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The study of information flow: A personal journey

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ABSTRACT

Information flow has been shown to be a key variable in system safety. Not only is information flow vital to the organization's "nervous system," but it is also a key indicator of the quality of the organization's functioning. The author describes how his personal trajectory took him from the study of social information about anomalous events to the role of information in causing or preventing technological accidents. The important features of good information flow are relevance, timeliness, and clarity. Generative environments are more likely to provide information with these characteristics, since they encourage a "level playing field" and respect for the needs of the information recipient. By contrast, pathological environments, caused by a leader's desire to see him/herself succeed, often create a "political" environment for information that interferes with good flow.

1. Introduction

The role of information in making systems safe is profound. Not only is information flow a prime variable in creating safety, but also it is an indicator of organizational functioning. By examining the culture of information flow, we can get an idea of how well people in the organization are cooperating, and also, how effective their work is likely to be in providing a safe operation.

My interest in information flow is the result of a lifetime of professional work and theorizing. My studies on information flow go back into my undergraduate years, and weave through my graduate work at Chicago and later the RAND Corporation. But my research wasn't initially focused on safety. In the early 1970s I was studying the role that information played in scientists' decisions about anomalous events. This was the result of a fascination with such unusual events as UFOs and meteorites (Westrum, 1978). Why didn't information about anomalies flow to the people who needed it? In my studies, I discovered, early on, that scientists often were unaware of their own biases in making decisions about unusual events. For instance, they often assumed that they would be "the first to know" about anomalous events, but in fact they often remained ignorant. They were unaware that their own biases interfered with search and with information flow. Thus, they often suffered from the "fallacy of centrality" (my term), thinking that they were critical in the flow of information about anomalies, but in fact they were often left out.

Eventually I realized that anomalies were often what I learned to call "hidden events" (Westrum, 1982,1986). Hidden events were things that in the words of Raymond Moody, were "very widely experienced but very well hidden" (Moody, 1975). Hidden events might lie beneath the surface of social radar, because of the "pluralistic ignorance" (Katz and Allport, 1931) of those who experienced them. Pluralistic ignorance is the reluctance to report something no one else seems to be reporting. So of course, if others are not reporting, then you don't want to report, either; no one wants to speak up. Similar forces kept silent the many victims of sexual abuse by the British celebrity Jimmy Savile, all of whom thought they would be singled out, when in fact they numbered in the hundreds (Burns and Cowell, 2013; Burns and Castle, 2012). But these disparate pieces of data were not put together.

In 1978–1979, I had a sabbatical year at the Science Studies Unit of the University of Edinburgh. During the 8 months or so I spent there, I was doing two things. The first was the preparation of my book on the sociology of hidden events. I was trying to put together everything that was known on how society makes decisions about anomalous events. I had started with UFOs, but soon branched off into other areas. For instance, while taking a course on "Forensic Medicine for Lawyers," taught by Professor John Mason, an expert on air crashes, I first heard about the "battered child syndrome." Aha, I thought, another "hidden event," like meteorites and UFOS! The book on hidden events was not fated to be published, but did stimulate further research.

While taking the Forensic Medicine course, I had began to stop over at the Medical Library, and shortly encountered the periodical *Aviation Psychology and Environmental Medicine*. It was in this magazine that I found the first articles I had read on the social

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psychology of the airliner cockpit. Some were written by NASA psychologist John Lauber, with whom I was later to correspond. These articles engaged me, but I was still researching the hidden events dynamics, and would later sum up my research in a paper on "Social Intelligence about hidden events: Its implications for scientific research and social policy" (1983). But "hidden events" seemed to engage few besides myself, and my research did nothing to advance my career. Other sociologists of science urged me to switch to a less controversial topic.

And gradually, that happened. I first begin to realize that the framework I had slowly erected to study hidden events might be useful for the study of technological accidents. And about this time I had another visiting professorship at the University of Hawaii. While shopping in its bookstore I noticed Charles Perrow's book *Normal Accidents* (1984). This broke like a phosphorus shell over my head—as I imagine it broke over the heads of others. It suggested that accidents were amenable to sociological analysis. About the same time I also discovered the writings of James Reason on human error and accidents. This seemed to be a promising area, and I dove into it. Lauber, Perrow, and Reason all seemed to be onto something important.

