Do Communication Styles Impact Safety Outcomes?

An Analysis of Canadian Drilling and Well Servicing Rig Managers

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Abstract

The oil and gas industry is a challenging and complex environment. As front-line participants, energy service (drilling and well servicing) companies face dangerous work, environmental controversy, poor public image, and volatile commodities markets. The emerging field of health, safety, and environment (HSE) provides an opportunity to manage these associated challenges in a meaningful way by enhancing the ability to attract and retain qualified staff, obtain long term contracts with customers, and generate positive public perceptions. How a drilling or service rig's manager (RM) communicates HSE messaging is critical to HSE quality. This study explores the relationship between an RM's communication style (CS) and safety records. A quantitative survey to measure CS was distributed to 87 rig managers working for one energy service company in Canada. The results from 37 successfully completed surveys were cross-tabulated with safety records and evaluated in light of existing research. Although findings are not statistically meaningful, they yield several interesting observations between CS variables and safe behaviour. In particular, contrasting with some existing literature, it appears an authoritarian and task-orientated approach to safety messaging specifically may be more effective in delivering better safety results. Findings also suggest expressive rig managers may not be as safe as less expressive ones. Overall, the study reveals areas where the energy service industry would benefit from additional research. Specifically, it provides some practical insight into measuring and evaluating communication style effectively, and suggests that situation and context may play a significant role in relation to achieving outcomes. The study also illustrates a need for industry to re-evaluate safety reporting methods and perhaps introduce standardized protocols.

Introduction

Producing fossil fuels today is a hazardous undertaking in an arena of public scrutiny. The nature of the work, and public concerns about the environment, have made the profession of oil and gas largely unpopular, with many customers and employees turning away from the industry. Although not as visible as explorers and producers[1] (E&Ps), drilling and well service companies must manage the same challenges these larger global companies face in order to survive. The challenge is difficult because in addressing issues such as public perception and a preference for clean energy, capacity is needed; however, capacity is limited by public perception and a preference for clean energy. Fortunately, the emerging field of health, safety, and environment (HSE) provides a meaningful opportunity to address this paradox. HSE today has developed far beyond simple safety protocols, and is a vehicle through which companies can develop themselves to proactively mitigate external risk. Advanced HSE cultures can build social capital, assist in recruiting and maintaining employees, and attract customers. For service companies, achieving such a culture begins on the rig floor with the difficult task of stopping injuries. As the leader on a rig, the rig's manager has a critical role of turning company HSE policies and procedures into safe and healthy employees. Therefore, how a rig manager communicates HSE information becomes an interesting proposition.

21st Century Energy Production

In 2013, the energy industry faces challenges associated with operating in a modern and connected global marketplace. Environmental disasters, increasing fossil fuel emissions, the race for cleaner sources, fluctuating commodities markets—all of these important issues, and many more, define the competitive landscape of energy production worldwide. The oil and gas

[1] Oil and gas E&Ps are companies who produce and sell petroleum products. Among them are globally known companies such as Royal Dutch Shell and Exxon Mobil.

industry—at all points along the production chain—is scrutinized closely and climate change debates and environmental concerns have led to questions about the continued usage of fossil fuels. Although many people would rather have a cleaner alternative to fossil fuel, right now there simply isn't one. For over 100 years, the industrialized world has been building an infrastructure around coal, oil and natural gas products, and currently there is neither a cleaner viable source capable of supporting global energy demands in terms of quantity and scale, nor the supporting infrastructure to distribute it. Therefore, for the foreseeable future, oil and gas production will continue.

Consequently, explorers & producers (E&Ps) face the difficulties of producing products for a market that doesn't necessarily want them. Particularly in developed western economies—where people are accustomed to abundant and readily available fuel, and have the ability to pay for it—customer demand for cleaner fuel alternatives is growing. As such, understanding a more informed and discerning customer has become a critical consideration for energy providers wishing to uphold profitable, sustainable companies over the long term. In order to generate the social capital[2] needed to be successful into the future, E&Ps must recognize the need to evolve with, and communicate to, their customer base. To attract and retain customers, two initiatives are paramount: (1) exploring clean fuel alternatives in a meaningful way, and (2) responsible stewardship for existing extraction methods through maximizing value, efficiency, and technology. This cannot be done however, if no one is interested in pursuing careers in the sector.

[2] Kadushin (2012) notes, "most sociologists define social capital as resources made available through social relations" (p. 165). For the purposes of this study, social capital will be defined as same. As such, the resource social capital makes available to energy service companies is positive public perception of the use of oil and gas products.

Skilled Labour: The Key to Sustainable Growth and Development

E&Ps are increasingly looking for partners to help them demonstrate a commitment to responsible business practices. Recognizing this, service providers have made several technical advances via research and development that add tremendous value to the industry as a whole. Horizontal drilling practices, for example, have made it possible to extract more oil and gas out of existing wells, decreasing both waste, and the need to drill new formations. Similarly, drilling and service rig design has progressed toward highly mobile units that leave smaller environmental footprints, and drill deeper wells using less energy and manpower. However, while somewhat progressive, these advances are not well publicized and they only begin to address the significant needs of an industry adapting to a new competitive environment.

In order to continue to improve research, development, and social capital, a steady influx of skilled labour into all parts of the industry is vital. In fact, within the service sphere, the trend toward a more technical and professional environment will require individuals who can not only adapt, but continue to evolve. Brains will ideally accompany brawn as the need to develop and promote cleaner and more efficient methods of extraction increases in conjunction with the need to explore new ideas in emerging technologies and markets.

Unfortunately, oil and gas services is not a popular career choice today. Despite high pay and plenty of opportunity, young people especially are not pursuing careers on the rigs for a multitude of reasons. According to a survey conducted by Statistics Canada, of approximately 1.3 million men aged 20-24 only 20,000 of them were working in forestry, fishing, mining and oil and gas *combined*—a decrease of 13.7 per cent from 1997 levels[3] (Usalcas, 2005, p. 8).

[3] What is responsible for such a decline? Within oil field services in particular, predominant factors include job instability, challenging working conditions, and poor public perception. Inherent to drilling and well servicing in Canada is uncertainty due to two unmanageable factors: (1) the price of oil and gas in the marketplace, and (2) the

Moreover, an Ipsos (2012) poll entitled *Views on Canadian Oil and Gas* suggests that while 80 per cent of Canadians aged 55 and older approve of oil and gas development, only 49 per cent of Canadians aged 18-34 share the same view.

Under these circumstances, service companies struggle to promote career opportunities. Working on the rigs means working outside, often in extreme heat or cold, for extended shifts (drilling rigs operate 24/7), in remote locations, and with heavy machinery. Moreover, the work involves the environmentally hazardous production of fossil fuel. For these reasons, although the pay is high, energy service companies continue to face labour shortages and astronomical attrition rates. Each year it becomes more and more difficult for companies to staff rigs, and those who do sign up often do not last long. According to the Canadian Association of Oilwell Drilling Contractors[4] (CAODC) typical attrition rates for the entry position of drilling leasehand are above 350 per cent (CAODC, 2004). Either new candidates cannot handle the rigours of the job, or they view it as a stepping stone to make some quick money before moving on to a more respected profession. This level of turnover dramatically narrows the pool of prospects for long term careers adding to the already large problem.

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weather. Operating in a commodity based industry, service companies are employed by larger exploration and production (E&P) companies that sell oil and gas. If the price of these resources falls to a point where production costs exceed profit margins, companies stop drilling wells and service companies are left with inactive rigs. Secondly, the seasonality of the industry in Canada sees rigs shut down in the spring and fall when temperature fluctuations lead to soft ground, provincial road bans, and the inability to move rigs from location to location. Inclement weather can limit a service company's operational days by as many as 120, and with day rates ranging from $10-$25,000 per rig, the cost of weather related downtime is considerable in terms of both profit and the ability to retain qualified workers.

[4] The CAODC is a voluntary, member-based organization of Canadian drilling and well-servicing companies. Membership is not regulated or enforced by any third party or government body.

The Impact of Negative Media

Finally, as the industry reaches out to people to meet its needs, it is often met with suspicion by potential candidates and the general public alike. In the United States, "the oil and gas industry along with the federal government have the least positive images" (Gallup, 2012). Although the oil and gas industry is not as unpopular in Canada, approval is higher in oil producing provinces, and contingent on respect for the environment. "Two-thirds (65%) of Canadians agree that 'it is possible to increase oil and gas production while protecting the environment at the same time..." (Ipsos, 2012). The prevailing dislike is rooted in environment and climate change debate, but also impacted by poor image and media stereotyping. For example, in Canada, television shows such as *"The Rig"* and *"License to Drill"* paint a rough and tumble, profanity laced portrait of life on a rig. These shows focus on smaller service companies with older technology, and highlight environmentally questionable operating practices while reinforcing stereotypical oil patch macho bravado. This type of environment may have been the norm several years ago, and admittedly remains to some extent in certain pockets today, but it is by no means representative of the current climate overall (a good example being modern terminology moving from "Roughneck" to "Rig Technician" complete with a Red Seal trade designation for rig workers). Such a deliberately skewed portrayal does damage to the industry in two ways: (1) it discourages individuals—especially women—who do not identify with this type of lifestyle from considering careers on the rig, and (2) it encourages individuals who happily embrace this stereotype to seek jobs in the field, further perpetuating the problem. As a result, most parents of high-school children would rather send their kids to college or university than out on the rig floor, and fewer kids themselves are taking entry level jobs in the industry, limiting the prospects for long term careers. Moreover, within the mainstream media,

popular television shows such as *The Nature of Things with David Suzuki,* documentaries such as *An Inconvenient Truth*, and celebrity denouncements of Alberta's oil sands (George Clooney, James Cameron) continue to add momentum to negative public sentiment.

Addressing Challenges

Clearly, energy service companies operate in an unfavourable environment with many challenges. To address these effectively, it becomes extremely important to implement professional and transparent policies and procedures wherever possible. One such area—health, safety, and environment (HSE)—is an excellent place to build professionalism and transparency because its scope touches most, if not all, of the industry's salient issues. Service providers can begin to accrue positive social capital by properly establishing and managing HSE culture and developing an environment where employees can be healthy, safe, happy, and productive.

Communicating HSE

Health, safety, and environment have replaced "safety" as the industry standard term of reference concerning employee well-being in the workplace. The rationale behind the change is a contemporary emphasis on employee work/life balance, mental and physical health and safety, and optimizing work environments. Within the oil field services sector, companies continue to develop approaches to HSE in a variety of ways and with varying degrees of success. International organizations such as Occupational Safety and Health (OSHA), domestic organizations such as Work Safe Alberta, and industry specific organizations such as Enform, have all been created in the interest of standardization (of policies, procedures, training etc.), continuous improvement, and regulation of HSE. Theoretically, successful HSE programs can benefit companies by reducing injury and turnover, and demonstrating professionalism, among other things. Practically, the success of HSE initiatives varies widely from industry to industry

and from company to company. As mentioned, the oil field services industry in Canada presents many challenges, and HSE is a critical element among each one.

For drilling and well servicing in particular, HSE is a fundamental part of achieving sustainable operations. Safe rigs are crucial because they generate consistent revenue, develop and retain employees, and secure future contracts. For the energy industry as a whole, service rigs with high-functioning, professional HSE cultures can help dispel myths and improve the collective image by demonstrating progress and a commitment to sustainable operations.

However, as mentioned, rig operations are inherently dangerous. Injuries sustained on the rig floor and on the drilling lease[5] are common, and often the result of improper training, routinized work, or absentmindedness[6]. Therefore, the position of rig manager (RM) on a drilling and well servicing rig is an important one. As a critical part of business enterprise, RMs are responsible for the safety of crews while meeting demands of: (a) customers wanting profit maximizing expediency, (b) sales and management teams wanting satisfied customers and shareholders, and (c) legislators wishing to regulate industry and hold it to environmental and safety standards. Rig managers are also the cardinal point where a service company's HSE training, policies, and procedures are introduced to new employees, reinforced in less experienced employees, and entrenched in future leaders.

