



## **Serious Incident and Fatality (SIF) Prevention Model and Guidebook**





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# Introduction

With support from U.S. Steel and numerous subject matter experts across industries and geography, National Safety Council is proud to release this **Serious Incident and Fatality (SIF) Prevention Model**. The goal is to assist organizations of all sizes in their vital efforts to prevent serious incidents and fatalities in the workplace.

The NSC SIF Prevention Model is designed as a dynamic, continuous improvement process to help organizations understand and analyze the multifaceted nature of safety threats that have potential for a SIF. It’s not a static solution, nor does it guarantee results on its own. Rather, it must be integrated into the operations and key functions across each organization for every industry, company size, or level of safety maturity

## What Is a SIF Prevention Framework?

A SIF prevention framework is a dynamic process designed to assist organizations in comprehending and addressing safety threats that could result in a SIF. A SIF prevention framework serves as a structured approach for identifying SIF hazards and risks, implementing safeguards, controls and establishing a process for continuous monitoring and improvement.

## Why Is a SIF Prevention Framework Needed?

According to the Bureau of Labor Statistics (BLS), more than 5,000 fatalities occur annually in U.S. workplaces<sup>1</sup>, highlighting a critical need for more effective preventative measures and systems. On a global scale, the World Health Organization (WHO) estimates that 2.9 million workers die annually due to occupational injuries and illnesses. This is a staggering and sobering reminder of how much help is needed to reduce this number.

A SIF prevention framework is essential to workplace safety because it provides a structured, systems-based approach to understanding and mitigating risks that lead to serious incidents and fatalities. By focusing on both structural vulnerabilities and individual risk factors, the framework helps organizations identify and address SIF-related hazards through implementing and verifying the effectiveness of critical control measures. A framework can be used to prevent serious and potentially fatal incidents, rather than merely reacting to them after they occur.

1. Bureau of Labor Statistics. (2024). Retrieved from [www.bls.gov](https://www.bls.gov)

## Key aspects of why a SIF prevention framework is essential include:

- » **Proactive Risk Management:** The SIF prevention framework promotes a proactive approach to safety, encouraging organizations to anticipate, identify, and mitigate risks before they lead to serious incidents.
- » **Risk-Based and Systems Approach:** It supports a comprehensive understanding of how different systems interact within an organization and individuals and how these interactions can produce risks, enabling a holistic assessment and strategic approach to risk management.
- » **Comprehensive Safety Framework:** By integrating both organizational and technical aspects of safety, the SIF prevention framework model offers a more complete view of workplace safety challenges, facilitating more effective and sustainable solutions.

## Who Should Use a SIF Prevention Framework?

Incorporating a SIF prevention framework within organizational safety strategies will benefit companies of all sizes to guide their efforts to address SIF risks and foster a culture of safety that prioritizes employee well-being.

Organizations with a robust Safety Management System (SMS) may already have elements of SIF prevention in place. The NSC SIF Prevention Model can be used to supplement and enhance existing elements of an SMS and is intended to be customized to best meet the needs of any organization.





# NSC SIF Prevention Model

The NSC SIF Prevention Model is designed around the Plan-Do-Check-Act (PDCA) continuous improvement framework, with key principles embedded from Human and Organizational Performance (HOP). It is intended for prevention purposes, and can be used to compare against a company’s existing SIF prevention efforts or elements of a SMS.

