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Building Continuous Improvement Teams that Change Safety Cultures

Michael Williamsen, Ph.D.
CoreMedia Training Solutions
Portland, OR

Introduction

When applied to the workplace, Kaizen activities continually improve all functions of a business, from manufacturing to management and from the CEO to the front line workers. By improving standardized activities and processes, Kaizen aims to eliminate waste. The following paper explains how Kaizen principles are used in concert with accountability, Continuous Improvement Teams and organizational tools (such as Pareto charts), to achieve milestones and overcome the obstacles of culture change and achieve sustainable safety excellence.

Culture Change

The process for changing a safety culture and changing an overall company culture are remarkably similar. Each culture improvement initiative requires committed and involved management, clear rules of engagement, and the creation of well defined accountabilities up and down the organization. The focus needs to be squarely aimed on leading indicators. A grassroots Kaizen approach has been proven to be extremely effective by manufacturing giants such as Toyota and Motorola. These principles for transforming productivity and quality are really no different than those for driving safety excellence. The Kaizen model is effective in optimizing resources and long-term staying power by putting emphasis where it belongs: on leadership *visibility* and *participation*.

Once leadership is committed, it's a matter of supporting the process with tactical coaching and knowledge transfer. Another key to getting this initiative "up and flying" is the formation of Continuous Improvement (CI) Teams; volunteer-employee run groups dedicated to one safety process improvement objective at a time. A first step for these CI teams is training to learn both foundational theory and practice. CI Team training includes:

- Safety history and fundamentals
- A Four-Step Accountability Model
- The Six Criteria for Safety Excellence
- A Six Sigma approach to improving safety
- Team rules and dynamics
- Continuous Improvement Team tools

Detail on these practical theories is given during the initial meeting. From there, it is about the utilization of the Kaizen approach to improve safety culture deficiencies.

How long does a reculturization take? Like any other system change that lasts, there are no quick fixes: committing leadership and other resources for the long-term are a must. Perseverance is key. In other words, a Kaizen approach is systemic, and conducive to sustainability, and must be applied consistently over time.

The Process

How do the cross-functional, cross-organizational volunteer teams effectively Analyze, Focus and Execute using meaningful data available? The non-complex tools should be familiar to personnel who have engaged in manufacturing's Six Sigma, Kaizen, and Lean tactics. The purpose is not to re-invent a new type of tool or process. Rather, it is to demonstrate that safety culture change utilizes already-proven techniques that involvement teams are already using to relentlessly eliminate the errors that exist in an organization's cost, quality and customer service cultures.

There are five critical components of safety culture change:

1. A time of basic training so your people are able to understand how to "turn on the switch" that helps deliver culture change.
2. The utilization of safety performance improvement tools and techniques that help to deliver performance going beyond what is available through government regulations (level 1) and observation related programs (Level 2). These tools include:
    - Level 3 Accountability
    - Level 4 Culture Diagnostic
    - Level 5 Continuous Improvement Teams
    - Level 6 Effective Leadership
3. The engagement of your organization's volunteers in a 90 to 120 day Kaizen team process that turns complaints into goals. With visible, engaged upper management (visible – felt leadership) these teams turn "complaint – goals" into practical, low cost solutions.
4. The development of practical day-to-day safety accountabilities that are trained, lived, measured and rewarded by personnel at all levels and across the whole spectrum of the organization. These are best developed by a Continuous Improvement team that focuses on a detailed process of defining, training, measuring, and rewarding specific actions at all organizational levels.
5. The long term commitment of time, capital and leadership resources to this culture change initiative.

If the commitment for these basic critical components is in place, there are six outcomes that become a part of the safety culture change initiative:

1. A safety culture reality check. This is the safety perception survey that shows strengths and weaknesses at all levels and in all departments of the organization.
2. A systematic application of basic training. This includes learning the theories presented above by using both lecture and practical application exercises. The intent of this training is to help set a new direction.

3. The engagement of leaders that have a passion for the relentless pursuit of a zero incident safety culture (Level 6 leaders). These people need to be chosen from all levels of the organization, i.e., from hourly operators to senior executives.
4. The development of practical, visible audits that quickly check the state of the safety culture and its on going improvement.
5. A new safety performance metric that goes beyond reactive downstream incident events. The new focus needs to be on the execution of practical day-to-day accountabilities that help to eliminate injuries in the workplace. These metrics focus predominately on what people within the organization are doing that is right, rather than on the mistakes (errors) that are not desired.
6. The active, positive, meaningful engagement of the hourly workforce. They are the ones that get injured. They are the ones that know and live with the safety problems in an organization. They are mission critical to any Kaizen culture change initiative.

Basic Training

Most safety practitioners would agree with safety pioneer Dr. Dan Petersen's belief that accountability is a key component of a successful safety system. But what are the key accountability components, where do they fit in the safety system, and how are they implemented successfully? These and other safety fundamentals are presented and discussed. The basic training then moves on to some Key Components like: the four-step accountability model; Six Criteria for Safety Excellence and Six Sigma safety.

