Global Strategic Capital Project Management and Supply Chain Management in Oil and Gas Depression

CSSOPE Workshop

April 24, 2016
Business Management Exercise

M&A
• Business Management Exercise: M&A (15 min.)
• Rationalization on a Massive Scale: New Expectations (20 min.)
• Potential Cost Take-out: Disruptive Organizational and Financial Techniques (20 min.)
• Break (10 min.)
• Potential Cost Take-out: Supply Chain Strategies (30 min.)
• Exercise: Bundled Price Negotiation (30 min.)
• Break (10 min.)
• Changing the Game through Technology and Innovation (20 min.)
• Exercise: Digitalization (20 min.)
• Conclusion (5 min.)
Your Workshop Leader
# Boston Strategies International

## Oil, Gas, and Power Clients
- National Oil & Gas Companies such as Saudi Aramco, PDVSA, CNPC, and Gazprom
- International Oil & Gas Companies such as BP, Total, Novatek, and American Energy
- Power Producers such as Vattenfall and Iberdrola
- Suppliers such as Siemens (motors), BASF (chemicals), and Wood Group (turbine maintenance)

## Major Capital Projects
- Major capital projects failing to meet target rate of return
- Market opening, reform or deregulation requires elevated procurement capability
- New stringent technical requirements require evaluation of alternative technologies
- Diversification into a related business with different supply market dynamics

## Cost Reduction
- Custom Market Analytics for Highly Engineered Products and Services
- Contract Negotiations Support
- Procurement Advisory and Training (esp. Tender Design and Management)
- Strategic Value Chain Planning and Optimization
- Process Improvement

## “50x” Payback
- 50% cycle time compression
- 20-30% profit margin improvement
- 50+ times payback on consulting services

## Proven Track Record
- Founded in 1998
- Offices in USA, UAE, India, Bahrain, Qatar, Saudi Arabia, China, Colombia, Iraq, and UK

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E-mail: djacoby@bostonstrategies.com
David Jacoby, CEP, CSCP, C.P.M., CTL, CIRM, CFPIM

• Consulted for over 25 years in operations strategy and performance improvement, especially in the oil, gas, and power industries.

• Wrote The Economist Guide to Supply Chain Management (The Economist, 2009), and Optimal Supply Chain Management in Oil, Gas, and Power Generation (PennWell, 2012).

• 250 speeches, articles and webcasts to publications such as Oil and Gas Journal, Supply Chain Management Review, Energy Tribune, and Supply Chain Quarterly.

• Taught Operations Management at Boston University's graduate school of business

• Editor at the Economist Intelligence Unit

• Consulted to the World Bank. While based in Brazil, Hong Kong and France, he consulted on strategic sourcing, purchasing and outsourcing, shipping, and capital investments.

• MBA from the Wharton School

• Masters in International Business from Lauder Institute

• Bachelor of Science in Finance and Economics from the University of Pennsylvania

• Petroleum Engineering studies

• Certified Energy Procurement Professional (CEP), Certified Fellow in Production and Inventory Management (CFPIM), Certified in Supply Chain Management (CSCP), Certified in Integrated Resource Management (CIRM), Certified in Purchasing Management (Lifetime C.P.M.), and Certified in Transportation and Logistics (CTL).
Serving Industry Majors
A Procurement Consultancy

<table>
<thead>
<tr>
<th>Pre-Feasibility</th>
<th>FEED</th>
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<th>Tendering</th>
<th>Construction</th>
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<tbody>
<tr>
<td><strong>Custom Market Analytics for Engineered Products and Services</strong></td>
<td><strong>Organization Design and Development</strong></td>
<td><strong>Operations Improvement</strong></td>
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</tbody>
</table>
| A market intelligence solution that saves buyers money and helps them avoid costly mistakes by recommending timely procurement actions and technology strategies. | Training and development workshops and programs. | - Process and equipment standardization  
- Vendor managed inventory  
- Sales & operations planning  
- Demand planning  
- Debottlenecking  
- Preventive maintenance  
- Capital spares management |
| - MarketOutlook.com  
- Supply risk mitigation model  
- Supplier Optimization Model | |

