LET THE FEELINGS BURST AWAY:

the importance of the tacit in organizational management

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Tacit knowledge is now generally accepted as an important factor in organizational decision making; nevertheless, it is often underappreciated and this lack of appreciation is exactly what may incite disastrous results for an organization, as in the case of NASA's Space Shuttle *Challenger*. Thiokol engineer Roger Boisjoly could not quantify his feelings, (Choo 259) and this ultimately led to the death of seven people because NASA did not possess an information system – or an organizational culture, for that matter – that valued tacit knowledge sufficiently. This paper will show that tacit knowledge has emerged as an important element in many of the academic theories published on organizational decision making thus far, including Nonaka and Takeuchi's four modes of knowledge conversion and Choo's four models of organizational decision making. Non-quantifiable feelings ought to be valued in an organization's information system and cultivating a system that incorporates feelings right alongside quantitative data will result in a healthier organization.

What, then, are the benefits of valuing tacit knowledge? Let us look at the New United Motor Manufacturing, Inc. (NUMMI) project between Toyota and General Motors in the mid-80s (Choo and Bontis 83) to answer this question. By working directly with Toyota employees in this newly formed plant, General Motors employees were finally able to learn how to replicate the efficiency of Toyota's production system. GM's previous attempts at understanding the Toyota process merely through explicit knowledge – documents and manuals – fell flat. *(ibid.)* Choo writes, "co-practice to learn the system was necessary because the capabilities were 'tacit know-how in action, embedded organizationally, systemic in interaction and cultivated through learning by doing.'" *(ibid.)* Both companies were able to benefit from this process of embracing tacit knowledge, as GM learned how to make their operations more efficient and Toyota learned about managing U.S. workers. *(ibid.)* We can better understand the *Challenger* disaster at NASA when looked at through this context. The exact opposite approach was taken there, as tacit knowledge was actually greeted with hostility when the engineers had to battle it out with management. (Choo 260) Boisjoly testified after the disaster, “I couldn’t quantify it, but I did say I knew that it was away from goodness in the current database.” (259) The dangers of not valuing tacit knowledge enough are held in that simple statement. Boisjoly knew – he *felt* – that something was wrong and that the launch should be delayed, and obviously it should have been, despite his inability to make the tacit explicit. James March writes, “…we need to accept the notion that decisions require elements of playfulness. Intelligent choice needs a dialectic between reason and foolishness, between doing things for no ‘good’ reason and discovering the reasons.” (100) Management at NASA would have no doubt considered delaying the *Challenger* launch based on the engineers’ feelings to be a “no good reason,” and yet this “no good reason” would have prevented the disaster. *Mere feelings* must therefore be accounted for in an organization’s information system in order to improve chances of avoiding disaster.

In the absence of hard data, these gut feelings from employees may be the best indicators of appropriate direction that an organization has. Choo writes, “the organization must be able to recognize situations when existing rules are inadequate or irrelevant and be prepared to abandon them while inventing new rules.” (Choo and Bontis 87) Sufficiently valuing tacit knowledge may lead to a recognition that existing rules are inadequate. Clearly, NASA was not prepared enough to abandon their existing rules. They were too narrow-minded in stubbornly adhering to their “can-do” (Choo 255) cultural belief – NASA management did not *want* to believe that their spacecraft was unsafe to launch and made every effort to identify information that would support their ambitions. NASA management had not realized that their existing rules for decision making in the Space Shuttle context were inadequate, thus resulting in a “flawed decision culture” (261) in which participants "gradually demoted their concerns" *(ibid.)* due to organizational pressures. We may see that "concerns" in this context may be equated with "feelings" as we look at the example of engineering VP Bob Lund being pressured by colleagues into sidelining his intuition. (254) "Mason, Kilminster, Wiggins supported a launch recommendation, but Lund hesitated. Mason said to Lund, 'it's time to take off your engineering hat and put on your management hat.' Lund then voted with the rest." *(ibid.)* Instead of concentrating on making a decision with the available data, NASA should have listened to the emerging tacit concerns being voiced by many of their employees. If they had instead directed their attention toward getting to the root of these mysterious gut feelings, they may have discovered that *unbracketing* their data (Choo PDF 37) would have led toward the explicit reasoning behind these tacit concerns that management had been searching for. Prior to launch, NASA officials had been looking primarily at flight data that depicted the number of incidents they had recorded to date. (Choo PDF 36) This data did not reveal a clear pattern, as there had been incidents in both warmer and cooler temperatures. Unbracketing that data, however, reveals that a pattern could have been found. If they had instead focused on the fact that *all flights with no incidents had occurred in quite warm temperatures*, that may have set off some alarm bells for NASA managers. Taking seriously the tacit concerns – the *feelings* – voiced by employees and pursuing their origins may have allowed a much better decision to be made.

