

Facilitative Learning Analysis

HOWARD FIRE BRIDGE COLLAPSE



[August 22, 2013]

Organizational resilience is a measure of the "ability for early detection of...unsafe operating boundaries and [the] flexibility and adaptability in responding to surprises so as to mitigate any undesirable consequences."¹

Introduction

On August 18, 2013 at 0918 the Howard Fire was reported as .10 acres, smoldering in heavy timber above the Howard Ranch approximately 10 miles east of Riggins, Idaho on BLM managed lands.

At 0618 on Thursday, August 22nd a UTV with two occupants was traversing a privately owned bridge en route to Howard Ranch (ICP) when the bridge collapsed, causing the UTV to slide off the bridge and onto the bank of the creek, injuring the driver. He was placed on a backboard and transported by pickup, ambulance and eventually Life Flight helicopter to a hospital in Lewiston, ID where he was diagnosed with a fractured sacrum. The following narrative attempts to highlight the events, conditions and human performance that shaped the organization's resilience.

Narrative

The first reference to the bridge was on August 18th when the DIVS(T) was asked to drive an engine from the Howard Ranch to the jumpspot along Forest Service Road 309, along which the bridge in question was located. Upon assessment of the bridge, DIVS(T) indicated that "we are definitely not

driving the engine over this bridge it's an ATV bridge." No further assessment of the bridge was made.

The Bridge was constructed of 4 15"Dbh logs which spanned the width of the creek and were topped with 2"x8"x8'² rough sawn boards set perpendicular to the logs. On top of the boards were 2 repurposed aluminum 'rails' set to a width appropriate for cars and trucks, but too wide for ATVs/UTVs. At its highest point the bridge was approximately 8ft over the center of the creek and 6ft over the bank onto which the UTV fell.



Over the next 4-days the bridge was used, by one estimate, more than 20 times by the 4 UTV/ATVs assigned to the fire. Individuals crossing the bridge, either on foot, ATV or UTV thought the bridge seemed "sketchy." Some "gave it the ol' one-wheel test, and crept up onto it." Whereas others thought "this thing is kind of sketchy... [shrug] just another sketchy bridge in the woods," and walked across. In one instance someone stopped and wondered "where the hell are people

¹ Sheridan, Thomas B. "Risk, Human Error, and System Resilience: Fundamental Ideas." *Human Factors*, 2008: 418-426

² Approximate

crossing this thing?” Then thought,³ “Well the others are going across it, it’s going to be alright.” Once everyone crossed the bridge without it creaking or feeling it move they all indicated feeling more comfortable with it.

By the night of August 21st there were 3 ATVs and 1 UTV at the jumpspot on the other side of the bridge from Howard Ranch (ICP). In the early morning of August 22nd the OPS(T) headed down from the jumpspot to ICP, crossing the bridge on an ATV without incident. At approximately 0605 two firefighters “hopped into” a UTV loaded with their gear and headed down from the jumpspot to ICP. On the way down they talked about the success of the previous night’s AAR and arrived at the bridge at 0618⁴. The driver chose to favor the right side of the bridge as they crossed⁵. Both the driver and the passenger describe the timbers breaking and bridge failing in a “slow” or “gradual” manner. The bridge collapsed predominantly on the right side, rolling

and sliding the UTV off the right side of the bridge and onto the bank of the creek near the high water mark.

The Driver, who was not wearing his seatbelt, remembers trying to “climb out of the UTV” as it slid off the right side of the bridge. The passenger, who was wearing a seatbelt stayed in place as the driver slid by. The driver ended up sitting on a rock, next to the passenger’s head (the right side of the UTV if it were upright). They asked one another if they were OK, the passenger indicated that she was, but the driver stated that his tailbone hurt. In addition he was complaining of light headedness, tingling in his hands and left hip pain.



The passenger, a certified EMT, initiated and continued to assess his condition and radioed to the OPS(T) at 0618 stating that the bridge at DP5 broke and a UTV rolled off...one individual injured... [injured person’s] chief complaint is back pain and lightheadedness, vitals normal. The passenger established herself as the EMT in charge and that the firefighter who had just arrived on an ATV would be the IC of the incident within an incident. She ordered a back board and trauma kit from

³ A note on ‘thought’: I utilize phrases like they thought “and use a quote from the interview.” This is misleading in that it suggests that a conscious dialog transpired (if only in their head). What is more accurate is that in the interview, the respondents put words to feelings (unconscious thought) they had at the time. I use it despite this because of its ability to place the reader in the moment with those involved.

