2025 FTA JOINT STATE SAFETY OVERSIGHT AND RAIL TRANSIT AGENCY WORKSHOP

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Session #4

Effectively Conducting and Reviewing Safety Risk Assessments

2025 Joint SSO and RTA Workshop

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Agenda

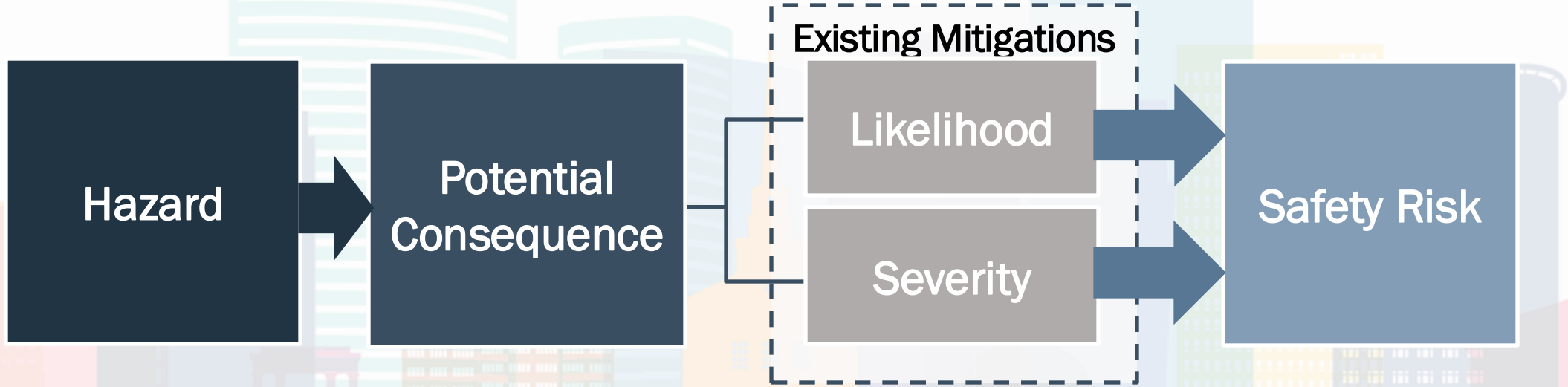
- Safety Risk Assessment Overview
- SSO's Role
- Best Practices
- Resources
- Panel Discussion

Safety Risk Assessment

49 CFR 673.25

c) Safety Risk Assessment

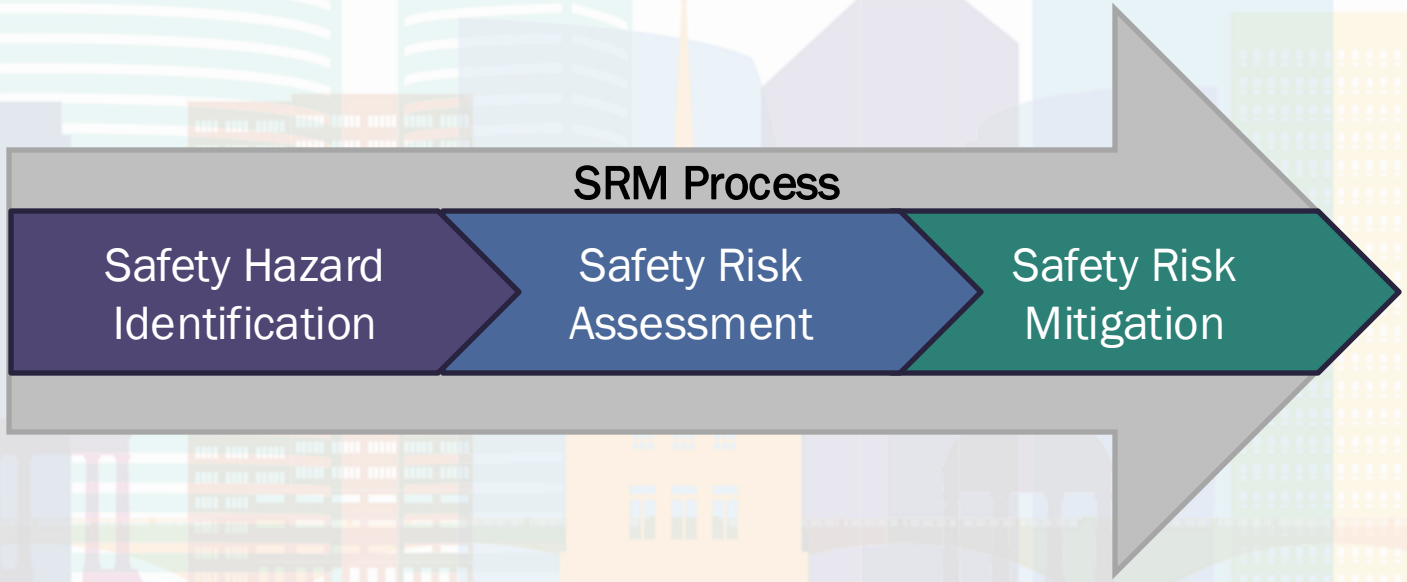
1) A transit agency must establish methods or processes to assess safety risks associated with identified safety hazards
2) A safety risk assessment includes an assessment of the likelihood and severity of the potential consequences of identified hazards, taking into account existing safety risk mitigations, to determine if safety risk mitigation is necessary and to inform prioritization of safety risk mitigations.



