



## Perspectives on Changing Safety Culture and Managing Risk

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### Abstract

This paper in brief looks at the history of BP and their recipe for success. The business model that, heretofore, has been embedded in BP's culture has been one of risk-taking, cost cutting, and capital efficiency improvement within the context of *risk management*...risk management of their portfolio of assets. This paper is not meant to be a commentary on "good" or "bad" corporate culture *per se*, but rather seeks simply to reveal some of the underlying issues that organizations must necessarily confront in order to manage risk comprehensively and successfully.

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<sup>1</sup> [FireExperts.com](http://FireExperts.com); The opinions expressed herein are solely those of the author, November 10, 2010.

## 1 Introduction

To suggest that BP has a history of taking risks is perhaps a gross understatement. In fact, BP owes its success and can claim its place among the other so-called super-majors for that very reason. BP was, and is willing to take risks that other companies have traditionally shied away from...BP has been both commended and condemned because of its risk-prone culture. Much like Tiger Woods trying to change his swing, BP is now trying to change the very thing that made it so successful. Can they succeed and still remain successful?

This paper in brief looks at the history of BP and their recipe for success. The business model that, heretofore, has been embedded in BP's culture has been one of risk-taking, cost cutting, and capital efficiency improvement within the context of *risk management*—risk management of their portfolio of assets. This paper is not meant to be a commentary on “good” or “bad” corporate culture *per se*, but rather seeks simply to reveal some of the underlying issues that organizations must necessarily confront in order to manage risk comprehensively and successfully.

In simplistic terms, safety is the judgment of risk. Something is judged safe when the risk is deemed acceptable—it does not mean that there not any risk—just that the risk can be mitigated or controlled to an *acceptable level*. This applies equally to investors purchasing BP stock and to regulators granting BP permits to operate offshore. In this regard it is important to understand that engineers and managers often look at risk differently. Engineers are apt to suggest that if risk cannot be quantified and measured, then its degree of seriousness cannot be adequately determined—in other words what you can't measure you can't manage—at least not very well. Moreover, engineers generally think of risk in terms of probability and consequence, i.e., how likely is it that something will go wrong and, if it does, what will be the likely consequences. When there is a great deal of uncertainty involved in quantifying risk, engineers tend to be risk-adverse, taking a conservative approach. In the past, this is how safety factors were determined, and more recently, how confidence levels of probability distributions are reflected in limit-state designs.

Managers, on the other hand, tend to think of risk more in terms of “risk and reward”—the bigger the reward, then the bigger the risk that is worth taking.<sup>2</sup> Their concept of risk management can differ significantly from that of engineers, and these differences, driven by business goals, can infuse and embed a corporate culture in which risk management is meant to maximize portfolio assets and increase the bottom line. This is not inherently bad—quite the opposite—it is exactly what they should be doing. In fact, in the U.S. it's the law!<sup>3</sup> As noted in Forbes Magazine, “U.S. corporate law states that the legal obligation of the directors and officers of a company is to serve the interests of shareholders. Period. Full stop. This is true even when serving the interests of shareholders comes at the expense of its workers, community, or the environment.”

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<sup>2</sup> For example, see <http://www.riskculture.com/>: The Keys to Success. Functionally, there are four aspects of financial risk management. Success depends upon a positive corporate culture. No one can manage risk if they are not prepared to take risk. While individual initiative is critical, it is the corporate culture which facilitates the process. A positive risk culture is one which promotes individual responsibility and is supportive of risk taking.... Risk Culture Blog, June 8, 2010.

<sup>3</sup> Jay Coen Gilbert, “A Solution To The BP Problem: Changing The Rules Of The Game,” Forbes – The CSR Blog, June 11, 2010, <http://blogs.forbes.com/csr/2010/06/11/273/>.

It would be difficult to find anyone who would disagree with the proposition that finding and drilling for oil and gas is a high-risk high-stakes business. The risks are enormous and so can be the rewards. In 1968, after a decade of drilling dry wells along the North Slope, BP was on the verge of abandoning its search. Its equipment was already packed up and awaiting shipment when a rival consortium made a suspiciously extravagant offer for BP's Alaska acreage along the edges of Prudhoe Bay. Atlantic Richfield (ARCO) and Humble Oil (Exxon) weren't telling, but they had struck oil in their own last-chance well in the centre of the Prudhoe Bay structure.<sup>4</sup>

After making its Prudhoe Bay Oil Field strike on the Alaskan North slope in 1969, BP has continued to grow to become the largest oil and gas producer in the U.S. and the major supplier of fuel to the U.S. military.<sup>5</sup> Both Tony Hayward and his predecessor, Lord Browne, did a commendable job in advance BP into the realm of the super-major oil companies—a lofty position that took guts, fortitude, and business-smarts to achieve.

Lord Browne, who holds a MS in business from Stanford (1981), having received a BS from Cambridge in 1969, placed huge bets by acquiring the oil companies AMOCO (1998) and ARCO (2000) in a series of mega-deals, while at the same time gained a reputation for cost-cutting and maximizing the bottom line.<sup>6</sup> He quadrupled BP's market capitalization while he was at the helm and was touted as *Tony Blair's favourite [sic] businessman* before being forced to resign in 2007 over a scandal in which he allegedly lied to the court about his homosexuality to protect his privacy. Since then, however, Lord Browne is back in the news, being appointed as the U.K. government's "lead non-executive director," working with Whitehall cabinet ministers to appoint people to cut costs and *improve efficiency* in each department.<sup>7</sup>

Seemingly, neither has his business savvy gone without recognition nor has his parsimonious talents gone to waste. Is it coincidental that in mid-October 2010 the powers that be at Whitehall announced the most severe austerity measures ever taken by the U.K. government in peace-time, proposing to cut 490,000 jobs in the public sector and slashing the budget across the board,

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<sup>4</sup> BP, "Post war history of BP, 1946-1970,"

<http://www.bp.com/sectiongenericarticle.do?categoryId=9014443&contentId=7027523>

<sup>5</sup> Neil King Jr. and Melanie Trotman, "BP Risks Big Fines and Loss of Major U.S. Contracts," Wall Street Journal, May 28, 2010, <http://online.wsj.com/article/SB10001424052748703630304575270822261954614.html>. "BP is the single biggest supplier of fuel to the Department of Defense, with Pentagon contracts worth \$2.2 billion a year, according to government records. BP is also the largest producer of oil on federal waters in the Gulf of Mexico, which makes it a significant contributor of revenue to the government."

