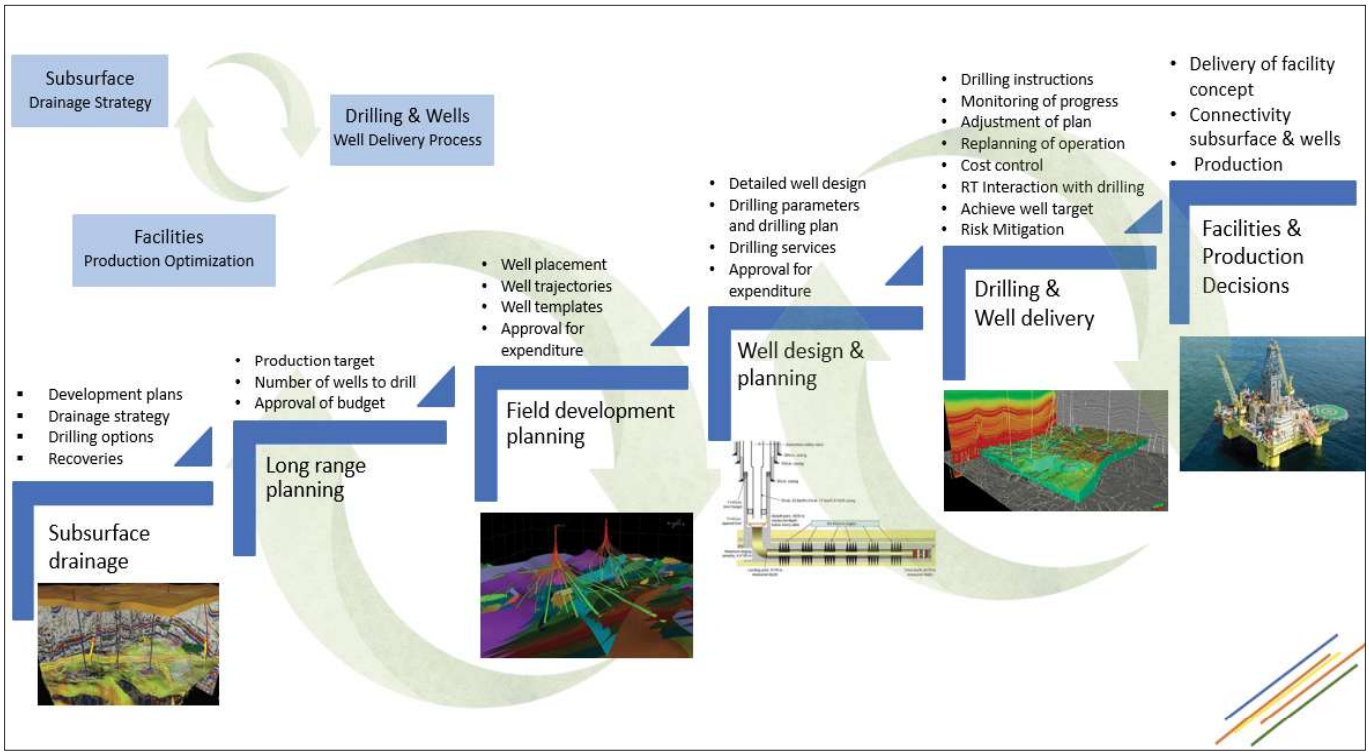


Figure 3: Integrated operations and field development – a holistic approach