### Independent Cost Benchmarking
- **Service**
- **Purpose**
- **Projects**
- **Savings**

### Value Chain Engineering
- **Service**
- **Purpose**
- **Projects**
- **Savings**

### Tender Design & Management
- **Service**
- **Purpose**
- **Projects**
- **Savings**

### Supply Contract Negotiation
- **Service**
- **Purpose**
- **Projects**
- **Savings**

### Project Controls
- **Service**
- **Purpose**
- **Projects**
- **Savings**

### Claim Drafting and Rebuttal
- **Service**
- **Purpose**
- **Projects**
- **Savings**

Additional Services and Supporting Products

Custom Market Analytics for Engineered Products and Services

A market intelligence solution that saves buyers money and helps them avoid costly mistakes by recommending timely procurement actions and technology strategies.

- MarketOutlook.com
- Supply risk mitigation model
- Supplier Optimization Model

Establishment of Capital Equipment Supply Partnerships

A proven process that accelerates the alignment between world-class, proven suppliers, and buyers that need local content for major capital projects in emerging markets.

- OGPNetwork

Organization Design and Development

Training and development workshops and programs.
MEGA-CAPITAL PROGRAM
A mega-capital program involves larger investment than the company has undertaken in the past, raising complex and interrelated questions of capacity, price, and lead time, even with familiar types of services and equipment.

EMERGING ENERGY-INTENSIVE NATIONAL INDUSTRY
A state-led company with relatively little previous experience in international contracting seeks to develop its internal procurement capability and supply market.

TECHNICALLY CHALLENGING PROJECT
A project involves a higher degree of technological reliability or durability than previously required, such as installation in arctic or deepwater subsea conditions, entailing significantly higher costs and different suppliers.

STRATEGIC DIVERSIFICATION
A company branches into a non-core energy business (e.g., a traditional energy company building windfarms, or an upstream company evaluating whether to build downstream facilities).
Rationalization on a Massive Scale: New Expectations
Technological advances, especially unconventional E&P, have unleashed a tidal wave of surplus hydrocarbons

- World crude oil proved reserves increased 63% from 2000 to 2015.
- Inventories rose 150% between 2000 and 2014.
- Global benchmark Brent crude price has fallen from $111.80 per barrel in June 2014 to $30 per barrel in January 2016, curtailing upstream oil & gas development.
Directional drilling, hydraulic fracturing and other unconventional techniques are “the new normal”

Production from tight formations increased from 0.5 million b/d in 2009 to 4.6 million b/d in 2015, 50% of total U.S. oil production.

Hydraulic fracturing, often used in combination with horizontal drilling, has allowed the United States to increase its oil production faster than at any time in its history.
Shale gas and tight oil are commercially produced in just four countries, and China is one of them.  

In China, Sinopec and PetroChina have reported commercial production of shale gas from fields in the Sichuan Basin. Their combined shale gas output has reached 0.163 Bcf/d, or 1.5% of total natural gas production.

The US shale gas boom is enabled by advances in horizontal drilling and hydraulic fracturing technologies. Similar advances are fueling China’s growth, as well.
Active rig count has dropped sharply

- Total rig counts dropped 45% from 36,516 in 2006 to 20,155 in 2015.
- In response to the rapid drop in oil prices, global rig counts have fallen a total of 30% from 3,670 in November 2014 to 2,578 in late March.
- Number of active rigs in the US dropped the maximum, 37%, down from 714 in December to 478 by the end of Q1. Latin American rig count dropped over 20% in the same period.
Operators cut total CapEx by 34% during 2015 and 2016