The Importance of Safety Risk Assessment

Why Conduct an SRA?

- Required Safety Risk Management element under 49 CFR 673.25
- Helps to define the scope of the risk
- Assists in the identification of stakeholders to ensure relevant parties are included in the discussion
- Supports effective prioritization of hazards instead of a reactive approach
- Identifies existing mitigations and their effectiveness
- Allows for an analytical approach to developing new mitigations
- Documents analysis for future SRM consideration



The Importance of Safety Risk Assessment

Why Are We Discussing it Today?

- As SMS processes continue to mature, Safety Risk Assessments will be an important tool to address emerging hazards
- Effective review and analysis of completed Safety Risk Assessments are crucial in ensuring that hazards are effectively prioritized, and appropriate mitigations are developed
- Numerous Safety Advisory responses have lacked all the required components of a Safety Risk Assessment

Concerns Observed in Safety Advisory Responses

Example of a transit agency not addressing the advisory's hazard/consequence pairings

Hazard: FTA Safety Advisory SA-22-2 Signal System Safety and Train Control **Required PPE**: N/A	Reviewed By: SSRC (see meeting minutes) Date: 11/3/2022

Scenario	Hazard	Rating	Notes
Current redundent [*sic*] Protections	Mistakes	High	Single point failure /Cost/Updating cars
Signal Overruns	De-Rail/Face up	Serious	Operator can bypass signals/multi problems
Speed	Speed not known	High	OP can decide to exceed the speed
Train doesent [*sic*] speak to rail	Multiple	High	Long term project in procurment [*sic*] and SGR