As March advocates, then, if NASA had only been "less oriented to anticipating uncertain futures than to interpreting ambiguous pasts," (113) perhaps they would have made the correct decision to not launch in those cold conditions. The answer resided in an unbracketing of data about past events. Explicit knowledge supporting this decision was in fact right under their proverbial noses and, ironically, the recognition of non-explicit, tacit concerns would have led management to concentrating on the crucial data.

Boland et al. state that "faster and higher quality decision making occurs in teams that use more, not less information, and consider more, not fewer alternatives. Investing in multiple problem-solving strategies and debating competing hypotheses (Eisenhardt 1989) obviates the possibility of oversimplification and premature decision closure." (458) This carries on from the notion that unbracketing data may prove useful, as it should lead to more *types* of information being considered. NASA management had been concentrating heavily on explicit knowledge at the expense of tacit knowledge. NASA, then, would have been better served to incorporate the less easily expressible, tacit type of information into their serious analyses to serve as a supplement to explicit data. Boland et al. suggest "movement beyond 'procedural rationality' (Simon 1978) to information systems that support reflexive dialogue." (459) Simon's concept of procedural rationality states that decision makers often attempt to find what is considered a *rational* means of making a decision (Muthoo 7) by discovering satisfactory alternatives, not necessarily optimal alternatives. (Choo 205) In suggesting a movement beyond this, perhaps Boland et al. are suggesting a movement toward *less* of a focus on rationality. Feelings and intuition often run counter to reason and rationality, but this reminds us of March's advocacy of "a dialectic between reason and foolishness." (100) To support this dialectic, an organization ought to cultivate an information system that clearly represents the employees' tacit *and* explicit knowledge and even supports experimentation on trying to connect non-quantified feelings with their quantified origins.

The NASA *Challenger* disaster typifies the importance of establishing a hermeneutic circle in an organization's information system. A hermeneutic circle follows the position that "we depend on a knowledge of the parts to guarantee our comprehension of the whole." (Boland et al. 460) In the context of NASA and the *Challenger, the parts* may be considered the individual employees who held valuable tacit knowledge. But management remained too focused on *the whole* – on aggregating the parts, merging them together and developing a consensus.