- Petrobras announced a reduction of some 25% in its five-year spending (2015 through 2019) from $130 billion to $98.4 billion.
- Chevron will cut its 2016 capex budget by 24% year over year to $26.6 billion.
- Statoil could face a cut of up to 40% in capex over the three-year period from 2017 through 2019 at the state’s oil ministry due to low crude prices.
- Exxon Mobil cut its capex by 15% in 2015, from $38.5 billion in 2014 to $34.0 billion.
Global E&P (upstream) spending will drop 27% in 2016 alone

- Overall spending by IOCs is expected to fall by around 21%. U.S. IOCs are expected to lower spending by 29% while European IOCs by 9%.
- NOCs are expected to cut spending by 9% this year with the largest cuts expected in Latin America. Pemex -31%, Petrobras -22%, and PetroChina -20%. Saudi Aramco’s capital spending will decrease 5%.

**IOCs vs NOCs**

**By region**

- India, Asia and Australia are expected to cut spending by 13.5%, while Europe and Africa are expected to spend 7.2% and 13.5% less, respectively. North American E&Ps are expected to cut into their budgets even further, with a 40% decline in spending.
- The Middle East, as well as Russia and the Former Soviet Union, are both expected to increase spending on E&P operations in 2016 – 5.5% and 3.6% respectively.
Debt levels have risen to unprecedented levels for IOCs

**Debt to Capital Ratio**

- Exxon Mobil: 7% (2006), 16% (2015)
- Chevron: 12% (2006), 20% (2015)
- Total: 33% (2006), 38% (2015)

**Debt to Equity Ratio**

- Exxon Mobil: 0.07 (2006), 0.22 (2015)
- Chevron: 0.14 (2006), 0.25 (2015)
- Shell: 0.15 (2006), 0.36 (2015)
- Eni: 0.30 (2006), 0.54 (2015)
- BP: 0.27 (2006), 0.54 (2015)
- Total: 0.50 (2006), 0.62 (2015)

**Notes:**

- IOCs companies’ debt to capital increased 10.5%, from 18% to 28.5% last year.
- Before the financial crisis of 2008, common D/E ratios among oil and gas companies fell in the 0.2 to 0.6 range. As of 2014, the range clusters within 0.4 and 0.8.
- In 2010, US upstream energy companies aggregated $128 billion of total debt, according to S&P Capital IQ. As of 4Q14, this increased to $199 billion of combined total debt, a jump of 55%.
Many NOCs are in twice as leveraged as in 2006

- Petrobras and Ecopetrol’s debt increased 35% and 23% respectively from 2006 to 2015.
- NOCs companies’ long term debt to capital averaged 39% in 2015, up from 27% in 2006.
Midstream, traditionally a safe haven, is over-leveraged and subject to renegotiation

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2015</th>
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<tbody>
<tr>
<td><strong>Debt to Capital Ratio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinder Morgan</td>
<td>77%</td>
<td>55%</td>
</tr>
<tr>
<td>TransCanada</td>
<td>63%</td>
<td>69%</td>
</tr>
<tr>
<td>Spectra</td>
<td>60%</td>
<td>69%</td>
</tr>
<tr>
<td>Enbridge</td>
<td>69%</td>
<td>80%</td>
</tr>
<tr>
<td>Williams Companies</td>
<td>69%</td>
<td>80%</td>
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<tr>
<td><strong>Debt to Equity</strong></td>
<td></td>
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</tr>
<tr>
<td>TransCanada</td>
<td>1.72</td>
<td>2.14</td>
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<tr>
<td>Enbridge</td>
<td>2.18</td>
<td>2.24</td>
</tr>
<tr>
<td>Spectra</td>
<td>2.24</td>
<td>2.24</td>
</tr>
<tr>
<td>Williams Companies</td>
<td>3.35</td>
<td>3.98</td>
</tr>
</tbody>
</table>

