SPE-177777-MS

The Normalisation of Deviance in the Oil and Gas Industry: The Role of Rig Leadership in Success and Failure

Dr Stewart Hase and Simon Phin, Beyond Break Pty Ltd

Abstract

The normalization of deviance is a major organizational cultural issue that is modeled and enabled by poor leadership and filters down through the organization with disastrous consequences for safety and operations. Culture has been shown to create the circumstances that result in safety problems ranging from near misses to major catastrophe due to failures in operations integrity, specifically process safety. The organizational culture is also responsible for the level of productivity, of effectiveness and efficiency. The major factor in operations integrity and in productivity is employee engagement. In turn, a transformational leadership style has been shown to be the most effective approach in developing an engaged workforce and a positive work culture, including in oil and gas installations. This paper discusses these issues and, in particular, the role of leaders in developing a safe and productive work environment in drilling operations. Finally, it provides a solution to the question of how to develop effective leaders that involves: talent recognition; effective recruitment; effective performance management; and training and coaching interventions across all three of these areas.

Leadership, Operations Integrity and Production

There is a necessary economic, engineering, social and psychological tension on a drilling rig. Often the elephant in the room, this tension is between production, on the one hand, and operations integrity on the other. Clearly the industry cannot survive without being effective and efficient. At the same time, there is a pressure to make sure that operations are sustainably safe for people and the environment. These two aims must co-exist without competing interests, without creating ambiguity by saying one thing, that safety is paramount, but sending another about the priority to meet production goals, particularly in times of stress. It is well known in the psychological research that people confronted with ambiguity are more likely to make mistakes in procedures and in practices (e.g. Hopkins, 2012).

There is overwhelming evidence that success in production and in operations integrity is the result of excellence in leadership. Let's focus on operations first. Most organizations and industries around the world have now come to accept that their success is harnessed to the quality of their leadership and they spend billions of dollars in training and developing their leaders (Kraus & Wilson, 2012) and, in turn, the development and maintenance of the right kind of culture. This is a culture of high employee engagement that has been shown to be the critical factor in both effectiveness and efficiency in any organization

(Catteeuw, 2007; Gallup, 2013; Taleo Research (2009; Harter et al, 2002). Low engagement costs organizations millions of dollars a year. Hence, the investment in leadership development by most organizations.

Broadly speaking, the two most common leadership styles, and their variations, found in organizations are known as transformational and transactional leadership. Transactional leadership is more concerned with maintaining the normal flow of operations, task completion, project completion. The transaction is focused on the job at hand. Motivation involves extrinsic rewards in exchange for performance since people are not self-motivated to do things right. Power is vested in the leader who directs activities and expects to be obeyed. It is a 'telling', authoritarian style, where getting the job done is paramount and typical of the 'old style' of management in drilling in years now long gone.

Leadership approaches are often defined by personality and experience. In industries highly focused on project management, problems solving, and engineering based most interaction is transactional. Thus, you find that when people are moved up the chain of command they naturally take a transactional leadership style with them. Transactional leadership styles are more commonly found in men (Alimo-Metcalf, 1995).

Transformational leadership involves leading through people, by achieving outcomes by maximizing the potential of the workforce, and by creating engaged employees. Reward is more about being part of the team, the organization and a sense of achievement that is owned. Three notable examples of transformational leaders are Sam Walton, Richard Branson and Nelson Mandela. Situational leadership is the ability to change one's leadership style to suit the circumstance, the team and the individual. We'll look at these in more detail as we examine how culture comes about in organizations and how it leads to success, failure or disaster.

Transformational leadership has been found to be more effective in producing positive operational and safety outcomes than transactional leadership in a number of industries including the oil and gas industry (Barling et al, 2002; Flin & Yule, 2004; Guldenmund, 2000; Hale & Hovden, 1998; O'Dea & Flin 2001; Shannon et al., 1997; Flin et al, 2000; Mullen & Kelloway, 2010). Kaiser and Hogan (2005) claim there are five factors contributing to organizational effectiveness that are mediated by good leadership: talented personnel; motivated people; clear leadership competencies used to evaluate leadership performance; a strategy for outperforming competition; and monitoring and feedback to enable leaders to manage their staff well.