<sup>6</sup> At the time there were two companies known as "supermajors" in the oil business—Exxon and Shell. By the end of 1998 there would be a third supermajor, and the trio would be dubbed the "three sisters." In May 1998 Browne called H. Laurance Fuller, the chairman of the board of Amoco, about acquiring Amoco. In August 1998 British Petroleum purchased Amoco for \$57 billion, and British Petroleum renamed itself BP Amoco. The purchase of Amoco made BP Amoco's workforce 99,000 employees. In 1999 this number was cut to 89,000. This and other cuts in expenses eventually saved the company \$2 billion annually. In 1998 Queen Elizabeth II made him a knight, upholding a British tradition whereby the monarch bestowed honors each year on her birthday. In April 1999 BP Amoco purchased ARCO for \$27 billion in BP Amoco stock. ARCO owned 22 percent of Prudhoe Bay, and BP Amoco owned 51 percent, but U.S. government regulators wanted BP Amoco to give up its ARCO Alaskan holdings. BP Amoco sold these holding to Phillips Petroleum for \$7 billion, leaving BP Amoco with control of 45 percent of Alaska's oil. <http://www.referenceforbusiness.com/biography/A-E/Browne-John-1948.html>.

<sup>7</sup> "Ex-BP boss Lord Browne to lead Whitehall reform," BBC News, June 30, 2010, <http://www.bbc.co.uk/news/10467532>. Also, Tom Bower, "July Fourth Outrage: British Gov't Elevates Disgraced BP Boss," The Daily Beast, July 1, 2010, <http://www.thedailybeast.com/blogs-and-stories/2010-07-01/lord-browne-and-bp-oil-spill-outrage/p/>.

including defense and welfare?<sup>8</sup> It is interesting to note that Alan Johnson, Labour’s spokesman on economic issues, accused Finance Minister, George Osborne, of economic “masochism”—a term that also has been applied to how the Deepwater Horizon management team seemingly approached drilling risks.<sup>9</sup>

This brings us to Tony Hayward, who has been vilified as the most reviled and hated man in America due to his frequent gaffs and inept handling of *The Spill*.<sup>10</sup> Tony Hayward took charge of BP following John Browne’s departure, and vowed to change BP’s safety culture in the aftermath of BP’s Texas City refinery catastrophe.<sup>11</sup> He also sought to improve BP’s bottom line and “close the competitive gap” that had been identified in BP’s place among its sister super-majors.

## **2 Closing the Competitive Gap by Portfolio Building and Cost Cutting**

On Tuesday, March 2, 2010, a few weeks before the blowout, Tony Hayward updated stakeholders on the success of BP’s strategy *to close the competitive gap* that was identified in 2007.<sup>12</sup> He discussed how momentum had been restored to BP’s core business and a focus on safe and reliable operations is now strongly embedded in BP, mentioning that they have started to see the benefits of improved performance flowing through to their bottom line. Hayward links 2009’s strategic progress to a longer track record over the past decade of building a portfolio of assets of great quality and huge potential. In Exploration and Production (E&P), he touts BP’s history of being both an efficient and successful explorer with a record as being among the best in the industry.<sup>13</sup> He compares BP to other “super-majors” in the industry and notes that while their portfolio ranks among the best in the industry, their financial performance has yet to reflect this... “*but there is now a real opportunity to make this portfolio work harder for us and we intend to do just that.*”

Hayward explains that their strategy remains unchanged but “we are now embarking on a new phase – to realize the potential of the portfolio built over the last decade.” He notes that “*we have considerable scope to pursue section leadership, particularly in costs, capital efficiency and margin quality.*” In upstream operations he explains that they will focus on cost and capital efficiency to deliver

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<sup>8</sup> “UK Announces 490,000 job cuts: Britain will cut 490,000 public sector jobs over four years under austerity measures designed to reduce the country’s record deficit;” *The Chronicle*, Oct. 24, 2010, <http://ghanaian-chronicle.com/business-news/uk-announces-490000-job-cuts/>.

<sup>9</sup> Trevor Kletz, “The Root Cause of the BP Leak,” DHSG Working Paper, June 2010. “The phenomenon I have described was also a root cause of the 2005 explosion on BP’s Texas City plant - the macho culture spread to the whole company, not just the offshore parts - and a similar phenomenon occurred in Buncefield, UK which resulted in the 2005 explosion there.”

<sup>10</sup> Maryann Tobin, “BP CEO Tony Hayward: The most hated man in America?,” *Examiner.com*, June 5, 2010, <http://www.examiner.com/political-spin-in-national/bp-ceo-tony-hayward-the-most-hated-man-america>.

<sup>11</sup> U.S. Chemical Safety Board Final Investigation Report: REPORT NO. 2005-04-I-TX, March 23, 2005, [www.csb.gov](http://www.csb.gov). Also “Baker report: Recommendations,” *Financial Times* (U.K.), January 16, 2007, <http://www.ft.com/cms/s/4429b9d0-a57b-11db-a4e0-0000779e2340.html>.

<sup>12</sup> “BP’s Strategy Update,” Tony Hayward, CEO of BP, <http://www.bp.com/sectiongenericarticle.do?categoryId=9021974&contentId=7040780>.

<sup>13</sup> BP forecast that in 2010 GOM deepwater operations would account for 35% of their total production; “More than 20% of its production is now in deep water or subsea (that is when production equipment is placed beneath the sea’s surface), a figure which is expected to rise to more than 35% by 2010.” <http://www.bp.com/sectiongenericarticle.do?categoryId=9025122&contentId=7047805>.

profitable growth. They will continue to unlock corporate efficiency through a culture of continuous improvement.

He goes on to state that their direction is clear, “*it is the unrelenting pursuit of competitive leadership in relation to cash-costs, capital efficiency, and margin quality.*” Their goal over the next few years is to realize their latent potential of their asset base by improving the efficiency and effectiveness of everything they do.

