Research Perspective: Safety culture and safety climate in construction

Over the past 20 years, researchers and practitioners have recognized that a strong safety culture and safety climate are key to reducing injuries, illnesses and fatalities on construction worksites. After reviewing the literature review and interviewing construction practitioners we concluded that to move forward on this topic we first needed to 1) agree on what safety culture and safety climate mean and what the core indicators are of these constructs, 2) develop reliable and valid measures to help identify and target areas needing improvement, and 3) design, implement, and evaluate interventions to improve identified areas. On June 11-12, 2013, CPWR-The Center for Construction Research and Training (CPWR) and The National Institute for Occupational Safety and Health (NIOSH) convened a 1½ day workshop designed to begin addressing these issues. Seventy-two invited construction stakeholders were invited including: contractors, employer associations, labor organizations, researchers/academics, consultants, and insurance firms. Participants were assigned to 1 of 6 small work groups and trained group facilitators used a
structured facilitator guide to maximize discussion. The sessions and key findings are reported below.

- **Session 1** Defining and Framing Safety Culture and Climate for the Construction Industry
- **Session 2** Leading indicators: Key factors that contribute to safety climate,
- **Session 3** Assessing safety climate
- **Session 4** Interventions to improve safety climate
- **Session 5** Next steps for bridging the gaps and moving forward

**Definitions – Participants agreed on three primary definitions:**

- **(Organizational) Safety Culture**: Deeply held but often unspoken safety-related beliefs, attitudes, and values that interact with an organization’s systems, practices, people, and leadership to establish norms about how things are done in the organization. Safety culture is a subset of, and clearly influenced by, organizational culture. Organizations often have multiple cultures or subcultures, and this may be particularly true in construction.

- **(Organizational) Safety Climate**: The shared perceptions of safety policies and procedures by members of an organization at a given point in time, particularly regarding the adequacy of safety and consistency between actual conditions compared to espoused safety policies and procedures. Homogeneous subgroups tend to develop shared perceptions while between-group differences are not uncommon within an organization.

- **Project Safety Climate**: Perceptions of occupational safety and health on a particular construction project at a given point in time. It is a product of the multiple safety climates from the different organizations involved in the project including the project owner, construction manager/general contractor, and subcontractors. Project safety climate may be heavily influenced by local conditions such as project delivery method, schedule and planning, and incentives.

**Indicators and Measurement - Participants agreed on 8 primary leading indicators of safety climate**

Participants agreed on 8 primary leading indicators of safety climate

- **Demonstrated Management Commitment**: In construction, management commitment to keeping workers safe (demonstrated through both words and actions) is critical for establishing and maintaining a positive safety climate. Just saying “safety is #1” does not automatically translate into a positive safety climate. In fact, just saying it can have the opposite effect.

- **Aligning and Integrating Safety as Value**: Management and owners align and integrate safety by embedding and integrating safety-related language and responsibilities into policies and procedures, including performance evaluations, and clearly and consistently communicating safety as an expectation. Commitment to safety is also demonstrated by never compromising it for the sake of productivity.

- **Ensuring Accountability at All Levels**: Everyone involved in a construction project should be held accountable for safety, including owners, management, safety personnel, supervisors,
and workers. Specific responsibilities for implementing safety need to be clearly defined at all levels by role, and communicated and reinforced throughout the organization regularly.

- **Improving Site Safety Leadership:** How supervisors lead, act as role models, communicate, and provide feedback are probably the most important factors in determining the degree to which a strong positive project safety climate is achieved.

- **Empowering and Involving Workers:** Involving workers in safety-related planning and decision making and empowering them to speak up when they identify hazards will help bridge the communication gap between workers and management, build mutual trust, and promote a shared belief that a positive safety climate is integral to getting the job done.

- **Improving Communication:** Clear and consistent communication about the importance of safety and its alignment with production and other organizational goals and objectives is at the core of all other factors. How an organization formally and informally communicates about safety issues through words and actions can have a significant impact on the jobsite safety climate.

- **Training at all Levels:** The best way to ensure that all members of an organization, at all levels, know and understand where and how they fit into the safety culture and climate is to provide ongoing, effective training tailored to their specific roles and responsibilities. Training should be provided by qualified trainers using adult learning principles; including active and interactive learning techniques.

- **Encouraging Owner/Client Involvement:** Owners develop and issue project policies, shape bidding practices, and ultimately approve budgets, all of which, if done with a focus on safety, can drive a strong project safety climate. Ongoing dialogue between owners and people in the field allows them to stay informed of the need for additional resources or actions to eliminate (or reduce) emerging safety issues.

