Leading indicators workshop: Breaking the barrier to zero injuries

[Risk Engineering]
Welcome

- Administrative issues
- Electronic devices
- Exits
- Schedule
- Class structure
- Lecture
- Q & A
- Breaks
- Evaluations
- Introductions
Seminar objectives

- Understand the difference between lagging indicators and leading indicators
- Discuss current research regarding leading indicators
- How to determine if your company has hit a safety plateau
- Potential barriers to implementing a leading indicator program
- Solutions to potential barriers
- Benefits of implementing a leading indicator program
- Utilize a step by step process to implement a safety leading indicator program
Agenda

• Section 1
  – Construction Industry Institute (CII)
  – The CII RT 284 research team
  – Definition of leading indicators
  – Common leading indicators

• Section 2
  – Discuss potential barriers to implementing a leading indicator program
  – Discuss the solutions to the implementation barriers
  – Discuss the benefits of implementing a leading indicator program

• Section 3
  – How to make leading indicators work in your company
Section 1

- Construction Industry Institute (CII)
- The CII RT 284 research team
- Definition of leading indicators
- Common leading indicators
Construction Industry Institute (CII)

• CII is based at the University of Texas at Austin and was formed in 1989
• A consortium of more than 100 leading owners and contractors from both the public and private sectors and more than 30 leading U.S. universities
• These organizations have joined together to enhance the business effectiveness and sustainability of the capital facility life cycle through CII research, related initiatives and industry alliances
• The result has been the creation of best practices and implementation tools in 15 key areas such as: constructability, front-end planning, project risk and zero accident techniques
RT 284 research team: Safety leading indicators

• Team of 20 individuals representing owners and contractors
• Two lead researchers from the University of Florida and the University of Colorado at Boulder
• Two-year research effort
• Finished product
  – RT 284-1: measuring safety performance with active safety leading indicators
  – RT 284-2: implementing active safety leading indicators

– Note – CII tools and products are available on the CII website: www.construction-institute.org
**Construction industry trends**

*OSHA Construction Division, NAICS 236-238 (SIC 15-17) Reflects OSHA reporting change

**Figure 2.** TRIR (RIR), aggregated data, 1989 - 2009

*Information in this slide was obtained from the Construction Industry Institute (CII) and Research Team 284.*
Scope of the research

• Identify the characteristics of passive and active leading indicators that most effectively predict safety performance on construction projects
• Create a leading indicator measurement tool that facilitates the integration of leading indicators in a comprehensive safety program
Lagging indicators

• How have we traditionally measured safety performance in the construction industry
• Traditional view of safety is typically from the pessimistic perspective
  – Focuses on failures
• If unacceptable numbers of injuries occur, it is too late to prevent them
• The question: can we or should we change the way we look at safety?
• Lagging indicators
  – Only give information about end result
• Traditional measures of safety force us to focus on failures (i.e., when it is too late)
  – RIR
  – Dart
  – Litigation
  – Regulatory citations
  – Loss ratio
  – EMR
Leading indicators

• Measures of attitudes, behaviors, practices, procedures, techniques or conditions that influence construction safety performance
• Proactive, measurable actions and/or results that may predict incidents, injuries and/or illness
Types of leading indicators

• Passive leading indicator: does not have an actionable metric
  – Example: requiring pre-task planning

• Active leading indicator: metric that prompts a proactive response relative to the process it measures
  – Example: measuring whether pre-task plans are completed and by who; addressing appropriate hazards reviewed with crews and reviewed for quality
• Measurement is important to evaluate the efficiency of any process
Measurement

- Where should measurements take place?
Measurement

- Where should measurements take place?