Then in 1986 there was a conference on aviation safety in Bad Windsheim, Germany. I got invited through a funny turn of events. I had sent some very half-baked preprints to Perrow, who was invited to this conference. But he couldn't go, so he suggested that the sponsors invite me. When I got there, I discovered I was to take Perrow's place! I certainly was not up to Perrow at that point, but at this conference were Jim Reason, and also Irving Janis, both giants, in my estimation (Wise et al., 1994). In 1986 I was a minnow. However, I rose to the challenge, and shortly began to be invited to other conferences. (Conferences are like pinball games: You win one, you get to play another. You win that, you get invited to yet another, and so on.)

And then I had a real breakthrough. In October 1988 the World Bank would have a large conference on "Safety Control and and Risk Management." It seemed as if this was intended to be the be-all and end-all of conferences on human factors in system safety. Participants had to prepare papers for the conference, and I was working on mine one evening when I suddenly got a string of insights that were extremely helpful. First of all I realized that there was a continuum of safety cultures that fell into three general categories: pathological, bureaucratic and generative.

> **Pathological** organizations are characterized by large amounts of fear and threat. People often hoard information or withhold it for political reasons, or distort it to make themselves look better.
> **Bureaucratic** organizations protect departments. Those in the department want to maintain their "turf," insist on their own rules, and generally do things by the book—*their* book.
> **Generative** organizations focus on the mission. How do we accomplish our goal? Everything is subordinated to good performance, to doing what we are supposed to do.

This classification (and derivations of it) would become widely used.

2. Elaboration of the Three Cultures Model

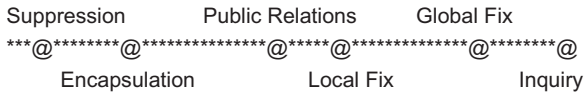
James Reason and Patrick Hudson, have suggested expanding my classification of cultures into a five-part version, essentially by defining "reactive" as between "pathological" and "bureaucratic," and "pro-active" as between "bureaucratic" and "generative." (e.g. Hudson, 2007) And some persons have felt that this was a useful improvement. I believe that there might be two valid reasons for doing this. The first would be theoretical, that there might be some theoretical advantage for this more articulated scale. The second would be that there is some empirical stimulus for such an articulation. However, I have not seen either theoretical arguments nor empirical evidence for doing so.

When I originally created the concept, I thought of pathological, bureaucratic, and generative as ideal types. However, over time I have come to think of the three as forming points on a scale, what one friend of mine, Russell Briggs, calls the "Westrum continuum." Why "bureaucratic" should be in the middle might be questioned, but there are many case studies that show that this is a distinct state of affairs. However, no such case studies exist, I believe, to support the proposed two additional types. There certainly must be intermediate points between, e.g., pathological and generative, something can be more pathological or less pathological, more or less generative, etc. In specific empirical examples, it might be valuable to name the intermediate points, but you could also argue that this is a continuous scale, and numbering the points from, say, one to ten would work just as well.

It might seem small-minded to refuse the Reason/Hudson elaboration, rather like Marx saying "je ne suis pas un Marxiste," as he did, in regard to some of his followers. I believe that the two scholars first mentioned it to me in the 1980s, and I didn't object. But time has passed, and the additional arguments and data have not come forth. Professor Dianne Parker of the University of Manchester has done some work using these five types (e.g. Parker et al., 2006), and asked a sample of persons in her business seminars to describe how they would put organizational cultures into the five categories. In looking over her materials, however, I discovered that the behaviors her survey participants imagined did not correspond to the behaviors I had found in the case studies I did. In particular, the "pathological" examples did not correspond to what I see as being genuinely pathological environments; real pathological organizations are much worse. I am not saying that Reason and Hudson are wrong, I am simply saying that I am unconvinced that this is a genuine improvement. I believe it is up to the aforementioned gentlemen to show the value they see in the classification they have. This is a task yet to be accomplished.

