

Corporate IQ Optimization as a Mitigation Strategy Against Enterprise Disconnect

Case Studies from the Energy Business

Ruud Weijermars

Alboran Energy Strategy Consultants, Molslaan 220, Delft 2611CZ, the Netherlands

weijermars@alboran.com

Abstract- A high Corporate Intelligence Quotient (IQ) is crucial for survival in any business. In this study, the Corporate IQ concept has been applied to assess the specific cognitive abilities of energy organizations. The IQ test results confirm that international oil companies (IOCs) lead the industry with best practice as reflected in high Corporate IQs. It takes genius to win the race for access to ever more complex oil and gas prospects. However, the building of enhanced Corporate IQ by organizational learning has now also been taken up successfully by several former national oil companies. Getting to the best oil and gas prospects first and developing these with positive margins means a company must outsmart its oil and gas rivals. If such industry leaders succeed, other companies run a risk of lagging behind. Locally operating oil and gas companies typically lag behind and run a high risk of enterprise disconnect. A deterioration of cash flow is a tell-tale sign of enterprise disconnect from its business environment. What hallmarks the top management of failing companies is a persistent neglect of warning signs and undue risk taking. In contrast, the common denominator of those firms who timely recognize and avoid such mishaps is adeptness to change and rapid organizational learning.

Keywords- Energy Business; Corporate IQ; Organizational Learning; Competition; Corporate Governance; Change Management

I. INTRODUCTION

The common denominator of those firms who timely recognize and avoid corporate mishaps is adeptness to change and rapid organizational learning^[1]. The risk of failure is virtually absent for companies that have sharper management with perceptive antennae for things that might go wrong for the company. In fact, management that has such antennae notice changes and lurking dangers more quickly and spot patterns and trends well ahead of any disruptive failure. Their success is based in no small part on prudent strategic and operational risk management^[2]. An important question remains whether costly corporate derailments can be avoided – a generic answer is “yes” one can – but only if such companies were better managed.

The real problem of derailing companies often resides in the very top: lagging enterprises are commonly directed by top management that is unable to recognize or concede that the metaphorical ‘melting icebergs’^[3] and ‘burning platforms’^[4] are rapidly homing in on them. Subsequently, they persistently neglect the warning signs and their undue risk exposure continues. As a result, the attention of management is more and more absorbed by retroactive mitigation of the compounding problems – rather than by

directing the optimization of a risk-balanced portfolio and the pro-active development of new assets and products.

For example, take Chesapeake which has been frequently headlined in the media (in fact, ever since its first sharp share drop in 2008) as the next Enron. And although the turmoil around Chesapeake may continue to surprise some investors, vigilant analysts have seen its problems steadily compounding over the years. The company’s deteriorating cash flow has been alerting analysts^[5] – as has its liberal reserves booking practices^[6]. In fact, the company’s market capitalization has been solely fuelled by the acquisition of more and more debt and equity capital^[7]. The lack of any retained earnings in the Chesapeake business operations is the most concise measure of its lagging performance^[7]. Diversification from gas to liquids is only slowly implemented and the company lacks the financial resources for growth.

In summary, Chesapeake’s net profits retained from operations over two decades of the firm’s existence have been negative right from the start (Fig. 1). Such a lagging performance is a stark sign of enterprise disconnect – this company is not leading but has landed itself in a position where it is besieged by problems. Management is forced into retroactively addressing the compounding problems rather than pro-active leading in the development of new assets and products. Asset sales are the only remaining way for management to avert illiquidity of the enterprise.

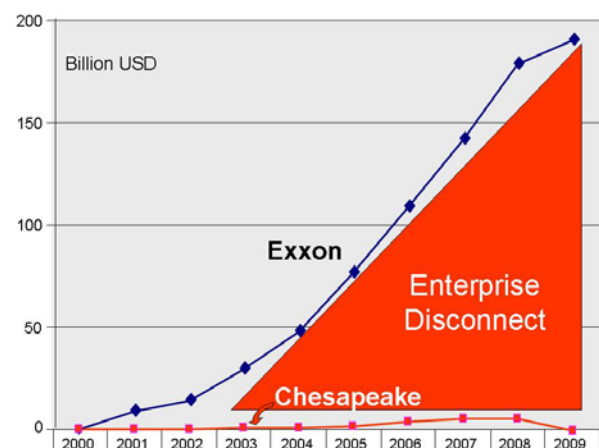


Fig. 1 Earnings retained by Chesapeake, North American leader in unconventional gas production, are lagging compared to Exxon, the world’s leading conventional gas producer [Data source: Alboran Energy Strategy Consultants]