Or here?
Lagging vs leading indicators of safety performance

Lagging indicators

Leading indicators

Underlying causes for unsafe behavior and unsafe conditions

Near miss incidents

Unsafe behavior and unsafe conditions

Fatality 1
Lost time injury 200
Medical case injury 2,000
60,000

Near miss incidents

Underlying causes for unsafe behavior and unsafe conditions

Unsafe behavior and unsafe conditions

Near miss incidents

Lost time injury

Fatality

Medical case injury

Underlying causes for unsafe behavior and unsafe conditions

Near miss incidents
Measurement

- Lagging, downstream or trailing measures focus on the end result, not the process
Measurement

• Leading indicators of safety
  – Proactive measures of processes that precede or influence safety performance
  – Signal the need for interventions before incidents occur
  – While lagging indicators indicate there is a problem, leading indicators help identify the source of the problem
Measurement

- Focus of leading indicators

Input \[\rightarrow\] PROCESS \[\rightarrow\] Output
Section II

• Discuss potential barriers to implementing a leading indicator program
• Discuss the solutions to the implementation barriers
• Discuss the benefits of implementing a leading indicator program
Leading indicator program: Potential barriers

• Program champion
  – Ability to identify weaknesses and deficiencies of the approaches already being utilized
  – Ability to communicate/teach others the importance of measuring leading indicators
  – Ability to facilitate the implementation of a leading indicator program
  – Ability to monitor data and communicate effectiveness
Leading indicator program: Potential barriers

- Management support
  - “Status quo factor” - organizations grow comfortable with the way things are
  - Upper management believes in program and provides financial support but supervisors and managers are not engaged
  - Lack of involvement of supervisors and managers
  - Concern about record & reputation
  - Fault-finding mind set
Leading indicator program: Potential barriers

• Employee engagement
  – Lack of understanding
  – Fear of punishment & retaliation
  – Peer pressure
  – “What’s in it for me?”
  – Lack of recognition and feedback
Leading indicator program: Potential barriers

• Data management
  – Resources to collect and analyze data
  – Prompt processing of data
  – Explanation/interpretation of the results
  – Recommendation (action) based on interpretation
  – Communicating results
Leading indicator program: Solutions to potential barriers

• Program champion
  – Select person (committee) who understands current programs and has the ability to identify weaknesses
  – Select person (committee) that has authority and the respect of co-workers
Solutions to potential barriers: continued

• Management support
  – Top level management is visibly committed to the process
  – Financial resources are available
  – Supervisors and managers have defined roles and performance is evaluated
  – Define expectations and goals
  – Steer employees toward desired actions and intentionally look to catch them doing what is correct
Solutions to potential barriers: Continued

• Employee engagement
  – Provide training to employees involved in processes and set expectations
  – Ensure tools/forms are easy to read and direct
  – Consider language and cultural barriers
  – Reward employees for participation
  – Provide clear and timely response
Solutions to potential barriers: continued

• Data management
  – Define a methodology for information/data collection
  – Define a frequency/schedule for information/data collection and processing
  – Monitor ongoing process regularly
  – Provide frequent feedback and results
  – Adjust program based on results
Leading indicator program: Benefits to implementing a leading indicator program

• Focus is on the actions or behaviors that lead to our success
• Shifts focus of safety
  – Focus shifts from the absence of incidents to a focus on safety efforts and activity (lagging to leading indicator mindset)
• Measures attitudes, behaviors, practices, procedures, techniques or conditions that influence construction safety performance
• Can be used to benchmark current practices and demonstrate continuous improvement over time
Leading indicator program: Benefits continued

- While lagging indicators indicate there is a problem, leading indicators help identify the source of the problem
- Proactive, measurable actions and/or results that may predict incidents, injuries and/or illness if not addressed
- Signal the need for interventions before incidents occur
Leading indicator program: Benefits continued

• Traditional view of safety (lagging indicators) is typically from the pessimistic prospective - focuses on failures (i.e., when it is too late)
• Only gives information about end results
• Leading indicators measure safety-related practices or observations
• Leading indicators provide a metric that prompts a proactive response relative to the process it measures
  – Example: measuring whether pre-task plans are completed and by who; addressing appropriate hazards reviewed with crews and reviewed for quality
Leading indicator program: Benefits continued

• Enables the identification and control of previously unknown or unrecognized risks
  – Hazards/processes are identified before an incident occurs
  – Safety leading indicators tell you the safety potential of your project and provide signals when specific corrective actions should be taken

