



International
Association of
Wildland Fire

Extended Abstracts from the Human Dimensions of Wildland Fire Conference October 23-25, 2007 Fort Collins, Colorado

Sponsored by:

The International Association of Wildland Fire

In Conjunction with:

Interior West Fire Council

Additional Sponsors:

Canadian Forest Service

Colorado State Forest Service

Sustainable Forest Management Network

Fire and Aviation Management

Joint Fire Sciences Program

Pacific Northwest Region

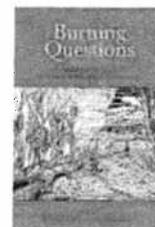
University of Alberta

USDA, US Forest Service

Wildland Fire Lessons Learned Center

Thank you for joining us along the Front Range in Colorado for a conference aimed at advancing the knowledge and practice related to the human side of managing fire prone landscapes. Specifically, this conference was intended for researchers and professionals involved in the science or practice of the human dimensions of wildland fire including suppression, fuels management, and community preparedness

Many within the wildland fire management community and the human dimension field of study will recall the report to the National Wildfire Coordinating Group titled: "Burning Questions". This conference "Human Dimensions in Wildland Fire" was in response to that report.



The objectives of the conference included:

- To serve as a venue for communication between wildland fire managers (policy makers, community planners) and social scientists - managers communicating their management problems and research needs to the science community and scientists communicating their research findings to the management community.
- To expand and build the network of individuals involved in human dimensions of wildland fire management:
 - *Researchers in various disciplines related to human dimensions of wildfire*
 - *Wildland fire and land managers, and community representatives, facing the challenges of fire management.*

- To foster the development of new research collaborations between managers and researchers and between groups in different regions and countries.
 - To raise awareness of the diversity of approaches, issues and ideas in wildland fire management - with the objective of developing innovative ideas for management and research.
-

Special thanks are owed to the conference steering committee, who formulated the structure, planned and implemented details of the conference. The conference was a success due to the contributions of dedicated individuals.

CONFERENCE STEERING COMMITTEE:

- ◆ *Dr. Vic Adamowicz*, Co-Chair, Professor, University of Alberta, Edmonton, Canada
- ◆ *Dr. Daniel Williams*, Co-Chair, Research Scientist, Rocky Mountain Research Station, USFS, Fort Collins, CO
- ◆ *Dr. Paul Woodard*, Operations Coordinator, Professor, University of Alberta, Edmonton, Canada
- ◆ *Mr. Bill Gabbert*, Finance, Executive Director, International Association of Wildland Fire, Hot Springs, SD
- ◆ *Mr. Chuck Bushey*, President, International Association of Wildland Fire, Billings, MT
- ◆ *Mr. Rich Homann*, Representative for International West Fire Council, Fire Division Supervisor, Colorado State Forest Service, Fort Collins, CO
- ◆ *Dr. David Martell*, Professor, University of Toronto, Canada
- ◆ *Dr. Bonnie McFarlane*, Senior Human Dimension Specialist, Canadian Forestry Service, Edmonton, Canada
- ◆ *Dr. Sarah McCaffrey*, Research Scientist, USFS - North Central Research Station, Evanston, IL
- ◆ *Dr. Alan Rhodes*, CFA/RMIT, Victoria, Australia
- ◆ *Ms. Mikel Robinson*, Special Events Manager, University of Montana, Missoula, MT
- ◆ *Dr. Toddi Steelman*, Professor, North Carolina State, Raleigh, NC
- ◆ *Dr. Jennifer (Thackaberry) Ziegler*, Professor, University Valparaiso, IN
- ◆ *Mr. Dave Thomas*, Renoveler, USFS Retired, Ogden, UT

INVITED SPEAKERS

- ◆ *David A. Cleaves*, Director, Rocky Mountain Research Station (RMRS), USDA Forest Service, Research and Development
- ◆ *Rick Gale*, Chief of Fire, Aviation and Emergency Response (retired) , United States National Park Service
- ◆ *Marc G. Rounsaville*, Deputy Director, Emergency Operations, U.S. Forest Service
- ◆ *Kathleen Tierney*, Professor, Department of Sociology and Institute of Behavioral Sciences and Director of the Natural Hazards Center, University of Colorado-Boulder
- ◆ *Jim Saveland, Ph.D.*, Program Manager for Social, Economic, & Decision Sciences, RMRS

