



Continuing Education Course



The Link Between Disorientation and Situational Awareness

BY CHRISTOPHER BRENNAN

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The Link Between Disorientation and Situational Awareness

Educational Objectives

On completion of this course, students will

1. Define Situational Awareness and its ability to identify, process and comprehend critical elements of information
2. Identify the consequences of losing Situational Awareness on the fireground
3. Correlate judgment to Situational Awareness and its importance
4. Determine the three modes of training and how they increase a firefighter's ability to incorporate Situational Awareness

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THE FIREGROUND IS A DYNAMIC ENVIRONMENT THAT is filled with threats to the firefighter. These threats exist in a 360° “bubble,” left and right, in front of and behind, and above and below the firefighter. To safely operate in this kind of environment, we must develop the skill to maintain situational awareness (SA). As defined by the U.S. Coast Guard, “Situational awareness is the ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regard to the mission.”¹ In other words, if you have SA, you constantly know what is happening around you and where you are in relation to the threats.

SA is taught in many “warrior” circles, particularly to fighter pilots. These pilots operate in an environment where they must maintain 100-percent awareness of their location in relation to friendly and hostile aircraft and be able to predict how an engagement will unfold. If they lose SA, they run the risk of a mid-air collision, being shot down, or being victims of a friendly aircraft. None of these circumstances would be acceptable, so pilots train constantly to maintain their SA. They do this using simulators, low-risk virtual reality “games,” and actual flight operations.

SA AND FIREFIGHTERS

The need for firefighters to maintain SA should be obvious. Like the fighter pilot, the firefighter operates in an environment where threats can come from any direction. Firefighters must know where they are within the “battle space,” the

fire building and in relation to the seat of the fire. They must know the locations of the other members of their crew and the larger fire suppression team. Firefighters' loss of SA means that they no longer are aware of where they are in relation to the “bubble.” They can no longer monitor where they and their crew are in relation to the fire or a safe egress. They no longer can accurately interpret the effectiveness of their actions or the suppression and rescue efforts as a whole. A loss of SA can lead directly to disorientation, which often leads to a firefighter line-of-duty death (LODD).

SA is a cognitive skill; it can be taught. Depending on your fire service experience, you may already be using an effective means of teaching SA. The wildland firefighting community is very effective at developing the skills needed to properly maintain SA. The structural firefighting community teaches new recruits skills that help in developing and maintaining SA but often not with the deeper understanding of the cognitive process. We can begin the process of developing SA in the classroom by examining the elements that lead to maintaining or losing “the bubble.”

Through classroom foundations, we can develop an understanding of how our brains collect and analyze data. The concepts presented in the classroom must be practiced in a drill if they are to be used effectively on the fireground. Even though we are saying that maintaining SA is essentially a cognitive ability, it must be performed while physically engaged in firefighting. It's like understanding the math behind friction-loss calculations but being overwhelmed by the amount of activity on the first structure fire at which you pump. You can have all the knowledge in the world, but if you cannot use it effec-

tively, it is wasted. Being trained in SA may be the difference between life and death for some of our people.

THE ELEMENTS OF SITUATIONAL AWARENESS

To effectively train our personnel in SA, we have to start with laying out the elements that go into developing and maintaining SA on the fireground. To have SA, you must be able to perceive a threat, comprehend the threat, and predict what effect that threat may have on you. These elements—Perceive, Comprehend, and Predict (or Project)—form the cornerstone of maintaining complete SA on the fireground. SA is a complex thought process; as such, we need to break it down into manageable components when teaching it as a new skill.

Perception

Perception is the first step in the cycle of maintaining SA. If I am unable to perceive the conditions around me, I am already at a disadvantage. A lack of perception is just another way to describe tunnel vision. In 12 years of attending fire service schools and teaching firefighters, I have heard the statement “Don’t get tunnel vision” more times than I can count. To me, tunnel vision is a cognitive focus on one particular aspect of a fireground operation. That singular focus causes you to lose your perception of everything else that is happening around you. A lack of perception can develop with the initial dispatch, your arrival on scene, or in the middle of an operation because you have encountered a situation that is shifting your heart rate from the “yellow” zone into the upper regions of the “red” or lower level “gray” zones.

