# No:1 Dirk Smit - Shell Chief Scientist for Geophysics

**Duration: 5:58 minutes**

# Description:

Shell Chief Scientist for Geophysics, Dirk Smit, discusses how innovative technologies -- sometimes developed in unusual R&D partnerships -- help energy companies to explore for harder-to-find oil and gas resources.

# No:1 Dirk Smit - Shell Chief Scientist for Geophysics Transcript

[Background Music]

Electronic music.

[Video footage]

Dirk Smit on the phone in an office.

Zooms in and looks past at computer screen.

[Dirk Smit]

Geophysical technologies are going to play a crucial role...

[Dirk Smit]

to meet the world's increasing demand for energy in the decades to come.

[Dirk Smit]

A lot more hydrocarbons will be needed, as the world's population grows so fast.

[Video footage]

Sped up footage of people walking along a city street.

People walking at normal speed.

Overlaid footage of lots of people walking.

[Dirk Smit]

Having access to large new resources of oil and gas...

[Video footage]

Oil rig in sea.

[Dirk Smit]

will buy us time to make the transition to renewable energy sources.

[Video footage]

Two tractors collecting crops.

Large wind farm in arid mountain scene.

[Dirk Smit]

The challenge we geophysicists are faced with...

[Dirk Smit]

is that in the pursuit of these large, new resources...

[Video footage]

Panning over mountains.

[Dirk Smit]

we are looking for more and more difficult to find hydrocarbons.

[Graphic]

Footage turns to a computer graphic of mountains.

[Dirk Smit]

These might be buried several kilometres in the ground...

[Dirk Smit]

hidden under complex geological formations such as salt...

[Graphic]

Panning around same graphic of mountain.

[Dirk Smit]

located under ice shields in the Arctic...

[Video footage]

Rig in the middle of ice, looks like the Arctic.

[Dirk Smit]

or just captured in small accumulations that are simply difficult to detect.

[Dirk Smit]

Of all the international oil companies...

[Video footage]

Man standing in front of large screen with coloured graphic of mountain.

[Dirk Smit]

Shell probably has the strongest overall reputation in geophysics.

[Video footage]

Dirk Smit explaining the computer graphic to the man.

[Dirk Smit]

We are definitely in the forefront of using...

[Dirk Smit]

one of the main tools of geophysics, namely; seismic imaging.

[Video footage]

Zooms in on man listening to Dirk.

[Dirk Smit]

Seismic imaging plays an essential role in finding oil and gas deposits.

[Graphic]

Graphic of layers beneath the earth’s surface.

Three lorries arrive on the surface.

[Dirk Smit]

We measure sound waves, bouncing off potentially hydrocarbon bearing rocks...

[Graphic]

Image made to look like sonar being sent down from lorries into ground.

[Dirk Smit]

which we then use to compute an image of these layers below the ground...

[Graphic]

Sound waves bounce back off the different layers below the ground.

[Dirk Smit]

or under the sea bottom.

[Dirk Smit]

Salt layers form a shield that interferes with seismic waves...

[Graphic]

Diagram of sea bed with a salt layer running across it, above a reservoir in the sea bed.

Waves being sent from boats aimed at the reservoir.

Signals being distorted by the salt layer.

[Dirk Smit]

so that we cannot see the underlying formations.

[Dirk Smit]

A promising novel seismic technique today...

[Video footage]

Dirk standing in front of a large diagram on screen.

[Dirk Smit]

enables us to illuminate below these seismic shields.

[Dirk Smit]

Unfortunately, the technique is not cheap...

[Dirk Smit]

as it involves placing hundreds of sensors on the sea floor.

[Video footage]

Graphic of rig in sea with two boats.

Small yellow squares laid out in grid formation on sea bed.

[Dirk Smit]

Therefore we are currently only using it on a small scale.

[Dirk Smit]

But already it dramatically increased the probability of finding hydrocarbons...

[Video footage]

Coloured computer graphic of what looks like underground layers again.

Large block of green in the middle.

[Dirk Smit]

for example in the Gulf of Mexico, where this picture is taken...

[Dirk Smit]

sometimes leading to billions of dollars of value...

[Graphic]

Another graphic of below the earth’s surface. Rotating.

[Dirk Smit]

from the hundreds of millions of barrels of oil we've discovered.

[Dirk Smit]

To deploy this measurement technique on a larger scale, costs must be reduced.

[Graphic]

Zooming in on one portion of the diagram.

[Dirk Smit]

While its quality and robustness may need to be further improved.

[Graphic]

Further exploring of the diagram.

[Dirk Smit]

This would allow us to make more precise measurements more often.

[Dirk Smit]

This seems an almost impossible task...

[Dirk Smit]

and it poses a significant challenge to the R&D community.

[Dirk Smit]

In Shell we are convinced that by working with partners...

[Dirk Smit]

sometimes outside our industry...

[Video footage]

Close-up of Dirk Smit writing.

[Dirk Smit]

we can develop innovative concepts that meet this challenge.

[Video footage]

Camera pans up to Dirk Smit on the phone.

[Dirk Smit]

Such unusual R&D alliances have proven to be rich sources of innovation for us.

[Dirk Smit]

One example is our collaboration with Hewlett-Packard.

[Dirk Smit]

In this project we are developing a wireless sensing network...

[Graphic]

Simplified green landscape with five sensors spaced apart.

Rows of yellow squares placed on the field in a grid around the sensors.

A pylon type sensor lands in the middle.