Rig workers continue to be hurt while on duty at rates that are problematic for both employee and employer. This suggests too much emphasis on producing policies and procedures, and too little emphasis on how they are deployed and reinforced. The role of rig managers in

[5] The drilling lease is the area that a rig and its associated equipment occupy while drilling a well.

[6] According to the CAODC, in 2012 there were 475 recordable incidents (not including first aid treatments or unreported injuries) and two fatalities in the Canadian drilling industry (CAODC, 2013). In the Canadian well servicing industry, since 2005, there have been 11 fatalities and 3,573 recordable incidents (CAODC, 2013).

overall HSE performance is critical in closing this gap. To be effective, RMs must communicate well with all stakeholders in a manner that will deliver results. Regarding HSE on the rig, how an RM balances, filters and disseminates information in order to facilitate safe behaviour becomes a key proposition. If an RM's ability to communicate can positively impact safety results and help overcome the friction generated by any of the industry's myriad challenges, it could assist service companies in operating more efficiently while improving public perceptions and profitability.

This study comprises an exploratory examination of the communication styles of rig managers in one western Canadian based drilling services company. Using a self-reporting methodology involving an online survey of rig managers, this study aims to help address a central research question: to what extent does a rig manager's communication style impact safety on his rig?

Chapter One: Literature Review

As this study's central question surrounds the extent to which communication styles (CS) may impact safety outcomes, a review of the literature was conducted for existing research and theoretical focus within the domain. First a look at the history of HSE in general, and its current state within oil field services in particular, provides insight into the landscape of workplace safety. Second, an examination of seminal work in defining communication style and assessing its relationship with behaviour is presented. Next, literature relating specifically to CS in the workplace and CS and outcomes is explored. Finally, leader member exchange, trait based leadership, and leadership and safety studies are evaluated to help provide a deeper understanding of the connection between communication and safe behaviour within the context of manager/subordinate relationships.

HSE in the Workplace

According to Hale & Hovden, (1998),

> The first age of more scientific study of safety concerned itself with the technical measures to guard machinery, stop explosions and prevent structures collapsing. It lasted from the nineteenth century through until after (WW II) and is characterized by such statements as those made by UK factory inspectors in the late nineteenth century that the only accidents they were interested in having reported were those with technical causes, since others could not be reasonably prevented. (p. 129)

Ridley & Channing (2008) note that legislation surrounding safety was disparate and selective in terms of scope, and "on the whole … tended to look to the protection of plant and equipment as a way of preventing injuries to workers" (p. 49). This technical bent, driven and administered by

governments and regulatory bodies, existed until the 1960s when the human element in risk analysis started becoming a more popular theme. “By 1970 many organizations, especially the trade unions, were questioning whether the existing legislation was either sufficient or effective in providing proper protection for work people” (Ridley & Channing, 2008, p. 49). Slowly, personnel selection, training, and motivation became regarded as more salient factors in effective injury prevention (Hale & Hovden, 1998) and the burden of safety responsibility began to shift from governments and regulatory bodies to corporations and the methods of individuals. Aalders & Wilthagen (1997) highlight the work of the 1972 British Committee on Safety and Health as a turning point in this movement with the Committee concluding:

> There are severe practical limits on the extent to which progressively better standards of safety and health at work can be brought about through negative regulations by external agencies. We need a more effectively self-regulating system… (p. 419)

From this conclusion the *Health and Safety Work Act* of 1974 (or ‘Robens Report’)—regarded as a primary catalyst in transitioning from old to new ways of thinking about workplace safety—was born. According to Ridley & Channing (2008) the Robens Report’s section two contained a general statement obliging employers to:

1. Provide and maintain plant and systems of work that are safe and without risks to health ….
2. Ensure that the use, handling, storage and transport of articles and substances is safe and without risk.
3. Provide such information, instruction, training and supervision to ensure that employees can carry out their jobs safely.

4. Ensure that any workshop under his control is safe and healthy and that proper means of access and egress are maintained, particularly in respect of high standards of housekeeping, cleanliness, disposal of rubbish and the stacking of goods in the proper place.

5. Keep the workplace environment safe and healthy so that the atmosphere is such as not to give rise to poisoning, gassing or the encouragement of the development of diseases. Adequate welfare facilities should be provided. (p. 50)

Publishing this document set the stage for a "new, broad concept of 'humanization of labour' … including not only occupational safety and health but also workers' well-being" (Aalders & Wilthagen, 1997, p. 419).

HSE in the Oil Patch

From these foundations, industries and organizations continue to develop approaches to health, safety, and environment in a variety of ways and with varying degrees of success. International organizations such as Occupational Safety and Health (OSHA), domestic organizations such as Work Safe Alberta, and industry specific organizations such as Enform have all been created in the interests of standardization (of policies, procedures, training etc.), continuous improvement, and regulation of HSE for workers. In practice however, the success of these initiatives varies widely from industry to industry and from company to company. In the book *Leading with Safety* (Krause, 2005), John Henshaw describes four stages common to organizations developing modern HSE approaches:

> Those that exercise blatant disregard or indifference to worker safety and health; those that are just plain ignorant of workplace hazards and relevant laws and regulations; those

> that are committed to worker safety and health and trying to improve their performance but have fallen short of expectations, and; organizations that have the right stuff and have achieved true superior performance. (p. xiii)

Within the Canadian oil and gas services sector (the oil patch), there are presently companies exemplifying each of Henshaw's stages. As mentioned, the sector has traditionally been a rough environment, and it remains a place where workplace injuries are common. The early years, when the Roughneck stereotype came to be, have shaped the industry's reputation with stories of death and dismemberment and people and companies learning by trial and error. Even today there are anecdotal tales of rig workers abusing alcohol and/or drugs and working in a state of inebriation, or without the proper protective equipment or fall arrest gear.

The "Roughneck machismo" stereotype remains an especially important challenge and, when combined with the inherent danger of the work itself, contributes to the safety problem. According to the provincial Government of Alberta (2011) — where the majority of Canadian wells have been drilled and completed — the well servicing sector in 2010 had the "highest disabling injury rate in the Upstream Oil and Gas industries at 4.32 per 100 person-years worked[7], greater than the average rate for all industries in the province, 2.67"—despite advances in training, technology, and HSE awareness (p. 11, [capitalization in original]). The drilling sector had a slightly lower disabling injury rate of 4.30 per 100 person-years worked (Government of Alberta, 2011, p. 11). However, both of these figures are significantly higher than many other provincial industries. Between 2006 and 2010 the Government of Alberta (2011) reported 79 fatalities in the upstream oil and gas industry and 29 of those were either

[7] The Government of Alberta (2011) defines one person-year as equal to one full-time worker working for one-year (2000 hours worked).

drilling or well service related (p. 23). In 2012, the Government of Alberta (2012) reported six investigated fatalities directly related to drilling and well servicing. Additionally, of the seven subsectors within the upstream oil and gas sector, "oil and gas drilling, servicing, and related labourers accounted for 33.8% of disabling injury claims (in 2010/2011)" (p. 34). In comparison, the remaining five subsectors had lost-time claim and disabling injury rates lower than the provincial level.

To analyze the various stages of HSE development specific to drilling and well servicing, Westrum's (in Parker, Axtell, & Turner, 2006) range of organizational climates provide a more precise breakdown of how different organizations respond to information about safety (Table 1).

Table 1: How organizations process information. Westrum (in Parker et al., 2006)

Pathological	Bureaucratic	Generative
• Information is hidden • Messengers are "shot" • Responsibilities are shirked • Bridging is discouraged • Failure is covered up • New ideas are actively crushed	• Information may be ignored • Messengers are tolerated • Responsibility is compartmentalized • Bridging is allowed but neglected • Organization is just and merciful • New ideas create problems	• Information is actively sought • Messengers are trained • Responsibilities are shared • Bridging is rewarded • Failure causes inquiry • New ideas are welcomed

In the oil patch, the move from pathological to generative is typically facilitated by size. The larger the company, the closer it will be to being generative in its approach to HSE because it has the luxury of more revenue generating assets. Among the barriers to smaller companies moving beyond the pathological stage may be a difficulty in refusing unsafe working conditions due to a greater need for revenue. These companies may not be in a position to pass up work or have the additional capital to put into purchasing and maintaining modern equipment. An excerpt from Gow's (2005) *Roughnecks, Rock Bits, and Rigs* sums up the environment, both past and present, very well:

> At the drilling contractor level, the attitude toward safety varied. Unlike the large companies which most often used their [own] rigs on wildcat wells … the smaller oil companies had to "hustle." It was not unusual for them to contract their drilling out to other firms… Among the drilling contractors there was even less concern for safety. Most were paid by the foot, and therefore their goal was to get in, get the job done, and get to the next well as quickly as possible… Drilling at a set fee for each vertical foot in the hole means drilling under pressure and being tempted to take shortcuts and risks. (p. 329)

All told, the oil field services industry in Canada presents many challenges and HSE is a critical element within each one. Yet, of all the uncontrollable variables facing drilling and well servicing companies, HSE is one that can be controlled.

Communication Style and Behaviour

As Henshaw (in Krause, 2005) suggests, "the most important factor in predicting the success of safety improvement initiatives [is] the quality of leadership" (p. xviii) while O'Dea and Flin (2001) point to a range of managerial behaviours as being key to good safety results. As O'Dea & Flin (2001) note, "it is increasingly being recognized that managers play an important role in establishing the kind of environment which can encourage workers to be motivated to behave in a safer way" (p. 53). De Vries et al. (2009) point to supportive communication as one factor essential to creating this environment; "supportive communication of a leader enhances knowledge donating behaviours to the leader and knowledge collecting behaviours from the leader" (p. 377).

The assumption that communication style (CS) can impact behaviour has its roots in the sociopsychological tradition of communication theory. Behaviourists such as Carl Hovland and

Albert Bandura, for example, point to "causal links between external factors and an individual's responses" (Merrigan, Huston & Johnston, 2012, p. 40). In particular, Hovland's Social Judgment Theory (SJT) substantiates "attention to outcomes in the environment, and … those activities of the organism that lead to successful outcomes" (Doherty & Kurz, 1996, p. 122), further defining communication in general as: "the process by which an individual (the communicator) transmits stimuli (usually verbal symbols) to modify the behaviour of other individuals (communicatees)" (Hovland, 1948, p. 320). Accordingly, Hovland (1948) suggests that studies of communication must consider four factors: the communicator; the stimuli; the communicatee; and the communicatee's responses (p. 320).

Similarly, Bandura (2001) theorizes that individual behaviour is determined by many different influences and that "most external influences affect behaviour through cognitive processes rather than directly" (p. 340). Cognition plays a large role in an individual's decision making process and is expressed in distinctly human capabilities such as forethought and symbolic communication (Bandura, 2001, p. 340). Bandura (2001) goes on to suggest that major factors influencing cognition (and by extension, behaviour) are "the social origins of thought and the mechanisms through which social factors exert their influence on cognitive functioning" (p. 340). This view is the foundation of Social Learning Theory and Social Cognitive Theory, both of which "explain psychosocial functioning in terms of triadic reciprocal causation, whereby an individual's internal psychological factors, the environment they are in and the behaviour they engage in, all operate as interacting determinants that influence each other bi-directionally…" (Cooper, 2000, pp. 118-119). As such, "both [SLT and SCT] also recognize that an employee might model behaviours learnt from … others." (Cooper, 2000, p. 119).

