Monitor
Deloitte.

Innovation in the New Reality

Dutch Oil & Gas Conference

Bart Cornelissen, Rotterdam, June 27th 2016

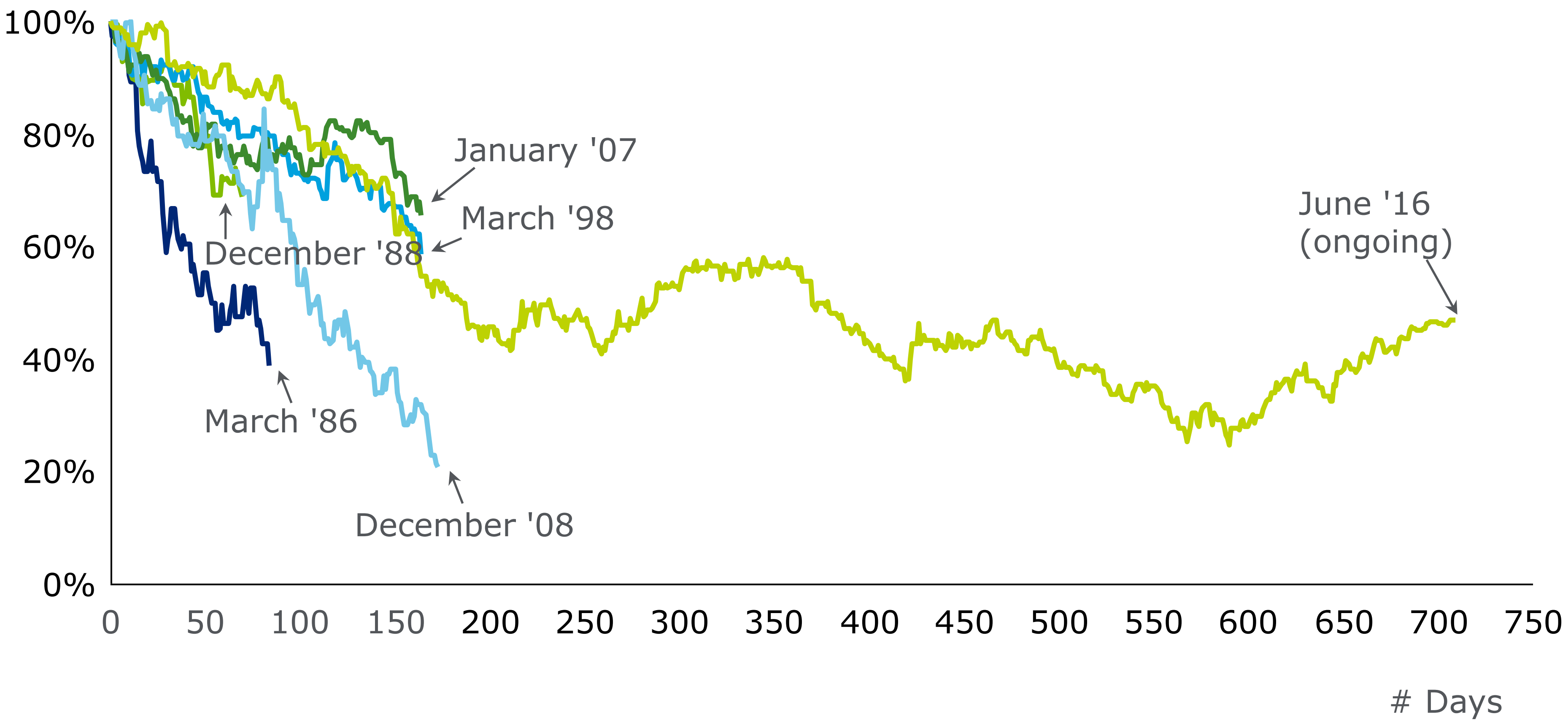
Topics for discussion

- Innovation in Oil & Gas - A new reality?
- The challenge – Cost reduction & beyond
- Collaboration – The way forward
- Building effective ecosystems

A new reality

We are currently experiencing the longest crisis in decades

Duration of Oil Price Declines since 1986 (WTI, Peak to Trough – % of Peak Price)

