Risk assessment and impact on technology decisions

OG21 Forum
29.11.2018

Stakeholders from a wide range of companies and institutions have provided input

25+
in-depth interviews

55
workshop participants

Source: OG21; Rystad Energy

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Suppliers

Sub-suppliers

25+
in-depth interviews

55
workshop participants

Operators

License holders

Source: OG21; Rystad Energy

Stakeholders from a wide range of companies and institutions have provided input

Supplier vs. operator

Sub-supplier vs. supplier

25+
in-depth interviews

55
workshop participants

Operator internal

Operator vs. license

Source: OG21; Rystad Energy

Four perspectives on risk assessment and impact on technology decisions

Supplier vs. operator

Changed service landscape

Early involvement and effects of integration

Technology qualification
- Qualification vs. lead time
- Sharing of data

Sub-supplier vs. supplier

Value chain inefficiencies as obstacle for technology adoption

Effect of integration on smaller sub-suppliers

Risk assessment and impact on technology decisions

Operator internal

Decision criteria in greenfield, brownfield and drilling applications

Enabling vs enhancing technologies – pull vs. push

Organizational barriers
- KPIs and cross discipline challenges
- Procurement («Terms and conditions»)
- Changed work processes

Operator vs. license

Changed player landscape on the NCS over the last three years

License dynamics
- Field vs. portfolio value
- Partner investment opportunities
- Partner technology evaluation and risk appetite

Source: Rystad Energy research and analysis

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TRL4 stuck between two chairs, “too big for Rotvoll” and too time consuming for license to adopt

Supplier vs. operator

Maturing technologies
Technology Readiness Level (TRL) – API17N

Steps on the TRL ladder

TRL0	TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7
Unproven concept Basic R&D	*Study or experiment to prove concept*	*Experimental proof of concept*	*Prototype tested*	***Pre production system environment tested***	*Production system interface tested*	*Production system installed and tested*	*Production system field proven*

Cost to progress to next step

E&P funding source

Operator R&D budget (FoT setup) | **License**

To qualify a technology from TRL3 to TRL4 is typically too expensive to be carried over the operators’ R&D budget and will need funding from a license

Paradox

All operators interviewed require a technology level of TRL4 or higher before sanctioning a project (DG3)*

Paradox:
Technology qualification does not match time sensitive nature of the development project, yet is dependent on the project for further maturation

*Exceptions exist, but using less mature technologies increases risk of project delay significantly
Source: Interviews; OG21 2016 strategy; Rystad Energy research and analysis

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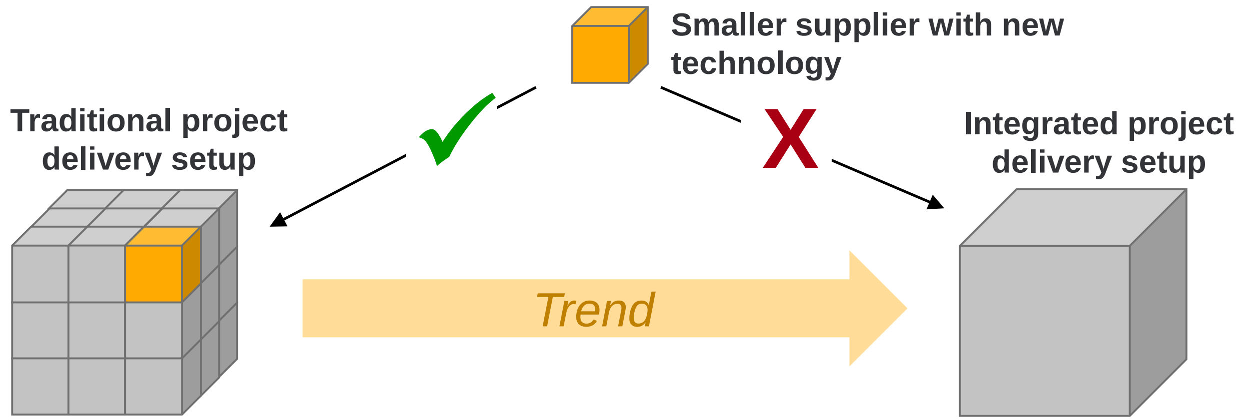
Operators are playing with bigger blocks; integrated suppliers are the new gatekeepers

Operators are playing with bigger building blocks; smaller suppliers can't deliver directly to operator and must go through the integrated service company



- Split contracts, smaller building blocks purchased at a time.
- **Possible for smaller supplier with independent delivery to operator**

- Integrated contracts, bigger building blocks
- **Sub-supplier cannot deliver directly to operator**

New ventures have been key in developing technologies to keep the NCS competitive
Where do they fit now? Who takes the risk?

