Hazard Awareness, Recognition, and Control:
So, Why Don't You Have Time to CHAT?

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Introduction

Six sigma tools have been used successfully to build essentially defect free environments (one can only expect to see 3.4 defects per million observations). This defect frequency is indeed extremely small and viewed as acceptable for many product and service based quality objectives. What if however, the defect resulted in a sprain of the wrist, a cut to the hand, the loss of a finger, a debilitating back injury, a fall to a lower level, and even death? Would 3.4 defects per million observations be acceptable? What if your definition of observation was not by job, task, or even procedural step….what if it were by hour of work, minute, or even second? With this definition, are you still comfortable with six sigma safety performance?

To further illustrate the challenge, what if we counted observations by each mental thought involved in order to execute the simplest of tasks…say walking through a door way:

- Will I use my left hand or right hand to open a door?
- Where will I stand as I open the door?
- How fast will I open the door?
- If the door is solid and I can't see what's on the other side how will I position myself?
- As I walk through the door, is there anything that can cut me, is there a threshold that I must navigate over to avoid tripping?
- What is the condition of the floor on which I'm about to walk, is it wet or slippery?

Consider your drive to work today. How many sub-conscious decisions were you required to make as you drove your vehicle? What if each and every one counted as an observation in the data set? If you drove an hour today, how many independent thoughts and actions were required during your commute? While this estimation is difficult, one thing is certain. One poor decision combined with a number of external conditions could end your life or cause serious bodily injury. One instant in time could re-direct your entire future and have an ever lasting impact on your immediate family, friends, and co-workers. Think about that as you reach to answer the cell

phone, look to see what your kids are doing in the back seat, or try to adjust the radio station next time you are driving to the grocery store.

Reducing Defective Decisions

The elimination of injury and illness is a significant challenge for all health and safety professionals. We work to educate, teach, and learn about hazards in the hope that individuals will apply this information to their work environments and make better decisions. Some groups have used graphic videos in an attempt to get folks to wear Personal Protective Equipment and not place their hands into moving equipment. Other use first hand testimony from victims of flash fire, chemical burns, and even from those who have failed to use a hand rail and fallen down a flight of stairs. Yet, in spite of all our efforts to share Learning Experiences, each and every one of these example incidents is repeated. Did you every wonder why?

Most would agree that distractions, inattention to surroundings, poor job design, and failure to recognize hazards has appeared as a plausible cause during the root cause investigation process. If we look deeper into the causes why get folks hurt, we may also find that individual risk tolerance, indirect rewards for taking shortcuts, and peer pressure also influence decision making and behavior. Industrial hygienists follow a very simple process to identify and remove hazards from the workplace: Anticipation, Recognition, Evaluation, and Control. A similar approach has been applied with CHAT – Continuous Hazard Analysis Technique. Once a participant truly understands how the various hazards within their work environment can hurt them (anticipation); they then can focus on identifying them (recognition); and work with peers to (evaluate) how to (control) them using a sound, culturally accepted risk management strategy. This process works but, it must be applied continuously as all actions are performed by each person throughout the work day. All members of the collective community (full-time leadership and staff; operations personnel; contracted contingent staff; new hires; short-term staff; and independent contractors) must understand the process and hold each other accountable for using if the true value is to be achieved. The first step starts with setting the case for change.

The Case for Change

A community of individuals, with different backgrounds, must be properly prepared for cultural change. Seeking 100% engagement can be accomplished in a number of ways. An approach used at one site within The Dow Chemical Company was to launch a fast track six-sigma Safety project. With ample advertising weeks before fast track week, project team members and the individual groups they represented were made aware of the case for change. A survey was used to measure safety attitudes and share the current performance of the site. The survey was initiated by the site leader. Members of the team were chosen to represent all groups on site. Participating on the team was viewed as a value added development opportunity. With that however came a number of expectations: Participants were to represent their local group's thinking-not just their own; they would help develop work product to close the gaps; each person would keep the lines of communication open; and of course all members would participate in the fast track week.