The Four-Step Accountability Model for Change

Define

The first step in a successful accountability system is to clearly define the safety activities that will be completed at each level of the organization. Everyone, from the CEO to the hourly employees, must clearly understand what they are supposed to do each day to prevent accidents and injuries. Traditional safety systems rely on the safety manager to implement safety activities while the rest of the business goes about quality production and on-time delivery to customers.

Defined roles must be specific and measurable. To say the role of the executive is to support safety is fuzzy. It is not clear exactly what the executive is to do, how often he/she is to do it, and how it will be measured. A single example of a more concise role definition for an executive is: To review all Vice President's safety activity reports each month, and discuss the reported activities and give positive, or negative, reinforcement as appropriate.

Train

Once safety activities have been clearly defined for each organizational level, a training plan must be developed to ensure everyone knows how to complete their tasks in a high quality manner. Traditionally, organizations have focused on training the hourly workers in compliance program basics and have failed to recognize the importance of skills development training for supervisors and managers. Many organizations begin defining activities at the supervisor level, such as conducting safety meetings, completing inspections, employee contacts, etc. Often we assume supervisors have the knowledge, skills, and ability to complete the tasks in a quality manner, when in fact they don't. For each specific activity we must ask the questions:

- Is training necessary to enable quality performance?
- What type of training will be provided?

- Who will conduct the training?
- How long will the training take?
- How will we ensure new employees receive training?
- How will we measure the effectiveness of the training?

The answers to these questions begin to culminate into a training plan (or matrix) for each level in the organization. This type of training plan is essential to the success of an accountability system.

Measure

Once the training plan has been executed, the safety activities must be measured for completion quantity and quality. This step combines the need for solid defined activities at the manager and executive levels because managers must spot check the work of their employees. Each level must spot check the level below, review and ask open-ended questions about the reported activities, and visibly demonstrate that safety is important by completing certain activities themselves. The overlap here for these senior levels between defined activities and measurement is not always obvious, as many of their specific activities deal with measuring the quality of the activities below them. Once supervisor activities have been defined, trained and begun, the managers defined roles, as described above, are a critical component to quality completion and to the success of the overall measurement process. Measurement systems are more effective when they are implemented in the spirit of "catching employees doing things right" at every level of the organization.

Reward/Recognition

Once we "catch employees doing things right" for safety, they should be recognized in a soon, certain, and positive way. We often think of rewards in the traditional safety environment that has "trinkets" (hats, T shirts, flashlights, etc.) given to employees for achieving no injuries over a period of time. These type rewards tend to encourage employees not to report accidents, as opposed to the intended purpose of changing their behavior from unsafe to safe. The real question is "if I give you a hat, will you make a habit of wearing your safety glasses?" For most employees, the answer to this question is "no." Therefore the reward is of no value in producing safe behavior.

Today, the most effective recognition processes focus on safety activities that immediately recognize safe behavior from boss to subordinate in the normal course of day-to-day activities. Employees want to know from their boss that they are doing a good job. The message should be delivered in a manner that employees believe is sincere. This process is not about gimmicks or trinkets, but is focused on proven principles of behavior reinforcement.

The Six Criteria for Safety Excellence

Before we begin to implement the four step accountability process, we must first understand its place in a successful safety culture. Dr. Dan Petersen identified six critical success criteria for a strong safety culture. In working with a variety of companies including railroads, bakeries, steel companies, furniture companies and the like, he discovered that companies within different industries that were successful in managing safety well had the following six things in common:

- Senior management visible commitment
- Middle Management is actively involved
- Supervisors are performance focused
- Employees are actively engaged

- Processes and Activities are flexible
- System is positively perceived by employees

These principles are presented and discussed with the improvement team members. They are then instructed to use the Six Criteria for Safety Excellence as a "filter" to judge the effectiveness of the improvement solution that they develop. Instead of asking something like "the five whys" teams ask how their solution involves and actively demonstrates: visible upper management commitment, active middle management and the like.

Six Sigma in Safety

What Six Sigma did for quality can also occur in industrial safety. A similar desire to eliminate product mistakes is at work to reduce injury and incident rates. In this parallel journey there are six levels (or "six sigmas") of performance tools and techniques in safety. Each "sigma control" builds on the previous level until the sixth sigma — a zero-incident safety culture — is attained.

One Sigma Control

One sigma is set in the era of the three E's of safety: engineer, educate and enforce. The tools for these rudimentary safety mechanics include work orders, safety rules, injury investigations and compliance programs. While barely touching the surface of why injuries occur, one sigma tools nonetheless lay the foundation in establishing a safe workplace. As with one sigma in quality, the performance — conceptually, at least — is 68.5% error-free. This first level represents the ability to sustain the reactive, predominately condition based, essentials in worker safety.

