Competitive advantage from applying an E&P clockspeed accelerator

Ruud Weijermars[1] introduces the concept of a clockspeed accelerator[*] as an analysis tool for optimizing the development of global oil and gas resources in a market currently characterized by intense competition between various 'Oils' and in the longer term threatened by growth of alternative energy sources.

The E&P industry is under global pressure to accelerate clockspeed to better match world energy demand with stable supply at affordable price levels. At present, the replacement rate of fossil hydrocarbons by alternatives is still slow and immature, which justifies why fossil fuels can still count on premium prices. But as alternatives mature and their market share grows, the future competition between the major providers of energy resources will involve many more players than IOCs and NOCs alone. Hydrocarbons may lose market share if the E&P industry does not manage to accelerate its clockspeed. Companies aiming to stay longer in the lead of the oil and gas business must accelerate the optimization of their overall business utility. This study highlights the competitive advantage to be gained from clockspeed acceleration for the E&P industry as whole, and formulates recommendations for clockspeed improvements at individual companies.

In August 2008 the oil price for West Texas Intermediate peaked at $148 per barrel. That came perilously close to the upper limit of about $150 per barrel crude oil termed Break Point by CERA (2006). Break Point is a price elasticity test, predicting that global decision-makers will act when oil prices rise beyond $150. The energy crisis was firmly centre stage on the global agenda before the financial crisis overtook the news headlines in Q4 of 2008. Indeed, global policies have already provided incentives for the speedy development of innovative energy solutions with simultaneous adoption of energy conservation policies (US Senate 2009). Such incentives for alternative energy solutions may result in a decreased need for production increases in oil exporting countries. Overall utility of produced oil volumes will decline when total oil consumption begins to slow down as argued in the Break Point scenario of CERA (2006).

The interest of the oil and gas industry is best served by managing the demand/supply ratio such that overall utility remains profitable for both the business and the consumer. Production levels must meet consumer needs in the medium and long-term future, otherwise overall utility will eventually decline. Thus measures need to be taken to avoid and delay the recurrence of Break Point. One pathway for the E&P industry is to optimize overall utility by developing a sustainable capacity to match supply and demand for hydrocarbons on the short and medium term through the acceleration of E&P clockspeed. E&P clockspeed acceleration is an important strategy concept to speed up production levels in order to close the energy supply gap (Weijermars, 2009). The 'clockspeed accelerator' tool provides gearshift levers for optimization of the three principal dimensions of E&P clockspeed. This paper expands the clockspeed strategy concept by formulating what could be done to remove obstacles for attaining faster E&P clockspeed.

Strategic transformation and 'best practice' clockspeed

The petroleum industry is high-tech and commonly interested in absorbing state-of-the-art tools and concepts that could help to improve the business performance. Industry clockspeed is a relatively new concept for the pacing of dynamic business strategies (Fine, 1996, 1998). Different industries move at different clockspeeds, as compared to one another and to the global business environment. Examples of indicators of clockspeed are the rate of change in organizational structures and the frequency of new product launches and new technology adoptions (Fine, 1996).

Fine's industry clockspeed (1996,1998) can be best translated as the velocity of change in the external business environment that sets the pace for a firm's internal operations (Noke et al., 2008). More specifically, clockspeed puts a timer on the well-known concept of strategic transformations. If companies move at too slow a clockspeed, they run the risk of strategic drift and they become disconnected from the competitively changing business environment (Fig. 1). Strategy initiatives are needed in individual companies to ensure that their speed of strategic change is not too slow

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* *The term 'clockspeed accelerator' is in the process of being trademarked by Alboran Media Group to whom all enquiries should be made.*