Often, the bubble cannot but burst in the end, especially if the business fundamentals become further compromised. Energy companies in pursuit of competitive profits frequently are tempted to transgress the boundaries of compliance with rules and regulations, especially when earnings are under pressure. Notorious past examples are Enron and Amaranth (energy trading violations), Shell (SEC reserve scandal), and BP (maintenance and drilling safety failures). Such corporate compliance failures may come as a surprise to many, but conscientious analysis usually signals troubles long before the media start their headline frenzy. The common denominator in all cases is that top management has lost touch with the changing realities of the business environment – such companies are in a state of denial until media frenzy alerts them into action – often under pressure from the alarmed shareholders. Sometimes it is already too late to reconnect with reality and a vicious collapse becomes imminent.

II. AVOIDING ENTERPRISE DISCONNECT

Major failures ripple through the energy business from time to time and these can be avoided if such company's see problems coming at them well in time – or better avoid these altogether. We found Corporate IQ provides an excellent indicator of a company's ability to anticipate change, seize opportunities and prevent costly crises. Companies with lowered IQs may become gradually misaligned with their business environment if they cannot keep up with the speed of change. Individual companies that cannot keep up with the speed of transformational change in the energy business will gradually develop an enterprise disconnect and run the risk to fail.

The strategic drift model (Fig. 2) explains how an enterprise disconnect commonly develops. A company begins to drift and swagger, long before they incur costly mistakes. Their internal organizational capacities are slow in recognizing change and inflexible in adapting to change – consequently, such companies consistently underperform and often struggle to stay profitable. These companies underperform because they miss the tell-tale signals from external and internal business indicators that should have urged them to accommodate change. If they continue not recognizing their predicament in time, these companies will ultimately fail (Path 4A in Fig. 2), unless last minute changes of management insight (often after replacing some key executives) leads to drastic measures (big bang) that help the slimmed down company to a recovery and reconnect to 'best practice' (Path 4B in Fig. 2).

But how can one be sure whether your company's future performance will continue to lead the industry by excelling in 'best practice' or even better – outperform its peers ('better than peers', in Fig. 2)? The monitoring of operational and financial performance metrics is by nature based on historic performance. These metrics often provide a warning for enterprise disconnect, but do not tell you how well your corporate brain will respond to the challenges ahead.

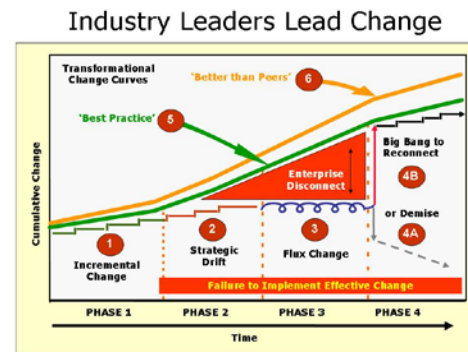


Fig. 2 Four phases (1 to 4A) of increasing enterprise disconnect with the transformational change are indicated. Only a major change (i.e. 'Big Bang', 4B) can save from demise a company that has erred for too long in strategic flux. Industry leaders set the pace for change in the business environment with Best Practice (5) or Better than Peers (6)

We found a company's Corporate IQ provides the required indicator of a company's ability to anticipate change, seize opportunities, and prevent costly crises. The generic concept of individual IQ dates back almost a century. About a decade ago, this work has been transposed to corporations. For example, 'Survival of the Smartest' -- by Mendelson and Ziegler^[8] -- introduced organizational IQ as an assessment tool for an organization's future health. The basic premise of the Corporate IQ concept is that a single number expresses a company's ability to outperform its peers. Smarter organizations recognize undue dangers long before these can incur costly damage; they take measures in time because they are smarter than their competitors. Smart energy organizations also are astutely aware that running a performance-based organization means learning faster than one's competitors.