One such cognitive behavioural influence is the style with which communication is delivered, and like communication theory in general, communication style is defined and rationalized in different ways. Norton's (1983) definition of CS is "the way one verbally, nonverbally, and paraverbally interacts to signal how literal meaning should be taken, interpreted, filtered, or understood" (p. 19). De Vries, Bakker-Pieper, Siberg, van Gameren, & Vlug (2009) give communication style a more precise definition by adding the dimensions of social context and social image:

> The characteristic way a person sends verbal, paraverbal, and nonverbal signals in social interactions denoting (a) who he or she is or wants to [appear to] be, (b) how he or she tends to relate to people with whom he or she interacts, and (c) in what way his or her messages should usually be interpreted. (p. 2)

This definition expands Norton's (1983) view "by also including the (a) identity, and (b) interactional aspects of communicative behaviours" (de Vries et al., 2009, p. 2). For example, an individual who's CS demonstrates attentiveness may want to assure their audience that they are actively listening, but also appear sympathetic as well as establish trust.

Communication Styles in the Workplace

Research on CS in the workplace is quite varied in scope and by industry, but little exists within oilfield services directly. There are, however, several studies—particularly within the field of healthcare—that focus on CS and related *outcomes,* which supports the central thesis of CS impacting behaviour. A second pocket of relevant research can be found in the area of leadership, and although these studies do not assess CS directly, they involve particular emphasis on a leader's ability to influence outcomes via communication (among other channels).

Regarding safety and CS specifically, again there is not a great deal of literature available; two studies—Parker, Axtel, & Turner's (2001) assessment of communication quality among other variables in designing a safer workplace, and a study by O'Dea & Flin (2001) examining the impacts of safety leadership on offshore drilling rigs—are discussed here.

Communication Style and Outcomes

Within the field of healthcare, Coeling & Cukr (2000), in a study entitled: *Communication Styles that Promote Perceptions of Collaboration, Quality, and Nurse Satisfaction*, examine how nurse/physician interactions are affected by communication style. Two groups of nursing graduate students (n = 65) were asked to evaluate interactions with physicians in terms of (1) which type of communication style was used (either of Norton's (1978) attentive, dominant, or contentious styles), and (2) how that communication style impacted (a) collaboration, (b) quality of care, and (c) nurse satisfaction (Coeling & Cukr, 2000). The study required participants to classify interactions into one of the three of Norton's (1978) communication styles described above, provide a yes/no answer to determine if an interaction was collaborative, and use a five point Likert scale to indicate quality of care (Coeling & Cukr, 2000). Findings suggest that usage of an attentive communication style emphasizing listening, empathy, and deliberation result in increased perceptions of collaboration, quality of care, and satisfaction (Coeling & Cukr, 2000).

De Vries, Bakker-Pieper & Oostenveld (2010) explore "the relations between leaders' communication styles and … leadership outcomes" (p. 367). It is hypothesized here that leaders with more human-oriented CSs are more effective in achieving desired leadership outcomes, and that communication styles can account for variance in: (a) subordinate evaluations of leader performance, and (b) subordinate assessments of self-commitment, satisfaction with leader,

leader performance, and knowledge sharing (de Vries et al., 2010). De Vries et al. (2010) identify human-oriented leadership and charismatic leadership with providing support and having consideration of subordinate input. Task-orientated leadership is defined as "more saturated with the actual content of the information provided instead of the style of communication" (de Vries et al. 2010, p. 369). Using questions from de Vries' (2009) CS inventory, 279 government employees were assessed for six main communication styles: "verbal aggressiveness, expressiveness, preciseness, assuredness, supportiveness, and argumentativeness" (de Vries et al., 2010, p. 367). Results indicate "both charismatic and human-orientated leadership styles are to a considerable extent grounded in communication styles [and] in contrast, task-orientated leadership is much less communicative…" (de Vries et al., 2010, p. 376). Results also indicate the following correlations with communication styles: a strong positive correlation between the CS supportiveness and charismatic and human-orientated leadership, a strong negative correlation between the CS verbal aggressiveness and human-orientated leadership, and a strong positive correlation between the CS assuredness and both charismatic and task-orientated leadership. Regarding outcomes, the study found a "leader's preciseness was, together with supportiveness, the most important predictor of subordinate's knowledge collecting from a leader" (de Vries et al., 2010, p. 377). Additionally, leaders demonstrating the descriptor of supportiveness appear to have the most impact on outcomes and improved "knowledge donating behaviours to the leader and knowledge collecting behaviours from the leader" (de Vries et al., 2010, p. 377).

Literature concerning communication leading to outcomes, but not specifically assessing communication styles, is also worth mentioning here. Again within healthcare, Street Jr., Makoul, Arora, & Epstein (2008) focus on communication pathways and their relationship with

health outcomes. The article suggests that, "to understand why communication may lead to better or worse health outcomes, researchers must identify the pathway through which communication influences health and well-being" (Street Jr. et al., 2008, p. 297). Specific pathways such as "increased access to care, greater patient knowledge and shared understanding … and better management of emotions" (Street Jr. et al., 2008, p. 295) are identified, and strategies for delivering messaging specific to each pathway proposed. This targeted communication could then result in direct, indirect, or cumulative effects on improved health outcomes. For example, physician communication directed at improving patient knowledge and shared understanding can directly or indirectly lead to improved patient understanding and satisfaction, and/or increased trust in the medical system (Street Jr. et al., 2008). These "proximal" and "intermediate" outcomes could then lead to improved direct health outcomes such as increased emotional well-being and pain management. While not explicitly focused on communication styles, this study highlights the importance of the communicator's role in delivering deliberate messaging designed to achieve both direct and indirect outcomes.

In a more scientific analysis regarding safety, Parker et al. (2001) conducted a longitudinal study within an operational environment to examine "the direct and indirect effects of work characteristics on self-reported safe working" (p. 211), where *work characteristics* are defined as "job autonomy, role overload, role conflict, supportive supervision, training adequacy, job security, and communication quality" (Parker et al., 2001, p. 211). While communication styles themselves are not assessed here, the common communication style descriptor of supportiveness is explored, and communication quality is defined as: "sharing … information and encouraging others to talk about aspects of work … [and] the information [workers need] to work safely, for example, when to wear protection equipment or follow specific procedures"

(Parker et al., 2001, p. 214). It was hypothesized that both supportive supervisor behaviour and quality communication would be positively associated with safety (Parker et al., 2001). A total of 161 operational employees completed two questionnaires 18 months apart, assessing safe work and the aforementioned work characteristics. Safe work was self-assessed on a three question scale with items such as "I always wear my protective equipment, even when it's inconvenient" (Parker et al., 2001, p. 217). Safe work was also validated by "comparing scores on this variable … with team leader ratings on [the] three dimensions for employees who also had appraisal data compiled" (Parker et al., 2001, p. 217). Remaining work characteristics were also self-assessed using questionnaires and Likert scale responses. The results indicate that, along with quality communication, supportive behaviour and job independence are all factors enhancing safe work practices. Additionally, "the findings suggest that having considerate, coaching-oriented team leaders causes employees to put greater effort into safe working at a period 18 months in the future" and that "safe working might be enhanced by training and developing supervisors to be supportive and to adopt a coaching-orientated rather than coercive style" (Parker et al., 2001, p. 223).

Interestingly, these cross-discipline studies reveal very similar practical considerations. In particular, appropriate communication methods that focus on attentive and supportive styles will enhance employee self-esteem and contribute to positive outcomes. Coeling & Cukr (2000), Street Jr. et al. (2009), and Parker et al. (2001) all point to a focus on variables such as support and empathy as relating to improved perceptions of satisfaction in the communication process as well as positive outcomes such as safer work practices and increased quality of care.

Communication Style and Safety

Regarding energy industry specific work assessing CS and safety, little research was uncovered. Two studies obtained from the Society of Petroleum Engineers' (SPE) database: *Lend a Hand to Save a Hand: An Innovative Communication Campaign to Reduce Hand and Finger Injuries* (Baistrocchi, 2011), and *Reducing Accidents through Implementing Behaviour Change via Observations and Interventions* (Camargo et al., 2010), scratch the surface but accomplish little else. Baistrocchi (2011) reviews the practical and conceptual considerations of an internal safety initiative designed to reduce hand and finger injuries, however no scientific analysis is conducted here, and the study simply describes a corporate "hand and finger campaign" (Baistrocchi, 2011, p. 2) designed to reduce injury. The study concludes with the rather banal observation that, "[facilitating] the process of change and [increasing] the culture of safety … [involves] the commitment of every interested party, from management to operational and office personnel" (p. 7). Camargo et al. (2010) conducted an assessment of the implementation of an organizational behaviour based safety (BBS) program, suggesting that "the next breakthrough in safety performance can only be achieved by systematically focusing upon unsafe behaviour in the workplace." (p. 3). In implementing BBS, Camargo et al. (2010) observe that the company in question, "[encouraged] employees to freely express their opinions on HSE issues independent of hierarchy" (p. 4), and empowered employees to stop unsafe behaviour in any situation regardless of rank. During the implementation phase of the initiative however, it is noted that the company, "probably did not adequately focus its attention on the human-interaction dynamics during an intervention process" (Camargo et al., 2012, p. 4). As such, the study finds that when BBS programs were introduced, "[safety] interventions were usually performed only by people capable of overcoming the initial barriers of the inherent confrontation

that such interaction implies" (Camargo et al., 2010, p. 4). Although not addressed specifically or scientifically here, the observations reported do reinforce a need for additional research examining communication skills relating to outcomes, as well as employer/employee communication, to assess how both of these variables may impact safe behaviours in the workplace.

Leader Member Exchange

"Leader Member Exchange Theory [LMX] is based on the works of Dansereau et al. (1975), Graen and Cashman (1975), and Graen (1976), originally under the title of Vertical Dyad Linkage Theory [VDL]" (Madlock, Martin, Bogdan, & Ervin, 2007, p. 453). LMX theory primarily characterizes the potential for a variance in the quality of relationships between managers and their reports due to factors affecting the exchange of communication within the relationship (Graen, Danserau, & Minami, 1972). While much leadership research focuses on the domain of either the leader or the follower within this dynamic, Graen & Uhl-Bien (1995) suggest "the critical issue of interest concerns the question: What is the proper mix of [a leader's] personal characteristics and leader behaviour to promote desired outcomes?" (p. 223). Going further, Graen & Uhl-Bien (1995) describe the "centroid concept of (LMX) theory [as the] effective leadership processes [that] occur when leaders and followers are able to develop mature leadership relationships" (p. 225). With this in mind, a parallel between communication style and LMX becomes clearer as CS, through this lens, is seen as a key ingredient in impacting outcomes. In fact, it could be argued that both Norton's (1977) and de Vries' (2009) definitions of CS, with their elements of verbal and paraverbal interaction, mirror the "mix" of personal characteristics and behaviour, as well as their effect on the resulting leader/member or sender/receiver relationship. LMX also parallels de Vries' (2009) conceptualization of

communication style in its dimensionality. Graen & Uhl-Bien (1995) have concluded through factor analysis that, in spite of some evidence to the contrary, LMX is multidimensional, containing "three dimensions … respect, trust, and obligation" (p. 237).

Early LMX studies centered on a "social exchange approach to leadership" (Graen & Uhl-Bien, 1995, p. 225). It is suggested that managers have different vertical dyadic linkages (VDL) with different reports, which result in managers forming both "in" and "out" groups, where "in" groups benefit from deeper and consequently more successful relationships, and "out" groups are limited to the minimum expectations required for the position (Graen & Uhl-Bien, 1995). The determining factor in forming these relationships is seen to be time for the required effort, and as such, the existence of low quality relationships is seen as inevitable due to "resource constraints" (Graen & Uhl-Bien, 1995, p. 227). However, in testing this assumption, "significant (variations) in follower responses to questions about their leaders" (Graen & Uhl-Bien, 1995, p. 227) resulted in shifting the focus from the leader to the relationship itself. Graen & Uhl-Bien, (1995) suggest this change in tack to assessing the relationship between leader and member can be classified into two categories: "(1) studies evaluating the characteristics of the LMX relationship, and (2) studies analyzing the relationship between LMX and organizational variables" (p. 227). Both arms are relevant here. The former includes analysis of the frequency and interactive patterns of communication, as well as the congruency between a leader's values and the values of his subordinates (Graen & Uhl-Bien, 1995, p. 227). The latter emphasizes the resulting relationship's impact on outcomes in the form of behaviour. Combined, the two arms form a basis for measuring exactly what this study attempts to observe: how a rig manager's style of communicating affects safety on his rig.