⁴ It is still dark at this point

⁵ The driver remembers the right tire being on the right side metal rail, while the passenger remembers the right tire was off to the right side of the metal rail.

the engine parked at DP 5⁶ and "a crew to get him out of the creek." In addition she requested an ambulance for medical transport to meet them at Howard Ranch (ICP). The IC, who was at ICP, asked Ironwood IHC to respond.⁷ The IC then radioed Payette Dispatch at 0625 to request a medical transport via ground ambulance and passed on the patient assessment. Ironwood IHC arrived on scene and "plugged in," helping out where needed and ensuring the passenger (and now lead EMT) was OK. The driver was put on a backboard⁸ and loaded into the back of a pickup at 0658. At 0709 while en route from DP 5 to ICP the patient stated that he had "weakness in his left leg," and pain radiating to the right side of his hip. This triggered a change to transport by air ambulance and at 0711 the IC contacted Payette Dispatch to order Life Flight, requesting it to meet the ambulance at Carlson Helibase. Payette Dispatch made the request through Idaho County Dispatch. At 0710 the ambulance arrived at ICP and at 0728 the pickup truck arrived at ICP with the patient. At 0740 the ambulance left ICP en route to meet Life Flight. At 0830 the patient was transferred to the Life Flight helicopter and taken to St. Joseph's Hospital in Lewiston, ID.

⁶ The engine's placement was deliberate as it was in the established medevac plan for that division.

⁷ Ironwood IHC is a Non-Federal crew sponsored by the Marana, AZ NW Fire District. They had 9 EMTs on the crew.

⁸ The "spider Straps were all black and got tangled before they could be used to secure the patient, so they used duct tape.

Discussion

*"Errors of one kind or another are almost inevitable...What matters are not the errors per se but whether or not they are detected and recovered."*⁹

This case, like all others, was replete with the potential for errors. Prior to the bridge collapse there were missed opportunities to identify and recover from environmental hazards and human error, while the response to the accident and injury showcases examples of errors identified and mitigated, successful improvisation and appropriate use of effective protocol.

Prevention

The Bridge

An obvious potential for error was the bridge's structural deficiencies. We now know that it wasn't able to support the weight of a UTV loaded with gear and 2 passengers. We also know from the interviews that most everyone who encountered the bridge took pause before crossing it, but no one inspected it. An obvious lesson is to take a closer look at that "sketchy" bridge before you cross it. This will likely be a central lesson from this event shared by those involved, but is not the lesson we will focus on here. The purpose of an FLA is to search for why no one inspected the bridge and learn from that. A possible explanation is based in the allocation of limited resources (in this case time, attention, personnel, etc.). The firefighter's challenge is to balance the

⁹ Reason, James. *The Human Contribution: Unsafe Acts, Accidents and Heroic Recoveries*. Burlington: Ashgate, 2008. p. 185

allocation of these resources between developing Situational Awareness (SA) and using that SA to meet objectives like putting out a fire.¹⁰ The question then becomes why didn't the individuals commit resources to inspecting the bridge? The answer is two-fold; first the firefighters were likely focused on the many known and familiar hazards associated with the fire that required their attention to mitigate before objectives could be met. Second, firefighters cross bridges a lot in this line of work and it is incredibly rare that they fail. Each time they cross a bridge without incident the behavior becomes more normal. Ultimately the bridge didn't elicit enough concern from any of the firefighters to divert their time and attention away from the hazards associated with their primary focus; the fire. It is also important to make clear that SA is not something you have or don't have, rather it is something you have more or less of. Our SA is never complete.

The lessons and recommendations come first as a discussion question and second as the system's response to addressing that question. First, how do we best prepare our personnel to balance SA and working towards objectives in novel situations so that potential hazards/errors can be identified and mitigated?

The above discussion is not new and the question has no simple answer, however there are resources available to help the firefighters address the SA/objectives challenge, a safety officer. The safety officer's job, like the

firefighter's, is to identify and mitigate hazards/errors, but unlike the firefighters this is their only job, eliminating need to balance this with meeting objectives. Safety officers intentionally expand their perspective to include hazards and errors beyond the fireline itself to things like travel infrastructure, bringing in subject matter experts as needed.¹¹ In this case a Line Safety Trainee (SOFR(T)) arrived on the fire on August 21st at 1500, but was technically not in place on the fire, as the fully qualified SOFR had not yet arrived. The SOFR visited the fireline (building his SA) shortly after his arrival, which didn't include using the bridge that collapsed the next morning. As the incident expanded and the potential for unidentified/unmitigated hazards increased, a safety officer was assigned to, in theory, reduce that potential. In practice, it takes time for this resource to become fully effective. The recommendation, again in the form of a question, is how do we best prepare our *personnel* to make timely decisions on when to bring in additional resources and design the *system* to reduce the amount of time it takes for that resource to be effective?

The Seatbelt

Another obvious unmitigated condition was that of the driver not wearing a seatbelt. The evidence suggests that wearing one may have mitigated the mechanism of injury.¹² First, it is

¹⁰ This is known as the "Safety vs. Production" predicament.

¹¹ In this case those subject matter experts would have been the forest engineer and/or the landowner.

¹² The passenger was wearing a seatbelt and did not sustain any reportable injuries.

important to highlight that wearing a seatbelt or not had no bearing on whether the accident occurred; it is only relevant to the injury. Second, and more importantly, the purpose of an FLA is to ask *why* he didn't use a seatbelt and learn from that discussion.