Leadership has also been demonstrated to be the determining factor in operations integrity. As report number 452 of the International Association of Oil and Gas Producers (2013) states:

> *A manager's style of leadership and visible demonstration of their commitment to safety through actions is important in shaping the organisation's culture. Improving Safety Culture requires determination and stamina. Long-term focus, commitment, and a willingness to 'walk the talk' are more influential than campaigns and posters (p. 18).*

The report goes on to talk about the value in transformational leadership and situational leadership to the oil and gas industry, particularly with respect to operations integrity. As the above quote recognizes, it is leadership that shapes the culture of an organization of a rig. The culture determines how people behave by establishing norms: the 'how we do things around here', and expectations.

As R. Tillerson (2010) notes:

> *A culture of safety starts with leadership, because leadership drives culture and culture drives behaviour. Leaders influence culture by setting expectations, building structure, teaching others and demonstrating stewardship.*

> *A commitment to safety and operational integrity begins with management. But management alone cannot drive the entire culture.*

> *For a culture of safety to flourish, it must be embedded throughout the organisation (p. 3).*

Andrew Hopkins, the world's foremost expert on the causes of disasters in the oil and gas industry, has pointed out several times in his various publications that organizational culture is a key factor in major incidents.

According to Reason (1990), who developed the Swiss Cheese Model, there are four factors that contribute to accidents. These are: organizational factors, leadership, preconditions and special acts. The Swiss Cheese Model hypothesizes that, normally, processes exist in organizations to mitigate hazards and fail safe systems include back ups. However, when failures of process or behavior (in the case of special acts) occur in sequence then disaster can occur. Organizational culture is a major component of Reason's organizational factors, leadership (reinforcing the way in which we do things around here) and preconditions. The normalization of deviance is a specific outcome and, culturally, concerns ignoring procedure and process, and the development of high-risk tolerance.

The rest of this paper examines this tension between production and operations integrity, and between success and failure. Furthermore, it looks at the triadic relationship between leadership, culture and organizational outcomes, and how the onboard leadership plays a key role in shaping the latter.

The Normalization of Deviance: The Acceptance of Unacceptable Tolerance in Safety and Production

Following the 1986 Challenger space shuttle disaster Diane Vaughan (1996) coined the term 'Normalization of Deviance'. This is a cultural phenomenon and describes how organizations come to accept behavior that is contrary to what would be considered as desirable, and to see flaws in operations as normal. The normalization of deviance is strongly related to the well-known psychological notion of desensitization. When we become desensitized to something our feelings about it become less acute, we become less afraid perhaps, less amazed, less concerned. This occurs due to repeated exposure to an event, which results in familiarity. It becomes more normal.

In the case of disasters there is a gradual acceptance and ignoring of danger signals: risk tolerance goes up as people become desensitized to hazards. In the 1986 Challenger disaster, for example, engineers came to ignore danger signs as they accepted a greater margin for error in the capacity of a set of O-rings to withstand the effects of cold.

The literature is full of examples of the normalization of deviance in practices and procedures in disasters including the: Blowout in the Gulf of Mexico (http://www.csb.gov/macondo-blowout-and-explosion/; Hopkins, 2012) in which quite extraordinary warning signs were ignored; Columbia space shuttle explosion in 2003, which was explained as a result of a flawed culture at NASA; Nimrod disaster in 2006 is a classic example of this phenomenon with the ignoring of several signs over many years, abnegation of responsibility, and increased risk tolerance; Three mile island in 1979; Bhopal leak in India involving thousands of deaths due to an acceptance of unacceptable risk; Sampoong store collapse in 1995 in which flaws in the building were ignored; Upper Big Branch Mine Disaster in 2010 in which there was a 'culture of violations'.

This is an abbreviated list just to remind us of how deviance can become institutionalized. However, the normalization of deviance is more often an 'every day' occurrence, rather than exceptional. It is the short cuts that creep into practices, the relatively innocuous ignoring or changing of procedure, the failure to notice, to check and to review what we are doing, that are of concern. It is that gradual and imperceptible change in culture that causes deviance to be normalized. In fact, the authors have collated in excess of 2500 days of data that shows that an acceptance to risk (risk tolerance) leads to the development of an appetite for risk and the belief that hazards can be contained.

In his book, Lessons from Longford, Hopkins (2000) concludes that it is the management culture rather than the workplace culture that is most relevant in major accidents. As Hopkins (2012) also points out, the oil and gas industry has tended to focus on personal safety and it is true that there has been an

incredible improvement in this area since Valdez. However, it is failure of process safety that results in major disasters. That is, failure in policy, procedures and practices. Unlike personal safety, failure in process safety is a leadership issue.

Given the repeatability of mistakes that cause disasters, it has to be asked whether or not organizations do in fact recognize the role of leadership in the development of a poor safety culture.