Trait Based Leadership Analysis

Judge, Bono, Ilies, & Gerhardt (2002) "provide a qualitative review of the trait perspective in leadership research" (p. 765), and use the five-factor model of personality as the basis for an examination of both leadership emergence and leadership effectiveness. After assessing the pros and cons of trait-based evaluations, Judge et al. (2002) reveal the divergence of opinions on trait theory as a basis for leadership study. They suggest this divergence is due to conflicting views among researchers, and the absence of a standardized method of assessing personality traits. In order to address the latter concern, Judge et al. (2002) use the five-factor model because its traits have proven generalizable across cultures, and are "heritable and stable over time" (p. 767). Additionally, the model was incorporated to provide a consistent taxonomy (Judge et al., 2002, p. 767). The results of the study find that a "relatively strong multiple correlation (R = .39 – .53) between the Big Five typology is a fruitful basis for examining the dispositional predictors of leadership" (Judge et al., 2002, p. 773). Regarding specific traits, the study notes that extraversion is the most consistent and strongest correlate of leadership, followed by conscientiousness, openness to experience, and then neuroticism, and agreeableness. The strongest correlations on all traits came with leader emergence however, and not leader effectiveness, suggesting the method of analysis is not as accurate a predictor of outcomes. Additionally, "the Big Five traits predicted student leadership better than leadership in government or military settings" (Judge et al., 2002, p. 774) suggesting the relevance of situational factors.

Leadership and Safety

Among the studies examining the relationship between leadership and safety, Hofmann and Morgeson (1999) found high-quality leader/member relationships, in addition to positive organizational support, affect members' willingness and comfort level in raising safety concerns as well as impacting an actual reduction in injuries. The findings suggested that, "effective exchange relationships … were linked to both subjective (i.e., safety communication and commitment) as well as more objective outcomes (i.e., actual accidents)" (Hofmann & Morgeson, 1999, p. 293). Although not directly referencing methods of communicating, this study highlights the importance of developing a sense of commitment to safety from an organizational perspective. Hofmann & Morgeson's (1999) findings indicate that positive exchanges between managers and their subordinates can facilitate relationships more conducive to safety related communication and safety commitment (p. 293).

Within oilfield services specifically, a study by O'Dea & Flin (2001) examine the impacts of safety leadership on offshore drilling rigs. This study was a rare find, with the authors themselves acknowledging "the influence of site managers on safety performance has received very little attention within the literature which is surprising given [their] impact … on the safety climate" (O'Dea & Flin, 2001, p. 41). In a quantitative assessment of 200 Offshore Installation Managers (OIM), O'Dea and Flin (2001) tested four separate hypotheses: (1) more experienced managers would have a more participative leadership style, letting subordinates be active in their decisions about safety, (2) more experienced managers would attribute accidents to process failures as opposed to people failures, (3) more experienced managers would find it easier to develop and maintain positive safety climates, and (4) managers will identify participative management as "best practice" in safety leadership (O'Dea & Flin, 2001).

Regarding the first hypothesis, there was no relationship found between experience (≥5 years) and leadership style. Examining the second hypothesis the opposite was found, with managers pointing to behaviour as a common source of accidents. The third hypothesis identified a more participative management style as more problematic when seeking safety outcomes (i.e., safe behaviour and low incident rates). Finally, while the fourth hypothesis was confirmed—managers identified a participative management style as best—the majority of managers in the study (57%) practiced a more authoritarian style, in direct conflict with their stated views (O'Dea & Flin, 2001).

The results of this study bring up a number of interesting points. First, none of the hypotheses were confirmed, suggesting there is a gap between theory and practice when it comes to leadership safety within an environment that is ultimately very similar to land-based oilfield services. Second, managers appear keenly aware of popular theory as evidenced by their statements, indicating participative management is indeed regarded as "best practice" (O'Dea & Flin, 2001). However, OIMs' choice to employ a different leadership style is contradictory to their beliefs as evidenced by the following findings: although a surprisingly high 71 per cent of respondents said establishing an open atmosphere for reporting accidents was easy, and 58 per cent of respondents found that communicating a safety message was easy (O'Dea & Flin, 2001), when asked about motivating subordinates to actually work safely and report near misses, 60 per cent and 69 per cent of managers respectively reported those two tasks as difficult (O'Dea & Flin, 2001). Acknowledging these discrepancies, O'Dea & Flin (2001) note, "it seems that there is a contrast between what leaders know to be best practice in leadership and how they actually prefer to behave" (p. 52). Additionally, study participants "overwhelmingly (identified) factors related to the individual, such as not 'thinking the job through', 'carelessness' and 'failure to

follow the rules', as the most common causes of accidents" (O'Dea & Flin, 2001, p. 52). These observations suggest managers believe they ultimately have limited control over their crews' actual safe behaviour, regardless of how they try to facilitate safety.

As O'Dea & Flin (2001) illuminate, the role of manager is "an important role in establishing the kind of environment which can encourage workers to be motivated to behave in a safer way" (p. 53). The apparent difficulty in creating this environment appears to have led managers to prefer more authoritarian approaches to achieving safety with their crews, despite stating the opposite tact is superior. Research also indicates a safe environment does not effectively translate into safe actions, suggesting a gap in both theory and practice relating to safety communication and safety leadership. More research in each of these areas may provide additional insight into the complex and challenging task of achieving safe employee outcomes.

Chapter Two: Methodology

To address the central research question, a quantitative assessment of communication style was developed and deployed. The data collected was then cross-tabulated with safety records and analyzed. In all, 87 rig managers of on-shore drilling and well servicing rigs were identified using the following criteria: (a) having at least five years' experience as a rig manager, (b) working in Canada, and (c) being employed by the same company. This approach was based on the following premises: (1) the assumption that more experienced rig managers have had more time to develop in their roles including how they communicate with their subordinates, (2) rigs from Canada have the same industry safety reporting and recording methods, regional industry safety protocols, and general rig culture and, (3) rigs from one company will have similar equipment types, and training methods, and will better facilitate the distribution of questionnaires (the primary researcher is also employed by the company).

Each rig manager was invited to fill out a questionnaire online via an email invitation. The email included a link to the questionnaire, created in FluidSurveys, and a cover letter (Appendix A) describing the purpose of the study. FluidSurveys was selected as a reliable online survey building tool that allows for complete customization of questions, online deployment, and collection and analysis of data. Additionally, FluidSurveys is a Canadian based company with servers located in Canada and therefore not subject to United States FOIP Act regulations.

A questionnaire based survey was employed for several reasons. According to Plumb & Spyridakis (1992) "survey research has the advantage of ecological validity: It asks questions of real people in real situations" (p. 626). Since this study is interested in assessing workplace communication, a high degree of ecological validity is desirable. Additionally, as Plumb & Spyridakis (1992) note, "the ostensible purpose of [a] survey is not to effect change, but to

describe the status quo" (p. 627). With a lack of information surrounding communication styles and their impact on safety in the workplace in general, and on the rig in particular, this study intends only to provide a correlative assessment and not attempt to prove causality.

Questionnaire

An online survey comprising 46 questions and scored on a basic five- point Likert scale (Appendix B) was created specifically for the study (Bayko, 2013), combining previously-identified variables from de Vries, Bakker-Pieper, Konings, & Schouten's (2011) Communication Styles Inventory (CSI) and Graen & Uhl-Bien's (1995) LMX-7. In addition to being a statistically validated measure of CS (de Vries et al. 2011), the Communication Styles Inventory was selected because of its dimensional or trait-based aspects that provide "a focus [on] the possible 'sender' behaviours in interactions" (de Vries et al., 2011, p. 17), and because it was created with foundations in both the five-factor and HEXACO personality models (p. 4). As Judge, Bono, Ilies & Gerhardt (2002) note, "the cross-cultural generalizability of the five-factor structure has been established through research in many countries (McCrae & Costa, 1997)" (p. 767). Similarly, as de Vries et al. (2011) point out, "several lexical studies have offered support for the HEXACO model" (p. 4), therefore the CSI's foundations are based on proven measures.

In addition to providing reliable data, the CSI's items themselves are varied and can be selected with respondents in mind. As mentioned, de Vries et al., (2009) have created a definition of communication style accounting for the importance of both how an individual wants to be perceived: "(a) who he or she is or wants to (appear to) be"; as well as the interactional component of communicating: "(b) how he or she tends to relate to people with whom he or she interacts, and (c) in what way his or her messages should usually be interpreted" (p. 2). Developed with these aspects in mind, the CSI should be better suited for capturing data

relating to contextual complexities. For example, the communication of safety involves messages about standard company procedures often within the context of contradictory circumstances. In this environment there is potential for mixed metamessages (Tannen, 1990) to occur. As Tannen (1990) relates, metamessages are cues, such as non-verbal signs and attitudes, that may confuse a message's meaning; a rig manager who tells an employee to wear safety glasses but who doesn't wear them himself is sending a mixed metamessage. In assessing communication style in dimensions relating to preciseness or impression manipulativeness, a respondent's answers to CSI items such as "I think carefully before I say something" or "in discussions I sometimes express an opinion I do not support in order to make a good impression" (de Vries et al., 2011) could provide interesting insight into a rig manager's ability to effectively deliver safety messaging.

With this in mind, the questionnaire was designed to assess the prevalence of Expressiveness (EX); Preciseness (P); Verbal Aggressiveness (VA); Questioningness[8] (Q); Emotionality (EM); and Impression Manipulativeness (IM) in respondents and correlate the data with safety records. Further, within the context of the CSI, each of these traits is comprised of four additional facets (Table 2) to allow for additional insight during analysis.

[8] In this context, "questioningness" refers to the tendency for one to ask questions and is defined by a set of facets including unconventionality, philosophicalness, inquisitiveness, and argumentativeness; the original wording of de Vries et al. (2011) is maintained for simplicity and fidelity regarding previous work in this area.

Table 2: CS Trait Facets (de Vries et al., 2011)

	Expressivenss	**Preciseness**	**Verbal Aggressiveness**	**Questioningness**	**Emotionality**	**Impression Manipulativeness**
Facet	Talkativeness	Structuredness	Angriness	Unconventionality	Sentimentality	Ingratiation
	Conversational dominance	Thoughtfulness	Authoritarianism	Philosophicalness	Worrisomeness	Charm
	Humour	Substantiveness	Derogatoriness	Inquisitiveness	Tension	Inscrutableness
	Informality	Conciseness	Nonsupportiveness	Argumentativeness	Defensiveness	Concealingness

Questions from the CSI used in the survey were selected from each of the six dimensional item banks (Appendix C). Each dimension was represented relatively equally (seven questions from VA; six questions from each of X; Q; E; and five from IM) with the exception of preciseness which was allocated nine questions. As mentioned, because preciseness has been theorized as important in impacting outcomes of communication interactions more of the items measuring preciseness were incorporated.

Questions from the LMX-7 were chosen due to Leader Member Exchange Theory's analysis of interactive patterns and the fidelity between leader and member (Graen & Uhl-Bien, 1995, p. 227). As discussed, the literature has highlighted communication between leaders and subordinates as highly applicable with regards to achieving specific outcomes, and as such, all seven items from the LMX-7 are included in the questionnaire. Terminology on the LMX items were tailored for the respondents with the terms "leader" and "member" being replaced with "rig manager" and "crew".

Because this is a quantitative self-assessment of rig managers from a single drilling and well servicing company, several measures were employed to help improve the study's validity. The questionnaire was built to include a larger bank of questions from two proven measures in an attempt to mitigate purposive sampling bias, and two factors were put in place to offset

socially desirable response bias: 1) the survey and instructions did not include information about correlating the final responses with TRIF rates, and 2) the questionnaire was voluntary.

