



---

Petroleum technology at a crossroad

# Technology and implementation

Stavanger 27.01.05

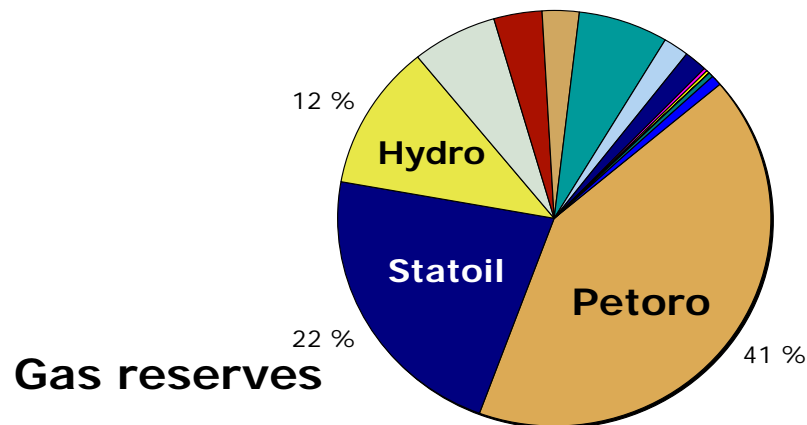
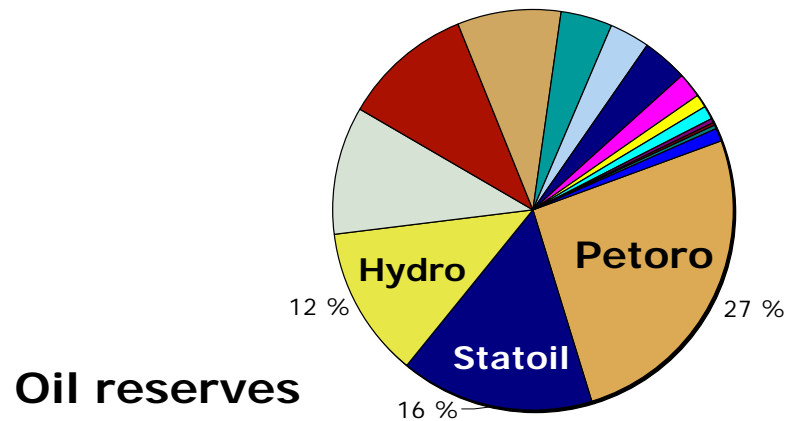
Tor R. Skjærpe, vice president technology and ICT, Petoro

# AGENDA

- **Petoro**
- The cost challenge
- New technology – excessive implementation time?
- Technology examples
- Reasons for the long implementation time.
- The suppliers role
- Future consequences/summary

Petoro on the NCS:

## Pushing early application of new technology



**90 licenses**

**18 joint ventures and companies<sup>1</sup>**

**32 field in production**

**3 fields under development**

**Strategic technology areas:**

- Smart operations
- IOR
- Light well intervention
- Subsea separation
- Subsea compression

1: pipelines and terminals

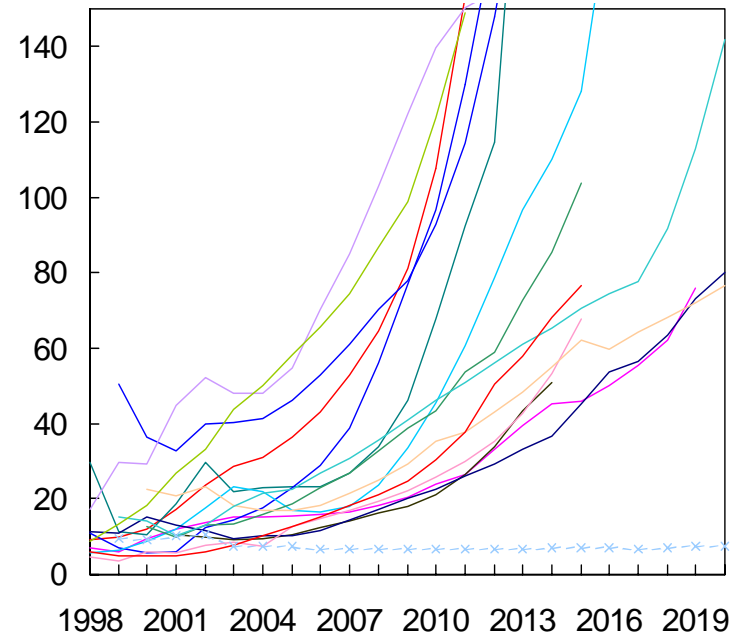
# AGENDA

- Petoro
- **The cost challenge**
- New technology – excessive implementation time?
- Technology examples
- Reasons for the long implementation time.
- The suppliers role
- Future consequences/summary

The cost challenge:

# Technology will be an important leverage

Production unit costs in NOK/bbl o.e. based on current cost level for future production.