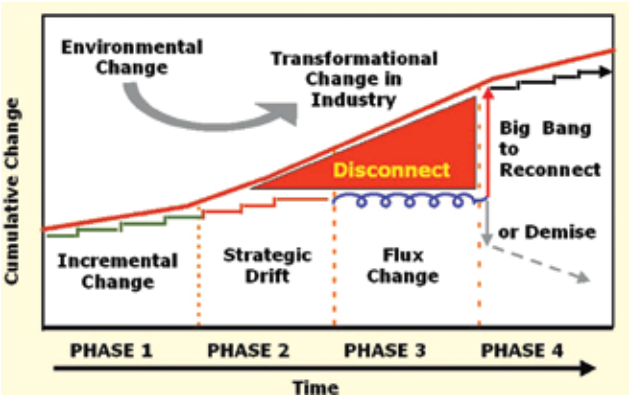

Figure 1 *Individual companies that cannot keep up with the speed of transformational change in the E&P industry will disconnect and run the risk of failurel. Four phases of increasing disconnect with the transformational change are indicated. Only a major change (i.e., 'Big Bang') can save an E&P company that has erred for too long in strategic flux.*

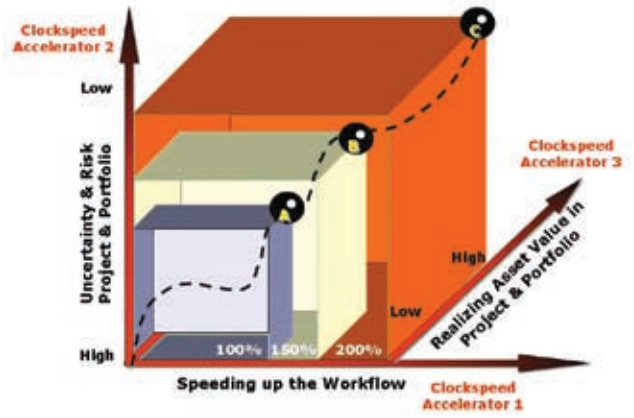

Figure 2 *The E&P clockspeed can improve in three dimensions: (1) speed up the field development lifecycle, (2) enhance quality of uncertainty control, and (3) optimizing the value adding efficiency. The improvement of 'best practice' in all three dimensions helps to accelerate a sub-optimum clockspeed (Case A), to an improved clockspeed (Case B), in pursuit of the optimum state (Case C).*

compared to the rest of the business league and to avoid a big bang or failure (Fig. 1). Aversion to risk generally lowers industry clockspeed and results in a slower absorption of organizational innovation and new technology, according to Noke et al. (2008).

Although there are studies that inventory the strategic effect of clockspeed in different industries (e.g. Meijboom et al., 2007), a systematic approach that defines 'clockspeed accelerators' for tailor-made use in the oil and gas industry was only recently published (Weijermars, 2009). Clockspeed accelerators are proposed as the gearshift levers that enable the energy industry to better keep demand and supply within its price elasticity range. Effective clockspeed strategies can help individual companies to outperform others, and to speed up their production levels to extend longevity of the oil and gas industry. The three principal dimensions of E&P clockspeed acceleration are (Fig. 2): (1) Speeding up the workflow, (2) Rate of risk mitigating, and (3) Accrual rate of asset value - at project level and portfolio level. The E&P industry must strive to perform optimally in all three dimensions of clockspeed acceleration in order to optimize its efficiency. The E&P industry can benefit from improved clockspeed performance, not the least in the expected growth areas of cooperation between IOCs, NOCs, and PPP Oils, as discussed below.

Radargraphs of E&P clockspeed

Privatization of over a dozen NOCs in the past decade has reshuffled the industrial landscape. The oil and gas industry traditionally distinguished NOCs and IOCs, but now it is more appropriate to distinguish three major groups of E&P players: (1) IOCs or 'Private Oils', comprising companies that are stock-listed and 100% financed by private equity, (2) true NOCs or 'State Oils', referring to national

PIW (*) 2006 Rank in peer Group	Top Six Private Oils 100%	Top Six State Oils 100%	Top Six PPP Oils (Private/State)
1	Exxon	Saudi Aramco	Gazprom (50-/50+)
2	BP	NIOC	Petrobras (67.8/32.2)
3	Shell	PDV	ENI (70.0/30.0)
4	ConocoPhillips	CNPC	StatoilHydro (29.1/70.9)
5	Chevron	PEMEX	ONGC (25.9/74.1)
6	Total	Sonatrach	OMV (86.5/31.5)
(*) Petroleum Intelligence Weekly			