Recognizing the importance of tacit knowledge entails recognizing the importance of the *individual* in organizational decision making. A group consensus may not necessarily be the right way to go at all times. The idea of representing individual interpretations in an organization is embodied in the concept of the hermeneutic system. Boland et al. write, "a hermeneutic system should help [the employees] to represent and exchange their individual understandings in as rich and flexible a way as possible, but it does not intend to provide a shared understanding..." (462) A hermeneutic system, then, accounts for individual interpretations of a situation but does *not* attempt to merge all of these interpretations into one neat and convenient whole. At NASA during *Challenger*, there was too much of a propensity to quickly aggregate perspectives and to merge all viewpoints into some kind of an agreement. Merging an individual perspective into a whole without the appropriate degree of delicacy may result in a loss of the value of that perspective, as much of the original context will be lost. Individual subjectivities, then, are important to retain in their original form. An organization's managers should ensure that they are not merely focusing on one aspect of the problem. As a solution to this, "[Edgar] Singer proposes a kind of tacking back and forth from images that simplify the view of a situation to ones that complicate." *(ibid.)* Retaining the multitude of individual perspectives in an organization while resisting the temptation to merge them all together would certainly result in a complicated view of a situation, but the merit of this complication is that *context is preserved*. Boland et al. state that "inquirers should be able to represent not only traditional economic, environmental and strategic data and assumptions, but also less traditional types of data, such as subjective preferences, ethical positions and aesthetic judgments.” (463) The point of “sweeping in” *(ibid.)* this comprehensive degree of an individual’s context is that it may lead to a greater understanding of that person’s position. In the case of Roger Boisjoly, for instance, “sweeping in” as much of the context behind his feelings about the *Challenger* launch as possible may have allowed management to develop a better understanding of where Boisjoly was coming from, and a different decision may have been made. March also supports this point by telling us to “consider ways in which the technology can be used to increase rather than reduce variability.” (113) By constantly attempting to find a consensus, NASA management did not actively encourage variability in perspectives. In fact, arguments for alternative courses of action (Choo 230) were met with inappropriate hostility. Managers’ frustrations with the engineers’ inability to transform their tacit feelings into explicit data created an unhealthy atmosphere around the organization, essentially pitting two sides against one another – management versus engineering. (Choo 260) Boland et al. write that “a system to support distributed cognition should enable a person to easily represent context in the process of constructing interpretations, and to exchange those representations in dialogue with others.” (460) An organization’s information system that encourages both sides of a conflict to represent their perspectives as comprehensively as possible through an active “sweeping in” of context may result in a more natural means of arriving at an agreement.

This discussion of organizational conflict provides an appropriate segue into a point relating to Choo’s political model of decision making. The political model describes a situation in which an organization has become divided into coalitions of employees with conflicting goals. Each coalition, however, has a good idea of how to go about achieving its goals – goal uncertainty is high, then, but procedural uncertainty is low. (Choo 220) NASA was no doubt operating primarily on the political model of decision making during the heated debates between management and engineering. Choo notes that "goal conflict is consequently a fundamental cause of the exercise of power in decision making." *(ibid.)* The conflict had escalated to the point at which both parties within the same organization were striving toward different goals – the managers wanted to launch, the engineers wanted to delay. Boisjoly reflected upon the experience, "this was a meeting where the [management] determination was to launch, and it was up to us to prove beyond a shadow of a doubt that it was not safe to do so." (Choo 260) This case exemplifies March's discussion of "decisions as being based on unreconciled conflict in preferences." (103) Perhaps a more productive approach for organizations would be to invest effort in reconciling these preference conflicts instead of making decisions that are born out of unreconciled differences that will no doubt fester and create lasting tensions between co-workers. As aforementioned, the first step in reconciling these preferences would be to acknowledge that feelings and tacit knowledge are viable sources worthy of serious investigation. This principle could then be built into the organization's information system, perhaps with a function supporting the clear articulation of feelings. As a more specific suggestion for how to go about reconciling these differences, we may take a look at Choo's process model of decision making. The process model describes a situation in which an organization's goals are clear but the means of achieving them are not. (Choo 216) Although NASA had conflicting goals throughout most of the *Challenger* case, certain relevant traits from the process model may be extracted for discussion. The process model usually involves comprehension cycles (Choo 218) that are "sometimes needed to grapple with complex issues – managers cycle between routines in order to better understand a problem, assess the available alternatives, and *reconcile multiple goals and preferences*." *(ibid.)* An information system that explicitly builds a function supporting comprehension cycles into its architecture, then, may provide management with a greater opportunity to understand the varying perspectives within the organization. This may be a function that encourages repetition in an iterative manner – for instance, managers may be asked to review an individual's perspective numerous times from different angles. This comprehensive, cyclical approach may lead to a fuller understanding of individual perspectives.

