



# Tighe&Bond

Engineers | Environmental Specialists

# **Safety & Health**

## **Lagging and Leading Indicators**

Dr. Scott Patrick Smith CSP  
Safety & Health Director  
Tighe & Bond

# Discussion Outline

- **Terminology**
  - Lagging Indicators
  - Leading Indicators
  - Passive Indicators
- **Lagging Indicators**
  - Injury Metrics
  - Near Miss Event
  - First Aid Cases
- **Leading Indicators**
  - Audits
  - Observations
  - Training
- **Passive - Active Indicators**
  - Passive
  - Active
  - Balanced Approach
- **Applying the Data**
  - Input, Activity, Outcome, Impact Metrics



## How Are These Defined

Outcome indicators: Completion terms of a task. Pre-established, preventative objectives in planning are taken as a starting point, and then observed which ones “actually” were met, and to what extent. These indicators refer to the reason why it was decided to conduct certain interventions

Efficiency indicators: Related to the capacity of the teams or areas to carry out their respective tasks. (Systematic / periodic inspections of workplaces and equipment, surveys, Internal audits)

---

Lagging Indicators: Lagging indicators measure the occurrence and frequency of events that occurred in the past (injuries, illnesses, fatalities)

Leading Indicators: Leading indicators are proactive and preventative measures that can shed light about the effectiveness of a system and reveal issues. (Operations, Systems, & Behavior Based)

---

Passive Indicators: Measure of attitudes, behaviors, practices, or conditions that influence safety. An indication of probable safety performance.

Active Indicators: Efforts made by companies to avoid risks. Safety investments on the condition of machinery or facility, investments in training, coaching and/or mentoring programs, or road safety.

Deming Cycle: Plan, Do, Check, Act

## Impacts of a Health & Safety Process

Fatality Totals  
Recordable Incident Rate (TRIR)  
Lost Time Injury Frequency Rate (LTIFR) (Hours)  
Lost Time Injury Incidence Rate (LTIIR) (Headcount)  
Near Miss Rate  
Number of Safety Violations  
Penalties Paid  
Fleet Safety (Collisions per million miles driven)



## Efficiency of a Health and Safety Process

Monthly Health and Safety Prevention Costs  
Employee Health and Safety Training Completion  
Percentage of Management Trained in Health and Safety  
Average Time To Resolution of Risks and Issues (risks not injures)  
Management Led Meetings Focusing on Health and Safety  
Process Audits – incorporating process owners and workers  
Surveys on Safety, Work Environment, Management Commitments



What can be learned? What does the data indicate?

Data costs time and money and should be obtainable across objective schedule.  
Will you need to normalize data, how will that be done?

---

## Data

### Injury Records

HR, Legal, Safety, Department Members

### Citation Data

HR, Finance, Legal, Safety

### Training

Cost of Training, Employee Time, HR and Safety Time

### Pre-Shift Safety Meetings

Employee time, impacts on process performance

### Weekly audits

Safety, Area Supervisors, Department Management



## Outcome Indicators

75% decrease of ergonomic injuries in third shift warehouse operators

- Near Miss
- Injuries
- Complaints

90% attendance at company sponsored safety and health training

- Near Miss
- Injuries
- Training Records

90% reported employee satisfaction with workplace safety

- Complaints
- Multiple same injury types
- Missed workdays

Conversion of 75% injury treatment at clinics with onsite on call nursing

- Minor injuries treated with prescription drugs
- Missed work time for minor injuries while off site
- High OSHA Recordable Costs

