

Revisiting Mindfulness, Managing the Unexpected,  
and the Cerro Grande Staff Ride

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At the recent Cerro Grande staff ride, participants tried to interpret some of their experiences using a set of ideas that were based on studies of high reliability organizations. One purpose of the staff ride was to see if the ideas had any application to organizations that were concerned with fire use, prescribed fire, and fire suppression. Several group discussions were held to see how well the ideas fit. The two people who initially presented the ideas about high reliability organizations, mindfulness, and managing the unexpected--Karl Weick and Kathleen Sutcliffe--circulated among the participants all week to clarify the ideas, answer questions, and learn. Because of a full schedule, there was no opportunity for Weick and Sutcliffe to comment late in the week on topics such as how the ideas were being used, where there seemed to be misunderstandings, and where there were good examples of the principles themselves. The purpose of this note is to supply just such a brief commentary. As we looked back over our notes, these are some of the key points that we think deserve continuing attention.

### **Preoccupation with failure**

Your discussions of ‘preoccupation with failure’ often missed a key point. When you heard the word ‘failure’ you seemed to think ‘escaped fire’. And then you went on to discuss how unfair it is that a suppression effort never fails and any escape is always a failure. The word ‘failure’ is clearly a red flag, and we understand your concerns. But what you forgot is that high reliability organizations are preoccupied with ***small, emerging, early failures aka problems*** (failures in the sense of things not working out exactly as expected). They see those small failures as clues that the system is not as healthy as they thought it was. Those early small failures are also easier to deal with than are full blown failures. And HROs spend a great deal of time and effort to catch stuff while it is still small.

Examples. Cerro Grande was not the first time there had been problems with Santa Fe dispatch. But the earlier problems persisted untreated and made it harder for the burn boss to do his job at Cerro Grande. If there had been a stronger ‘preoccupation with failure’, people might have diagnosed and dealt with that dispatch problem earlier. As a second

example, people at Cerro Grande were told ‘help is on the way.’ But there were delays in when that help arrived. A delay is a small failure. Delays are often a valuable clue that the system is not operating the way we thought it would, and therefore, we need to be even more alert for further problems. As a third example, we kept hearing the phrase “that fire was a wakeup call.” The Dome fire, for example, was described that way. If it takes something that big and that dramatic to stir you into action, then it’s not very likely that you’ll do much of anything when there is a much smaller failure like a late arrival, a surprisingly exhausted crew, or an unanswered phone. The whole point of a preoccupation with failure is that high reliability systems make strong responses to **weak** signals. If your mindset is that you only make strong responses to strong signals, then you need to consider changing that.

Here’s an example of what it sounds like when you’re NOT preoccupied with failure. During the staff ride, a comment was made that firefighting personnel often failed to solicit ‘local knowledge’ of quirks in local weather. In the case of Cerro Grande, locals knew that sudden ‘wind spurts’ were common in April and May, but fire people who were new to the area didn’t know that. And it was just such a spurt that was the severe wind event on Sunday that pushed the fire into the canyon. When it was suggested that burn bosses should pay more attention to local knowledge, an administrator replied, “It wouldn’t hurt to check, and at least try non-traditional ways to look at fire.” The sentiment that ‘it wouldn’t hurt to check’ has less intensity than is necessary to be preoccupied with early hints of the unexpected. Remember that slide 3 in the handout said that what is crucial for reliability is how strongly you disvalue mis-specification, mis-estimation, and misunderstanding. If it’s really important to get local quirks in the weather right, it will take more than ‘it wouldn’t hurt to check.’”

### **Reluctance to simplify**

Paul Gleason, reflecting on the lessons he learned from Cerro Grande, said that a big lesson was that ‘we do way too much simplifying.’ His example was that people erroneously tend to lump complexity, which is a logistical problem, and risk, which is an environmental problem. When people lump these two problems, neither problem tends to be handled adequately. While it is true that it is more complicated to pull those two problems apart and analyze them separately, it is also true that fire itself is complicated. And the whole point of simplification is that it takes a complicated analysis to grasp a complicated event.

Several examples came up in discussions. Recently, for example, people have become more reluctant to simplify what they mean by

‘contingency resources.’ ‘Contingency’ used to mean that the resources were available somewhere in the area and were anywhere from minutes to hours away. Now, people are beginning to refine the ways they describe and request contingency resources. The category of “on-site’ contingency resources has been added, and this avoids some of the old simplifications and gives people in the field more control.

A different example is the fact that with your current categories, a fire is either within prescription or it has escaped. To refine that distinction, you might want to think about varieties of escape. Rather than a fire being *either* in prescription *or* escaped, maybe there are times when it is *both* within prescription and escaped, and times when it is *neither* in prescription or escaped. Think about whether there might be times when what you are seeing might actually fit these odd descriptions. When you do that, you are practicing a reluctance to simplify. Once you begin to use a more detailed and differentiated set of categories to label your world, then you may discover more options for action, you may discover a greater variety of potential clues that can tip you off that a situation is beginning to deteriorate, and you could be in a better position to make sense of more complex events.