The normalization of deviance isn't just confined to safety, to operations integrity. Less than desirable habits can creep into production leading to a reduction in effectiveness and efficiency: diminished productivity with all its sequelae. Short cuts, inefficiency, increased waste, breakdown of equipment due to poor maintenance, lost time, the need to repeat jobs, inefficient use of human and other resources, poor organization, and a failure to plan, are just a few examples.

However, the most devastating effect on organizational effectiveness and efficiency is people's lack of engagement (e.g. Catteeuw, 2007; Taleo Research (2009; Harter et al, 2002). In several large-scale surveys of organisations across the world including a demining report in 2013 the Gallup organization has demonstrated the devastating impact of lack of engagement on organizational productivity. According to their research:

> . . .for the U.S., active disengagement costs US$450 billion to $550 billion per year. In Germany, that figure ranges from €112 billion to €138 billion per year (US$151 billion to $186 billion). In the United Kingdom, actively disengaged employees cost the country between £52 billion and £70 billion (US$83 billion and $112 billion) per year (p. 7).

Lack of employee engagement has also been found to be an issue with poor workplace safety (e.g., Gallup, 2013; Nahrgang et al, 2011).

Poor employee engagement is the result of the normalization of deviance since it involves the evolution of a negative organization or team culture. Leadership is the main factor in whether or not employees are engaged and is responsible for the culture of their workplace. (Gallup, 2103; Sejits & Crim, 2006; Shuck & Herd, 2012). Moreover, transformational leadership appears to be the most effective approach in developing worker engagement (Bass & Rggio, 2005; Dvir et al, 2002; Zhu et al, 2009).

It is clear from the evidence that the normalization of deviance is an insidious cultural problem in organizations. It results in a decline in processes designed to ensure operational integrity, what we call an acceptance of unacceptable tolerance. It is responsible for the gradual acceptance of disengagement, which results in a reduction of operational effectiveness, efficiency and production. All of these effects can have disastrous implications in drilling operations. We now turn to solutions.

Leadership Talent Management and Development

The above discussion suggests that in order to be effective in maximizing production and maintaining operations integrity leaders need to be able to develop an appropriate work culture, engage employees, and avoid the normalization of deviance by normalizing excellence. The skills required in achieving these objectives are considerable. While some aspects of transactional leadership, the dominant style in the oil and gas industry, may co-exist, it is the dual approaches of transformational and situational leadership that is the key (International Association of Oil and Gas Producers (2013).

Transformational leadership is a mixture of attributes or personality traits, and skills that correlate highly with leadership effectiveness (Hogan & Kaiser, 2005). However, most descriptions of leadership make reference to attributes but fall short of explaining their importance in talent recognition, recruitment and performance management. While skills can be learned there are certain personality characteristics that are more difficult to obtain and, in some people, may preclude them from leadership roles. This latter point is the 'elephant in the room' when it comes to discussing leadership: there are some people who will find it difficult to be effective leaders, although they may have tremendous skills in other areas. An example might be the Tool Pusher or OIM in the past who had influence only through knowledge and power even though they were highly accomplished drillers. Furthermore, we believe that it is the combination of

transformational and situational leadership styles that are most suited to the needs of the 21st century leader. Table 1 below outlines a leadership model developed by the authors for the 21st century that takes into account these issues

Table 1—A Leadership Model for the 21st Century

The capacity to accept and manage ambiguity
Attributes

       Low need for control
       Openness to Experience (one of the Big 5 personality traits)
       Moderate on perfectionism scale (Big 5)
       High Stability (low anxiety) (Big 5)
       Capability

Skills

       Project management skills
       Ability to use social media for learning, research and development

The ability to foster engagement
Attributes

       Empathy
       Optimism
       Flexibility to change approaches as circumstances change

Skills

       Interpersonal effectiveness
       Ability to self-regulate
       Understanding of how to motivate others
       Ability to foster a shared purpose and vision
       Maintaining direction
       Motivating people

The capacity to learn
Attributes

       Willingness to change own ideas or beliefs

Skills

       Ability to research and learn
       Being thoroughly on top of one's subject areas
       Having wide and accessible networks
       Ability to share openly with others
       Knowledge management skills
       The ability to foster collaborative learning
       Ability to apply learning
       Willingness to change own ideas and beliefs

The ability to use open systems thinking
Attributes

       Willingness to empower others

Skills

       The capacity to frequently scan the external environment
       Ability to foster participative democracy/collaboration decision-making and process
       Capacity to work in a team as leader and member
       Ongoing internal and external analysis of effectiveness (continuous improvement)
       The ability to filter information (research skills)