The answer is rooted in the driver's perception of what a UTV is and the risks associated with its use. Our general perception is likely influenced by the off-highway vehicle industry itself and our Agency's training and use of the vehicles. The Off-highway vehicle industry has evolved quickly from 3 to 4 to 6-wheeled ATVs to side-by-side utility vehicles without seatbelts or Roll Over Protection systems (ROPs) to the latest versions called Recreational Off-highway Vehicles (ROV) which are capable of speeds in excess of 35 Mph and are equipped with seatbelts and ROPs. For obvious reasons, the ROV industry portrays these vehicles as safe family fun; everyone from children to the elderly can be seen driving them around town¹³. Secondly, our perception is shaped by the Agency's training and use of the equipment, which can be described as emerging. The Payette's JHA specific to UTV use was only prepared in February 2012 and a training course specific to UTVs was just completed in December of 2012. Most importantly, training opportunities are still limited.¹⁴

¹³Although this is not supported by the accident rate involving ATV/UTVs. FLAs 2011-13 ([1](#),[2](#),[3](#),[4](#),[5](#),[6](#),[7](#))

¹⁴ At the forest level, one 'train the trainer' class was made available this year, but the employee's home unit was unable to send a representative. Thus no

It is within this context that the driver's perception was formed. First, he didn't appear to make a clear distinction between ATVs and UTVs. This was evidenced by his belief that "with ATVs it was best to get clear of the machine in the event of a rollover," and his reference to a 6-wheeled ATV (Gator) as a UTV in the interview. Second, he didn't believe he was engaging in a dangerous activity; he was "just driving down to ICP, [talking] on the way to briefing." Third, the driver had not received UTV training and was not certified to operate a UTV, although he was certified to operate an ATV. The accident had nothing to do with his ability to operate the UTV safely, but any training would have included protocol for seatbelt use and this may have been the subconscious trigger to put a seatbelt on. Evidence of his perception of ATV/UTVs helps to explain (not justify) why, in that tiny moment as he got into the UTV, he didn't 'think' to put on a seatbelt.

Recommendations therefore need to work towards ensuring that the perceptions of the equipment our personnel are likely to encounter are accurate and up-to-date. Training and certification are a large part of that, but I don't believe more training per se is the answer, rather more access to training through the use of technology and creativity. Through training and the use of UTVs themselves our personnel can begin to normalize appropriate behavior like the use of seatbelts; just like the normative behavior of using a seatbelt in a car/truck; you don't think about it you just do it. Rules govern both of these behaviors, but the rules themselves are

training was available at the employee's home unit.

not responsible for appropriate behavior. Normative behavior, while based on rules, is developed through training (ensuring perceptions are accurate and up-to-date) and experience.

The Response

Preparation and Training

According to everyone involved, the response to the accident and injury was highly successful. This was attributed to good preparation and training enabling those involved to identify and mitigate the potential for error. The passenger's (and lead EMT) command presence and identification of the incident within an incident set in motion a structure that aided success throughout. The passenger took control of the patient care and passed off the communication and IC responsibilities. Ironwood IHC knew what had to be done and ensured that the passenger was OK too. The team was able to improvise when the spider straps were unmanageable, using duct tape to secure the patient. Changes in patient condition leading to a change in transport preference were identified and acted upon. Much of the success of this operation was attributed to the presence of 17 EMTs on the fire. Their training and experience was critical to the resilience of the team. It was noted by some that the Agency deserves credit for its support of individuals seeking additional medical training and that more support is needed to ensure qualifications are maintained and more opportunity is provided for those who are interested.

Brevity: Words Matter

Intentional use of predefined terms provided a more complete

understanding of the incident to dispatch and forest leadership. The term 'medical transport' was used instead of 'medevac'. This was a predetermined distinction meant to communicate the level of incident severity. Medical transport generally describes a serious situation in which there is no imminent threat to life. Whereas medevac indicates a much more serious and imminent threat to life and/or limb. The use of 'medical transport' in this case set the tone for the operation and engendered confidence among dispatch and forest leadership in the personnel on the ground.

Communication

As information moved up the chain of command, appropriate notifications were made in a timely manner; Individuals knew their roles and "stayed in their lanes." This appeared to be the result of effective preseason preparation and training, clear protocols¹⁵ and previous lessons learned, resulting in trust among individuals to know and perform their roles. Despite the success of the communication at the forest level and above, an inescapable truth surfaced. The quality of information deteriorates exponentially as it moves away from the source or context of the event. Expect this, it is not an indication of organizational performance, rather it is an inevitability of information flow. At times there was uncertainty as to when the injury happened and what kind of injury it was. That this uncertainty didn't

¹⁵ Both the [Payette NF Emergency Medical Response Plan](#) and the [Payette NF Agency Administrator's Guide for Critical Incident Management](#) were critical components for success.

elicit unnecessary interventions or impede progress towards the end state speaks to the resilience of the organization in this case.

Conclusion

Limitations in human and organizational performance combined with the complexity, dynamism and novelty of the fire environment generated unmitigated errors and conditions leading to the injury of a firefighter. In response to the injury the organization demonstrated high levels of resilience as a result of preparation, training and the ability of individuals to successfully improvise to achieve the desired end state.

Facilitative Learning Analysis

To learn more about this process go to:

<http://wildfirelessons.net/OrgLearning.aspx>

