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## SHORT LINE SAFETY INSTITUTE: THE MOST ROBUST MODEL FOR ASSESSING SAFETY CULTURE IN THE U.S. RAILROAD INDUSTRY

### SUMMARY

Since 2015, the Short Line Safety Institute (SLSI) has been conducting voluntary, non-punitive, confidential assessments of the safety culture at participating short line and regional railroads (i.e., Class II and Class III railroads). The SLSI defines *safety culture* as *the shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands*, based on the US Department of Transportation (DOT) Safety Council safety culture definition (Morrow & Coplen, 2017). The SLSI's Safety Culture Assessment (SCA) process utilizes the most robust model, based on a review of published literature, as highlighted in this report.

The SLSI's SCA model utilizes teams of two Assessors and a multi-method, data-focused, site-customized, in-depth process that involves survey, observation, interview, and document inventory. The SLSI uses the Ten Core Elements of a Strong Safety Culture, as identified by the US DOT Safety Council (Morrow & Coplen, 2017), as a theoretical framework to operationalize its definition of safety culture.

At the end of the 5- to 8-day on-site Assessment, more or less time as customized to the specific railroad, the participating railroad receives a final report that presents the Assessment Findings in relation to the Ten Core Elements of a Strong Safety Culture. Positive and negative findings are presented about the safety culture at the railroad. *Opportunities for Improvement* also are provided to suggest organizational changes or actions that, if

implemented, may strengthen the railroad's current safety culture.

The review reported here establishes the criteria by which the warranted judgement regarding the rigor of the SLSI's SCA model was made, particularly in the context of what has been or currently is being used to assess safety culture.

### BACKGROUND

The Federal Railroad Administration (FRA) Office of Research, Technology and Development (RD&T) has been a collaborating supporter of the SLSI's development and aim to build a stronger, sustainable safety culture on short line and regional railroads in response to the 2013 Lac-Mégantic incident. The industry consists of 603 short lines and regionals with approximately 18,000 employees, serving nearly 10,000 customers, and represents 29 percent of freight rail across 49 States in the U.S.

The SLSI engages in research-based practices and continuous improvement efforts through an ongoing program evaluation conducted by the Volpe National Transportation Systems Center (Volpe), commissioned by FRA RD&T through an Interagency Agreement, to determine the quality and support the improvement of the SLSI since its inception. Through the Pilot Project (2014–2015), the process model for assessing the strength of a railroad's safety culture was designed to include empirical and methodological best practices appropriate for a multi-dimensional and nuanced construct such as *safety culture*. After the Pilot Project, the SLSI became incorporated as a nonprofit organization, and began its program



implementation phase in 2016. Through 2 years of implementing the SCA model, experiential lessons learned also were integrated into the continuous development and improvement of the model as well as developing its educational efforts. [See earlier publications for more details about the history of the SLSI: Assessor Job Analysis (Coplen & Kidda, 2014), Pilot Project Site and Assessor Recruitment (Kidda & Coplen, 2015), Development of Assessment Tools (Kidda & Coplen, 2016), and Status of Safety Culture in the Industry (Kidda & Davies-Schriels, 2018).] The SLSI's SCA model has been applied to more than 70 Class II and Class III freight railroads that employ approximately 6,300 management and non-management employees.

## OBJECTIVES

The Volpe evaluation of the 2016–2017 SLSI program implementation found that its SCA model had become stable and was emerging as not only the most developed aspect of the SLSI, but also as the most robust assessment model in the industry. To determine the extent to which the SLSI SCA model is the most robust, the evaluation team conducted a review of the published literature to (a) identify common features (i.e., merit criteria) of other safety culture assessment models, and (b) compare those to the SLSI model to validate that best practices are in place.

## METHODS

A systematic search strategy was used to conduct the literature review; the initial steps were to define the screening and inclusion criteria. To be included, the source must have been published in English and in known databases, and describe a process model for assessing safety culture at an organization in the transportation industry. Sources that used the term “safety culture,” but did not describe a research study or evaluation of a safety culture assessment process were excluded from the review.

The evaluation team used a phased approach to conduct a total of nine searches across six databases. The first batch of searches were conducted in the National Transportation Library Repository & Open Science Access Portal, the full-text repository for DOT. Search terms included “safety culture assessment” that produced results across sectors. To narrow the results, “railroad” was added to the search. Another search combined “transportation” and “safety culture,” but did not necessarily contain the word “assessment.”