- In 2015, Williams Companies had long-term debt of $24 billion, which represents a debt to capital ratio of 80%. Williams Companies’ operating subsidiary – Williams Partners – was very exposed to weak natural gas prices as the company has little hedging arrangements for its natural gas liquid production.
- Kinder Morgan's long-term debt stood at $43 billion at the end of 2015, up 200% from 2009 $14B. Its net debt is 5.6 times EBITDA vs its pipeline rivals such as Energy Transfer Partners LP at 4.75 times. In the period from 2011 to 2014, Kinder Morgan bought $22 billion worth of pipeline assets (to do this, KMI had to add $26 billion in debt).
Major capital projects have been suspended or cancelled

Upstream E&P projects
- Statoil delayed production from the Aasta Hansteen and Mariner fields
- Statoil’s Johan Castberg field in the Norwegian Arctic ($11.29b)
- BP’s Mad Dog 2 in the Gulf of Mexico ($10b)
- Second phase of the giant Kashagan field in Kazakhstan

Midstream LNG projects
- Americas: Caribbean FLRU in Colombia; Bradwood Landing, Clahoun Crown landing, Creole train, Jordan Cove, Oregon, Port Arthur, Port Dolphin, Vita del Sol and Weaver’s cove in the US; and Cacouna, Goldboro and Kitimat in Canada.
- Europe: Gulf LNG plant in Papua New Guinea; Liongas LNG Terminal the Netherlands, and the Priolo LNG Terminal in Italy.
- Asia: the Abadi Floating LNG Plant in Indonesia; the Mashal LNG terminal in Pakistan; and the Mangalore LNG terminal in India.
- Woodside Petroleum dropped $40 billion Browse floating LNG project

Oil companies delayed making decisions on 68 major projects world-wide last year, accounting for some 27 billion barrels of oil and equivalent natural-gas volumes and bringing total 2015 deferred spending to $380 billion industry-wide. Deepwater hit the hardest: more than half of new project deferrals up from 17 to 29; 62% of total reserves; and 56% of total capex
Major capital projects have been suspended or cancelled

**Downstream Refinery projects**
- Fujairah on the Gulf of Oman postponed its 200k bpd refinery project in UAE
- Shell, Qatar Petroleum, and China National Petroleum Corporation (CNPC) cancelled their proposed 400k bpd refinery project in Taizhou, China.
- KNPC scrapped its $15b Al Zour refinery project
- Petronas is delaying the start-up of its $16b RAPID refining and petrochemical complex until mid-2019.
- Indonesia's Pertamina scrapped its plans to upgrade its 220k bpd Balikpapan refinery
- China National Petroleum and Recope, the Costa Rican state-run oil company, decided to abandon a $1.5b refinery upgrade project in Costa Rica.
- Exxon Mobil has put on hold a project to double the size of the company’s 344.5k bpd Beaumont Texas refinery

**Power**
- Shell delayed by two years its 80k bpd Carmon Creek thermal oilsands project northeast of Peace River in northern Alberta, Canada

**Major suppliers of liquefied natural gas, are being affected the most:** In Angola, $76 billion in spending will be deferred; in Australia, $43 billion; in Mozambique, $37 billion; in Nigeria, $29 billion; in the U.S. Gulf of Mexico, $17 billion; Indonesia, $10 billion; in the UK, $8 billion; and $12 billion in other regions.
Suppliers must prepare for at least 2 more very harsh years. “Low oil price” is dominating the long-term scenario.
Fossil fuels have had a slow transition to renewables since oil, gas, and thermal power generation are integral to our economy.

1973
Fossil fuels have had a slow transition to renewables since oil, gas, and thermal power generation are integral to our economy (continued)
And fossil fuels will transition to renewables over time

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Transformation</th>
<th>End Use</th>
</tr>
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<tbody>
<tr>
<td>Coal 155 EJ</td>
<td>Direct Consumption 149 EJ</td>
<td>Industry 118 EJ</td>
</tr>
<tr>
<td>Natural gas 116 EJ</td>
<td>Power and co-generation plants 213 EJ</td>
<td>Transport 102 EJ</td>
</tr>
<tr>
<td>Biomass and waste</td>
<td>Electricity 68 EJ</td>
<td>Residential 87 EJ</td>
</tr>
<tr>
<td>Oil 179 EJ</td>
<td>Refineries and other transformation 188 EJ</td>
<td>Non-energy use</td>
</tr>
<tr>
<td></td>
<td>Oil products 153 EJ</td>
<td>Conversion losses 154 EJ</td>
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<td></td>
<td>Losses</td>
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</tbody>
</table>
However suppliers must leverage low costs to weather the next several years