Reduction in vehicle insurance costs by 50%

- Roadway accidents
- Unsafe Driving Culture
- Road Rage Situations



# Lagging Indicators

Fatalities

Recordable Incident Rate

Lost Time Injury Incident Rate

Number of Safety Violations

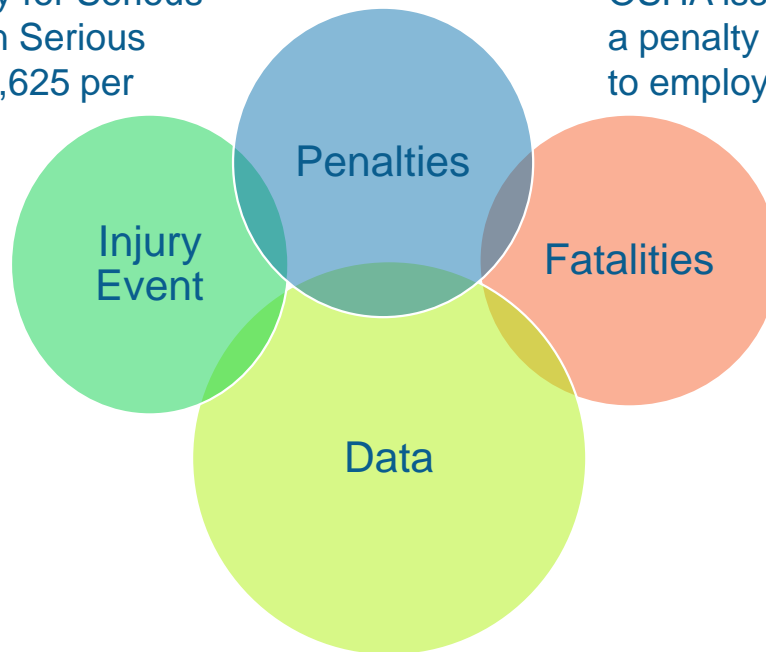
Total Penalties Paid

(Near Miss Rate) – soft lagging factor

Absolute and Relative Indicators

OSHA penalty for Serious or Other Than Serious finding is \$15,625 per

OSHA issued Sam's Club a penalty of \$156,259 due to employee death.



Sometimes called “Failure Metrics”