You may order additional copies of this CD by sending \$25 and your mailing information in label form through one of the following media to:

TELEPHONE: (888) 440-IAWF (4293)

INTERNATIONAL: (605) 890-2348

FAX: (206) 600-5113

E-MAIL: iawf@iawfonline.org

MAILING ADDRESS: International Association of Wildland Fire
P.O. Box 261
Hot Springs, SD 57747-0261

Citation Example:

Author. Title. IN Extended Abstracts from the Human Dimensions of Wildland Fire Conference, 10/23-25, 2007, Fort Collins, Colorado, S. McCaffrey, P. Woodward, M. Robinson, compilers. International Association of Wildland Fire, 135 pp

The clock time as the Procrustean bed in the Cramer Investigation Report

Elena Gabor

Department of Communication, Purdue University, West Lafayette, IN 47906, USA

Email: egabor@purdue.edu

Key words: time, clock, firefighter, Cramer

Introduction

The time of the fire appears to be non-linear and uncontrollable. This creates psychological demands on the firefighters that lead to altered perceptions of time. This paper uses the Cramer Fire as a case study to illustrate that how firefighters make sense of time is different from how accident investigations make sense of time, and that investigations may be making incorrect assumptions about firefighters' sensemaking of time. On July 22, 2003 in the Cramer Fire, two firefighters (rappellers Jeff Allen and Shane Heath) who had been assigned to create a helispot lost their lives after being surrounded by the flames. The conventions of accident investigations and report writing in general tend to assume a linear, objective and even omniscient experience of time following the measurable clock time. But this paper shows how from their own words, it is apparent that firefighters experience time subjectively and intersubjectively, in polychronic fashion, dealing with multiple tasks, each with its own time. Thus, there is a gap in the investigation process that is worth addressing because time is also one of the instruments for assessing efficiency of work processes. The ancient Greek legend of Procrustes is used here as a metaphor for the way subjective and intersubjective experiences of time are shrunk or stretched to fit the objective time of investigation reports.

Literature review and Method

A combination of archival research and discursive analysis of the Cramer Accident Investigation Report (USDA, 2003) and three OSHA interviews with firefighters was used for this study. The literature informing this problem stems from four areas: philosophy, anthropology, psychology, and organizational communication. In philosophy, Heidegger (1924/2000) pointed out that the clock does not communicate duration, but a "now." He also found that the clock has made people view time as uniform, rhythmic and the same all over.

In anthropology, Hall's (1989) findings reveal that societies can be categorized as *monochronic* (e.g., United States), where schedules are prioritized rather than relationships, and where time is viewed as linear and tangible, and *polychronic* (e.g., Mediterranean countries), where relationships are prioritized, and where time is viewed as cyclical and intangible. Furthermore, Hernadi (1992) found that individuals exist at the intersection of three times: *subjective* (individual), *intersubjective* (dictated by the activities of the group/community), and *objective* (the clock time). The anthropological literature identifies the macro-cultural characteristics (that are often taken for granted) of the society in which firefighters live.

The psychological literature helps us understand the mind processes that can alter our perceptions of time in situations of increased stress. Specifically, according to the theory of self regulation, when people attempt to manage their emotions in a stressful situation, they tend to perceive that more time has passed than it actually has (Vohs & Schmeichel, 2003; Kathleen & Schmeichel, 2003). The norms of communication via radio that encourage firefighters to hide their emotions of panic or fear can facilitate such perceptions of time. On the other side of the

coin, when individuals are in a state of *flow* (Csikszentmihalyi, 1996), deeply absorbed by their activity, they perceive that less time has passed than it actually has.