• Enhances management credibility
  – Enhances management credibility through visibility, positive action
  – Managers/supervisors must be engaged in the process
Section III

• How to make leading indicators work in your company
Safety must be managed like other business objectives
Exercise 1

• Come up with some leading indicators that may be measurable within your company
Most common leading indicators

- Near miss reporting
- Project management team safety process involvement
- Worker observation process
- Stop work authority
- Auditing program
- Pre-task planning
- Housekeeping program
Most common leading indicators

• Owner’s Project Manager (PM) participates in worker orientation
• Foreman feedback meetings with owner’s PM
• Owner performs safety walk through
• Pre-task planning for vendor activities
• Vendor safety audits
• Vendor exit debrief
• Vendor design for safety
Best safety leading indicator

- There is no best leading indicator
- Different processes require different indicators
- Strong safety commitment from management is necessary for success
The concept

• Safety leading indicators can be measured and can alert management about the need for a positive response \textit{before} an injury occurs

• Some are strategies most companies are already doing!
  – Site safety audits
  – Toolbox meetings

• A \textit{shift} toward:
  – Measurement of the strategies
  – Setting thresholds
  – Implementing an action plan if the values are not desirable
Additional findings from leading indicator research

• Very few leading indicators are fully implemented
  – Case average TRIR approx. 2.0
• Projects where leading indicators were measured and fully implemented had an average TRIR of 0.19!
• Every firm can benefit from safety leading indicators
• A strong foundation of safety is a pre-requisite
• A champion must be committed to success
• The next step is to carefully select a few safety leading indicators and implement them on your project
Implementing a leading indicator program

1. Selecting a leading indicator
2. Define an actionable leading metric
3. Develop measurement process
4. Engage responsible parties
5. Implement the leading indicator measurement process
6. Analyze leading indicator information
7. Publicize leading indicator performance
8. Evaluate effectiveness of leading indicator and adjust accordingly
9. Celebrate success
Implementing a leading indicator program

1. Select indicator
2. Define actionable metric
3. Develop measurement process
4. Engage responsible parties
5. Implement
6. Analyze information
7. Publicize performance
8. Evaluate effectiveness
9. Celebrate

Continuous improvement: learn and adjust

Information in this slide was obtained from the Construction Industry Institute (CII) and Research Team 284.
1. Selecting a leading indictor

• The key step to the entire process
• Questions to consider
  – Whose contribution to the safety effort is to be monitored?
  – How many leading indictors are to be monitored?
  – Which leading indicators should be given top priority?
  – Are there any process weaknesses in the implementation of the existing safety program?
1. Selecting a leading indicator

• Keys:
  – What is the return on investment
  – Initially focus on one or two indicators
  – Discuss with key personnel

• Leading indicator measurements will indicated when some type of corrective action is needed prior to an injury occurring
Step 2: Define an actionable leading metric

- “What gets measured, gets managed” Pete Drucker
- Leading indicators
  - Must be quantifiable
  - Objectivity is critical
- Can influence positive and negative behavior
Step 2: Define an actionable leading metric

• Fundamental rules
  – Data must be numeric – they can be translated as a “score”
  – Data must be easily understood
  – Data must be perceived as credible; they must be objective rather than subjective
  – Data must signal the need for action when they indicate a deviation from expectation
  – Data must be related to other indictors, e.g., supervisor responsibilities and safety inspections
  – Data must not generate unintended consequences or be easily manipulated
Step 3: Develop measurement process

• Consistency is crucial
  – Same assessments under similar conditions
  – Guidelines for measuring must be clear and unambiguous

• How will the statistics be presented
  – Percentage of events
  – Number of events per man hours

• Be prepared to change the guidelines if necessary

• The value of the program will be no better than the integrity of the scores generated
Step 3: Develop measurement process

• The process requires:
  – Personnel knowledge about the process to be measured
  – Personnel trained to collect information/data in a consistent fashion
  – A defined methodology for information/data collection
  – A defined frequency/schedule for information/data collection
  – Tools formatted for the consistent collection of information/data
  – A repository for the information/data
Exercise 2