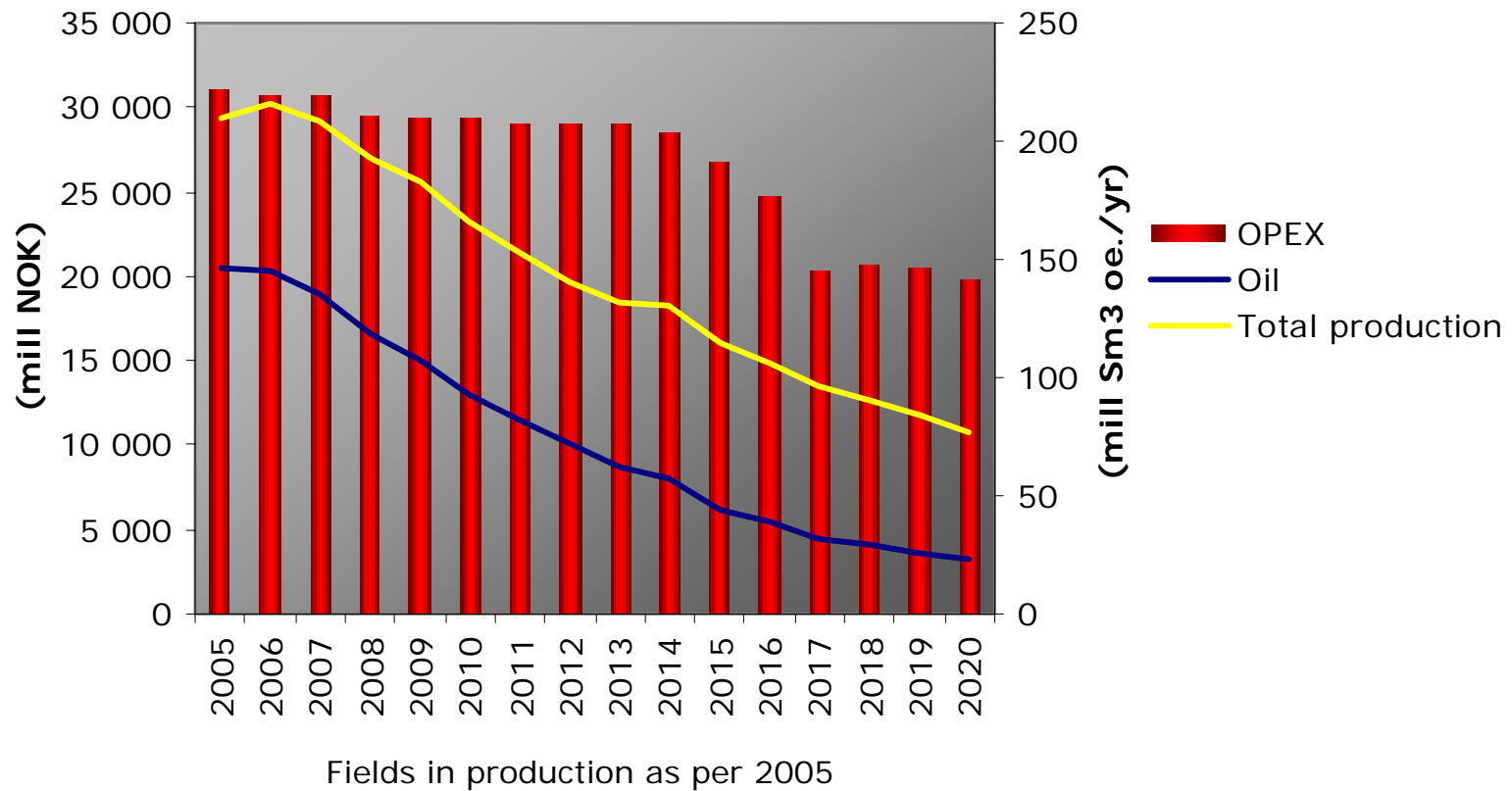


Source: WoodMac, McKinsey



# NCS – a mature province

## Opex and production prognosis



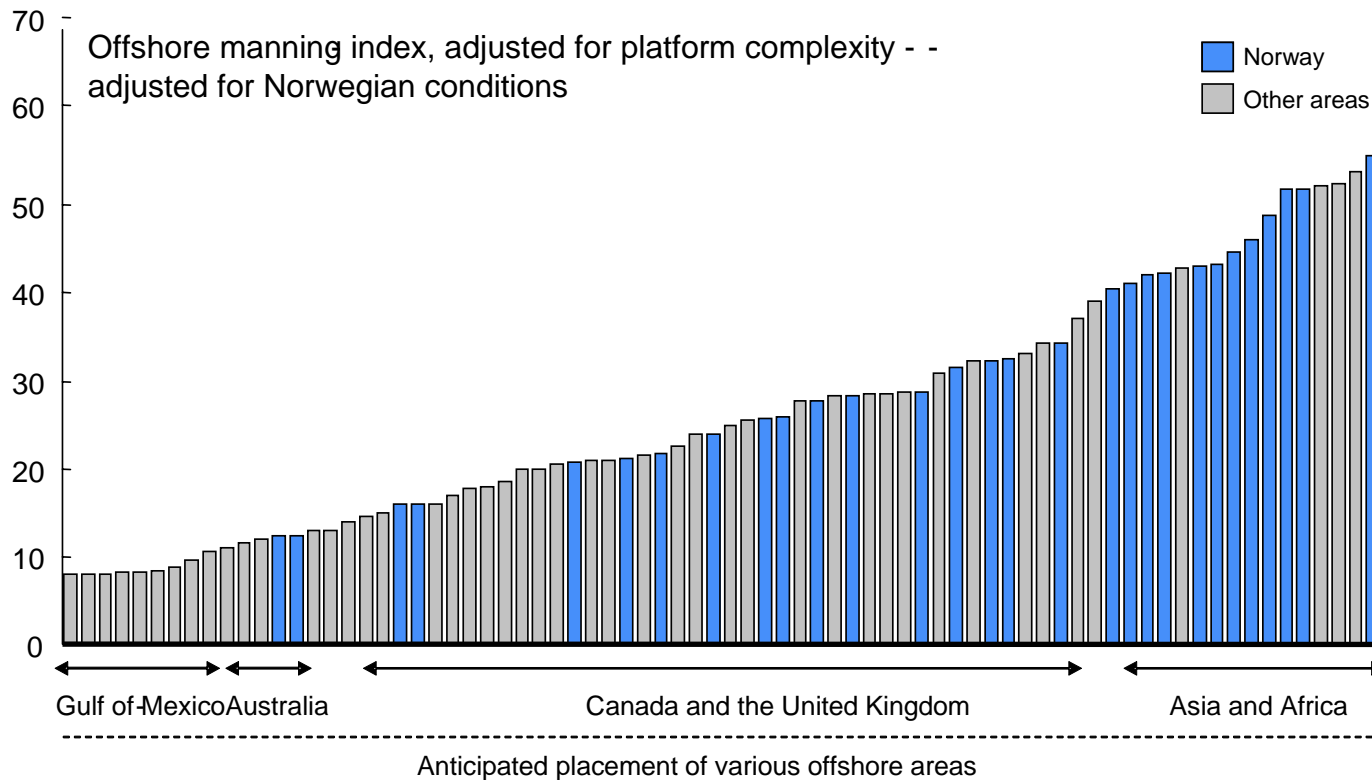
Source: RNB 2005, Petoro's portfolio



# High manning levels

(adjusted for complexity)

