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IMPLEMENTING SLSI-PROVIDED OPPORTUNITIES CONTINUES TO SUPPORT SAFETY CULTURE GROWTH

SUMMARY
The Short Line Safety Institute (SLSI) measures short line and regional railroads' safety culture using a multi-method assessment process that examines safety culture performance across the U.S. Department of Transportation (DOT) Safety Council's 10 Core Elements of a Strong Safety Culture (Morrow & Coplen, 2017). This document summarizes findings from an analysis of safety culture growth across 20 short line railroads that completed both an initial (Time 1) and follow-up (Time 2) Safety Culture Assessment (SCA) by SLSI.

In this analysis, the Volpe National Transportation Systems Center (Volpe) staff established Time 1 and Time 2 safety culture scores for each railroad, using outputs from SLSI's SCA process. Volpe staff then measured railroads' safety culture growth within the 10 Core Elements. While the analysis revealed safety culture growth across all railroads and within all 10 Core Elements, the magnitude of improvement varied by railroad and Core Element.

BACKGROUND

Numerous factors can affect a railroad's safety outcomes. A strong safety culture can help reduce the frequency and severity of accidents by creating a safer, more accountable work environment. The DOT Safety Council defines safety culture as "the shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands" (Morrow & Coplen, 2017).

In 2014, with support from the Federal Railroad Administration's (FRA) Office of Research, Development, and Technology, the American Short Line and Regional Railroad Association established SLSI, an organization focused on strengthening safety culture in the short line and regional rail industry. SLSI uses the 10 Core Elements of a Strong Safety Culture as a theoretical framework to operationalize its definition of safety culture. Figure 1 shows the 10 Core Elements, as adapted by SLSI.

#	Core Element Description
1	Leadership Is Clearly Committed to Safety
2	The Railroad Practices Continuous Learning
3	Decisions Demonstrate That Safety Is Prioritized Over Competing Demands
4	Reporting Systems and Accountability Are Clearly Defined
5	There Is a Safety Conscious Work Environment
6	Employees Feel Personally Responsible for Safety
7	There Is Open and Effective Communication Across the Railroad
8	Mutual Trust Is Fostered Between Employees and the Railroad
9	The Railroad Is Fair and Consistent in Responding to Safety Concerns
10	Training and Resources Are Available to Support Safety

Figure 1. The 10 Core Elements of a Strong Safety Culture

SLSI conducts voluntary, non-punitive, confidential SCAs for short line and regional railroads across the United States. SCAs provide a diagnostic appraisal of a railroad's safety culture at a given point in time, with documented Opportunities for Improvement.

SLSI began industry-wide implementation of its SCA model in 2016. The SCA model uses teams of Assessors and a multi-method, data-focused, site-customized process that involves observations, interviews, document inventories, and surveys (surveys are only used at railroads with at least 25 employees.) At the end of each SCA, SLSI provides the participating railroad with a final report that summarizes Findings about the railroad's safety culture and suggests Opportunities for Improvement that may strengthen the railroad's safety culture, if implemented.

In 2019, SLSI developed its Time 2 Assessment process to measure changes in a participating railroad's safety culture over time. To date, SLSI has conducted 20 Time 2 Assessments, representing approximately 20 percent of the railroads that have received an SCA.

OBJECTIVES

The objective of the current analysis was to measure safety culture changes among 20 railroads that completed Time 1 and Time 2 Assessments with SLSI between 2016 and 2023. This research provides updates to a previous FRA report that summarized safety culture growth across ten participating railroads (Kidda & Howarth, 2022).

METHODS

First, the Volpe team systematically compared each railroad's Time 1 SCA report with its Time 2 SCA report, with a focus on identifying positive and negative safety culture indicators under each of the 10 Core Elements of a Strong Safety Culture. Using these indicators, analysts estimated whether the safety culture under a particular Core Element strengthened, stayed about the same, or weakened. To support the interpretation of the SCA reports, analysts documented assumptions and reviewed areas of uncertainty with SLSI.

The Volpe team implemented a scoring system to support quantitative analysis of the railroads' safety culture growth. For each Finding in a railroad's Time 1 report, the Volpe team assigned a Time 1 score of 1, 2, or 3 (where 1 = no evidence of a particular safety culture indicator; 2 = evidence with noted room for improvement; and 3 = evidence with no noted room for improvement), based on the language in the Finding and the presence of an associated Opportunity for Improvement.

Similarly, for each associated Time 2 Finding in a railroad's Time 2 report, the Volpe team calculated a Time 2 score by adding corresponding Time 1 scores to ratings of the degree of safety culture change (-1 = worsened; 0 = no change; 1 = improved). Resulting Time 2 scores totaled 1, 2, 3 (as above), or 4, where 4 indicates improvement to a previous Time 1 rating, despite no noted need for improvement. This scoring system enabled the team to investigate how much each railroad's safety culture changed by Core Element and by railroad.

RESULTS

The time between SCAs varied between 23 and 65 months with an average of 46 months. The 20 railroads fully implemented an average of 47 percent of the Opportunities for Improvement recommended by SLSI. In order to assess safety culture growth, the Volpe team subtracted Time 1 ratings from Time 2 scores; this resulted in a change score for each railroad, plotted in Figure 2.