Finally, studies of time in organizational communication show that time is socially constructed in organizations. Ballard and Seibold (2004b) proposed ten dimensions of time classified along two criteria: how people perform time (flexibility, linearity, pace, precision, scheduling, and separation) and how they interpret it (scarcity, urgency, and present and future time perspective). For firefighters, the dimensions of time are influenced by the fire and by the resources and strategies of their organization. These different theories support the idea that there is not only one kind of temporal experience (the clock time), but there are several *times* that individuals can experience in various contexts and situations.

Findings

Data from three interviews with firefighters involved in the Cramer Fire and from the radio transcripts illustrate that firefighters experienced time as being uncontrollable, non-rhythmic, and nonlinear, although it is likely they expected it to evolve linearly (Close, 2005). Individuals had *subjective* and *intersubjective* (via radio) experiences of time reflected in different levels of urgency. At the same time, the radio communication maintained linearity, as it only allowed one speaker at a time.

However, investigation reports tend to construct a sequence of events taking in consideration only the clock time, homogenous, the same all over, ignoring subjective and objective experiences of time. Thus, accident reports function like a Procrustean bed where the subjective and intersubjective time are shrunk or stretched to fit the clock time. The linear way of reporting reifies only one orientation to time, thus legitimizing the expectation that firefighters should be in control of their temporal experiences.

Given these findings, there is hope that investigators could be sensitized to how people process time in the moment and to finding ways to report incidents in alternative ways besides the chronological narrative. I also hope that this information can be of use to firefighters in learning to pay attention to time during fire, in learning how to process information, and how to understand their own experiences during fire.

Literature cited

- Ballard D, Seibold D (2004b) Organizational members' communication and temporal experience: Scale development and validation. *Communication Research*, **31**, 135-172.
- Close K R (2005) *Fire behavior vs. human behavior: Why the lessons from Cramer matter*. Paper presented at the Eighth International Wildland Firefighter Safety Summit: Human Factors 10 Years Later (April 26-28, 2005, Missoula, MT), Fairfax, VA.
- Csikszentmihalyi M (1996) *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
- Hall ET (1983) *The dance of life: The other dimension of time*. New York: Doubleday.
- Hernadi P (1992) Guest editor's introduction. *Time & Society*, **1**, 147-158.
- Kathleen DV, Schmeichel BJ (2003) Self-regulation and the extended now: Controlling the self alters the subjective experience of time. *Journal of Personality and Social Psychology*, **85**, 217-230.
- United States Department of Agriculture (2003) *Accident investigation factual report: Cramer Fire fatalities North Fork Ranger District Salmon-Challis National Forest Region 4* (No. 0341-2M48-MTDC). Missoula, MT: USDA Forest Service Technology and Development Program.

Sensemaking, Decision Gates, and Linear Thinking in an Exponential Environment - Lessons from the Cramer Fire

Kelly R. Close

Poudre Fire Authority, Ft. Collins, CO, USA; email: kclose@fcgov.com

Abstract. The Cramer Fire of 2003 resulted in the tragic deaths of two firefighters, and there has been no shortage of debate and controversies since. However, the Cramer Fire also offers some powerful lessons, particularly in the breakdown of rational thinking and decisionmaking in a rapidly-changing fire environment. The final 20 minutes at H-2 can provide important insights and lessons in this realm.

Additional keywords: Cramer Fire, acceleration, decision gates, sensemaking.

Introduction

Humans tend to be linear thinkers, not readily able to think in an exponential fashion or effectively "multi-task" (Putnam, 2007). In volatile, extreme burning conditions in steep terrain, the immediate fire environment changes rapidly, and the rate of spread has actually been shown to accelerate exponentially during a fire's final run (Viegas, 2005).

In this situation, fire spread can intensify far more quickly than people's perceptions and cognitions can readily reconcile, making it difficult for someone immersed in this environment to accurately assess a rapidly-changing situation and take appropriate actions. As conditions deteriorate and fire spread accelerates, rational thinking also deteriorates. Perceptions, cognitions, emotional reactions, and judgments that would be appropriate under normal circumstances fall short. "Sensemaking," the interpretation by an individual of the surrounding environment and events, begins collapsing and complex analysis and decisionmaking are hampered. Increasing stress from the situation causes the individual to fall back on simpler, previously-learned behaviors that may not apply to the new environment (Zeigler, 2006; Weick, 1993).