The manning level is driven primarily by technology, organisation and work processes



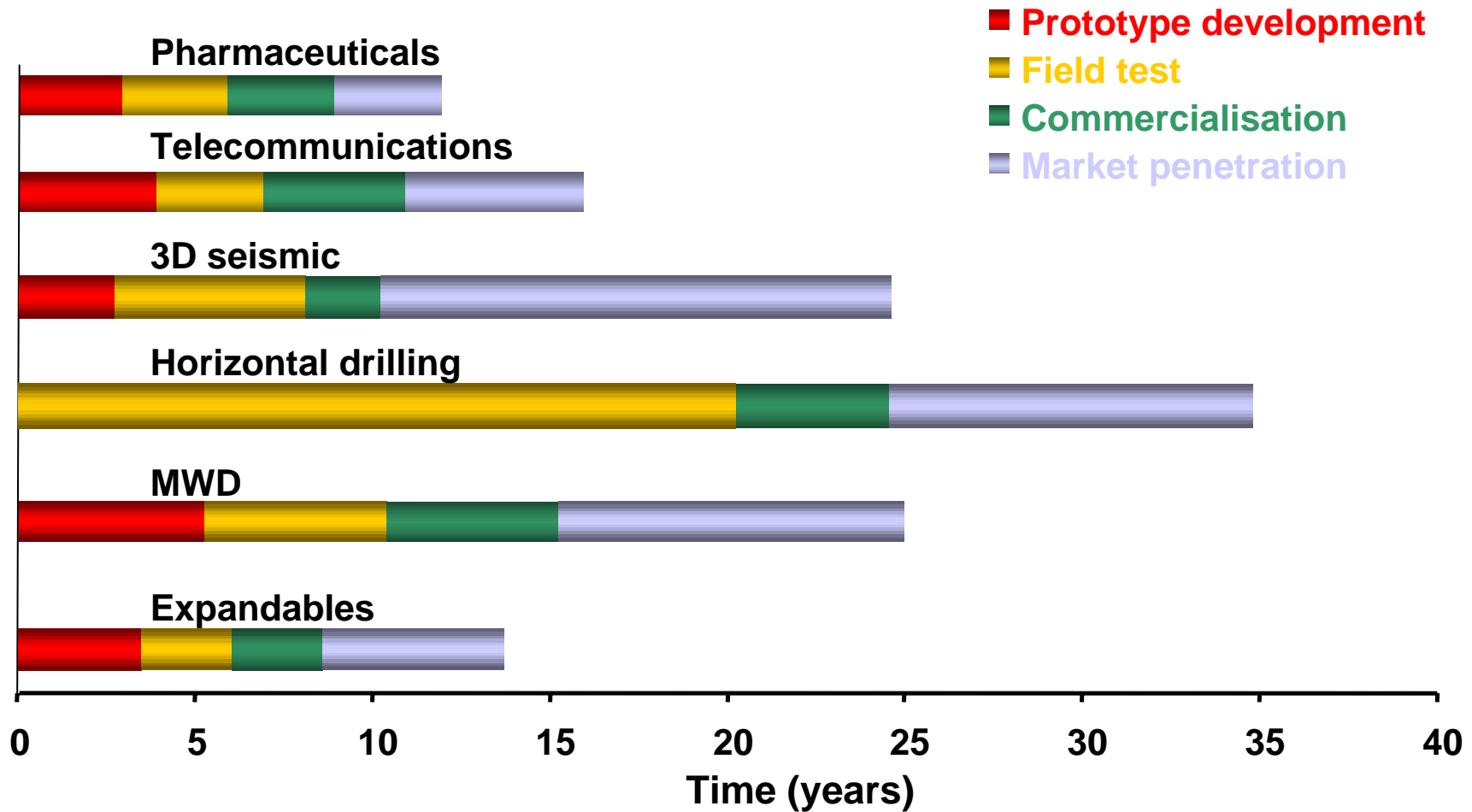
Source: KonKraft analysis



# AGENDA

- Petoro
- The cost challenge
- **New technology – excessive implementation time?**
- Technology examples
- Reasons for the long implementation time
- The suppliers role
- Future consequences/summary

# The pace of innovation in E&P has been slow relative to other industries

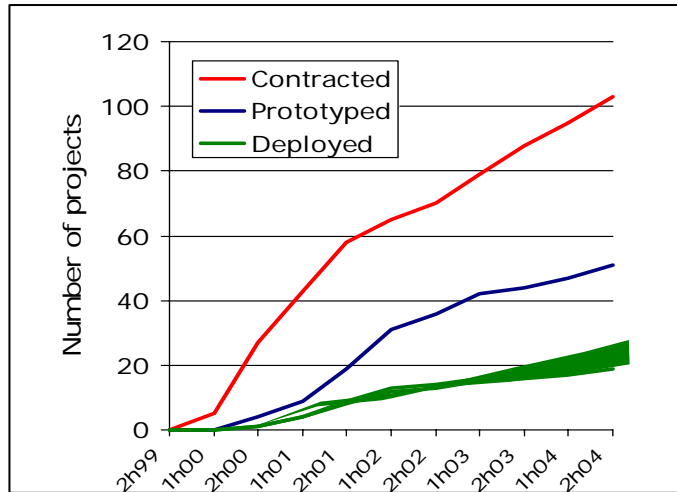


Source: McKinsey, Shell, Halliburton

# AGENDA

- Petoro
- The cost challenge
- New technology – excessive implementation time?
- **Technology examples**
- Reasons for the long implementation time.
- The suppliers role
- Future consequences/summary

