



Research & Statistical Services Group

Safety Intervention Evaluation: A Systematic Approach

*Control Banding Workshop:
Validation & Effectiveness*

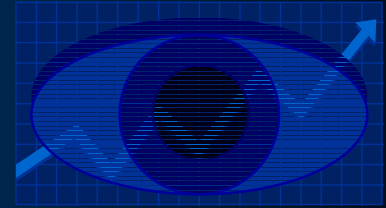
March 2, 2004 Cincinnati, OH

National Safety Council

- Not-for-profit, mission-driven membership organization
- Formed in 1913
- Formed by Industry Leaders
- Chartered by Congress
- 15,000 Members



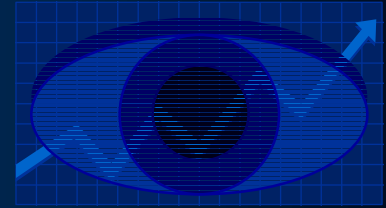
RSS Mission



- Innovative S&H research entity (practical and interdisciplinary)
- Most up-to-date, reliable and comprehensive S&H statistics
- Platform for the exchange of S&H research and Statistical Information
- Transfer S&H research/statistics from injury science community to S&H practitioners and public



Research Focus



- S&H program evaluation
- Occupational, transportation and home/community statistical surveillance
- S&H monitoring surveys
- Off-the-job injury research
- Safety and productivity monitoring



Presentation Objectives

- **Defining Evaluation Research**
- **Important Components of Systematic Evaluations**
- **Extent of Evaluation Research in Safety and Health**



Why Conduct Evaluations?

How do you **KNOW** if your safety program, or any component of the program really works?



Why Conduct Evaluations?

- **Making a causal link**
- **Performance measurement**
- **Provides solid data to make management decisions**
- **Optimal allocation of safety and health resources**



What is an Evaluation?

- Everyone evaluates
- Safety & Health Intervention Evaluation:

A **systematic inquiry** that determines whether a **safety intervention** or **program** has had the **intended effect**.



Levels of Intervention



Management Interventions

- **S&H Policy**
- **S&H Procedures**
- **S&H organizational structure (e.g., safety committees, inspections schedules, performance incentives)**
- **S&H communication mechanisms**



Technical Interventions

- **Physical setting**
- **Workstation design**
- **Production processes**
- **Machine design**



Human Interventions

- **Safety attitude and perceptions**
- **Knowledge**
- **Motivation**
- **Behavior**
- **Safety culture**



Types of Evaluation

- **Developmental (Needs Assessment)**
- **Formative (Process or Implementation)**
- **Summative (Effectiveness or Outcome)**



What Developmental Evaluations Can Answer:

Needs
Assessment

- **What changes need to be made to improve employee S&H?**
- **What are employee perceptions about current S&H interventions?**
- **What should a new S&H intervention consist of?**
- **Are there certain groups of employees that have specific S&H needs?**
- **What might be obstacles to making S&H changes?**
- **Will employees buy into a new S&H intervention?**



What Formative Evaluations Can Answer:

Implementation/
Process

- **What are the specific components of the intervention as implemented?**
- **Is the intervention being implemented as intended?**
- **Who is accepting and/or rejecting the intervention?**
- **How could the implementation be better or what implementation procedures need to be changed?**
- **What is the immediate feedback from participating employees?**