Regular assessments of a company's Corporate IQ (Fig. 3) provide an X-ray of the organization's effectiveness in optimizing the organizational learning process. In our study, the median IQ score for all companies is normalized at 100, in analogy to personal IQ tests. Acquisition of Corporate IQ over time is assumed to pass through the typical stages of IQ development and value adding capacity. Corporate IQ is thus determined by the collective efficiency of the organizational learning processes. The efficiency gap in a company's value-adding capacity is responsible for the enterprise disconnect, which occurs when the Corporate IQ is declining due to poor Organizational Learning (Fig. 3).

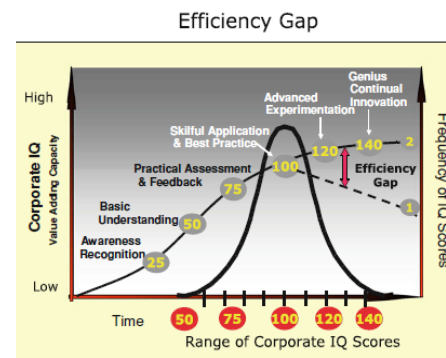


Fig. 3 Corporate IQ scale and organizational learning curve, Decline in the Corporate IQ (Trend 1) that strays away from the preferred Corporate Learning path (Trend 2) results in the development of an Efficiency Gap, which means lagging business performance and enterprise disconnect

The corporation as a goal-seeking entity requires managerial efficiency to focus all resources to realize profits and develop a strong corporate identity as an industry leader. Shareholder returns must be delivered and the changing business environment is canvassed continually in search for opportunities to grow the corporate brand name and prevent failures. This also requires the adoption of new business principles and technology innovation. The key to competitive performance lies in outsmarting one's peers by seizing opportunities ahead of the competition, faster recognizing lurking risks and taking timely countermeasures.

III. CORPORATE BRAIN SCAN

A higher Corporate IQ enables oil and gas companies to upgrade information into goal-oriented applications and make the right decisions at the right time to build assets with growth value. Our new Corporate IQ framework^[9] is based on the organizational learning cycle, which can be broken down into four logical steps (Fig. 4): (1) stimulating new knowledge development, (2) applying this knowledge goal-oriented, (3) building new assets with this goal-oriented knowledge, and (4) communicating why the organization has unique knowledge capacities that allows it to lead the industry.

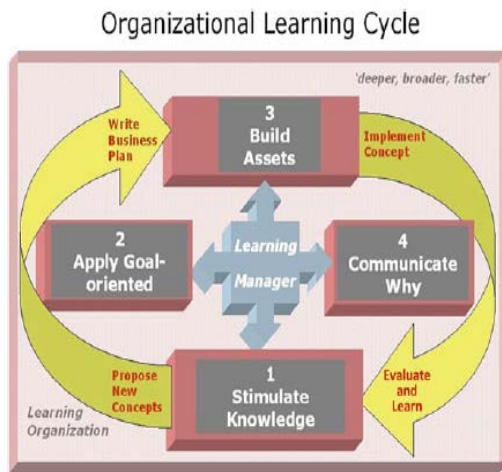


Fig. 4 The four stages of the organizational learning cycle that define Corporate IQ form a business value-loop, based on information flow and knowledge exchanges. The role of the learning manager, in smaller organizations, coincides with that of the asset manager

The assessment of the Corporate IQ is done via test sheets that probe whether managers see bottlenecks in their companies that could slow down organizational learning cycle. The questionnaire also assesses the quality of the corporate decision-making processes. The outcome of the IQ survey provides an estimate of the company's Corporate IQ, with 140 as a ceiling. The Corporate IQ index thus obtained in essence is a measure of the effectiveness of the corporate brain and its ability to transform the corporate capacity into a profitable performance.

Although energy business failures make for juicy headlines, most energy firms excel at organizational learning. The energy business is pushing technology frontiers and moving across country boundaries to access new oil and gas fields. International oil companies have learned to excel at

organizational learning in order to develop the leading technology appropriate for oil and gas fields in difficult environments. Our Corporate IQ concept has been applied to assess the specific cognitive abilities of a range of energy organizations.