# Demo 2000 Status



## Progress:

- 103 projects awarded
- 33 projects at engineering/procurement stage
- 51 projects in prototyp phase
- 19+ pilots deployed at Statoil, Hydro, Shell, TFE, PDVSA, Lasmo, Agip, Petrobras, CNR

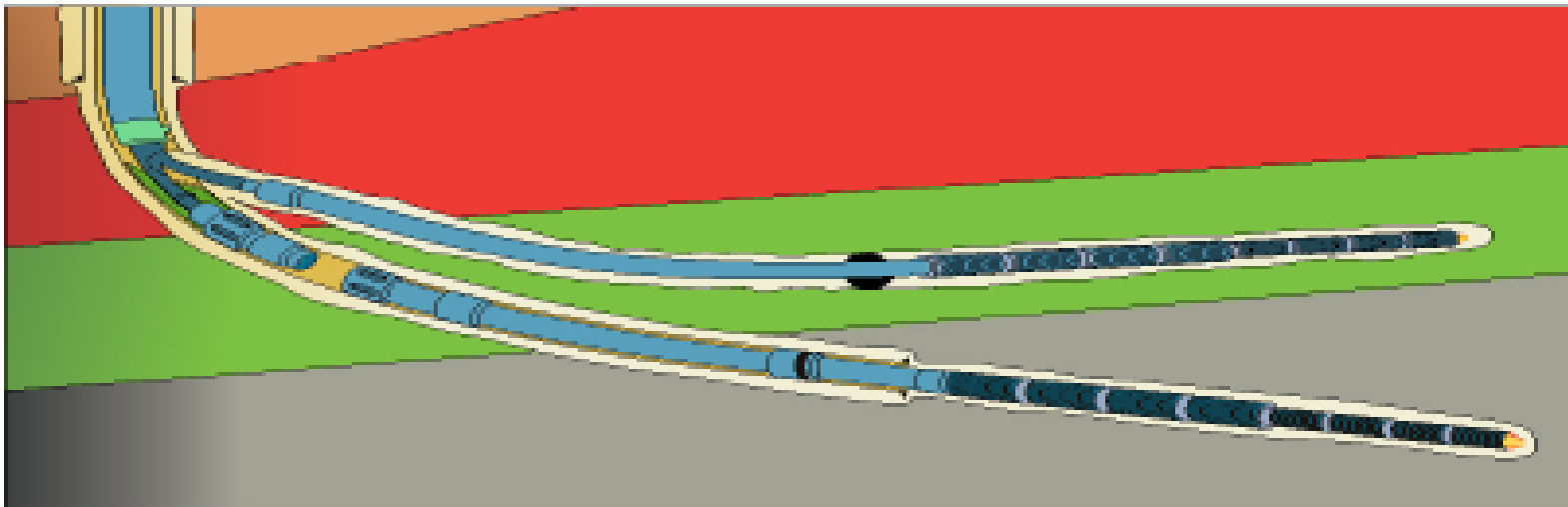
## Critical elements:

- Better planning for future usage of a successful pilot
- Upfront, define the success criteria for the pilot
- Visualize the technology in the licensees
- Asset Forum with OLF: Use it, or terminate the activity.

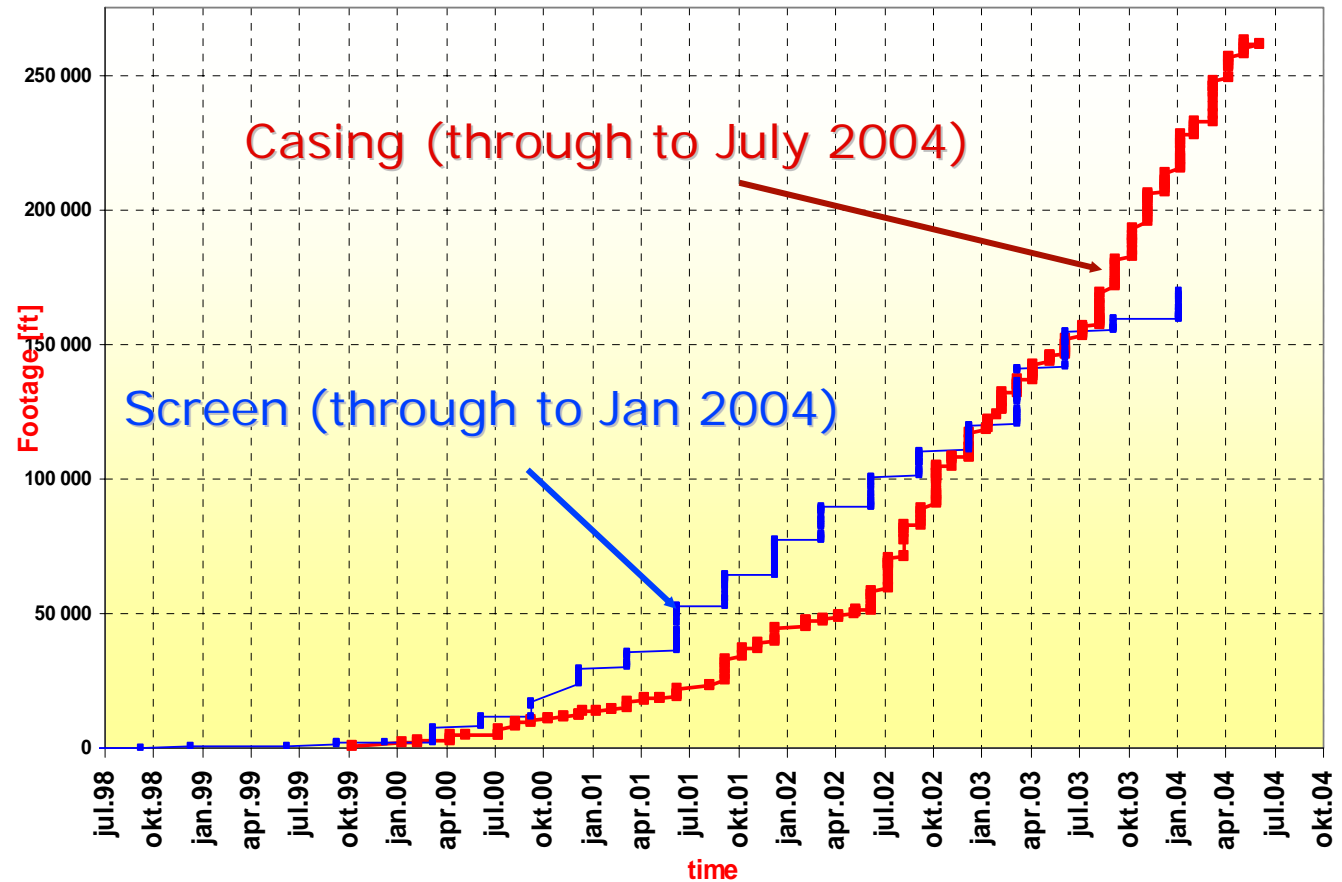
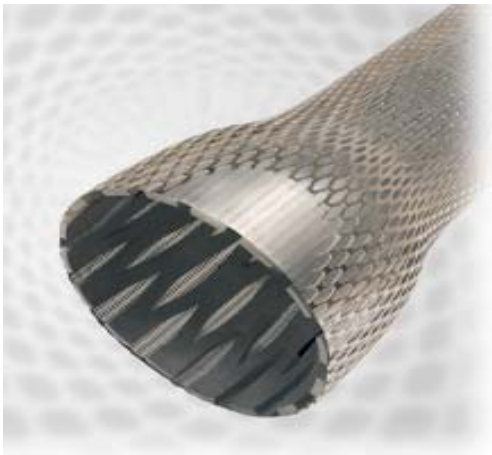
# Troll field – technology development