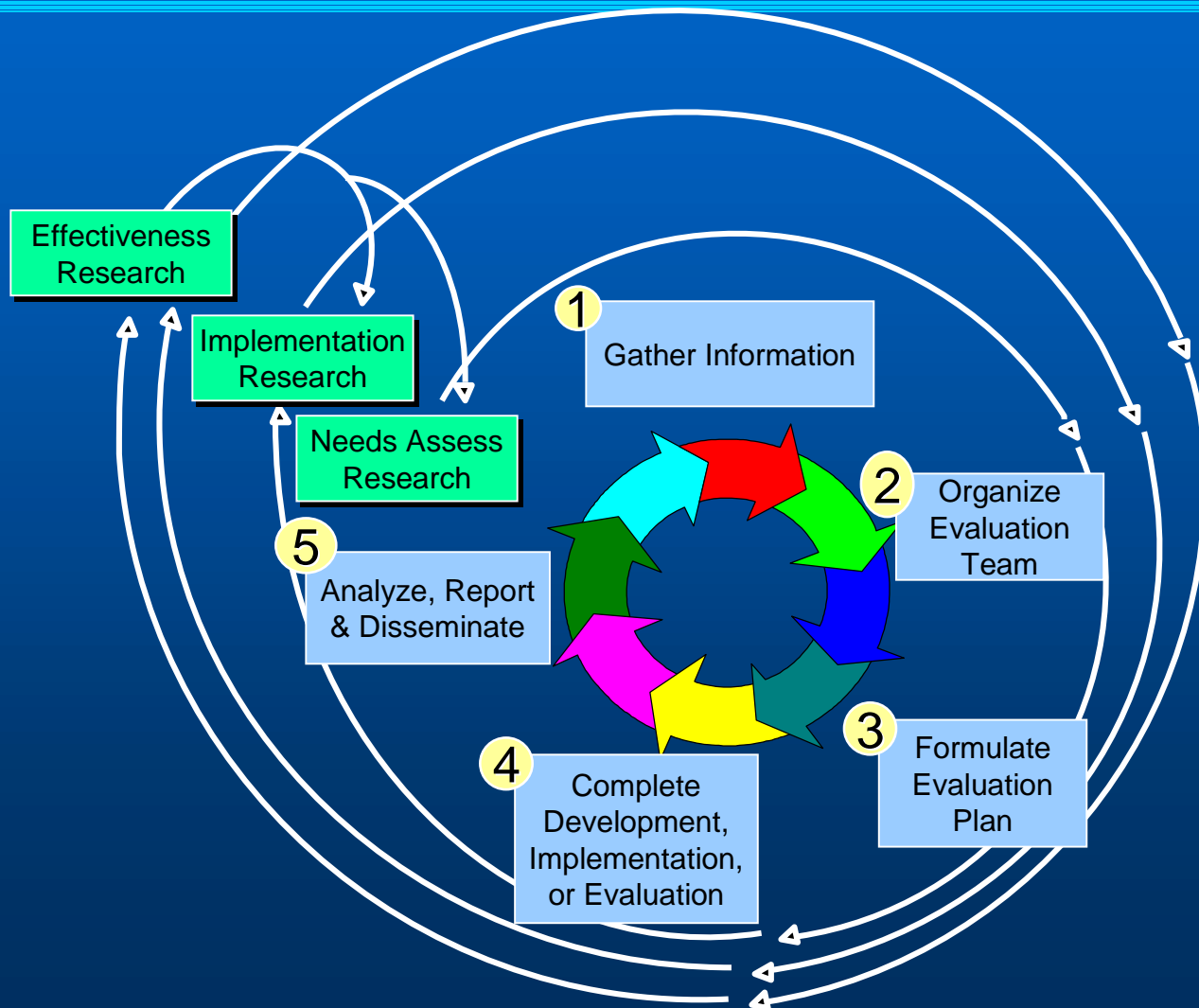
What Summative Evaluations Can Answer:

Effectiveness

- To what extent does the intervention reduce occupational injuries, illnesses, lost work days, disability, or fatalities?
- To what extent does the intervention reduce worker exposure and level of exposure to hazardous conditions?
- Does the intervention improve workplace S&H culture?
- How has the intervention changed the attitude, knowledge and behavior of employees?
- What is the effect of the S&H intervention on productivity?



Evaluation As a Process

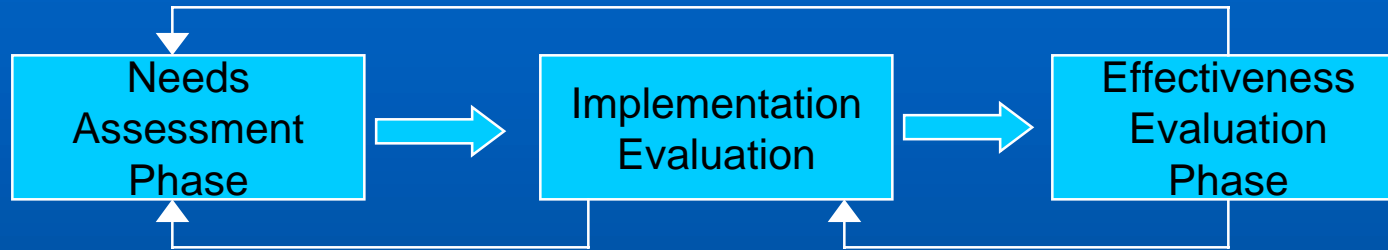


Matrix of Intervention Evaluation Process

Phase	Step 1: Gather Informa- tion	Step 2: Organize Interven- tion/ Evaluation Team	Step 3: Formulate Evaluation Plan	Step 4: Implement Interven- tion/ Evaluation	Step 5: Analyze, Report, Dissemi- nate
Needs Assessment					
Implementation Evaluation					
Effectiveness Evaluation					