Two Sigma Control

The tools for two-sigma control include observation programs, job safety analyses (JSA), and near-miss reporting. At this level, awareness and analysis tools are applied to reach a two-sigma level or injury-free rate of about 98.5%. Statistical equations show that a 10% error level requires about 3,000 observations to be statistically relevant in detecting mistakes. As errors decrease, more observations are needed to detect the incorrect activities. The same statistical formula calculates that a 1% error level requires about 40,000 observations to be statistically valid. This is a benchmark that underscores just how challenging it is for companies to move beyond two-sigma control without adding to their traditional safety repertoire of observation programs and "rearview mirror" injury reporting. Two sigma safety control is focused on the reactive approach of "what we see" with respect to work force actions.

Three Sigma Control

Three-sigma product quality requires well defined responsibilities and accountabilities to provide predictable results on a regular basis. The same is true for three-sigma safety. Without well defined roles, responsibilities and safety accountabilities at all levels, the possibility for companies to attain this level is next to impossible. Organizations that have been able to move from two-sigma to three, have generally attributed their success to the introduction of individual accountabilities into their safety programs. Embracing the conventions of accountability and personal responsibility is a critical factor in achieving a workplace that is closer to injury free. While three sigma is commendable, companies are still incurring lost-time injuries at about a rate of three per 1,000 employees. Three-sigma safety addresses proactively "what we do" in the workplace.

Four Sigma Control

Beginning in 1979, industrial safety author Dan Petersen, Ed.D., teamed up with Charles Bailey, Ph.D., to develop a comprehensive and statistically validated safety perception survey on behalf of the U.S. rail industry. Today, the survey system is used to audit an organization's safety culture and identify safety belief scores and gaps across 20 categories (or safety management processes) for management, supervisors and front-line employees. The self-administered questionnaire includes 73 questions and provides companies with a statistically reliable method to answer the questions, "Where do our people believe we are weak (and strong)?" and "Where do they agree and disagree?" Today's safety perception survey results can be compared with a database that combines more than two million respondents. It's a tool that provides statistically valid data for industry-wide comparison analyses. Not only does it identify safety shortcomings, its implementation is recognized as an invaluable "buy-in" mechanism to set the stage for continuous improvement work teams — a necessary component to reach four-sigma injury free levels. Four-sigma control concentrates proactively on the non-observable "What we believe" in workplace safety.

Five Sigma and Six Sigma Control

The next challenge is to unlock and utilize the data in the previous four levels of safety:

- The fundamentals: injury, condition and work order data
- Observable processes and actions
- Accountabilities of what we do
- Information on what we believe from a safety perception survey

The data from these four safety performance levels needs to be utilized by CI teams in a rapid, accurate, and functional way. Once a company is nearing four sigma performance, the major barriers to effective cross-functional continuous improvement are eliminated. A roadmap can be developed to an unprecedented five-sigma and six-sigma (three injuries per million employees) safety performance. It is now becomes possible for an organization to approach a virtual zero-injury workplace.

Just as in Six Sigma quality programs, all the foundational mechanics — engineer-educate-enforce, observe, investigate, accountability principles, and thought patterns — are necessities to establish an authentic Six Sigma safety culture. The challenge is to create a sustainable safety culture where heightened safety decisions happen without thinking deeply about them, they are a matter of course for such a well defined, documented, trained and followed safety process culture.

Good data is necessary. Yet in order to get to four-sigma performance and beyond, safety professionals need to implement a similar approach to what zero-error quality cultures use in manufacturing. That's why the next two critical success factors to establish a zero-injury safety culture require continuous improvement teams to "own" and implement the following.

- A regular, sanctioned meeting system with actionable rules and mechanisms
- The use of Six Sigma analytical techniques/tools focused on improving safety issues using reliable data

Once these critical success factors are in place, a zero-error safety culture can be developed as a recognized strength alongside the traditional business necessities of customer service, quality assurance, and manufacturing excellence.

Available Data

Typically organizations focus on level one (injury/incident) and level two (observation) data. As the organization pushes to get beyond downstream reaction data and into more proactive approaches to safety other materials are considered, like perception surveys.

Some years back Dan Petersen and Chuck Bailey of Univ. of Minnesota (Duluth) teamed together to develop a statistically validated Safety Perception Survey. A portion of their 10-year study delivered 20 categories (safety management processes) that are an effective tool to measure the condition or "health" of an organization's safety culture. The statistically validated assessment system includes 73 survey questions that map to the following 20 Safety Management Processes:

ACCIDENT INVESTIGATION	SAFETY PERFORMANCE GOALS	QUALITY OF SUPERVISION
	HAZARD CORRECTION	RECOGNITION OF PERFORMANCE
ALCOHOL & DRUG ABUSE		
ATTITUDE TOWARD SAFETY	INSPECTIONS	SAFETY CLIMATE
AWARENESS	INVOLVEMENT OF EMPLOYEES	SAFETY CONTACTS
COMMUNICATION	MANAGEMENT CREDIBILITY	SUPERVISOR TRAINING
DISCIPLINE	NEW EMPLOYEES	SUPPORT FOR SAFETY
EMPLOYEE TRAINING	OPERATING PROCEDURES	

Data from this type of survey is key to continuous improvement team solution development of leading metric safety processes that in turn are critical success factors for a zero incident safety culture. With basic training and upstream and downstream safety data, the teams are now ready to begin work.

