Tracking and Responding to Small Errors in High Risk Environments
July 16, 2008 by LLC Staff Writer Jonetta T. Holt

All Photos by Dyan Bone, Coronado NF

Those who work in high risk environments know they must pay close attention to tracking and responding to small system failures before they become big problems, even deadly catastrophes. But what does tracking on the health of the system mean? Often the act of recognizing that something is wrong, that a small failure has occurred, without being able to pinpoint the actual cause is confusing and creates hesitation.

*"**HRO Principle #1: Preoccupation with Failure.** HROs are distinctive because they are preoccupied with failure. They treat any lapse as a symptom that something may be wrong with the system, something that could have severe consequences if several separate small errors happened to coincide…HROs encourage reporting of errors, they elaborate experiences of a near miss for what can be learned, and they are wary of the potential liabilities of success, including complacency, the temptations to reduce margins of safety, and drift into automatic processing."*

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Managing the Unexpected: Resilient Performance in an Age of Uncertainty
Karl Weick & Kathleen Sutcliffe 2007, pp. 9

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If we are unable to articulate what the error is exactly, we are often reluctant to raise it to the next level where it can be identified by knowledgeable team members and have its origin identified. Reluctance to raise an issue is easily understood. We do not want to be perceived as a person who proclaims "the sky is falling" every time we are confused about a situation or how it developed. If we identify a problem that we are unable to articulate yet, and upwardly report that problem, we face the risk of ridicule.

So how should we go about insisting that a weak signal of system failure be traced to its cause without becoming an alienating figure on our team? Maybe the story you are about to read will provide some clues. In this event, recognizing that an "unidentified" error occurred and the process of trying to identify the error led to the exposure of a chain of small errors. It is helpful to note that the team members who originally became alerted to the situation, and stayed involved until the team addressed the issue, were operating outside of their normal function.

An Invisible Chain of Errors

One night on a wildfire in Idaho, an engine crew arrived back from the fireline at about 11 p.m. They found the camp quiet, but a couple of incident management team members were still working in one of the tents. The engine captain asked if she could get some help locating her division supervisor.

Probably because the team members looked puzzled, the captain explained she had become separated from her division supervisor because her crew had apparently misunderstood the rendezvous time. They had thought that their direction was to meet the supervisor at 8 p.m. on the division and travel back to camp together. When they showed up at 8 p.m., no one else was around. The engine captain said she wanted to make contact with the supervisor and let them know the crew had returned to camp and had arrived at camp at 11pm. She was concerned because she thought there was a chance the supervisor may be on the division looking for them.

The crew leader also said she had been unable to contact anyone in incident communications or personnel at the local unit's dispatch by radio. She said she was finally able to contact the local unit's dispatch through her cell phone. She advised dispatch that her crew was on the line and asked them to contact the incident communications unit. Dispatch reported to her that they received no answer from the incident communications unit by radio and they received no reply from a team member they called on a cell phone number. The crew decided that they would return to the incident camp and try to locate the division supervisor there.

When asked whether she had been in radio contact with her supervisor during shift, the engine captain said her radio had been malfunctioning that day and she had experienced only intermittent communications with other division resources and the supervisor. She said she was able to hear more than she was able to transmit.

Team members assisted her in locating her division supervisor who had gone to bed in camp and left the two to talk about what happened, but realized several aspects of this situation remained unresolved. Encountering the engine captain on the way to her tent, the team members asked her to meet them after the team briefing in the morning so that they could go to the Communications Unit tent together.

After the morning briefing, team members, the engine captain and the division supervisor went to the Communications tent together where the Communications Unit Leader conducted a series of tests on the radio. While the radio was being tested, the engine captain repeated several times that she had recently purchased the radio for $750 and thought she had made a good purchase. The Communications Unit Leader found that despite the fact the radio tested normal during several tests and showed all of the correct frequencies were properly cloned, one final test proved that the radio was in fact transmitting only to itself. He explained that the normal "testing" that personnel do on their radios to check their functionality is clicking the mike to determine if the radio is hitting the repeater. If the mike click comes through loud and clear, then the radio is considered to be working normally. In this case, the mike click worked indicating the radio was hitting the repeater. But in one final test, the unit leader determined the radio was transmitting on its receiving channel and making the radio talk only to itself. He wrote a description of the radio's problems and said he would help the engine captain return it to the manufacturer for repair or replacement. The engine crew was then issued an incident radio for the rest of their fire assignment.