Source: Interviews; Rystad Energy research and analysis

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New tech pivotal for the largest fields – current avg. NCS development too small?

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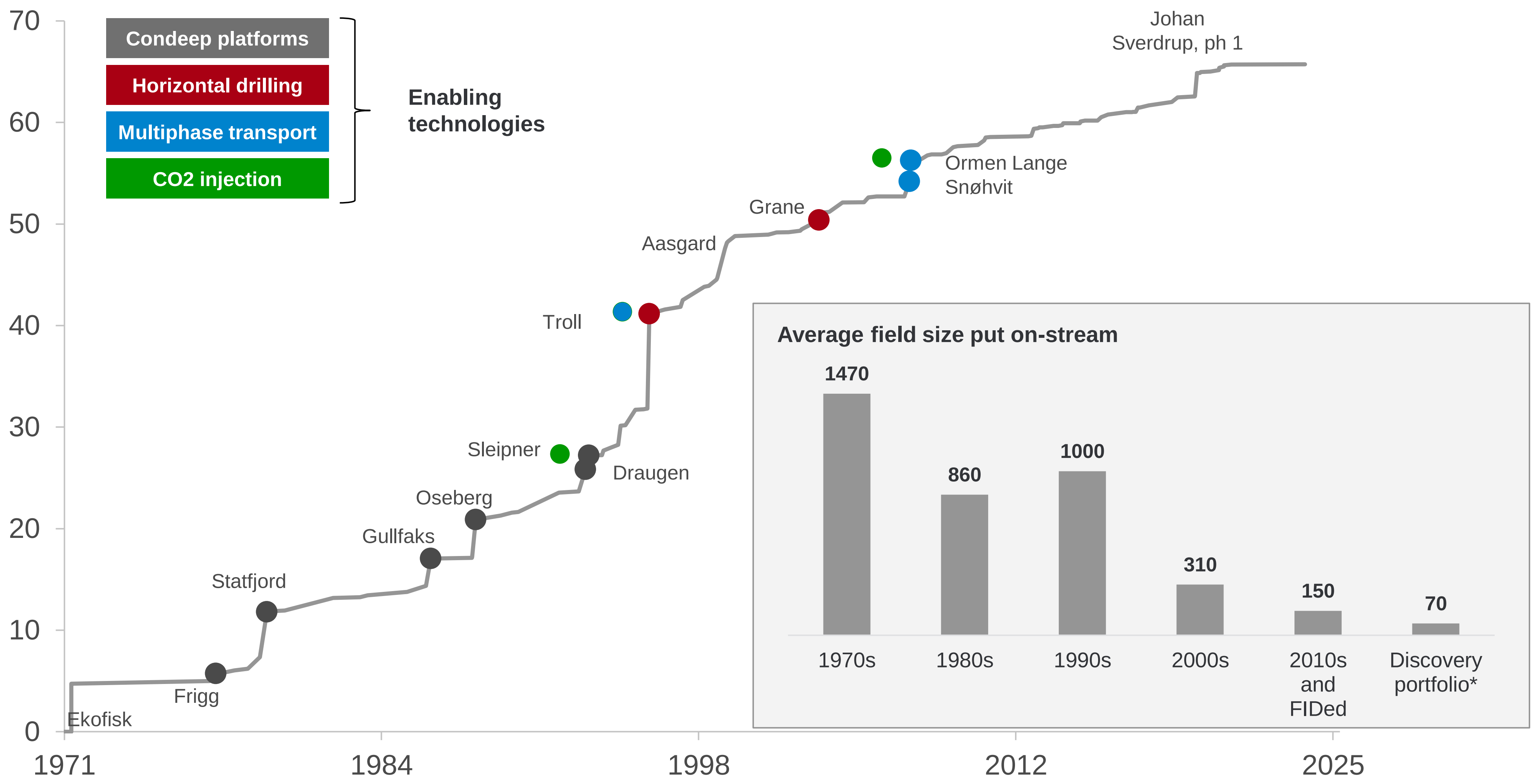
Cumulative resource development on the NCS by start-up year and field
Billion barrels of oil equivalents