A different example of a potentially troublesome simplification is the idea that in planning a burn, the intent is to ‘mimic nature.’ If nature lights fires more in the spring than in the fall, then that’s when humans should also ignite fires. But, that may be a simplification that is misleading. Nature’s ways, as judged by fire return intervals, may be relatively insensitive to more recent changes such as global warming, drought, different forest composition due to suppression, and landscapes interrupted by man-made structures. We are not trying to sound like fire ecologists. That’s your specialty, not ours. But we are trying to sound like people who have studied how labels and categories can produce blind spots. If you lump burn plans together and try to design all of them to ‘mimic nature,’ then you may blind yourself to some differences that could give you more options.....or more headaches.

### **Sensitivity to operations**

To be sensitive to operations means in part to put your understanding of operations into words. That was the central message of slide 57 in the handout which was titled, “Explain Yourself.” To be sensitive to operations means to tell people what you think we face, what you think we should do, why you think that is what we should do, what we should keep our eye on because if that changes it’s a whole new ballgame, and then to ask people what is unclear, what you might have missed, what they think they may not

be able to do. Sensitivity to operations means partly that you make sense of puzzling situations, but you do so publicly. When you explain your understanding of what you face, that gives listeners a framework. Equally important, you hear yourself talk and you may discover that parts of your reasoning are more shaky than you thought. A sizeable chunk of our life is spent living by the recipe, “how can I know what I think until I see what I say.” People who live in the world of fire are no different. You have to speak up to discover what you’re thinking. And then be prepared to update and modify what you discover.

Several people were struck by the use of different colored shirts in the video of the aircraft carrier to signify different roles. It was mentioned that it is often hard at some fires to discover who is filling which roles. More than once we heard the suggestion that fire ops would go smoother if people wore different colored helmets to depict their roles.

Sensitivity to operations means getting the big picture of what is going on here and now. It’s important to keep this in mind because you tend to pay lots and lots of attention to burn plans. On pages 42-44 in the book ‘Managing the unexpected,’ several liabilities of planning are noted, especially the fact that plans tempt you “to search narrowly for confirmation that the plan is correct.” The problem is, you overlook signs that the plan isn’t working and that unexpected events are piling up. When people are sensitive to operations, that are unfolding here and now, they catch the unexpected sooner and are in a better position to deal with it. There seemed to be sensitivity to operations on the mountain at Cerro Grande, but that same sensitivity did not seem to continue on through the system until it was too late. Usually, when people hear the phrase, “the big picture”, they think it refers to top level stuff like strategy, system, plans, policy, a macro point of view. What the good HROs are teaching us is that it’s just as important to have the big picture at the bottom, where the situation is unfolding right here and now in all its intricacy. NASA lost sight of the situation in the Columbia shuttle disaster when they paid more attention to future shuttle flights than to the puzzling debris strike on the left wing that had been caught on a fuzzy photograph. Sensitivity to operations is an issue involving the frontlines, in the field. But, the point of this principle is that this frontline sensitivity has to spread upward in the organization, and not get stalled in a dispatch center that is insensitive to operations.

### **Commitment to Resilience**

It’s interesting to us that when you looked for examples of a commitment to resilience, the example that you mentioned most often was

the ‘After Action Review’. The AAR seems to be a program you like and a program that is working. But we would argue that the AAR is an example of your efforts to intensify your “Preoccupation with failure,” and not so much an example of resilience. The AAR is an example of resilience *if* the lessons you learn from the AAR help you increase your capabilities to deal with unexpected events in the future. Resilience is about making do with the resources you have at hand to contain and manage an unexpected event. And a commitment to resilience is about increasing the capabilities of those resources that you have at hand so that they can better handle whatever is thrown at them.

Another word for ‘resilience’ is ‘improvisation.’ You do improvisation all the time. And you’re good at it. You have to be. As one person put it, “on every fire we do have an idea what will happen, but what actually occurs is always a surprise.” Paul Gleason didn’t plan to be a temporary burn boss, he had tickets to fly out of Albuquerque. Mike Powell didn’t anticipate that he would have to send a newly arrived crew back down to get rested. No one expected that a much needed helo would arrive with two people and an administrator but no bucket. Despite these setbacks and unanticipated events people had to keep going. And that’s where a commitment to resilience comes in. The broader and deeper the capabilities in the group, the better your chances that they can re-plan and improvise a new system and a new response that can deal with the unexpected.

In many ways, commitment to resilience takes the form of what might be called a *Before* Action Review (do we have lots of capability and do we have confidence in our ability to recombine some of those capabilities in novel ways?) and a *During* Action Review (e.g. I didn’t expect this, but if we redeploy our people we can handle it).

An interesting tension in many of your discussions revolved around the fact that people develop a big investment in the burn plan, and this makes it harder for them to see the necessity for improvisation when the unexpected occurs. And a big investment in a plan makes it even harder for a planner to accept that having a capability for improvisation is a significant basis on which to select the people who will manage the incident.