Table 1 *Top 6 for major E&P player groups.*

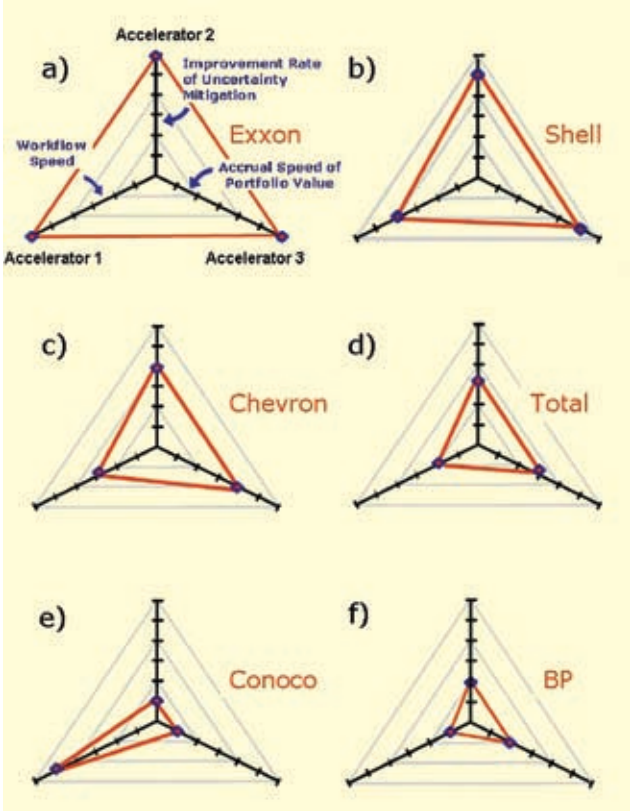

Figure 3 *Relative Clockspeed performance of Private Oils for five-year time-series period 2002 to 2007 (data according to Weijermars, 2009).*

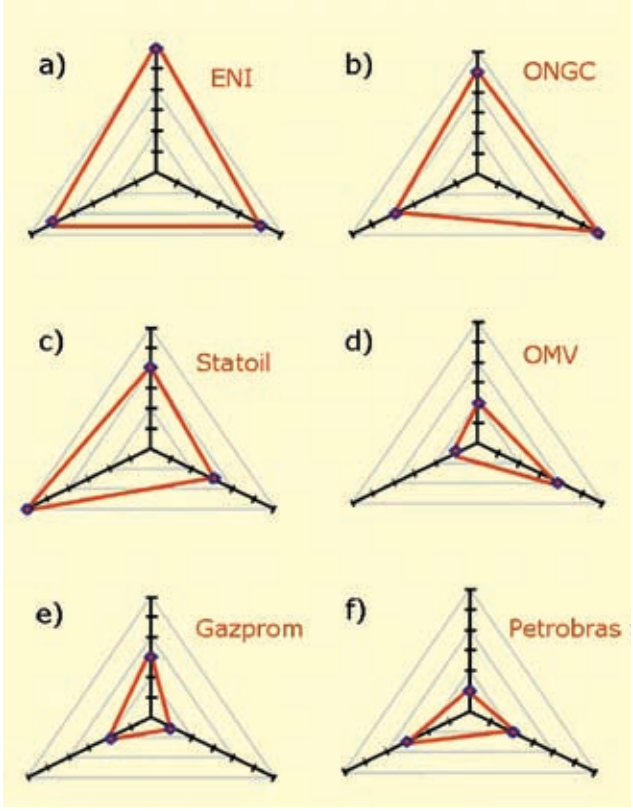

Figure 4 *Relative clockspeed performance of PPP Oils for five-year time-series period 2002 to 2007 (data according to Weijermars, 2009).*

oil companies that are 100% state ownership, and (3) Public-Private-Partnership NOCs or 'PPP Oils', that are stock-listed but in which the state still holds a significant stake. Table 1 lists the world's Top Six companies in each group, based on operational performance (liquid production, gas production, reserves of liquids, reserves of gas, refining capacity, and product sales).