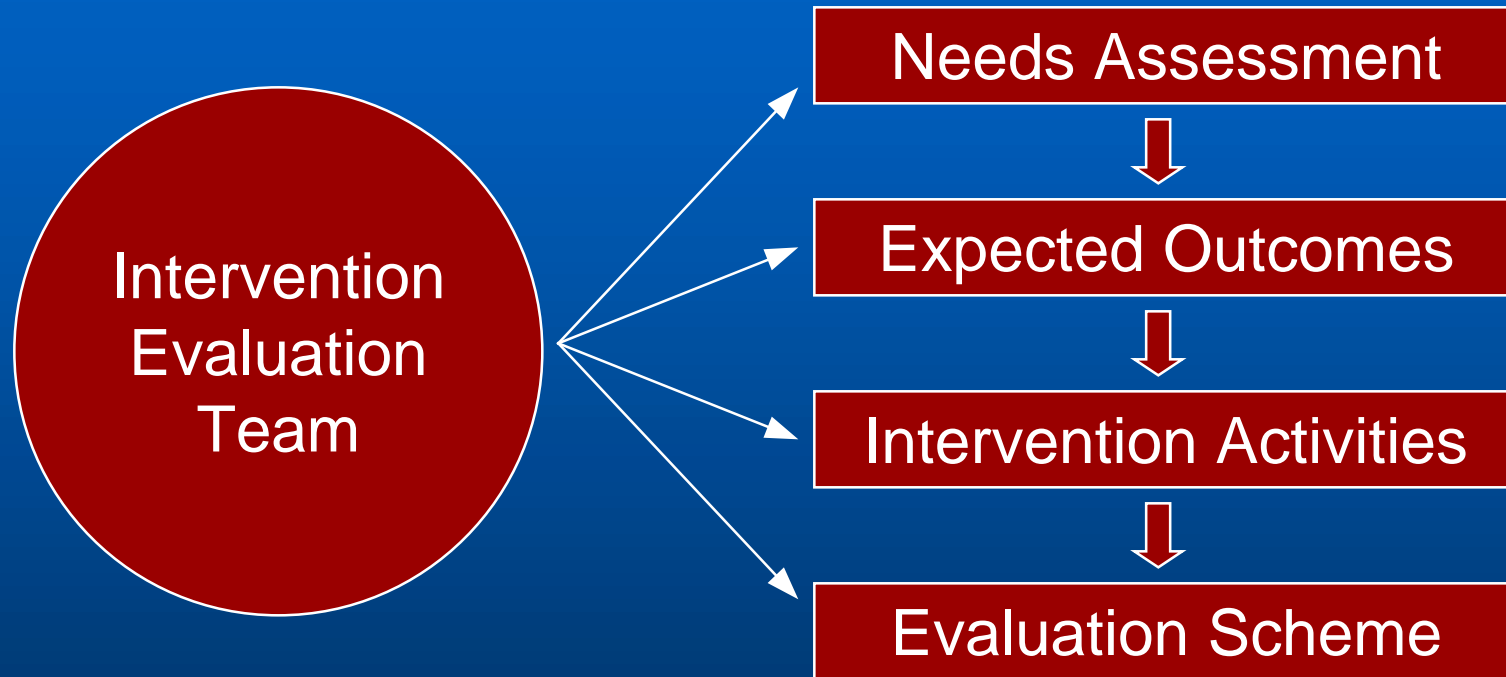
Evaluation Refining Process



- **Modify intervention content, methods, or strategies**
- **Modify implementation delivery mechanism**
- **Re-examine baseline OSH principles and assumptions**
- **Re-scale implementation scope**
- **Select intermediate measures**
- **Adjust for dropouts**
- **Add observation elements**
- **Use additional outcome measures**
- **Control confounding factors/moderators**
- **Revise implementation/evaluation schedule**