These zones are relative markers of anxiety. They are directly related to the arousal of the sympathetic nervous system (SNS) (your “fight or flight” response). As you become anxious or fearful, your heart rate begins to climb. At 90 beats per minute (bpm), you are somewhere in the yellow zone, where you may experience a loss of fine motor control. When approaching 140 bpm, you are in the red zone; you will begin to suffer loss of gross motor skill. As anxiety snowballs, your heart rate will climb to between 150 and 170 bpm; you are entering the gray zone and begin to suffer a deficit of cognitive processing, auditory exclusion, and tunnel vision.

The elevated heart rate directly affects your ability to process cognitive information. Using techniques like the four-count “combat breathing” exercise to regain control of your heart rate is critical if you are to maintain your cognitive ability to perceive threats. This simple exercise involves counting your breaths. Breathe in for a count of four. Hold your breath for a count of four. Exhale for a count of four. Pause for a count of four. This exercise acts to reboot the cognitive processing by slowing the escalating heart rate.

Fighting SNS responses of anxiety becomes easier with training and experience. Teaching new firefighters who aspire to be fire service warriors to control the SNS reaction lays the foundation for their being able to maintain SA.

Comprehend

Perceiving a threat is only half of the goal; you must also understand that you are facing a threat to be able to act on

the perception. Let’s take pending flashover conditions as an example. We understand that flashover is a violent event that regularly occurs at interior structural fires. There are signs we can use as indicators that flashover is likely: A great volume of turbulent smoke exiting a room (or the structure) is a sign that the heat inside is beginning to reach the point where flashover is near. Rollover and flameover of the unburned smoke are also indicators that a flashover is imminent. Do your people understand this? Can they comprehend these warning signs when they see them? If they see a significant volume of dense, turbulent smoke pouring from the doorway of a two-story wood-frame structure at 1:00 p.m., can they articulate these facts, or will they think, “That house is on fire”?

One of the challenges we all face is a lack of opportunities to develop experience because the number of structural fires is lower and training time in burn buildings is limited. As a whole, the fire service is called on to deal with so many other tasks—EMS, hazmat, technical rescue, and fire prevention, for example—that we have limited time to develop our “combat senses.” Although all the aspects of our profession are important and need practicing, we need to ensure that the high-risk/low-frequency skills of firefighting are practiced more frequently in a burning structure.

Predict (Project)

The final step in SA is predicting the potential effects based on your comprehension of the perceived threats. You have to perceive the smoke conditions, comprehend that they are indicators of impending flashover, and then predict what will happen if you crawl head first into that doorway without taking some kind of action to mitigate the conditions first. So you pull up in front of a two-story home at 1:00 p.m. with dense, turbulent smoke exiting the structure and say to your partner, “Hey, that looks like it’s getting ready to flash; let’s hit it from the doorway for a minute until they pop the windows and we get some lift.” You have the SA to determine that if you just crawl right into this threatened environment, you are going to get burned and that you need to change the environment to make it “relatively safe.”

RELATIVE SAFETY

Everything we do on the fireground or at any incident scene is about maintaining “relative safety.” We accept the fact that by crawling into a burning structure to extinguish a fire or search for victims, by going onto a roof to ventilate, or by doing any of the other suppression or support tasks we perform, we are doing something “unsafe.” Our objective must be to maintain “relative safety” by making decisions based on conditions that will allow us to accomplish our objectives without needlessly placing ourselves or our people in an untenable threat environment.