Attributes concern certain personality characteristics such as openness, low need for scontrol, high stability, being able to alter one's values and beliefs, optimism, belief in others, and flexibility. Related to these characteristics is the skill of interpersonal effectiveness consisting of empathy, communication and interpersonal skills, and self-regulation. To a certain extent these attributes can be improved in people through coaching and training, as long as the opposite dominant attributes are not excessively strong. That is, the need for control, dominant behavior, a general distrust of others, high introversion and extraversion, high conservatism, a dislike of ambiguity and change, poor interpersonal skills, low empathy for others, high task orientation, high stress, and the need for autocracy, can make it difficult for a person to learn to be an effective leader.

Given the right attributes, the skills associated with transformational leadership can be learned to considerable effect (e.g. Carter et al, 2005; Burke et al, 2006; Conger, 2010). It is so effective, and disengagement so costly, that many organizations are prepared to invest heavily in leadership development (e.g. Fulmer & Goldsmith, 2000).

Globally, there is a tendency for organisations to manage their leadership succession and talent poorly (Charan et al, 2010). One common habit is to promote people into leadership positions because they are technically very competent. Thus we see talented medical officers taking on administrative roles in hospitals, excellent accountants becoming CEOs and successful engineers becoming OIMs or company men on a drilling rig. This is usually done with very little training in management and leadership other than that which is obtained on the job. This learning tends to be relatively poor in terms of substance and based on role models rather than any kind of science or rational consideration. Transactional leaders are more likely to be promoted because they are outcome focused and have similar personalities to their bosses. Management and leadership work is one of the few 'professions' now in existence that one can enter without any training whatsoever. The oil and gas industry is similar to many others in this regard. However, all this must change towards a more professional, accountable approach in the post-Macondo world.

As noted above, some oil and gas industry peak bodies have recognized that the development of transformational leaders is critical for the industry We need to adopt a four pronged approach to address this issue. The first of these is the implementation of an effective performance management and development system that is able to both develop those with clearly visible leadership capability and allocate those who can't to more suitable roles in the organization. Performance measurement needs to be based on identifiable leadership skills rather than project management ability by itself or other transactional skills. The second is to identify talent early in the career of young people who have leadership ability and promote accordingly, dependent on performance. The third is to recruit effectively based on the recognition of leadership abilities and skills. The fourth is to provide a structured ongoing training and coaching system in leadership skills.

Conclusion

As this paper has pointed out there is ample evidence that effective leadership is closely linked to both to operations integrity, as measured by excellent safety and environmental outcomes, and to production. Furthermore, this link has been identified by peak bodies in the industry, specifically transformational leadership.

Good people managers, good leaders, are competent in informing employees of what is required and expected from them, providing feedback on their performance, providing opportunities for their development, delegating appropriate levels of responsibility and setting priorities. They know that people are largely self-driven and motivated intrinsically rather than by extrinsic rewards. They are approachable, fair, good listeners and establish and maintain good relationships with their direct reports and other key colleagues. They have courage, integrity and honesty and know that breaches of these values are transparent to others.

Great leaders understand human behavior and know how to engage rather than disengage their people. Furthermore, they have insight into their personal behavior and understand their impact on others. They know how to get the best out of people. These leaders are transformational leaders. They also have the flexibility to change their approach depending on the situation.

Organizations are dependent on their leadership and great organizations have great leaders. The culture of an organization is dependent on the leadership team: it is their responsibility. It is essential for organizations to have an effective leadership development plan that includes integrated talent recognition, recruitment, performance management and training/coaching dimensions.

References

Alimo-Metcalfe, B. 1995. An Investigation of Female and Male Constructs of Leadership and Empowerment, *Women in Management Review,* **10**(2), 3–8. http://dx.doi.org/10.1108/17542411011092309.

Barling, J., Loughlin, C, and Kelloway, K. E., 2002. Development and Test of a Model Linking Safety-Specific Transformational Leadership and Occupational Safety, *Journal of Applied Psychology,* **87**(3), 488–496. http://dx.doi.org/10.1037/0021–9010.87.3.488.

Bass, B. M., and Riggio, R. E. 2005. *Transformational Leadership.* Psychology Press.

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E. and Halpin, S. M. 2006. What Type of Leadership Behaviors are Functional in Teams? A Meta-Analysis. *The Leadership Quarterly,* **17,** 288–307. http://dx.doi:10.1016/j.leaqua.2006.02.007.

