



Evaluation of a safety culture intervention for Union Pacific shows improved safety and safety culture



Michael Zuschlag^{a,*}, Joyce M. Ranney^a, Michael Coplen^b

^a Office of Safety Management and Human Factors, US Department of Transportation John A. Volpe National Transportation Systems Center, 55 Broadway, Cambridge, MA 02142, USA
^b FRA Human Factors Division, Office of Research, Development, and Technology, 1200 New Jersey Avenue, SE, Mail Stop 20, Washington, DC 20590, USA

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ABSTRACT

The Federal Railroad Administration (FRA) sponsored a multiyear pilot demonstration of Clear Signal for Action (CSA), a safety culture intervention implemented with Behavioral Science Technology Inc., at a Union Pacific (UP) service unit. CSA combines peer-to-peer feedback, continuous improvement, and safety-leadership development. The US Department of Transportation John A. Volpe National Transportation Systems Center conducted an independent program evaluation of the pilot, using qualitative and quantitative measures. The evaluation found that, over two years, the site experienced significant improvements in safety outcomes, operations, and safety culture, including an 80% drop in at-risk behaviors, a 79% decrease in engineer decertification rates, a 81% decline in the rate derailments and other incidents, and better labor–management relations. Comparison locations showed no improvements in the decertifications or derailments. The success of the pilot, in addition to successes UP had earlier with CSA-type processes, encouraged UP to expand these processes throughout its transportation department. The success of this pilot and other similar pilots led to the development and adoption of the FRA's Railroad Safety Risk Reduction Program in the Rail Safety Improvement Act of 2008, and the implementation of similar safety-culture programs by other carriers.

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1. Introduction

1.1. Background

Despite continued efforts by the Federal Railroad Administration (FRA), management, and unions, safety systems in the railroad industry have stagnated (Coplen, 1999). The current safety systems are imbedded in the industry's "safety culture." In this article safety culture is defined as the factors that determine an organization's (labor and management) commitment, style, and proficiency in ensuring safety that result from safety-related beliefs, values, attitudes, competencies, and behavioral patterns (Reason, 1997, 2003). The railroad safety systems have progressively elevated safety performance until 1986, when improvements stalled (FRA, 2001, 2008). Therefore, it is possible that the safety culture may be limiting further safety improvements (Ranney and Nelson, 2003).

The key aspect of an effective safety culture is a "trust culture," where the organization's members trust each other (Reason, 2003). This trust is necessary to open rich communication on safety issues, allowing an organization to identify and ultimately

counteract systemic upstream causes of accidents and injuries (Reason, 1997, 2003; DeJoy, 2005). However, railroad culture has several characteristics that limit such trust, especially between labor and management (Coplen, 1999). The culture has a command-and-control management style, reactive tendencies, and inclinations to inflict punishment for accidents and injuries, inclinations that arise from a rule-and-discipline approach to safety (Gamst, 1982) and litigious incentives. In practicing command and control, managers tend not to elicit input (including safety-related information) from workers but instead to issue orders. Reactive tendencies discourage proactively collecting information on conditions or trends that may lead to accidents or injuries. Instead, labor and management react to each injury or accident as a separate incident. Traditionally, management tends to blame accidents and injuries on rules violations, while labor tends to blame workplace deficiencies or management pressure for productivity. Managers characteristically respond to injuries and accidents by disciplining workers, including firing them, for safety rule infractions. Injured workers often sue the company for financial compensation under the 1908 Federal Employers Liability Act (FELA). Fear of discipline and lawsuits breeds distrust and chills cooperation and communication between workers and managers, stifling the sharing of safety information.

* Corresponding author. Tel.: +1 617 494 3250.

E-mail address: michael.zuschlag@dot.gov (M. Zuschlag).

To improve safety, the FRA Human Factors Division is exploring new approaches that counteract these cultural tendencies. These approaches achieve this by incorporating the following features, which are characteristic of a positive safety culture (Reason, 1997; Phimister et al., 2004):

- *Nondisciplinary*: Seeking to improve safety without punishment or blame through protective elements such as worker anonymity.
- *Proactive*: Collecting data on at-risk behaviors and conditions to prevent associated accidents or injuries before they occur, and thus reduce the incentives for workers and managers to blame each other.
- *Systems-safety-analysis orientation*: Gathering and using rich objective data to identify underlying organizational factors in safety.
- *Cooperative*: Engaging stakeholders within both management and labor.
- *Sustainable*: Including mechanisms for long-term sustainment.

These features improve safety by creating an environment where individuals freely exchange information upward, downward, and laterally across the organizational hierarchy, providing the open communication necessary to solve safety problems.