## Where is the rest of the NCS?

- Troll oil is producing from 35 branched wells
- 15 new branched wells are planned in the present drilling program.
- The rest of the NCS has only 8 branched wells



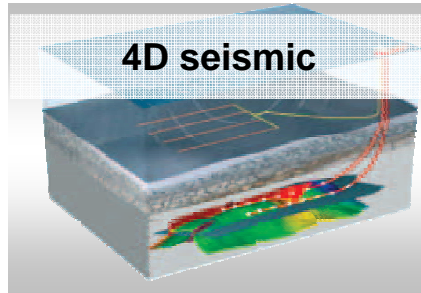
# Expandable technology: 600 global field cases- Norway 1 !



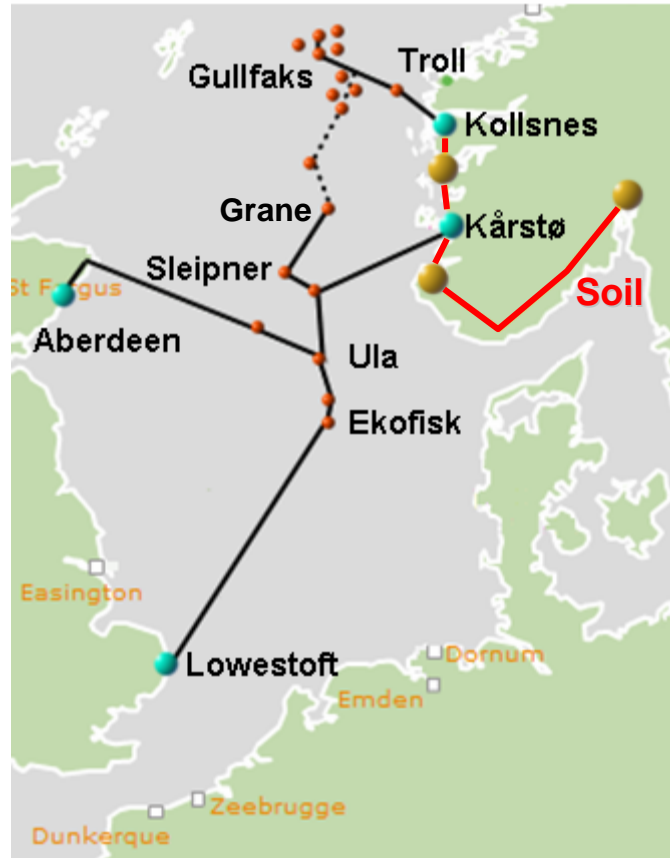
Source: Shell

# Integrated Operations fighting its way

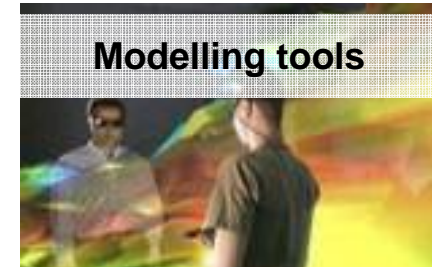
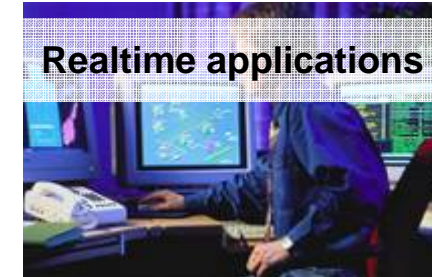
## Offshore



## High capacity digital network



## Onshore



The technology is there – Use it!

# AGENDA

- Petoro
- The cost challenge
- New technology – excessive implementation time?
- Technology examples
- **Reasons for the long implementation time**
- The suppliers role
- Future consequences/summary

# Many reasons for the long implementation time



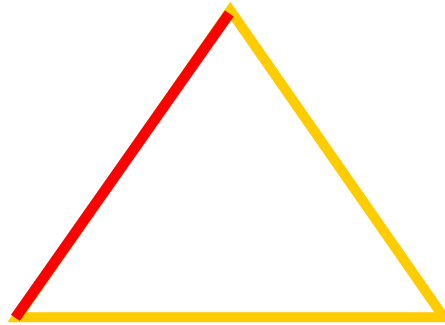
## E&P companies

- High oil price
- Little culture for sharing value creation
- High cost of failure
- Scorecard driven
- Cumbersome change processes
- Contract strategy with few and large suppliers
- Reduced R&D budgets



## Big Service Companies

- Lack of incentives
- Difficult to set off on new ideas
- Bitter past experiences!



