THE THREAT OF OPERATIONAL RISK TO THE OIL INDUSTRY

Time for the industry to rethink its risk mitigation process and revitalize its safety roadmap

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DuPont Sustainable Solution

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About DuPont

DuPont Sustainable Solutions (DSS) is one of 8 DuPont businesses. Bringing customers the benefits of an integrated global consulting services and process technology enterprise, DSS applies DuPont’s real-world experience, history of innovation, problem-solving success, and strong brands to help organisations transform their workplaces and work cultures to become safer, more operationally efficient and more environmentally sustainable.

For more information, visit our website at:www.sustainablesolutions.dupont.co.uk

DuPont (NYSE: DD) has been bringing world-class science and engineering to the global marketplace in the form of innovative products, materials, and services since 1802. The company believes that by collaborating with customers, governments, NGOs, and thought leaders we can help find solutions to such global challenges as providing enough healthy food for people everywhere, decreasing dependence on fossil fuels, and protecting life and the environment.

For more information about DuPont, visit: www.dupont.com
Sharp drops in crude prices is not new… however the emergence of unconventional producer will tend to shorten cycles in the future

BRENT MONTHLY AVERAGE
US$/BBL

Companies have not taken the opportunity to transform themselves during this period

Impact of US Light Tight oil production on industry cycles

New technologies in unconventional development have spurred significant growth in the industry, particularly in the United States. Oil production has risen 80 percent in the U.S. since 2008, from an average of 5 million barrels per day to 9.2 million barrels per day as of December 2015.

Reactivity

- 6-12 months lead time to production
- 50%+ natural production decline rate in year 1

Source: EIA, DSS Analysis
O&G companies are taking more than 4 years to adjust OPEX to market deflation due to inherent portfolio and operating constraint.

The UOCI measures cost changes in the oil and gas field operations arena. UOCI is similar to the consumer price index (CPI) in that it provides a clear, transparent benchmark tool for tracking and forecasting a complex and dynamic environment.

Source: EIA, HIS UOCI, DSS Analysis
Since 2 years, companies have been working extensively on achieving various cost-cutting measures to protect their Cash Flow.

As companies seek to monetize every drop of oil taken out of the ground in response to falling prices, it is inevitable that certain risk management initiatives are re-prioritized as capital is transferred from one part of the business to another.

**ADJUSTMENT LEVERS TO INDUSTRY CYCLES**

**Qualitative Assessment**

**Long**
- **Structural**
  - Lower cost base line

**Impact sustain on Cash Flow**

**High**
- 3rd party rates
- Contractor headcount & rates
- Activity cancellation & delay
- Logistics optimization
- Digital Oilfield
- Collaborative Supply Chain
- Production portfolio change
- Operating model specialization
- Analytics
- Lean operations
- Production Excellence
- Predictive maintenance
- Standardization

**Cyclical**
- Lower time to adjustment

**Flexibility during price cycles**

**Source: DSS Analysis**

**New operating models**

**Accelerate cost base adjustment**: quicker reaction in the first phase is more likely to generate impact on CFO rather than outgrowing market deflation in the second phase.

**Accelerate early production growth**: early barrels are high margin barrels as they benefit from OPEX adjustment lag & tight market supply.
During this period cost-cutting measures, important risk management efforts are neglected leading to disturbing weaknesses

It is during these times of price instability that operational risk management – the identification, evaluation and control of hazards based on potential levels of severity and likelihood of occurrence – should remain a top priority for companies in the oil and natural gas industry. Taking such steps will enable companies to avoid costly incidents and high insurance premiums, and thus continue to drive profitability, ensure the safety of their workers, and maintain their future right to operate.

How will you qualify your Operational Risk Management system after 2 years of cost-cutting measures?