Pre-Intervention stage: Needs Assessment & Evaluation Planning



Defining the Scope of the Evaluation

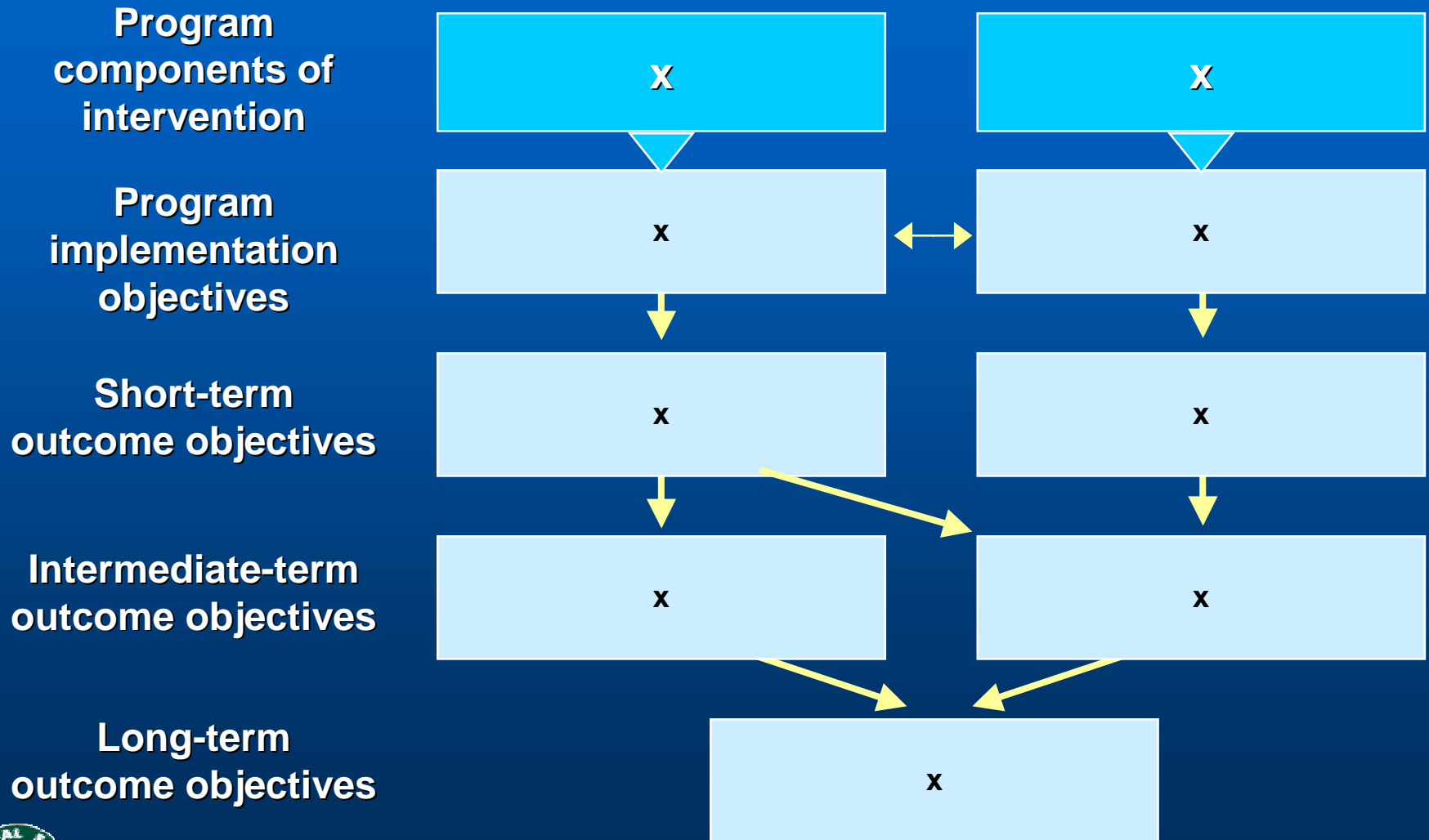
- Overall purpose of the evaluation
- Evaluability
- Main questions the evaluation should answer
- Available resources
- Timetable
- Management support