Sources: Rystad Energy research analysis; Rystad Energy UCube

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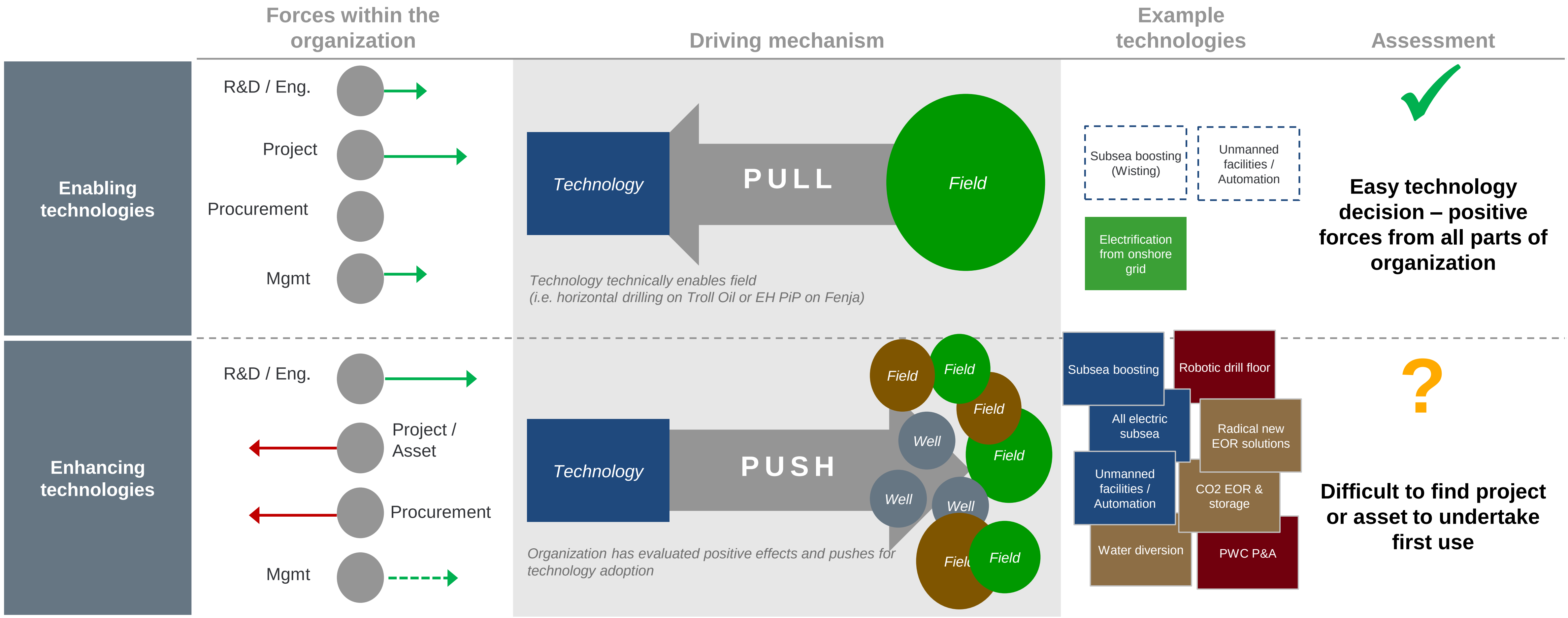
Most example technologies are enhancing – need to be pushed through the system