During the safety culture/climate workshop we presented and discussed the numerous surveys designed to measure primarily safety climate available in the academic literature. Workshop participants also worked to help develop safety rubrics that could help companies assess their maturity level with respect to the 8 leading indicators.

### Interventions

A workbook entitled: *Strengthening Jobsite Safety Climate by Using and Improving Leading Indicators* [http://www.cpwr.com/whats-new/strengthening-jobsite-safety-climate-using-and-improving-leading-indicators](http://www.cpwr.com/whats-new/strengthening-jobsite-safety-climate-using-and-improving-leading-indicators) was developed after the workshop and is based in large part on the workshop findings. It includes numerous interventions (aka “Ideas”) targeting the 8 leading indicators.

### Improving safety culture/climate in the real world

Construction research is most helpful when it can be put into practice to improve worker health and safety. The ASSE panel included safety and health directors from 4 different sized companies who presented an initiative implemented to improve safety culture and climate in their own organizations. They also shared the challenges they faced. At the conclusion of the session attendees should have understood and be able to explain the importance of having common definitions for safety culture and safety climate for construction and be able to list some of the leading indicators that can be measured and targeted for change. Finally, they should be able to compare and contrast the various strategies small, medium, and large companies have used to
improve safety climate or culture and engage in a discussion of how they might apply the knowledge gained to their own worksites.

**Practice Perspective: Medium sized company – Safway**

Safway’s journey to be best in class for safety began in 2012. This is when the CEO and I agreed that our goal was not to be simply compliant, but to be the best in class! Once we set the goal, we challenged our safety staff to begin assessing what we were currently doing, where we need to go, and brainstorming about how we will be able to get there.

Our assessment showed us that like almost everyone in our industry, our company concentrated on lagging indicators, which are not helpful for predicting future performance. Although focusing on lagging indicators directly impacted our safety culture, it was not the most effective way to do so. It became clear that with respect to safety 1. We were not begin fully proactive; and 2. We lacked employee engagement.

To move our safety culture and climate in a positive direction and become best in class, we determined that we needed to change our mind-set from compliance and lagging indicators to a more proactive approach, which included identifying leading indicators, while continuing to reduce incidents and injuries and increase reporting on near-hits.

**Our Journey from Lagging to Leading and Best in Class**

We understood that there was no one “magic bullet,” so we adapted a matrix developed by Skanska USA that includes 5 critical components of safety:

- Culture
- Competency
- Communication
- Controls
- Sub-contractors

Next, we defined benchmark levels for each of these components, evaluated where we were as a company, and set goals. To accomplish our goals and get to the next level, we developed action items for each one. We mapped overall three- and five-year plans to each component and action item, which have become part of our company’s yearly EHS execution plan.

About the time we completed this process, we received the booklet from The Center for Construction Research and Training called *Strengthening Jobsite Safety Climate: Using and Improving Leading Indicators*, which included eight worksheets to help companies refocus their safety efforts on improving leading indicators. We incorporated this information into our matrix to strengthen it. We even worked with a consultant, who helped us to develop an audit process that identifies deficiencies related to the eight leading indicators.

Other initiatives included realigning resources to accommodate our company growth and changing the indicators we measure from lagging indicators alone to also include the 8 leading indicators. We also refined how we measure lagging indicators, moving from strictly recordable days, to days away from work due to injuries, which is a better severity indicator than recordable alone.
One last component, which was challenging at first, but then became our strongest catalyst, was improved communication. We began to communicate at every level about safety on a daily basis, continually reinforcing these messages from the top to bottom in our company.

Outcomes and Challenges
Some of the challenges we encountered along the way included the need to intensify our overall safety culture and fully impact the subcultures. Once we identified these issues, we conducted a perception survey to assist in our efforts. To combat these challenges, we continued:

- Educating front line supervision;
- Attacking risk tolerance and complacency; and
- Enhancing our behavior based safety

We are seeing great results directly related to changing our approach to include these eight leading indicators. We have experienced an increase in hazard identification and mitigation. Our management team now has higher levels of awareness and appreciation for the need to preform jobs safely, and mid-level management is also buying in and becoming heavily engaged with safety. We have also seen an increased involvement from our field supervision in developing positive safety cultures where they did not exist and strengthening those that already existed.