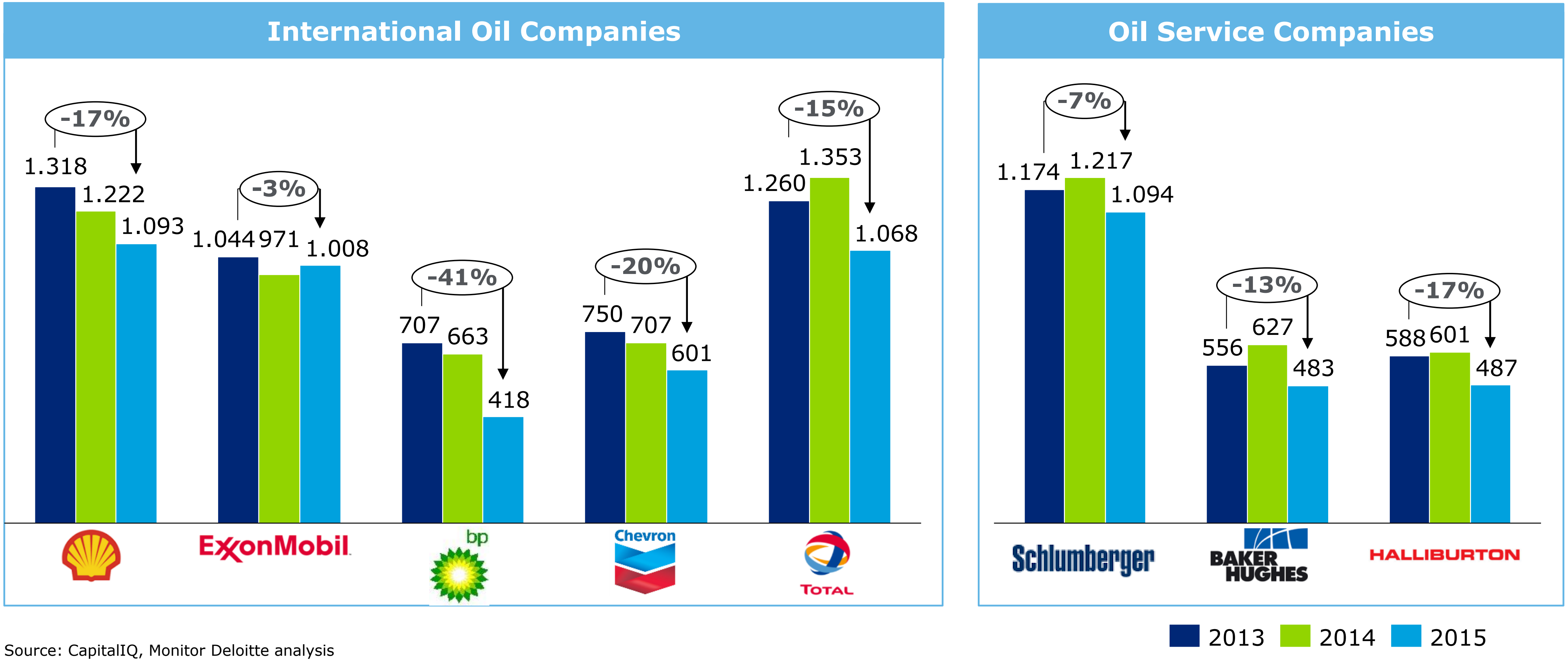


Source: Federal Reserve Bank of St. Louis; Monitor Deloitte analysis

A new reality

Cost-cutting in recent years resulted also in a reduction of R&D spend by IOCs as well as oil service companies

Spending on R&D ($m)