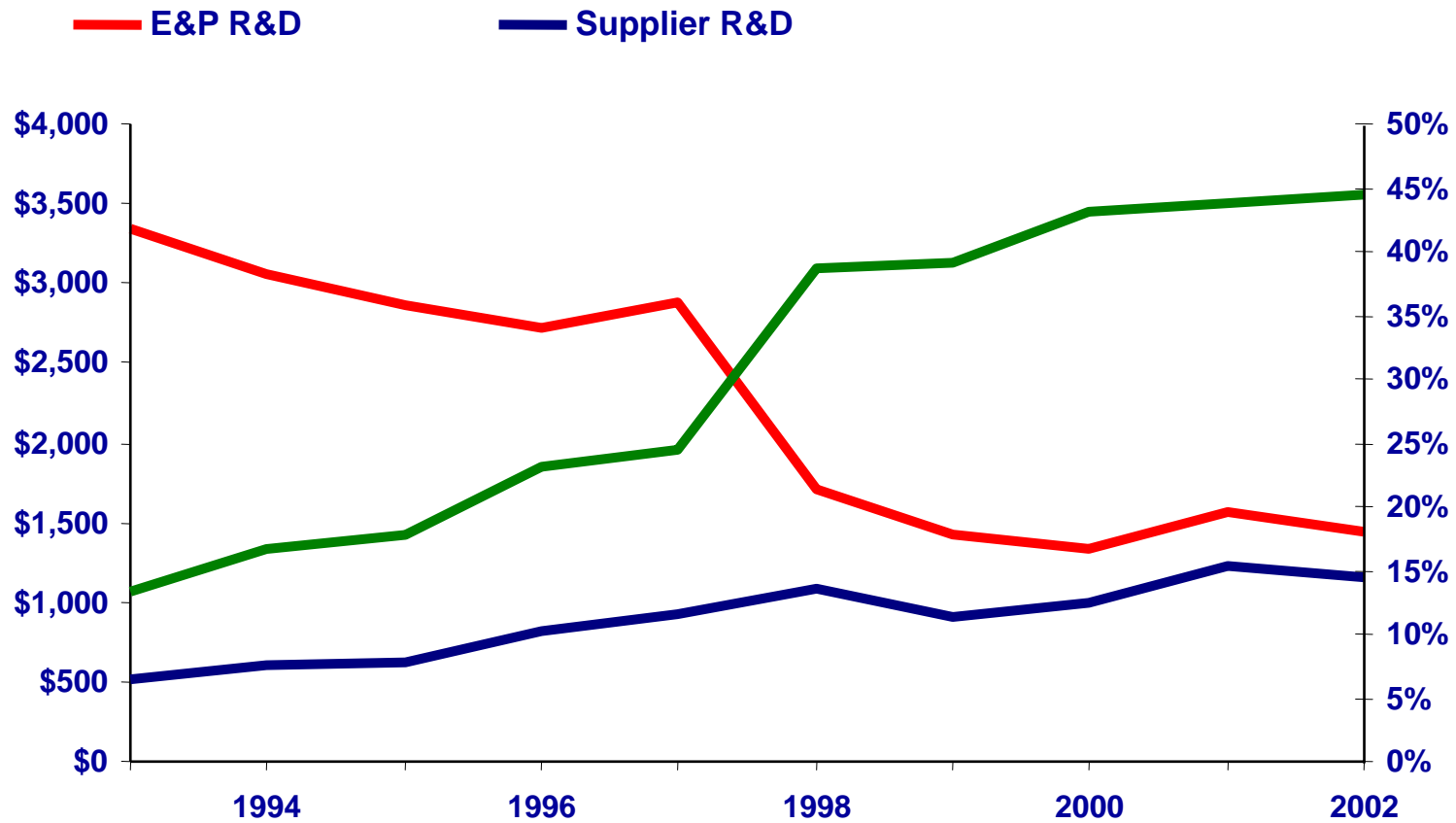
## Small Innovators

- Ambitious
- Lack funding
- Limited market access

# AGENDA

- Petoro
- The cost challenge
- New technology – long implementation time?
- Technology examples
- Reasons for the long implementation time.
- **The suppliers role**
- Future consequences/summary

# Suppliers importance in R&D are increasing



Source: EIA FRS Financial Reports, SEC Filings



# Supplier economy are squeezed

$$\text{Earning} = \text{Revenue} - \text{Costs}$$

Reduction  
↓  
Revenue

Increase  
↑  
Costs



## E&P comp.Methods:

- Horizontal integration
- Vertical integration
- North Sea contracts
- Global discounts
- Zero rate
- Reversed auctions

## Elements:

- Personnel
- Equipment
- Increased responsibility
- Technology
- Environmental requirements