This paper presents an evaluation of one such approach, the FRA's Clear Signal for Action (CSA) applied to a transportation department. With funding and sponsorship from the FRA, Behavioral Science Technology Inc. (BST) actively designed and implemented the demonstration pilot. The US Department of Transportation John A. Volpe Center, also with sponsorship from the FRA, independently conducted a formative and summative evaluation (Rossi et al., 1999). This article presents a summary of the summative evaluation.

1.2. Clear Signal for Action (CSA)

1.2.1. CSA implementation

CSA integrates three approaches that have been applied previously to improve safety proactively:

- *Peer-to-peer feedback (PPF)*, where workers observe each other, and exchange feedback about the safety of their behavior, conditions, and organizational factors (Geller, 2001; Krause, 1995).
- *Continuous improvement (CI)*, where workers and managers cooperatively gather and analyze data to identify systemic causes of observed at-risk behaviors and conditions, and then implement corrective actions to address the causes (Harrington, 1987; Juran, 1964; Krause, 1995).
- *Safety-leadership development (SLD)*, where managers are trained to promote proactive safety practices such as PPF and CI (Krause et al., 1999).

Fig. 1 illustrates a combined theory of action and theory of change (Funnel and Rogers, 2011) for CSA.

Detailed CSA activities are listed in the box headed Implementation, and their theoretical outcomes are depicted in the two columns of boxes designated Proximal Outcomes and Distal Outcomes. Proximal outcomes result directly from implementation activities, while distal outcomes are mediated by proximal outcomes. The arrows indicate the effects of prior activities and outcomes on subsequent ones, with influence moving primarily in a left-to-right direction. Within the Implementation box, activities are grouped according to their primary association with PPF, CI, or SLD.

1.2.1.1. Peer-to-peer feedback (PPF). To initiate the PPF component, a local CSA process steering committee, composed of workers and

sometimes several managers, develops a checklist of safe and at-risk worker behaviors and working conditions based on analyses of injury reports and other sources of safety information (Krause, 1997). The steering committee recruits, trains, and coaches workers to be "peer observers," who observe the safety of their coworkers (overtly, with their permission) then conduct with them anonymous nonconfrontational feedback sessions devoid of any disciplinary connections. The feedback includes both acknowledging any observed safe behavior, and discussing any observed at-risk behavior. By focusing on the behavioral and conditional antecedents of accidents, CSA seeks to proactively prevent accidents before they occur.

1.2.1.2. Continuous improvement (CI). Within the CI component, workers are trained to interview their coworkers during the feedback sessions about the coworkers' explanations for any observed at-risk behaviors or conditions. Thus, a feedback session has feedback from the observed peer to the observer, in addition to from observer to peer. The observing worker records on the checklist all data on the behaviors and the explanations. The steering committee aggregates and objectively analyzes these data through root-cause problem-solving to identify the systemic causes for barriers to enhancing safety. Potential systemic causes include organizational policy, training, tool design, environmental conditions, procedures, and cultural aspects. The steering committee executes corrective actions against barriers that it can remove, for example, through feedback to workers during PPF sessions. If the barriers require actions beyond the authority of the steering committee, such as new equipment purchase or procedures changes, a joint labor-management barrier removal team reviews and prioritizes the barriers, then develops corrective actions, which management executes. Data-gathering continues after a corrective action is deployed, to allow its effectiveness to be evaluated.

1.2.1.3. Safety-leadership development (SLD). Within the SLD component, managers are trained in effective nondisciplinary, proactive techniques for enabling employees to work safely, including but not limited to supporting safety-related activities such as feedback sessions and barrier removal. These SLD processes are conducted parallel to existing disciplinary processes. SLD activities are not a substitute for addressing rules violations.

1.2.2. Integration of behavioral and safety culture approaches

When used alone, PPF approaches have often placed too little emphasis on the influence of upstream managers, systems, and policies and procedures on at-risk behavior and conditions, resulting in negative reviews from several unions (Spigener and Hodson, 1997; Howe, 1999; Frederick and Lessin, 2000). Thus, recent variants of PPF, such as CSA, have acknowledged that behavioral-oriented safety interventions can complement culture-oriented safety interventions such as CI and SLD. (DeJoy, 2005). These new variants integrate PPF with CI, utilizing the peer-to-peer sessions as opportunities to collect the data needed by CI. SLD encourages managers to implement corrective actions that need management support and otherwise targets "latent" factors in accidents and injuries that are further back in the chain of causation, such as safety climate and culture (Reason, 1997). SLD trains organizational leadership to eliminate these causes since it has the resources and authority to alter the direction of the organization. It also trains managers to provide the necessary resources and the integration of CSA into other safety programs so it becomes institutionalized. SLD can therefore accelerate changes initiated by PPF and CI and make them lasting characteristics of the organization's safety culture.

By combining PPF, CI, and SLD, responsibility for safety is distributed among workers and managers. PPF activities are

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