Concerns Observed in Safety Advisory Responses

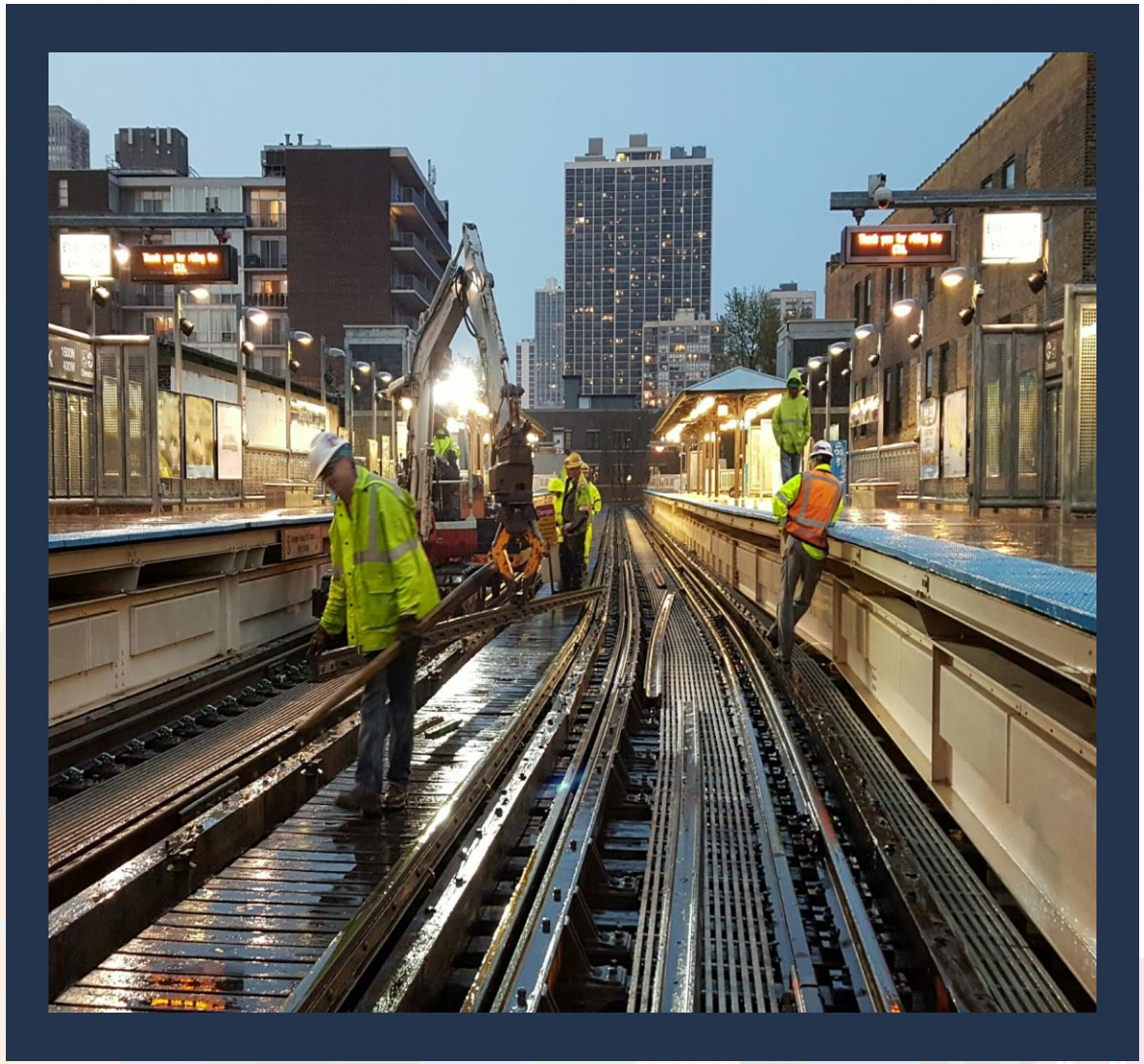
Example of a transit agency skipping from hazard identification to mitigation

	Hazard	Description	Potential Consequence	Responses
2	Vehicle signal components insufficiently maintained	Signal components that are within a rail vehicle, such as receivers, relays, and cab signals, are not maintained according to manufacturer or agency standards.	a. Signal system fails to control train movements as designed resulting in a train-to-train collision or derailment.	Revenue vehicle is being maintained according to PM programs as listed on PTASP. RTA uses MAXIMO to administer and track PM status. PM programs are frequently being audited by System Safety Department and SSO.
3	Signal system design insufficiency	A signaling system is not designed to accommodate the current level of service or technology in use.	a. Signal system fails to detect occupancy of track segment (false clear) as designed resulting in a train-to-train collision.	New Train Control System has to go through safety certification process where design, construction, commissioning of the system are certified.