[Dirk Smit]

that could revolutionise the way we gather seismic data.

[Dirk Smit]

Some day this technology may allow us to cost effectively collect...

[Graphic]

Rows of lorries line up alongside the field of sensors.

Camera pans out to show beneath the earth’s surface.

Shows pipes going down to layers underneath.

[Dirk Smit]

up to two orders of magnitude of more seismic data...

[Graphic]

Computerised diagrams.

[Dirk Smit]

that is more precise, more robust and can be taken more frequently.

[Dirk Smit]

This then would immediately pose another challenge.

[Text displays]

How do we process and manage all that data?

[Graphic]

Above text on a background of computer screens with rows and rows of numbers.

[Dirk Smit]

How do we process and manage all that data?

[Dirk Smit]

This creates significant R&D challenges to the computing industry.

[Video footage]

Room full of computer hardware.

Zooms in on one row of computers.

[Dirk Smit]

Which is why such alliances are perhaps not so unusual:

[Dirk Smit]

We are pretty much driven into each other's arms.

[Dirk Smit]

What really motivates us to team up with these important players...

[Dirk Smit]

and form R&D partnerships, is to bring in more new ideas...

[Dirk Smit]

and quickly test them for applicability, to solve our challenges.

[Dirk Smit]

For geophysics that is paramount.

[Dirk Smit]

And computing, medical and defence industries, and even Hollywood...

[Graphic]

Black screen. A computer screen with diagrams pops into one corner.

A scan of a human skull pops into another corner.

A radar scanning pops into another corner.

A camera pops into the last corner.

[Dirk Smit]

are becoming relevant to helping us solve our geophysical problems.

[Dirk Smit]

For example, the development of large- scale MRI and ultrasound techniques...

[Video footage]

MRI scanner with lots of wires showing.

Man looking closely at something with goggles on.

Some sort of drum rotating.

[Dirk Smit]

in the medical sciences, has led to interesting concepts...

[Dirk Smit]

that are also relevant in geophysics.

[Dirk Smit]

Similarly, the computer rendering and animation, used to create 3D movies...

[Video footage]

Two people with 3D googles on in the dark.

[Dirk Smit]

may help us to visualise large amounts of seismic data.

[Video footage]

Camera pans to back of the room, shows people with googles on watching a large screen with a mountain range on it. Person sitting at back of the room with same image on a computer screen.

[Dirk Smit]

In other words: We can learn something from how DreamWorks made <i>Avatar</i>.

[Video footage]

Another computer image of what looks like below the earth’s surface.

[Dirk Smit]

In fact, the pace of innovation has dramatically accelerated...

[Video footage]

A man looking at a computer screen with lots of data on it.

[Dirk Smit]

and is now more driven by market demands.

[Graphic]

Zooms in and rotates diagram on computer screen.

[Dirk Smit]

This means we need to be flexible and willing to co-operate...

[Video footage]

Two people sitting at computer discussing image on screen.

[Dirk Smit]

with new, sometimes unexpected partners and on much more accelerated timeframes.

[Graphic]

A man sits and explains computer diagrams.

Men listening behind him, join in and talk.

[Dirk Smit]

Of course it is one thing to increase the number of ideas by partnering...

[Graphic]

Various computerised diagrams.

[Dirk Smit]

but to be effective you also need to cull ideas.

[Dirk Smit]

Culling early is very important.

[Video footage]

Close-up of hands at a computer keyboard with mouse.

[Dirk Smit]

I use to say: The best researcher is the one that fails fast.

[Video footage]

Looking over a man’s shoulder at diagram on computer screen.

[Dirk Smit]

You have to be able to let go and learn at the same time.

[Dirk Smit]

You may think there is a geophysicist in an attic...

[Dirk Smit]

working out a single solution that could revolutionise the business.

[Dirk Smit]

In reality it is a diverse effort. Not just a research effort...

[Dirk Smit]

but often the ideas are initiated on the business side.

[Dirk Smit]

Bringing the ideas to full maturity for innovation to be effective...

[Dirk Smit]

requires a clear line of sight...

[Dirk Smit]

and linking the research and business teams in an ongoing working relationship.

[Dirk Smit]

As the chief scientist for geophysics in Shell...

[Video footage]

Dirk Smit working at computer.

[Dirk Smit]

it is very gratifying and exciting for me to help create that vision...

[Video footage]

Dirk Smit explaining a large coloured diagram on screen.

[Dirk Smit]

and provide the space and energy for people to work together and get aligned.

[Video footage]

Dirk Smit walking in conversation with another man.

[Dirk Smit]

These are exciting times, as much more is possible today than a few years ago.

[Video footage]

Dirk and another man look at models of rigs.

[Dirk Smit]

To make full use of emerging opportunities requires courage...

[Dirk Smit]

technical intuition, combined with a good business sense...

[Dirk Smit]

and an entrepreneurial attitude.

[Dirk Smit]

I'm excited to see more and more of these qualities appearing...

[Dirk Smit]

in the technology groups, here in Shell.

[Dirk Smit]

It is these qualities; innovation spirit and drive of our people...

[Dirk Smit]

that make me confident that in 2 or 3 years Shell will be clearly ahead...

[Dirk Smit]

in getting business value from new geophysical technologies.

[Sound effect]

Shutter sound on camera, like a photo being taken.

[Graphic]

Black and white photo of Dirk Smit smiling in front of a diagram.

[Graphic]

Shell logo on white background.

[Text displays]

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