The NASA *Challenger* case also shares some commonality with Choo's anarchic model of decision making. The anarchic model describes a situation in which both an organization's goals and the means of achieving them are unclear. (Choo 224) All the confusion surrounding the O-rings in the Space Shuttle signifies a lack of clarity in the technology, which is one trait of organized anarchy. (Choo 225) Choo writes about the anarchic model, "the organization's technology is unclear in that its processes and procedures are not well understood by its members and the means of achieving desired ends are not readily identifiable." *(ibid.)* The anarchic model is also similar to the NASA *Challenger* situation in that it involves "issues and feelings looking for decision situations in which they might be aired." (Choo 224) Again, the importance of airing feelings – letting "the feelings burst away" (Choo 199) – is given precedence here in the anarchic model.

Boland et al. state that "mixed form is the basis for using technology to achieve the engaging, playful interaction (Te'eni 1990) that should characterize a hermeneutic process." (468) This means that in order to sufficiently communicate tacit knowledge across an organization, the information system must support multiple means of expression. Boland et al. elaborate on the rationale behind this principle:

> "Actors have sometimes radically different modes of expressing their understandings, ranging from text, pictures and graphs to perhaps audio or video. In order to allow a Kantian inquirer to represent an understanding fluidly, the system should be as open as possible to the actors' preferred mode of expression." (467)

One employee, for instance, may be better at expressing her feelings about a matter through numbers, while another may be better at expressing them through drawings. If a visual-oriented employee is forced to express her tacit knowledge through numerical data, then the entire company may miss out on the clear articulation of an important perspective. The information system should account for these differences so as to allow the highest quality of communication amongst employees within the organization.

Perhaps if Boisjoly and the engineers had found a way to convert their tacit knowledge into explicit knowledge, they would have saved the lives of the *Challenger* astronauts. But how? Nonaka and Takeuchi address this question:

> "How can we convert tacit knowledge into explicit knowledge effectively and efficiently? The answer lies in a sequential use of metaphor, analogy, and model. As Nisbet (1969) noted, 'much of what Michael Polanyi has called tacit knowledge is expressible in so far as it is expressible at all in terms of metaphor.'" (Nonaka and Takeuchi 66)

For instance, in order to successfully manufacture the drum cylinder for the Mini-Copier, a manager at Canon came up with an unlikely but appropriate metaphor – the aluminum beer can. (Nonaka and Takeuchi 65) Nobody in the organization could figure out how this drum cylinder could possibly be produced at the necessary low cost. Certain employees, however, *felt* that it could be done – they just could not articulate how. At this stage, then, their knowledge was tacit. Eventually, a clever manager compared the cylinder to a beer can, asking "how much does it cost to manufacture this can?" (66) By comparing the similarities and differences between the can and the cylinder, explicit knowledge was formulated and a technology was created to manufacture the cylinder at a low enough cost. *(ibid.)* Through the use of metaphor, the concept that the cylinder could be manufactured at a low cost was thus convincingly implanted in the employees' minds and this led to successful development.

Nonaka and Takeuchi's four modes of knowledge conversion are socialization, externalization, combination and internalization. (70) Socialization "aims at the sharing of tacit knowledge." *(ibid.)* But in order to make that tacit knowledge explicit, the organization must move into the externalization mode, where metaphor is created to help employees "articulate hidden tacit knowledge that is otherwise hard to communicate." (71) This newly created explicit knowledge is then dispersed throughout different sections of the organization in the combination mode. *(ibid.)* Finally, the internalization mode is about reinforcing the acquired knowledge through "learning by doing" *(ibid.)* – as we saw in the case of the NUMMI project between Toyota and GM. An information system that actively cultivates the development of metaphor may aid in situations of decision making conflict such as the NASA *Challenger* case. It seems that NASA did not progress beyond the socialization mode during *Challenger*. The engineers made attempts at sharing their tacit knowledge, but without the critical metaphor ingredient, a shared understanding was impossible to generate. If the engineers had managed to devise an appropriate metaphor for the situation at hand, NASA may have been able to progress through the ranks of the four modes of knowledge conversion, generating positive results in the process.