Hazard, Consequence Identification

Hazards and Consequences

- **Hazards**
  - Intentional Trespass
  - Unintentional Trespass
- **Consequences**
  - Injury
  - Death
  - Property Damage
  - Operator Mental Distress
  - Public Relations Damage
  - Litigation

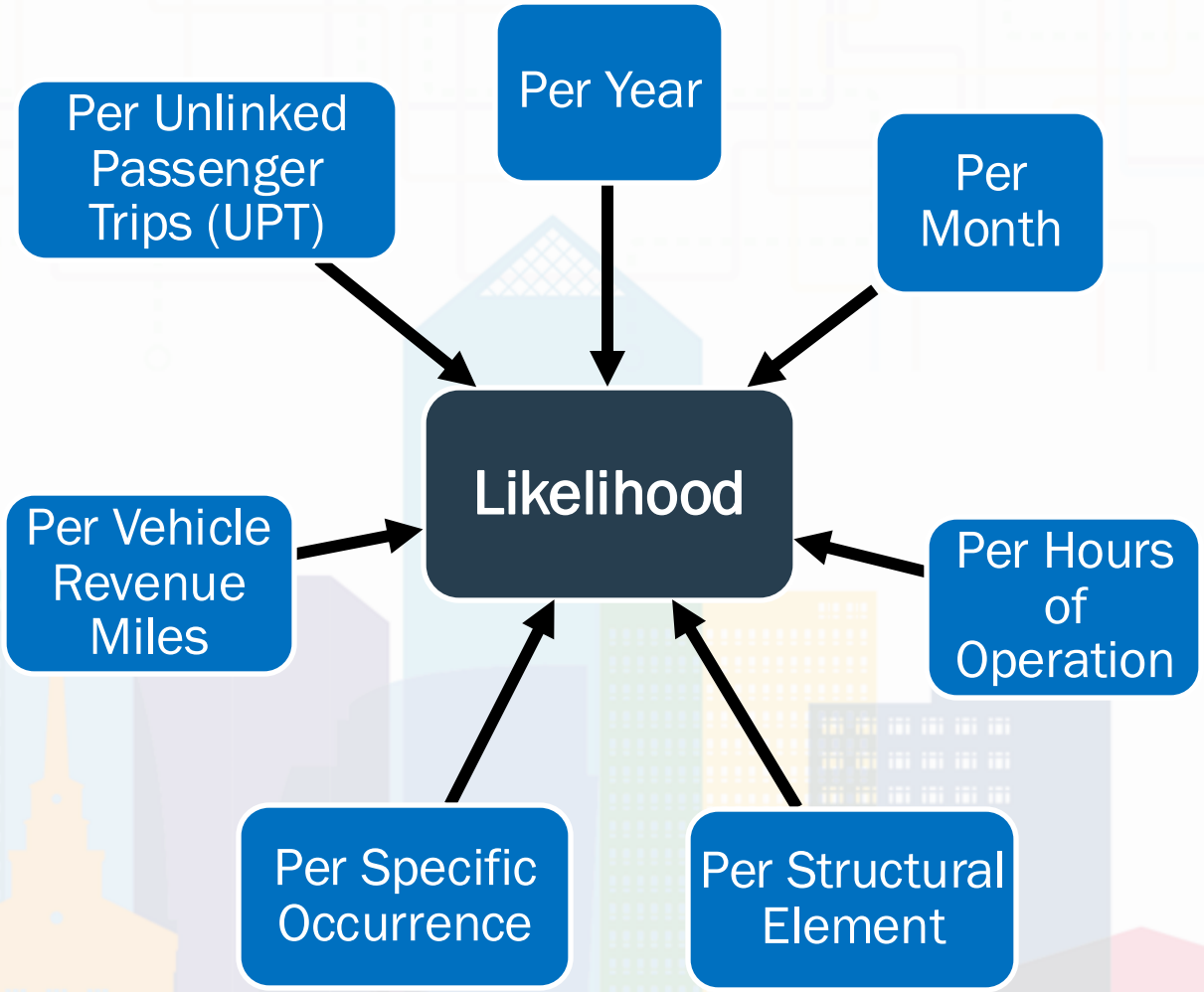


Assessing Likelihood

Likelihood

- How likely is a potential consequence?
- Likelihood can be estimated:
  - Using quantitative and qualitative data
  - Using lagging and leading indicators
- Likelihood risk is “scored” or normalized using established likelihood scales
  - Likelihood scales can use different denominators – such as time, service provided, or service consumed – to account for the type of consequence and available information

