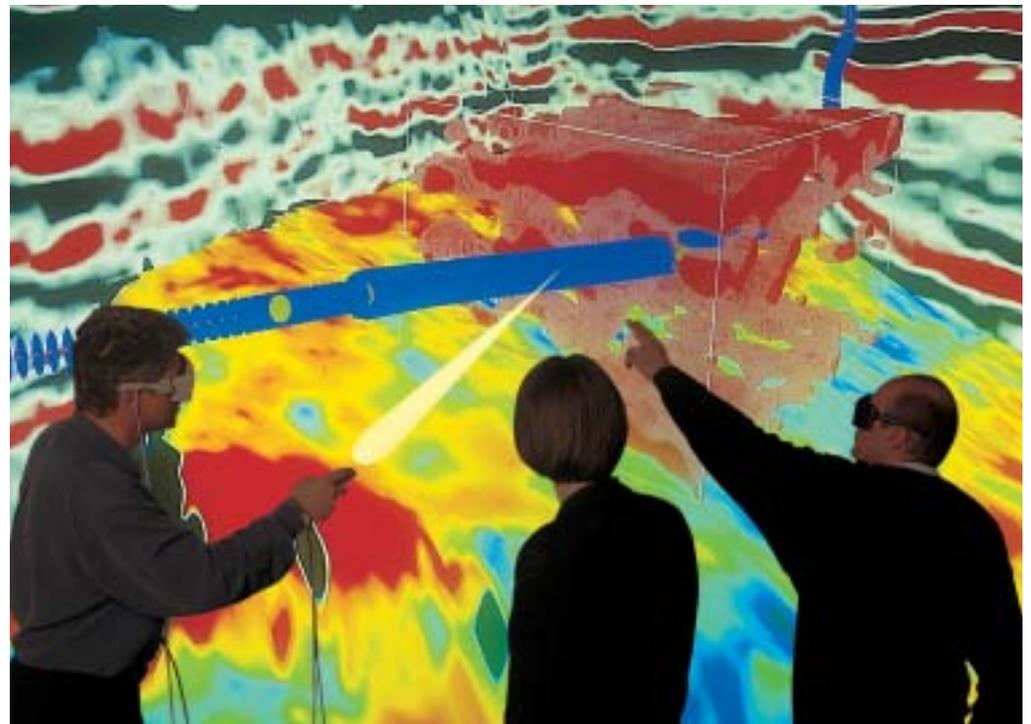


# Case Study: Inside Reality 3D virtual reality technology

## Norsk Hydro increases sand penetration on the Oseberg field



Team members use Inside Reality virtual reality technology to geosteer a complex horizontal well.

### Situation

The Oseberg field is located offshore the western coast of Norway. The field was put into production in 1988. In 1998 the field went into decline and an extensive increased oil recovery (IOR) program was initiated to extend the lifetime of the field. One of the most important actions in the IOR program is to produce as much as possible of the reserves in the Ness formation. The Ness formation consists of a complex pattern of fluvial channel sands. The mapped sand lobes vary in width from 50 to 400 meters and in thickness from 1.5 and 15 meters.

### Challenge

In 1999 Norsk Hydro drilled the B-29 horizontal well in the Oseberg field. To support the IOR program, the company wanted to penetrate a maximum section of the channel sands in the Ness formation.

### Solution

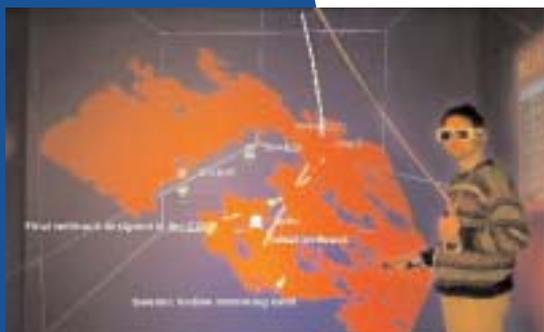
Inside Reality® virtual reality technology was used in a virtual reality environment, in this case a CAVE, extensively during both the planning and drilling phases of B-29.

Virtual Reality

“Inside Reality technology was a key contributor to the success of the B-29 well. The system is now implemented as a standard part of the planning and steering of wells on the Oseberg Ness Formation.”

*Norsk Hydro geologist*

## Inside Reality 3D virtual reality technology



*An Oseberg geoscientist compares the planned straight well path with the final well path, which resulted in increased sand penetration. The oil-filled sand is shown in red.*

The image on the left shows acoustic impedance bodies in the Ness formation corresponding to oil-filled sand. The data have been extracted from an acoustic impedance cube by region growing. An initial proposal of the B-29 well path based on reservoir simulation is shown as the straight white line in the figure. In the CAVE it became obvious that this straight well path would not fulfill the objective of maximum sand penetration. A new well path was therefore designed interactively in the CAVE by placing target points directly inside the acoustic impedance bodies. The more complex well path resulting from this work is also seen in the figure.

During drilling of B-29, the data was updated with the latest drilling results at least twice daily and status meetings were arranged with all the members of the well team present. On several occasions, these meetings were used for active geosteering of the well where the drill rig was contacted and given new drilling instructions. These operations were constrained to a very short time frame and Inside Reality proved to be an extremely valuable tool for making these kind of difficult decisions in a minimum of time.

### Results

The planning and drilling of B-29 was a success. The use of Inside Reality contributed to an optimized well path. The horizontal part of the well encountered 65 percent oil-filled sand, while the average for other nearby wells in the Ness formation is 35 percent. It was concluded by the Oseberg asset team that Inside Reality played a major role in achieving this result and the system is now implemented as a standard part of the planning and steering of wells on the Oseberg Ness Formation.

### Inside Reality

Inside Reality virtual reality technology creates a unique and powerful environment for interactive well planning, real-time geosteering and geophysical analysis. It provides a fun, exciting and intuitive way of working in virtual reality where users interact with the data employing natural hand and body movements, such as walking, pointing and grabbing.

### Norsk Hydro

Inside Reality is based on technology under license from Norsk Hydro, and developed by Norsk Hydro in collaboration with Christian Michelsen Research AS.

### GeoQuest

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to experience the unmatched  
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