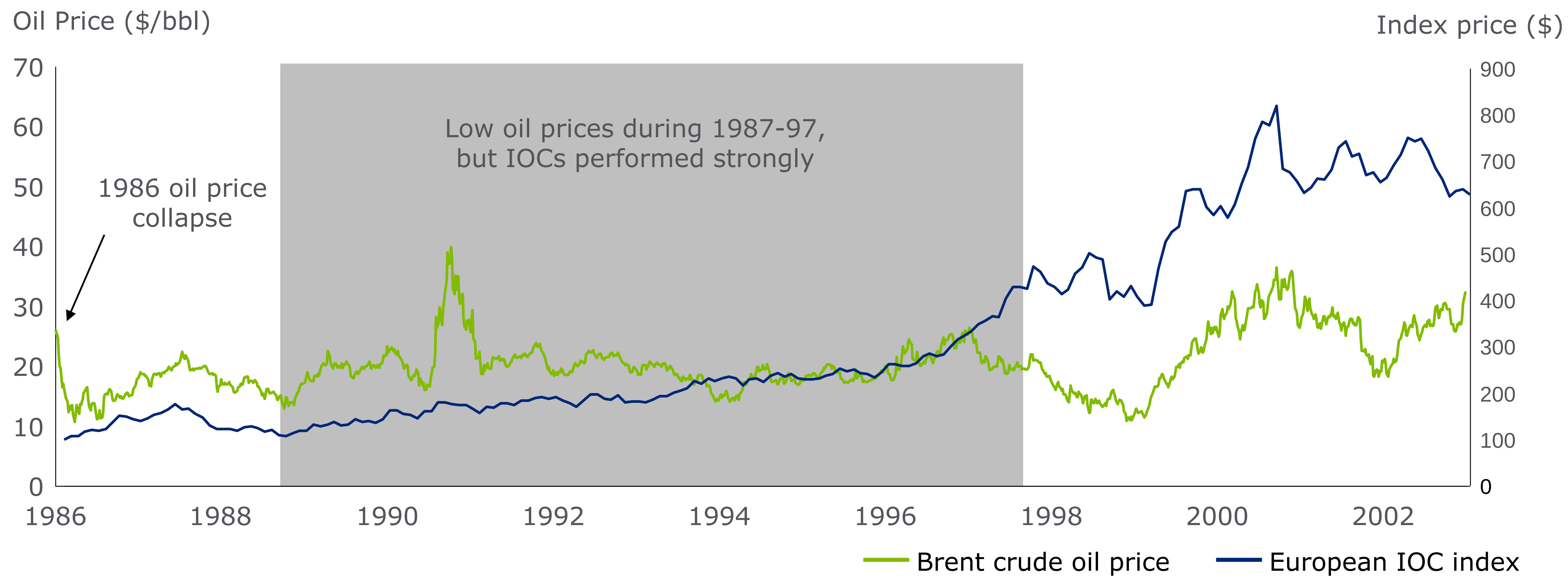


Source: CapitalIQ, Monitor Deloitte analysis

The challenge

After 1986, oil prices stayed low and stable for 10 years, nevertheless IOCs performed strongly with relatively low volatility

European IOC Share Price* (indexed) vs Brent Oil Price

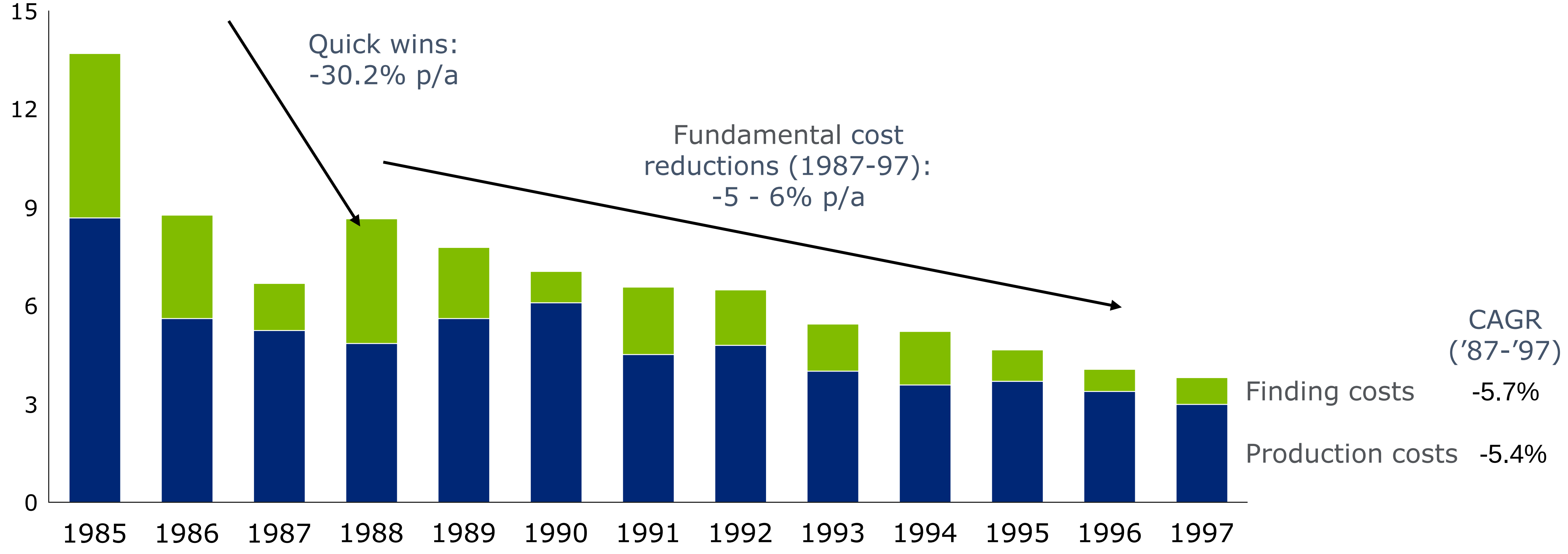


Note: Custom index contains equally weighted average returns from Royal Dutch Shell, BP, Total and Elf Aquitaine (rebased at 1986=100)
Source: Bloomberg

The challenge

A ‘cost-culture’ was established, finding 5-6% real-term cost savings each year during 1987-97

Production and Finding Costs ($/boe; in real 1987 dollars)