Operator internal



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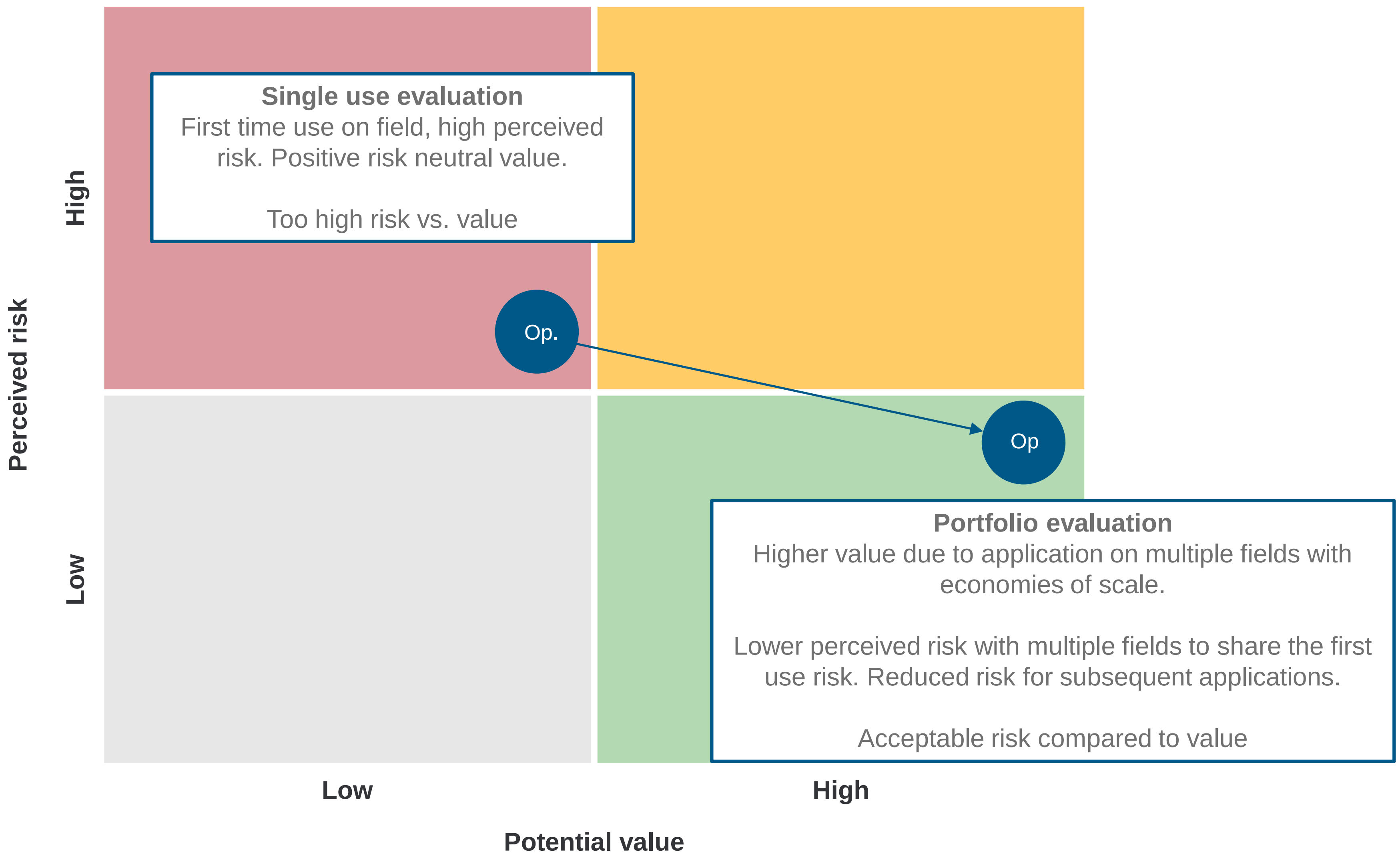
Visualizing the license: Operator positive to technology due to high portfolio value