The initial email was sent to all 87 eligible rig managers at the beginning of April, 2013 and two follow-up emails (end of April and middle of May, 2013) were sent out to further encourage participation. The questionnaire was also announced at two rig manager's conferences, and a booth with a computer was provided at the conference tradeshow for those who may want to take the questionnaire. Finally, prizes were offered as an incentive to participate, and each RM filling out the survey had his name entered into a draw for a prize package of work related clothing and outerwear.

Rig Manager Safety Records

Rig manager safety records were determined based on two variables, Total Recordable Incident Frequency (TRIF) and Incident Free Days (IFDs).

TRIF. Total Recordable Incident Frequency (TRIF) is the standard used by the Canadian Association of Oilwell Drilling Contractors (CAODC) to statistically analyze incidents industry wide. TRIF numbers are calculated using the following formula (CAODC, 2007):

Formula: Total Recordable Incident Frequency

$$\frac{(\text{<\#F>} + \text{<\#LTI>} + \text{<\#RWC>} + \text{<\#MTO>}) \times 200{,}000}{\text{\#Manhours}}$$

The reporting of TRIF is done quarterly, on a 12 month rolling average. Variables in the formula are defined as follows:

FATALITY (F): Total number of fatalities in a period = <#F>	LOST-TIME INCIDENT (LTI) FREQUENCY: Total number of lost-time accidents in a period = <#LTI> LTA frequency for period: (<# LTI> + <#F>) x 200,000/# Manhours (Note: For this frequency a fatality is counted as LTI)
RESTRICTED WORK CASE (RWC) FREQUENCY: Total number of restricted work cases in a period = <#RWC> RWC frequency for period: <#RWC> x 200,000/# Manhours	MEDICAL TREATMENT ONLY (MTO) FREQUENCY: Total number of medical treatment only in a period = <#MTO> MTO frequency for period: <#MTO> x 200,000/# Manhours
LTI SEVERITY INDICATOR FOR THE PERIOD: #LTI days/# LTIs x 30	RWC SEVERITY INDICATOR FOR THE PERIOD: #RWC days/#RWCs x 30
1) Manhours is defined as total hours worked by field crews and all administrative staff.	2) 200,000 manhours is a widely used measure for 100 men working full time for one year.

IFDs. Incident free days (IFDs) are assigned to individual RMs and are used by the CAODC for recognition and tracking purposes. According to the CAODC (Whitehead, 2012) IFDs are consecutive days without a recordable incident where recordable incident is defined as:

1. Any work-related incident or illness as defined by any of the classifications that appear on the CAODC Injury Analysis Definitions.
2. Any incident or illness that renders an employee unable to work in any capacity on their next regularly scheduled workday.
3. In cases of vehicle incidents accepted by the Worker's Compensation Board (WCB), the loss of recordable-free days for rig managers and drillers will be reviewed individually by the CAODC Safety Awards Sub-committee.
4. Vehicle incidents accepted by the WCB will be counted as recordable incidents against the company and not the rig.

5. Each case of hernia or carpal tunnel syndrome accepted by the WCB as having resulted from an incident and requires immediate or future surgical operation will not be counted as a recordable incident against the rig or individual for the purpose of this award.
6. Fatalities are recorded as one recordable incident. Any rig suffering a fatality in 2012 will not be eligible for a CAODC Safety Excellence Award.

Chapter Three: Findings

At the survey's conclusion, 44 attempts to complete the questionnaire had been made by subjects, with 38 successful completions. Of 38 successful completions, one set of results was eliminated due to ineligibility (the rig manager had been working in United States), for a final number of 37 (n = 37) and response rate of 42.5 per cent. Each rig manager was given a score for each of the communication style traits assessed by the questionnaire. Points from 1 to 5 were given based on the response chosen with a score of 1 given for the response *least* indicative of the trait and a score of 5 given for the response *most* indicative of the trait. If the trait category had six questions then, the maximum total score for that category was 30 points and higher scores indicated higher levels of the trait. Questions that were worded such that a response of 1 was more indicative of the trait were coded as negative questions. With negative questions, individuals were given a score of -1 for responses most indicative of the trait and -5 for responses least indicative of the trait. For example, one of the questions assessing the trait "expressiveness" was "most of the time, other people determine what the discussion is about, not me: (1) false, (2) somewhat false, (3) sometimes, (4) somewhat true, (5) true". A response of "(1) false" would normally score 1 point but in this instance the response of "false" means the individual is MORE expressive as opposed to less expressive. Therefore, for negative questions, participants who demonstrated traits to a higher degree were deducted fewer points than those who demonstrated traits to a lower degree. As such, the range of scores for a trait where six questions are used for assessment is: –30 (indicating the lowest levels of the trait) to 30 (indicating highest levels of the trait).

Rig manager safety records were based on two variables: (1) total recordable incident frequency (TRIF) rates for the current rig manager's rig for 2012, and (2) incident free days

(IFD) as of July 4, 2013. These variables were obtained by contacting HSE advisors for both the drilling and well servicing divisions for the company where the study was conducted. IFD values for this study were calculated as follows: drilling IFD = 24 hour period without a recordable incident as defined by the CAODC (see Method section), and well servicing IFD = 12-hour period including travel to and from the worksite without a recordable incident as defined by the CAODC.

The sample size here is not large enough to provide statistically relevant results that could be extrapolated to other organizations. Nonetheless, a statistical analysis was undertaken to provide a thorough examination of the data gathered. A summary of the questionnaire results is provided in Table 3. Mean, standard deviation, low and high score, range, and interquartile range were reported for each communication style trait, as well as for incident free days, and total recordable incident frequency. Table 4 lists the Pearson correlations between individual CS traits and IFD and TRIF records. All correlation data are Pearson correlations with two-tailed significance tests generated using SPSS software (IBM, 2011). Additionally, a group of six rig managers were identified as having >600 incident free days which was significantly higher than the average IFD value. These RMs are highly successful in terms of safety performance compared to the rest of the sample and therefore their questionnaire scores were evaluated for any meaningful trends.

Table 3: CS Summary

	Expressive-ness Total (30)	Precise-ness Total (45)	Verbal Aggressive-ness Total (30)	Questioning-ness Total (30)	Emotionality Total (30)	Impression Manipu-lativeness Total (25)	LMX-7 Total (35)	IFD	TRIF
Mean	7.43	18.70	0.78	4.05	5.54	-0.89	29.05	345.46	4.27
Standard Deviation	3.48	3.35	4.53	3.77	3.89	3.62	3.77	303.49	7.59
Low Score	1	12	-6	-4	-6	-7	16	0	0
High Score	14	26	10	13	12	10	35	1185.52	36.9
Range	13	14	16	17	18	17	19	1185.52	36.9
Q1	5	17	-3	2	4	-4	26.5	100.39	0
Q3	9.5	20.5	4.5	7	8	1	31.5	523.65	6.75
IQR	4.5	3.5	7.5	5	4	5	5	423.26	6.75
Top 6 IFD mean (*n*)	338 (17)	331.5 (9)	323 (18)	349.28 (14)	376.73 (15)	306.8 (19)	362.8 (16)		
Top 6 TRIF mean (*n*)	4.48 (17)	3.26 (9)	4.94 (18)	2.60 (14)	4.38 (15)	3.63 (19)	339.4 (16)		
Bottom 6 IFD mean (*n*)	371 (15)	434.9 (13)	351.7 (11)	374 (15)	215 (8)	409.9 (15)	382.4 (15)		
Bottom 6 TRIF mean (*n*)	5.44 (15)	4.95 (13)	2.28 (11)	6.05 (15)	4.83 (8)	2.09 (15)	5.65 (15)		

Table 4: Pearson Correlations		
	Injury Free Days (IFD)	Total Recordable Incident Frequency (TRIF)
Expressiveness	*r* = 0.038	*r* = 0.148
Preciseness	*r* = -0.199	*r* = -0.039
Verbal Aggressiveness	*r* = 0.052	*r* = -0.160
Questioningness	*r* = -0.036	*r* = -0.181
Emotionality	*r* = 0.204	*r* = 0.059
Impression Manipulativeness	*r* = -0.230	*r* = 0.095
LMX7	*r* = 0.051	*r* = 0.049

Expressiveness (EX)

The communication styles index (CSI) (de Vries et al., 2011) marks expressiveness with four facets: talkativeness, conversational dominance, humour, and informality. There were no significant correlations between expressiveness and IFDs (r = 0.038) or TRIF (r = 0.148), and of the six RMs with IFDs >600, only one had an expressiveness score above 10/30 (13). The remaining five RMs had scores of 9, 9, 7, 6, and 5 out of a total of 30. Three of the six scores were above the EX mean of 7.43. Of the rig managers with the top six EX scores (8 to 14 out of 30, n = 17), the average number of IFDs was 338 and the average TRIF was 4.48. Of the bottom six EX scores (1 to 6 out of 30, n = 13) the average number of IDFs was 371 and the average TRIF was 5.44.

Preciseness (P)

The CSI marks preciseness with four facets: structuredness, thoughtfulness, substantiveness, and conciseness. This study found there were no statistically relevant correlations between preciseness and either IFDs (r = -0.199) or TRIF (r = -0.039). Interestingly, in direct opposition to the expectation, the correlation between preciseness and IFDs, while not statistically significant, is nonetheless negative. Of the six RMs with over 600 incident free days, only two scored higher than the preciseness mean score of 18.79/45 (20 and 24). The other four RMs were below the mean with scores of 17, 15, 14, and 12 out of 45. Of the rig managers with the top six P scores (from 21 to 26 out of 45, n = 9), the average number of IFDs was 331.5 and the average TRIF was 3.26. Of the bottom six P scores (from 12 to 17 out of 45, n = 13) the average number of IDFs was 434.9 and the average TRIF was 4.95. Additionally, in keeping with the negative correlation, 12 is the lowest score of all 37 respondents on the preciseness measure but the RM who scored 12 has the highest amount of IFDs (1185.52) and a 2012 TRIF of 0 indicating a very good safety record.

Verbal Aggressiveness (VA)

VA is marked with four facets: angriness, authoritarianism, derogatoriness, and nonsupportiveness. There were no statistically relevant correlations between the CS verbal aggressiveness and either IFD (r = 0.052) or TRIF (r = -0.160). Of the six RMs with IFDs above 600, five of the six scores were above the mean of 0.78 (1, 2, 3, 4, 5). Of the rig managers with the top six (lowest) VA scores (from -6 to 0 out of 30, n = 18), the average number of IFDs was 323 and the average TRIF was 4.94. Of the bottom six (highest) VA scores (from 3 to 10 out of 30, n = 11) the average number of IDFs was 351.7 and the average TRIF was 2.28. Here the self-

evaluation method may have biased results however, and it should be noted that de Vries et al. (2010) had respondents rate their supervisors and not themselves.

Questioningness (Q)

Q is marked with four facets: unconventionality, philosophicalness, inquisitiveness, and argumentativeness. The study found there were no statistically relevant correlations between the CS questioningness and either IFD (-0.036) or TRIF (r = -0.181). The scores for this variable were quite low (maximum value of 13 out of a possible 30) suggesting that the rig managers surveyed were not overly inquisitive. Of the six RMs with >600 IFDs, only two had scores higher than the Q mean of 4.05 (7 and 9). The remaining four had scores of 4, 2, 0, and -2 out of a possible 30. Of the rig managers with the top six Q scores (from 5 to 13 out of 30, n = 14), the average number of IFDs was 349.28 and the average TRIF was 2.60. Of the bottom six Q scores (from -4 to 3 out of 30, n = 15) the average number of IDFs was 374 and the average TRIF was 6.05.