Wolf and Pollitt (2008) already concluded that the Top 5 NOCs jointly produce only 18% of the net profit realized by the combined Top Five IOCs, averaged over a 20 year period (1987 to 2006). The relative performance of Private Oils and PPP Oils has been studied for a five-year performance period (2002-2007) for two peer groups made up by the Top 6 Six State Oils and Top Six PPP Oils (Weijermars, 2009). Figures 3 and 4 visualize the relative clockspeed settings for the companies in each of the two peer groups benchmarked. The radargraphs indicate that clockspeed acceleration leaders among the Private Oils are: Exxon, Shell, and Chevron; laggards are Total, ConocoPhillips, and BP. Clockspeed leaders for the PPP Oils are ENI, ONGC, and Statoil; Laggards are OMV, Gazprom, and Petrobras. ENI, although clockspeed winner in its peer group, has a relatively high debt-leverage of 38% at the end of fiscal year 2007 limiting its tactical response options (more so than its peer group companies) in times of falling oil revenues in a recession. For a detailed discussion of clockspeed acceleration, see Weijermars (2009).

How to boost E&P clockspeed?

Further efforts are needed to enhance E&P clockspeed. IOCs, PPP Oils, and pure NOCs can jointly prevent the occurrence of Break Point by increasing clockspeed. And while IOCs and PPP Oils have made headway, most reserves are held by NOCs.

Whereas IOCs have traditionally worked together with NOCs, they are now joined by PPP Oils in the global competition to secure mutually beneficial partnerships with State Oils that have access to reserves. PPP Oils include many former NOCs that have moved toward international markets because domestic reserves were too limited to fuel further growth (e.g., ENI, StatoilHydro, ONGC, OMV). Althouh IOCs can still bring to bear their cutting-edge technology to win NOC business agreements, PPP Oils commonly are more sensitive to the political intricacies of State Oils and have become not only formidable competitors but also trusted stakeholders in risk-sharing projects (between IOCs, PPP Oils, and NOCs). In these partnerships, the NOCs have access to the hydrocarbon reserves, whereas IOCs and PPP Oils bring in their expertise and appetite for risky projects.

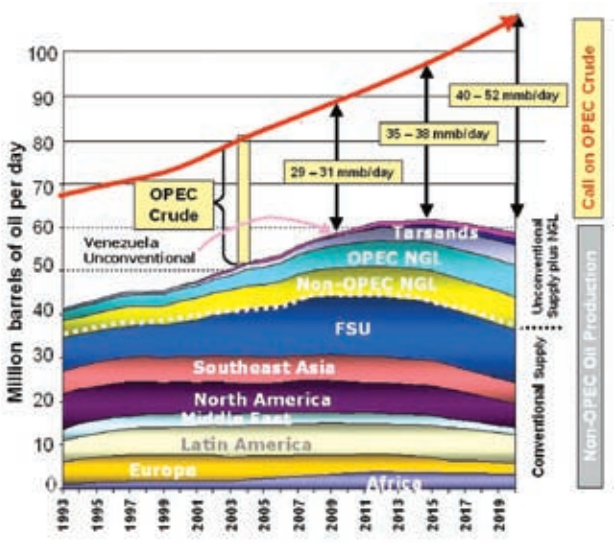

Figure 5 *Non-OPEC oil production based on historic data till 2006 and anticipated production to 2020 based on ongoing projects and investments. Non-OPEC conventional oil production will peak and decline early next decade but is mitigated by growth of unconventional oil resources. Natural gas liquids (NGL) in unconventional supply includes both non-OPEC and OPEC supply. Demand beyond conventional oil peak needs to be met by boost in OPEC crude supply (adapted from PFC Energy).*

NOCs remain attractive strategic partners for both IOCs and PPP Oils, because State Oils have access to some 88% of the world's 'proven' oil reserves and the reserve replacement ratios of PPP Oils and Private Oils are dwindling.