*“We will vigorously drive cost and capital efficiency while at the same time maintain our priority of safe and reliable operations. We believe that there is still a considerable prize to be had from embedding a culture of continuous improvement across the organization. We’ve emerged from 2009 in great shape, with renewed confidence and determination. We can see the prize and believe we are well positioned to capture it.”*

### **3 Black Gold – The Means to the Prize**

In his quest to be Number One, Hayward took a number of steps to further profits and improve the bottom line. After a disappointing 4<sup>th</sup> quarter in 2007 he called in Neil Perry, oil & gas specialist with investment banker Morgan Stanley, who recommended further cost-cutting and austerity measures. Perry told Hayward that BP has failed consistently on upstream project delivery and downstream reliability. He added, however, that the organization was “sitting on a goldmine” of assets that could help it close the gap on competitors. Shortly thereafter Hayward announced BP’s intention to cut 5000 jobs and reduce overhead by some 20%.<sup>14</sup> By the end of the cost-cutting that followed, more than 6,500 jobs were eliminated—almost 10 percent of BP’s workforce—according to The Wall Street Journal. Insiders are reported to have spoken of “draconian” measures and a heavy emphasis on production targets.<sup>15, 16</sup> Earlier, when retired Coast Guard Captain James Woodle took a job with the Alyeska oil consortium (majority-owned by BP) in Valdez, Alaska, and put in charge of oil spill recovery, he reportedly told Newsweek he was appalled when he arrived on-scene: “They had cut back on equipment, on staff.” And when he asked about the cuts, he was told very pointedly: “**Safety doesn’t make money.**”<sup>17</sup>

As explained in BP’s Horizon magazine:<sup>18</sup>

*“GROUP chief executive Tony Hayward’s admission that in recent years BP has been a ‘serial underperformer’ was a brutally honest assessment of how the company sits in relation to its competitors. His address at a gathering of the company’s top 500 leaders in Phoenix in March, left managers in no doubt that BP had ‘promised a lot but not delivered very much’. Hayward’s words still ringing in their ears, delegates were in no doubt that if BP is to close the current performance*

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<sup>14</sup> David Robertson, “BP to cut 5,000 jobs as profits fall by a fifth,” The Sunday Times, February 5, 2008, [http://business.timesonline.co.uk/tol/business/industry\\_sectors/natural\\_resources/article3310399.ecc](http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article3310399.ecc), and “BP to cut jobs after profits fall,” BBC News, February 5, 2008.

<sup>15</sup> Guy Chazan, “BP’s Worsening Spill Crisis Undermines CEO’s Reforms,” Wall Street Journal, May 3, 2010, <http://online.wsj.com/article/SB10001424052748704093204575215981090535738.html>

<sup>16</sup> Ravi Somaiya, “The Road to Deepwater Horizon-- BP’s oil spill in the Gulf of Mexico was a disaster three decades in the making,” Newsweek, July 13, 2010, [www.newsweek.com/2010/07/.../the-road-to-deepwater-horizon.html](http://www.newsweek.com/2010/07/.../the-road-to-deepwater-horizon.html).

<sup>17</sup> Ibid, Newsweek, July 12, 2010.

<sup>18</sup> Greg Goodale, “A new framework for success,” Horizon—The Global Publication for BP People, Issue 3, May 2008, 3, [http://nw-assets.s3.amazonaws.com/pdf/horizon\\_magazine\\_issue\\_3\\_2008.pdf](http://nw-assets.s3.amazonaws.com/pdf/horizon_magazine_issue_3_2008.pdf).

*gap to its competitors, then it must implement the forward agenda, which was set out in October last year. One part of that agenda is the new leadership framework. For BP's executive team, the new, single framework is key to making a sustainable change of leadership behaviours across the company."*

Hayward also instigated a bonus system linked to how much money an employee could save the company, thereby, perhaps inadvertently, creating a cultural incentive across the workforce to *"do it quicker and do it cheaper."*<sup>19</sup>

*"At a federal hearing this week, an investigator revealed that BP's top manager on a drilling rig is given a performance evaluation that includes the category "Every Dollar Counts and Simplification." Of 13 employee evaluations reviewed by investigators, 12 had documented ways they had saved the company large sums of money, typically six-figure amounts, and one had put together a spreadsheet showing that he could account for \$490,000 in savings, said Jason Mathews, an investigator for the Bureau of Ocean Energy Management, Regulation and Enforcement, which is conducting the joint inquiry with the Coast Guard."*

This was recently changed following Bob Dudley's replacement of Hayward to a reward system based on achieving safety goals.<sup>20</sup> Faced with accusations that BP precipitated the Gulf of Mexico oil spill by placing profits before safety, Dudley reportedly sent an internal memo to the staff directing that safety would be the sole criterion for rewarding employee performance in its operating business for the fourth quarter; however, this change has been received with considerable skepticism as a way of effecting change in corporate safety culture—but certainly is a step in the right direction.

Hayward's CEO of Exploration and Production – the bread and butter producer of the bottom line, made it clear that BP was at the frontier and ready to take on risks that other companies would pass on. BP placed its bets and rolled the dice for the biggest rewards, encouraged by their own success, even though these plays involved the deepest waters and riskiest oil reservoirs—High Pressure High Temperature (HPHT) fields that are much more problematic to safely drill in and to complete wells. The risks are enormous but so are the rewards, and they were making a ton of money to prove it because they had the know-how and guts to take it on. Perhaps it was gold-fever, or perhaps they sincerely believed they knew what they were doing—in any event, the perspective was lost and its consequent price is enormous.

On February 1, 2007, the Board of BP announced that it had appointed Andy Inglis as a managing director of the BP Group.<sup>21</sup> He also succeeds Tony Hayward as chief executive of BP's Exploration & Production (E&P) business. Inglis, who is a Chartered Mechanical Engineer, a Fellow of the Royal Academy of Engineering, and a Fellow of the Institution of Mechanical Engineers, put forth E&P's vision in a speech later that year at the Sanford Bernstein 4<sup>th</sup> Annual Strategic Decisions

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<sup>19</sup> Joel Achenbach, "At BP, safety vs. cost-saving," Washington Post, October 9, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/10/08/AR2010100806687.html>.

<sup>20</sup> Guy Chazan and Dana Mattioli, "BP Links Pay to Safety in Fourth Quarter," Wall Street Journal, October 19, 2010, <http://online.wsj.com/article/SB10001424052702303496104575560422023190664.html>.  
[http://online.wsj.com/article/SB10001424052702303496104575560422023190664.html?mod=WSJ\\_topics\\_obama](http://online.wsj.com/article/SB10001424052702303496104575560422023190664.html?mod=WSJ_topics_obama).

<sup>21</sup> BP Press Office, "Andy Inglis Joins BP Board And Succeeds Tony Hayward as Head of Exploration & Production," <http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7028141>.