Changes 2012 vs. 2016 (Indicative)

<table>
<thead>
<tr>
<th>Supply Required</th>
<th>Indicative Price Change vs. 2012</th>
<th>Change in Buyer-Supplier Relationship &amp; Contract Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Exchangers</td>
<td>-20% to -30%</td>
<td>• Increased consolidation of large suppliers (E.g. GE)</td>
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<tr>
<td></td>
<td></td>
<td>• Prices for individual heat exchangers obscured in large bids for refinery process modules</td>
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<td></td>
<td></td>
<td>• More specialization by industry, offering more targeted services to buyers</td>
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<tr>
<td>Instrumentation and Process Control Systems</td>
<td>-4 to -6%</td>
<td>• Integrated, centralized process control systems</td>
</tr>
<tr>
<td>Valves</td>
<td>-2% to -3%</td>
<td>• Long-term agreements at ultra-low prices</td>
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<td>• 15-25% discount on large orders has evaporated</td>
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<tr>
<td>Wellheads &amp; Christmas Trees</td>
<td>0% to +3%</td>
<td>• Bundled services though alliances with other suppliers and/or acquisitions</td>
</tr>
<tr>
<td>Turbines</td>
<td>0% to +3%</td>
<td>• Expanded service capabilities</td>
</tr>
</tbody>
</table>
Chinese suppliers have a window of opportunity to supplant dominant Western sources

### Bid Slates, 2012 vs. 2016 (Indicative and Illustrative)

<table>
<thead>
<tr>
<th>Category</th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>Italy, France, Japan, USA</td>
<td>Japan, Italy, USA, Hengtong Group, Jiangsu Shangshang</td>
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<tr>
<td>Heat Transfer</td>
<td>Germany, Sweden, USA, India</td>
<td>Korea, USA, Dongfang, Shanghai Boiler, Harbin</td>
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<tr>
<td>Drilling Equipment</td>
<td>France, USA</td>
<td>USA, France, China Oilfield Services</td>
</tr>
</tbody>
</table>
Chinese suppliers have a window of opportunity... (continued)

Bid Slates, 2012 vs. 2016
(Indicative and Illustrative)

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<tr>
<td>Valves</td>
<td>USA</td>
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<td>Spain</td>
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<td>Neway</td>
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<td>Non-Metallic Pipe</td>
<td>Saudi Arabia</td>
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<td>Turbines</td>
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<td>Vessels</td>
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<td>Japan</td>
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<td>USA</td>
<td>Shanghai Boiler Works</td>
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<td></td>
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<td>Sinopec Engineering</td>
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</table>
Aggressiveness in the current downturn could result in deeply embedded positions in the supply chains of Western oil and gas operators for years to come.

Examples of Equipment Categories

Heat Transfer

Turbines

Pressure Vessels

Price

Quality

China

Korea

USA

Japan

Germany

USA

China

India

France

China
Leaders will change paradigms & add more value

Custom Market Analytics for Engineered Products and Services

A market intelligence solution that saves buyers money and helps them avoid costly mistakes by recommending timely procurement actions and technology strategies.