Company Composite
Positive Perceptions & Gaps

Category	Percent Positive			Perception Gap		
	Emp.	Sup.	Mgr.	Emp./Sup.	Emp./Mgr.	Sup./Mgr.
Recognition for Performance	**47.8**	74.8	68.9	**56.6**	**44.2**	7.9
Discipline	**49.2**	**51.0**	**47.2**	3.6	4.1	7.4
Inspections	**52.6**	66.6	64.2	**26.5**	**21.9**	3.6
Alcohol & Drug Abuse	**52.8**	60.2	65.1	14.0	**23.4**	8.2
Supervisor Training	**53.5**	70.3	72.2	**31.2**	**34.9**	2.8
Hazard Correction	**54.7**	68.2	75.5	**24.6**	**38.0**	10.7
Operating Procedures	**58.1**	**59.0**	77.8	1.6	**33.9**	**31.8**
Goals of Safety Performance	**58.4**	66.2	66.7	13.2	**14.1**	0.8
Management Credibility	61.5	77.0	73.8	**25.3**	**20.0**	4.2
Quality of Supervision	61.5	81.1	76.7	**32.0**	**24.7**	5.5
Support for Safety	61.7	73.5	69.9	**19.0**	13.3	4.9
Attitude Towards Safety	61.8	80.5	82.2	**30.3**	**33.0**	2.1
Safety Climate	63.0	77.3	77.8	**22.7**	**23.4**	0.6
New Employees	63.2	74.0	73.3	**17.0**	**16.0**	0.9
Employee Training	63.9	79.1	77.8	**23.7**	**21.7**	1.6
Communication	65.3	78.9	74.1	**20.9**	13.5	6.1
Involvement of Employees	66.3	81.0	79.6	**22.3**	**20.2**	1.7
Awareness Programs	67.5	79.4	70.4	**17.6**	4.3	11.4
Safety Contacts	69.0	84.5	85.2	**22.4**	**23.5**	0.9
Accident Investigation	76.1	85.2	66.7	12.0	12.4	**21.8**
Combined Score	60.4	73.4	72.2	**21.8**	**22.0**	6.7

The Effective Safety Task Force

How does your organization create safety task forces? How do they prioritize tasks? The answers are summarized in the following process.

- Start with an Action Item Matrix
- Have only as many teams as you can comfortably run. Avoid running too many teams at once; resources can be spread too thin and people can become over-burdened and susceptible to burn-out.
- Attempt to enlist only volunteers. In so doing, people assign themselves to tasks they want to pursue and are willing to take the time necessary to follow-through and complete these necessary tasks.
- Implement only short-term, ninety-day teams that have effective facilitation, effective leadership, and effective closure. If these "three effectives" are not achievable, then the teams should not be initiated. The short-sighted approach of trying to "do everything for everybody right now," will only lead to frustration and failure.
- Have all members of the teams meet together every two weeks so as to re-connect on a regular basis. The time between these full team meetings can be increased to about three weeks, but the group should not meet more often than every two weeks. The sub-teams meet as necessary to do their testing, discussions, and problem resolutions.

<u>Continuous Improvement Team Tools in Safety</u>

How to apply Six Sigma tools in the workplace
Five and six sigma injury control requires:

- Statistical process control tools
- Dedicated continuous improvement teams
- Active participation from all levels of employees

This last component emphasizes the importance of effective meetings. Organizing effective "sub teams" to carry out tasks is an imperative. And because many of the sub teams combine cross-functional employees from different work groups, it's critical to spell out proven principles to ensure a meeting structure that ensures efficiency, participation, action and high performance.

Effective safety meetings for continuous improvement
To achieve results from safety meetings, the person who called the meeting must focus on its purpose and desired outcomes. By deploying a model called "POP" — purpose, outcomes, process — the group is able to remain focused and stay on task.

Purpose
This is a mini-mission statement. Why are we meeting? If it's unclear, start with an open-ended question, "What is our purpose for this meeting?" If necessary, go through a process of recording responses on a flip chart until agreement is reached. Subsequent meetings by this same group need to restate the purpose and make sure it is still on target. If the meeting starts to wander or branch into a separate tangent, ask if this current topic is "on purpose." A typical safety purpose may

resemble a statement such as, *Develop safety accountabilities for all levels of our organization that will help us eliminate injuries.*

Outcomes
What will be accomplished when the stated purpose is achieved? This is a brainstorm list of the issues the meeting is designed to address. It is also the metric for whether or not the tasks the group set out to do have been accomplished. The whole team or group participates in setting these outcomes and therefore seeks complete agreement as to definitions of success. Not only will you eliminate future differences, it helps eliminate discussions that stray from the desired outcome. A typical set of outcomes for our safety team might include: *Accountabilities that make a difference in safety for every job in the facility; a tracking system to follow accomplishment of these accountabilities; a reward system that reinforces these activities; reduced injury frequency as a result of doing this work well.*

Process
How will we accomplish our purpose and outcomes? Typically what follows is a description of how the team will work. Often this is *to split up into small problem-solving teams that include 'volunteers to accomplish small tasks.* Why volunteers? When people get to place themselves in performance zones where they are comfortable, they are much more likely to succeed. Conversely, quick delegation can possibly lead to having the wrong people on the wrong task. If there aren't enough volunteers to do all the work in the time allotted, time or people resources (or both) might need to be increased. This is not a crisis team; it is an improvement team that works the continuous improvement process.