Furthermore, OPEC oil supply – which took 22 years to rise from 15 million barrels of oil per day (mmb/day) in 1984 to 30 mmb/day in 2006 – needs to rise further to nearly 40 mmb/day by year 2015 (Fig. 5). That steep rise in production is needed because supply by non-OPEC producers, which stood at 55 mmb/day in 2006, can barely be lifted beyond 60 mmb/day in the early part of the next decade (2010-2020). Total demand for oil stood at 85 mmb/day in 2006, and is expected to rise to 99 mmb/day by 2015 (IEA, 2006). The world community expects OPEC to fill the supply gap, but OPEC is severely challenged as far as expanding production capacity fast enough. In fact, the emerging supply gap can be viewed as an intensifying clockspeed gap.

One may ask whether it is fair to expect OPEC members to bear the burden of investment for our global demand for oil? And whether OPEC is prepared to expand production? It is unrealistic to expect OPEC alone to close the gap between demand growth and non-OPEC supply, which occurs even under average to moderate demand growth projections. The E&P industry as a whole (State Oils, PPP Oils and Private Oils) needs to jointly optimize clockspeed.

As a starting point, generic strenghts, concerns, and weaknesses of NOCs and IOCs are inventoried in Table 2. Interestingly, PPP Oils commonly share the strengths and weaknesess typical for both Private Oils and State Oils. In effect, that translates to a competitive advantage for PPP Oils.

E&P industry can jointly improve industry clockspeed by removing the principal barriers to clockspeed acceleration. The barriers that critically impede each of the three clockspeed accelerators (in NOCs, IOCs, and PPP Oils) are outlined in the next sections. This approach provides a systematic framework for optimizing the clockpeed performance of the E&P business still further.

NOC strengths, concerns, & weaknesses	IOC strengths, concerns, & weaknesses
NOCs have emerging strengths in: • Mobilizing project finance • Building professional capacity • Using cultural & political leverage • Optimizing usage of service firms	IOCs proven capabilities are in: • Bearing financial risks • Developing large and complex projects • Adopting cutting-edge and trademarked technology • Competing on the basis of E&P expertise and performance
NOCs principal concerns are: • Local politics and bureaucracy • Mandate confusion • Accountability • Managing IOC presence	IOCs principal concerns are: • Share price • Portfolio management • Access to opportunities • Reliable agreements
NOCs weaknesses are in: • Understanding value of time • Providing stable regulatory policies • Transparency of decision-making processes • Leveraging their country & resource risk with appropriate incentives	IOCs weaknesses are in: • Understanding local politics and bureaucracy • Cultivating a positive image in the host country • Developing new types of joint ventures and contracts • Providing transparency about strategic objectives

Table 2 *SWOT analysis for NOCs & IOCs.*

Optimizing E&P clockspeed accelerator

Accelerator 1 – Optimizing workflow speed

E&P companies are doing relatively well in fast-tracking work progress when it comes to internal factors that affect the workflow processes. Oil companies (IOCs, NOCs, and PPP Oils alike) are all concerned with speeding up their workflow; traditionally their focus is on improving the *internal* clockspeed. Operational performance improvement can still be achieved by accelerating the connections between workflow silos, which typically occur at the decision gates between the stages in field development projects. Owners of the value assurance reviews process need to make sure the decision support package (DSP) is not waiting too long for a project stage decision (i.e., hold, rework, proceed with or kill the project).

When it comes to dealing with the *external* or *ambient* factors that continue to impede progress in improving E&P clockspeed, NOCs, IOCs and PPP Oils jointly face numerous traps. Major obstacles that continue to impede a boost in *Clockspeed Accelerator 1* reside in the screening of concessions and in the early exploration stages – thus mostly rooted in the ambient dependencies. Evidently, the typical time elapsed versus time spent working in the early concession and exploration stages needs to be shortened. Examples of ambient factors that may need speedy attention are: slow moves in governments, shortage in local contractor services, and regulatory issues. Clockspeed sluggishness due to ambient factors has two damaging effects: (1) Company's resources are attached to these projects and remain preoccupied even during idle-times, (2) Value is destroyed for the resource holders in time-based competition.