- Choose one of the most common leading indicators below and develop the first three steps of the implementation process using the blank leading indicator worksheet provided
  - Near miss reporting
  - Project management team safety process involvement
  - Worker observation process
  - Stop work authority
  - Auditing program
  - Pre-task planning
  - Housekeeping program
Step 4: Engage responsible parties

- Change is difficult
- A successful program needs to:
  - Engage the participants that the program is targeting
  - Assign a program champion
  - Participants must have an understanding of leading indicators
  - Top management commitment to support the program
  - Those collecting the data understand the value
Step 5: Implement the leading indicator measurement process

- “Work the plan”
- Open channels of communication
  - Program implementers
  - Project management
  - Field employees
Step 6: Analyze leading indicator information

• Collect, process, and evaluate
  – Data must be reviewed and analyzed in a timely fashion
  – Assign responsibilities
  – Threshold limit values
  – Adjust

Information in this slide was obtained from the Construction Industry Institute (CII) and Research Team 284.
Step 6: Analyze leading indicator information

- Considerations
  - Compilation of the data by responsible parties
  - Prompt processing of the data
  - Graphical representation of the data
  - Explanation/interpretation of the results
  - Recommendations (action) based on interpretation
  - Correlation with other metrics (lagging and active leading indicators)
Step 7: Publicize leading indicator performance

- Performance metrics need to be communicated:
  - Submitted to owner and management through monthly reports
  - Distributed to subcontractor management
  - Reviewed weekly by project safety committees
  - Displayed (and explained) in “common” project locations for the benefit of the workforce
  - Regularly reported to those with a vested interest
Step 8: Evaluate effectiveness of leading indicator and adjust accordingly

• Leading indicators need to be evaluated at all times
  – Interventions
  – Changes to the measurement process
  – Assure value is derived from the measurement effort
• Considerations:
  – Is the attention to the relevant process given at the appropriate level
  – Do perception survey results, relative to the process, demonstrate improvement
  – Is there consistency in the data collected
  – Is the process easy to implement
  – Is the information perceived as meaningful
Step 9: Celebrate success

• What motivates those involved?
  – Individual recognition
  – Public recognition
  – Other means
Exercise 3

• Continue with the development of the chosen leading indicator using the blank leading indicator worksheet provided.
Continuous improvement

- Accountability
- Feedback
  - Positive and negative
- Develop action plans
- Data-driven decisions

- Purpose
- Expectations
- Data use plan
- Communication

- Plan
- Do
- Study
- Act

- Periodic review
- Identify gaps and trends
- Measure progress
- Inspection strategy
- Observe
- Initial correction
Safety must be managed like other business objectives

Treating safety like other business objectives will get your ducks in a row
Zurich national construction roundtable recommendations and solutions

• Perform cultural assessment to establish a baseline
• Educate management (both client and company) on understanding lagging vs. leading indicators
• Report results on a continuous basis at all levels of the company (i.e., company dashboard)
• Determine what, why and how to measure (develop a plan)
• Ensure behavioral-based observation process is in place and working
• Make certain focus observation process is in place and working
• Ensure near miss/near hit reporting process is in place and working
Zurich national construction roundtable recommendations and solutions

• Conduct employee perception surveys to determine the state of EH&S health
• Conduct employee pre-hire screening
• Ensure contractor selection (EH&S) process is in place prior to the start of project
• Ensure active management safety participation (i.e., tours, walkabouts, written communications)
• Evaluate supervisor safety activities
Zurich national construction roundtable recommendations and solutions

• Ensure hazard identification and analysis process is in place prior to start of project
• Conduct JHA/JSA prior to start of new work/at the beginning of shift
• Recognize achievement based on leading vs. lagging indicators
• Educate owners to shift focus to leading indicators
Conclusion

• Difference between lagging indicators and leading indicators
• Reviewed CII research regarding leading indicators
• How to determine if your company has hit a safety plateau
• Potential barriers to implementing a leading indicator program
• Solutions to potential barriers
• Benefits of implementing a leading indicator program
• Utilize a step by step process to implement a safety leading indicator program
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