Action Item Matrix

There are often a significant number of tasks that need to be done by a variety of people in varying time frames. To effectively manage this wide spectrum, use an action item matrix (AIM). This AIM is a simple five-column spreadsheet (see below). The columns (from left to right) are:

- Item number. A number for each item on the list. As action items are completed, they are moved to the bottom of the list. This way there is always a record of what has been completed, as well as what still needs to be accomplished.
- Task to be accomplished. This is a simple, succinct statement of the issue. Each task or action item is a small, bite-size manageable piece of the larger project scope.
- The team. This is a list of the volunteers that have agreed to accomplish this action item. There may be one or more, or — in some cases — no one if the assignment isn't ready to be worked on.
- The date. This is the next report out date for the task team on this action item. Sometimes it is a completion date, sometimes a progress report date.
- Comments. This is a field to succinctly write down whatever is pertinent to the action item, e.g., "awaiting vendor quote."

An abridged example of an AIM for the safety accountability team:

Action Item Matrix
Accountability Team

DATE: 6-27-XX

Members: Wolf, Lowery, Jennings, Williamsen, Brown, Morrison, Gilbert

ITEM	ACTION ITEM	WHO	Target DATE	COMMENTS
1	List all job titles/functions	Morrison	7-2	In data base
2	Hand out accountabilities from company "xyz" for examples	Jennings	7-2	Will be emailed
3	Each team member to list their own safety accountabilities	Team	8-27	Judy to put in DB
4	Critique accountabilities	Team	Until completed	Final copy review by safety council and other potential parties

The team now has its marching orders; the POP statement and its progress-tracking mechanism, the Action-Item Matrix. But how often should teams meet? The whole team meets every two weeks, the task or sub-teams meet more frequently than the greater project team. These sub-teams are the problem-solving units. More frequent whole team meetings don't give the sub-teams time to carry out their tasks and are an inefficient use of everyone's time. Less frequent meetings don't create the sense of urgency necessary for the sub-teams to move through their action items.

In addition to the above fundamentals, the safety Continuous Improvement teams may also use standard six sigma non mathematical tools like: Pareto Charts, Process Maps, Cause and Effect Diagrams and Fault-Tree Diagrams. Beyond POP and AIM, the tools they use depend on what is required by the nature of the problem being solved. Some practical examples of these follow.

Pareto Charts

The Pareto chart is one of the most helpful visual tools in the safety Six Sigma tool box. These charts are able to pinpoint unacceptable occurrences that warrant high priority investigation. Pareto charts (Fig1) show the frequency and severity of problems and where they occurred geographically.

Figure 1.
Department lost-time injuries for last 10 periods

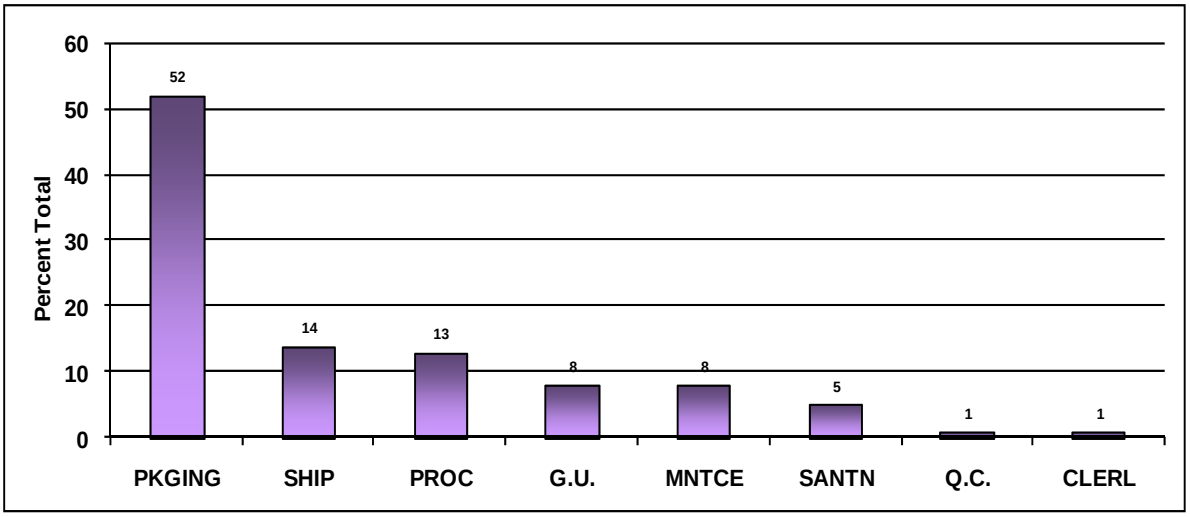


Figure 1 establishes a baseline to determine where the investigation should begin. It illustrates lost-time injuries over the last ten months by various departments, and breaks out which departments warrant the most attention (e.g., packaging with 52 injuries and then shipping and processing). Once identified, the plants with high numbers of injuries in these departments often determine where to begin the company's "Continuous Improvement in Safety" initiative.