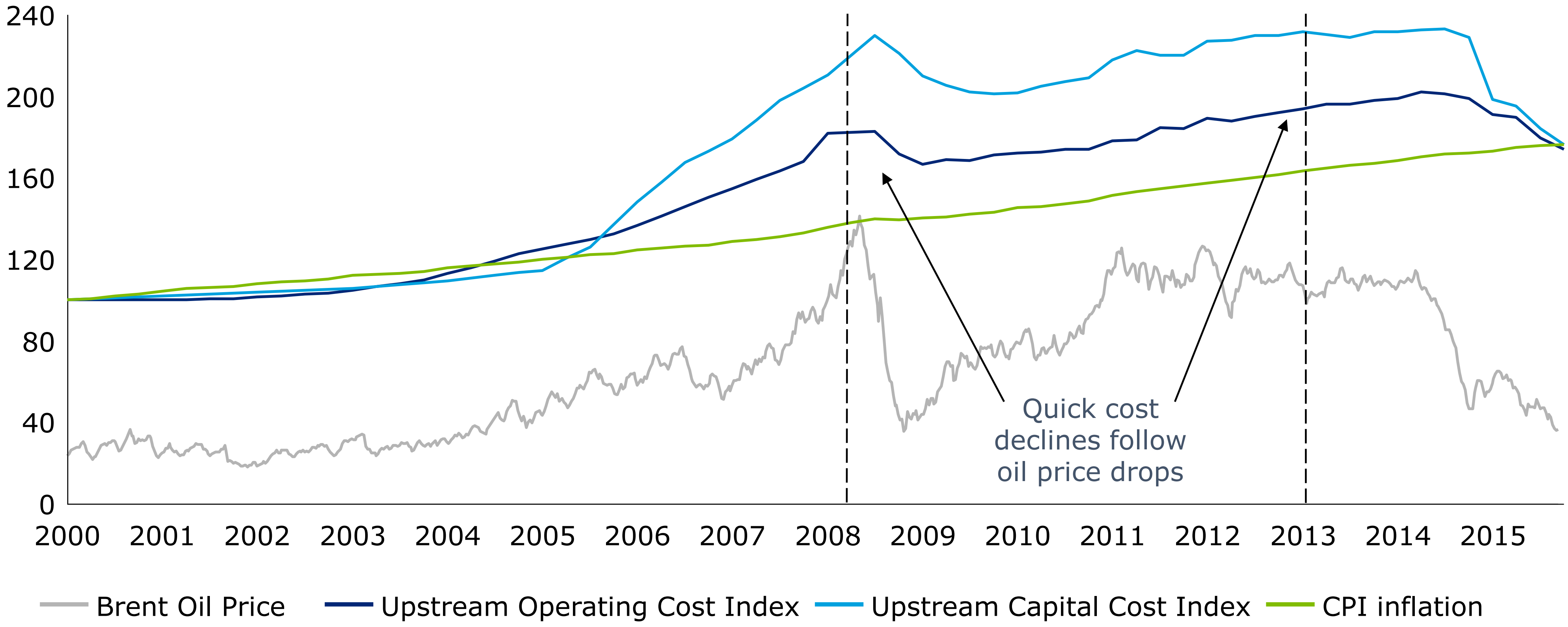


Note: IOCs include Shell, BP, Total and Elf Aquitaine
Source: Morgan Stanley Research 2015

The challenge

Highly inflated upstream costs clearly establish a role for innovation to drive fundamental cost reductions

Upstream Cost Indices vs Global CPI Inflation (Y2000=100) and Brent Oil Price ($/bbl)



Source: IHS, IMF

Besides cost reduction the longer-term themes of late-life/ decom-missioning and energy transition will drive the need for innovation

Late-life / decommissioning

Challenges	Innovative solutions
Decommissioning **equipment** availability	New **methodologies** / supply chain & logistics improvements
Supplier **lack of experience** / capability gaps	New **methodologies** / **ecosystem** thinking
Limited experience with successful **collaboration**	New **business models /** **ecosystem** thinking

Opportunity: $18b market (2015-2025, North Sea)