Taking the impending flashover example again, if you are the nozzleman, the company officer, or the incident commander, you need to perceive, comprehend, and predict what the effects of just having that initial attack line advance into the building will be. That SA will allow you to choose a course of action that will help maintain the “relative safety” of the folks operating on the fireground. If your standard operating

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guidelines (SOGs) indicate that an aggressive interior attack is called for, your thinking must be agile enough for you to realize that some task must be accomplished first for you to meet your objective. You must change the environment so that it is tenable. By doing this, you are using the Boyd Loop—the Observe, Orient, Decide, and Act cycle—(see “Fireground Tactical Decision Making,” *Fire Engineering*, April 2011) to choose the best course of action to mitigate the immediate threat and continue your mission. SA is the skill set that allows you to perform the Observe and Orient functions of the Boyd Loop.

DISORIENTATION

Disorientation is the antithesis of SA. Disorientation is the root cause of firefighter fatalities the National Institute for Occupational Safety and Health (NIOSH) identifies as the likely cause of firefighters being “lost”; likely, it is also a contributing factor to firefighter deaths attributed to being “caught/trapped.” In “You Want Me To Do What?” (*Fire Engineering*, December 2009), I discussed the effects of anxiety on increased heart rates and the impact those elevated heart rates have on the cognitive function. Although there is no definitive reporting on the role anxiety plays in firefighter LODDs, we can examine published reports of LODDs and extrapolate how anxiety may be related.

On October 29, 2008, 24-year-old Volunteer Firefighter Adam Cody Renfroe became lost while operating inside a residential structure fire and was subsequently caught in a flashover (NIOSH Firefighter Fatality Report F2008-34).² The cause of death was reported as smoke inhalation and burns, but we must consider that disorientation likely could have been the root cause. If Renfroe had not become disoriented, he would not have become lost, and he may not have been caught by the subsequent flashover.

In examining any LODD, the last thing we should do is blame the victim. Quite the opposite. It is much harder to ignore the improvable actions that are identified when we attach the name and face of a fallen firefighter to the action. It is important to look at the actions that were taken in these fires and to try to understand what cognitive process led to those decisions.

Renfroe had two years of experience with the Crossville (AL) Fire Department at the time of the incident; he had completed department training on essential firefighter skills, but he had not been through Alabama’s Volunteer Firefighter Certification course. He was among the first three firefighters to arrive on the scene and the “senior” firefighter of the two firefighters who stretched the initial attack line.

I can place myself in Renfroe’s shoes; I was a 24-year-old paid-on-call firefighter. He entered the structure to do what he perceived was his job. He entered alone because he felt a sense of duty to act. His heart rate was already pounding from the adrenaline rush. We’ve all had this experience—you’re either excited or terrified by what you are facing. When he crawled in through the carport door to begin the fire attack, he found himself in an incredibly difficult set of circumstances.

The initial reports transcribed into the NIOSH report say that thick black smoke was coming from the roof. The initial attack line was stretched, and “The victim and FF2 [Firefighter 2], on air, walked into the structure through the carport door. They were approximately two feet inside the structure; they were met by thick, rolling black smoke but no fire. Quickly, they exited through the carport door taking crosslay #1 with them.”

Renfroe then sent his partner, a member with six months of experience, back to get a flashlight. When the second firefighter returned, Renfroe was no longer waiting by the carport door; he had reentered the structure.

NIOSH investigators state, “FF2, still on air, entered back into the house through the carport door but could not see his hands or feet just inside the door.”

At that time, FF2 exited the building, unable to locate Renfroe. So this young man, with minimal training but a huge desire to do what he believed was right, entered an environment that rapidly sent his heart rate skyrocketing. He exited with his partner but then reentered on his own? Why? We can never be certain.

We can postulate, though, that when Renfroe and his partner entered the structure the first time, the response of his SNS was engaged, and his heart rate was elevated in response to the perceived threat (the conditions). Disorientation is a key factor in firefighters’ becoming lost. When the heart rate, as a result of anxiety, approaches 175 bpm, cognitive processing deteriorates, tunnel vision begins, and there is often a perceived slowing of time.