Safety managers need to know when to become safety leaders and build personal responsibility rather than hold people accountable. And most importantly, whether or not you hold a safety management position, you can be a safety leader and help people transition from an other-directed to a self-directed motivational state. Remember, few manage, but many must lead.

Practice Perspective: Mid-sized mechanical contractor – TCM

An analysis of a spike in injuries in 2005 revealed unclear expectations of project leadership including foremen, general foremen, superintendents and project managers in regards to their role in identifying and controlling hazards. In addition, there was little understanding of ways competing expectations of direct reports were communicated and how their communications created the perceptions of what is important to the organization.

Improving Supervisory Leadership and Communication
In 2006, TCM formed a Strategic Safety Leadership Committee to engage the executives, project managers and superintendents to focus on continuous improvement efforts that would reduce injuries. Over the ensuing 8 years, the SSLC has changed personnel as the organization has changed but has overseen development of annual strategic plans and activities to intentionally shift the culture of the organization.

Early efforts focused on low hanging fruit such as mandatory glove policy, stretching in conjunction with daily tool box meetings, integrated hazard identification into pre-job planning and through the rolling short interval plans. Also in 2006 the SSLC introduced a climate survey for all employees using an instrument developed by Dov Zohar. This survey was subsequently used 6 times over the next 5 years to identify areas of focus. In 2007, TCM began a working relationship with Colorado State University’s I/O Psychology and Occupational Health departments who were funded with NIOSH grants focused on improving communication and leadership in construction. This collaboration included 3 major interventions focused on
Communication, Task Planning and Leadership and Culture over six years. Later interventions added other instruments to assess effectiveness and clarify climate issues.

The Mission of the SSLC is “To promote an organizational culture that ensures our project delivery systems and work practices consistently identify, eliminate or control hazards associated with our work.” The Goal statements have evolved with the SSLC as well as the specific activities that have focused on Leadership Development, consistency in Processes and Procedures, Planning, Training and Mentoring tiered contractors. The past couple of years have focused on integration of safety, quality and lean initiatives with alignment of organizational Core Values and more broadly the organizational culture.

Outcomes and Challenges
TCM has significantly grown in size, revenue and geographic footprint. There has been considerable turnover in organizational and project leadership though current leaders are actively involved in continuous improvement initiatives, including the 35 participants of the SSLC. Injury experience has variability though the EMR continues to trend downward.

The primary challenge for the organization is to define who you aspire to be while making a sincere effort to understand how consistently, or not, you meet this vision. The organization is continuously creating itself and the changes in management, supervision and craft workers require ongoing effort to clarify expectations and accountabilities. The intentional effort to create a safe and healthy culture that supports the business objectives benefits from structured direction but will be more successful by using as many data points as possible, especially from those who are putting work in place.

Practice Perspective: Large general contractor – Kiewit

A few years ago the management team at Kiewit noticed that the incident rates were not improving as much as they would have liked. The rates had been steadily improving up until then but it seemed as if they had hit a plateau. The management team came together to brainstorm ideas on how they could improve the statistics. With the leadership of the District Manager and District Safety Manager, Rusty Brown, it was determined that we needed to look at the safety culture as a whole. If the culture was to improve then surely right behind it the safety statistics would continue to fall, and ultimately result in our workers going home safely day after day.

Strategies to improve safety culture and safety climate at Kiewit Power Constructors
Below I will share some of the most important ways that we at Kiewit are working to continuously improve our safety culture and safety climate on jobs that are very fast paced and all together very dynamic.

Demonstrating Management Commitment: The first item is Kiewit's vision of NOBODY GETS HURT. It is in the forefront of all of our daily operations and is even the company motto. Every person in the company believes that all tasks can be completed injury free and it is each person’s goal and responsibility to do so. Kiewit demonstrates commitment in a number of ways. First, the district manager writes and signs a letter stating that, “It is our policy to perform work in the safest manner possible and be consistent with good construction practices. To fulfill the
requirement of this policy, an organized and effective safety program must be carried out at the job location where the work is performed. Responsibility for the safety program is delegated to line supervision in accordance with the chain of command. The Safety Manager is a staff assistant to line personnel, and their presence in no way relieves the line organization of its responsibility. We recognize that in order to achieve and maintain safe operations, there must be written guidelines which will assist employees in conducting their daily work activities in a safe and efficient manner. We also recognize that all personnel associated with the construction operations must consider safety as an integrated function of their individual responsibilities and duties.” This letter is included as the first page in every job site safety procedural manual. Each job site has a specific safety plan that includes topics ranging from project risks and mitigation, craft ownership, safety tours, and subcontractor engagement.