Figure 2
Injury Sequence Process Map

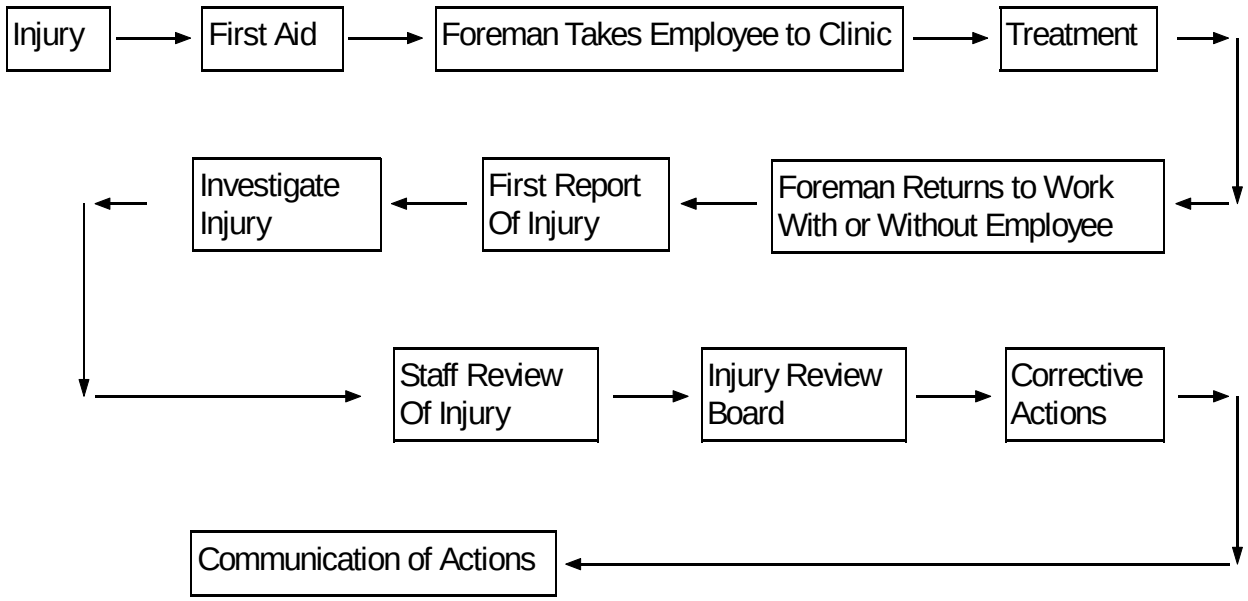


Figure 2 was developed as a result of a continuous improvement team's effort to achieve consistent injury reporting and analysis throughout the corporation. The team found that each of the plants handled its injured employees in their own way. Employees from the plants were assembled to analyze the injury action process (Figure 2). The resulting process map was what worked best and most consistently in the manufacturing environment.