Why did he reenter the structure without his partner? Again, there is no way to be certain, but it is likely that his SNS response caused him to perceive that his partner was gone for an extended time and that the fire was getting beyond the point where it could be controlled. His SNS was screaming “fight” because his personal condition, his assessment of himself, dictated putting out the fire. Unfortunately, the circumstances of his position did not provide him with the knowledge, skills, or experience to fully perceive, comprehend, and predict the possible outcomes of entering the structure. We must examine LODDs like that of Adam Cody Renfroe if we are to fully understand the importance of SA and the critical role that disorientation plays in firefighter LODDs.

TRAINING IN SA

The ability to maintain SA depends on our training, judgment, and personal condition. These factors must come together every time we are going to perform a high-risk evolution—structural firefighting, wildland firefighting, collapse or high-angle rescue, or any of the wide arrays of emergencies we are called to mitigate. A lack of competency, or even a temporary lack of focus, can lead to a chain of events that may be catastrophic or even fatal.

Judgment

Judgment is defined as “the process of forming an opinion or evaluation by discerning and comparing.”³ It is the ability to choose the “best” option to respond to a given set of

circumstances. Developing a sound basis for making judgments or tactical decisions on the fireground is a direct result of training and experience. Given the national trend toward a dwindling number of structural fire responses, we must give our firefighters the ability to develop experience through realistic, live fire training.

Personal Condition

The firefighter who subscribes to the ideals of the fire service warrior embraces the Boy Scout motto “Be Prepared.” We begin instilling into recruits that idea of being ready on day 1 at the academy. Recruits are taught that they must have their equipment ready for duty and how their personal turnout gear is to be placed on the rig. We teach the concept of readiness when we work on developing self-contained breathing apparatus (SCBA) donning skills, ensuring that the recruit places his SCBA into the “ready position” every time it is doffed. It is incumbent on the fire service warrior to place himself in the ready position every day.

We have countless trivial, mundane, and downright serious matters on our minds 24 hours a day, seven days a week. As firefighters, we are bound to bring those concerns into the firehouse. Minimizing the impact of distractions is important, however, if we are to concentrate 100 percent on the task at hand when we are fighting fires, caring for patients, or even cleaning the firehouse. It needs to be made clear that if you are distracted when you are performing a high-risk evolution, the likelihood increases that you or another member of your team will be injured or killed. Distractions take away from your ability to maintain SA, and a loss of SA will lead to accidents and mistakes.

The fire service warrior sets out each day to be prepared, to be ready, for whatever will come his way: a structure fire, an EMS call, hazmat training, a fire prevention lecture at the grade school, or cleaning the small tools on the engine. It is easier for career firefighters to be mentally and physically prepared for duty because they know when they are going into work, the drive in leading up to shift change, is a time where you can put your game face on. The on-call firefighter must be able to set aside the thoughts and activities in which he is engaged when the pager goes off and must train to “flip the switch” and suddenly be in the ready position.

Personal condition is a combination of being mentally and physically prepared to perform the job at hand. If you are distracted by situations and circumstances, you are placing yourself and other firefighters in danger. If you are not physically fit enough to maintain the metabolic output required to perform any job on the fireground, you are placing yourself and other firefighters in danger.

Modes of Training

Training lies at the core of everything we do in the fire service. No one is born instinctively knowing fire behavior, building construction, or critical thinking. We must provide our apprentice and journeymen fire service warriors with the basic and advanced training they need to flourish. I will ven-

ture to say each of us has seen the results of a poorly trained firefighter. It is a “20-year mistake.” In my experience, training comes in three modes: formal, company, and individual. Formal training includes those classes that lead to our certifications and often relate back to standards developed by the National Fire Protection Association, the Occupational Safety and Health Administration, or the state fire marshal’s office. Company training is the day-to-day training that company officers lead to make sure their people are prepared. Individual training is that study, research, or experience we undertake on our own.

Training to maintain SA needs to occur across all three modes of training. We must begin with the recruit firefighters and train them in fire behavior and building construction, tactics and procedures for fire attack and suppression, ventilation, search, and the related fireground support functions. Once this foundation has been laid, we must teach our apprentices to put all of these individual concepts together and think critically about how they are interdependent.