Related to my classification of culture was another idea. These cultural styles are associated with how the organization is likely to respond to information that things are not going well. We might see a set of ways in which an organization might respond to anomalous information. There were six ways:

(1) First of all, the organization might "shoot the messenger."
(2) Second, even if the "messenger" was not executed, his or her information might be isolated.
(3) Third, even if the message got out, it could still be "put in context" through a "public relations" strategy.
(4) Fourth, maybe more serious action could be forestalled if one only fixed the immediately presenting event.
(5) Fifth, the organization might react through a "global fix" which would also look for other examples of the same thing.
(6) Finally, the organization might engage in profound inquiry, to fix not only the presenting event, but also its underlying causes. The scale of reactions might appear like this:



Each of these reactions was associated with the cultural types. Suppression seemed to be a type marker for pathological environments. Bureaucratic climates tended to use encapsulation, public relations and local fixes. Generative environments were more likely to engage in global fixes and inquiry. These ideas about

reactions occurred to me over a few hours, though the work on culture and information flow had been longstanding. Yet bringing it together changed my perspective. Sometimes nothing is as valuable as a theory uniting disparate things.

In great contrast to the tepid reactions to my work on hidden events, the "three cultures" idea caught on quickly, especially after Jim Reason cited it his classic *Human Error* (1990). (Shortly after, I met a French colleague, Jean Paries for the first time, and he asked me if I was the "famous" Ron Westrum!.) And information flow seemed to bring together not only culture, but also management style. Later I would suggest that pathological environments were caused when the leader puts stress on his/her own advancement and perquisites (Westrum 2004). By contrast, bureaucratic environments come when leaders put departmental goals ahead of organizational ones. And generative environments focus on the organization's *mission* above all else.

But how, in fact, does a theory of "information flow" unite so many disparate currents? Let us reflect for a few moments and see how it works. Recall, there are really two critical reasons for attending to information flow.

(1) First, when information does not flow, it imperils the safe and proper functioning of the organization.
(2) Second, information flow is a powerful *indicator* of the organization's overall functioning.

3. Information flow as a vital resource

Organizations function on information. Stop the information and the organization stops, too. Better organizations require better information. Worse information flows leads to worse functioning. Better information flow leads to better functioning.

The words "information flow" suggest water moving through a pipeline. Yet the mere fact of information itself tells us little about the character of the information. More information is not necessarily better. Good information has these characteristics:

(1) It provides answers to the questions that the receiver needs answered.
(2) It is timely.
(3) It is presented in such a way that it can be effectively used by the receiver.

These sound like simple criteria, but they are fact often very difficult to meet in practice. Take the first one, for instance, which is often violated. Getting the right information to the right person is absolutely critical. But the underlying issue is that the information should respond to the needs of the receiver, not the sender. Receiver-focused information is a powerful sign that the organization is engaging in teamwork. Yet, often, information may instead serve a political purpose, to protect the sender ("covering one's posterior," in common language), to provide the illusion of cooperation, or in the worst case, to baffle or deceive the receiver.

Timeliness is another *desideratum*. The same information, presented a day later or a second later, may be useless. We want to be updated in a timely way, otherwise we are "out of the loop." Information is used to make decisions. If it is late, it may put us in a bad way versus an adversary, it may blind us to a current danger, it may lead to a wrong decision. Cf. Col. John Boyd's famous idea to stay "inside the loop" of an opponent, so that one's own decision cycle is faster (Coram, 2002). But more often, it is simply the needs of the system that drive timeliness. Whether driving a truck, building a building, or operating a search-and-rescue system, information need is driven by the reality that decisions are constantly being made, and they need to be informed by the best information.

And then there is the signal-to-noise ratio. The information we get consists not only of the facts we need to know, but many we do not need to know. Has the sender offered us a "bill of lading" telling us the value of the information we have been sent, i.e., why it has been sent, the reliability of the source, the relevance to current problems, etc.? [a "bill of lading" is an old maritime term for the list of cargo a merchant has consigned to a steamer for shipment. I find it useful] If not, we have to do the sifting, trying to figure out what is important, and what is not. A useful analogy is an operation carried out by the Emergency Department in a hospital, where confusion, multi-tasking, and constant pressure exist. We need to get the information to answer our questions, we need to get it right now, and we need to avoid the information being fuzzed or confused by shifting attention and inappropriate prompts. To have a "mind like the moon," that shines serenely on everything, is demanding, but necessary (Westrum, 2009a,b).