Conference.<sup>22</sup> Much like the fictitious Captain James T. Kirk, Commander of the Starship Enterprise, whose mission was to explore space...*the final frontier*, so too is BP's.<sup>23</sup> Remember how it goes:

*These are the voyages of the Starship Enterprise. Its five-year mission: to explore strange new worlds; to seek out new life and new civilizations; to boldly go where no man has gone before...*

During his short tenor at the helm of E&P, Inglis often struck a similar note in his speeches. He spoke in terms of BP's frontier expertise and experience. For example, at the aforementioned 4<sup>th</sup> Annual Strategic Decisions conference, he explained:

*"...BP operates on the frontiers of the energy industry - geographically, technically and in terms of business partnerships. Challenges and risks are our daily bread. We can't be sure what the next challenge will be, but the important thing is to have the capability to meet multiple challenges. I have confidence that BP has that capability and I hope I can pass that confidence on to you today.... Companies like BP increasingly work in extreme weather conditions, in increasingly deep water and in complex rock formations. Our projects get more complex and multi-layered every year..."*

*"How BP's Implements The Five Competitive Advantages. The critical thing is to exploit the distinctive advantages that the IOC<sup>24</sup> experience brings with it. And I think there are five key advantages. **First, taking major risks** (emphasis added); second, assembling large and diversified portfolios; third, building deep intellectual and technical capability; fourth, making best use of global integration; and finally, forging long-term, mutually beneficial, partnerships."*

*"So let me move on to look at those potential advantages of being an IOC – and how BP is seeking to implement them. So first – risk. As a leading IOC, we take and manage **big risks for commensurate rewards** (emphasis added). We take exploration risks, capital risks and ongoing operations risks..."*

*"And another example of risk taking is the Gulf of Mexico. Twenty years ago we could drill in water depths of 1,500 ft to reservoirs at 15,000 ft. Today we are drilling in over 10,000 ft of water and reaching reservoirs nearly 35,000 ft deep. Pushing the technical boundaries is not without challenges, as we have found with the recent issues with the Thunderhorse (sic) Project. **This is right at the edge of the technical envelope** (emphasis added) and providing many lessons for other projects."*

*Once again being at the frontier in large basins has enabled us to create incumbent positions for the future. As this slide shows, the deep-water Gulf of Mexico resources have increased more than 100 fold since 1985, from less than 150 million barrels to nearly 19 billion barrels, with BP holding over 20 percent share. And there are an estimated 25 to 40 billion barrels yet to be found."*

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<sup>22</sup> Andy Inglis, "The role of an International Oil Company in the 21<sup>st</sup> Century," Sanford Bernstein 4th Annual Strategic Decisions Conference, Sept. 25, 2007, <http://www.bp.com/genericarticle.do?categoryId=98&contentId=7037044>.

<sup>23</sup> The sophistication of deepwater oil exploration and drilling technology is often compared to that of NASA and the space program.

<sup>24</sup> International Oil Company (IOC)

In the aftermath of The Spill, however, the spokesman for this bold vision became a casualty of overzealous risk-taking. The news-byte read: Exploration and Production division head Andy Inglis will leave the company as part of a broad restructuring designed to improve safety and rebuild confidence after the disastrous Gulf of Mexico blowout and oil spill, BP said Wednesday.<sup>25</sup> Is this the beginning of a new safety culture?<sup>26</sup> Well perhaps, but then again, Mr. Dudley is in denial that cost-cutting had anything to do with causing The Spill—at least in print. Perhaps he truly believes this or perhaps he is simply holding true to BP’s party-line response as developed by their own investigators under the purview of the BP legal department—time will tell.

And, in the aftermath of *The Spill*, Hayward admitted that BP did not have all the equipment needed to stop the leak from its Macondo well. Six weeks after the blowout, Tony Hayward mused that “What is undoubtedly true is that we did not have the tools you would want in your tool-kit.” He accepted it was “an entirely fair criticism” to say the company had not been fully prepared for a deep-water oil leak, but was quick to add that the containment effort on the surface, he said, had been “very successful” in keeping oil away from the coast (...after all, *the GOM is a very big ocean*). “Considering how big this has been, very little has got away from us,” Mr. Hayward boasted. But in trying to plug the leak, BP had been reaching for many of the same techniques used to control the Ixtoc 1 blow-out in the Gulf of Mexico 31 years ago.<sup>27</sup> They found themselves in very deep water, relying on old oil boom technology and untried oil collection *inventions* that, in desperation, they were making-up as they went along. The ongoing criminal probe will consider, *inter alia*, BP’s drill permit that grossly misrepresented the size of a spill that BP was prepared to handle. Moreover, former Administrator of the Environmental Protection Agency Carol Browner and Congressman Ed Markey (D-MA) both accused BP of having a vested financial interest in downplaying the size of the leak in part due to the fine they will have to pay based on the amount of leaked oil.<sup>28</sup>

It should be now patently obvious that Mr. Hayward’s attempt to put a smiley-face on spill containment, BP’s disingenuous press releases about estimated flow rates, BP’s utter lack of preparedness, and, following in the footsteps of the Royal Navy’s Admiral Horatio Nelson in the 1801 battle of Copenhagen—who continued to press-on by *turning a blind eye to the risk*, Tony Hayward set the course for his own downfall—and an assignment in Siberia. But will his departure change BP’s safety culture?

In response to the continued delay and time involved for design and fabrication of the ill-conceived “Top Hat” containment contraption in the midst of *The Spill*, University of Texas engineering professor Paul Bommer, a member of the Coast Guard team and head of the *Flow Rate Technical Group* that was trying to determine how much oil was actually leaking, put it this way, “It’s

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<sup>25</sup> James Herron, “BP’s E&P Boss Steps Down In Major Safety Shakeup,” Dow Jones Newswire, Sept. 29, 2010, <http://online.wsj.com/article/BT-CO-20100929-708863.html>.

<sup>26</sup> According to Bob Dudley, “BP is a company that is coming back from a near-death experience,” Mr. Dudley said in a telephone interview, one of several he gave on Thursday to introduce himself and describe his vision for the company. “We are not going to run away from risk. We are going to make sure we are among the best in the world at managing risk going forward.” Clifford Krauss, “New BP Chief Seeks a ‘Fast Evolution,’” New York Times, Sept. 30, 2010, <http://www.nytimes.com/2010/10/01/business/01bp.html>.

<sup>27</sup> Ed Crooks, “BP ‘not prepared’ for deep-water spill,” Financial Times, June 2, 2010, <http://www.ft.com/cms/s/0/e1e0e21c-6e53-11df-ab79-00144feabdc0.html>.

<sup>28</sup> “Government, BP spar over size of oil leak,” CNN.com, May 31, 2010, <http://edition.cnn.com/2010/US/05/30/oil.spill.bp.government/>.

not something you just go to Wal-Mart and buy." True, but then again, the RMS Titanic was unsinkable...who needs lifeboats...full speed ahead...we need to set the record...and so forth.