# Leading Indicators

Safety Prevention Spends

Safety Training Completion

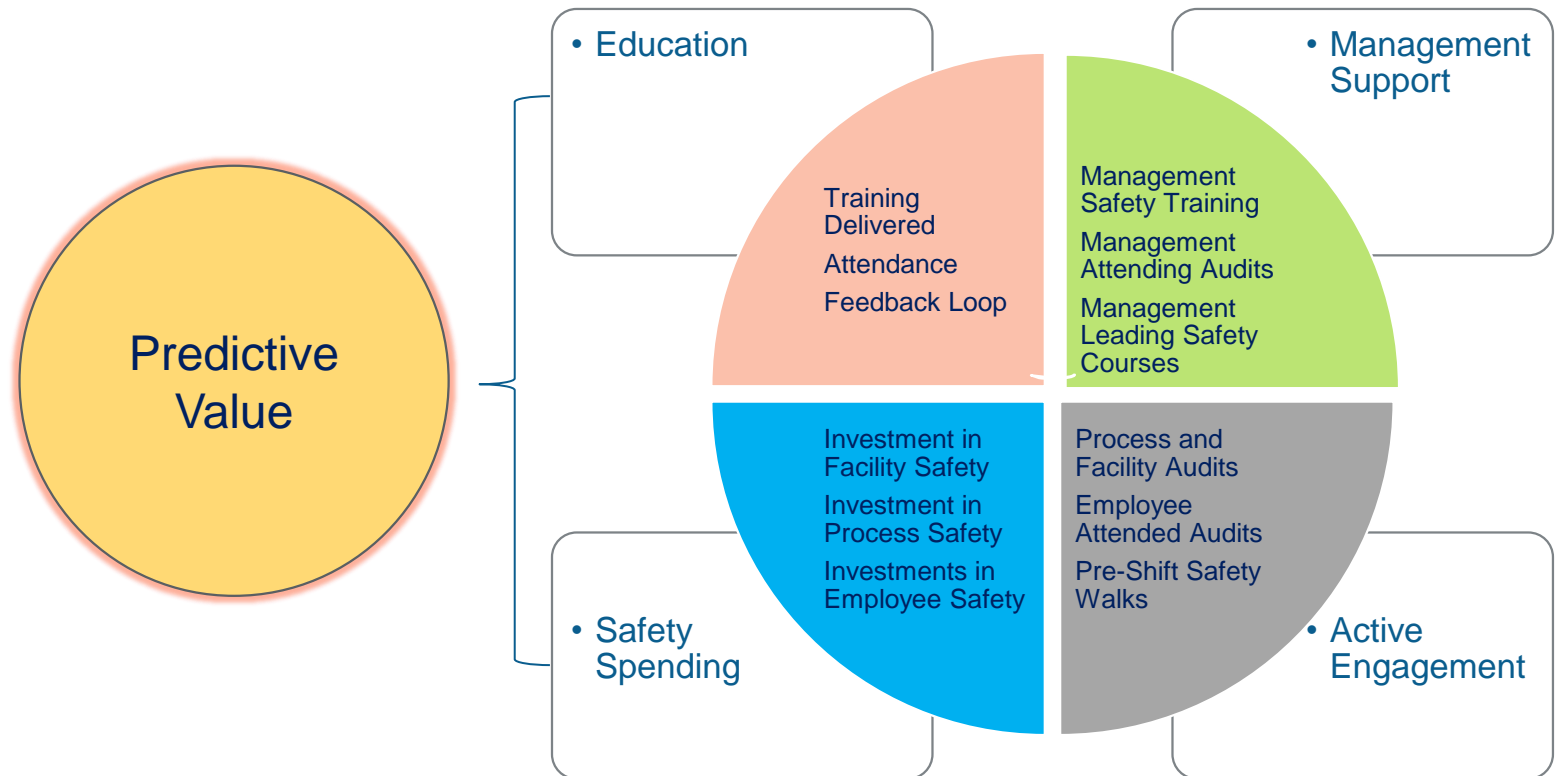
Management Trained in Health and Safety

Average Time To Resolve Identified Risks

Management Led Meetings Focusing on Health and Safety

Process Audits

Employee Surveys (Work Environment, Management Commitments)



## Passive / Active – starting the process

Passive measures can be predictive over an extended period. Passive leading indicators are those that provide an indication of the probable safety performance to be realized within a firm or on a project. These are less effective at being predictive on a short-term basis.

Active indicators and measures are more responsive. Active measures can trigger corrective actions in a short period of time.