The second batch of searches were conducted in the Transportation Research International Documentation (TRID) database. These searches were conducted in a similar manner to the prior batch, however, the nature of this database expands the results worldwide. And, the final batch of searches used the social science academic databases of Academic Search Premier, PsycInfo, and Education Resources Information Center (ERIC). Lastly, Google Scholar for the final search.

In total, 9 searches were conducted returning 1,118 results; 1,077 sources were screened to identify eligible sources, of which 25 were reviewed to establish the merit criteria for rigorous models of safety culture assessment.

## RESULTS

The literature review yielded 25 sources of interest. Nine of those sources were Technical Reports and Research Results that described evaluations of transportation industry safety initiatives that included some form of safety culture assessment, although not presented as the study's focus. Another nine sources were research studies in which measuring safety culture was the primary focus. Three of the 25 sources were reviews of safety culture research, and the last four sources were papers discussing safety culture measurement based on literature reviews.

All sources were reviewed to aid in establishing merit criteria for the assessment of safety culture and to identify other similar models to the SLSI



model. In relation, this review identified characteristics that can contribute to establishing the rigor of a safety culture assessment model. Primarily, the criteria were identified from the safety culture research review sources, however, secondary sources were also identified and cited accordingly below.

- **Multiple methods of measurement:** An assessment that combines different qualitative and quantitative methods is a benefit for gaining a comprehensive and the most credible understanding of safety culture (Wiegmann et. al, 2004; Grebensek & Kosel, 2015).
- **Multiple levels of measurement:** When assessing an organization, separate instruments may be needed to examine the different units and to acquire reliable data, extend the inquiry to all levels of the organization (Wiegmann et. al, 2004; Grebensek & Kosel, 2015).
- **In-situ observation:** To understand a safety culture, observing the way things actually are done affords an inside view into the organizational safety practices (Schein, 1983).
- **Safety policy review:** Organizational policies shape the safety context and working conditions at the group and individual levels, also shape the attitudes within the organization. Therefore, in understanding a safety culture, review safety policy documents (Guldenmund, 2007).

This review did not include unpublished works, i.e., “grey” literature, because they are not accessible in known databases (e.g., proprietary studies conducted by for-profit organizations). Also, work that may be considered equivalent to safety culture assessment, but is not termed as such, was not visible in the searches. Sources regarding best practices for social science research in general are not represented in this list of criteria.

## CONCLUSIONS

According to Volpe’s review of the published literature, the SLSI’s SCA model emerged as the most comprehensive or robust approach in the U.S. railroad industry. Through the review, the key characteristics of the SLSI’s SCA model (e.g., multi-method, data-focused, site-customized, in-depth process that involves survey, observation, interview, and document inventory) were determined to be exemplary, meeting the identified merit criteria for “rigor.” Moreover, these key characteristics of a rigorous safety culture assessment model were not described in any of the reviewed literature as being utilized as part of a current effort to assess safety culture in the transportation industry.

## FUTURE ACTION

The SLSI has maintained the integrity of and continues to hone the valid and comprehensive approach for assessing safety culture strength that was developed and tested during the Pilot Project. The SLSI is maintaining its engagement in continuous improvement through the program evaluation effort being conducted by Volpe, with the support of FRA RD&T. As part of that effort, the evaluation is focusing on the fidelity of the SCA model implementation in the field as the SLSI continues to grow and scale its efforts.

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## CONTACT

### **Starr Kidda, PhD**

Division Chief, Human Factors Division  
Federal Railroad Administration  
Office of Research, Development & Technology  
1200 New Jersey Avenue, SE  
Washington, DC 20590  
(202) 493-6346  
[Starr.Kidda@dot.gov](mailto:Starr.Kidda@dot.gov)

### **Heidi D Howarth, PhD**

Engineering Psychologist  
Volpe National Transportation Systems Center  
55 Broadway  
Cambridge, MA 02142  
(617) 494-2522  
[Heidi.Howarth@dot.gov](mailto:Heidi.Howarth@dot.gov)

## KEYWORDS

Safety culture, safety culture model, safety culture assessment, safety culture measurement, evaluation, short line railroads, regional railroads, literature review

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