But does this make Andy Inglis, Tony Hayward, and Lord Browne “bad men,” or for that matter, Titanic’s Captain Edward Smith (at least he went down with his ship)? Professor Bob Bea doesn’t think so [...*these are not bad men...*60 Minutes, May, 16, 2010], nor does CBS’s Steve Tobak<sup>29</sup> think so...as he puts it:

*“...is BP’s **Tony Hayward** a bad CEO? Has he handled the gulf oil spill crisis poorly? I don’t think so. I may be the only person on the planet with that opinion, aside from Hayward’s family, but I really don’t think so. Frankly, I think Hayward has found himself in the mother of all no-win situations.”*

In a Washington Post news-byte<sup>30</sup> headlined, “Oil spill reveals the dangers of success,” Bob Samuelson notes that before the accident, deepwater drilling seemed to be a technological triumph. About 80 percent of the Gulf of Mexico's recent oil production has come from deepwater operations, defined as water depths exceeding 1,000 feet, and accounts for about 30% or more of U.S. production. In the wake of accusations of cost-cutting by BP, careless rig operators and lax regulators as plausible culprits in the blowout, Samuelson raises the question of whether the success of deepwater drilling led to failure. Did success sow overconfidence? Did continuing achievements obscure the dangers? As he observes:

*“One theory of the oil spill is that the deepwater technology is inherently so complex and dangerous that it can't really be understood or regulated. The safety record before the BP spill seems to rebut that. The problem is that the system broke down. Careless mistakes were made. Or regulators were co-opted by industry. Judgments were botched. Something. The post-crisis investigations will presumably fill out the story. But they may miss the larger question of why... It is human nature to celebrate success by relaxing. The challenge we face is how to acknowledge this urge without being duped by it.”*

Is it just deepwater drilling and ill-defined risk, or is the problem more systemic? Following on the heels of BP’s Texas City refinery tragedy, Jordan Barab, deputy assistant secretary for the U.S. Occupational Safety and Health Administration said OSHA zeroed in on safety problems at the nation's refineries.<sup>31</sup> The results were “deeply troubling.” Inspectors found a significant lack of compliance and the same violations repeated at refinery after refinery. “We are sick of the industry bragging about their safety record when children are burying their parents.” Obviously, the status quo is not working. Cost-cutting and deferred maintenance have been offered as the root cause of not only the Deepwater Horizon incident, but also for the 2005 Texas City refinery explosion and the 2006 Alaska Pipeline Oil spill.<sup>32</sup>

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<sup>29</sup> Steve Tobak, “In Defense of BP CEO Tony Hayward,” CBS BNET Blog, June 10, 2010, <http://www.bnet.com/blog/ceo/in-defense-of-bp-ceo-tony-hayward/4780>.

<sup>30</sup> Robert Samuelson, “Oil spill reveals the dangers of success,” Washington Post, June 7, 2010, [http://www.washingtonpost.com/wp-dyn/content/article/2010/06/06/AR2010060602925\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2010/06/06/AR2010060602925_pf.html).

<sup>31</sup> Les Blumenthal, “Safety record of oil and gas industry is weak, OSHA says,” Miami Herald, June 10, 2010, <http://www.miamiherald.com/2010/06/10/v-print/1674080/safety-record-of-oil-and-gas-industry.html>.

<sup>32</sup> Abrahm Lustgarten, “Furious Growth and Cost Cuts Led To BP Accidents Past and Present,” ProPublica, October 26, 2010, [propublica.org](http://propublica.org).

Joe Nocera of the New York Times<sup>33</sup> writes:

*“We have to get the priorities right,” the chief executive of BP said. “And Job 1 is to get to these things that have happened, get them fixed and get them sorted out. We don’t just sort them out on the surface, we get them fixed deeply.” The executive was speaking to Matthew L. Wald of The New York Times, vowing to recommit his company to a culture of safety. The oil giant was adding \$1 billion to the \$6 billion it had already set aside to improve safety, the executive told Mr. Wald. It was setting up a safety advisory panel to make recommendations on how the company could improve. It was bringing in a new man to head its American operations — the source of most of the company’s problems — who would make safety his top priority. And on, and on.”*

*“That interview didn’t take place this week — a week in which BP was excoriated in Congress for the extraordinary safety lapses that led to the Deepwater Horizon rig disaster, while also being strong-armed by President Obama into putting \$20 billion in escrow to compensate victims. No, the interview took place nearly four years ago, after BP’s previous disaster on American soil, when oil was discovered leaking from a 16-mile stretch of corroded BP pipeline in Prudhoe Bay in Alaska. And that was just a year after a BP refinery explosion in Texas City, Tex., killed 15 workers and injured hundreds more.”*

*“Nor was the chief executive in question Tony Hayward, who spent Thursday before a Congressional panel ducking tough questions and evading personal responsibility — while insisting, absurdly, that as head of the company he had been “laser-focused” on safety. No, the interviewee was his predecessor and mentor John Browne, who had spent nearly 10 years at the helm of BP before resigning in May 2007.”*

*“Do you remember the Prudhoe Bay leak and the Texas City explosion? They were big news at the time, though they quickly faded from the headlines. BP was fined \$21 million for the numerous violations that contributed to the Texas City explosion, and it was forced to endure a phased shutdown of its Alaska operations while it repaired the corroded pipeline, which cost it additional revenue.”*

*“In retrospect, though, the two accidents represented something else as well: they were a huge gift to the company. The fact that these two accidents — thousands of miles apart, and involving very different parts of BP — took place within a year showed that something was systemically wrong with BP’s culture. Mr. Browne had built BP by taking over other oil companies, like Amoco in 1998, and then ruthlessly cutting costs, often firing the acquired company’s most experienced engineers. Taking shortcuts was ingrained in the company’s culture, and everyone in the oil business knew it.”*

*“The accidents should have been the wake-up call BP needed to change that culture. But the mistakes and negligence that took place on the Deepwater Horizon in the Gulf of Mexico — which are so profound that everyone I spoke to in the oil business found them truly inexplicable — suggest that the two men never did much more than mouth nice-sounding platitudes.”*

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<sup>33</sup> Joe Nocera, “BP Ignored the Omens of Disaster,” New York Times, June 18, 2010, [http://www.nytimes.com/2010/06/19/business/19nocera.html?ref=joe\\_nocera&pagewanted=print](http://www.nytimes.com/2010/06/19/business/19nocera.html?ref=joe_nocera&pagewanted=print).