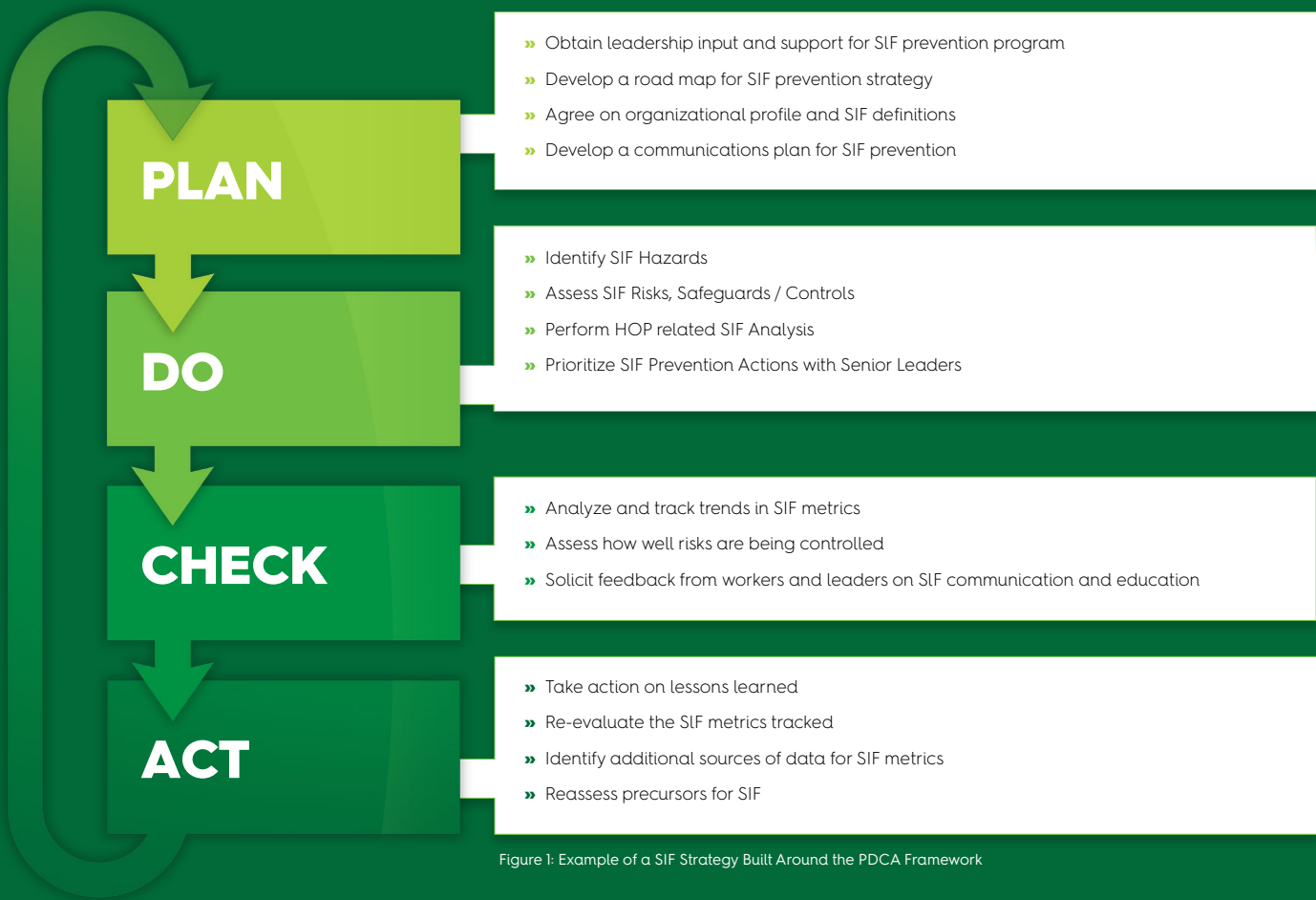
## The NSC SIF Model involves four primary steps:

- » **PLAN:** Secure leadership commitment and ensure organizational readiness by assessing existing capacity for SIF prevention work and obtaining a complete view of all SIF risks across the entire organization.
- » **DO:** Develop a comprehensive understanding of SIF risks by conducting initial hazard identification, determining risk levels, and prioritizing and implementing additional safeguards as needed.
- » **CHECK:** Analyze and verify the effectiveness of safeguards by ensuring they are sufficient and functioning properly and monitoring them over time.
- » **ACT:** Prioritize resources and drive continuous improvement in SIF prevention based on the insights gained from safeguard analysis and verification.



# PDCA Framework

The **Plan Do Check Act (PDCA)** is a commonly used management methodology for continuous improvement in processes, products, and services. It can also be used to **guide change management** when implementing or piloting a new safety initiative. The NSC SIF Prevention Model is designed around this PDCA framework, leveraging its cyclical nature to acknowledge and address key influencing factors to workplace safety and SIF prevention.