Energy transition

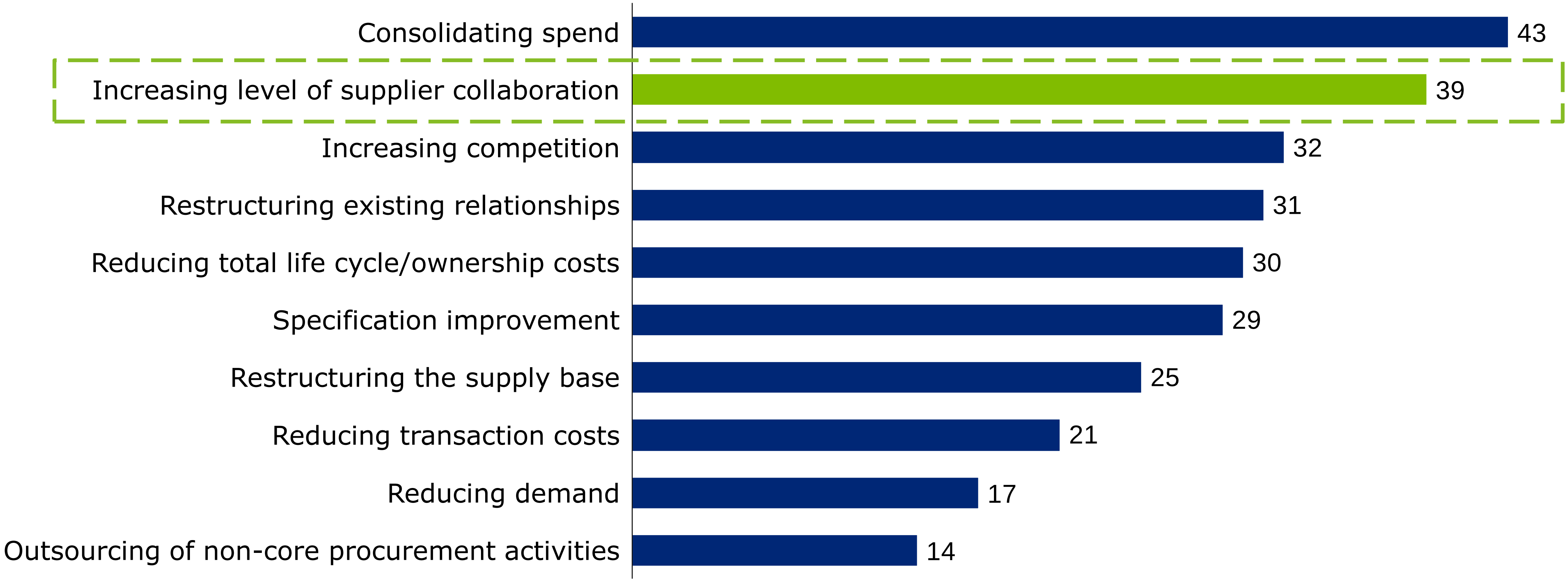
Challenges	Innovative solutions
Short-term reduction of CO_2 emissions	Efficient production of **natural gas**
Increasing demand for **lower carbon energy**	Scale up decarbonisation technology (**CCS**)*/***
Long-term reduction of CO_2 emissions	Efficient **underground** injection / large scale gas **separation** development**
	Optimise zero net carbon (**ZNC**) fuel technology***

Opportunity: growing demand for lower carbon energy / continued low oil prices

Source: * www.shell.com; ** www.epa.gov; *** www.carbonbrief.org; Monitor Deloitte analysis

Supplier collaboration is one of the most important strategies CPOs focus on to deliver value

CPO Focus (% of Survey Respondents)

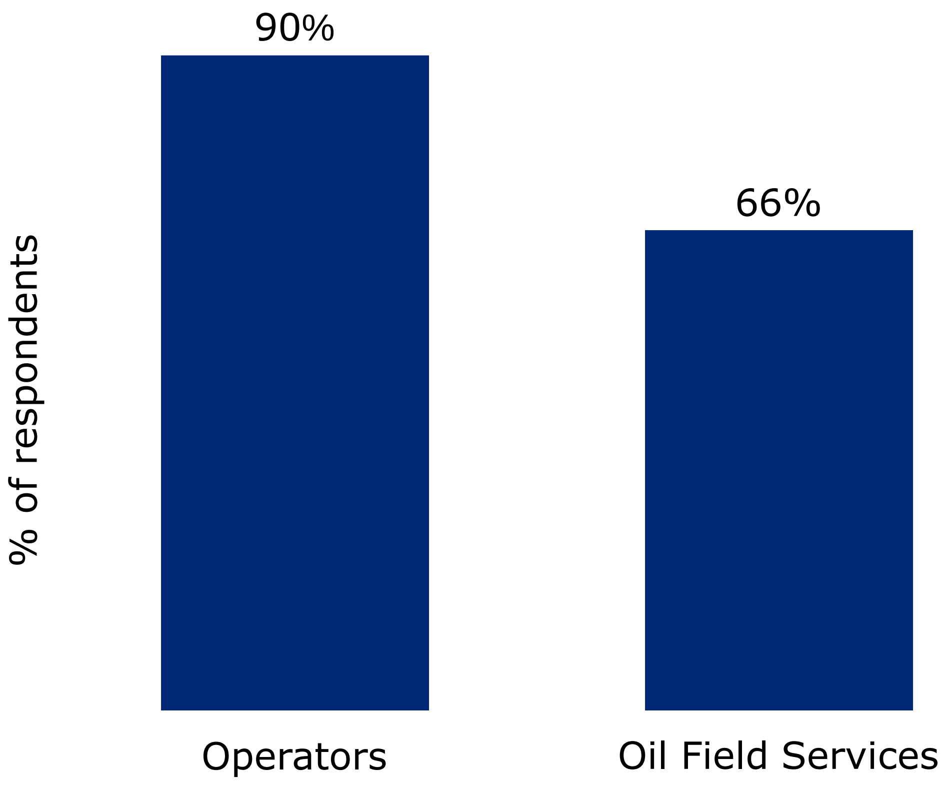


Note: The survey combines the opinions of 324 procurement leaders from 33 countries across several industries
Source: The Deloitte Global CPO Survey