Fast track week began with a review of previous incidents to establish a detailed understanding of the causes which are common to all cases. This process has been used at a number of locations with the direct intent of better understanding how individuals are getting hurt. In most examples, hazard awareness and control defects have accounted for a sizable percentage of the defects noted (40-70%). Once the opportunity has been established by way of the cause analysis, then teams were formed to further understand how improvements could be made to eliminate the defect. In one location hazard awareness was identified and a project team was charter. After a careful reviewed the site's previous two years of root cause investigations it was determined that in 90% of the cases, some element of the hazard awareness process had failed as noted in either a direct root or contributing cause.

Pre-Task Analysis: CHAT Evolution

Prior to developing CHAT, Dow had a number of Hazard Awareness and Recognition documents located in a globally available Model Practice Archive (MPA). A review of the available tools illustrated several improvement opportunities including:

1) A lack of hazard control expectations prior to work
2) A failure by leadership to clearly expect certain control strategies would be used every time
3) Poor integration of tools to identify and control hazards

While the tool set in the MPA was deficient in some aspects, these model practices served as an excellent resource for the Hazard Awareness (HA) development team.

The HA development team was composed of a diverse group of individuals with a broad range of backgrounds and opinions (operations includes both union and staff representation, Research and Development (R&D), contractors including site support and contingent staff, and other administrative roles). The initial focus of the team was targeted on redesigning the site approach to using Pre-Task Analysis (PTA): the HA process was welcomed and utilized by all employees.

Pre-Task analysis is designed to drive individuals to think about the risks of performing work before work actually begins. The process is facilitated by completing a written card which is used to stimulate the individual to plan for hazard control. While there are many, many versions of the card found across Dow globally, most have the key common elements: a person's name is entered, there are multiple check boxes provided to prompt individuals to think about common hazards, the back of the card requires individuals to list steps associated with doing work, then list 3-5 hazards for each step. The final column is used to list controls expected to be followed to mitigate the hazards.

The trigger for completing Pre-Task analysis cards varies by work group. Office / Administration folks tend to complete cards anywhere from weekly to monthly; R&D and operations personnel tend to require them weekly. Newer personnel (recent hires) and contractors require the completion of cards daily. One maintenance group requires a card to be completed with each Job Ticket. An individual may be asked to complete multiple cards per day – depending on the number of jobs completed. In most locations, cards must be carried on the person for the duration of the week. Supervision may request to see someone's card at any time. In the event of an incident, cards are usually requested as part of the root cause investigation process. Even with all

this focus, we still have a significant number of individuals being hurt (90% of cases) as result of HA related cause.

The HA team's detailed analysis of the previous two years of injury / illness data from Root Cause Investigations (RCIs) shaped the scope, direction, and work product of the team. The team moved in an innovative direction which went well beyond just "changing" how PTA was used. By design, the key messages found in hazard recognition, evaluation, and control would be implemented over prolonged period of time. This approach was chosen to enable learning versus completing compliance training. To be more effective, the team would need to take a comprehensive approach to interconnecting already existing programs and tools associated with HA. In addition, the team would need to deliver the information in a creative "non-traditional" way to maximize learning which included a sprinkle of humor to peak interest. As a result, four modules were included in the roll out:

1. The Value of Hazard Awareness – Why there is Personal value in analyzing hazards
2. The Process of Hazard Awareness – How to identify, analyze, and detect hazards
3. Hazard Awareness Tools – Improved tools used effectively
4. Prevent, Protection, and Elimination – Sound risk management control strategy

Each module was designed to build upon learnings from the previous module. Self-paced narrated Power Point presentations were developed to ensure a common message and effective use. Each module promoted discussion by the group watching the presentation (stop and discuss questions included). Multiple exercises were also developed to reinforce key points that were discovered during the six sigma project cause analysis. While the concepts and safety theory of the training materials are not "new" nor unique, the approach used to weave them together ensure greater learning proved effective. An effort was put forth to demonstrate how multiple programs work together to enhance the layers of protection and ensure better choices are made task-by-task instead of once per week. In order to drive acceptance across multiple cultures within a single site, two versions (with different examples) were created. One version was designed for manufacturing and engineering and the second was adapted for R&D, functional roles, and administrative personnel. Contractor companies were permitted to select the version that best fit their organization.

The CHAT program establishes a culture of personal value and responsibility which is core to injury reduction. It reinforces continuous communications between workers and reduces the focus on written PTA cards once capability has been validated within the work group culture. CHAT also encourages workers to stop work and re-assess hazards when conditions in the field change. Workers effectively trained on appropriate control strategies continuously help reduce risks associated with on-the-fly decisions.