The IQ test results (Fig. 5) confirm that international oil companies (IOCs) lead the industry with best practice as reflected in high Corporate IQs. IOCs know that they must keep up with the speed of change by active organizational learning - to stay ahead. That way they stay attractive partners for national oil companies - now the world's prime oil and gas resource holders. Unique knowledge has become a competitive instrument for the international oil majors, as is evident from trademarked concepts like Smart Fields (Shell), Intelligent Fields (Chevron), and Field of the Future (BP), all of which are built around competitive knowledge and technology. Oil majors use their lead to win new licenses from the national resource holders to develop and operate new oil and gas fields together with them.

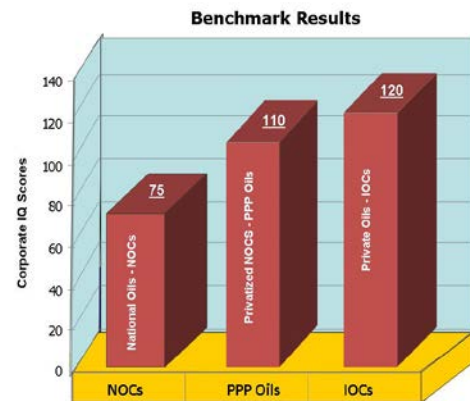


Fig. 5 Corporate IQ scores for peer group panels of National Oils, PPP oils and Oil majors. Data based on IQ assessments in peer groups and client programs over a 5-year period (2007-2011)

However, the building of enhanced Corporate IQ by organizational learning has now also been taken up successfully by several former national oil companies. Privatization of over a dozen national oils over the past decade has changed these former State Oils into competitive learning organizations. Examples of such public-private partnerships (so-called PPP oils) are Statoil of Norway, and Lukoil, and Tatneft of Russia. These companies have developed entrepreneurial strategies that in the past kept the business tactics of Oil Majors and State Oils distinctly apart. By moving toward internationalization, these former State Oils entered into the more competitive international business climate. Privatization commonly means exposure to higher risk and more organizational intelligence is needed for such companies to survive under faster competition. They learn quickly to smartly respond to changes in the business environment and the cognitive abilities of PPP oils are speeding up.

Learning organizations are good at scanning the business environment for change and translate this change rapidly into opportunities to grow the corporate brand name and raise product sales. But they pull out when high risk is not

rewarded by high returns. Smart oil companies are particularly good at applying lessons learned and avoiding past mistakes; they quickly recognize undue risks that could cripple the company. They also seize new business opportunities well ahead of the competition. Their portfolios seek a proper balance between risks and opportunities.

In contrast, national oil companies (NOCs) that operate with unique access to domestic oil and gas resources, traditionally tend to have less need for a competitive advantage. They remain under-challenged and their protected markets can be managed without competitive IQs; their Corporate IQs are commonly lower than those of international oil companies (Figure 5). In contrast, the new PPP Oils, which were traditionally divided by lower corporate IQs from the oil majors, are now rapidly learning the skills required to take on international oil and gas projects with inherent higher risks.

IV. DIFFERENCES IN PERFORMANCE

In addition to the Corporate IQ test, one can monitor financial KPI's to draw conclusions about the relative competitiveness within the peer group of International Oil Companies. Together, the international oil majors are still fastest and best at organizational learning and this is reflected in their profitability. Their joint return on capital employed (ROCE) averaged 16 percent for the period 2001-2011 (Fig. 6), nearly double the ROCE recorded for the preceding decade. The ROCEs over the past decade showed a decline in step with the receding oil prices of 2009 and early 2010 (Fig. 6). Consequently, the pressure on oil companies remains high to restore their ROCEs to 2005 peak levels now that global oil prices have firmed up again.

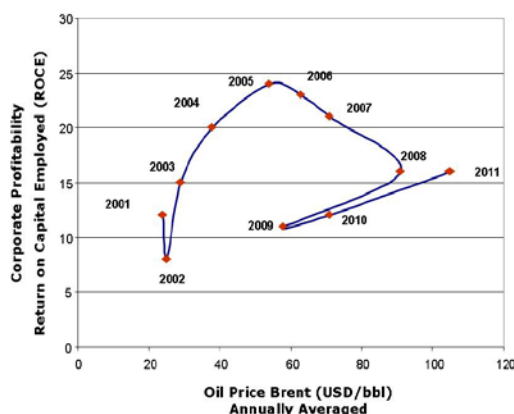


Fig. 6 Peer group profitability (ROCE) versus Brent oil price (annual averages 2001-2011)