- MarketOutlook.com
- Supply risk mitigation model
- Supplier Optimization Model

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<td>Supply Contract Negotiation</td>
<td>Project Controls</td>
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<tr>
<td>Purpose</td>
<td>Benchmark Project Economics</td>
<td>Determine Ways to Achieve Target Economics</td>
<td>Manage EPCI Activities</td>
<td>Minimize Budget Variances</td>
<td>Minimize Budget Variances</td>
</tr>
<tr>
<td>Projects</td>
<td>Capital Project Cost Estimates, Equipment / Component Cost Estimates</td>
<td>Supply Chain Strategy (for Buyers), Value Chain Strategy (for Suppliers)</td>
<td>Supplier Prequalification, Technology Selection, Preparation of Invitations to Bid</td>
<td>Negotiation Support, Hands-on Negotiation</td>
<td>Control in project execution, Objective claim drafting &amp; rebuttal</td>
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<tr>
<td>Savings</td>
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Potential Cost Take-out

Disruptive Organizational and Financial Techniques
Disrupting the Status Quo

Levers for Disruption

AUTOMATION
- Mechanical engineering optimizations

ORG & FINANCIAL
- Business management transformations

DIGITALIZATION
- Digital Engineering

ENGINEERING
- Enhancing production process effectiveness

R&D
- Scientific breakthrough

Complexity, Difficulty, and Time to Implement
- Robotic drilling
- Unmanned operations
- Partnering
- M&A
- Financial restructuring
- Smart sensing
- Digitalization
- Intelligent response3
- Primary Enhanced Oil Recovery
- Secondary Enhanced Oil Recovery
- Plasma EOR technology.
- Heavy crude distillation using catalysts

Today’s focus
### Business Management: Partnering – Levels of Integration

- **Arm’s Length**
- **Weak Partnership**
- **Strong Partnership**
- **Joint Venture Dominated by One Partner**
- **Joint Venture with Equal and Independent Partners**
- **M&A**
Business Management – Partnering Value
Objectives and Metrics

- Asset/Cost Efficiency
  - Product cost efficiency
  - Distribution cost savings
  - Packing cost savings
  - Managerial efficiencies
  - Assets to the relationship
- Customer Service
  - Improved on-time delivery
  - Better tracking of movement
  - Paperless order processing
  - Accurate order deliveries
  - Improved cycle times
  - Improved fill rates
  - Customer survey results
  - Process improvements
- Marketing Advantage
  - New market entry
  - Promotion
  - Price
  - Product
  - Place
  - Access to technology
  - Innovation potential
- Profit Stability/Growth
  - Growth
  - Cyclical inverting
  - Seasonal leveling
  - Market share stability
  - Sales volume
  - Assurance of supply

After Doug Lambert, “So You Think You Want a Partner”
Business Management – Evaluating Partnering Challenges

- Corporate Compatibility
  - Culture
  - Business
- Management Philosophy and Techniques
  - Organizational structure
  - Use of TQM
  - Degree of top management support
  - Type of motivation used
  - Importance of teamwork
  - Degree of employee empowerment
- Culture
  - Skills
  - Willingness to share

- Commonalities
  - Sales
  - Market share
  - Financial strength
  - Productivity
  - Brand image
  - Technological sophistication
- Shared competitors
- Proximity
- Interest in exclusivity
- Previous successful partnering
- Common customer(s)

After Doug Lambert, “So You Think You Want a Partner”
Potential Cost Take-out

Supply Chain Strategies
## Program Management Structure (EPC vs. EPCI[M])

<table>
<thead>
<tr>
<th>Ownership of Site</th>
<th>DBOM</th>
<th>BOO</th>
<th>BOOT</th>
<th>EPC(I)-LSTK</th>
<th>EPC(I)-Cost Plus or EPC(I)-T&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition Cost Risk</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Sponsor</td>
<td>Sponsor</td>
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<td>Design Risk</td>
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<td>Sponsor</td>
<td>Sponsor</td>
<td>Sponsor</td>
<td>Sponsor</td>
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<tr>
<td>O&amp;M Cost Risk</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor/ Sponsor</td>
<td>Contractor/ Sponsor</td>
<td>Sponsor</td>
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<tr>
<td>Prime Contractor Performance Risk</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Sponsor</td>
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<tr>
<td>Change Orders</td>
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<td>Contractor</td>
<td>Contractor</td>
<td>Sponsor</td>
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<tr>
<td>Project Management Resources</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Contractor</td>
<td>Sponsor</td>
</tr>
</tbody>
</table>

