



Situation Awareness Requires Attention

How difficult is it to pay attention? Maintaining attention is a skill, a rapidly diminishing skill in today's world. One definition of attention is "a concentration of mental activity." I don't know about you, but I find it difficult to concentrate for an extended period of time. One of the reasons I write one-page fatigue management articles is because of people's limited attention spans. The length of TED talks is 18 minutes, long enough to be meaningful and short enough to hold people's attention. Tweets are 144 characters, text messages have their shorthand language, and e-mails are supposed to be brief if the sender expects the receiver to read the message.

Yet, a pipeline controller sits in front of SCADA displays for a 12-hour shift and is supposed to be attentive all the time. What challenges might a person face in maintaining attention on day shift? Would it be any different on night shift? Have you experienced any of the situations in the drawing above? Can any of those distract a person from paying attention to the SCADA displays? Consider what these statements from controller job postings have to do with the importance of attention and situation awareness:

- Must maintain a high level of mental alertness and be capable of quickly processing and reacting to incoming information. Response time is critical.
- Maintain a high level of attention to detail for extended periods of time.
- Remain seated and focused on color monitors for extended periods.
- Perform detailed, regimented tasks and sustain concentration under stressful situations.
- Perform a variety of tasks at once.

In a previous article on situation awareness I wrote, "We need to retain awareness of the overall system while paying attention to the details of particular operational tasks at the appropriate times." What can be done to improve our abilities to pay attention to our responsibilities on the job? The first thing we can do is easy to say, but hard to do. Do not use your personal electronic device at the console. I know what you are thinking: *I can stop using my device at any time; I can pay attention to my device and react to an abnormal event if something happens; I'm used to multitasking; I use my device for fatigue mitigation; My family may need to contact me; yada, yada, yada.* Before every airplane flight, the flight attendants announce over and over again that people need to stop using their devices and people do not stop. Either people think they are too important to abide by the instructions or they are addicted to something they are doing with that device. If your company allows the use of electronic devices, look around the room and see how many people are using a device. They can hinder our ability to pay attention.

Companies develop policies to guide the responsible use of devices in control centers. Your company probably has one; how is it working? We cannot pay attention to several things at once and we have limited control over what sensed stimuli we choose to process. There are reasons that PHMSA issued an Advisory Bulletin in 2010 that is summarized:

PHMSA is issuing an Advisory Bulletin to remind owners and operators of natural gas and hazardous liquid pipeline facilities of the risks associated with the use of personal electronic devices (PEDs) by individuals performing operations and maintenance activities on a pipeline facilities. Pipeline operations and maintenance tasks require a critical level of attention and skill, which may be compromised by visual, manual, and cognitive distractions caused by the use of PEDs. Such distractions may also hinder their prompt recognition and reaction to abnormal operating conditions and emergencies. Owners and operators of natural gas and hazardous liquid pipeline facilities should integrate into their written procedures for operations and maintenance appropriate controls regarding the personal use of PEDs by individuals performing pipeline tasks that may affect the operation or integrity of a pipeline.

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Another action we can take to improve our attention paying abilities is to understand that we have a limited amount of cognitive resources. Consider how this assertion in Absent-Minded: The Psychology of Mental Lapses and Everyday Errors by Dr. James Reason and Dr. Klara Mycielska might apply to you, "Attention is a limited control resource of which we are only partially conscious." When we devote our resources to one activity, other activities will suffer. Operations and maintenance tasks require large amounts of information processing in short periods of time. We may practice *selective* attention, *focused* attention, *divided* attention, and *sustained* attention. We will practice all during a shift or workday. Selective attention allows us to process the most important information during a task or situation. Focused attention allows us to filter out unimportant information. Divided attention is when we do several things at once. Sustained attention is necessary for monitoring tasks so we are aware of the condition of the overall system

The key for controllers is to be conscious of when to focus, when to be selective, when it is appropriate to practice divided attention, and how to sustain attention. During an abnormal operating event, we have to select the most important information and take the appropriate actions. This is why it is critical to have good abnormal operating procedures and train/drill on the initial and follow-up actions to address the abnormal event. A person must focus during the initial actions, and then it might be necessary to divide the attention and communicate with others about the follow-up actions. After the abnormal event has been addressed with the appropriate actions, a person should then return his or her attention to the overall system.

The third suggestion to improve our attention on the job is to be aware of the effects of mental fatigue on our abilities to perform tasks and on our motivation to even perform the necessary tasks. I was in a control room in Ontario a few weeks ago for a workload assessment and the controller was engaged for almost three hours with continuous operational tasks. I know he must have experienced time-on-task fatigue. I later asked him about his amount of sleep the night before since fatigue and stress affect our ability to practice selective attention. We need to be well rested before we come to work and we need to have some opportunities during a shift to take a break. One of the other controllers eventually gave the first controller a break even though he did not want to leave the console. We need to recognize that we are more prone to errors when mentally fatigued. It is also harder for us to pay attention and easier for us to get distracted.

If you have reached this point in the article, thanks and congratulations! You have read over 1100 words. An important part of Team Resource Management is situation awareness and it requires the ability to pay attention. If you have problems paying attention on or off the job, do some research into ways to improve that ability. In addition to the suggestions above, some experts suggest performing tasks that require concentration. Those might include meditation, physical exercise, mental exercise, and the removal of clutter from personal and work areas.

Companies should remove visual clutter from control rooms and SCADA displays. Policies should be developed to reduce distractions and unnecessary noises in control rooms. Alarm and other warning sounds should be designed to enhance attention and situation awareness. The use of checklists and job aids should be encouraged, perhaps even formalized. Standards of professional conduct should be developed and implemented. Consider some positive changes to improve your control room and yourself. Pay attention to what is important. You have serious responsibilities for pipeline and public safety.

"Everybody thinks of changing humanity and nobody thinks of changing himself." Leo Tolstoy