Figure 6 *Strategy ranking matrix for State Oils and PPP Oils. Quadrants take into account technology level and production growth or decline. Knowledge networks in the oil industry help to balance geopolitical tensions, which may influence knowledge transfer in the global energy business. Acronyms of companies ranked can be readily retrieved using web search engines (adapted from PFC Energy).*

For IOCs and PPP Oils, the early entry into new concessions has become more and more important as the number of the world's most attractive prospects is generally declining. NOCs are attractive partners, especially if production decline needs to be mitigated (Fig. 6). Growth of non-OPEC oil production is slowing due to an expensive race for access to limited new resources. OPEC has access to relatively huge oil reservoirs that can be produced with relatively low investment. Therefore, OPEC countries still harbour excellent reserve-adding potential. Interesting prospects have also opened up at newly founded NOCs in the southern republics of the former Soviet Union. As NOCs have become the dominant players on the world market for crude oil, E&P clockspeed is now affected more by geopolitical agendas than by technology, especially when considering pre-concession and concession work.

Consequently, IOCs and PPP Oils now can gain as much (or more) from learning the finesses of political complexities and cultural differences, as from technology innovation, in their drive to increase their chances to gain access to NOC resources (Weijermars et al. , 2008). While State Oils are diversifying their business models, Private Oils want to optimize the business value of their services to build sustainable business cooperation. Meanwhile, PPP Oils are learning to take on more risk, and increasingly adopt entrepreneurial strategies (Fig. 6) previously only followed by Private Oils. Jointly, all oils are now more prone to venture into complex business relationships, based on a broad spectrum of services and assets rather then a single asset or service. Consequently, NOCs, IOCs, and PPP Oils now increasingly have a common agenda to strive for substantial clockspeed improvements.

Accelerator 2 – Rate of risk mitigation

The E&P industry must continue to build stronger relationships, based on mutual trust, integrity, and reliable agreements. Recently joined by PPP Oils, NOCs and IOCs are beginning to evaluate strategic collaborations that involve cross-discipline and cross-function value propositions. Inventorying the goals of each organization and mapping these against their strategic objectives, project goals, and resource capacity are important steps to assess mutual risks and uncertainties of the individual key players: 'Who has best expertise to extract the oil and gas resources in this region? Can we move to a more service-based business model? Can we deliver traditional E&P expertise plus something extra (e.g., infrastructure projects, nuclear expertise, etc) to become the preferred partner for choosy NOCs? What characteristics should an NOC look for in their partners? Who has best access to skills and capabilities? Who has experience and track record with new and proven technologies? Who has easy access to capital markets?' These issues can best be explored via professional dialogues between upper manage-

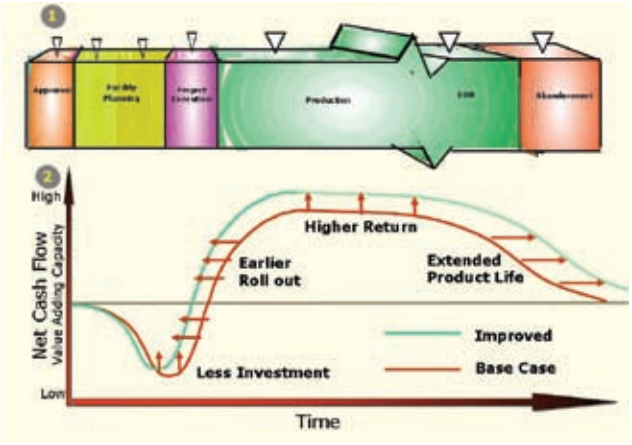

Figure 7 *Upstream oil and gas project lifecycle: full field development value is realized by effective execution of each phase of the project lifecycle (1), which generates cash flow (2) that earns back operating costs once production starts. Starting production earlier and extending EOR contributes to value adding for the company.*

ment and portfolio management teams, rather than by the managers of individual assets.

Meanwhile, service companies (SCs, notably Schlumberger) increasingly provide NOCs with horizontally integrated management solutions and vertically integrated technology solutions. The strategic relationships between NOCs, IOCs, PPP Oils, and SCs are governed by the following questions: 'Is there enough mutual trust? Is there sufficient knowledge sharing? How can we improve our cooperation? Should we review our strategy and policies? Which actors are the drivers of innovation? What should we optimize to accelerate our clockspeed? What are our mutual risks and opportunities?' NOCs excel at optimizing political bargaining in their home country, obtaining construction permits for facilities and infrastructure, gaining public support for new projects and partnerships as well as possessing state-of-the-art expertise on domestic and regional geopolitics and markets. Improved cooperation and utilization of the joint expertise base will speed up clockpeed accelerator 2.