# Starting the process:

Benchmarking



Outcome Indicator

Lagging

- Injury Rates
- Near Miss Reports

Leading

- Audits
- Training

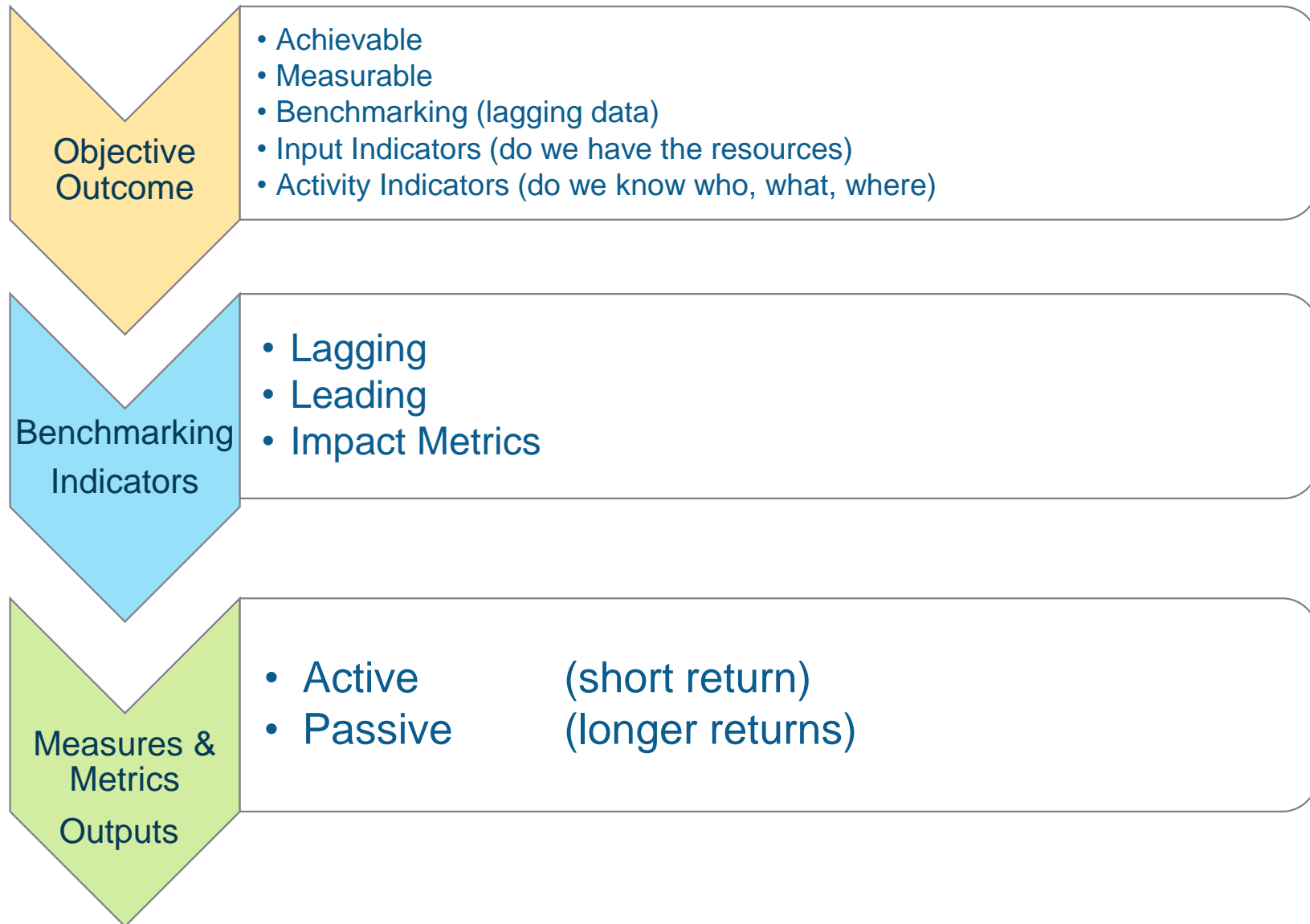
Passive  
Active

- Prior start of work (Static)
- Changed Throughout Job

Stakeholder Communication

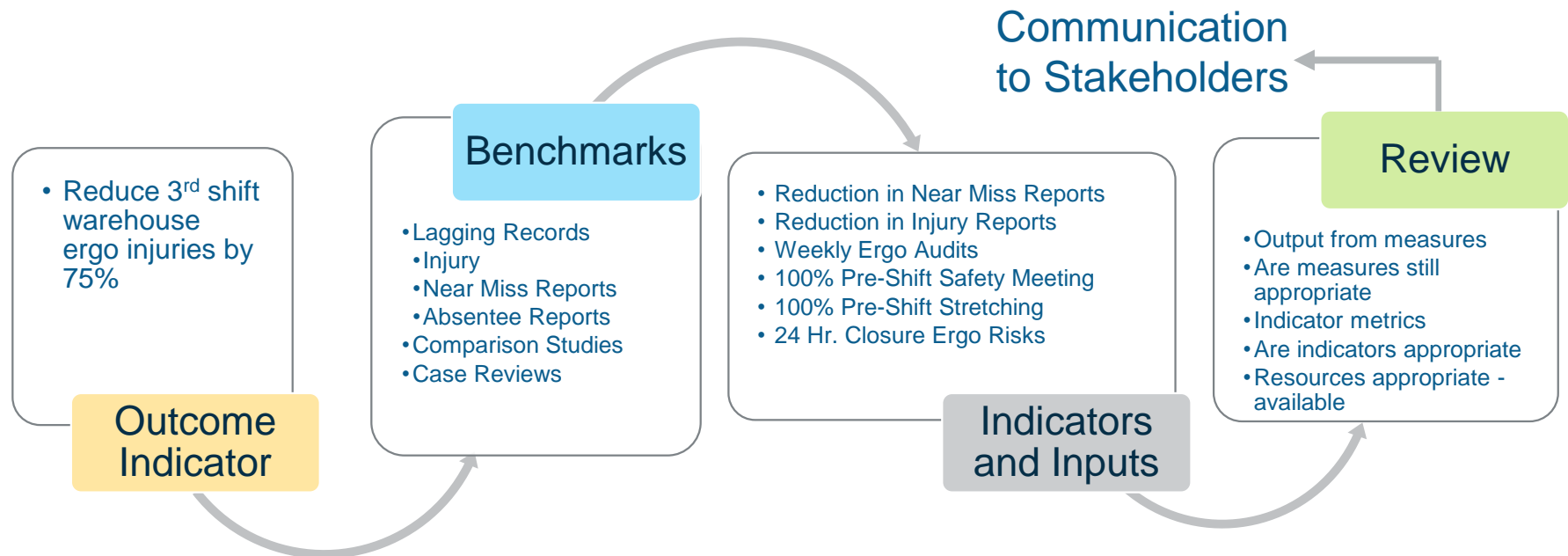
## Management Commitment

## Example:



# Simple Process Model:

Objective: Reduce third shift ergonomic injuries in the warehouse

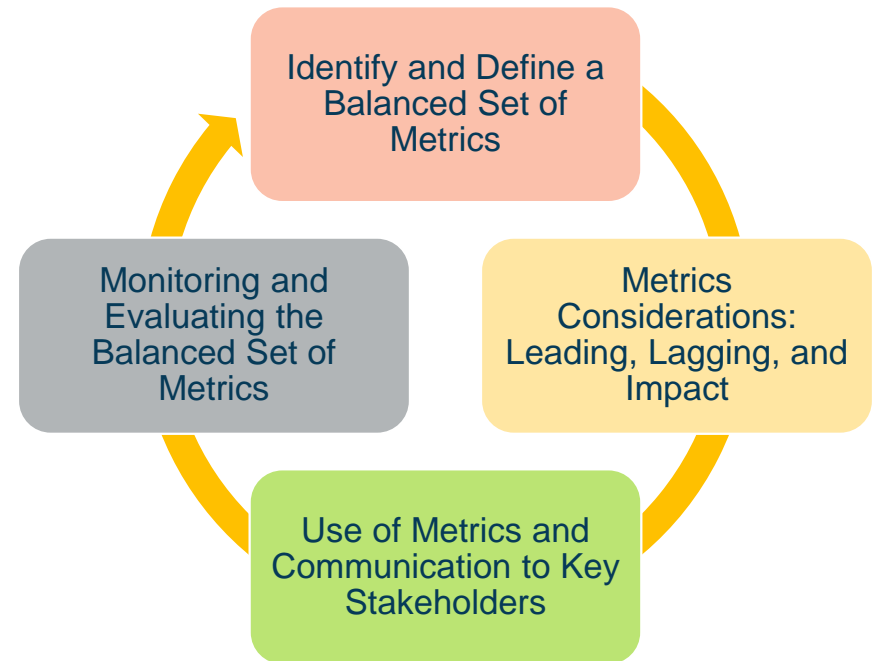


## ANSI/ASSP Z16.1-2022 Safety and Health Metrics and Performance Measures

Provides a broader framework of metrics to better understand and improve safety metrics. Provides a set of leading metrics (inputs and outputs) to help influence and predict outcomes and results (lagging and business impact metrics).

It is a process that encourages integration with organizational management systems facilitating continuous improvement. Provides you with a walkthrough from gap analysis to management.

Continual Improvement Driven



### ANSI/ASSP Z16.1-2022 Safety and Health Metrics and Performance Measures

**Scope:** The standard outlines the scope and objectives of implementing safety and health metrics and their relationship with the overall safety management system.

**Definitions:** ASSP Z16 provides definitions for key terms related to safety and health metrics to ensure consistent understanding and interpretation.

**Metrics Selection:** The standard offers guidance on selecting appropriate safety and health metrics that align with an organization's goals, objectives, and specific industry requirements.

**Leading and Lagging Indicators:** ASSP Z16 emphasizes the importance of both leading and lagging indicators. Leading indicators are proactive measures that predict and prevent incidents, while lagging indicators are reactive measures that provide information about past incidents.

### ANSI/ASSP Z16.1-2022 Safety and Health Metrics and Performance Measures

**Data Collection and Analysis:** The standard provides recommendations for collecting, analyzing, and interpreting safety and health data. It emphasizes the importance of accurate and reliable data to drive informed decision-making.