Effectively training our firefighters to maintain SA requires that we engage in realistic, scenario-based training. We must push them to confront experiences that are difficult and that scare them so that they can develop the ability to manage not only critical fireground tasks but also the inevitable anxiety reactions that they will cause. If you cannot keep yourself calm and focused, anxiety will lead to a loss of SA. A loss of SA may lead directly to disorientation, which all too often leads to a firefighter fatality.

IT’S A TEAM SPORT

Firefighting is a team sport. We are not operating as individuals, and the actions of the team are vital in our ability to maintain SA. We accomplish this through the use of our SOGs, knowing what our teammates are doing based on the situation. Think about a successful National Football League (NFL) team. If the offense has any hope of moving downfield and scoring a touchdown, the guy calling the plays, be it the head coach (the IC), the offensive coordinator (the Operations section chief), or the quarterback (the group supervisor), has to rely on each team member to perform his assigned mission without having to be micromanaged. What happens when someone misunderstands the play that has been called? The quarterback gets sacked, the pass gets intercepted, or the running back does not have a hole to run through. That well-conceived plan is only as good as the execution of the individual team members.

NFL teams play 16 games a year, but they practice from the end of July until the beginning of September to make sure everyone knows the playbook. I’m going to use the Baltimore Ravens 2009 training camp schedule as an example (it is the first team listed on the NFL’s Web site). It began practicing for the season on July 28; practice was twice a day. August 14 was the first full day the players were off. During this time, the team practiced 26 times and had team meetings and a preseason game.⁴ These men worked hard to make sure they were prepared physically before the season started and then

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developed their ability to play as a team through difficult, realistic practices. Is your fire department training that hard? Do your companies *know* what everyone else on the fireground is going to be doing based on well-developed SOGs and realistic scenario training?

A key concept on the fireground is Implicit Coordination, the noncommunicated coordination of action that takes place on the fireground. *Implicit Coordination in Firefighting Practice: Design Implications for Teaching Fire Emergency Responders*, by Zachary O. Toups and Andruid Kerne of Texas A&M, examines this concept in some detail.⁵ The authors assess how firefighters use “complementary communication modalities, well-defined roles, and shared experience histories to implicitly coordinate their actions.” These aspects of implicit coordination allow firefighters to maintain a collective SA, which the authors of the Texas A&M study team call “team cognition.” Team cognition is an example of distributed cognition, “a theoretical framework for investigating how information is coordinated within systems of people, artifacts, and environments.” It applies to the actions of small groups, such as a fire company or a football team. In team cognition, or Team SA as I call it, we are aware of the actions of the other team members based on the audible and environmental cues we are receiving. If we do not have 100-percent knowledge of everything that is happening on the fireground based on direct observation, then we fill in the blanks using the cues we observe.

As an example, Tom and Bill are assigned to the engine; Tom has the nozzle, and Bill is the backup. They arrive on the scene of a reported structure fire and find a working fire in what appears to be the kitchen of a one-story ordinary house. They advance a crosslay into the building based on their SOGs. As they make entry, visibility is limited to about two or three inches above the floor. Tom moves forward into the structure; Bill remains just inside the front door, feeding in hose. Tom and Bill work together every third shift, they train together, and they have been to dozens of fires together. They know the actions the other will take. As Tom is advancing the line, Bill is listening to the staccato sound of the nozzle opening and closing as Tom ensures that the ceiling isn't too hot as he sweeps the floor to ensure that it is intact and cool enough to crawl on.

Tom's progress is not slowed because Bill knows that Tom moves in increments of four to five feet at a time, so he feeds 10 feet of hose into the house each time he feels Tom advance. This is all accomplished without a lot of talking back and forth, no screaming “Give me more line,” or anything else. They are practicing Team SA. You can develop this ability in your fire company through regular drills and training. Is it easier for a career department where the same crew works together every third day? Yes, but it is still an attainable skill set for volunteer, paid-on-call, part-time, and combination departments. It just requires a diligent focus in training.