### **Deference to Expertise**

Several interesting themes surfaced in your discussions of expertise. One group that reported out on Wednesday said on their flipchart that it was important to “Defer to experience.” That’s not quite the same thing as “Defer to expertise.” A person could have lots of experience with fire, but

not much expertise. The person could keep showing up at fires, but never reflect, seek feedback, experiment, learn, or try to improve.

Expertise itself can be something of a trap as in the notion the fallacy of centrality (slide 53 in the handout). Experts sometimes overestimate how much they know they are and they erroneously assume that if something threatening or unexpected or potentially dangerous were occurring, they would know about it. And since they don't know about it, then it isn't occurring. When experts think this way, the people who work with them are ill-prepared to deal with growing problems until it is too late. The fallacy of centrality discourages curiosity as Kathie Sutcliffe has found in her research in medical settings.

But expertise can be something of a trap for the consumer of expertise as well as the expert. We saw a good example of this in the Tenerife air disaster. The KLM pilot was head of training at KLM and his co-pilot had been trained by the pilot. When the co-pilot sensed that the premature takeoff of the KLM plane might be in error, he did not speak up to the pilot, but rather assumed instead that, if there was another plane on the runway ahead, surely a pilot of this stature would know it. Similar dynamics may be put in play when there are big differences in expertise on fire management teams. People with lesser expertise may spot early warning signals but fail to mention them under the assumption that, if they were really significant, then the expert would say something about them. And since he or she is saying nothing, there must be nothing to worry about. In this case, no news is not good news. No news means simply no news. And it is everyone's responsibility to communicate whatever news they do know and not to assume that it is common knowledge.

### **Principles to emphasize**

1. You don't need more data.

Paul Gleason described your situation as one of "limited information in a dynamic environment." Another way of saying that is to say that your situation is unpredictable, often ambiguous, and usually complex. So? So more and more data won't help you that much since you don't face clearcut questions to which there are clearcut answers. Instead, you've got to hammer out some sense of what seems to be happening, and then update that sense often and through discussion. That's why we kept urging that you see yourselves NOT just as decision-makers, but as sensemakers. NASA didn't not do a good job of sensemaking in the Columbia disaster. Why? Because they used inappropriate models, ignored cues of trouble on the shuttle, ignored cues of trouble in the administrative hierarchy in Houston. And

because they did a poor job of prior sensemaking, when they finally got around to making decisions (e.g. should we try to get external photographs of the damage), they made bad decisions. But the problem wasn't with their decision making. It was with their sensemaking. It was their tendency to look for data that confirmed their belief (and hope) that things were okay on the shuttle, and their tendency to see this as an 'in-family' event that they already knew about. Both of these tendencies set the stage for the wrong decision. The remedy lies in candor, trustworthy reporting, listening, active seeking of viewpoints, and willingness to negotiate a workable understanding of what might occur and how to deal with the inevitable gaps that will show up in that understanding.

## 2. Small stuff makes all the difference.

At Ed Hiatt's stand, he was still amazed that a 1" wide finger of fire crawled across the black, ignited a stand of 1 foot tall bunch grass that would relight every time he thought he had it extinguished, and this slopover became harder and harder to catch. Cerro Grande is a story of other small stuff like a depleted Black Mesa crew, a prescribed burn not entered in the dispatch log, a temporary dispatcher on duty at nite, a new FMO officer in the adjacent Santa Fe National Forest, water drops from a small bucket at 10,000 feet, a Haines index of 6. These are small events with large consequences. HROs have learned the significance of the small stuff. Mindfulness incorporates a deep respect for the small stuff and what it can become. HROs try to tilt the playing field of risk so that they are able to spot events that are hard to diagnose but easy to cure because they know full well that by the time those events become easy to diagnose, they are much harder to cure.

## 3. Reliability is not bankable.

If there is one flaw with the phrase "high reliability organization", it is that it is too static. We'd all be better off if we kept referring to high reliability organizing. Systems, teams, groups, and the best laid plans all unravel. You have to keep redoing them. Al King and Mike Powell were continually reorganizing the burn crew. While it is true that you may want to develop mindfulness as a standard operating procedure, that doesn't mean that you run through the routine mindlessly. It means that you audit your group often to see where your strengths and weaknesses are (see Chapter 4 in *Managing the Unexpected*). You're probably already doing something about all 5 of these HRO properties. But you may not realize this. And until you do, you can't improve and strengthen how you're doing this. It means

you use the 5 HRO properties as a checklist, as a briefing format, as a set of “watch outs” for reliable team functioning.

Organizing for high reliability means fitting the high reliability principles with guidelines that you know well and value. For example, think about the fit between LCES and the 5 HRO characteristics. Lookouts are people whose role is to be sensitive to operations and to be preoccupied with expectations for fire behavior that fail. Communication covers all 5 characteristics but is geared to be sure that sensemaking and decision making flow toward expertise and that people are not oversimplifying but rather are attentive to fine-grained details that signal changing conditions. Escape routes and safety zones are the epitome of resilience and the epitome of a preoccupation with failure. Escape routes and safety zones represent capabilities that allow crews to bounce back.