See Sample Safety Risk Assessment Matrices for Rail Transit on the PTASP TAC for more details



Assessing Severity

Severity

- How serious might the effects of a potential consequence be?
- Severity considers the impacts on **people**, the **system**, and the **environment**
  - Severity also considers the gravity of damage, duration of impact, and cost
- Examples:
  - The seriousness of injuries from a fall from the platform
  - The amount of time it takes for power restoration after an outage
  - The cost to replace equipment lost to storm surge

See Sample Safety Risk Assessment Matrices for Rail Transit on the PTASP TAC for more details

Safety Risk Assessment and Data

The Importance of Data

- Data is a critical building block in a successful safety risk assessment process

- Data helps agencies determine:
  - Which potential consequences of a hazard should be assessed
  - The potential severity of the consequence
  - The likelihood of occurrence

- The ability to access and use information and data is critical

See Safety Risk Assessment in Practice on the PTASP TAC for more details

Prioritizing Safety Risk

SAMPLE SAFETY RISK ASSESSMENT MATRIX				
Severity / Likelihood	(1) Catastrophic	(2) Critical	(3) Marginal	(4) Negligible
(A) Frequent	High	High	High	Medium
(B) Probable	High	High	Medium	Medium
(C) Occasional	High	Medium	Medium	Low
(D) Remote	Medium	Medium	Low	Low
(E) Improbable	Medium	Low	Low	Low

See Sample Safety Risk Assessment Matrices for Rail Transit Agencies on the PTASP TAC for more details

Identifying Mitigations

Safety Risk Mitigation

- The objective is to consider whether mitigations or strategies can:
  - Reduce risk by affecting the likelihood and/or severity, or
  - Eliminate the risk altogether, if possible
- Mitigations can be through design changes or operational in nature
- Agencies should consider potential cost/benefit of mitigations

See Developing Mitigations in Response to the Safety Risk Assessment on the PTASP TAC for more details

Mitigations	
Possible Controlling Measures and Remarks	**Residual Risk Rating**
Peform propagation study for frequency range; perform radio coverage test of system; add supplemental repeaters, provide redundant equipment.	**IID**
Design pedestrian walkways in accordance with MUTCD, ADA and other relevant codes and standards; install appropriate signage, roadway markings or barriers; and enforce operator rules and procedures.	**IID**
Utilize reroute measures or suspend services as necessary.	**IVC**

Identifying Mitigations

Example of a complete Safety Risk Assessment

Hazard Description	Hazard Cause/Effect		Hazard Risk Index Assessment			Mitigations	
	Potential Cause	Consequences	Initial Risk Rating	Likelihood	Severity	Possible Controlling Measures and Remarks	Residual Risk Rating
Failure of radio system	Equipment/power failure	Loss of comms during regular or emergency situations, death, injury, property damage	IC	Occasional	High	Peform propagation study for frequency range; perform radio coverage test of system; add supplemental repeaters, provide redundant equipment.	IID
Person struck by approaching/ departing vehicle	Design element; poor or incorrect signage, passenger or operator inattention	Personal injury, loss of life	IIC	Occasional	Moderate	Design pedestrian walkways in accordance with MUTCD, ADA and other relevant codes and standards; install appropriate signage, roadway markings or barriers; and enforce operator rules and procedures.	IID
Flooding	Human error (errant backhoe), infrastructure failure (water main break, sewer system failure)	Flooded roadways, damage to vehicles and infrastructure	IIIC	Occasional	Low	Utilize reroute measures or suspend services as necessary.	IVC

Safety Risk Assessment and Decision Making

Decision Making

- Safety risk assessments create a snapshot of information available at the time and promote informed discussion about safety risk and the level of safety risk the agency is willing to accept
- Key agency stakeholders are part of the safety risk conversation and support decisions on whether and how to address safety risk
- A safety risk assessment is just one factor that goes into decision-making.