- **Inadequate**
  - Identification / evaluation of operational risks
  - Integrity of facilities
  - Competing priorities, i.e., production, quality, costs
  - Resources, both quantity and capabilities
  - Management of change
  - Compliance-to-procedures culture, operational discipline
  - Capacity to manage process safety risks differently from workplace safety
  - Audit function
  - Leadership & risk culture

Source: DSS discussions with O&G clients
Our client experience indicates that most O&G companies have reasonably good Operational Risk Management systems in place.

**THE CHALLENGE IS MAKING IT WORK TO ACHIEVE INCIDENT FREE OPERATIONS**

**ILLUSTRATIVE**

DuPont recognises that there are four key components for achieving Process Safety Excellence:

1. **Culture of Anticipation** (how risks are understood by people and systematically addressed)
2. **Culture of Openness and Collaboration** (how people work together and support each other)
3. **Operational Discipline** (how following the rules is transformed into organizational pride)
4. **Integrated Management System** (cultural and risk based elements meshing together)
There is a ~2 years time lag between the point at which oil prices begin to fall and when reflected in safety performance indicators.

Looking back to the past, there is an alarming correlation between declining crude oil prices and rising safety violations and injury rates in the oil industry. When oil prices dropped between 2000 and 2002, there was a 6 percent rise in LTIF rates from 2002 to 2003. After crude oil prices rebounded but fell sharply during 2008-2009, the industry experienced a 14 percent increase in LTIF rates in 2012, as compared to 2010.
Time has come for O&G companies to rethink their risk mitigation model and to revitalize their safety roadmap

**Differentiated Risk Approach**

Focus on Top Risks:
- To Critical Assets / Processes / Activities
- Along the entire Value Chain

Differentiate between short-term Risk Containment vs. long-term sustainable Risk Reduction

**Integrated Capabilities**

Effective risk governance to overcome risk management silos and foster integration with core asset & operations management processes.

**Move from individual capabilities to a learning organizational process**

**Risk Culture & Operational Discipline**

Embed a strong and aligned risk culture and operational discipline to drive the implementation of risk management efforts
How Can Organizations ACHIEVE MAXIMUM RISK REDUCTION AT MINIMUM COST?

Apply an integrated approach addressing all the components of an Operational Risk Management System
DSS INTEGRATED APPROACH

PEOPLE

MANAGING PROCESSES
To keep focus on what really matters with the right people

TECHNICAL MODEL
Standard tools and practices to drive focused operational risk reduction

CAPABILITIES ENGINES
To ensure the right skills and effective coaching on operational risks

MINDSETS & BEHAVIORS
To align organization on the purpose and objectives of operational risk reduction

EXPECTED BUSINESS OUTCOME
DIFFERENTIAL RISK APPROACH

Specific company risk profile

Risk Governance

Risk Tolerance
HOW TO ASSESS AND MITIGATE RISKS

HIGH

FREQUENCY

TREAT?

HIGH

CONSEQUENCE

TRANSFER?

COMPETITIVE Advantage

LOW

TRANSFER?

UNsustainable

Terminates

TREAT?

MEASURE

OF RISK

DuPont Sustainable Solutions
ORGANIZATIONS MUST DEFINE THEIR “RISK TOLERANCE”

*Take into account…*

- Protection of People
- Assets
- Environment
- Business Implications
RISK GOVERNANCE

*Additionally takes into account...*

- Regulatory Requirements
- Insurance
- Stakeholder’s Expectations
- “Risk Tolerance”
THE PEOPLE DIMENSION TO RISK
THE PEOPLE DIMENSION TO RISK

EFFECTIVE ORM SYSTEMS should consider the following dimensions of...