Emotionality (EM)

Emotionality is marked with four facets: sentimentality, worrisomeness, tension, and defensiveness. There was no significant correlation between emotionality and IFDs (0.204) or TRIF (r = 0.059). Of the six RMs with >600 IFDs four of the scores for EM were above the mean of 5.54 (12, 11, 9, 7) and two were slightly below (5, 5). Of the rig managers with the top six EM scores (from 7 to 12 out of 30, n = 15), the average number of IFDs was 376.73 and the average TRIF was 4.38. Of the bottom six EM scores (from -6 to 2 out of 30, n = 8) the average number of IDFs was 215 and the average TRIF was 4.83.

Impression Manipulativeness (IM)

IM is marked with four facets: ingratiation, charm, inscrutableness, and concealingness. There was no significant correlation between impression manipulativeness and IFDs (r = -0.230) or TRIF (r = 0.095). Of the six RMs with >600 IFDs four of the scores for IM were below the mean of -0.89 (-7, -5, -2, -1) and two were above (2, 2). Of the rig managers with the top six IM scores (from 0 to 10 out of 25, n = 19), the average number of IFDs was 306.8 and the average TRIF was 3.63. Of the bottom six IM scores (from -7 to -2 out of 25, n = 15) the average number of IDFs was 409.9 and the average TRIF was 2.09.

Leader Member Exchange (LMX)

There was no significant correlation between leader member exchange and IFDs (r = 0.051) or TRIF (r = 0.049). Of the six RMs with >600 IFDs two of the scores for LMX were above the mean of 29.05 (33, 31) and four were below (29, 28, 28, 27). Of the rig managers with the top six LMX scores (from 30 to 35 out of 35, n = 16), the average number of IFDs was 362.8 and the average TRIF was 3.39. Of the bottom six LMX scores (from 16 to 28 out of 35, n = 15) the average number of IDFs was 382.4 and the average TRIF was 5.65.

Chapter Four: Analysis

In the absence of statistically relevant correlations, there are, nevertheless, important observations to be made when viewed within the context of existing literature.

Expressiveness

Through the lens of Hovland's (1948) definition of communication, the stimuli used to communicate are primarily verbal symbols that are critical to the exchange (p. 320). Therefore, both the words an RM uses and the manner in which he uses them may impact the quality of his communication.

The literature suggests a high level of expressiveness is perhaps not overly valuable when it comes to delivering safety messaging on the rig. De Vries et al. (2009), in their study of leadership and communication note that "surprisingly, expressiveness was found to be unrelated to charismatic leadership[9] when entered into the equation with other communication styles" (p. 376). The communication styles index (CSI) items used here to assess expressiveness focused on a subject's propensity to express himself in general terms with questions such as "I always have a lot to say" and "I often determine the direction of a conversation". These items primarily assess the amount of stimuli as well as who is controlling the direction of the conversation. With this in mind, the fact that five of six RMs with a high number of incident free days scored on the lower third of the expressiveness scale provokes a number of questions: within the rig manager/subordinate relationship, does a higher level of expressiveness mean too much information or the wrong information is being delivered, resulting in poor safety performance? Are more expressive RMs less succinct or perhaps less focused when delivering their

[9] De Vries et al. (2009) define charismatic leadership as a "assured, supportive, argumentative, precise and verbally non-aggressive communication style" (p. 376).

messaging? Do higher levels of expression result in the use of more colourful language or slang? And finally, is a simple set of instructions better when delivering safety messaging? These questions are interesting when considering new employees especially, as they are often unfamiliar with the many unusual terms and stories specific to the oil field. In fact, several rig companies have developed slang dictionaries to help new employees adjust. As Hovland (1948) suggests, differences in language can exist between groups within common spheres such as "the scientist and the layman or between labour and management" (p. 320).

Further, as de Vries et al. (2009) surmise, perhaps cultural differences impact how a sender and receiver value expressiveness within verbal and non-verbal exchanges. Certainly, it appears the sample group of rig managers represented here does not demonstrate high levels of the four facets of expressiveness (talkativeness, conversational dominance, humor and informality) the CSI was designed to measure.

Preciseness

Based on prior research, it was predicted preciseness would be a key factor in the ability of a rig manager to convey safe procedures to his crew. As de Vries et al. (2011) note,

> Preciseness was found to be the most important predictor of leadership performance …. According to Hargie and Dickson (2004), well-planned and structured explanations result in greater understanding and better retention of the verbal content, and thus in more successful interpersonal transactions. (p. 17)

Further, de Vries, Bakker-Pieper & Oostenveld (2010) found the correlation between task-oriented leadership and preciseness as significant: "($r = .35$, $p < .01$)" (p. 373). Even more significant was a strong correlation found between preciseness and a leader's performance

relating to outcomes: "(r = .61, p <.01)" (de Vries et al., 2010, p. 373). For this reason this study's questionnaire was developed to include more items assessing preciseness. The results here however do not substantiate prior research. The >600 IFD group had only two of six RMs score above the mean for preciseness, and the group of RMs with the top six preciseness scores had approximately 24 per cent fewer consecutive incident free days than the bottom six RMs on the preciseness measure (although the more precise group had a lower average TRIF: 3.26 vs. 4.95). As it is difficult to theorize how a lack of precise communication could result in better overall safety performance outcomes, additional research in this area would be welcomed.

Verbal Aggressiveness

Regarding verbal aggressiveness, some very interesting observations can be made in light of the literature. As de Vries et al. reveal in their 2010 study on CS and outcomes, although a leader's verbal aggressiveness correlates negatively with human-orientated leadership (r = -.62) (p. 373), it has a "small (but not significant) positive correlation with task-orientated leadership" (p. 373). Additionally, O'Dea & Flin (2001) note in their study of offshore rig managers (OIMs) that not only do 'consulting' style OIMs find it more difficult to get workers to accept ownership of safety, they also report a 'telling' and 'selling' approach is more effective than a 'consulting' and 'joining' one when "establishing effective disincentives against carelessness and violations" (p. 48). In support of these findings, this study's VA scores illustrate an increase in incident free days with *more* verbally aggressive RMs (351.7 vs. 323) and a significant difference in TRIF records (2.28 vs. 4.94). These numbers suggest verbally aggressive rig managers have, on average, better safety records than their less verbally aggressive counterparts. The existing literature notes, "human-orientated leadership is strongly associated with the communication style of supportiveness, and to a lesser extent with a leader's expressiveness and (a lack of)

leader's verbal aggressiveness" (de Vries et al., 2009, p. 376 [parenthesis in original]). Parker et al. (2001) suggest supportive leadership may enhance self-efficacy and that "sharing information and encouraging others to talk about aspects of work might alert employees to potential hazards and educate them about procedures" (p. 214). Based on findings here, however, it would appear task-oriented leadership is more effective at achieving outcomes. Similarly, although O'Dea & Flin (2001) suspected a less authoritarian approach to achieving safety objectives would be more effective, their findings revealed the opposite, with "the more participative OIMs and those with greater experience [tending] to rate tasks such as 'establishing effective disincentives against carelessness and violations' and 'getting workers to accept ownership of safety' as more difficult to achieve" (p. 52).

From this perspective, then, the Camargo et al. (2012) observation that "safety interventions were usually performed only by people capable of overcoming the initial barriers of the inherent confrontation that such interaction implies" (p. 4) is also interesting. Perhaps the VA facet of authoritarianism is valuable for leaders when communicating safety messaging because it helps overcome any situational ambiguity.

On the other hand, the VA facet of nonsupportiveness and the results of this study conflict with Parker et al. (2001), Street Jr. et al. (2009), and Coeling & Cukr (2000), all of whom found supportiveness to be an important aspect of successful communication. The difference here could be explained in terms of context, as two of the above studies were in the field of healthcare. While the Parker et al. (2001) study was in an industrial work setting, it was also longitudinal, and their findings suggest supportiveness was valuable 18 months after the initial interaction.

Questioningness

Although none of the literature reviewed here addresses the variable of questioningness directly, the facets measured by the index are catalysts of effective communication. Particularly, inquisitiveness and argumentativeness are two elements of the communication process that can either inhibit or facilitate its success. Responses to questions such as "I don't bother asking a lot of questions just to find out why people feel the way they do about something" and "to stimulate a discussion, I sometimes take the opposite view of the person I am talking with just for fun" may be indicative of an RMs ability to generate and sustain a successful rapport with subordinates. Hofmann & Morgeson's (1999) findings indicate that "employees who … have high-quality relationships with their leader are more likely to feel free to raise safety concerns" (p. 293). Additionally, in a study on the effect of communication and patient care, Street, Makoul, Arora, & Epstein (2009) suggest that responding to patient questions with "clear explanations and expressions of support could lead to greater patient trust and understanding of treatment options" (p. 297). Following that line of thought, the degree to which rig managers ask their subordinates questions and initiate conversation could perhaps set the stage for better information exchange. As Hofmann & Morgeson (1999) suggest, "positive exchange relationships are more likely to engender a context within which members will raise safety concerns, which … can lead to the identification and implementation of safety programs" (p. 293). Further, Street et al. (2009) note that enhancing patient agency leads to "active participation in medical encounters and decision-making [and] to self-care skills" (p. 298). In this instance then, the same tendency to elicit questions could result in similar agency in rig hands. The data found here, although admittedly inconclusive, does reveal a marked difference in TRIF from those with top six Q scores (TRIF = 2.60) and those with bottom six Q scores (TRIF

= 6.05). As this discrepancy is the largest between TRIF numbers among all the CS traits, the degree to which the CS of questioningness impacts safety communication may be worth additional investigation.

Emotionality

Emotionality levels in rig managers yielded the largest difference in incident free day averages (161.73 days between those with the highest levels of EM and those with the lowest) and all of the six RMs with IFD records greater than 600 were above or right near the mean score of 5.54. These findings are interesting when considering the four facets of EM (see Table 2). Perhaps higher levels of worry, sentiment, or tension in general would compel RMs to act in a manner that promotes safer behaviour.

Impression Manipulativeness

Impression manipulativeness findings are also noteworthy. RMs with lower IM scores appear to be safer on average than RMs with higher IM scores. These observations raise additional questions about the type of communication styles or leadership styles that are effective in conveying safety related messaging. CSs or leadership styles that involve discussion, and input from subordinates, or where roles and expectations are not well defined, do not seem to be as impactful in generating safe outcomes. Looking at the facets of IM (see Table 2), and taking into account O'Dea & Flin's (2001) findings reveals a gap between theory and practice:

> Research suggests managers are keenly aware … that the best way to promote safety is by developing good quality participative and open relationships with subordinates. Yet the evidence presented here suggests that translating these principles into leadership practices is not so simple … (p. 54)

Perhaps RMs with less of a tendency toward ingratiation, charm, inscrutableness, and concealingness deliver a message that is indeed more straightforward and easier to understand.

Leader Member Exchange

It was theorized that examining the relationship between rig managers and their crews in light of safety performance would provide additional insight into how CS may correlate with safety outcomes. The LMX-7 is intended to measure the dimensions of trust, commitment, and obligation, and both Graen et al. (1995), and Hofmann & Morgeson's (1999) findings indicate positive exchanges between managers and subordinates can facilitate safety commitment (p. 293). The LMX-7 however, is more effective when used to assess both parties in the exchange. Here, only rig managers were asked to evaluate LMX, so its primary characteristic (the relationship itself) could not be sufficiently measured. Although the self-assessment suggests all rig managers in the study felt their crews supported them, those numbers suggest commitment from crews to the organization, and do not evaluate the inverse. Perhaps these limitations, in addition to sample size, were factors in the inconclusive data surrounding LMX, IFDs, and TRIF.