NASA's standardization processes certainly contributed to the devaluation of tacit knowledge in the organization. Choo's rational model of decision making describes a situation in which both an organization's goals and the means of achieving them are clear. (212) When in the past the management and engineering departments were actually on the same page and goals were aligned, NASA had had many successful launches. And, as Choo reminds us, "if the goal is seen as being achieved, the organization responds to the environmental feedback with standard decision rules..." *(ibid.)* NASA had achieved this launch goal multiple times before and had thus solidified decision rules based on those circumstances, but the decision rules were obviously too rigid and not malleable enough, leading to disaster when the same standards were applied in the *Challenger* context. Those rules had made essentially no room for tacit input. Placing standards anywhere in an organization can be quite dangerous and should be done only when absolutely necessary. And when they are placed, they ought to be malleable enough to change if tacit knowledge seems to contradict the standard. NASA was perhaps a little too liberal in the application of standards to their organization. To strengthen this point, Davenport and Prusak write, "only the most essential shared terms should be standardized... what is called for is just enough uniformity to make the system work. The goal is to harmonize organizational knowledge, not to homogenize it." (86) NASA, however, made the mistake of going too far and homogenizing their organizational knowledge. The principles that they had bracketed through past launch experiences had become so inextricably bound together – homogenized – that breaking them down had become an almost impossible task.

Nonaka and Takeuchi remind us of the value of periodically breaking down organizational knowledge. They write, "a breakdown refers to an interruption of our habitual, comfortable state of being. When we face such a breakdown, we have an opportunity to reconsider our fundamental thinking and perspective." (78) NASA, then, would likely have benefited from such a breakdown of their standard decision rules, as they were in dire need of reconsidering their fundamental thinking. Strategic equivocality refers to when management deliberately employs "ambiguous visions" (79) relating to certain goals in order to "change the flow" *(ibid.)* and get employees thinking differently and more creatively. March also supports this approach when he says that "a manager might well view decision making somewhat less as a process of deduction and somewhat more as a process of gently upsetting preconceptions of what is going on." (March 100)

After leading the international effort that successfully eradicated smallpox, Donald Henderson was asked at a meeting which disease should be eradicated next. Henderson replied, "bad management." (Choo 291) The intention of this paper was certainly not to depict the NASA engineers as right and the managers as wrong. Rather, the *Challenger* tragedy was a failure of the entire organizational system and not any one group of people. The overall organization's undue hostility toward tacit knowledge and resistance to change caused the failure – it truly was a failure of conformity. (262) Perhaps the disease of bad management may be eradicated in an organization if it learns from the *Challenger* failure by valuing tacit knowledge just as much as explicit knowledge and takes the necessary steps to develop a hermeneutic information system that fully supports this resolve.

REFERENCES

Boland, Richard J., Jr., Ramkrishnan V. Tenkasi, and Dov Te'eni. "Designing Information Technology to Support Distributed Cognition." *Organization Science* 5.3 (1994): 456-75. Print.

Choo, C.W. *The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions*. New York: Oxford University Press, 2006. Print.

Choo, C.W., and Nick Bontis, eds. *Strategic Management of Intellectual Capital and Organizational Knowledge*. New York: Oxford University Press, 2002. Print.

Davenport, Thomas H. and Laurence Prusak. *Working Knowledge*. Cambridge: Harvard Business School Press, 1998. Print.

March, James G. "How Decisions Happen in Organizations." *Human-Computer Interaction* 6.2 (1991): 95-117. Print.

Nonaka, Ikujiro and Hirotaka Takeuchi. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press, 1995. Print.

Choo, C.W. "The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions." *University of Toronto*: 1-43. PDF file.

Muthoo, Abhinay. "Rationality in the Face of Uncertainty." *The Elgar Companion to Consumer Research and Economic Psychology*: 1-10. PDF file.