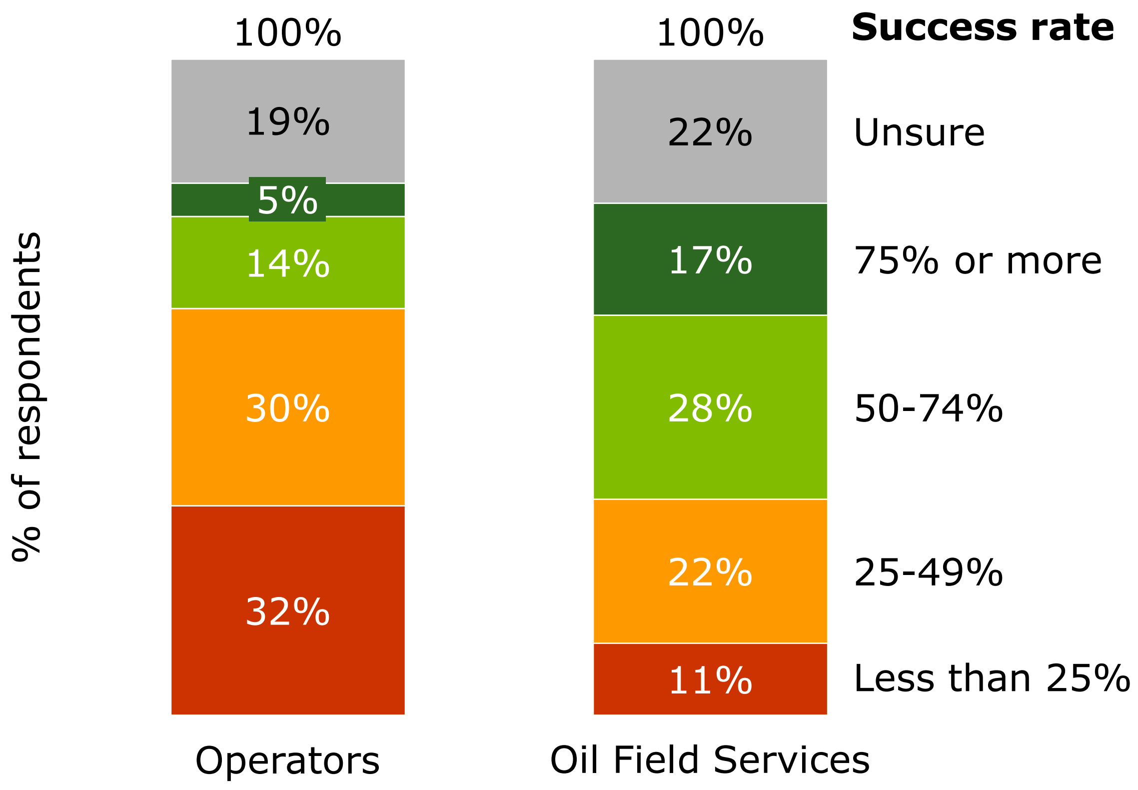
The way forward

In O&G there is a long tradition of collaboration, though we struggle to do this successfully

Collaboration is an integral part of business (%)



Successful collaboration efforts by company (2015)