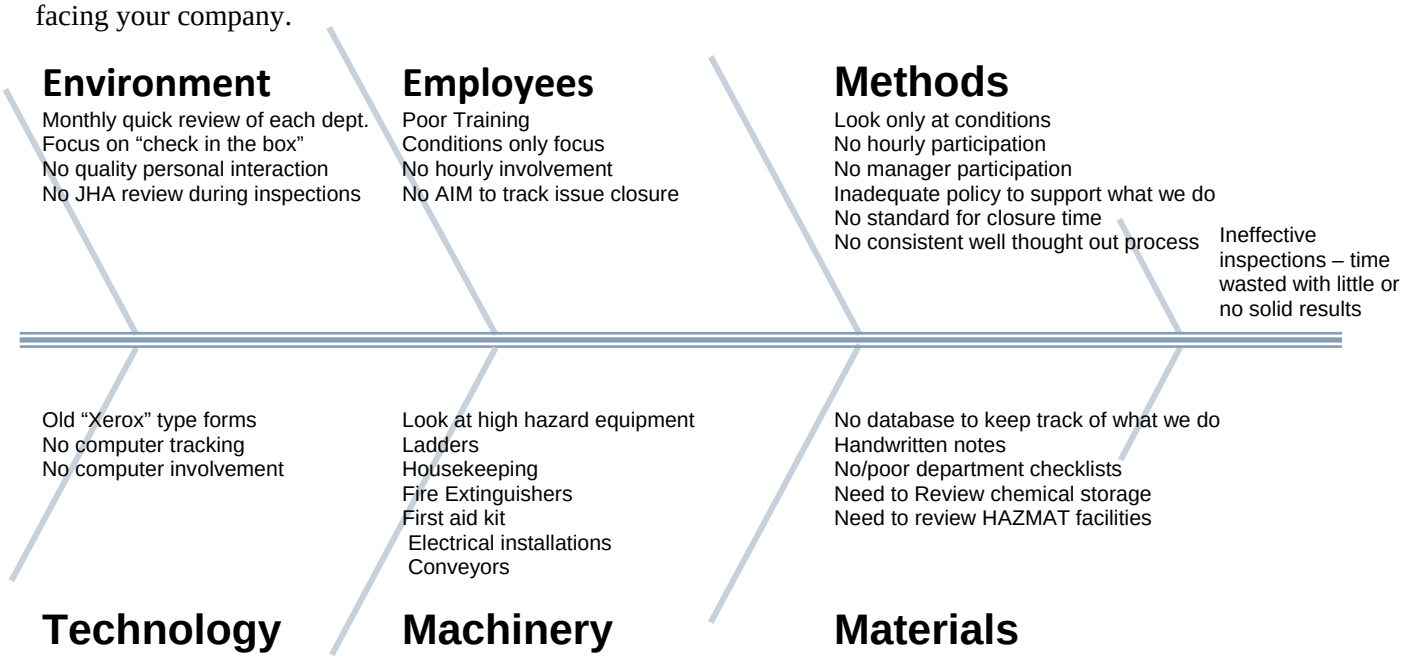
It was found that when plants sent the supervisor to the clinics with injured employees, every step in the process functioned better. Part of the reason was the supervisor took more personal responsibility for the safety of the employees because plant production was significantly at risk when they had to leave as a result of an injury. Additionally, there was a more consistent discussion of the injury (and the type of work) with the doctors when the supervisor presented what was actually happening. The employees, potentially in a state of shock, usually did not present the realities of the work situation as effectively. Lastly, they decided that the correct principle for the management to follow was one of personal employee care and not the previous practice of sending injured employees alone, by cab, to a clinic. This was viewed as a significant improvement by the employees. However, the real effort to eliminate all injuries — not simply handle them correctly — is still the target.

The Fishbone or Cause and Effect Diagram

The Fishbone Diagram is used next to better flesh out the details of the Fault Tree Analysis diagrams. The Fishbone Diagram is also an excellent tool any time you wish to provide guiding structure for a group in a brainstorming activity.

This management tool is usually associated with Total Quality Management programs and is often referred to as a Cause and Effect Diagram and Ishikawa chart. The name "fishbone" originates with its original author, who drew the chart to resemble the skeleton of a fish.

Since the Fishbone Diagram is meant for brainstorming, it is much less structured than Fault Tree Analysis. It offers a framework that allows your problem-solving group to uncover unique issues facing your company.



The first step is to state the problem on the right hand side of the diagram at the head of the fish. The question that the group would address at this point is:

What are the primary areas that might cause ineffective inspections?

From the diagram provided, we can see six possible areas that might contain the cause of the problem: environment, methods, employees/procedures, technology, machinery and materials. The second step is to place these areas on the main fish bones that run off the spine of the fish.

Consider all six potential causes of the problem. And consider the four Ms (i.e., eMployees, Machines, Methods and Materials), which are useful when dealing with problems that exist in the organization’s operating areas. This concept requires that you first write your problem at the head of the fish and then place the four Ms (and other potential causes) as the major bones. The questions used to start the brainstorming session are:

– What is there about the environment at our company that could cause this problem?

– Is there anything about our employees/procedures that could be causing this problem?

– Could the problem be caused by something in the machinery that we use?

– Is there something about the methods that we use, which could contribute to this problem?

– Could the materials that we use be causing this problem?

While the four Ms are focused on manufacturing situations, the four Ps (Policies, Procedures, People and Plant) are frequently helpful when trying to solve administrative issues and are applied the same way as the four Ms.