See Safety Risk Assessment in Practice on the PTASP TAC for more details

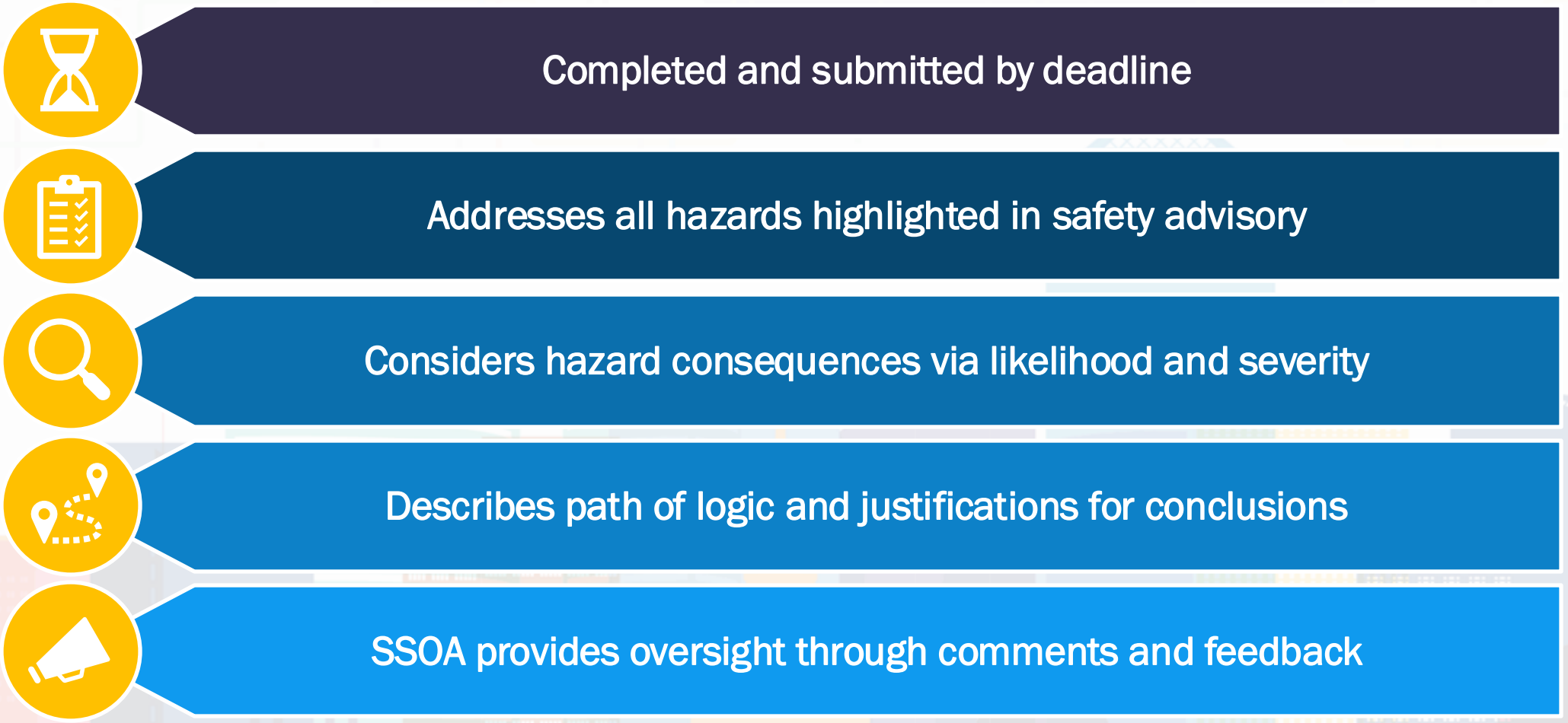
The SSOA Role in Safety Risk Assessment

SSO's Role

- Review and approve the RTA's ASP, including the Safety Risk Assessment process (49 CFR 674.25(b))
- Include policies and procedures within the SSO Program Standard for collecting and reviewing data the RTA uses when assessing safety risk (49 CFR 674.27(a)(14))
- Oversee the RTA's development, implementation, and monitoring of safety risk mitigations (49 CFR 674.27(a)(6))
- Review SRM activities conducted in response to a safety advisory or general directive to ensure the RTA has adequately addressed all related hazards and potential consequences