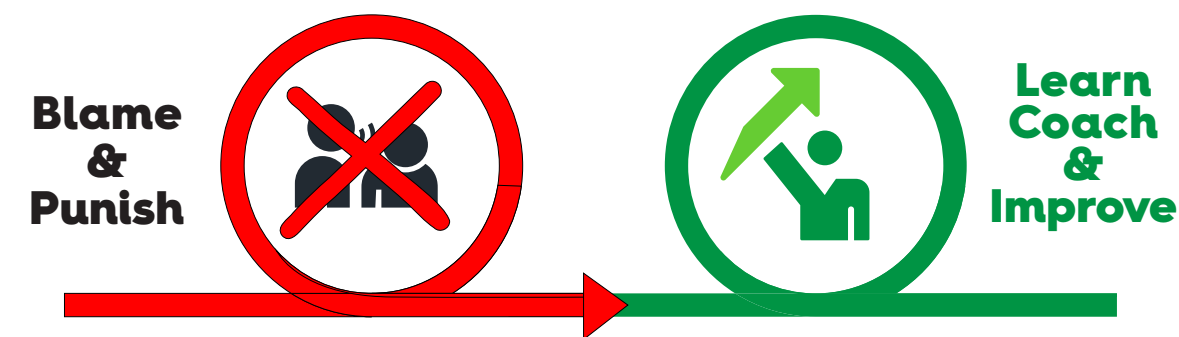
1. Inouye, J. (2020). Designing strategy for serious injury and fatality prevention. *National Safety Council, Campbell Institute*.

## Human and Organizational Performance (HOP)

Human and Organizational Performance is a philosophy that focuses on improvement by understanding the broader context of workplace environments, recognizing that human errors are often predictable and indicative of deeper systemic issues. This perspective shifts the focus from individual blame to an understanding of underlying system flaws that contribute to errors. Essential to the HOP approach is a commitment to learning and comprehensively understanding the dynamics of tasks and systems so more resilient safeguards can be implemented.

By incorporating HOP principles, the NSC SIF Prevention Model addresses the organizational, technical, and individual risk factors that contribute to serious incidents and fatalities at work, characterized as **risk amplifiers**. This integration ensures that the model targets the underlying systemic conditions, promoting a safer and more resilient workplace environment.

- » Everyone makes mistakes
- » Employees are masters at adaptive problem solving
- » Context drives the actions, behaviors, and decisions of employees
- » Leadership response to failure matters
- » Blame fixes nothing
- » Improvement happens through learning



## The Role of Safety Culture

Advancing health and safety maturity within an organization plays a pivotal role in shaping a strong and resilient organizational culture. This maturity is not solely about adhering to protocols, but about fostering an environment where employees are actively engaged in safety-related practices and decision-making. As safety maturity progresses, it cultivates greater employee satisfaction and commitment, reinforcing a culture of shared responsibility and continuous improvement. Open communication around SIF prevention strategies and inclusive involvement across all organizational levels are essential drivers of this maturity. These efforts not only enhance operational safety but also strengthen the overall cultural fabric of the organization.

The NSC SIF Prevention Model can help to mitigate risk and assist workers in completing job tasks more safely and efficiently, supporting their engagement and satisfaction. By strengthening the organizational structure and cultivating safety leadership, risks can be more effectively mitigated, and employees experience greater benefits as well. This holistic and risk-based approach ensures that safety and health practices are effective, and employee wellbeing is a core value, leading to more sustainable and effective SIF prevention.

## Guidance for Use

This guidebook outlines a strategic approach for SIF prevention and recognizes that success is dependent upon how the model is applied. This guidebook includes supporting tools that can be used directly or modified in a manner that best fits the needs of your organization and culture.

Customization is highly encouraged for optimal use of this model.

Adapted from Hallowell, M. R. (2021, Dec.). The energy wheel: Review of the art and science of energy-based hazard recognition. Professional Safety. Retrieved from [www.safetyfunction.com](http://www.safetyfunction.com)

# PLAN:

## Ensure Leadership Commitment and Organizational Readiness

This initial step is critical for setting the foundation for effective SIF prevention. It involves five key actions designed to align organizational readiness and leadership roles toward a unified strategy around SIF prevention.

### Tools and Guidance:

- » Document Review
- » Conduct an Organizational Gap Analysis
- » Collect SIF-related Employee Perception Data
- » Collect Feedback from Key Stakeholder Groups
- » Set Expectations for Leadership

These tools can be used directly or adapted to best meet the specific needs of each organization. This flexibility allows organizations to effectively integrate the NSC SIF Prevention Model into their existing safety frameworks, enhancing their overall approach to safety management and supporting greater employee adoption.

# DO:

## Assess and Understand SIF Risk

This second step begins with understanding SIF risks to effectively mitigate or eliminate them. The guidance tools below will assist with identifying the size and scope of an organization’s SIF risks and frame the justification for the resources needed for successful SIF prevention.

