# SPE 112137

# StatoilHydro Global Operations: Exploiting 24/7 Operational Support for Well Construction From Different Geographical Locations in Three Time-Zones

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## Abstract

This pilot was executed in Statoil, before the merger with Hydro, involving a drilling operation at the Åsgard Asset on the Norwegian Continental Shelf. Onshore operational support for well construction is now a common procedure in StatoilHydro for each local operation. In the spring of 2007 StatoilHydro launched the Houston Integrated Operation (IO) pilot; its objective was to prove the possibility of a global networked operation, exemplified by a 24/7 drilling operations from three different geographical locations, exploiting the different time zones and thereby eliminating the need for employees working unfavourable nightshifts.

A global networked operation will induce a substantial transfer of knowledge and experience between the various international activities of the company. A set of daily tasks were selected from the common corporate work process of well construction for the purpose of proving the concept of global 24/7 operational support. The pilot scope was also to evaluate the possibility to expand the use of global networked operation to a wider range of processes.

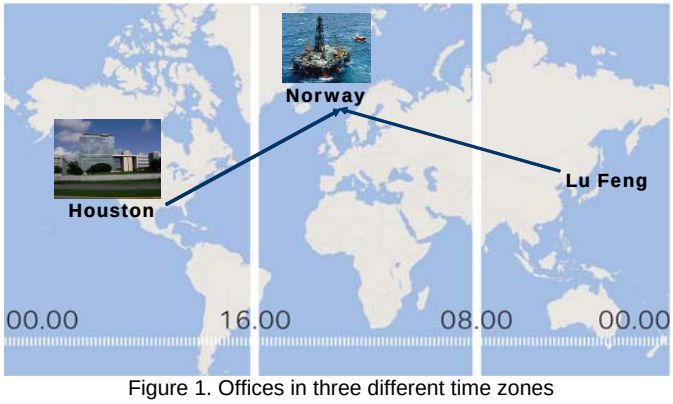


Figure 1. Offices in three different time zones give support to operations in Norway.

The three time zones included in the pilot were Norway (GMT +1) the Stjørdal office and the Åsgard asset, USA (GMT-6) Houston, Texas office and China (GMT+8) "Lu Feng" this last time zone was fictitious and actually based in the Houston office. The professional staff tested out and verified various functions. They executed real-time drilling data services with quality control in the transference of data to project databases and they carried out real-time quality control of directional survey data and drilling efficiency services. While carrying out these functions the technology performance was monitored at all times.

The main objective of the pilot was to test the capability *Global networked operation.* While fulfilling this objective, the pilot would establish the Man, Technology and Organisation (MTO) elements that are required to create this capability. It was hoped that the pilot would prove that it is possible to achieve a working method for 24/7 operations, removing the need for evening and night shifts in Norway and establish and verify a technological platform that is good, simple and robust. The pilot would be used to recommend the way forward for StatoilHydro related to *Global Networked Operation* and establish guidelines for what is required to achieve successful implementation of this approach and working method.

## The Results

The Houston pilot has been deemed a success. The pilot activities were fulfilled and the team in Texas was able to perform their tasks in the operations as a fully integrated member of the Well Operation Team in the Åsgard Asset. While carrying out their tasks the Houston team had access to all data and subsurface applications that they required and the whole pilot was tested without any network downtime. The Houston team was able to effectively collaborate with their colleagues in Norway- both onshore and offshore.

## The background of Integrated Operations

Integrated Operations has been a high priority for everyone involved on the Norwegian Continental Shelf (NCS) since the beginning of this century. That includes operators, authorities, asset owners, OLF (Norwegian Oil society) and vendors. The reasons for this commitment are many but one overriding reason is the possible value creation. In 2004, Petoro (the Norwegian state's representative in the oil sector) estimated the value generation of IO to be 13 billion USD. This estimate was raised by OLF in 2006 and the net present value is 45 billion USD. Current estimates indicate that the potential is even greater.

StatoilHydro started their Integrated Operations initiative in the 90's working with DART (a non-proprietary, internet-based system for real-time transfer of depth-based drilling data which later continued into the growth of the WITSML standard). It continued with investments in an offshore fibre optic network, use of real-time information, visualisation technology and collaboration centres. Several asset based IO pilots were initiated to change current work processes and find new ways of working. In order to achieve maximum effect throughout the company with focus on value creation, the company created a corporate initiative for Integrated Operation in 2005. This initiative has been very successful and out of the StatoilHydro potential on the NCS, the company has already realised a substantial portion of the current possibilities and the prognosis for further value realization is positive. The leaders of StatoilHydro have prioritized IO and view this initiative as a very important enabler in developing StatoilHydro into a stronger global competitive company. The goal for the company is to be one of the world leaders in effective implementation of IO.