Taking a closer look at the competitive peer group of oil majors, one can see a considerable spread in their performance over the past decade. A company's deviation from the peer group's annual average (Fig. 7) easily identifies the consistent outperformers, underperformers and average performers. For example, ExxonMobil has consistently outperformed its peer group – its ROCEs averaging 24% in the period 2001–2011, well above the peer group's mean ROCE. ExxonMobil's ROCE spread above the peer group's annual average therefore is consistently

positive and highest in its peer group. In contrast, ConocoPhillips has consistently underperformed, its ROCE as low as -18% in 2008, and averaging only 9% over the full study period. Conoco's ROCE spread below the peer group's annual average is therefore consistently negative, except for a meager +1% spread in 2010. Chevron has recorded a ROCE spread of up to 10% higher than the peer group's annual average – but is volatile in its performance, sometimes underperforming compared to the peer group. Similarly, the ROCEs of Shell and Total also swing, but less volatile in amplitude than Chevron's departures from the peer group ROCE. Unsurprisingly, BP has seen considerable drops away from the average oil major ROCE, particularly in 2010, when the Macondo disaster occurred.

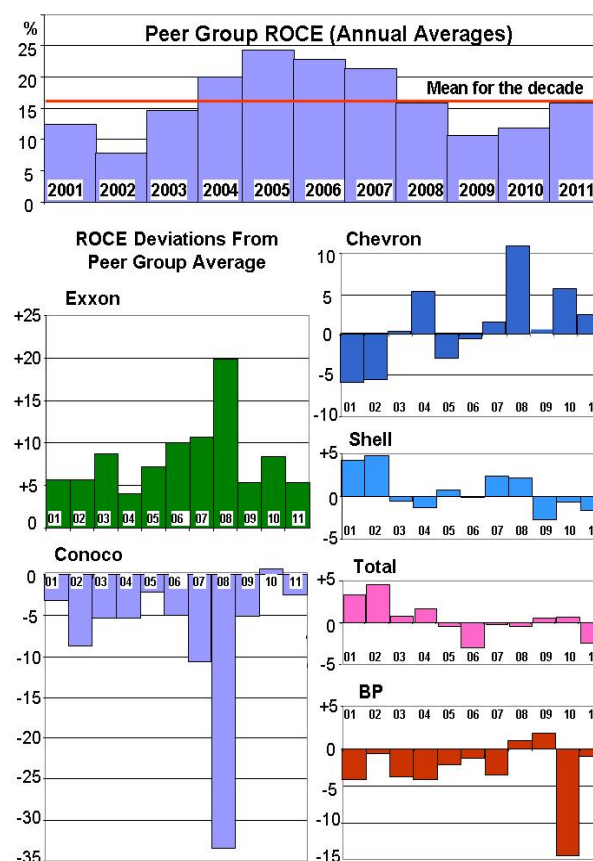


Fig. 7 Spread above and below peer group ROCE (2001-2011)

V. CHANGES IN CORPORATE IQ

Unlike personal IQ, which is mostly innate, a company's IQ can rapidly change over time (Fig. 8). Deterioration of the Corporate IQ can quickly occur if new and current knowledge remains overlooked or ignored. The corporate brain must feed on knowledge acquisition and organizational learning that is translated into business performance. When a company (or even an entire nation) has landed into trouble, there are many indicators that rate the degree of risk in the company. For example, the world's leading credit rating agencies help the investor community in quantifying how much risk the troubled party actually represents^[10]. Their rating assessments are rigorous, based on a transparent set of criteria, involving debt load, corporate governance, cash

flow, and other key performance indicators – the fullest array imaginable.