Team SA must extend beyond the company level to the entire fireground team. We need to “see” the big picture through the input we are receiving from the entire operation.

As the nozzleman of the attack line, I am using the senses I have at my disposal to maintain my SA, but I am also relying on cues from the other firefighters operating on scene. I am listening for the sounds of windows breaking, a saw on the roof, and radio communication about what is happening in front, behind, above, below, and to either side of me. My company and I are monitoring these cues as we advance on the seat of the fire to ensure that the environment will remain tenable for us.

At the same time, other companies are taking their cues from us. The truck searching the floor above the fire is listening for the sound of victims but also for the sound of water hitting the ceiling level below them, cues that help them to maintain the same Team SA that I have: We are getting water on the fire and the ceiling isn't so hot that everything is turning to steam. They know that it is okay to continue with their assignment without having to listen to a radio message from the engine officer or a direction from the operations chief to go ahead. You don't need to actually say in your mind, “Because I hear water hitting the ceiling and falling to the floor, the temperatures in here are tenable for us to continue our tactical advance to the seat of the fire,” if you have read the playbook, understand what is happening on the fireground, and can observe the cues presented. You are using Team SA to help “observe” what else is occurring within the structure and to continue making critical decisions using the Boyd Loop.

We may not be able to prevent all fireground fatalities. Developing the skills of our personnel to maintain SA will give them a better chance of avoiding disorientation, a risk factor that often leads to a fatality. Realistic, challenging, scenario-based training performed in single-company, battalion, and mutual-aid exercises allows firefighters to develop the cognitive skills to maintain SA and use the Boyd Loop to make life-or-death fireground tactical and strategic decisions. ●

ENDNOTES

1. U.S. Coast Guard, <http://uscg.mil/hq/cg3/cg3pcx/training/tct/chap5.pdf>, retrieved 1 March 2009.
2. <http://www.cdc.gov/niosh/fire/reports/face200834.html>; accessed via Internet 11/1/2009.
3. <http://www.merriam-webster.com/dictionary/judgment> accessed via Internet 11/2/2009.
4. http://www.baltimoreravens.com/News/Training_Camp_2009/Training_Camp_Schedule_2009.aspx accessed 11/9/2009.
5. *Implicit Coordination in Firefighting Practice: Design Implications for Teaching Fire Emergency Responders*, Zachary O. Toups, Andruid Kerne, Interface Ecology Lab | Computer Science Department | Texas A&M University. <http://portal.acm.org/citation.cfm?id=1240624.1240734> accessed via Internet 11/1/2009.

● **CHRISTOPHER BRENNAN** is a 14-year veteran of the fire service. He is a firefighter with the Harvey (IL) Fire Department and an instructor with the Illinois Fire Service Institute. He maintains the Web site www.fireservicewarrior.com. He is the author of *The Combat Position: Achieving Firefighter Readiness* (Fire Engineering, 2011).

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COURSE EXAMINATION INFORMATION

To receive credit and your certificate of completion for participation in this educational activity, you must complete the program post examination and receive a score of 70% or better. You have the following options for completion.

Option One: Online Completion

Use this page to review the questions and mark your answers. Return to www.FireEngineeringUniversity.com and sign in. If you have not previously purchased the program, select it from the "Online Courses" listing and complete the online purchase process. Once purchased, the program will be added to your **User History** page where a **Take Exam** link will be provided. Click on the "Take Exam" link, complete all the program questions, and submit your answers. An immediate grade report will be provided; on receiving a passing grade, your "Certificate of Completion" will be provided immediately for viewing and/or printing. Certificates may be viewed and/or printed anytime in the future by returning to the site and signing in.