Remaining issues about how this situation developed were addressed by Command and General Staff in their morning meeting. Incident management team members were able to piece together a timeline of events explaining how an engine crew came to be left on the fireline and how the team did not realize it. Three other important points were also raised during a discussion about how the situation developed.

Operations team members said that the engine captain believed her crew missed the rendezvous because they did not understand the difference between 1800 and 8 p.m. They believed that they were supposed to report in at 8 p.m. and that this time was the end of shift, not 6 p.m. which is noted in military time as 18:00.

The Division Supervisor also said he had forgotten to turn his cell phone back on after turning it off during the evening strategy meeting as required by team protocol. Although his normal practice is to sleep with the cell phone on and next to him in his tent, he had not realized the cell phone was off. When he discovered it in the morning, he found two messages from dispatch advising him of the engine's situation.

Communications Unit personnel had signed off and gone to bed because they were not told to staff the radios any later than 10 p.m..

The system in this case had failed in several ways.
- Engine personnel did not clearly understand all of the elements of their assignment. In particular, they did not understand that 18:00 in military time means 6 p.m.. This fact is a significant signal to fire managers that we are not only responsible for what we say but also what is understood.
- An engine was unaccounted for and it was undetected. Division Supervisors have the responsibility of being the first to check on missing personnel.

Corrective actions were immediately put in place with the intention of these effective practices becoming team standard operating procedures.

- Operations personnel directed Division Supervisors to conduct "hard check-ins" with all of their personnel at the end of each operational period. This direction was included in the special directions for each division assignment in the Incident Action Plan. Hard check-ins at the end of every operational period can be an effective tool for ensuring line personnel accountability and safety.
- Hosting unit dispatch personnel should possess several contact numbers for incident management members so that there will be alternatives if one phone number contact fails.
- And finally, the manner in how radio checks are performed prior to going to the field was reevaluated. If one radio only transmits to itself exists, are there others? How will we know if we happen to get one of those rare radios unless we check by actually transmitting a real "radio check" before going to the field?

It would have been easier for the team members who were originally alerted to the engine's late arrival to limit their involvement by simply passing it off to other appropriate function personnel. In fact, these team members were probably perceived by some to be interfering outside of their function and incapable of distinguishing between a little mistake and a life-endangering event. Negative feedback from team members could easily have discouraged them and other team members from ever participating in error identification outside of their expertise again. They may not be likely to engage again as a true "team" member. Being a team member means putting the interests of the organization ahead of our personal comfort zone.

"What If" questions related to this event:
- What if issue resolution had been directed at only helping the engine crew understand military time and no attention had been paid to their malfunctioning radio?
- If that engine crew had gone on to another fire and the malfunctioning radio was never identified as a safety problem, could that engine crew have gotten into a life endangering situation later on?
- And what if the engine crew's absence had gone undetected for several more hours and that their real situation had been that they had rolled the engine and the crew members were seriously injured?
- What if the team members who were operating outside of their ICS function when they raised the idea to identify the error, received negative feedback from team members, and the result is that they never "interfere" again?

Broader questions to ask ourselves regarding our teams and organizations:
- How do we amplify weak signals so that they can be noticed more easily?
- How do we organize ourselves, so relevant details noticed by team members are not prevented from reaching the right people?
- How do we contextualize and interpret weak signals in a timely manner, so they can assist organizational responses?

- How do we design policies, rules, and procedures in such a way that fosters a friendly institutional environment for weak signal detection?

Consider using this HRO Story in a learning opportunity, teaching moment, or team-building session you design for your unit, team or organization. For more information on High Reliability Organizing and Organizational Learning, please visit the Wildland Fire Lessons Learned Center's website at www.wildfirelessons.net, or contact the LLC staff:

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