Advisory and Directive Response Best Practices

Best Practices for an effective safety risk assessment conducted in voluntary response to advisories:



Example: SSOA Review and Feedback

RTA described path of logic justifying risk ranking

RTA analyzed all hazards highlighted by safety advisory

SSOA provided feedback on RTA's actions

FTA SA-22-2 REVIEW CHECKLIST						
#	Hazard	Description	Potential Consequences	RTA Response / SSOA Determination May 2023	SSOA Response Sufficiency Requirement Met? (Yes-Partial-No)	Status
1	Wayside signal components insufficiently maintained	Signal components that are on the roadway or in signal rooms (wayside), such as relays, cables, or signal sources are not maintained according to manufacturer or agency standards.	a) Signal system fails to detect occupancy of track segment (false clear) as designed resulting in a train-to-train collision.	**RTA Response:** For this hazard, the RTA identified **five (5)** existing controls to mitigate the potential consequence of a train-to-train collision as a result of the signal system failing to detect occupancy of track segment (false clear). These controls include daily inspection and ongoing maintenance of switch machines, gages, switch stands, train stops, and track circuits; vital relay testing; real time performance monitoring of the wayside signal system with a track circuit monitoring tool; maintenance observation panel; and event recorders in relay houses for all track circuits and interlocking signals. The RTA assigned a risk assessment ranking of **2E, Acceptable** wi **Review**, for this hazard and determined no additional mitigations were warranted at this time. **SSOA Determination:** Upon review of the supporting materials, the SSOA determined that the RTA conducted a sufficient safety risk assessment of this signal system hazard and consequences identified by FTA in Table 1 of the Safety Advisory 22-2, including the requirement that no additional mitigations are warranted at this time.	Yes	CLOSED
			b) Signal system fails to properly route train through interlocking resulting in a train-to-train collision or derailment.	**RTA Response:** For this hazard, the RTA identified three (3) existing controls to mitigate the potential consequences of a train-to-train collision or derailment as a result of the signal system failing to properly route a train through an interlocking. These controls include the design of the RTA interlockings as fail safe; the maintenance audit program; and the Automatic Train Control system.	Yes	CLOSED

Resources

Implementing Safety Risk Assessment Approaches

Publication Date	June 2021
Format	Webinar
Intended Audience	Bus and rail transit agencies
Purpose	Webinar presentation and recording provides transit agencies and states with sample approaches to implementing safety risk assessment. Guest transit agency speakers share their experiences and answer questions from participants.