A particularly interesting example of this clarity was the communication of the information regarding the NASA lunar orbit decision. Engineer John Houbolt successfully convinced NASA that the Apollo program needed a lunar orbit solution. John Houbolt, then director of Dynamic Loads at the Langley Space Center, was sure that the only right way was to use a "lunar orbit." This would involve a spaceship circling the moon sending down a "lander" to the moon's surface. Other methods that were being considered were a large "Nova" rocket that could land on the moon and then take off, and an "earth orbit" solution, in which an earth-circling space station would send a ship off to the moon. The immediate reception of Houbolt's idea inside NASA was largely negative. Maxime Faget, one of the "maestros" of NASA's technological culture, suggested that Houbolt's numbers would never work out. Von Braun still liked his "Nova" idea. Houbolt, though, went "back to the drawing board," and then came back with somewhat different numbers. This proposal, too, was rejected. But Houbolt kept coming back with better proposals. Eventually, Werhner von Braun would say that clearly Houbolt was right. Everyone was ready to consider all the possibilities, because everyone wanted to fulfill Kennedy's promise to land on the moon before the end of the 1960s. It was this vision, to fulfill the Kennedy promise, that got people initially hesitant to agree finally that Houbolt's idea was the only one that would work in the time frame (Hansen, 1995).

What is important about the decision is that originally, Houbolt wasn't one of the major "players" in the moon shot decision. However, because of the value of his concept, and his persistence, he was able to call attention to the work that he was doing, and he had more than one chance to present it. Sometimes problems need a champion like Houbolt, who will insist on others paying attention to his idea.

In a similar (though of course much less important) instance, Col. Jack Broughton describes becoming a safety champion in regard to the problems of the F-106 ejection seat in 1964. Broughton, as an Air Force squadron commander, had had many of his pilots killed when the ejection seat on the F-106 failed. After 14 pilots had died, Broughton forced the commanding general (4 stars) of the Air Defence Command, Herbert Thatcher, to ground this defective fighter, the F-106. Yet even though the seat had killed over a dozen pilots, General Thatcher did not want the F-106's grounded. They provided a needed service as bomber interceptors. But by putting his career on the line, and confronting General Thatcher in a forceful way, Broughton managed to get him to change his mind. Thatcher, of course, could have punished Broughton for insubordination, but he understood that the passion Broughton exhibited testified to a loyalty to the pilots rather than to simple rebellion. Hughes then fixed the seat (Broughton, 2008).

Summing all this up, we might look at the organization as a whole. In regard to the information inside the organization, how much of it can the organization actually access? Suppose we could

give some general parameter that might represent the ability of the organization to use some piece of information it has, regardless of who has it, why it has been acquired, and how it is labeled. Can we use what we have got? Do we know what we have got? And the answer is frequently "no, we can't" or, "no, we don't." We can't use it because A doesn't consider herself on the same team as B. We can't use it because it would reveal something embarrassing about the maintenance department or admit some organization fault bad for morale. We can't use it because information from that particular source is low-status, so we don't listen, etc.

Let's call this parameter IF. Pathological organizations have low IF, bureaucratic organizations have middling IF, and generative organizations have high IF. That means that if you ask a pathological organization to use its information, it will have big problems doing that. And it means that often generative organizations will succeed where pathological organizations fail, because the former are better at utilizing the information they have. An organization's ability to use the information it has is a most important feature. And it also reflects the general quality of performance in the organization.

4. Information flow as an indicator

If we can agree that ability to use its information is important to an organization, it is also true that this ability says other things about an organization. This is less obvious, but it is no less true.

Information flow reflects culture. So what people in organizations do with information reflects a number of other things.

The first thing it reflects is cooperation. Information tends to flow well when people co-operate, because cooperation and information flow both respond to trust. Where there is trust, there is more cooperation. And trust also means that people share information. By contrast, when there is no trust (e.g. in pathological environments) information becomes a political commodity. It is used to help friends, but also to harm enemies.

Trust is established when "the walk matches the talk," one of the best indicators of a generative environment. Leaders who are honest and forthright create an environment in which people will talk about their concerns. This has further impacts in getting people to report the "latent pathogens" (Reason, 1990; Westrum, 2009a,b) and increases the willingness to consult when puzzling events happen. When people consult more, their grasp of the technical issues increases, and they are less likely to do things they do not know are dangerous. A lack of such consulting was a major factor in the Tokai-Mura nuclear accident in Japan. In that event, workers engaged in work-arounds that were technically unwise, leading to a radiation accident (Westrum, 2000).