StatoilHydro are running several pilots to test and expand the current way of working. The Houston pilot is one of the initiatives to continue a phased capability development in order to achieve StatoilHydro's ambition. IO enables a networked structure and empowerment of the resources performing the operation at all local sites and facilities.

## Integrated operation changes the way we work:

| Before IO: | With IO: |
|---|---|
| Serial | Parallel |
| Single discipline | Multidiscipline teams |
| Dependent of location | Independent of location |
| Decision based on - | Decisions based on |
| Historic data | Real-time data |
| Reactive | Proactive |


Figure 2. The IO implementation model

The pilots are key elements to a successful implementation of IO opportunities in the operating assets.

## Introduction to Global Networked Operations

The capability exemplified in this pilot has been drilling operation support, performed in a networked global operation across different time zones and different locations. In doing so the basic objective has been to establish the MTO elements that are required to achieve this capability. The terminology used in the paper comes from various strategic management theories that are used within StatoilHydro.

A capability within a company refers to the capacity to perform a particular task, function or activity. A capability has to be value driven therefore measurable and action orientated. The capability for IO is obtained by achieving the correct balance within the trio of Man (people), Technology and Organization which is referred to as MTO. There is a fourth element to this group which is process; the processes are the glue that holds the other three together.

## Development of capabilities and MTO focus

The success criteria for this pilot was to establish a clear vision and strategy, good leadership involvement on several levels and all involved locations, a balance between all the MTO activities and create a highly motivated pilot team. It was clear from other IO pilots within the company that in order to achieve these criteria certain elements were necessary.
The complex tasks meant that common processes and shared awareness were major requirements. Technical solutions were adapted to create the necessary platform to be able to build this shared awareness among the team at all locations. From a technical point of view these aspects were covered by making the data available in real-time regardless of geographical location.

## The MTO Preparation Activities

Main People activities

- Leadership involvement and engagement
- Preparation and involvement of all people in the different locations
- Educate for cultural differences and challenges
- Communication within the pilot team
- Communication to StatoilHydro involved departments
- Communication to rest of StatoilHydro and StatoilHydro management

Main Technology activities

- Setup of data and communication architecture based on StatoilHydro standard technology elements
- Preparation of data security and reliability
- Data access using thin client with 2D and 3D applications
- Technology support
- Logging of uptime, bandwidth, capacity and reliability
- Prepare collaboration environment and technology

Main Organisation and Process activities

- Updated work processes to support the capability
- Shared process understanding
- Clear roles and responsibilities
- Common understanding of decision rights
- Agreements for support and new way of working
- Goals and measurement

## A technology platform made globally operable

The approach for this pilot has been to build on standard corporate infrastructures such as the network system, fibre optics, centralised databases and real-time transfer service – and the latest, thin client solutions and terminal servers making both 2D and 3D application available anywhere. By doing so we are leveraging the already established MTO elements into a new capability by enhancing from a local operation to a global networked operation.

Assembling different elements into one robust solution makes it possible to eliminate the geographical barriers to the operations and give people access to data and applications as if they were located at the operation. These solutions ensure a safe and reliable access to all necessary applications and data regardless of location.

The safety and security of the applications are of the highest importance in drilling operations; as the operation is handling sensitive data. This is ensured by accessing the data from its centralised source through remote access solutions, eliminating the need of around the globe duplications with the necessary adherent safety measures. Traditionally engineers have been dependent on being present at the location where the operations are taking place - close to where the data is captured. Now we are bringing the data to the experts, enhancing the utilization of available resources.

## Pilot preparation (pilot introduction and scope)

The Houston pilot was established to support the drilling operations on a selected 12 ¼" section on the Åsgard Field.
There were several reasons why Global networked operations were made feasible within this work process and activity and on this specific asset, at this time. The main reason is that StatoilHydro has developed a new common (global) work process for well construction. This work process contains the collaborative and multi-disciplinary work required in both the planning phase and the execution phase to perform safe and efficient operations in regards to optimum drainage. The Åsgard asset which was used in the pilot has excelled as both a contributor and innovator in development and implementation of the new common work process for well construction in StatoilHydro. It has also been one of the main initiators and innovators in exploiting new collaborative technology. Åsgard has used collaborative technology in the operations of optimal well placement and decision making support for many years.
Åsgard IO capabilities together with the leadership commitment and courage in both the Åsgard and Gulf of Mexico (GoM) (which is controlled from Houston) assets made this activity the most suitable for the pilot on global operations.