Figure 3.1 – BP Thunder Horse platform in the GOM severely listing and in danger of sinking.

Are these incidents just a part of *the normal cost of doing business* in the myopic eyes of management – the byproduct of seeking to close the competitive gap at all costs and *claiming the prize*? Was it worth the risk of nearly sinking the Thunder Horse platform, BP’s largest producer and one-of-a-kind drilling and production facility in the GOM,<sup>34</sup> when poor QA/QC and HOE was nearly their undoing?<sup>35</sup>

Sarah Lyall of the New York Times writes:<sup>36</sup>

*“Towering 15 stories above the water’s surface, Thunder Horse was meant to be the company’s crowning glory, the embodiment of its bold gamble to outpace its competitors in finding and exploiting the vast reserves of oil beneath the waters of the gulf. Instead, the rig, which was supposed to produce about 20 percent of the gulf’s oil output, became a symbol of BP’s hubris. A valve installed backward had caused the vessel to flood during the hurricane, jeopardizing the project before any oil had even been pumped.”*

*“Other problems, discovered later, included a welding job so shoddy that it left underwater pipelines brittle and full of cracks. “It could have been catastrophic,” said Gordon A. Aaker Jr., a senior engineering consultant on the project. “You would have lost a lot of oil a mile down before you would have even known. It could have been a helluva spill — much like the Deepwater Horizon.”*

*“The problems at Thunder Horse were not an anomaly, but a warning that BP was taking too many risks and cutting corners in pursuit of growth and profits, according to analysts, competitors and former employees. Despite a catalog of crises and near misses in recent years, BP has been chronically unable or unwilling to learn from its mistakes, an examination of its record shows.”*

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<sup>34</sup> The BP operated Thunder Horse started production in 2008. With the capacity to process more than a quarter of a million barrels of oil per day and 200 million cubic feet per day of natural gas, Thunder Horse is currently the largest single producing field in the Gulf of Mexico. Today, with seven wells online, it is producing around 300,000 mboed . “Deep-water production,” <http://www.bp.com/sectiongenericarticle.do?categoryId=9025122&contentId=7047805>. Million Barrels Oil Equivalent per Day (mboed).

<sup>35</sup> QA/QC = Quality Assurance/Quality Control; Human and Organizational Errors (HOE)

<sup>36</sup> Sarah Lyall, “In BP’s Record, a History of Boldness and Costly Blunders,” New York Times, July 12, 2010, <http://www.nytimes.com/2010/07/13/business/energy-environment/13bprisk.html?pagewanted=3>.

*“They were very arrogant and proud and in denial,” said Steve Arendt, a safety specialist who assisted the panel appointed by BP to investigate the company’s refineries after a deadly 2005 explosion at its Texas City, Tex., facility. “It is possible they were fooled by their success.”*

*“Indeed, there was a great deal of success to admire. In little more than a decade, BP grew from a middleweight into the industry’s second-largest company, behind only Exxon Mobil, with soaring profits, fat dividends and a share price to match.”*

Atlantis, Neptune, Mad Dog, Holstein, and Crazy Horse (later re-named Thunder Horse) are some of the names given to the GOM’s richest deepwater fields—exploration successes credited to BP’s adoption of an “elephant-hunt” strategy that focuses only on potentially the biggest and most lucrative prospects while ignoring the rest.<sup>37</sup> BP’s oil explorers decided on this new strategy that focuses all the company’s energy on seeking big reserves, dubbed “elephants,” and the company put big resources behind this new approach to ensure its success. Following in the wake of the Thunder Horse problems, Kenny Lang, BP’s head of Gulf of Mexico operations reportedly observed, “We’re operating at the edge of what is known,” and “When you’re at the edge, you’re creating knowledge. And when you create knowledge, you sometimes stub your toe.” So what caused the Thunder Horse to almost sink—an *unlikely chain of events*.<sup>38</sup> And why did much of the subsea production piping and manifolds have to be replaced—bad welds due to *an unforeseen chemical reaction*.<sup>39</sup>

When you’ve pushed “the envelope” too far, bad things will happen. Knowing when you’ve crossed “the line” is difficult if you don’t know where the line is in the first place, and in deepwater frontier, there are many lines to cross. The dearly paid-for history of lessons learned from a long lineage of industrial catastrophes can serve as a chart in unknown waters and provide guidance for safe operations when exploring the frontiers of knowledge. However, preventing *impossible failures* takes a bit more than reliance on past experiences—be they good (successes) or bad (failures). Both *lagging and leading* indicators must be fully considered and evaluated.

## 4 Impossible Failures

Before BP’s Alaska North Slope and GOM oil spills, Professor Bea<sup>40</sup> wrote:

*“Most failures involved never-to-be-exactly-repeated sequences of events and multiple breakdowns or malfunctions in the components that comprise a system. Failures resulted from breaching multiple defenses that were put in place to prevent the failures. These events are frequently dubbed incredible or impossible. After many of these failures, it was observed that if only one of the barriers had not been breached, then the accident or failure would not have occurred. Experience adequately showed that it was extremely difficult, if not impossible, to recreate accurately the time sequence of the event that actually took place during the period leading to the failure. Unknowable complexities generally pervade this process because detailed information on the failure development is not available, is withheld, or is distorted by memory. Hindsight and conformational biases are*

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<sup>37</sup> David Greising, “Troubles Run Deep on Gulf Oil Platform,” Chicago Tribune, May 28, 2007, [http://www.redorbit.com/news/science/948325/troubles\\_run\\_deep\\_on\\_gulf\\_oil\\_platform/index.html](http://www.redorbit.com/news/science/948325/troubles_run_deep_on_gulf_oil_platform/index.html).

<sup>38</sup> Ibid., Greising.

<sup>39</sup> Ibid., Greising.

<sup>40</sup> Robert G. Bea, “Learning from Failures: Painful Lessons from the Recent History of Failures of Engineered Systems,” University of California, Berkeley, December, 2005

*common as are distorted recollections. Stories told from a variety of viewpoints involved in the development of a failure were the best way to capture the richness of the factors, elements, and processes that unfold in the development of a failure.”*

The tragic and preventable explosion and fire aboard the Deepwater Horizon drilling rig was, in the minds of some, an **impossible failure**—it was characterized as ‘inconceivable,’ ‘unprecedented,’ and ‘unforeseeable.’<sup>41</sup> In the immediate aftermath, the failure of the so-called last-resort “fail-safe” device, the Blowout Preventer (BOP), was targeted as the cause: “If that would’ve worked,” a senior oil industry executive said of the blind shear ram, “that rig wouldn’t have burned up and sunk.”<sup>42</sup> However, as one member of the DHSG astutely observed, “isn’t that like blaming a malfunctioning fire sprinkler for causing the fire that burns down your house?” World renowned loss prevention expert and contributing member of the DHSG, Professor Trevor Kletz, recently presented a paper<sup>43</sup> addressing errors commonly made in accident investigation. Professor Kletz observed that one of the most common errors is to report that such an event has never occurred before. Moreover, simply placing the blame on human error, blaming individuals, or even worse, thinking of a possible cause and then seeking evidence to support it, will not produce meaningful results. The most important aspect of incident investigations is arriving at needed “actions.”