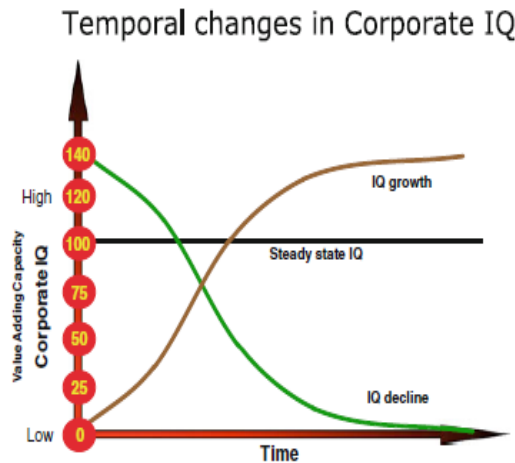


Fig. 8 Periodic assessment of Corporate IQ allows the tracking of temporal IQ changes (growth, decline or steady-state). Periodic monitoring provides early warning for the negative impacts of Corporate IQ decline

A Corporate IQ assessment is not available for Chesapeake (CHK), but the company shows clear signs of becoming progressively out of touch with the realities in its business environment (Box 1). Companies like CHK bear a huge responsibility to cultivate a transparent working relationship with their banks, the analyst community, and rating agencies. Organizational discipline in providing reliable, consistent and sincere information to the market is working in favor of a company's standing with investors, analysts and rating agencies. In a serious display of disconnect, and wholly inconsistent with its credit rating outlook, CHK stated in an investor call of May 2012, it expected to obtain investment grade ratings by the end of 2012. Such an investment grade projection is exactly counter to reality: the firm has been grounded three big steps under investment grade. As a gravely troubled company with a BB- rating, there is no conceivable way to restore its financial business fundamentals in just 6 months time. CHK can with certainty not become financially fit so fast and exit 2012 with an investment grade rating - this is not a realistic scenario option.

Numerous past cases of credit downgrades in the energy business have preceded corporate failures and forced takeovers. For example, the early rationale for Enron's credit rating downgrade from BBB- to junk bond status back in 2001 was its failure to complete a planned merger (the Dynegy deal) that was crucial to solve Enron's liquidity crisis. The loss of the merger opportunity, representing \$9 billion market capital growth and \$1.5 bn cash access, sent Enron's liquidity fix down the drain. It triggered Enron's subsequent junk bond grading and the instant maturation of \$3.9 bn debt – heralded its ultimate failure. The multiple frauds that Enron had covered up until then, only emerged later, during the firm's notorious bankruptcy investigation. In another example, El Paso's credit rating ended so deep into junk status over the past decade that it could never recover the cost of capital from its energy business operations. Asset sales followed over the past decade, but

always failed to improve either the company's rating or its cash flow. Finally, the illiquid company was handed over to Kinder Morgan in 2011.

Box 1 - How much risk does CHK's enterprise disconnect actually carry for equity and debt investors?

Chesapeake (CHK) unsecured loans and bonds were already a relatively poor BB credit-grade in early May 2012. The implied default risk was about 1 in 26 (~3.75%). Still, such a junk bond company provided an interesting opportunity for risk-hungry investors, because of the high interest rates. Goldman Sachs and Jefferies Group stepped into the opportunity, stipulating 8.75% initial interest rate when they approved CHK's unsecured loan of \$4bn. But the \$4bn debt deal immediately led to a further downgrade of CHK to BB-, with a distinctly stated negative outlook. The reason being that CHK can never earn back such high interest rates from its meagre returns on the employed capital (which stood just over 6% in the best of its past few years). By mid-May 2012 all major rating agencies (Fitch, Moody, S&P) had awarded CHK a junk bond credit rating of BB- (Ba3). Asset sales are the company's only way out to avert insolvency, which is why its risk of defaulting had grown to BB- or about 1 in 20 (~5%).

Obviously, investors and credit rating agencies need each other. The rating agencies tell investors precisely which cost of capital should be charged to a risky firm. A lowered credit rating means the cost of capital goes up, which is why investors may then charge higher interest rates – to compensate for the higher risk exposure. Thousands of analysts continually monitor troubled energy companies like CHK for integrity of data provided in corporate filings and sincerity in verbal communications. Credit analysts focus on an assessment of CHK's downside risks. Whereas investors look for value plays, credit analysts uncover the ticking time bombs. Investors looking for risky high yield opportunities may still see a substantial capital gains upside in CHK – albeit temporarily – by rightly timing the market sentiment.

The world is watching with anxiety to find out whether or not some of the US and Canadian shale gas companies have become ticking time bombs, ready to hurt investors by an implosion of shareholder value^[11]. The contention made here is that a progressive mismatch between the true market conditions and the corporate outlook is eventually picked up by credit rating agencies and reflected in a company's credit ratings. The concerned companies seem less and less able to proactively direct their business, because management is embattled by media revelations about poor results. Such companies often resort to downplaying these facts and refuse to bite the bullet. The longer the situation lasts, the steeper the Corporate IQ decline will be as long as effective organizational learning remains impaired.