Situational Factors

Based on the observations made from the data set here, it would appear that communication style effectiveness may be also be impacted by situations or settings, and that more human-orientated CSs may not be as effective within an oilfield setting when trying to achieve safe behaviour. This assertion supports the findings of Judge et al. (2002) who indicate "there are many situational factors that may moderate the validity of personality in predicting leadership" (p. 774) including structure and formally defined roles. Within less structured settings, Judge et al. (2002) found personality traits were more influential on leader emergence and less so on leader effectiveness. While Coeling & Cukr (2000) found that dominant,

aggressive and overly precise communication styles were not effective in a health care setting, O'Dea & Flin (2001), de Vries et al. (2010), and the observations made in the present study, indicate that within settings where specific behaviours or outcomes are desired, a more authoritarian or task-oriented approach can have better results. Certainly within the context of onshore and offshore rig crews, structure and defined roles are more predominant than those in a school or health care setting. Where safety outcomes are concerned, leader effectiveness may be more relevant than leader emergence, as the latter is more perception based, especially within less-structured environments (Judge et al., 2002).

Limitations of the Study

While affording some provocative insights, the study was limited in several ways. The questionnaire was a self-assessment and, as such, was subject to response bias. It would have been helpful to perhaps have a rig manager's crew fill out a similar questionnaire and combine the results for a more valid reflection of both RM communication style and, especially, leadership traits. While the items on the questionnaire were all taken from established and tested measurement instruments, the items from the LMX in particular would have benefited from either more descriptive self-measurement questions regarding leadership or, as mentioned, a follow up measure completed by an RM's crew. As it was, the LMX component of the survey was not designed well enough to yield relevant data. Additionally, voluntary participation in the study may have attracted a more homogenous sample of the population, as one type of person may be more predisposed to completing surveys than another, in addition to limiting sample size. For a trait based study such as this it would be much better to have a larger sample size in order to increase validity and the possibility of statistically significant correlations.

The effectiveness of a communication style survey within this context can also be debated. As Judge et al. (2002) note, "results of investigations relating personality traits to leadership have been inconsistent and often disappointing" (p. 765). In light of their findings that personality traits were more influential on leader emergence and less so on leader effectiveness, perhaps a study focused on outcomes, as this one is, should employ a different methodology or a combination of methods to generate data. While correlations only were sought here, the general nature of trait-based indexes makes it more difficult to obtain statistically significant values.

Although used as a key performance indicator (KPI) in the Canadian oilfield services industry, it was determined that for the purpose of this study TRIF values by themselves would not be an accurate reflection of an individual rig manager's safety performance. TRIF records are assigned to rigs and do not take into account who is managing the rig when an incident occurs. Because drilling rig managers work 24 hours per day/7 days per week, they are relieved by a temporary RM for extended periods, and both drilling and well servicing RMs will often transfer from rig to rig depending on activity levels. Additionally, there is no mandate from government or other regulating bodies to report TRIF to the CAODC, and companies generate all incident related data using their own internal reporting structures and definitions. Statistically, the lack of reporting requirements for TRIF makes it an unreliable and inaccurate measure of individual RM safety performance. Despite these inconsistencies however, TRIF remains a key performance indicator industry wide, and is used by exploration and production companies to assess the safety performance of prospective contractors. The difficulty in associating TRIF records with individual rig mangers makes the value of such a measure unclear, and brings into question its usefulness as a key performance indicator. For these reasons it was determined that incident free days would be a more accurate reflection of an individual rig manager's safety performance

within the context of this study, and that IFDs should be added to the data set. While IFDs are also calculated without industry guidelines, the values in this study have been calculated using one company's formulas, and are therefore consistent.

Lastly, because the concept of HSE includes the variables of both health and environment in addition to safety, this study may have also benefitted by including measures for both of these. Although challenged by crew movement and the seasonality of work, perhaps a smaller, targeted sample of long-standing crews could also employ drug and alcohol test results and crew retention rates in an effort to create a more holistic picture of a rig's overall HSE performance as opposed to simply safety performance.

Chapter Five: Conclusions/Recommendations

As a preliminary exploration of the communication styles among RMs employed by one Canadian oil field service company, the goal of this study was to address a fundamental research question: is there a relationship between a rig manager's CS and the safety record on his rig? While the degree to which a rig manager's communication style impacts the safety record of his rig remains unclear, a cross-tabulation of the resulting data provides some interesting insights relevant to service companies and regulators moving forward. Although the data is not statistically robust, some interesting observations can be made that will hopefully form the basis for subsequent research. The present study raises pertinent questions surrounding appropriate methodology for assessing CS, the influence of situational factors on communication, the impact of topic, or message content, on how messaging is most effectively delivered, and the ability of total recordable incident frequency and injury free days to capture an accurate reflection of safety in the field. Additionally, although the study's sample population is most likely homogenous due to the voluntary nature of the survey, it would appear the stereotypical "roughneck machismo" may not be as prevalent today as it has been in the past. This observation in itself indicates a greater capacity for the continued development and progress of, not only HSE, but the energy services industry as a whole.

Regarding methodology, in order to generate more salient data on rig manager communication styles, it would be helpful to: (a) increase sample size for any trait-based or quantitative assessment, (b) introduce qualitative and subordinate assessment measures, and (c) introduce more direct questions about safety and/or achieving outcomes on any survey used.

The study's findings suggest rig managers as a group do not exhibit very high levels of expressiveness overall. Findings also suggest an abundance of expression may not be needed

when delivering safety messages in a rig setting. As an implication for training, those creating safety training programs should:

- Try to simplify procedures so a minimum of verbal explanation is required (perhaps using images, video, or other graphic illustrations).
- Familiarize new employees with the idea that roles on the rig are not as ambiguous as they may be in other professions, and that directions from superiors should be followed accordingly.
- Emphasize listening skills, and the need to ask questions when uncertain about procedures.
- Provide a glossary of terms to better prepare new recruits (a tactic many companies currently employ).

Structurally, the rig is a setting where roles are clearly defined. The literature and findings here, suggest that a leader's traits or communication style, on the whole, become less of a factor with increased structure. Contextually, the energy service industry is one with a distinct culture, different from other leadership settings such as schools or health care facilities. With these two factors in mind, in order to effectively achieve HSE outcomes on drilling or service rigs, support for organizational structure appears critical. Senior managers of service companies, therefore, should:

- Establish clear expectations for all employees regarding HSE.
- Communicate these expectations uniformly and consistently across the organization.

- Hold *all* employees accountable with fair and transparent HSE rules.

These steps would help remove any ambiguity surrounding a company's HSE priorities, and drive desired outcomes. It would also allow for more rig managers, with a greater range of communication styles and leadership abilities, to be successful.

Further, it appears that safety messaging has a better chance of yielding safe behaviour when delivered in a more authoritarian and less debatable manner—at least initially. The data suggests that, when communicating safety messaging, using a more participative and human-orientated CS or leadership style may create the impression there is room for negotiation or non-compliance when in fact there is not. Findings here support O'Dea & Flin's (2001) conclusions that managers, despite stating a consulting and joining approach to leadership was more effective, find "many of the tasks associated with developing and maintaining a positive safety climate difficult to achieve" (p. 52) when employing those methods.

Communicating that HSE is a fundamental part of an employee's duties does not appear to be well suited to a human-oriented style of delivery. This may be because the manner in which individuals keep themselves safe is subject to proper procedures and protocols that are often inflexible, and open to interpretation only after minimum requirements are met (e.g., the type of safety glasses one wears is debatable, but whether one wears them is not an option). As such, service companies should:

- Establish HSE as fundamental to the organization.
- Establish that HSE is a non-negotiable expectation.

- Clearly communicate and uphold *the consequences for not meeting* these expectations.
- Clearly communicate and promote *the benefits for meeting* these expectations.
- Support all decisions that are made in accordance with HSE policy, regardless of short term, or financial implications.[10]
- Actively engage employees in seeking solutions to HSE challenges within the established HSE framework.

Once these criteria have been implemented, a more supportive and open environment can then serve to entrench safe behaviour en route to establishing a culture of safety. This observation is substantiated by Judge et al. (2002), who found leaders' extraversion correlates more strongly with leader *emergence* than with leader effectiveness.

Further, as Westrum (in Parker et al., 2006) notes, organizations in a pathological stage of HSE development withhold information and cover up unsafe behaviour (Table 1). In the bureaucratic stage, organizations ignore it. Generative organizations, however, are those that set and communicate their parameters for HSE, and then share the responsibility of holding employees accountable for remaining within them, while simultaneously encouraging appropriate discussion and new ideas (Parker et al., 2006). The present study's results, and existing literature, suggest that in order for a more human-orientated, generative HSE approach to eventually succeed, it should be underpinned by a non-negotiable and continually reinforced overarching framework. Once established, this framework will allow for eventual flexibility, growth, and development within defined parameters.

[10] Refer to the Gow (2005) excerpt in Literature Review (pp. 17-18).

Regarding the concepts of communication style and leadership style, it appears there are significant similarities between the two that may warrant additional standardization. De Vries et al. (2010) have made considerable headway in assessing CS, and it would be interesting to see whether the concepts of human-orientated, charismatic, and task-oriented leadership styles could be somehow merged with similar communication styles and facets. There may be value in grouping certain CSs into general categories in the same manner as leadership styles so one could refer to a human-oriented CS, or a task-oriented CS. Further, data found in the literature, and observations made in this study, suggest certain communication or leadership styles are better in specific situations and with specific messages. This observation opens the door to investigating particular combinations of styles and messages, and whether the delivery of one message and CS combination could impact the success of another CS and message combination within the same group dynamic. For example, if a rig manager is more 'verbally aggressive and emotional' when delivering safety messaging, would this impact the effectiveness of his 'expressive and precise' delivery of a maintenance procedure?

While conducting the study, it was revealed that the reporting of both total recordable incident frequency and incident free days is not regulated or enforced in a standardized manner, and therefore, limited in its reliability. For this reason, accurately determining how safely rig managers operate is not an easy task, which makes it challenging for service companies wanting to effectively evaluate RM performance. As TRIF is currently used as a key performance indicator, the industry would be better served by exploring ways to:

- Regulate and enforce how TRIF is reported.
- Regulate and enforce how IFDs are reported.

- Develop a method of combining TRIF and IFD measures into a more meaningful statistic.

The fact that TRIF cannot be easily attributed to specific rig managers obscures its value as a reporting measure, and symbolically suggests a deflection of responsibility and ownership that is simply problematic, especially when considering the many image challenges the oil and gas industry faces in the public arena. Incident free days appear to be a better reflection of a rig manager's safety record, as it is people who are ultimately responsible for incidents, and not the rig itself. IFDs, however, also have no standardized, industry-wide reporting structure.

Finally, sharing the general results of the study with both rig managers and the company, and discussing trends and tendencies found in the results, may stimulate thought for improving outcomes in a number of areas, including training, safety, retention, and so forth. Additionally, if published, these results could also serve to publicly demonstrate a tangible commitment to HSE commensurate with a high level of professionalism, responsibility, and sustainability. Proactive analysis is one of the characteristics of Westrum's (1996) generative stage of an HSE climate, and demonstrates to all stakeholders a genuine attempt to incorporate best practices. The resulting social capital could then be leveraged to address the aforementioned challenges of creating interest in oilfield services as a career, and securing contracts with E&P companies.

Health, safety, and environment remain fundamental considerations for oil field operations, and continue to require serious analysis for myriad reasons. Until alternate sources of energy are capable of meeting global demands on a larger scale, oil and gas will continue to be an essential resource for the bulk of the world's population. As such, industry specific research

on a variety of HSE related topics and areas would be beneficial, and companies operating within this sphere would be wise to consider supporting its development.

Appendices

Appendix A: Cover Letter

UNIVERSITY OF ALBERTA
FACULTY OF EXTENSION

COMMUNICATIONS AND TECHNOLOGY
GRADUATE PROGRAM

Enterprise Square
10230 Jasper Avenue NW
Edmonton, Alberta, Canada T5J 4P6

Study: An analysis of Rig Managers' Communication Styles

You are being asked to participate in a study to find out the different ways Rig Managers communicate. The reason this study is being done is to try and understand what types of communication styles are effective for training safe rig crews. The goal of the study is to use the information collected to improve training programs for all rig positions, including Rig Manager.