### Tools and Guidance:

- » Identify Potential SIF Hazards
- » Conduct a Baseline Assessment Onsite
- » Complete the Severity/Risk Safeguards/Controls Matrix
- » Perform a HOP-related SIF Analysis
- » Complete the SIF Prioritization and Rationale Table

This step focuses on the detailed analysis of one key SIF hazard at a time. It involves diligent work to properly understand the risk and its potential to result in a serious incident or fatality. By taking a methodical and focused approach to each significant hazard, organizations can develop more targeted and effective mitigation strategies, thus improving safety outcomes and reducing the likelihood of SIFs.

CHECK:

Analyze and Verify the Effectiveness of Safeguards and Controls

Once the targeted SIF risk has been identified and prioritized, the existing safeguards and layers of protection are evaluated and verified for effectiveness. New or enhanced safeguards are also considered.

This step can further assist in analyzing a company’s overall hazard control strategy.

Tools and Guidance:

- » Complete and Maintain the **Critical Controls for SIF Matrix**
- » Use the **Safeguards and Control Verification Table** to Analyze Safeguards
- » Use the **Action Planning Template** for Adding or Enhancing Safeguards

**These tools are intended to assist** in evaluating your existing controls and identifying ways to strengthen safeguards for SIF risks by tracking corrective or preventive actions.

Hierarchy of Controls and Safeguards

The Critical Safeguards of SIFs Matrix is based on the Hierarchy of Controls framework. It is intended to assist in evaluating your existing controls and identify ways to strengthen safeguards for SIF risks.

When applying the Hierarchy of Controls framework, the higher levels of controls (engineering and above) are considered to be the most effective. The effectiveness of a control is related to whether the control can be defeated or bypassed by worker actions or human errors.