# Contract hurdles

## Technology development is different from shopping commodities

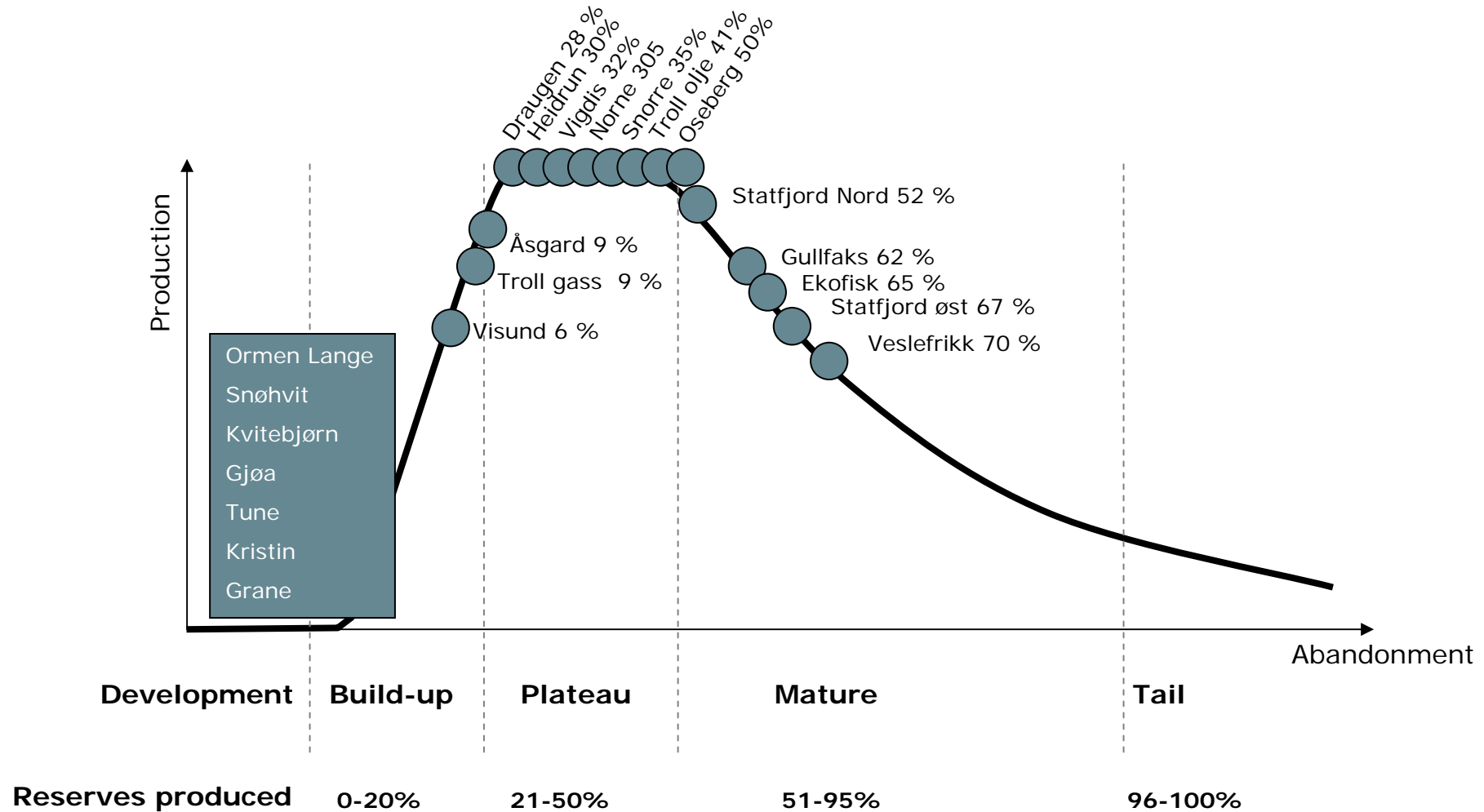
### Important Elements:

- Contracts should stimulate more to quick adoption of new technology, incentivise technology
- Contractors need more long term commitments and security after an initial pilot test.
- Incorporate a long term view and predictability
- Balance the risk
- E&P companies should require the same of own organization and operation regarding cost effectiveness and improvement processes as required of the service industry