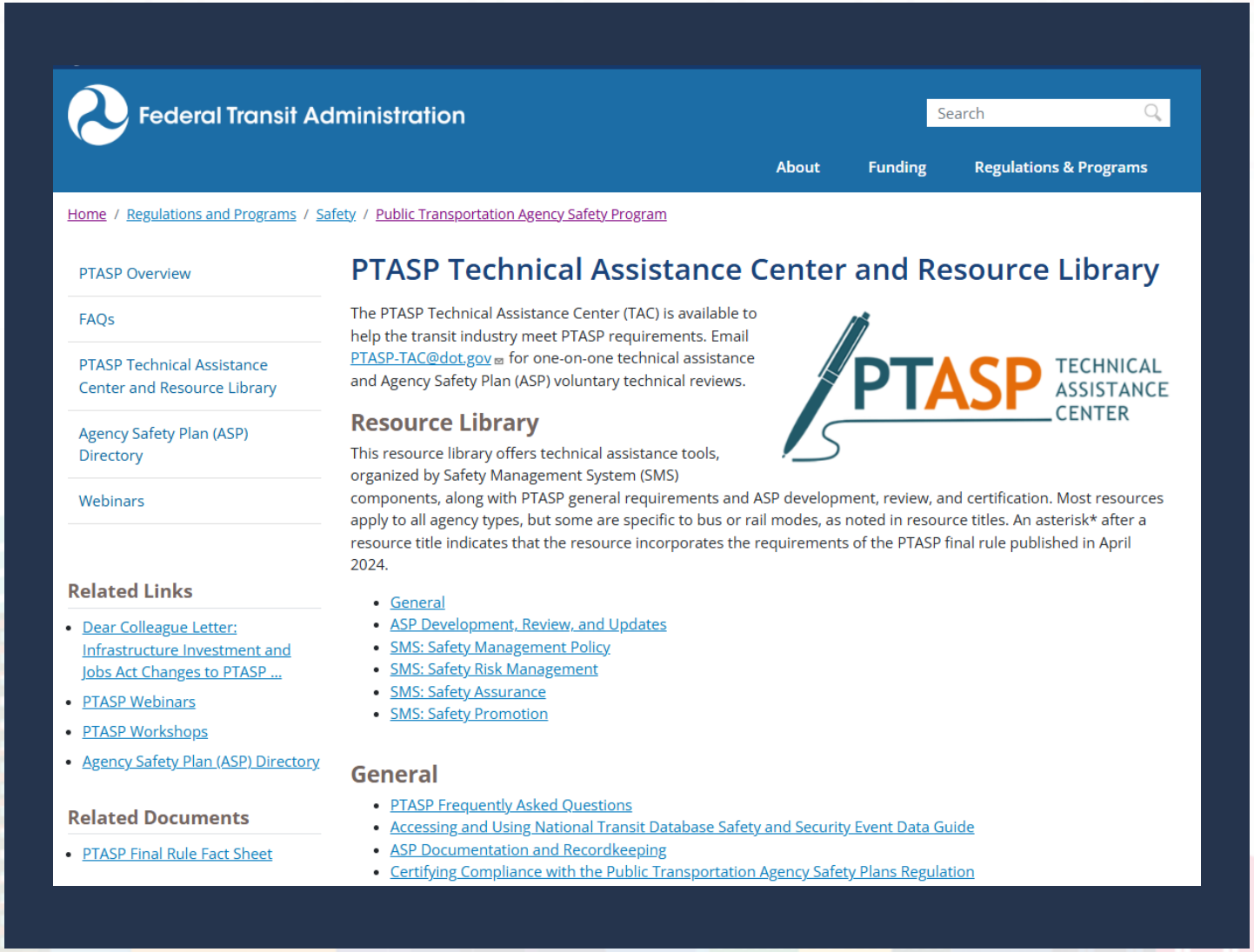
Resources

Safety Risk Assessment in Practice

Publication Date	April 2022
Format	Webinar
Intended Audience	Bus and rail transit agencies
Purpose	Webinar presentation and recording reviews key challenge areas for Safety Risk Assessment in practice and provides examples of ways agencies can address these challenges.

Resources

PTASP TECHNICAL ASSISTANCE CENTER



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- Dear Colleague Letter: Infrastructure Investment and Jobs Act Changes to PTASP ...
- PTASP Webinars
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- Agency Safety Plan (ASP) Directory

Related Documents

- PTASP Final Rule Fact Sheet

PTASP Technical Assistance Center and Resource Library

The PTASP Technical Assistance Center (TAC) is available to help the transit industry meet PTASP requirements. Email PTASP-TAC@dot.gov for one-on-one technical assistance and Agency Safety Plan (ASP) voluntary technical reviews.

PTASP TECHNICAL ASSISTANCE CENTER

Resource Library

This resource library offers technical assistance tools, organized by Safety Management System (SMS) components, along with PTASP general requirements and ASP development, review, and certification. Most resources apply to all agency types, but some are specific to bus or rail modes, as noted in resource titles. An asterisk* after a resource title indicates that the resource incorporates the requirements of the PTASP final rule published in April 2024.

- General
- ASP Development, Review, and Updates
- SMS: Safety Management Policy
- SMS: Safety Risk Management
- SMS: Safety Assurance
- SMS: Safety Promotion

General

- PTASP Frequently Asked Questions
- Accessing and Using National Transit Database Safety and Security Event Data Guide
- ASP Documentation and Recordkeeping
- Certifying Compliance with the Public Transportation Agency Safety Plans Regulation

Panel Discussion

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