**Human Factors**

- Organizational Change
- Human Factor Integration
- Human Reliability
- Human Error & Risk Awareness
- Learning and Development
- Pressure & Stress
TRUE MEASURE OF PROGRESS
CULTURAL MATURITY
In order to move to a higher state of CULTURAL MATURITY

Leadership and Operations need to shift their Values, Attitudes & Beliefs towards more holistic Operational Risk Management & Safety Culture Improvement approach…
DUPONT BRADLEY VALUE CURVE™
for Operational Risk Management & Safety Culture Improvement

Incident & Injury Rates
Risk Reduction & Control
Value Generation & Operational Discipline

LEADERSHIP
WORKER ENGAGEMENT

SHIFT in VALUES, ATTITUDES & BELIEFS

REACTIVE
DEPENDENT
INDEPENDENT
INTERDEPENDENT

DuPont Sustainable Solutions
90 days approach to secure cash from operations and prepare O&G companies for the industry rebounds

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Where are the gaps? | Where do you want to go? | How do you want to get there? | How to get rapid impact? | How to make it sustainable? |

| Operational risk profile | Focus areas and ambitions | High level Roadmap | Strengthen Governance Structure | Develop Sustainability Plan |
| DuPont Safety Perception Survey | Quick wins | Basis for the next 1 – 3 years | Build Organizational Capability | Develop Perfor. Management Process |
| Process Safety Management 22 elements | Short term and long term actions | Detailed action plan | Strengthen Operational Discipline | Develop Auditing Process |
| CFO, OPEX, CAPEX Production targets | Business case scenarios | Readiness for change | Coach & develop leadership competences | Create a Learning & Development Curriculum |
DSS Supported an Upstream O&G Company to Design and Implement a Risk-based PSM System Across Disciplines

**SITUATION**
Client realized additional systems were required to improve management of significant risks;
Client lacked the necessary safety culture;
Client not successful in securing the buy-in for PSM across drilling and subsurface disciplines.

**DuPont Approach**
Designed risk-based PSM system, across BUs and disciplines based on client risk portfolio;
Prioritized implementation across 13 sites.
Assessed drilling and subsurface processes for applicability / integration to PSM:
- Identified key PSM tasks across workflows;
- Developed best practices and identified check points to ensure completion of tasks.

**OUTCOME**
Integrated process safety across disciplines (e.g. drilling and subsurface workflows);
Employee LTIF dropped from 0.17 to 0.04 as a result of improved risk culture.
Oil price cycle

New operating models

ORM Systems performance

LTIF cycle vs. oil price

companies have not taken the opportunity to transform themselves during this period.

1996, OPEC 1% quote increase and Asian financial crisis resulting in 53% oil price increase and 1999

Slowly demand increase in supply of unkononmental

New cost structure

Inadequate Weak Normal

- Identification / evaluation of operational risks
- Integrity of facilities
- Competing priorities, i.e., production, quality, costs
- Resources, both quantity and capabilities
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BRENT MONTHLY AVERAGE
LU$1/BBL

ANTICIPATED DEFALATION IN A $10 $1/BBL WORLD

UOIC (UPSTREAM OPERATING COST INDEX)

Modeling of UOIC based on Brent price levels and variations (P<0.05)

The UOIC measures cost changes in the oil and gas field operations area. UOIC is similar to the consumer price index (CPI) and it provides a clear, transparent benchmark tool for tracking and forecasting a complex and dynamic environment.

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LOST TIME INJURY FREQUENCY

LTIF per million hours

13 years

-2% Anticipated deflation of operating costs

-10% -18%

-6% -53%

-93%

-120%

140

200
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Impact sustain on Cash Flow

- Predictive maintenance
- Production Excellence
- Lean operations
- Contractual strategy
- Maintenance optimization
- 3rd party rates
- Headcount lay-off, pre-retired
- Contractor headcount & rates

Cyclical

- Lower time to adjustment

Short

- Standardization
- Operating model specialization
- Digital Oilfield
- Collaborative Supply Chain
- Transformational
  - Transform cost profile

Flexibility during price cycles

- Low
- High

$ Price

Time

1. Accelerate cost base adjustment: quicker reaction in the first phase is more likely to generate impact on CFO rather than outgrowing market deflation in the second phase

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