Catteeuw, F., Flynn, E., and Vonderhorst, J. 2007. Employee Engagement: Boosting Productivity in Turbulent Times. *Organization Development Journal,* **25**(2). http://dx.doi:10.2753/MTP1069–6679200201.

Carter, L., Ulrich, D. and Goldsmith, M. (eds.) 2005. *Best Practices in Leadership Development and Organization Change.* San Francisco: John Wiley and Sons.

Charan, R., Drotter, S. and Noel, J. 2010. *The Leadership Pipeline: How to Build the Leadership Powered Company,* San Francisco: Jossey-Bass.

Conger, J. A. 2010. Developing Leadership Talent: Delivering on the Promise of Structured Programs. In ed. R. Silzer and B. E. Dowell. *Strategy-Driven Talent Management: A Leadership Imperative* (pp. 281–311). San Francisco, CA: Jossey-Bass.

Corporate Leadership Council, 2004. Driving Performance and Retention Through Employee Engagement, *Corporate Executive Board.* http://www.mckpeople.com.au/SiteMedia/w3svc161/Uploads/Documents/760af459–93b3–43c7-b52a-2a74e984c1a0.pdf (accessed 15 Aug 2015).

Dvir, T., Eden, D., Avolio, B. J. and Shamir, B. 2002. Impact of Transformational Leadership on Follower Development and Performance: A Field Experiment. *Academy of Management Journal,* **45**(4), 735–744. http://dx.doi:10.2307/3069307.

Gallup 2013. *State of the Global Workplace.* Washington DC: Gallup Inc.

Flin, R., Mearns, K, O'Connor, P. and Bryden, R. 2000. Measuring Safety Climate: Identifying the Common Features, *Safety Science,* **34,** 177–192. http://dx.doi:10.1016/S0925–7535(00)00012–6.

Flin, R., and Yule, S. 2004. Leadership for Safety: Industrial Experience. *Quality and Safety in Health Care,* **13,** 45–51. http://dx.doi:10.1136/qshc.2003.009555

Fulmer, R. M and Goldsmith, M, 2000. *The Leadership Investment: How the World's Best Organizations Gain Strategic Advantage Through Leadership Development,* New York: AMACOM.

Gonring, M. P. 2008. Customer Loyalty and Employee Engagement: An Alignment for Value. *The Journal of Business Strategy,* **29**(4), 29–40. http://dx.doi.org/10.1108/02756660810887060.

Guldenmund, F., (2000). The Nature of Safety Culture: A Review of Theory and Research. *Safety Science,* **34** (1–3): 215–257. http://dx.doi.org/10.1016/S0925–7535(00)00014-X.

Gunn, R. W. and Gullisckson, B. R. 2004. The Normalization of Deviance. *Strategic Finance,* March, 1–3. http://www.paci.com.au/downloads_public/risk/11_NormalisationOfDeviance.pdf. (accessed 16 Aug. 2015).

Haddon-Cave, C. 2013. Leadership &; Culture, Principles & Professionalism, Simplicity & Safety–Lessons from the Nimrod Review. Presented at the Piper 25 Oil & Gas UK Conference, Aberdeen – June 19.

Hale, A. R. and Hovden, J. 1998. Management and Culture: the Third Age of Safety. A Review of Approaches to Organizational Aspects of Safety, Health and Environment. In ed. A. M. Feyer, and A. Williamson. *Occupational Injury: Risk, Prevention and Intervention*. Taylor and Francis: London.

Hase, S. and Phin, S. 2012. When Culture Gets in the Way of Safety: A Revisit Post 500 days of Multi Site Observation, Presented at the Safety Alliance Conference, Sydney, May 18.

Hogan, Robert; Kaiser, Robert B. 2005. What We Know About Leadership. *Review of General Psychology,* **9**(2), 169–180. http://dx.doi.org/10.1037/1089–2680.9.2.169

Harter, J. K., Schmidt, F. L and Hayes, T. L. 2002. Business-Unit-Level Relationship Between Employee Satisfaction, Employee Engagement, and Business Outcomes: A Meta-Analysis. *Journal of Applied Psychology,* **87**(2), 268–279. http://dx.doi.org/10.1037/0021–9010.87.2.268.

Hogan, R. and Kaiser, R. B. 2005. What We Know about Leadership. *Review of General Psychology,* **9**(2), 169–180. http://dx.doi.org/10.1037/1089–2680.9.2.169

Hopkins, A. 2000. *Lessons from Longford: the Esso Gas Plant Explosion*. Australia: CCH.