Bundling options, usually based on cost vs benefit

Horizon Bundling

**Pros**
- Engineering integrity
- Warranty guarantee
- Operational outsourcing (less hassle)

**Cons**
- Loss of control
- Premium price

Vertical Bundling

**Pros**
- System design integrity
- Economies of scope
- Logistical synergies

**Cons**
- Less specialized expertise

Example: Windea Offshore to provide logistics, maintenance, and repair services

Example: DONG acquired A2SEA

Context
Vertical bundling: maximise buying power
- Integrated approach leads to few proven suppliers (e.g. Siemens: electrical and WTG)
- Build market (e.g. by requiring WTG suppliers to come up with foundation design)

Horizontal bundling: already have in-house O&M capability
- Choice of OEM or 3rd party maintenance – OEM is incentivised to minimise costs through reliability, design-to-maintain, etc
- Length of contract (~5yrs max), requiring in-house or 3rd party capability afterwards
- Bundling with installation (EPCI)

Link to Value Drivers
- Standardisation: equipment interface issues reduced (e.g. transition between tower & foundation?)
- Learning Effects: shared across the ‘bundle’

Example: DONG offshore to provide logistics, maintenance, and repair services

Source: Boston Strategies International
Duration, Intensity of Supply Contract: Long-Term Agreements

All projects ‘stand-alone’

‘Sub-programmes’

Project 1 stand-alone/Projects 2-6 programme

Complete programme approach

Standardisation

Low

High

Frequently return to market to buy innovation; more equip types risks higher OPEX

Technology benefits

Low

High

Secure larger orders over time, though scale of EA1 may be enough.

Economies of scale

Low

High

Go back to market at each phase to re-tender; but more equip types risks higher OPEX

Benefits of competition

Low

High

Supplier learnings contained within consistent supplier set; internal learnings retained

Learning Effects

Low

High

Fewer contracted suppliers to manage

Project mgt costs / risks

Low

High

Standardize products or services to reduce manufacturing and operating costs

Source: Boston Strategies International

Standardization (Common vs. Customized): Shell Cuts Cost and Lead Time through Product and Process Standardization

- Shell standardizes equipment and processes using company-wide design and engineering practices (DEP) and a comprehensive Materials and Equipment Standards and Code (MESC) catalog.
- Over five years, the program allowed Shell to streamline its vendor list and leverage its spend across fewer items, reducing purchase price and cutting inventory.

- Notable achievements under the program by category:
  - Electric cable: 30% price savings; 50% stock reduction
  - Valves 30% price savings; 80% stock reduction

- The effort helped speed up multiple projects:
  - Pinedale Wyoming shale field; hundreds of multistage wells:
    - First well 2002: 60 days, reduced to 25 days on average and cut costs by 25%
  - Groundbirch shale gas field
    - Reduced time to first production from 40 days to 15 days over three years
  - Groningen gas field
    - Cut compressor station costs by 20% from project 1 to project 3, and cycle time by 15-20%

Source: Boston Strategies International
Standardization (Common vs. Customized): BP’s Caspian Projects: Lower Cost, Shorter Schedule

• BP standardized topside design for three project phases in the Caspian Sea, cutting equipment costs, accelerating project schedules, and reducing man-hours.

• From project 1 to project 3, benefits included:
  • Tens of millions of dollars in cost savings
  • Moved from six weeks to 4+ months ahead of schedule
  • Reduced design man-hours per tone of topsides from 42 to 11, and from 50 to 10 for the drilling systems
  • Progressively fewer engineering change orders

• Modules standardized included:
  • Wellbays
  • Utilities
  • Drilling systems
  • Quarters
Cradle-to-Grave Asset Lifecycle Service Offering

Lifecycle Services

- Upgrades & Retrofit
- Diagnostics
- Migration
- Environmental Services
- Training
- Troubleshooting
- Support & Remote Service
- Maintenance
- Repair
- Spare Parts