The risks involved in oil exploration and production projects have increased as subsurface challenges, environmental pressure, financial risks, and geopolitical tension have all risen. Recent studies have highlighted that financial and regulatory issues pose the largest strategic risks for both NOCs and IOCs (Jessen, 2008). The Top 10 risks that companies must address in order to gear up clockspeed accelerator 2, are: (1) lack of manpower, (2) worsening fiscal terms, (3) CAPEX inflation, (4) OPEX inflation, (5) bundled competition for NOC reserves, (6) political pressures to boycott certain NOCs, (7) swaggering energy policies, (8) demand and supply shocks, (9) climate concerns, and (10) energy conservation by global policymakers. These are the issues companies can mitigate in order to improve performance of clockspeed accelerator 2.

Accelerator 3 – Accrual rate of project value in corporate portfolio

Value management in IOCs traditionally concentrates on factors that optimize NPV, such as enhanced discounted cash flow, recovery factor, and field development time (Fig. 7). Their value adding tactics commonly focus on maturing 'tougher barrels' and increasing reservoir efficiency. In contrast, E&P investor focus (of IOC shareholders) is on ROI of investments made in terms of NPVs, not on details such as recovery factor; ironically, the latter is where IOCs create primary value.

NOCs traditionally tend to focus less on portfolio performance in terms of financial KPIs (Wolf, 2008). Earlier work has emphasized the need for NOCs and their governments to find proxies for competitive performance (Zanoyan, 2002). The separation of government roles (national energy laws, policies, regulation, and taxation) and State Oil responsibilities (commercial management of hydrocarbon assets) stays blurred and can be articulated by partial privatization into PPP Oils. For example, the relationship between the Norwegian government, its PPP Oil policies and the regulatory authority (NPD) provide a role model for the transition of NOCs into competitively operating companies, including the possibility of preparing for full privatization. Many other NOCs can improve competiveness simply if business entry is facilitated by full transparency about roles, process, and professional information management. If NOCs are empowered by their governments to act commercially and articulate a competitive business strategy their managerial decisions can stay aligned with global market drivers. Improved mandates for NOCs to perform competitively can boost clockspeed accelerator 3 for all oil companies as reserves are held by NOCs.

Figure 8 *Effective building of assets results from balanced project and portfolio management. For example, if field development projects are poorly phased, cashflow may kick-in too slowly or with interruptions. Optimum project phasing is of paramount importance for increasing value accrual in the corporate portfolio.*

	Accelerator 1	Accelerator 2	Accelerator 3
All oils	Enhance internal workflow speed; Champion speedy value assurance reviews of DSPs	Inventory mutual strengths and weaknesses (people, process & technology) before start doing	Maximize range of project options for selective portfolio balancing
	Speed up learning how to offer bundled services and handle multiple assets	Jointly address global industry challenges related to Top 10 risks listed on page 18.	Develop novel types of contracts to jointly maximize value accrual rate in projects under time-based competition
Private oils	Improve emotional intelligence in negotiations and JVs with partners	Utilize expertise of State Oil partners to optimize political bargaining & public support; contain geopolitical risks	Optimize project phasing to ensure accrual rate of portfolio value grows
State Oils	Speed up and streamline licence process & regulations for exploration and concessions	Reciproce their speed of knowledge sharing, and speed up risk mitigation with partners	Articulate & separate roles of regulators and commercial management
PPP Oils	Improve speed of entrepreneurial strategies	Speed up learning in risk mitigation related to Entrepreneurial Strategies	Speed up privatization process when needed for market valorization
SCs	Speed up innovative solutions and agree on incentives with client for mutual benefit	Outperform Private Oils, State Oils and PPP Oils in speed of risk mitigation	Maximize lifecycle value of asset with long-term view