Management commitment is also demonstrated by having the management group from the district office participate in a conference call every Friday morning with all of the job site managers to discuss safety. During the call all incidents experienced on the jobs the past week as well as any positive experiences are discussed and shared so all managers’ benefit from the information and lessons learned.

**Accountability at all levels:** We hold everyone accountable for their own and each other’s safety. For example, if one of our employees is hurt, we stop work immediately and perform an in-depth root cause investigation. We determine why and how the injury occurred. We look at the ways in which the employee's management may have failed to ensure a safe work environment and also the degree to which the employee’s work practices played a role. Depending on the outcome of our investigation, the employee as well as his or her management are held accountable and experience commensurate disciplinary action.

**Empowering and Involving Workers:** Another way Kiewit works to continuously improve our safety culture and jobsite safety climate is to create programs and processes that allow all of our employees to participate in safety in an on-going and meaningful way. A good example of this is our Craft Voice In Safety program. (CVIS) The CVIS program is completely run by members of the craft and it gives them an opportunity to relate to their specific craft representative thus enabling the craft representative report any safety issues or near misses that may have otherwise gone unreported.

The actual mission statement of the program is, “To provide a platform to ensure all craft have an equal voice in safety, working in partnership with management to take a proactive approach on relationship building, empowering our peers to support safety through prevention, education and awareness with the ultimate goal of "NobOdy GETS HURt."

Craft foremen and members are integral participants on our jobsite Daily Safety Tours along with a staff supervisor and engineer. Because they are the subject matter experts when it comes to their craft, we rely on them to be equal partners with our staff personnel to identify safety deficiencies in the field operations. We invite our subcontractors to join the Daily Safety Tours as well since they too are integral to ensuring jobsite safety. Indeed, our subcontractors are exposed to the same safety experiences as our direct hire staff including the same amount of
safety training, the safety tours, first day safety training and site orientation, among other safety-related activities.

Employees are very involved in our Job Hazard Analysis. There is an updated and relevant JHA for each task or operation being performed. The employees review the JHA and are trained to understand that it is a living breathing document that they can and should update when they identify any relevant change to the task or operation. The JHA is an instrumental part of communicating the plan to each member of a crew.

One last example of craft involvement is a weekly craft foreman's meeting where the craft foreman and the staff management come together and discuss site safety issues, results of the daily safety tours, or any another pertinent information that may be necessary. It is also a two sided meeting where the foremen hear about any safety concerns from management and then the foremen have the opportunity to bring up site safety concerns as well.

**Mining The Diamond:** All of the projects participate in what is called the Mining the Diamond program. This program focuses its attention on any and all activities that have to do with trenching and excavation, confined spaces, temporary structures, fall protection required, the use of construction equipment, crane use, rigging, and/or LOTO. These activities are mapped out on the three week schedule that is posted in our site conference room. Then, the daily safety tour group, described above, stops in the conference room to see what diamond activities are being performed for the day before they head out for their tour of the site. The expectation is that during the tour the group will observe each of the diamond activities taking place on the site that day.

**Outcomes and Challenges**

By implementing what I have described above we have seen our safety statistics again begin to drop lower than ever before. In 2013 the power district won the prestigious Bob Wilson award. This award is given to the Kiewit district that has shown the greatest safety improvement over a three year period. Kiewit Power Constructors has shown that with these continued efforts our district is working more and more man hours each year while our frequency rates of injuries are dropping. This means that we are on our way to NOBODY GETS HURT!

However these outcomes did not come with challenges. First of all this was a change. Whenever we are faced with change there is always discomfort. We too had these struggles within our organization. Secondly, when we roll these programs and activities out to the craft some are overwhelmed at the effort Kiewit Power puts into safety and they may not believe what they are hearing. They say, “We have heard it all before. Here is another contractor that is going to talk up safety on the first day and then when they get to the field it’s all out the window.” We do everything possible to make sure they understand that safety is our first priority and always will be on our jobs. We not only review all of these programs in the new hire orientation with our craft, but immediately when they are sent to the field they see the programs in action. They see that Kiewit Power not only talks the talk but also walks the walk.
Practice Perspective: Small specialty subcontractor – Aldridge Electric

Event reporting is one of the best methods for identifying and eliminating (or controlling) employee exposure to workplace hazards. Specifically, incident, near miss, and good catch reporting is invaluable when identifying areas of focus and developing action plans to reduce or eliminate injury and property and equipment damage.