Although it is attractive to use corporate credit ratings as a proxy for a firm's Corporate IQ, the validity of this

correlation needs yet to be confirmed. Companies with excellent credit standing were indeed able to achieve this status by an effective past performance, which itself required successful organizational learning. But Corporate IQ is a measure which differs from credit ratings because it assesses the present capacities of the firm, which will determine and affect its future performance. Lowered credit ratings are commonly the result of an already compromised Corporate IQ. In fact, an alert for undue IQ deterioration can be established well before an actual lowering of the firm's credit rating.

Exactly this sequence of events was played out for a Dutch gas transmission company, which had its Corporate IQ tested in a 2009 pilot study. A representative sample group of 52 middle- and sub-top managers participated and yielded a Corporate IQ score of 75 with a narrow standard deviation. The managers expressed little surprise over the low score - which confirmed their sense of knowledge hoarding and precious lack of knowledge sharing; extensive silo-forming between departments had grinded the organizational learning curve to a halt and precluded any form of self-adjustment. In the course of 2010-2011, the company's corporate credit rating was stepwise lowered from AAA to AA-.

The trouble with flagging companies is that their upper management is often resorting to a denial policy, which does not bode well for the survival chances of such companies unless remedial action is taken to improve the Corporate IQ. Effective organizational learning requires internal and external transparency. Instead, corporate governance in such embattled companies is marked by progressively opaque and obtrusive decision-making. To avoid such outcomes regular IQ assessments should become part of a firm's quality assurance process. Remedial action needs to be taken quickly if the Corporate IQ lithmus test provides evidence for an unfavourable IQ status.

VI. CONCLUSIONS

The Corporate IQ brain scan can spot strategic drift and helps to explain why companies outperform, underperform, or fail. A persistent lower profitability of some companies is commonly a result of their slower and deficient organizational learning speeds. Slow learning lowers their Corporate IQ Index, which needs to be high to lead among peers. Figure 7 suggests that ExxonMobil has been by far the fastest and most disciplined organizational learner over the past decade, while ConocoPhillips was the slowest learner in its high IQ peer group. BP has also slowed its organizational learning and past mistakes are repeated. Chevron, Shell and TOTAL - all high IQ organizations -- were average organizational learners over the past decade. One should remember that this ranking may well change in the decade ahead of us.

The Corporate IQ metric should be monitored frequently: maintenance and improvement of the Corporate IQ is worthwhile, because it is such a powerful indicator of future performance. Everything being equal, i.e., access to technology, people talent, and adequate process engineering, keeping the lead with a competitive edge requires

optimization of the organizational learning process. Periodic assessment of the Corporate IQ can prevent and mitigate undue decline in a company's organizational intelligence (Fig. 9). The Corporate IQ metric helps companies to assess where they stand. This quantitative approach goes hand in hand with understanding the complex interaction of the company's internal operations and its strategy adaptations to changes in the external business environment.



Fig. 9 The outcome of the IQ assessment (1) provides diagnostics (2) for improvement in targeted interventions (3) that enhance the organizational learning capacity (4). Periodic IQ assessments will reveal whether the targeted interventions were effective and thus lead to positive growth of the Corporate IQ

Flagging companies should intensify their Corporate IQ assessments to help reconnect their internal capacities with the external reality. If this is not seen as a priority, the firm's state of strategic drift will only worsen (Fig. 2). Restoration of the alignment with the external business environment is essential to avoid an imminent demise of the firm.

Ironically, the higher the IQ score is, the better is the company's concurrent managerial capacity to take the right decisions at the right time. They act accordingly, knowing full well that their firm's Corporate IQ leadership requires the sharing of mature explicit knowledge augmented with recently externalized tacit knowledge at the greatest speed. In such companies, the corporate culture and reward systems encourage the sharing of knowledge to support the organizational learning process. Professionals in high IQ organizations commonly work efficiently and know how to share experience and knowledge to complete projects faster, better and cheaper. A company's innovation rate and prudent risk management are also seen positively correlated to its Corporate IQ.