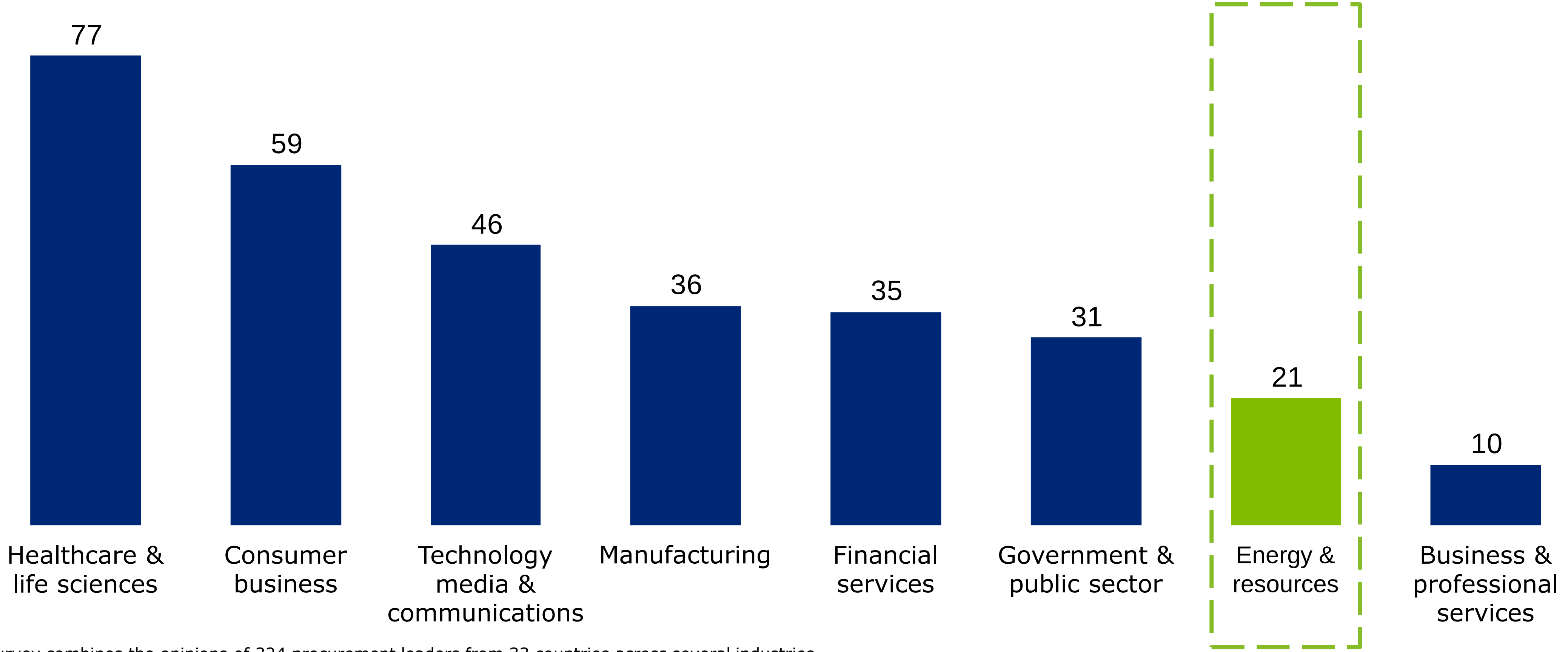


Source: Deloitte Survey of UKCS operators and oilfield services companies (August 2015)

The way forward

To turn this around we might want to learn from other industries…

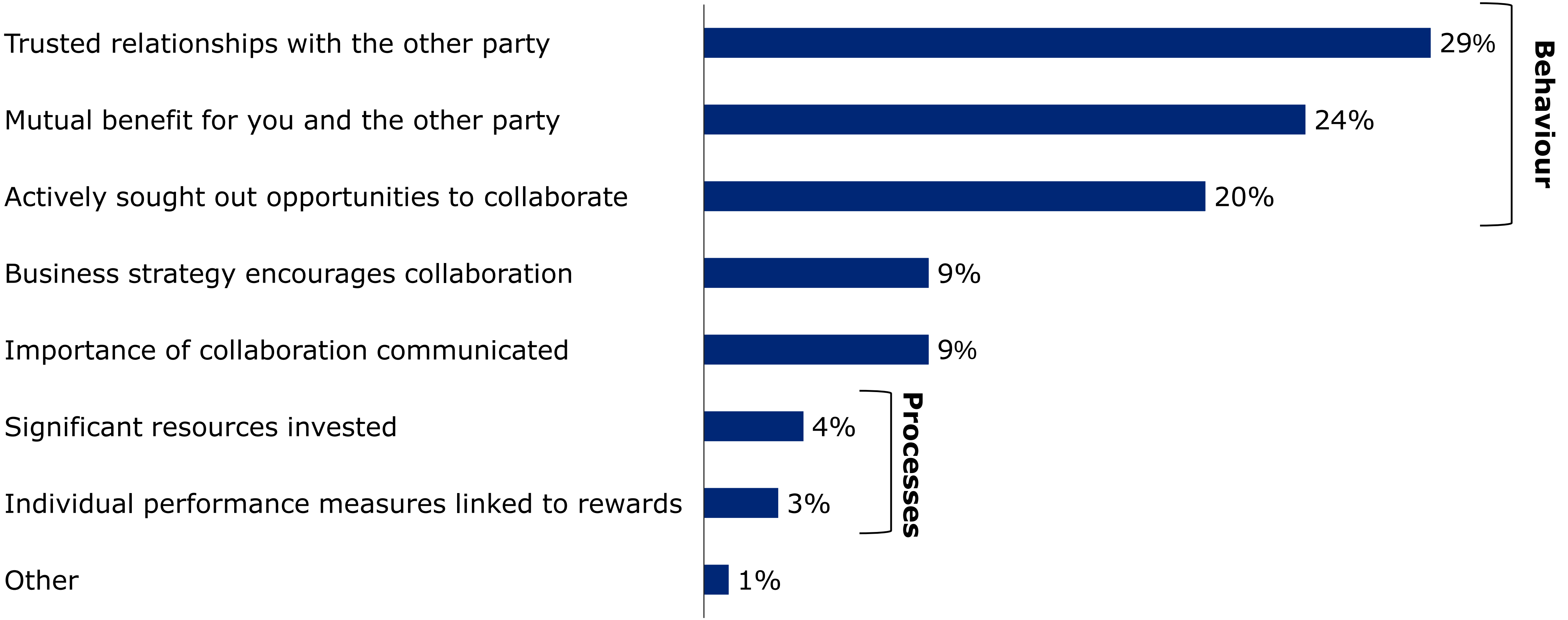
Percentage of surveyed CPOs that are actively driving innovation with suppliers



Note: The survey combines the opinions of 324 procurement leaders from 33 countries across several industries
Source: The Deloitte Global CPO Survey

…And focus on building trust relationships, mutual benefits and being proactive

Principal reasons for successful collaboration (% of responses)



Source: Deloitte Survey of UKCS operators and oilfield services companies (August 2015)