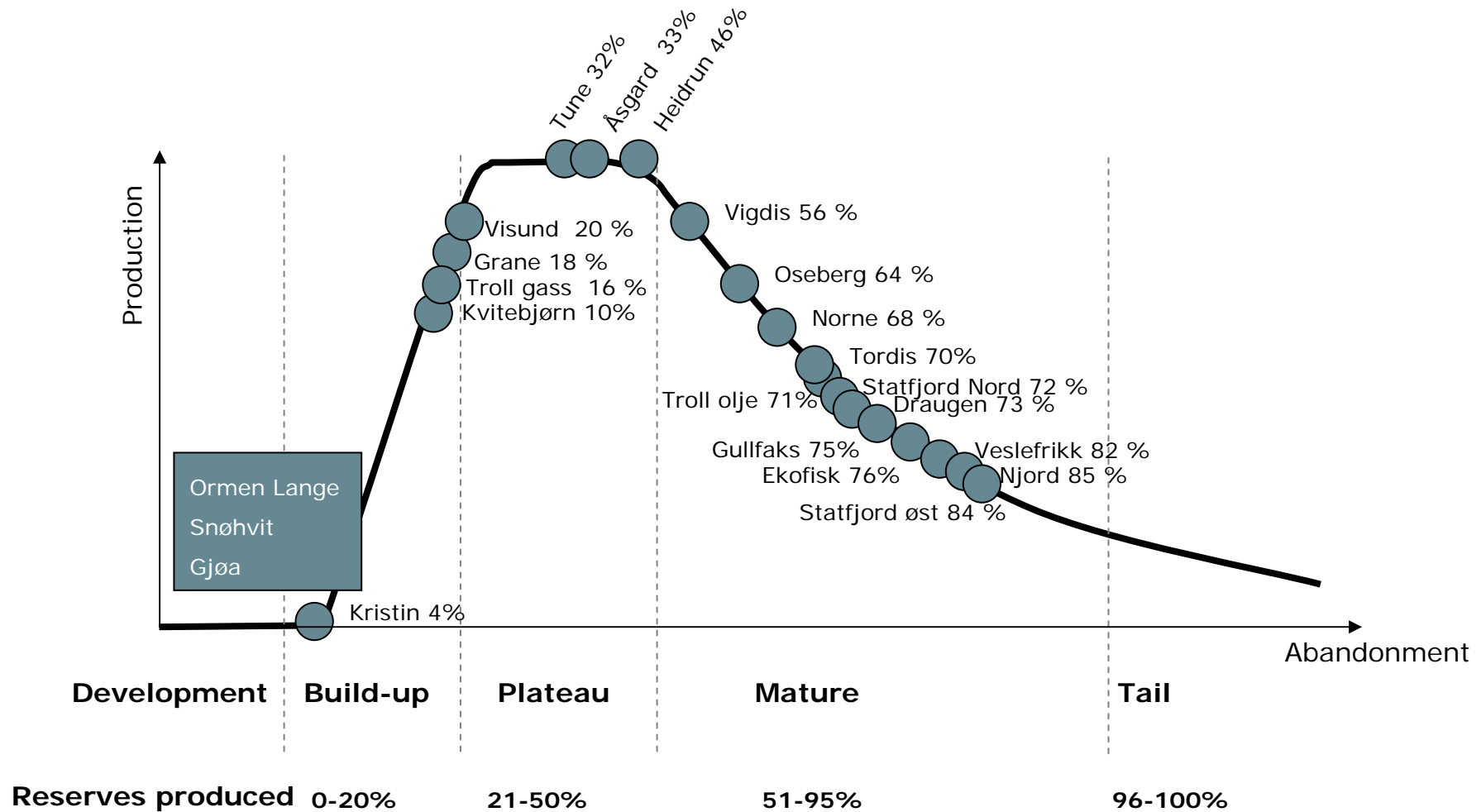
# AGENDA

- Petoro
- The cost challenge
- New technology – long implementation time?
- Technology examples
- Reasons for the long implementation time.
- The suppliers role
- **Future consequences/summary**

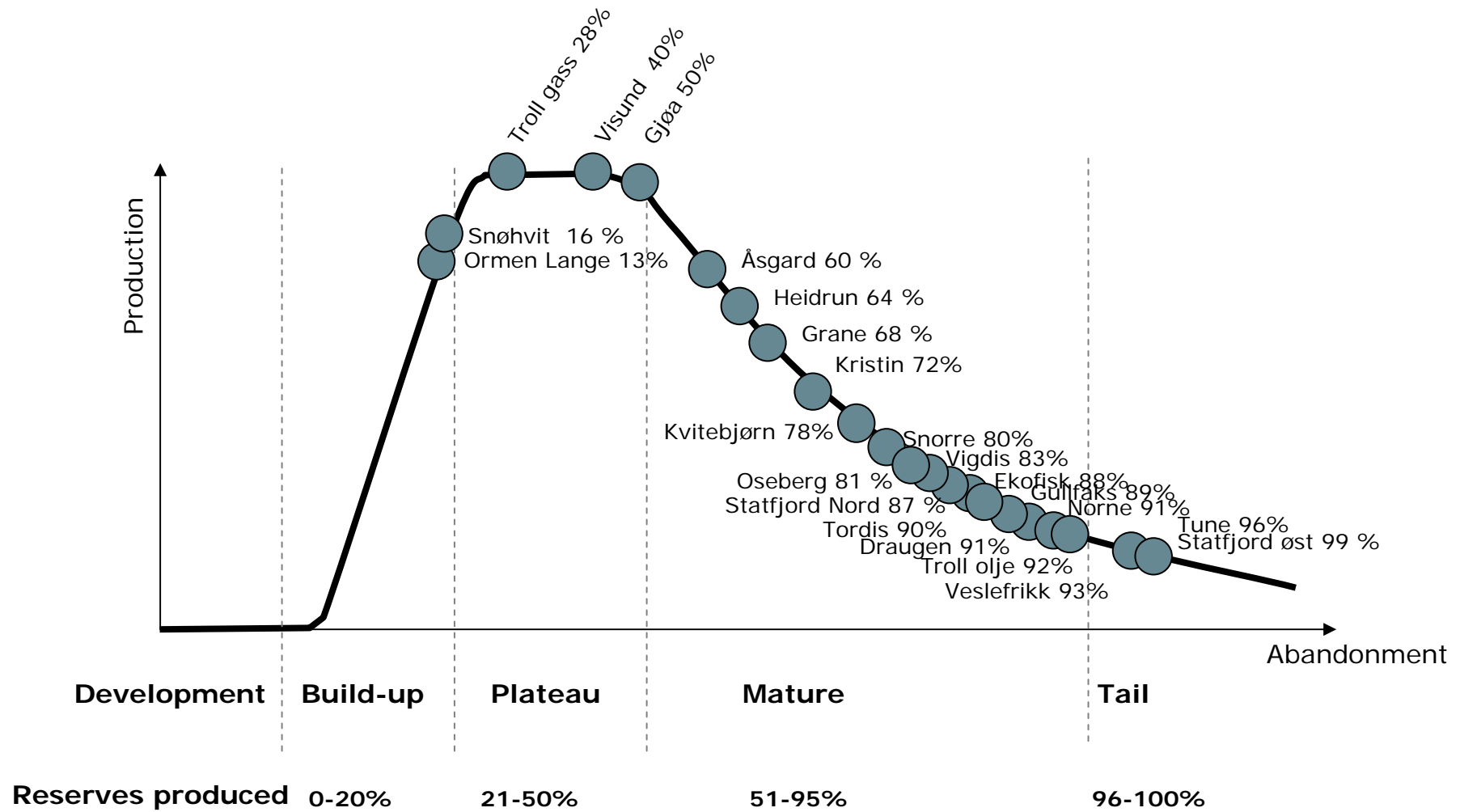
# Maturing NCS - SDFI portfolio in 2001



# Maturing NCS - SDFI portfolio in 2005



# Maturing NCS - SDFI portfolio in 2010



# SUMMARY

- New technology and pilots need to be a part of a strategic planning, owned by the business units.
- The implementation process has to be accelerated
- Increased R&D funding are necessary.
- Contracts need incentives to stimulate to development and trial of new technology.
- Middle management in E&P companies need to be trained in contract management.
- From plateau to mature phase – Requires different management approach.
- We are good in applying new technology in new field developments. This is not the case in many of the mature fields.