As always, top management must lead the way and provide leadership in organizational learning and transparency. If they fail to do so diligently, Enron and Chesapeake provide excellent case studies for the imminent business decline that can be attributed to a deteriorating Corporate IQ. One or more major enterprise failures in the North American shale energy business will surely send shock waves to emerging shale plays around the world.

Already scrambling for environmental credibility and investor trust, the global development of these plays will then be delayed even further. In the next few years we will find out whether there are any winners left in the North American shale bonanza – a real survival struggle will unfold, which is bound to be won by only a handful of the smartest companies.

DISCLAIMER

This study analyzes company performance based on data abstracted from company reports. The analysis of these empirical data inevitably involves a degree of interpretation and uncertainty connected to the assumptions made. Although the results derived here are reproducible using the outlined research methods, the authors, Alboran Energy Strategy Consultants and publisher take no responsibility for any liabilities claimed by companies included in this study. Readers, especially serious investors, should perform their own due diligence analysis regarding internal corporate technical risk management, considering the wisdom of some risk premium for companies having primary assets in newly evolving plays and potentially unstable business models.

REFERENCES

- [1] Weijermars, R., 2011. Building Corporate IQ: Moving the Energy Business from Smart to Genius: Executive Guide to preventing Costly Crises. Springer, London, ISBN 978-0-85729 -678-8.
- [2] Weijermars, R., 2012. Responsibly Securing Natural Resources – The Art of Managing Risk in Complex Field Operations and Volatile Energy Markets. First Break, Vol. 30, No. 6 (June Issue), p.111-119.
- [3] Kotter, J.P., and Rathgeber, H., 2006. Our Iceberg Is Melting: Changing and Succeeding Under Any Conditions. Macmillan, New York.
- [4] Conner, D., 1992. Managing at the speed of change: How resilient managers succeed and prosper where others fail. New York, Villard.
- [5] Weijermars, R. & Watson, S., 2011. Unconventional Natural Gas Business: TSR Benchmark and Recommendations for Prudent Management of Shareholder Value. *SPE Economics & Management*, vol. 3, no. 4, p. 247-261, SPE 154056.
- [6] Weijermars, R., 2012. Jumps in proved unconventional gas reserves present challenges to reserves auditing. *SPE Economics & Management*, SPE 160927-PA & Online First. 10 May 2012.
- [7] Weijermars, R., 2011. Security of Supply: Operational Margins at the Wellhead and Natural Gas Reserve Maturation, Abstract & Forum Presentation, Taking Natural Gas Seriously: Opportunities and Challenges (AAPG) General Assembly A; Co-Chairs: S. W. Tinker, W. L. Fisher and S. Ikonnikova, AAPG 12 April 2011. *Search and Discovery Article #70106* (2011); Posted Sept 19, 2011. http://www.searchanddiscovery.com/documents/2011/70106weijermars/ndx_weijermars.pdf.
- [8] Mendelson, H. and Ziegler, J., 1999. Survival of the Smartest: Managing Information for Rapid Action and World-Class Performance. Wiley.
- [9] Weijermars, R. 2011. Moving the Energy Business from Smart to Genius by Building Corporate IQ. *SPE Economics & Management*, Vol. 3. Issue 3 (July), p.186-194 (SPE paper 144490-PA).
- [10] Weijermars, R., SPE paper 144489: Credit Ratings and Cash Flow Analysis of Oil & Gas companies: Competitive disadvantage in financing costs for smaller companies in tight capital markets. *SPE Economics & Management*, Vol. 3, Issue 2 (April 2011), p. 54-67.
- [11] Weijermars, R. & Watson, S., 2011. Unconventional Natural Gas Business: TSR Benchmark and Recommendations for Prudent Management of Shareholder Value. *SPE Economics & Management*, vol. 3, no. 4 (Oct.), p. 247-261, (SPE paper 154056).



Ruud Weijermars is Senior Partner at Alboran Energy Strategy Consultants and researcher at Delft University of Technology, the Netherlands. He is the Editor-in-Chief of Energy Strategy Reviews. Ruud frequently publishes in scholarly journals on energy economics and technology solutions.

His book on Building Corporate IQ was published in 2011: *Moving the Energy Business from Smart to Genius: Executive Guide to preventing Costly Crises*, Springer, London, ISBN 978-0-85729-678-8.