The Value of Hazard Awareness

The first step in getting folks ready to address the need to change was to get all individuals to recognize that the choices they make at work do have personal consequences for not only themselves but, their co-workers and family. While many presentations have focused on the "fun things" folks might miss if they are hurt, this presentation highlights the impact injuries and illness have on the ability of the injured to perform required at home tasks. Simple things like

loading the dishwasher, going to the grocery store, and painting a door. While one may be able to give up the "fun things", we all will need to find a way to manage the things we "need to do".

While the presentation persuades most individuals that a work related injury or illness would impact their family life, some feel it wont' happen to them. To address this issue, the previous year's recordable cases were analyzed with a focus on Hazard Awareness. The data indicate that the majority of the cases do indeed have a strong hazard awareness component. Either folks did not recognize the hazard at the time the work was performed or, chose not to implement an effective control to mitigate the hazard. The presentation demonstrates the decision process which one goes through and is illustrated by Greek mythological figures – called angelos (angel) and debolos (Mr.) mischief or devil. An exercise included in the presentation helps to reinforce, to all participants, that one's personal choices in the work environment will certainly impact one's personal life.

The presentation was well received by all as entertaining, informative and attitude changing. A survey of participants, after seeing the presentation, indicated that 84% would take fewer risks in the future as a result of this presentation. The techniques used in the presentation have been dubbed transformational in that it presents the material in a truly innovative and effective.

The Process of Hazard Awareness

In the second segment, the team addressed the learning Process associated with Hazard Awareness. One of the keys to this segment was acknowledging that indeed there were many programs and process already in use to identify and control hazards. Within Dow, a person may be receiving information on hazards by way of a written procedure, Safe Work Permit, Behavior Based Performance process; warning stickers on equipment; key point cards; job safety analysis; job operation card; pre-start-up review; local safety standards and requirements; global requirements; and by peer interaction. Each program and practice was developed over many years. To this point, no one compared and contrasted how each of the systems worked together to provide layers of protection against hazards. As a result, most individuals felt that the work being asked to be performed was redundant and of low value. The Process of Hazard Awareness was designed to address this issue "head-on" and clearly articulate how the systems work together.

The team developed the following process: 1) Get Ready, 2) Stop and 3) Go Safely. The process was designed to pull together all the other tools described above. The Ready step is our experience and training which prepares us to be able to recognize hazards. The Stop step requires one to take the time to look for the hazards in the field. The Go Safely step is dedicated to controlling recognized hazards. In addition, the team learned that many injuries occur due to changing conditions. In response to this discovery, we added another step in the flow chart. If something changes Stop Again to first evaluate new hazards introduced with the change before continuing. The case analysis also recognized that there were prompts present to stop and revaluate but, most folks did not stop. Injured personnel were not considering changing conditions. As part of the presentation, a stop sign with eyes was created as a visual to remind us to stop to look for changing hazards.

Changing conditions come in many forms. If a maintenance person is removing seven bolts from an eight-bolt flange pattern easily only to find that the eighth is frozen, will he go and get a hot

work permit to remove the eighth? If were climbing a 10-ft ladder 5 feet and discovering that we need to go 9 feet to get the job done, will we stop and get fall protection and tie off? Having the discipline to recognize that job scope has changed and a commitment to get the right tools for the job or consult with others how to proceed has directly been seen in the data.

Another surprising discovery was that our process analysis demonstrated that many people simply overlook routine and repetitive tasks, such as traveling to and from the area where the task would be performed. A detailed review of Pre-Task cards noted many did not include this as part of their Hazard Analysis. As a result, there were not able to respond to the hazardous conditions because they did not anticipate them. Our analysis determined that we were very good at mitigating hazards of the task but, were commonly overlooking the risks associated with getting ready to do the job, getting to the job, and wrapping things up after the job was finished.

The audio dubbed Power Point presentation was used to communicate this enhanced process. It shows actual injury situations which recently occurred, showing how the recognition and control process failed and how the new process with prompts for change could greatly enhance the recognition and control of hazards. It showed examples of prompts and the expected reaction to stop for these prompts of changing conditions. The presentation also clarified that failure to look for hazards and to control hazards is not an accident. While the unexpected may occur, our preparation and reaction will allow us to avoid an injury.

