

Developing a Detailed Causal Taxonomy for Transit Safety Events

In order to help FTA and the transit industry better identify and manage safety risks, FTA is developing a new taxonomy for the causes of transit safety events. Based on a review of the published literature and industry practices, this taxonomy is intended to comprehensively categorize and describe the types of factors that can cause or contribute to accidents and incidents in transit. Once it is complete, the taxonomy will be used to guide changes to data collection and reporting methods for transit safety events.

At present, this taxonomy is still a work in progress, and we are looking for feedback from subject matter experts on our choices of causal factors and terminology. We will be giving a presentation on this project at the upcoming SSO workshop on Wednesday, May 16th, but we would appreciate if you could review the proposed causal factors in advance so we can get your feedback during our presentation.

This document summarizes the factors included in the current draft of this taxonomy. At this stage, it is focused on rail transit, but it will be expanded to cover other modes as we continue making revisions. The rail transit safety event causal taxonomy organizes causal factors into five categories:

- **Human factors** describe the errors, rule violations, and characteristics of the people involved that contributed to the safety event.
- **Equipment and infrastructure factors** describe the failures in functioning of vehicles, tracks, or other technological components of the transit system that contributed to a safety event.
- **Environmental factors** describe the characteristics of the environment in which the people and vehicles were operating that contributed to the safety event.
- **Organizational factors** describe the elements of the management, policies, and procedures of the transit agency operating the transit vehicles that contributed to the safety event.
- **Outside factors** describe the larger context in which the transit agency is operating, where factors outside the control of the agency contributed to the safety event.

Category	Factors	Definition
Human Factors	Errors	An individual intends to achieve a safe outcome, but their actions inadvertently differ from this intended outcome due to <u>Skill-Based</u> , <u>Decision</u> , or <u>Perception errors</u> .
	Violations	An individual's actions intentionally violates rules, policies, or procedures. In a <u>Routine</u> or <u>Exceptional</u> violation, the individual is still trying to achieve a safe outcome, unlike cases of <u>Intentional harm</u> .
	Communication	Coordination or communication between individuals, or lack thereof, contributed to the occurrence of a safety event. Sub factors include <u>Failure to give</u> , <u>Failure to receive</u> , or <u>Failure to comply with communication</u> , or <u>Use of improper communication</u> .
	Condition	An individual's state or trait contributed to the safety event. Examples include fatigue, distraction, impairment, or lack of necessary job skills.

Equipment & Infrastructure Factors	Vehicle	On-track equipment failing to function as intended contributed to the safety event due to <u>Mechanical</u> , <u>Electrical</u> , or <u>Design failures</u> .
	Infrastructure	Structural components of the rail transit system failure to function as intended contributed to the safety event due to <u>Track, Roadbed, and Structures</u> ; <u>Signal and Communication</u> ; or <u>Design failure</u> .
Environmental Factors	Lighting Conditions	Insufficient lighting contributed to the safety event.
	Weather/Visibility Conditions	Circumstances other than lighting contributed to the safety event through reducing visibility or impeding work.
	Surface Conditions	The surface on which persons or vehicles were moving contributed to the safety event, through impairing the traction for vehicles, or contributing to slips, trips, and falls.
	Extreme Environmental Conditions	Natural disasters or other exceptional natural events contributed to the safety event.
	Obstructions	Obstructions in the right-of-way or operating environment contributed to the safety event.
Organizational Factors	Supervision	Supervisory decisions on how to plan and manage operations contributed to the occurrence of a safety event. Sub factors include <u>Inadequate Supervision</u> , <u>Planned Inappropriate Actions</u> , <u>Failure to Correct Known Problems</u> , or <u>Supervisory Violations</u> .
	Resource Management	Organizational decisions regarding the allocation, management, or maintenance of resources contributed to the occurrence of a safety event, including <u>Human Resources</u> , <u>Equipment/Facility Resources</u> , or <u>Monetary/Budget Resources</u> .
	Organizational Culture & Climate	The transit agency's <u>Organizational Structure</u> , <u>Policies</u> , or <u>Culture</u> contributed to the occurrence of a safety event.
	Organizational Processes	Decisions made by the transit agency in establishing and maintaining the formally defined <u>Operations</u> , <u>Practices and Procedures</u> or <u>Safety Oversight</u> contributed to the occurrence of a safety event.
	Organizational Contraventions	The transit agency itself contributed to a safety event by violating rules or regulations.
Outside Factors	Regulatory Oversight	Federal, State, or Municipal regulatory oversight contributed to a safety event.
	Economic/ Political/ Social/ Legal Environment	Any other elements of the transit agency's operating environment, outside the scope of control of the agency, contributed to the safety event.