Methods

An examination of the events during the final 20 minutes at H-2 on the Cramer Fire, and the communications between H-2 and the helibase, builds a compelling and powerful story. Though all the facts will never be known, interpretation of evidence, events and communications, through known human factors on past fatality fires, indicate a strong interaction of deteriorating cognitive processes and critical actions against a backdrop of a volatile, rapidly-changing environment (Close, 2006).

Once fire was established in the bottom of the canyon below where the two firefighters were working, and as it moved up the drainage, it accelerated significantly. The final estimated rate of spread was two to three times the initial rate (Donoghue et al., 2003). The firefighters were not in a position where they could monitor the fire's progress effectively, and likely did not receive any other information indicating the fire's spread rate was accelerating. Based on the consistently calm tone of voice in the radio transmissions from H-2 to the helibase in the final 20 minutes, it's likely they didn't perceive they were in

immediate danger and possibly thought they had more discretionary time than they actually did. Further, there appears to have been a growing mis-match between their "linear" perception of events and the actual fire spread and intensity in an exponentially-changing environment. Other analysis of the final timeline indicates the firefighters were experiencing "time subjectivity," essentially operating on altered perceptions of time, and on a time scale that was subjective and "polychronic" (Gabor, 2007).

Results

On the Cramer Fire, sensemaking appears to have broken down significantly in the final 20 minutes before the fatalities. Critical "decision gates" (Gleason, 2000) were passed through with an ever-narrowing window of time in which to think, decide, and act. As the minutes passed and the firefighters remained near H-2, waiting for a helicopter to pick them up, each of the two most viable options for escape on foot to a safe area disappeared. Ultimately, they were unknowingly committed to the final outcome.

The tendency toward linear thought processes can too often cause firefighters to underestimate changes in fire behavior and potential. And the dynamic process of sensemaking in a rapidly deteriorating situation, coupled with deteriorating cognitive processes, can lead to a significant gap between perceptions and reality. The resulting human behavior and actions can have a critical influence on the final outcome, and appear to have been significant factors at H-2 on the Cramer Fire. These factors have also been implicated in the outcome on other past fatality fires (Putnam, 1995). Until we can break the cycle, similar patterns and outcomes are likely to be repeated again and again.

Literature Cited

- Close, K. (2006) 20 Minutes at H-2: Linear decisionmaking in an exponential environment. In: Proceedings 9th Wildland Firefighter Safety Summit; 2006 April 25-27, IAWF.
- Donoghue et al. (2003). Accident Investigation Factual Report: Cramer Fire Fatalities. U.S. Forest Service, 0351-2M48-MTDC.
- Gabor, E. (2007). The clock time as the Procust's bed in the Cramer Investigation Report. in: Human Dimensions of Wildland Fire (oral presentation).
- Gleason, P. (2000). Kate's Basin Fatality Report. Appendix 6 – Operations and Critical Decision Gates.
- Putnam, T. (2007). Personal communication.
- Putnam, T. (1995). The collapse of decision making and organizational structure on Storm King Mountain. In Findings from the Wildland Firefighters Human Factors Workshop. (Ed. T. Putnam). (USDA Forest Service MTDC: Missoula, MT).
- U.S. Forest Service (2006). FOIA request 06-3051-R: Redacted transcripts of Forest Net radio traffic from Central Idaho Dispatch, Salmon-Challis N.F., July 22, 2003.
- Weick K.E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly* 38, 628-652.
- Viegas, D.X., L. P. Pita, L. Ribeiro and P. Palheiro (2005). Eruptive Fire Behaviour in Past Fatal Accidents. In: Butler, B.W and Alexander, M.E. Eds. Eighth International Wildland Firefighter Safety Summit; April 26-28, 2005 Missoula, MT.
- Zeigler, J. (2006). Personal communication.