Table 3 *Hints for E&P clockspeed acceleration.*

The building of a profitable and sustainable corporate asset portfolio must occur faster and faster to realize full asset value. At the portfolio level, company performance can be monitored through corporate KPIs, P/E ratio, share price, profitability, liquidity, annual growth, reserve replacement ratios, and the balance of risks and opportunities in the portfolio. Company performance therefore is still the result of effective (field development) project management and effective management of the overall portfolio of projects (Fig. 8). While the drive towards real-time decision-making can bring economic benefits, project phasing is best steered by decisions at corporate portfolio level. Different projects arrive at different times at the field development appraisal gate stop (and resources need to be allocated for future development planning with prioritization of resources based on the corporate alignment of projects).

Barriers to the speeding up of clockspeed accelerator 3 may arise when new projects in the portfolio are lined up too fast, so contractors become more expensive and not instantly available. The parallel pacing of 50 prospects and five development projects is easier to phase when portfolios are managed in a central organization rather than in regionally silo-ed and asset-based business units. Additionally, contracting surface facilities, rigs, and shipyards (for construction of production platforms and LNG tankers) in an already stretched marketplace must be optimized at corporate level in order to help management on a project level. Smaller companies and SCs tend to manage individual assets much more with a short term-vision. They tend to optimize profit, but not necessarily extend the lifecycle of a field nor enhance recovery factors. The relationship with the host government is less crucial in short to medium term lifecycle projects as compared to long term lifecycle projects. In contrast, larger companies have a portfolio, which includes many large projects with lifecycles that span decades. Optimization of clockspeed accelerator 3 can be most effectively realized by better management of the corporate project portfolio.

Recommendations and conclusions

Removing the obstacles to attain faster E&P clockspeed is a crucial test for the oil and gas industry in the coming decade. IOCs, NOCs, PPP Oils, and SCs should jointly strive to supply the market such that price elasticity stays below the range, with a Break Point at $150 per barrel (CERA 2006), where alternatives develop faster than fossil fuels deplete.To prevent the early occurrence and to delay the passage of the optimal purchase price, it is in the interest of the petroleum industry to manage the oil demand/supply ratio such that the overall utility remains attractive and profitable. In the worst case scenario, only 'easy oil' continues to be produced profitably in a market where emergent and affordable energy alternatives prevent the netting of premium prices needed for the further development of the more complex oil & gas resources. The Canadian tar sands are an illustration of a complex develop-

ment operation that has become largely subeconomic when oil prices dropped steeply in the second half of 2008.

In the broader perspective, major obstacles for E&P clockspeed improvement neither reside in technology nor in subsurface reservoirs. Impediments to faster clockspeeds are mostly decision-making hurdles, organizational structures, strategic disparities, and cultural gaps. Table 3 summarizes hints for clockspeed acceleration for the E&P industry as a whole, and for the individual player groups. Better cooperation between IOCs and NOCs, now joined by PPP Oils and SCs, is a win-win game for all rather than the zero-sum game - as sometimes perceived by NOCs, where any gain of IOCs is felt as a loss for the NOCs. Many E&P decisions still focus on a suboptimum set of project options rather than on decisions that optimize the full corporate portfolio. Global reserve maturation schedules must develop further into both dynamic and stable business relationships that are understood by all parties to better match supply and demand so as to build win-win situations. Dealing with the major challenges of global energy policies, climate change, and impact of the financial crisis is what industry can best focus on through united initiatives.

Acknowledgements

Discussions on the topic of time-based competition between IOCs and NOCs with global experts and senior partners (Maurice Berns, Jan-Willem Maas, and Philip Whittaker) from Boston Consulting Group (BCG) are gratefully acknowledged. The views expressed in the present study are the sole responsibility of the author and do not necessarily reflect BCG policies or opinions.

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Disclaimer *- This study analyzes company performance in terms of clockspeed acceleration, strategic positioning and financial gearing, based on data abstracted from company reports. By its nature, the analysis of empirical data involves a degree of uncertainty connected to the assumptions made. For example, the equity performance of the companies in terms of shareholder return has not been taken into account in this study. The author and publisher take no responsibility for any liabilities claimed by companies included in this study.*