Operator vs. license

Risk – value matrix

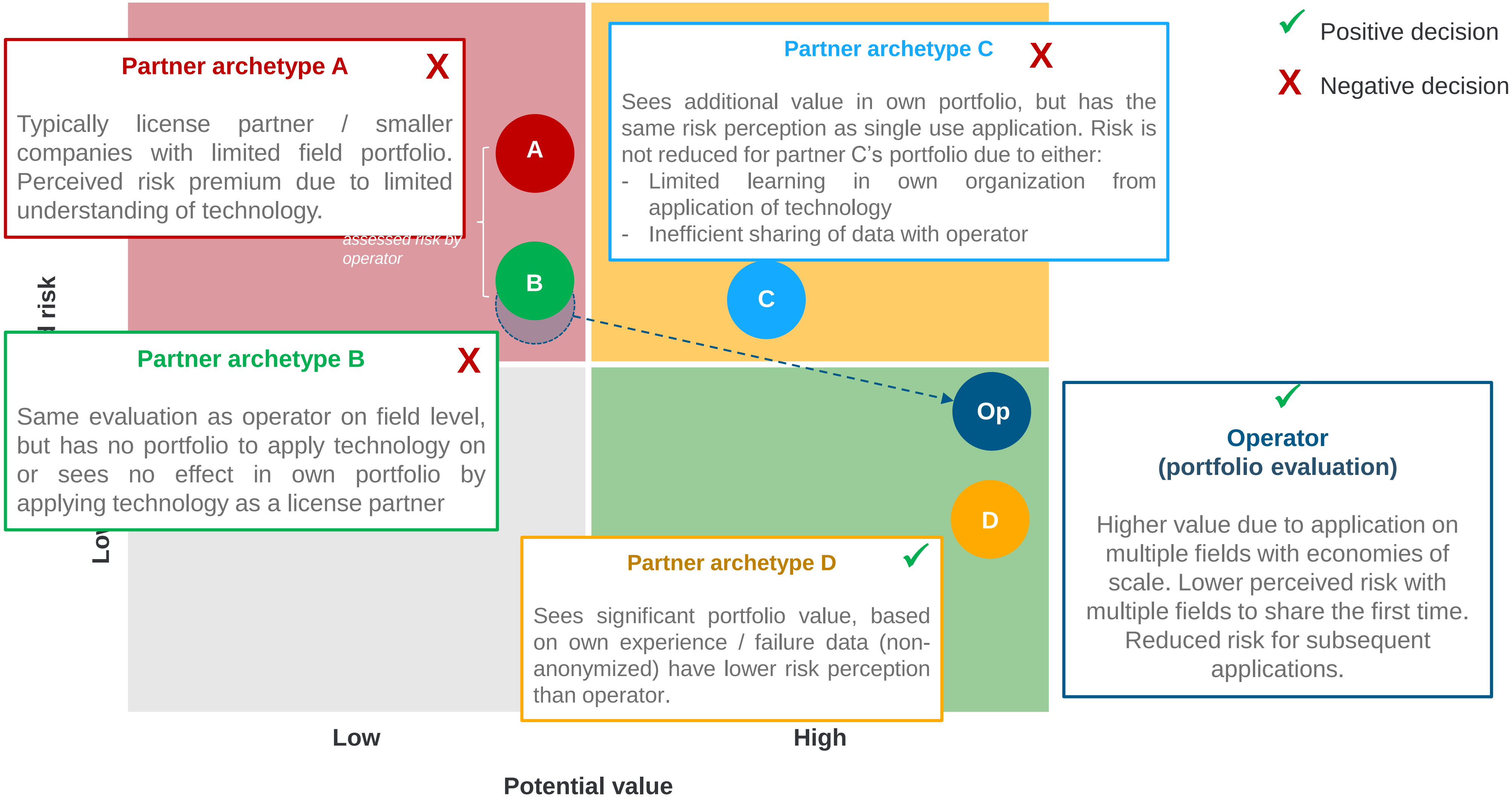


Source: Interviews; Rystad Energy research and analysis

Visualizing the license: Portfolio differences and risk assessment key differentiators

Operator vs. license

Risk – value matrix



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Key take-aways from the four perspectives

Supplier vs. operator

- Early involvement has positive impact on the use of new technologies and innovative concepts, but could limit the set of potential technologies for application.
- Technology must find a license for last qualification steps, but the license may not have sufficient time for qualification without affecting lead time.
- Technology pipeline management challenging for suppliers with respect to field use cases and timing
- Limited data sharing results in requalification and negative technology decisions

Sub-supplier vs. supplier

- Sub-suppliers are a key contributor to technology development on the NCS and globally
- Value chain inefficiencies, like day-rate models, hinder adoption of new technologies from smaller sub-suppliers
- Although integrated set-ups create one more gatekeeper for the sub-suppliers, it may resolve some but not all value chain inefficiencies

Risk assessment and impact on technology decisions

- Decision holders are not incentivized to be first movers on new technologies, particularly for enhancing technologies
- Technologies that are cross discipline tend to amplify *"first mover disadvantage"*
- Procurement is cost-optimized rather than value-optimized – terms and conditions do not favor suppliers to take on technology risk
- Change of work process needed to fully realize value from new technologies

Operator internal

- Technology adoption may stop in licenses due to differences in perceived value and risk
- License partners do not get the same portfolio effect as operators in applying the technology for the first time, partly due to inefficient sharing of data
- The operator is often late in bringing technology decisions to the license – can result in conservative decisions
- Mostly benefits from the changed NCS player landscape

Operator vs. license

Source: Rystad Energy research and analysis

Key take-aways from the four perspectives

- Tidlig bra, men begrenser løsningsrommet
- Kvalifisering forsinker
- Ulik kø for leverandør og bruker
- Data deles ikke – et problem

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- De små er oppfinnerne!
- Dagrater = "nei til forbedring"
- Integrasjon kan også hinder

Risk assessment and impact on technology decisions

- *"First mover disadvantage"*
- Innkjøpere kan kost men ikke verdi
- Prosessen stopper teknologien

Operator internal

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- Ludvik effekten – "kan værra fali det"
- Ny operatører i Norge vil mer!

Source: Rystad Energy research and analysis

THANK YOU

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Oslo, London, New York, Houston, Rio, Moscow, Dubai, Singapore, Tokyo, Sydney, Bangalore, Stavanger, Ålesund, Bratislava

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