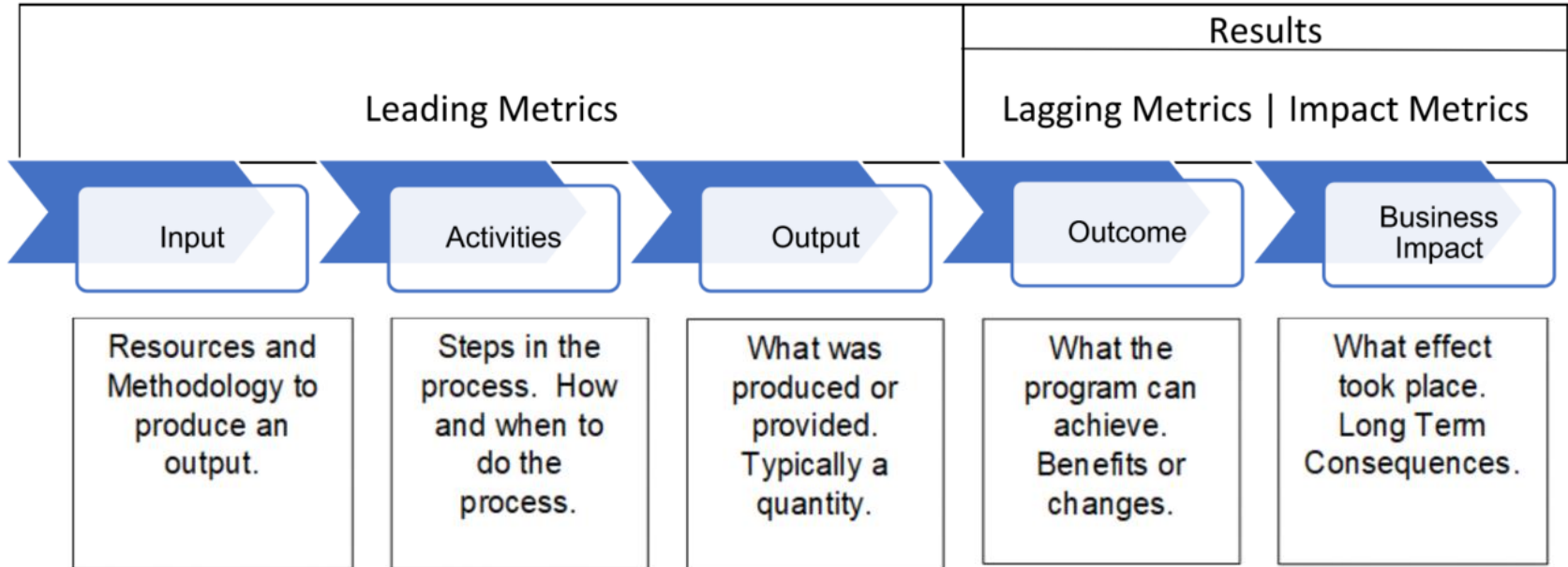
**Performance Monitoring:** ASSP Z16 highlights the significance of regularly monitoring safety and health performance using established metrics. This helps organizations identify trends, measure progress, and take appropriate actions for continuous improvement.

**Reporting and Communication:** The standard emphasizes effective reporting and communication of safety and health metrics to relevant stakeholders within the organization, including management, employees, and external entities.



## ANSI/ASSP Z16.1-2022 Safety and Health Metrics and Performance Measures

**Figure A-1 Logic Model of Metrics**



## ANSI/ASSP Z16.1-2022 Safety and Health Metrics and Performance Measures

**Figure A-2 Risk and Safety & Health-Based Management System Set of Logic Metrics**

Hearing Loss Example				
Input	Activities	Output	Outcome	Impact
Risk-Based				
% of workplace with noise surveys	% of overexposed with audiograms	% of hazards controlled	Fewer Threshold Shifts	Productivity enhancements due to less administrative down time administering a HCP
% of population overexposed	% of new equipment over the noise limit	# of new controls	Fewer hearing loss cases Fewer personnel in the hearing conservation program (HCP)	HCP cost reduction

# Summary

## Using Lagging and Leading Indicators To Improve Processes

- 1) Establish a clean and detailed objective outcome
- 2) Set a completion date to establish time frameworks (often annually)
- 3) Select indicators that add value to your objective outcome
- 4) Select indicators that can be obtained and managed
- 5) Ensure you have the resources to collect and maintain data
- 6) Use active and passive tool sets to measure changes, continually benchmarking
- 7) At end of time frame, review findings, assess positives and negatives
- 8) Using that data, change objective as need, selected corrected indicators





# THANK YOU!

## SAFETY & HEALTH: LAGGING AND LEADING INDICATORS

### Safety & Health

Dr. Scott Patrick Smith CSP  
[ssmith@tighebond.com](mailto:ssmith@tighebond.com)