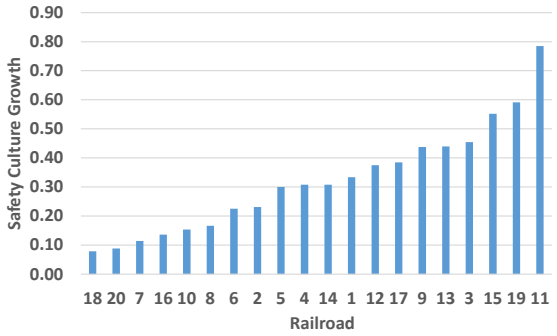

Figure 2. Safety Culture Growth from Time 1 to Time 2 by Railroad

Each railroad in the sample demonstrated evidence of safety culture growth. The growth varied from a minimum change score of 0.08 to a maximum change score of 0.78, with an average change score of 0.34. More information is needed to understand the factors that contributed to this variation.

The analysis provided additional insight into which Core Elements the railroads demonstrated growth. As shown in Figure 3, the improvement in the average SCA score for each Core Element varied from Time 1 to Time 2.

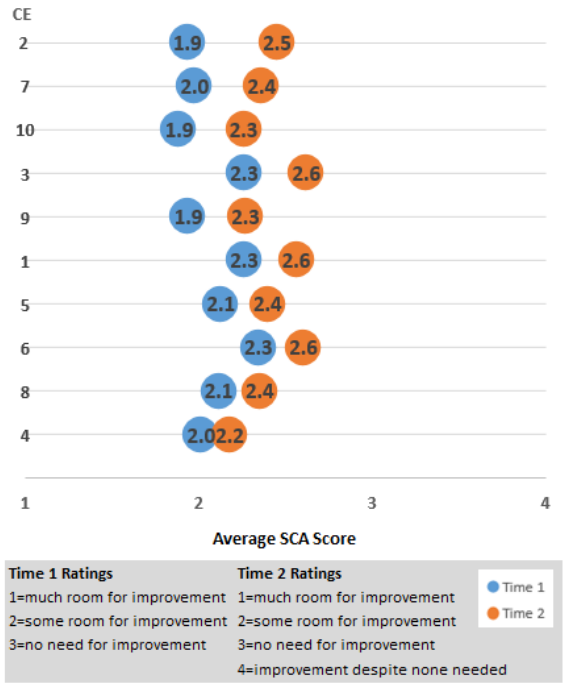

Figure 3. Changes in Participating Railroads' Safety Culture Scores Over Time

Figure 4 depicts the average safety culture growth within each of the 10 Core Elements, which ranged from a high of 0.52 in Core Element 2 (*The Railroad Practices Continuous Learning*) to a low of 0.16 in Core Element 4 (*Reporting Systems & Accountability Are Clearly Defined*). The average change score for all railroads was 0.32 across Core Elements.

Figure 4. Average Growth in Safety Culture Core Elements Over Time

The Volpe team also analyzed the implementation status of the Opportunities for Improvement identified in the participating railroads' Time 1 SCA reports. Figure 5 shows the percentage of Time 1 Opportunities across all railroads that were fully implemented, partially implemented, or showed no evidence of implementation. Forty-seven percent of Opportunities for Improvement were fully implemented, 14 percent were partially implemented, and 39 percent showed no evidence of implementation.

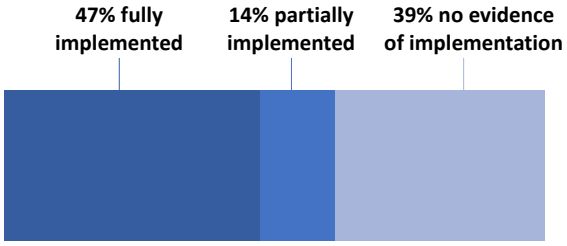

Figure 5. Implementation Status of Time 1 Opportunities for Improvement at Time 2 SCA

As part of the Opportunities analysis, the Volpe team examined how much time had passed between the railroads' Time 1 and Time 2 SCAs. In contrast to the previous analysis of ten railroads, which found a positive correlation (0.68) between the number of months between SCAs and Opportunities fully implemented, the current analysis showed no correlation (-0.02) between months lapsed and full implementation status.

CONCLUSIONS

The current analysis of 20 railroads participating in a Time 2 SCA showed continued support for

safety culture growth through railroads addressing feedback in the SCA post-Assessment reports and by implementing SLSI-recommended Opportunities for Improvement. The average safety culture growth is similar at both analysis points; for ten railroads, analysts calculated an average growth score of 0.27, while the 20-railroad sample produced an average growth score of 0.32.

While growth varied across railroads, the current descriptive analysis suggests support for the hypothesis that, overall, implementation of SLSI-provided Opportunities for Improvement results in strengthened safety culture outcomes. Participating railroads fully or partially implemented over 60 percent of Time 1 Opportunities for Improvement provided by SLSI. Predominantly, this supported a stronger safety culture by a railroad's Time 2 SCA. For all railroads, however, the Assessors reported there was room for additional safety culture improvement.

This analysis continues to support the possibility that it may be easier for railroads to strengthen their safety culture under some Core Elements and more difficult under others, as evidenced by the trends in safety culture growth for the 20-railroad sample, where Core Element 4 (*Reporting Systems & Accountability Are Clearly Defined*) continues to demonstrate low growth.

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KEYWORDS

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

CONTRACT NUMBER

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