Developing a Detailed Causal Taxonomy

For Transit Safety Events

U.S. Department of Transportation
Volpe Center

Advancing transportation innovation for the public good

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Goals for Today

- Introduce the Transit Safety Event Causal Taxonomy project
- Describe the categories of causal factors in our current draft
- Discuss how SSOs currently identify causes of safety events
- Get feedback from you on the draft taxonomy

Safety Event Causal Taxonomy

- As part of a larger effort to improve safety data quality and utilization, FTA is developing a detailed safety event causal taxonomy
  - At this stage just for Rail Transit, later will be expanded to Bus Transit
- Cause is crucial for analyzing a hazard and developing effective risk mitigation strategies
- A detailed causal taxonomy will allow FTA and transit agencies to more effectively identify and manage safety risk

Current Causal Taxonomy

- Only reported for rail events that meet the thresholds for the SSOA to conduct an investigation
- SSO data reporters select probable cause from a dropdown list of eleven options:
  - Equipment Failure
  - Poor Maintenance
  - Operating Rule Violation/Human Factor
  - Slips and Falls
  - Imprudent Customer Actions
  - Medically Related
  - Actions of Motorist
  - Pedestrian Actions
  - Trespasser
  - Suicide
  - Other

Problems with Current Taxonomy

- Current categories are too broad
  - E.g., fatigue, distraction, or substance use all covered by “Human Factor”
- Categories are not sufficiently comprehensive
  - No environmental/contextual factors
  - No organizational factors
- Lack of sub categories
- Only a single cause can be selected

Taxonomy Outline

0. Description of Event
1. Human Factors
2. Equipment and Infrastructure Factors
3. Contextual Factors
4. Organizational Factors
5. Outside Factors

0. Description of Event

- Location and Setting
- People Involved
- Vehicles Involves
- Sequence of Events

1. Human Factors

- Identity
  - Who was involved, how were they involved, were they an employee
- Errors
  - Skill-based errors
  - Decision errors
  - Perceptual Errors
- Violations
  - Routine
  - Exceptional
  - Intentional
- Coordination
- Condition

2. Equipment and Infrastructure Factors

- Vehicle
  - Mechanical and Electrical Failures
    - Brakes
    - Trailer or Container on Flatcar
    - Body
    - Coupler and Draft System
    - Truck Components
    - Axles and Journal Bearings
    - Wheels
    - Locomotives
    - Doors
    - General Mechanical and Electrical Failures
  - Design Failures
- Infrastructure
  - Tracks, Roadbed, and Structures
    - Roadbed
    - Track Geometry
    - Rail, Joint Bar, and Rail Anchoring
    - Frogs, Switches, and Track Appliances
    - Other Way and Structure
  - Signal and Communications
  - Design Failure

3. Contextual Factors

- Lighting Conditions
- Weather/Visibility Conditions
- Surface Conditions
- Extreme Environmental Conditions
- Obstructions

4. Organizational Factors

- Supervision
  - Inadequate Supervision
  - Planned Inappropriate Actions
  - Failure to Correct Known Problems
  - Supervisory Violations
- Resource Management
  - Human Resources
  - Equipment/Facility Resources
  - Monetary/Budget Resources
- Organizational Culture and Climate
  - Organizational Structure
  - Organizational Policies
  - Organizational Culture
- Organizational Processes
  - Organizational Operations
  - Organizational Practices and Procedures
  - Organizational Safety Oversight
- Organizational Contraventions

5. Outside Factors

- Regulatory Oversight
- Economic/Political/Social/Legal Environment

Questions

- What are the pros and cons of a new causal taxonomy?
- How well does this taxonomy align with your current investigation methods?
- Are there any causal factors that are missing?
- Are there any causal factors that are unclear?
- Is there any language or terminology that should be changed?
- Do you have any other comments, concerns, or suggestions about FTA using a more detailed causal taxonomy?

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