**Figure 4.1 – 1999 BP Advertisement**

So as the investigation of the Deepwater Horizon tragedy continues to unfold and the causes of this *impossible failure* are illuminated, we should ask ourselves how much more spill oil will have to wash up on American shores before we get it right? And, more importantly how do we get it right – how can we measure and manage the associated risks of deepwater oil drilling and production? Are the risks acceptable and can the risks be successfully managed? Can we do this safely?

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<sup>41</sup> “BP calls blowout disaster ‘inconceivable,’ ‘unprecedented,’ and ‘unforeseeable,’” *ClimateProgress*, May 4, 2010, <http://climateprogress.org/2010/05/04/bp-calls-blowout-disaster-%E2%80%98inconceivable%E2%80%99-%E2%80%98unprecedented%E2%80%99-and-unforeseeable/>.

<sup>42</sup> Michael Moss and Henry Fountain, “Regulators Failed to Address Risks in Oil Rig Fail-Safe Device,” *New York Times*, June 20, 2010, <http://www.nytimes.com/2010/06/21/us/21blowout.html>.

<sup>43</sup> Trevor Kletz, “Some Common Errors in Accident Investigations,” SARS Conference, London, October 14, 2010.

The answer is, I think, YES, we can IF we can hold true to a common vision and apply common sense. We know better – we do know, or ought to know, how to go about assessing hazards and managing risk...and we are smart enough to know when there is insufficient data and evidence to support risky decisions. And we know how to characterize high reliability organizations (HROs). The problem, of course, is rooted in the perception of risk solely in terms of reward, i.e., in terms of only good consequences and not the potential catastrophic ones...by those decision-makers who, with a dutiful but perhaps lustful eye on the bottom line and, in the glimmer of black gold, with one eye on the prize and crossed fingers behind their backs, and buoyed by the hubris of past successes, may wrongfully decide that the best course to set is full speed ahead...and damn the torpedoes...because it has always worked before...well at least most of the time. We should know by now that “*If it ain’t broke, don’t fix it*” doesn’t work! And we should also know that “*Organizations have no memories.*”<sup>44</sup> What we seem to lose track of, however, is the meaning of prudence.

Following BP’s Texas City refinery explosion – characterized as *the worst industrial accident in a decade*,<sup>45</sup> CSB Chairman Carolynn W. Merritt said:<sup>46</sup>

*“It is my sincere hope and belief that our report and the recent Baker report will establish a new standard of care for corporate boards of directors and CEO’s throughout the world. Process safety programs to protect the lives of workers and the public deserve the same level of attention, investment, and scrutiny as companies now dedicate to maintaining their financial controls. The boards of directors of oil and chemical companies should examine every detail of their process safety programs to ensure that no other terrible tragedy like the one at BP occurs.”*



**Figure 4.2 – The Deepwater Horizon Platform.<sup>47</sup>**

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<sup>44</sup> Trevor Kletz, *Lessons from Disaster: How Organizations Have No Memory and Accidents Recur* (Houston: Gulf Professional Publishing, 1993).

<sup>45</sup> “BP chided in report on fatal Texas fire: Internal papers show oil company aware of hazards before 2005 explosion at refinery;” CNNMoney.com, October 31, 2006, [http://money.cnn.com/2006/10/30/news/companies/bp\\_refinery/index.htm](http://money.cnn.com/2006/10/30/news/companies/bp_refinery/index.htm). “Internal BP documents reveal the oil company’s knowledge of “significant safety problems at the Texas City refinery,” months or years before the March 2005 explosion that killed 15 workers and injured more than 170 others, according to preliminary findings released Monday by the U.S. Chemical Safety Board.”

<sup>46</sup> “U.S. Chemical Safety Board Concludes “Organizational and Safety Deficiencies at All Levels of the BP Corporation” Caused March 2005 Texas City Disaster That Killed 15, Injured 180,” U.S. Chemical Safety Board, March 20, 2007, <http://www.csb.gov/newsroom/detail.aspx?nid=205>.

As Professor Bea has pointed out, the human and organizational factor (HOF) challenge to designing and maintaining high-level quality and reliably engineered systems is not an engineering problem *per se* but rather is considered a management problem. Often, the discrimination has been posed as technical and non-technical. Case histories of recent major failures clearly indicate that both engineers and management have a critical role to play if the splendid history of successes and achievements is to be maintained or improved. Through integration of technologies from the physical and social sciences, engineers and management can learn how to better recognize, measure, and manage risk. The challenge is to wisely apply what is known. In the end, the broader *lessons learned* from the Macondo blowout may not turn out to be *new lessons*, but rather *newly relearned lessons*—a repeat of what has been shown to be a commonality in all impossible failures. To continue to ignore the human and organizational issues as an explicit part of engineering is to continue to experience things that engineers, regulators, industry, and the public do not want to happen, and the occurrence of which can be more effectively reduced and managed *looking forward*.

BP's own internal report,<sup>48</sup> released on September 8, 2010, concluded that:

*The accident on April 20, 2010, involved a well integrity failure, followed by a loss of hydrostatic control of the well. This was followed by a failure to control the flow from the well with the BOP equipment, which allowed the release and subsequent ignition of hydrocarbons. Ultimately, the BOP emergency functions failed to seal the well after the initial explosions.*

The BP investigation team was headed by Mark Bly, BP's head of safety and operations and who was recently elevated to a vice president. In a subsequent news briefing after the report was released, investigation leader Bly was asked whether BP sacrificed safety to save money, as other investigators have alleged. Bly replied that his team did not find anything to support that conclusion.<sup>49</sup> Instead Bly pointed to Transocean and noted that the rig crew “*failed to recognize and act on the influx of hydrocarbons into the well*” when it might still have been possible to cut off the flow. Moreover, with regard to well design, Bly noted that “*based on the report it would appear unlikely that the well design*<sup>50</sup> *contributed to the incident, as the investigation found that the hydrocarbons flowed up the production casing through the bottom of the well.*”

On November 8, 2010, the lead investigator and chief counsel for the National Commission<sup>51</sup> investigating the BP oil spill, Fred H. Bartlit, Jr., Esq., a prominent trial lawyer and who has defended oil giant AMOCO more than once in the past, announced to the commissioners that he found no evidence that anyone involved in drilling the doomed well had taken safety shortcuts to save money.<sup>52</sup> This disputes findings of other investigators, including members of Congress,<sup>53</sup> who

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<sup>47</sup> photo credit: thehistorypages.aimoo.com

<sup>48</sup> “Deepwater Horizon Accident Investigation Report,” BP PLC, September 8, 2010.