You are being asked to fill out the attached questionnaire based on your years of experience as a Rig Manager. You will not be personally identified with your answers to the questions other than by your rig number, and all information collected will remain the property of the University of Alberta. The University of Alberta will not give out the names of any of the participants in the study and is legally required to keep all questionnaires completely confidential. To ensure confidentiality, all completed questionnaires will be accessible only to the researchers named below, and will be kept on a password protected server for a period of five years, after which they will be destroyed.

The information collected will be used as research in my Major Research Project for a master's degree in communications and technology (MACT). The final project may be published in academic journals and will also be presented to your employer, Savanna Energy Services Corp. As mentioned, Savanna will not have access to, nor has legal rights to access, completed questionnaires or the identity of study participants. The Principal Investigator, as an employee of Savanna, is the only member of Savanna allowed to know who has been asked to participate in this study. Additionally, all participants may contact the Principal Investigator and request a copy of the completed study. The study is scheduled to be completed by August 31, 2013.

The attached questionnaire has 46 multiple choice questions and takes approximately 10 minutes to complete. You may complete the questionnaire on the internet by clicking the link provided; filling out the Microsoft Word version and sending it back via e-mail; or by filling out a printed paper version, scanning it, and sending it back by e-mail.

If you complete this questionnaire, it will be taken as a sign that you understand the nature of the study and give your consent to participate. You are under no obligation to participate in this study, and if you do choose to participate in the study and change your mind, you can withdraw at any time. Your confidential data will be destroyed if you choose to withdraw before July 15, 2013. If you choose to withdraw after July 15, 2013, I will be unable to separate your data from the data set; however, the data set will be completely anonymous and it will be impossible to interpret individual responses from it. If you have any questions or concerns or would like more information about the study, please contact John Bayko at 403 829 2870. The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615.

Thank you very much,

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Appendix B: Items of the Communication Styles Inventory (CSI)

Dimension	Facet	Item
Expressiveness		
	Talkativeness	I always have a lot to say
	Talkativeness	I have a hard time keeping myself silent when around other people.
	Talkativeness	I am never the one who breaks a silence by starting to talk.
	Talkativeness	I like to talk a lot.
	Conversational Dominance	I often take the lead in a conversation.
	Conversational Dominance	Most of the time, other people determine what the discussion is about, not me.
	Conversational Dominance	I often determine which topics are talked about during a conversation.
	Conversational Dominance	I often determine the direction of a conversation.
	Humour	Because of my humor, I'm often the centre of attention among a group of people.
	Humour	I have a hard time being humorous in a group.
	Humour	My jokes always draw a lot of attention.
	Humour	I often manage to make others burst out laughing.
	Informality	I communicate with others in a distant manner.
	Informality	I behave somewhat formally when I meet someone.
	Informality	I address others in a very casual way.
	Informality	I come across as somewhat stiff when dealing with people.
Preciseness		
	Structuredness	When I tell a story, the different parts are always clearly related to each other.
	Structuredness	I sometimes find it hard to tell a story in an organized way.
	Structuredness	I always express a clear chain of thoughts when I argue a point.
	Structuredness	My stories always contain a logical structure.
	Thoughtfulness	I think carefully before I say something.
	Thoughtfulness	I weigh my answers carefully.
	Thoughtfulness	The statements I make are not always well thought out.

	Thoughtfulness	I choose my words with care.
	Substantiveness	Conversations with me always involve some important topic.
	Substantiveness	You won't hear me jabbering about superficial or shallow matters.
	Substantiveness	I am someone who can often talk about trivial things.
	Substantiveness	I rarely if ever just chatter away about something.
	Conciseness	I don't need a lot of words to get my message across.
	Conciseness	Most of the time, I only need a few words to explain something.
	Conciseness	I am somewhat long-winded when I need to explain something.
	Conciseness	With a few words I can usually clarify my point to everybody.
Verbal Aggressiveness		
	Angriness	If something displeases me, I sometimes explode with anger.
	Angriness	I tend to snap at people when I get annoyed.
	Angriness	I can sometimes react somewhat irritably to people.
	Angriness	I am not very likely to tell someone what they should do.
	Authoritarianism	I sometimes insist that others do what I say.
	Authoritarianism	I expect people to obey when I ask them to do something.
	Authoritarianism	When I feel others should do something for me, I ask for it in a demanding tone of voice.
	Derogatoriness	I never make fun of anyone in a way that might hurt their feelings.
	Derogatoriness	I have at times made people look like fools.
	Derogatoriness	I have been known to be able to laugh at people in their face.
	Derogatoriness	I have humiliated someone in front of a crowd.
	Nonsupportiveness	I can listen well.
	Nonsupportiveness	I always show a lot of understanding for other people's problems.
	Nonsupportiveness	I always take time for someone if they want to talk to me.

	Nonsupportiveness	I always treat people with a lot of respect.
Questioningness		
	Unconventionality	I sometimes toss bizarre ideas into a group discussion.
	Unconventionality	I often say unexpected things.
	Unconventionality	In discussions, I often put forward unusual points of view.
	Unconventionality	In conversations, I often toy with some very wild ideas.
	Philosophicalness	I never enter into discussions about the future of the human race.
	Philosophicalness	I like to talk with others about the deeper aspects of our existence.
	Philosophicalness	I never engage in so-called philosophical conversations.
	Philosophicalness	I regularly have discussions with people about the meaning of life.
	Inquisitiveness	During a conversation, I always try to find out about the background of somebody's opinion.
	Inquisitiveness	I don't bother asking a lot of questions just to find out why people feel the way they do about something.
	Inquisitiveness	I ask a lot of questions to uncover someone's motives.
	Inquisitiveness	I always ask how people arrive at their conclusions.
	Argumentativeness	To stimulate discussion, I sometimes express a view different from that of my conversation partner.
	Argumentativeness	I like to provoke others by making bold statements.
	Argumentativeness	I try to find out what people think about a topic by getting them to debate with me about it.
	Argumentativeness	By making controversial statements, I often force people to express a clear opinion.
Emotionality		
	Sentimentality	When I see others cry, I have difficulty holding back my tears.
	Sentimentality	During a conversation, I am not easily overcome by emotions.
	Sentimentality	When describing my memories, I sometimes get visibly emotional.

	Sentimentality	People can tell that I am emotionally touched by some topics of conversation.
	Worrisomness	When I'm worried about something, I find it hard to talk about anything else.
	Worrisomness	I tend to talk about my concerns a lot.
	Worrisomeness	People can tell when I feel anxious.
	Worrisomeness	When I worry, everybody notices.
	Tension	Because of stress, I am sometimes unable to express myself properly.
	Tension	I can be visibly tense during a conversation.
	Tension	I am able to address a large group of people very calmly.
	Tension	I find it hard to talk in a relaxed manner when what I have to say is valued highly.
	Defensiveness	The comments of others have a noticeable effect on me.
	Defensiveness	Nasty remarks from other people do not bother me too much.
	Defensiveness	When people criticize me, I am visibly hurt.
	Defensiveness	I am not always able to cope easily with critical remarks.
Impression Manipulativeness		
	Ingratiation	I sometimes praise somebody at great length, without being really genuine, in order to make them like me.
	Ingratiation	In discussions I sometimes express an opinion I do not support in order to make a good impression.
	Ingratiation	Sometimes I use flattery to get someone in a favorable mood.
	Ingratiation	To be considered likeable, I sometimes say things my conversation partner likes to hear.
	Charm	I sometimes use my charm to get something done.
	Charm	I sometimes flirt a little bit to win somebody over.
	Charm	I would not use my appearance to make people do things for me.
	Charm	I sometimes put on a very seductive voice when I want something.
	Inscrutableness	I make sure that people cannot read it from my face when I don't appreciate them.
	Inscrutableness	Even when people ask for my thoughts on

		something, I seldom speak my mind if those thoughts are unacceptable for others.
	Inscrutableness	I am able to hide negative feelings about other people well.
	Inscrutableness	Other people can easily tell when I think badly about them.
	Concealingness	I sometimes conceal information to make me look better.
	Concealingness	I sometimes "forget" to tell something when this is convenient for me.
	Concealingness	I tell people the whole story, even when this is probably not good for me.
	Concealingness	Even if I would benefit from withholding information from someone, I would find it hard to do so.

Note. Adapted from "The Communication Styles Inventory (CSI): A Six-Dimensional Behavioural Model of Communication Styles and its Relation with Personality," by R. de Vries, A. Bakker-Pieper, F.E. Konings, and B. Schouten, 2011, *Communication Research*, *XX* (X), pp. 1-27, doi: 10.1177/0093650211413571. Copyright 2011 by the Authors.

Appendix C: Questionnaire

CSI Items (the first 39 questions are scored on a scale where 1 = strongly agree; 2 = agree; 3 = neutral; 4 = disagree; and 5 = strongly disagree)

Expressiveness

1. I always have a lot to say
2. I have a hard time keeping myself silent when around other people
3. Most of the time, other people determine what the discussion is about, not me
4. I often determine the direction of a conversation
5. My jokes always draw a lot of attention
6. I come across as somewhat stiff when dealing with people

Preciseness

7. When I tell a story, the different parts are always clearly related to each other
8. I sometimes find it hard to tell a story in an organized way
9. I always express a clear chain of thoughts when I argue a point
10. I think carefully before I say something or answer a question
11. Conversations with me always involve some important topic
12. I am someone who can often talk about trivial things
13. I rarely if ever just chatter away about something
14. I don't need a lot of words to get my message across
15. I am somewhat long-winded when I need to explain something

Verbal Aggressiveness

16. Even when I'm angry, I won't take it out on someone else
17. I tend to snap at people when I get annoyed
18. When I feel others should do something for me, I ask for it in a demanding tone of voice
19. I have at times made people look like fools
20. I have been known to be able to laugh at people in their face
21. I always listen and take the time for someone if they want to talk to me
22. I always treat people with a lot of respect

Questioningness

23. In sometimes toss weird ideas into conversations
24. I never engage in so called philosophical conversations
25. I regularly have discussions with people about the meaning of life
26. I don't bother asking a lot of questions just to find out why people feel the way they do about something
27. I like to provoke others by making bold statements
28. To stimulate a discussion, I sometimes take the opposite view of the person I am talking with just for fun

Emotionality

29. During a conversation, I am not easily overcome by emotions
30. I tend to talk about my concerns a lot
31. People can tell when I feel anxious
32. Because of stress, I am sometimes unable to express myself properly
33. I am able to address a large group very calmly
34. Nasty remarks from others do not bother me much

Impression Manipulativeness

35. To be considered likable, I sometimes say things people like to hear
36. Even when people ask for my thoughts on something, I seldom speak my mind if those thoughts are unacceptable for others
37. I am able to hide negative feelings about people well
38. I tell people the whole story, even when this is probably not good for me
39. Even if I would benefit from withholding information from someone, I would find it hard to do

LMX-7 Items

40) Do you know where you stand with your crew… do you usually know how satisfied your crew is with what you do?

a) Rarely
b) Occasionally
c) Sometimes
d) Fairly often
e) Very often

41) How well does your crew understand your job problems and needs?

a) Not a bit
b) A little
c) A fair amount
d) Quite a bit
e) A great deal

42) How well does your crew recognize your potential?

a) Not at all
b) A little
c) Moderately
d) Mostly
e) Fully

43) Regardless of how much authority you have as a Rig Manager, what are the chances of your crew helping you solve problems in your work?

a) None
b) Small
c) Moderate
d) High
e) Very high

44) Again, regardless of how much authority you have, what are the chances your crew would bail you out at their expense?

a) None
b) Small
c) Moderate
d) High
e) Very high

45) I have enough confidence in my crew that I would defend and justify their decisions if they were not present to do so.

a) Strongly disagree
b) Disagree
c) Neutral
d) Agree
e) Strongly agree

46) How would you characterize your working relationship with your crew?

a) Extremely ineffective
b) Worse than average
c) Average
d) Better than average
e) Extremely effective

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