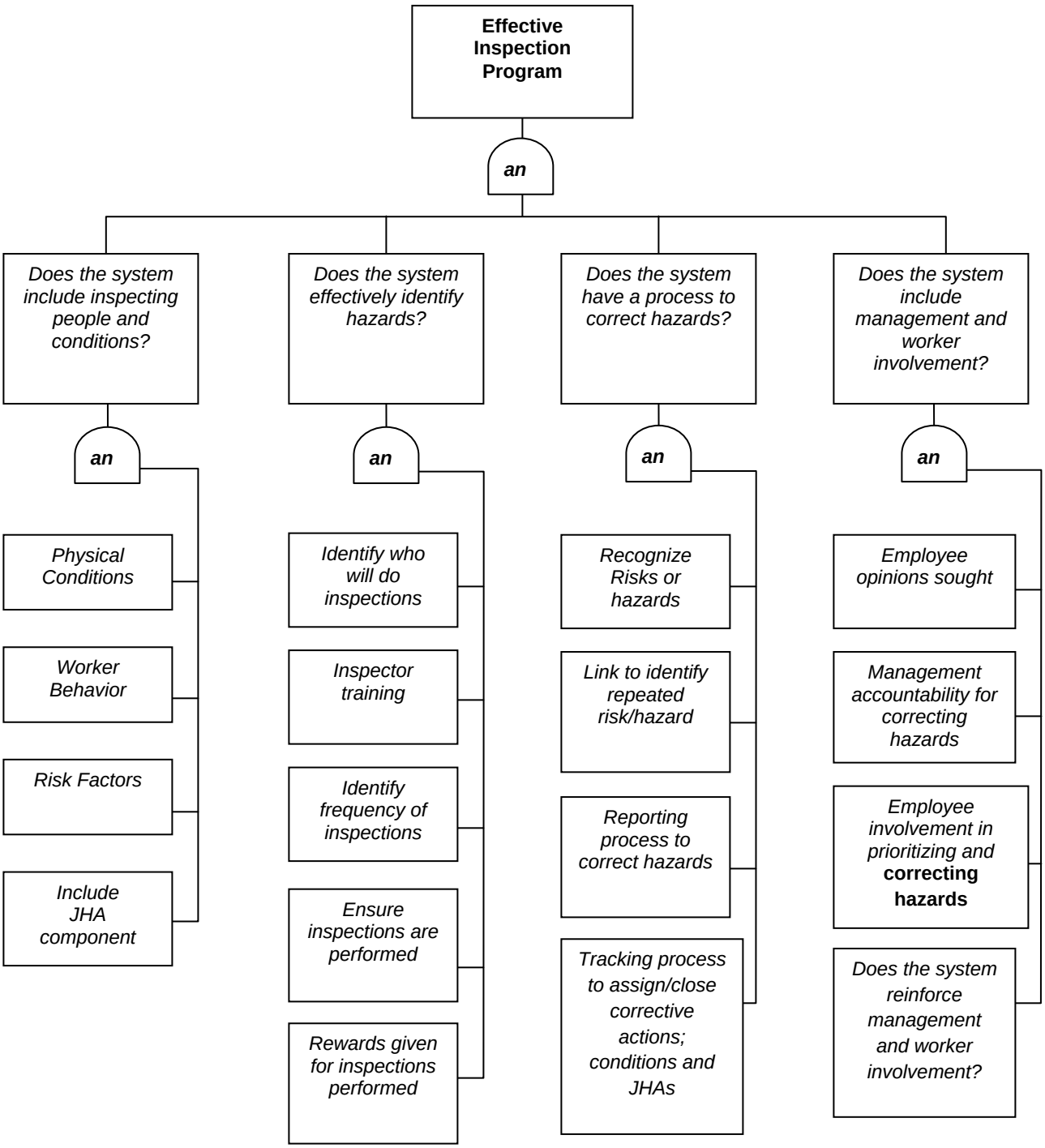
The strength of the Fishbone Diagram is its flexibility. Once the problem-solving groups gain some experience with it, they should feel free to improvise and make up categories or "fish bones" that apply specifically to the conditions in your company.

After listing all the potential causes the team members can think of, each member votes for two or three of the individual fishbone diagram causes deemed most important. This individual voting process is referred to as "Pareto voting" in Six Sigma organizations. It is not a rigorous statistical evaluation, rather it is a method that uses the personal experiences and beliefs of the engaged participants. In this manner the team can quickly sort down to the few issues they believe need to be researched and resolved in greater detail. These "focus causes" were then placed in an Action Item Matrix.

The next Six Sigma problem-resolution step was to begin a systematic search for low cost, highly effective solutions. The cause-and-effect diagram (in group mode) allows each team member to record what he or she believes to be important. In turn, the team begins to work on areas of interest believed necessary to be resolved in order to eliminate injuries and safety process problems.

Fault-Tree Diagram

A Fault-Tree Diagram is used by the Six Sigma Safety Action Teams in an effort to better define their critical success criteria. The safety category/process that is being analyzed is listed in the top box and is usually stated in terms of a goal or a desired performance. The boxes on the second level use a question to describe the conditions required for the goal to be achieved. The two connector symbols, "and" and "or" describe the relationship between the goal and its conditions. The "and" symbol means that all of the conditions must be present for the goal to be achieved. The "or" symbol means that only one of the conditions needs to be present for the goal to be achieved. In either case these important considerations lead to required actions in order to error proof the process under consideration.



Summary

These materials demonstrate tools used in a Kaizen Continuous Improvement approach that have worked well for a number of organizations. In this approach, plant injury data is combined with

Safety Perception Survey data to get a full spectrum of the realities, both observable and hidden. Hourly and salaried employees then team together using Six Sigma tools and effective safety meeting techniques to develop and implement a zero-injury safety culture — a workplace that eliminates tolerance of risky behaviors and systematically elevates safety awareness throughout the organization.

When applied to the workplace, Kaizen teams that focus on standardizing activities and processes improve all functions of a business. Kaizen Continuous Improvement teams, when used in concert with accountability and organizational tools, deliver milestones. This approach overcomes the obstacles of culture change, thereby achieving sustainable safety excellence.