<sup>49</sup> Steven Mufson and Joel Achenbach, “In its report on the gulf oil spill, BP spreads the blame,” Washington Post, September 8, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/09/08/AR2010090807789.html>.

<sup>50</sup> Well design and completion is addressed in Section 2 of “Deepwater Horizon Accident Investigation Report,” BP PLC, September 8, 2010.

<sup>51</sup> <http://www.oilspillcommission.gov>.

<sup>52</sup> Steven Mufson and Joel Achenbach, op. cit.

<sup>53</sup> Congressman Edward Markey; “*When the culture of a company favors risk-taking and cutting corners above other concerns, systemic failures like this oil spill disaster result without direct decisions being made or tradeoffs being considered.*” Rep. Edward J. Markey (D-Mass.), a senior member of the House Energy and Commerce Committee. [markey.house.gov/](http://markey.house.gov/)

have previously charged that BP and its contractors, Transocean and Halliburton, had cut corners to speed completion of the well, which cost \$1.5 million a day to drill. Bartlit stated that “To date we have not seen a single instance where a human being made a *conscious decision* to favor dollars over safety” (emphasis added). Nevertheless, Commission Co-chair William Reilly earlier Monday (November 8<sup>th</sup>) declared that “*safety concerns took a back seat to the pursuit of the remarkable returns available offshore.*”<sup>54</sup> And this morning at the outset of the second day of the panel’s two-day hearing, Reilly said “*Whatever else we learned and saw yesterday, it was emphatically not a culture of safety on that rig.*”<sup>55</sup>

Bartlit announced he has accepted BP’s claim that its decision to use fewer barriers to protect the sides of the well likely had little to do with the direct cause of the accident.<sup>56</sup> However, commission investigators also reportedly said the decision to use the cheaper design, called a long string, still could have had serious implications in leading to the disaster. The long-string design, rather than a liner raised the risk of mud contaminating the cement that was supposed to seal the well closed and also may have forced BP to use less cement than advisable because of concerns about heat and pressure. However, Reilly summed it up this way, saying the commission probe has revealed a “ghastly” story of “*one bad call after another,*” including the decision to proceed after failed cement tests, well pressure tests that were mistakenly judged a success and others. And Bob Graham, in a separate statement, added, “*The problem here is that there was a culture that did not promote safety, and that culture failed.*”<sup>57</sup>

## 5 Conclusion

As described by Exxon-Mobil CEO Rex Tillerson in response to questions before the National Commission, an organization’s safety culture takes time to develop and has to be grown from within—you can’t buy it or import it—it has to be nurtured from within the organization. Exxon-Mobil has been at it now for more than twenty years, after learning the hard way and paying for its complacency and risk management failures that led to the Valdez spill. Since that time, Exxon-Mobil has turned the corner and introduced many positive innovations to improve safety culture, such as their Operations Integrity Management System (OIMS), introduced in 1992 as an integral part of their overall safety management system.

In contrast, at the time of the Macondo blowout, BP’s corporate culture remained one that was embedded in risk-taking and cost-cutting—it was like that in 2005 (Texas City), in 2006 (Alaska North Slope Spill), and, as discussed herein, remained unchanged in 2010 (GOM, “The Spill”). Perhaps there is no clear-cut “evidence” that someone in BP made a *conscious decision* to put costs before safety; nevertheless, that misses the point. It is the underlying “*unconscious mind*”<sup>58</sup> that

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<sup>54</sup> Steven Mufson, “Cost didn’t drive decisions on oil rig, spill panelist says,” Washington Post, November 9, 2010, <http://www.washingtonpost.com/wp-dyn/content/article/2010/11/08/AR2010110806296.html>.

<sup>55</sup> Ben Geman, “Spill panel: BP, firms made ‘egregiously bad’ decisions, need revamp,” The Hill, November 10, 2010, <http://thehill.com/blogs/e2-wire/677-e2-wire/128319-spill-panel-chief-bp-transocean-and-halliburton-need-top-to-bottom-reform>.

<sup>56</sup> David Hammer, “Oil Spill Commission: Gas that blew out BP well shot up center, not open side space,” Times Picayune, November 8, 2010, [http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/11/oil\\_spill\\_commission\\_gas\\_that.html](http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/11/oil_spill_commission_gas_that.html).

<sup>57</sup> Siobhan Hughes, “Spill Panel Says Rig Culture Failed on Safety,” Wall Street Journal, November 10, 2010, <http://online.wsj.com/article/SB10001424052748704635704575604622510434324.html>.

<sup>58</sup> The unconscious mind is that part of the mind which gives rise to a collection of mental phenomena that manifest in a person’s mind but which the person is not aware of at the time of their occurrence, generally attributed to 18<sup>th</sup> century German philosopher Sir Christopher Riegel.

governs the actions of an organization and its personnel. Cultural influences that permeate an organization and manifest in actions—actions that can either promote and nurture a high reliability organization (HRO), and that are indicative of a strong safety culture, or actions reflective of complacency, risk-taking, and a loss of situational awareness from pushing the envelope too far in trying to close the competitive gap.

The lessons are there to be learned if only the student would pay attention and take them to heart. Sometimes the lessons are taken to heart and meaningful changes are effected, and sometimes the lessons are ignored—the *why* this is not so much of a mystery—effecting meaningful organizational-behavioral change is the tricky part...a conundrum that regulators, researchers, and ‘teachers’ are seeking answers to as America and the world keep demanding more and more black-gold. Lets’ redouble our efforts to keep it out of the Gulf of Mexico—after all, nobody wants to kill anymore of those endangered GOM walruses—they are getting very hard to find!



**Figure 5.1 – Walrus.<sup>59</sup>**

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<sup>59</sup> Photo Credit: NOAA-walrus.