



Decision Making in Control Rooms

By some estimates, a person makes 35,000 decisions a day (WSJ June 11, 2016 “The Cure for Decision Fatigue,” Jim Sollisch). Pipeline companies rely on controllers to monitor and remotely control pipelines and facilities. If a controller is making up to 35,000 decisions in a work day, companies need to provide adequate information, relevant procedures, and training programs that ensure that controllers and their supervisors have the requisite knowledge, skills, abilities, and qualifications to make the right decisions at the right times.

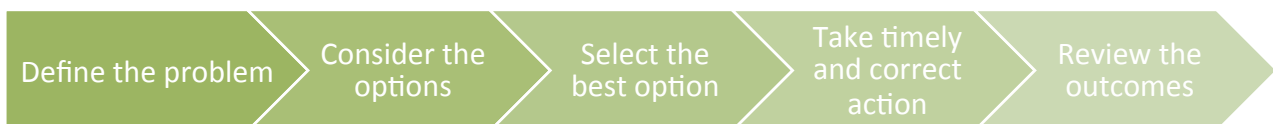
Team Resource Management (TRM) training should include modules on both individual and group decision making methods. The purpose of this article is to provide basic information on decision making processes from a human factors and teamwork perspective and apply that information to control rooms.

In most control rooms, a controller is assigned to a specific console or domain of responsibility. He or she is responsible for the decisions related to the operation of assets from that console. That simplifies decision making unless the company requires the controller to seek advice or permission from another person, such as a supervisor, before taking some of the actions. If that is the case, the supervisor should be both trained on the operation of the console and qualified to perform covered tasks. How does your control room team assign responsibilities for decision making?

I worked with PetroChina in their Beijing Oil and Gas Control Center a few years ago. They had two controllers assigned to each console and they shared responsibilities for operational decisions. I did not think that is a good practice, but since then I have seen the same practice in other control rooms. Perhaps two heads are better than one, but how do the two make the final decision in a situation? Do they flip a coin? This may not be a problem if there are procedures for normal, abnormal, and emergency operations that provide specific guidance. In most companies, the procedures for normal operations lack specificity and a controller still has to apply some individual judgment. How will two decide what is best?

Over the last 20 years, some pipeline companies have enacted a shutdown philosophy that has made it simpler to minimize the effects of abnormal operations. These companies have provided “stop work authority” or “when in doubt, shut it down orders” for all employees if they suspect something might be a leak, spill, or other abnormal or emergency event. That is a best practice and a sign of a robust safety culture. Other companies depend on employees to make the right decision in abnormal situations.

Decision Making is a process of choosing a course of action to meet the needs of a situation or to solve a problem. The process includes:



A person faced with a problem has to use the available information and then analyze that information, based on their knowledge, experience, and judgment. The risks and consequences of the decision should be considered, and it is best if the person uses a method of simple risk assessment. Procedures should be developed to address the risks of abnormal situations, and employees should be trained on their use. That makes it easier to take the correct action at the correct time. Time is of the essence in an abnormal situation. And the person is held responsible for the decision. That is as it should be. But that does not mean it is easy for an individual to make the right decision. Some are hesitant to shut down a pipeline. We want to keep the lines running.

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Here are a few quotes from a NTSB pipeline accident report in 2004:

- *An 8-inch-diameter pipeline ruptured and released approximately 4,858 barrels (204,000 gallons) of anhydrous ammonia.*
- *Contributing to the severity of the accident was the pipeline controller's failure to accurately evaluate available operating data and initiate a timely shutdown of the pipeline.*
- *The controller's assessment was that he was delivering more ammonia from the pipeline than was being added to the pipeline and that this condition had decreased the pressure. This assessment led him to increase the flow rate at 11:27:50. He later said that he thought that within 10 or 15 minutes the pressure readings would increase. Therefore, he planned to wait for a few minutes, and, if the pressure readings for the pipeline did not increase, he would reevaluate and delve deeper into the situation.*
- *The SCADA system can display a trend screen that shows pressure and flow trend data graphically, and the controller told investigators that looking at a trend screen would have been helpful in the analytical stage. However, the NTSB report said, he did not use trend screens in evaluating the incoming data. He told investigators that his training did not specify which screens to use to analyze and evaluate the SCADA data.*
- *The controller said that he felt that he had full authority to shut down the pipeline and that he did not believe there would be consequences from Enterprise if he shut down a pipeline and it was subsequently determined that there was no leak.*
- *About 11:48 a.m., the dispatcher (county sheriff's office) called the control room to report the release that had been reported to 911. Another controller, who was sitting at the console adjacent to the ammonia pipeline controller's console, answered the phone and handled the call. The ammonia pipeline controller told investigators that when he heard the telephone ring he immediately realized that there was a leak on the ammonia pipeline.*
- *He (the supervisor) indicated his belief that the controller had enough information between 11:20 a.m. and 11:25 a.m. to lead him to shut down the pipeline.*

There are four principal methods for making decisions:

1. **Recognition-based** or intuitive: Remembering actions from a previous experience and applying it to the present situation.
2. **Rule-based**: Identifying the situation and applying the rule or procedure for the situation.
3. **Choice-based**: Generating a number of options and selecting the best one for the current situation.
4. **Creative-based**: Devise a new course of action for new or unusual situations you are facing.

There are limitations with each method. In the accident described above, the pipeline controller evidently did not have the experience to use the recognition-based method. He was making calls to field personnel to see if they were affecting operations. No one has enough experience to know every operation that can occur on pipeline systems. Since most controller training is on the job, it is not likely that all situations will occur during the training period. That is why some companies are now using simulations or scenarios to help people learn to recognize abnormal situations. All companies should be doing that regularly, not just once every year or once a career.

Perhaps there was a rule to use the trend screens, but the controller said his training did not specify that rule. After the accident, the company instituted a new rule for controllers. It stated that if controllers were not able to analyze an abnormal condition and determine the cause within five minutes, the controller was to shut down and block in the pipeline.

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The choice-based method or creative-based method might have been the ones the controller was using in the situation above, but they are not the best ones for companies or individuals who want to reduce the risks of a pipeline accident. They are more appropriate for group problem solving and decision making when the information is ambiguous and when there is adequate time for data gathering, analysis, discussions, and group consensus seeking.

What would you have done if you were the controller in the 2004 pipeline accident?

Could any of these factors affect your ability to make the right decision: level of experience, technical knowledge, familiarity with the situation, stress, fatigue, distractions, interruptions, lack of information, pressure from peers or managers? These individual and organizational factors can and do affect us.

There are ways to improve our decision-making abilities:

- Improving situation assessment skills
- Improving problem solving skills
- Enhancing technical skills and knowledge of the pipeline systems
- Regularly reviewing rules, regulations, procedures, and lessons from incidents
- Drills on recognition and response to abnormal operating conditions and emergencies
- Maintaining knowledge of ongoing processes
- Remaining current on any changes in the pipeline system

I keep thinking about those 35,000 decisions a day and wondering what companies should be doing to ensure that controllers, operators, technicians, and others make the right decisions when performing operations and maintenance tasks.

In the absence of skills, knowledge, procedures, and well-defined responsibilities, will employees resort to a coin toss?

Would you? What is your usual method for making decisions?

Do you have procedures so employees can practice rule-based decision-making?

What lessons from operating incidents and near misses at your company could be used to improve decision making by you and your team?

Do you have a library of scenarios for training employees on the steps to take during abnormal and emergency operations? How often do you use them with groups and individuals?

Contact me if you want additional information on our Team Resource Management training courses. We can do a four hour awareness course that introduces the concepts or courses of one or more days that are comprehensive and tailored to your control room. It is likely we will do a workshop in early 2017 in the Houston area.