The number of reported events didn’t seem reasonable given the size of our company. Based on the number of reports that should be expected with a company of our size, and the type of work being performed, it can reasonably be assumed that incidents, near misses, and potential good catch events are occurring on a daily basis. However, we noticed that the actual number of events being reported was inadequate and we wanted to find out why. We asked management and craft workers to share their thoughts and determined there were quite a few reasons for each type of event reporting activity.

1. Failure to report all Incidents
   a. Lack of understanding of the definition of an Incident
   b. Fear of disciplinary action by employer
   c. Inconsistency in disciplinary actions for same or similar incidents.
   d. Fear of removal from jobsite by general contractor or customer
   e. Craft workers not encouraged to report all Incidents
   f. Field management not encouraged to report all Incidents
   g. Too much time involved in answering for a reported Incident
   h. Why report if no one saw it

2. Failure to report all Near-Misses
   a. Near-Miss reporting program does not exist
   b. Lack of understanding of the definition of a Near-Miss
   c. Craft workers not encouraged to report Near-Misses
   d. Field management not encouraged to report Near-Misses
   e. Executive management not requiring it
   f. Lack of understanding of benefits of Near-Miss reporting

3. Failure to report all Good Catches
   a. Good Catch reporting program does not exist
   b. Lack of understanding of the definition of a Good Catch
   c. Craft workers not encouraged to report Good Catches
   d. Field management not encouraged to report Good Catches
   e. Executive management not requiring it.
   f. Lack of understanding of benefits of Good Catch reporting

Once we understood the reasons for failing to report an event, we developed and implemented a program to train and encourage craft workers and field management to report all events. We call it the Event Reporting Program. The elements of the Event Reporting Program include; establishing definitions for the different events; education on the benefits of reporting the events; establishing a chain of command (i.e. procedure) for reporting events and for sharing event information; plus a plan for communicating the program to employees using language that
made it clear management completely supported the program. The specific elements of the program are as follows:

1. Definitions agreed upon
   a. Incident: An unexpected and undesirable event resulting in personal injury and / or property or equipment damage.
   b. Near Miss: An event where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and / or injury easily could have occurred.
   c. Good Catch: A condition or situation that has the potential to cause an incident but that did not actually occur due to corrective action and/or timely intervention of an employee.

2. Benefits of reporting
   a. Lagging indicators
   b. Incident reporting
   c. Near-Miss reporting

3. Leading indicators
   a. Good Catch reporting

4. Reporting / chain of command procedure
   a. Field reporting
   b. Management reporting

5. Information sharing
   a. At executive level
   b. Across entire company

6. Event Reporting Program communicated to
   a. Craft workers
   b. Field management
   c. Executive management

7. Reporting of events encouraged and supported by all levels of management
   a. Disciplinary actions eliminated or greatly reduced for reporting Incidents and Near-Misses.
   b. Employees rewarded for reporting Good Catches.
   c. Event reports shared with all executives, division management, field management, and craft workers.

Outcomes and challenges

After we fully implemented the Event Reporting Program, the number of reported events increased by 75%. We also conducted year-end analyses on the data generated from event reporting. Specifically, a trend analysis was conducted for each division that helped us identify where we were seeing more incidents and near misses (i.e., “Areas of Focus”). Then, action plans were developed by each Divisional Vice President to target those areas in an effort to reduce the occurrence of incidents and near-misses.

We also performed a SWOT analysis and identified the following challenges to implementing the Event Reporting Program.

1. It can be challenging to maintain the program and encouraging on-going event reporting
2. Craft workers and field management don’t always see the benefits of reporting.
3. It’s easy to return to inconsistent disciplinary actions for Incident and Near-Miss reporting.
4. It’s important to regularly assess the Event Reporting Program as a whole and also assess the effectiveness of the plans that were developed to address identified “Areas of Focus.
5. It’s important to continually share information with craft workers and field management.
6. It’s important to keep-up the reward program for Good Catches.

While the Event Reporting Program is only one of many elements of our safety and Health program, any decrease in enforcement or perceived usefulness could have a negative effect on the safety culture and climate of the organization. Safety managers need to know when to become safety leaders and build personal responsibility rather than hold people accountable. And most importantly, whether or not you hold a safety management position, you can be a safety leader and help people transition from an other-directed to a self-directed motivational state. Remember, few manage, but many must lead.

Bibliography