> I will always look for the hazard.
> I will be alert for prompts due to change
> I will always take the time to stop.
> I can avoid an injury.

The CHAT Tool – What Has Been Improved?

Several improvements opportunities were identified during the case cause analysis. The CHAT card template was modified to reflect these changes. An area for "prompts to stop" was added along with a section that required individuals to document what they would actually do if prompted to stop. If the prompted triggered a concern for others, a visual trigger and data entry point drives this behavior to occur. In addition, individuals are asked to document the activity they would personally "miss" if they were injured today. This approach permits two things: (1) to acknowledge that being safe bring personal value; (2) it becomes an initial ice breaker when someone stops a person to "CHAT" about the hazards they are controlling today. The final change was to include a section where a second person could document that a CHAT card was reviewed. By doing so, we move closer to a culture where a more common approach is used to identify and control hazards. All these improvements were identified during the cause analysis process.

The written program, designed to direct the use of the CHAT process, also received some upgrades. The focus on the written card was diminished. It is clearly better to CHAT about hazards 20 times than to write a perfect CHAT card once. Experienced personnel are permitted to use the verbal process once they have demonstrated proficiency completing written cards. Our behavior based performance process is used to verify this competency. Members of the community view verbal CHATing as less onerous thus, it is an incentive to "graduate" to the

verbal process. Some experience groups now complete a verbal CHAT in groups while others document verbal CHAT on poster boards in the control room. The key is getting folks to think about how to control hazards all the time…not just during perceived at-risk tasks. Guidelines advancing groups to a verbal program are provided in the written program.

Control: The Art of Prevention, Protection, and Elimination

As was previously noted, the missing piece of the hazard awareness puzzle was how to adequately define "accepted and expected" controls to prevent injury. While it is very easy to write up an "iron clad" set of control strategy for a given risk…. it may be very difficult to perform work while applying these controls. Getting all individuals to exercise an acceptable and equivalent amount of control is significant challenge. In order to address the issue, we first need to define the three primary levels of control: Prevention, Protection, and Elimination in terms that each work group could understand and relate. In terms of prevention, were attempting to prevent a person from being exposed to the hazard in the first place. Typically, engineering controls are used to keep humans away from the hazard. Protection is an approach common to Personal Protective Equipment strategies. Finally, if we can eliminate a hazard by removing the condition all together, we can eliminate the possibility that a co-work could stumble across it and get hurt. This segment then attempts to prioritize the levels of control by recognizing that while elimination is the best choice, it's no always one we can choose first. Each level of control must work in harmony to deliver a safe work environment. An individual's willingness to use these controls is then influence by their personal risk tolerance and how the management systems are applied to the work group to influence this decision making.

The amount of effort needed to customize each CHAT presentation is variable. Ultimately, examples used within each slide set should reflect the local culture and represent actual recordable cases at the local unit level to have the greatest impact on worker decision making. In the first presentation segment a base case is made for Personal Value. Next, participations are taken through the hazard awareness Process. In the third segment, the CHAT tools are introduced. The final presentation segment is devoted to Hazard Control. Modifying each presentation to reflect local culture could result in the need to change multiple pictures and to re-record several of the voice over slides. Groups that have made the effort have enjoyed the results.

Results

The CHAT program was developed and implemented at one of Dow's major US manufacturing sites as part of a fast track safety Six-Sigma project. The project analyzed all injuries for causes and found that HA was a major cause in nearly 90% of injuries, and then identified gaps in the existing PTA program for targeted improvements.

After implementation, the site Dow and contractor employees completed over seven months at an OSHA-recordable injury rate of 0.13. During this lengthy run, the site has had three injury-free streaks of 62, 70, and 70 days as of March 30, 2007. This is more than 6 million work hours with just four injuries severe enough to be called an OSHA recordable. During this time, injuries have been reduced by 75% overall and 85% for injuries due to failure to recognize or control a hazard.

This is a statistically-significant improvement. It means that there have been 13 fewer people injured in 7 months than what was experienced in 2005 -- just before CHAT (Continuous Hazard Awareness Technique) implementation.