The second thing information flow reflects is the quality of decision-making. Good decisions are made on more complete information, but also, once the decision is made, the decision is more open to examination, because openness and transparency are both part of information flow. If people make bad decisions in an open organization, they become more obvious—and in some cases can be reversed. By contrast, when they take place in secret, not only are the decisions often worse, but they are harder to change. A bad decision in a closed environment is not only a mistake, but it is a failing. The decision-maker can be attacked for making it. So it is often covered up or denied.

A perfect example of the latter is seen in Mayor (New York) Giuliani's decision to fire Richard Murphy, an outstanding youth administrator, who had created the "beacon schools" project. Giuliani had accused Murphy of favoritism and corruption. After those charges were proven false, Giuliani's response was not to acknowledge that he had made a mistake, but to suggest that the mistake was a minor matter.

'Mr. Giuliani shrugged. "This happens all the time," he said. "And you write about those things all the time. Sometimes they turn out to be true. And sometimes they turn out to be wrong." (Dwyer, 2013b).

But the accusation wasn't a minor matter. Giuliani had said "My immediate goal is to get rid of the stealing, to get rid of the corruption." He ruined Murphy's reputation, which never quite recovered, though Murphy went onto do many other good things. (Martin and Murphy, 2013; Dwyer, 2013) This kind of political assassination is, unhappily, typical of pathological environments.

Third, information flow reflects the quality of life in that organization. An organization where information flows well is also one that, I believe, does a better job with its people. Certainly, a prime example of a generative organization would be Southwest Airlines, one of the most popular employers in the USA (Freiberg and Freiberg, 1998). It is also one of the best airlines in terms of its promotion of people. And it promotes everybody, not just the elite few. This is in striking contrast to say, Microsoft or General Motors, where policies promote only those on the star track (GM) or the top, say, 10% (Microsoft) (see Eichenwald, 2012). It is also in striking contrast to American Airlines, which in many respects seems to exhibit a pathological culture (Gittell, 2002). A culture similar to Southwest's was seen on the US destroyer *Benfold*, during the tenure of captain Michael Abrashoff, when he took what was apparently a pathological culture, and turned it into a generative one (Abrashoff, 2002). Information flow was one of the benefits of this generative environment. Not only were the ship's "latent pathogens" quickly identified and fixed, but the openness led to solving a technological communication problem that had long hobbled the Pacific Fleet.

What is it about generative culture that makes information flow? Actually, generative culture supports IF for three reasons. First of all, there is the trust issue, mentioned earlier. Second, generative culture emphasizes the mission, an emphasis that allows people involved to put aside their personal issues and also the departmental issues that are so evident in bureaucratic organizations. The mission is primary. And third, generativity encourages a "level playing field," in which hierarchy plays less of a role (e.g. Edmondson, 1996). Thus one can have a "boundaryless organization," to use a phrase popular at General Electric (Ashkenas et al., 1995). Because hierarchy is de-emphasized, most of the problems that attend getting information to flow up hierarchies disappear. Information flow, then, is testimony to quality of worklife, because a bad quality of worklife will interfere with flow.

Another feature of generative environments is getting information to flow across the internal boundaries of the organization. When every department competes with other departments, e.g. in a bureaucratic environment, sharing information with other departments is a problem. Yet often the "faint signals" that something is amiss are perceived by the "wrong person" organizationally. There is a very interesting anecdote about Charles Franklin ("Boss") Kettering in Douglas MacGregor's book (1966, 118–119). He mentions that Kettering one day had gone down to the shipyard to see about the installation of one of his diesel engines. While there, he noticed a painter looking at the ship's propeller. He asked the painter why he was staring at the propeller, and the painter offered that he thought the propeller was too large by five inches. Concerned that something might be wrong, Kettering called the design office, and asked them to come down and measure the propeller, which they claimed they had already done. When the propeller was re-measured, however, the painter turned out to be correct.

> And then we have the famous "bottle of champagne" story about Wernher von Braun. Since this special number regards the "Foundations of Safety Science," I am going to quote the original source of this story, von Braun himself.