We have seen some good examples of how collaboration may actually work to drive innovation

New Business Models

Schlumberger, Golar LNG

What? Partnering based on **a risk-based contract model** for deployment of FLNG technology

Why?
- **Commercial alignment** across the value chain
- Upside **compensations** (SLB)

Impact
- Improved **cost structure** / efficiency
- Provide a **platform** for further growth / collaboration with other partners

www.slb.com / www.marketrealist.com

Internet of Things (IoT)

Halliburton Landmark, pentaho

What? Combination of **semi-structured data** from multiple sources with **advanced analytics algorithms**

Why? Use **predictive analytics** capabilities **to spot business trends**, gain new insights and mine unexplored data

Impact
- **Increased pump safety** and decreased spills
- **Improved critical decision making**

www.pentaho.com

Advanced Materials

International Centre for Advanced Materials, UCL, University of Cambridge, Manchester 1824, Illinois

What? Collaboration of BP and four universities to perform **fundamental research on advanced materials**

Why? Combine **complementary knowledge** to become the market leader and be on the **forefront of emerging technologies**

Impact
- **Better performance** in E&P
- **Improved knowledge** on carbon management, bioenergy, efficiency & storage

www.bp.com

Building effective ecosystems

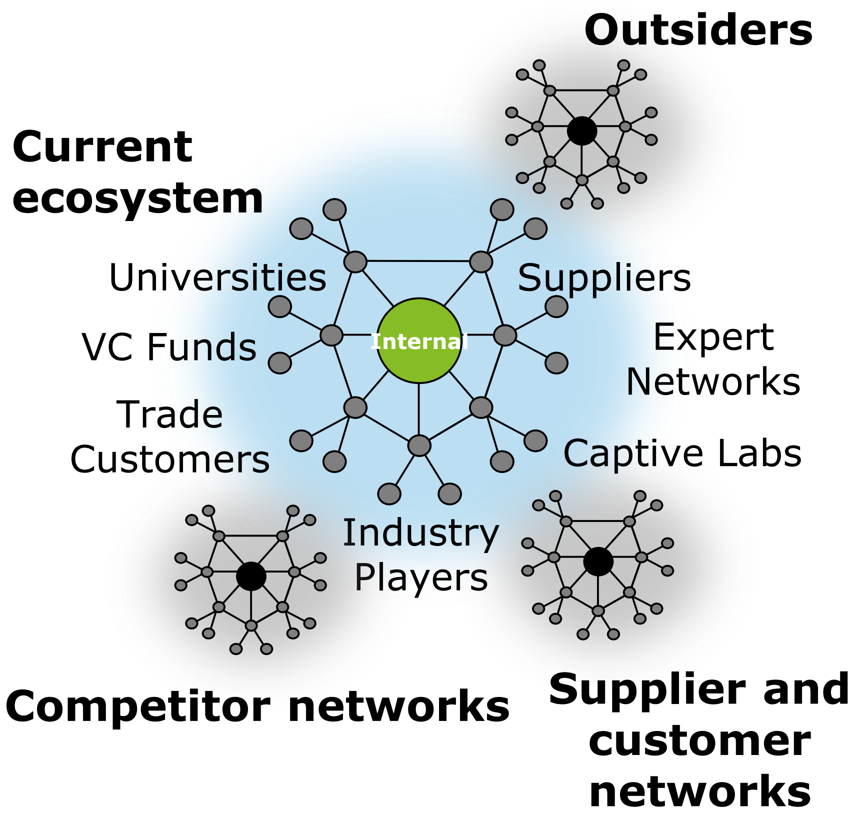
Collaborating across the value chain with different models creates ecosystems that in turn interact with other ecosystems and platforms

Spectrum of ecosystem models

Broad Reaching and Transactional

- **Open partner platforms**
  iPhone / App Store / Google Maps
- **External challenges**
  P&G Connect & Develop / Netflix Prize
- **R&D / Technology brokering**
  GSD & ceedd™ / XETANOL & UTEK
- **Consortium / Incubator**
  US Advanced Battery / IBM "Collaboraties" / Automotive
- **Value chain network**
  SABIC Innovative Plastics Network / IFF Value Chain Network
- **Partnership / Alliances / JVs**
  Walt Disney & NBC & News Corp. / Nike & Apple iPod

Focused and Collaborative



In order to be successful, eight key elements need to be properly covered in the ecosystem

SPONSORING & INCENTIVES
Provide sponsorships, metrics & incentives

PARTNERS
Identify & manage partner & portfolio relationships

KNOWLEDGE SHARING
Define optimal levels of IP and knowledge sharing with partners

STRATEGIC ALLIANCE
Define long-term collaborative strategy fitting for all partners

ANALOGIES
Spot useful analogies in external companies and adjacent industries

CHALLENGES
Frame market problem statements and challenges

EXTERNAL EXPERTISE
Attract relevant external expertise

OPPORTUNITIES
Create high impact opportunities