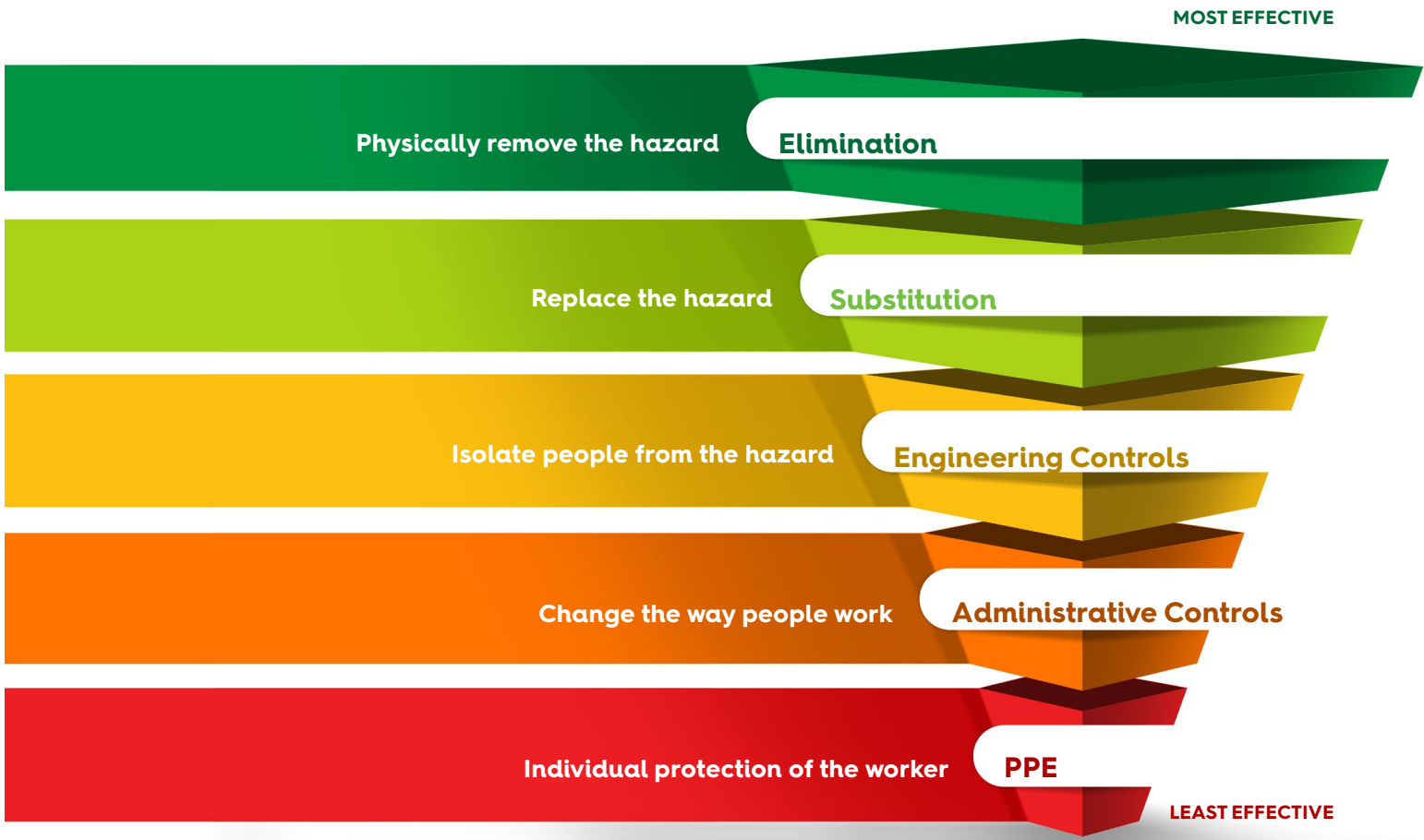


Figure 4: Hierarchy of Controls

**The Critical Safeguards for SIFs Matrix** helps to rank SIF risk based on **Severity** of a potential SIF event and the **Effectiveness** of risk controls currently in place. Analyzing the purpose of a control involves determining whether it:

**Prevents Exposure to the Hazard or... Reduces the Impact of Exposure to the Hazard**

MOST EFFECTIVE

**Elimination of the Hazard:**

Physically remove the hazard from the process or operation.

Cannot be affected by worker actions. *Highly Effective*

**Substitution to Lessen the Hazard:**

Replace the hazard (or hazardous components) with something less hazardous to the worker. Can be defeated by worker actions. *Generally Effective*

**Engineering Controls:**

Install physical, mechanical, or electrical controls with the intent of isolating the worker from the hazard. Somewhat dependent on worker actions.

*Generally Effective*

**Administrative Controls:**

Enact policies, procedures, or warning systems designed to change the way the worker interacts with the hazard. Highly dependent on worker and supervisory actions. *Less Reliably Effective*

**Personal Protective Equipment:**

Protect the worker from exposure to the hazard by using PPE that is designed for the specific hazard in your process or operation. Highly dependent on worker actions. *Less Reliably Effective*

LEAST EFFECTIVE

**ACT:**  
**Ensure Continuous Improvement**

The final step requires significant coordination across various levels of the organization to ensure that improvements are effectively identified, implemented, and sustained. Two vital components of this effort include an **assessment process** and the strategic use of **metrics and Key Performance Indicators** (KPIs). Together, these tools not only support a dynamic learning environment, but also foster an organizational culture that prioritizes safety and risk mitigation as an ongoing commitment.

**Tools and Guidance:**

- » Use an **Assessment Protocol for Continuous Improvement**
- » Consider a **Variety of Metrics and Key Performance Indicators**

Implementation of a rigorous **Assessment Process** of the **SMS** is key, whether it's internal or conducted by a third party. Regular and systematic audits are crucial for assessing the health and function of a SMS.

These assessments help ensure that safety protocols are not only in place but are effective across the organization. Additional continuous improvement benefits include identifying gaps in system processes and safety practices and better understanding the challenges and hazards that frontline workers face every day. An assessment process supports the maintenance of safety compliance and helps organizations to understand and mitigate SIF risk and potential. This is key to enable success of an organization's SIF prevention strategy by reinforcing commitment to safety standards and learning within the organization.



Key components in an organization’s auditing process:

- » Review of existing policies and written work procedures related to SIF prevention
- » Review of training associated with SIF-related work tasks
- » Job observations conducted and employee feedback collected
- » Guidance around frequency and schedule of review, including key personnel to participate, and any other requirements of the assessment and continuous improvement process
- » Process for tracking preventative and corrective actions to completion

The use of a variety of metrics and Key Performance Indicators is also essential for tracking and ensuring continuous improvement. It is particularly important to incorporate **leading indicators** that focus on learning and risk reduction. These leading indicators, which may include metrics on employee training completion rates, near-miss reports, and closure of prioritized corrective actions, provide early signals of potential risk and effectiveness of safety measures before incidents occur.

By prioritizing these proactive metrics, organizations can not only monitor the efficacy of their current SIF strategy, but also increase maturity and foster a proactive culture that emphasizes prevention and continuous learning. This forward-looking approach allows companies to make informed adjustments to their safety strategy, enhancing overall safety performance and reducing the likelihood of serious incidents and fatalities.



For more information visit [nsc.org/sif](https://nsc.org/sif)