> "One of our early Redstone missiles developed trouble in mid-flight. The telemeter records indicated that the flight had been flawless up to that instant, and permitted us to localize the probable source of trouble. However, the suspected area had been very carefully checked in numerous laboratory tests so that all explanations sounded highly artificial.
>
> Several theories were advanced. Finally one theory was accepted as most likely and remedial action on it was initiated. As this point an engineer who was a member of the firing group called and said he wanted to see me. He came up to my office and told me that during firing preparation he had tightened a certain connection just to make sure that there would be good contact.
>
> While doing so, he had touched a contact with a screwdriver and drawn a spark. Since the system checked out well after this incident, he hadn't paid any attention to the matter. But now everybody was talking about a possible failure in that particular apparatus, he just wanted to tell me the story, for whatever it was worth. A quick study indicated that this was the answer. Needless to say, the "remedial action" was called off and no changes were made.
>
> I sent the engineer a bottle of champagne because I wanted everybody to know that honesty pays off, even if someone may run the risk of incriminating himself. Absolute honesty is something you simply cannot dispense with in a team effort as difficult as that of missile development." (von Braun, 1956, p. 41)

And in fact von Braun was an exemplary leader when it came to seeing that information flowed up, down, and across at Marshall Space Flight Center (Tompkins, 1993). By contrast, in pathological organizations, information flow is problematic. First of all, an environment of fear and dread makes people cautious about what they say. People try to minimize risks. Second, the emphasis is on providing additional power and glory to the chiefs. Whatever does not serve this end is less important. And third, hierarchy provides strong incentives not to "speak up," to avoid provoking retaliation. For instance, the original reason for creating "cockpit resource management" seemingly had to do with encouraging co-pilots to speak up to their pilots. But "speaking up" is discouraged when blame and punishment are a major element in the environment, or when differences in power and position are great (Stein, 1967).

Problems with hierarchy can become much worse when the manager is a bully, and is willing to seek severe sanctions against those unwilling to "get in line." The candidacy of John R. Bolton for American ambassador to the United Nations allowed a rare glimpse of a public figure who seems routinely to have used bullying to pressure unwilling subordinates and associates. Bolton sought to punish, by threat and removal from office, those under his management control (and even those not) who defied his wishes. Several officials testified to Bolton's threats and attempts to have them dismissed when they had a different opinion than his own and to his willingness to override their ideas in favor of his own (Jehl, 2005).

Another special problem, when powerful people are involved, is that certain subjects become "off-limits." This is very common, for instance, in sexual abuse cases. We have already mentioned the case of Jimmy Savile at the BBC (see also Dintner, 2003). "Off-limits" was also an operative factor in the disturbing Penn State child abuse case, in which protecting an athletic team and its coach was more important than the safety of young people (Belson, 2012). And of course it was also involved in virtually all the child abuse cases within the Catholic Church (Berry, 1992; Dintner, 2003) and furthermore, many other churches and religious organizations as well.

But power also operates to bottle up in information in frankly political situations, for instance in authoritarian or totalitarian regimes, when certain facts are "inconvenient" (French, 2000). During the "Great Leap Forward" in China, a famine was raging, but information about it was encapsulated because it was politically incorrect. If local leaders came forward, they would be accused of being "right deviationists" or food hoarders, and would suffer brutal punishments or death. Lower level leaders, eager to appear proper communists, lied about the harvest results, with the outcome that little about the reality appeared on the surface. In addition the party cadres often had food when the peasants did not, decreasing their motivation to raise the issue. In the end, 38 million people would die during the famine. It would be years before the truth was generally known. (Jisheng, 2012).

5. Conclusion

What I have tried to establish here is that the safety scientist must necessarily be concerned with information flow. Not only is information flow the life blood of the organization's nervous system, but it is also a powerful indicator of other processes within the organization. I must admit, that early on, I did not appreciate how valuable IF analysis was. But its value became clear as more and more fellow scholars, and their industries as well, adopted and used these concepts in evaluating organizations and operations, from the emergency department, to the flight deck, from the nuclear power console to the oil platform. I remember Jim Reason asking me, in the late 1980s, "Why do think information is so important?" I don't think anyone would ask that question now.

Information flow is deeply linked to the safety culture of the organization (Cf. Curry et al., 2011). Indeed, many others have proposed and used other measures of safety culture, notably Pronovost (2010) in relation to infection control. Furthermore, others have modified—i.e. elaborated—my own three categories into more. As I have indicated, I think the value of this elaboration is shaky. No doubt there is a "Westrum continuum." In fact one might say, as one goes from pathological to generative, that the organization becomes more-mission oriented, and less "personal." Identifying sub-categories might be helpful in particular contexts. I am not convinced that there is a theoretical reason to do so.

In summing up, culture is no longer neglected. Information flow is of course only one issue among many in safety culture, but I feel it is a royal road to understanding much else.

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