Hopkins, A. 2012. *Disastrous Decisions*. Australia: CCH.

Kraus, A. J. and Wilson, C. 2012. *Leadership Development for Organizational Success, Bowling Green,* SIOP Visibility Committee.

Howell, J. M., and Avolio, B. J 1993. Transformational Leadership, Transactional Leadership, Locus of Control, and Support for Innovation: Key Predictors of Consolidated-Business-Unit Performance. *Journal of Applied Psychology,* **78**(6), 891–902. http://dx.doi.org/10.1037/0021–9010.78.6.891.

Howell, J. M. and Hall-Merenda, K. E. 1999. The Ties that Bind: The Impact of Leader-Member Exchange, Transformational and Transactional Leadership, and Distance on Predicting Follower Performance. *Journal of Applied Psychology,* **84**(5), 680–694. http://dx.doi.org/10.1037/0021–9010.84.5.680.

International Association of Oil and Gas Producers 2013. *Shaping Safety Culture Through Safety Leadership,* OGP Report no 452.

Lockwood, N. R. 2007. *Levering Employee Engagement for Competitive Advantage: HR's Strategic Role,* Report from the Society for Human Research Management, Virginia.

Lowe, J. 2007. *Warren Buffet Speaks: Wit and Wisdom from the World's Greatest Investor*. New Jersey: John Wiley.

Mullen, J. E. and Kelloway, K. 2010. Safety Leadership: A Longitudinal Study of the Effects of Transformational Leadership on Safety Outcome, *Journal of Occupational and Organizational Psychology,* **82**(2), 253–272. http://dx.doi:10.1348/096317908X325313.

Nahrgang, J, Morgeson F. and Hoffman, D. 2010. Safety at Work: A Meta-analytic Investigation of the Link Between Job Demands, Job Resources, Burnout, Engagement, and Safety Outcomes. *Journal of Applied Psychology*. **96**(1), 71–94. http://dx.doi.org/10.1037/a0021484.

O'Dea, A., and Flin, R. 2001. Site Managers and Safety Leadership in the Offshore Oil and Gas Industry. *Safety Science,* **37**(1), 39–57. http://dx.doi:10.1016/S0925–7535(00)00049–7

Prielipp, R. C., Magro, M., Morell, R. C. and Brull, S. J. 2010. The Normalization of Deviance: Do We (Un)Knowingly Accept Doing the Wrong Thing? *Anesthesia & Analgesia,* **10**(5), 1499–1502. http://dx.doi:10.1213/ANE.0b013e3181d5adc5.

Reason, James (1990–04–12). ″The Contribution of Latent Human Failures to the Breakdown of Complex Systems″. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* **327** (1241): 475–484. http://dx.doi:10.1098/rstb.1990.0090

Seijts, G. H., and Crim, D. 2006. What Engages Employees the Most or the Ten C's of Employee Engagement. *Ivey Business Journal,* **70**(4), 1–5. http://www.ifcaonline.com/wordpress2/wp-content/uploads/2013/10/Ten-Cs-of-Employee-Engagement.pdf (accessed 15 Aug 2015).

Shannon, H., Mayr, J. and Haines, T. 1997. Overview of the Relationship Between Organisational and Work-Place Factors and Injury Rates. *Safety Science,* **26**(3), 201–217. http://dx.doi:10.1016/S0925–7535(97)00043-X

Shuck, B. and Herd, A. M. 2012. Employee Engagement and Leadership: Exploring the Convergence of Two Frameworks and Implications for Leadership Development in HRD. *Human resource development review,* **11**(2) 156–181. http://dx.doi:10.1177/1534484312438211

Taleo Research 2009. Alignment Drives Employee Engagement and Productivity. http://www.taleo.com. (accessed 15 August 2015).

Tinsley, C. H., Dillon, R. L. and Madsen, P. M. 2011. How to Avoid Catastrophe, *Harvard Business Review,* April. https://hbr.org/2011/04/how-to-avoid-catastrophe (accessed 15 August 2015).

Vaughan, D. 1996. *The Challenger Launch Decision : Risky Technology, Culture, and Deviance at NASA*. Chicago: University of Chicago Press

Zhu, W., Avolio, B. J., and Walumbwa, F. O. 2009. Moderating Role of Follower Characteristics with Transformational Leadership and Follower Work Engagement. *Group & Organization Management,* **34**(5), 590–619. http://dx.doi:10.1177/1059601108331242