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COURSE EXAMINATION

- The US Coast Guard Defines Situational Awareness as
 - "the ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regard to the mission."
 - "the ability to observe, orient, and understand the critical elements of information about what is happening to the team with regard to the mission."
 - "the ability to identify, process, and comprehend the critical elements of information about what is happening to the individual with regard to the mission."
 - "the ability to identify, process, and comprehend with perfect knowledge what is happening to the team with regard to the mission."
- Pilots use the following means of developing the ability to maintain situational awareness
 - simulators
 - low-risk virtual reality "games"
 - actual flight operations.
 - All of the Above
- A loss of SA can lead directly to disorientation, which often leads to a firefighter line-of-duty death (LODD).
 - True
 - False
- Situational Awareness is a _____ skill.
 - Psychomotor
 - Cognitive
 - Decision Making
 - Language
- The elements of situational awareness are? (indicate all that apply)
 - Observe
 - Perceive
 - Orient
 - Comprehend
 - Predict
- _____ is the first step in the cycle of maintaining Situational Awareness.
 - Observe
 - Perceive
 - Orient
 - Comprehend
 - Predict
- Recognizing a condition only adds to our situational awareness if we can _____ what it means.
 - Observe
 - Perceive
 - Orient
 - Comprehend
 - Predict
- The final element in developing Situational Awareness is the ability to _____ what will occur.
 - Observe
 - Perceive
 - Orient
 - Comprehend
 - Predict
- Accomplishing our objectives without needlessly placing ourselves or our people in an untenable threat environment is called
 - Safety
 - Everyone Goes Home
 - Relative Safety
 - Situational Awareness
 - None of the Above
- The ability to maintain SA depends on our training, judgment, and personal condition.
 - True
 - False
- Disorientation is the root cause of firefighter fatalities the National Institute for Occupational Safety and Health (NIOSH) identifies as the likely cause of firefighters being "lost".
 - True
 - False
- Judgment is defined as "the process of forming an opinion or evaluation by discerning and comparing."
 - True
 - False
- Personal condition is a combination of being _____ and _____ prepared to perform the job at hand.
 - Mentally, Physically
 - Emotionally, Mentally
 - Physically, Emotionally
 - Financially, Emotionally

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| 6. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D | 16. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |
| 7. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D | 17. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |
| 8. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D | 18. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |
| 9. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D | 19. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |
| 10. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D | 20. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |

COURSE EVALUATION

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 1.

- | | | | | | |
|--|-------|---|---|-----|----|
| 1. To what extent were the course objectives accomplished overall? | 5 | 4 | 3 | 2 | 1 |
| 2. Please rate your personal mastery of the course objectives. | 5 | 4 | 3 | 2 | 1 |
| 3. How would you rate the objectives and educational methods? | 5 | 4 | 3 | 2 | 1 |
| 4. How do you rate the author's grasp of the topic? | 5 | 4 | 3 | 2 | 1 |
| 5. Please rate the instructor's effectiveness. | 5 | 4 | 3 | 2 | 1 |
| 6. Was the overall administration of the course effective? | 5 | 4 | 3 | 2 | 1 |
| 7. Do you feel that the references were adequate? | | | | Yes | No |
| 8. Would you participate in a similar program on a different topic? | | | | Yes | No |
| 9. If any of the continuing education questions were unclear or ambiguous, please list them. | _____ | | | | |
| 10. Was there any subject matter you found confusing? Please describe. | _____ | | | | |
| 11. What additional continuing education topics would you like to see? | _____ | | | | |

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

AUTHOR DISCLAIMER
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COURSE EVALUATION and PARTICIPANT FEEDBACK
We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to: [Pete Prochilo, peter@penwell.com](mailto:Pete.Prochilo, peter@penwell.com).

INSTRUCTIONS
All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form.

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Completing a single continuing education course does not provide enough information to give the participant the feeling that s/he is an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

COURSE CREDITS/COST
All participants scoring at least 70% on the examination will receive a verification form verifying 4 CE credits. Participants are urged to contact their state or local authority for continuing education requirements.

RECORD KEEPING
PennWell maintains records of your successful completion of any exam. Please go to www.FireEngineeringUniversity.com to see your continuing education credits report.

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