The work process describes, as mentioned, the multi-disciplinary work in the execution phase with evident roles, tasks, responsibilities, participation and communication at any time through the process. Based on the experience of this pilot the time and focus that is needed to clarify the above mentioned subjects should not be underestimated. It is crucial that everyone involved knows their piece in the puzzle. This makes the operations team capable of geographically distributing parts of people involved and their tasks in what we can call a global operational network.

The daily tasks performed by the land-based part of the operations team in Norway were handed over to the Gulf of Mexico office at the end of office hours in Norway, and visa versa at the end of day in Houston. To ensure a common understanding and shared awareness of the situation a hand over report was utilized in combination with a video conference hand over between the two teams. Continuous focus was in this manner given to the operation since the team on duty, could then give the team that were to go on duty a proper handover and bring them quickly up to speed about the latest activities.

By looking at the operations team, their tasks and responsibilities, as participating roles in a global network context, this does not alter the line of responsibility, decision-making process or the chain of command.

Figure 3. Teams collaborating across continents with use of real-time data and video conference

## 24/7 Drilling Operation

Subsurface personnel in Houston and Norway tested out and verified the following functions:

- Performed drilling optimization services.
- Performed real-time quality control of the directional drilling and directional surveying services.
- Real-time data management including quality control in the data transfer.
- Subsurface application performance and operability testing

A drilling operation does not stop, it continues in the same way when the office employees go home from work at the end of the day. Duty systems are normally the solution for 24/7 continuous operations regarding support and assistance from shore. The Houston pilot did not substitute the existing duty system for the Åsgard organisation, but it showed alternative solutions for 24/7 support for the operation.

The existing work process for well construction describes the multi-disciplinary teamwork through the whole process; planning phase, operations phase and the evaluation phase. The operations phase is divided into sub-activities i.e. drilling, casing and cementing. Each sub-activity is divided in three sub-categories; pre operational tasks, during operations tasks and post operational tasks.

Utilization and analysis of real-time data were conducted, focusing on key parameters of the operations. Pre-operational analysis consisted of typical critical parameters like torque/ drag, ECD (Equivalent Circulation Density) simulations, tripping in/ out speed, surge and swab analysis to name a few. All these parameters were simulated and used for trending as limits and control boundaries in combination with real-time data during the different operations. In this manner the optimisation work increased the value of exploiting the real-time data that could be used to a greater extent to support decision making with higher quality.

Quality control of the directional drilling and surveying was performed in real-time with the objective to optimise well placement in accordance to the geological model. Any abnormality in the directional measurements was trigged in depth analysis to assure a quality controlled well path at all times. Continuous flow of real-time data is vital to the operational tasks that were performed, thus divided among the two teams at the different geographical locations (Stjørdal and Houston). Since this pilot was feasibility mapping, other non-operational tasks where included. Monitoring the performance of software, network stability, real-time data lag and video/sound quality were logged for future use.

## Challenges

Global operations bring many challenges to a networked operation. A clear and understandable vision and strategy along with leadership engagement in all locations are fundamental for effective implementation. The cultural, operational and business differences in the networked locations must not be neglected. It must be ensured that enough time and resources are used on preparation, engagement and follow up to build common understanding and trust between the team members. The people element will be meaningless if there is not a relevant preparation of the organisational and technical elements. A lot of challenges are in the details.

## Results

The Houston Integrated Operations (IO) Pilot has been deemed a success. The pilot activities have been successful and the Houston team was able to perform their tasks as a full member of the Well Operation Team. The team has had access to all information, databases, applications and data that have been used in the Stjørdal office – all without any network downtime.

The applications that have been used in the pilot are all a part of StatoilHydro's subsurface portfolio. The Houston Team has had good collaboration and effective cooperation with Ocean Vanguard, Åsgard J-1 H Operations Team and ITC Subsurface personnel in Stavanger. The capability to support operations globally generates measurable value.

Figure 4. Member of the Houston pilot team in Stjørdal

## Lessons learned

There were important lessons learned during the pilot. The importance of preparation, including involvement, information and engagement with people was clearly shown. The time required for building relationships, trust, roles/responsibilities and common understanding for all involved participants was shown to be a critical factor.

The challenge of all the details that are needed to change from a traditional way of working to a global networked operation must be realistically viewed. The new global way of working, as tested in the Houston pilot, requires trust, shared awareness, easy collaboration and effective IT support. In order for this to come about good leadership and high enthusiasm from key personnel is essential. In addition, technology and network needs to be very stable and requires sufficient bandwidth.


Figure 5

## Conclusions

- The Houston pilot was a success
- The pilot clearly showed that Global Networked Operation is possible with the current technology platform
- The pilot recommendation to StatoilHydro is to implement Global Networked Operation in StatoilHydro with a phased approach.
- The challenges are mainly related to clear vision and strategy, leadership, culture, people and practical issues

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