Source: Boston Strategies International
Price Negotiation Exercise
Changing the Game through Technology and Innovation
Digital Oilfield – What It Is

Cost Imperatives
• Need to change crews in E&P operations
• New software for workflow design
• Availability of new software
• Steadily decreasing number and size of new discoveries
• Increased expense on EOR

Digital Oilfield
Use of massive real time data and new software to analyse operational data
• Decision support
• Data integration
• Workflow automation

Benefits
• 5-25% operating cost decrease
• 2-8% production increase
• 1-10% CapEx decrease
Potential Pitfalls

• Insufficient skill set for dealing with complex and sometimes ambiguous data, data management, data governance, and data quality
• Deeply ingrained standard operating procedures that reinforce “silooed” thinking
• Conservatism or reluctance to invest in multi-million dollar productivity improvements
  • Big payback, but low accuracy of benefits
  • Potential for unanticipated costs such as running electricity and telecom to remote locations
• Rigidity or inability to enact swift change. Unconventional wells face rapid declines, so the window of opportunity for investment may only be 6-12 months.
• Complacency. National Oil Companies (NOC) have sometimes lacked enthusiasm for higher productivity due to their monopoly status.
Digital Oilfield – Paradigm Shift

- Division of responsibilities:
  - Drilling engineers
  - Reservoir engineers
  - Production engineers

- Cross-disciplinary processes:
  - Reservoir surveillance
  - Well test validation
  - Production optimization

- Lagged information
  - Long decision-making processes

- Real-time information
  - Real-time decision-making

- Independent work

- Interconnection between remote sites

## Framework for Launching a Digitalization Initiative

<table>
<thead>
<tr>
<th>Section</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Articulating the Vision</strong></td>
<td>• In which level in the value chain do the benefits accrue?</td>
</tr>
<tr>
<td></td>
<td>• Are the benefits in reduced cost, increased revenue, or capital cost savings?</td>
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<td></td>
<td>• What type and level of investment is required?</td>
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<tr>
<td><strong>Assessing Organizational Readiness</strong></td>
<td>• Does the organization have skill sets for resolving complex problems using data?</td>
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<td>• Do standard operating procedures support cross-functional behavior?</td>
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<td></td>
<td>• Are budget committees reluctant to invest in productivity improvements?</td>
</tr>
<tr>
<td><strong>Anticipating Data Sharing and Security Issues</strong></td>
<td>• Do your value chain partners have a history of trust?</td>
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<td></td>
<td>• Is a data security plan in place?</td>
</tr>
<tr>
<td></td>
<td>• Is a data governance framework established?</td>
</tr>
<tr>
<td><strong>Gaining Stakeholder Support</strong></td>
<td>• Does the CEO consider “digitalization” core to the company’s competitive advantage?</td>
</tr>
<tr>
<td></td>
<td>• Is senior management familiar with the plan?</td>
</tr>
<tr>
<td></td>
<td>• Do shareholders, supply chain partners and customers understand the benefits?</td>
</tr>
<tr>
<td><strong>Designing a Pilot Program</strong></td>
<td>• What information could be collected?</td>
</tr>
<tr>
<td></td>
<td>• How it can be stored and analyzed?</td>
</tr>
<tr>
<td></td>
<td>• What decisions could be made based on the analysis?</td>
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</tbody>
</table>
Conclusion
Key Take-Aways

• Today’s cost environment is brutal. No price is too low.

• Use supply chain best practices to lower costs with existing processes.
  • Know your breakeven cost
  • Bundle, package, and otherwise drive value below the breakeven cost

• Use unconventional / non-cost thinking to reach breakthrough price levels.
  • Pure business management methods
  • Mechanical engineering optimizations (e.g., automation of mechanical operations)
  • Smart technologies (e.g., Digital Oilfield/ Digital Engineering)
  • Enhancing production process effectiveness (e.g., chemical, thermal, geologic solutions)
  • Scientific breakthroughs (e.g., technology licenses)