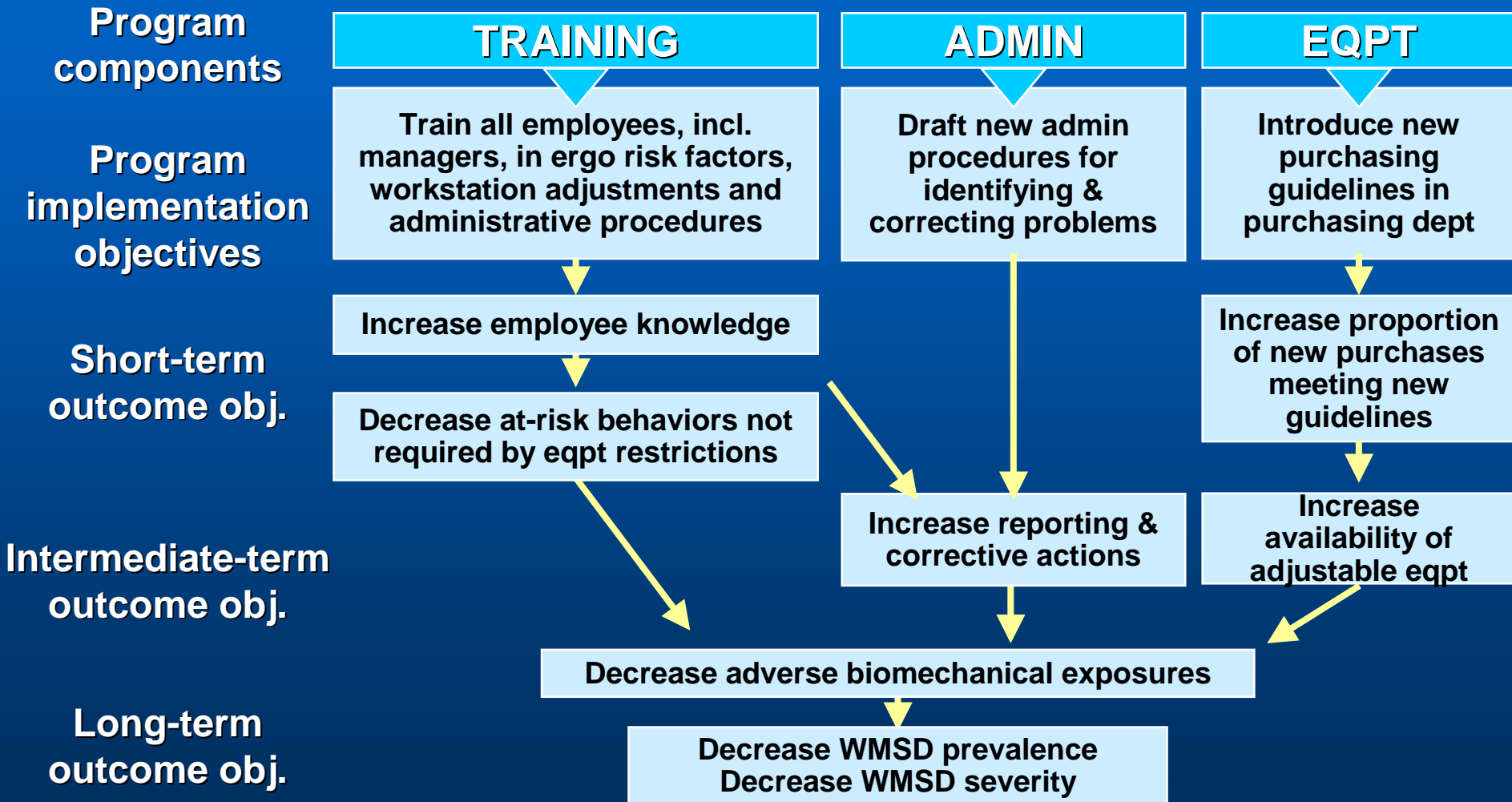
Intervention Evaluation Team



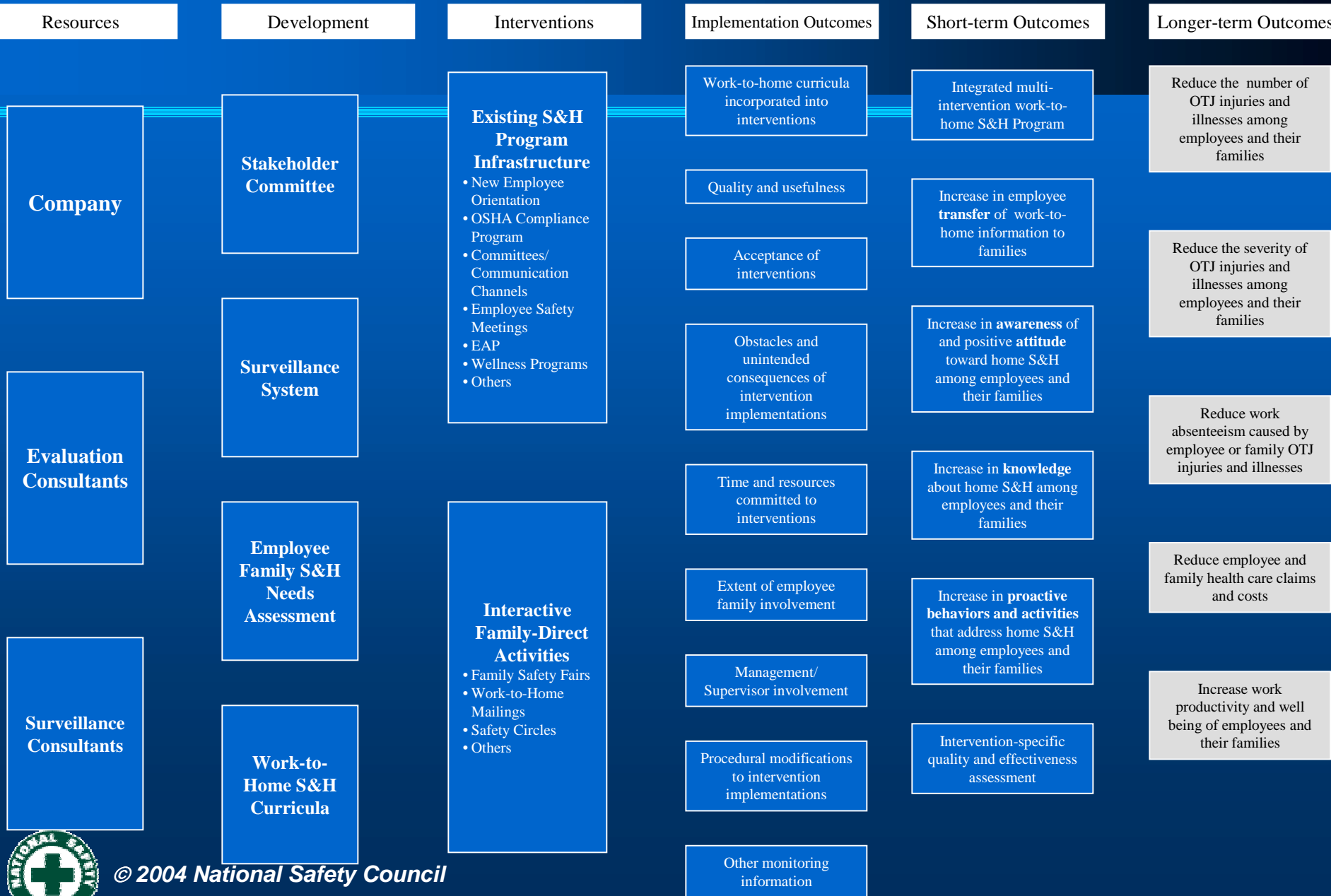
Logic Models



Program Logic Model



Work –to-Home: Logic Model



Evaluation Scheme

Evaluation Scheme			
Design	Data	Measures/ Indicators Selection & Collection	Other Considerations
<ol style="list-style-type: none">1) Non-experimental2) Quasi-experimental3) Experimental	<ol style="list-style-type: none">1) Quantitative2) Qualitative	<ol style="list-style-type: none">1) Baseline2) Short-term3) Intermediate4) Long-term	<ol style="list-style-type: none">1) Who will participate?2) How many will participate?3) Data analysis?



Non-experimental Design



Major weakness

- Cannot be sure if the outcome measure would be different without the intervention



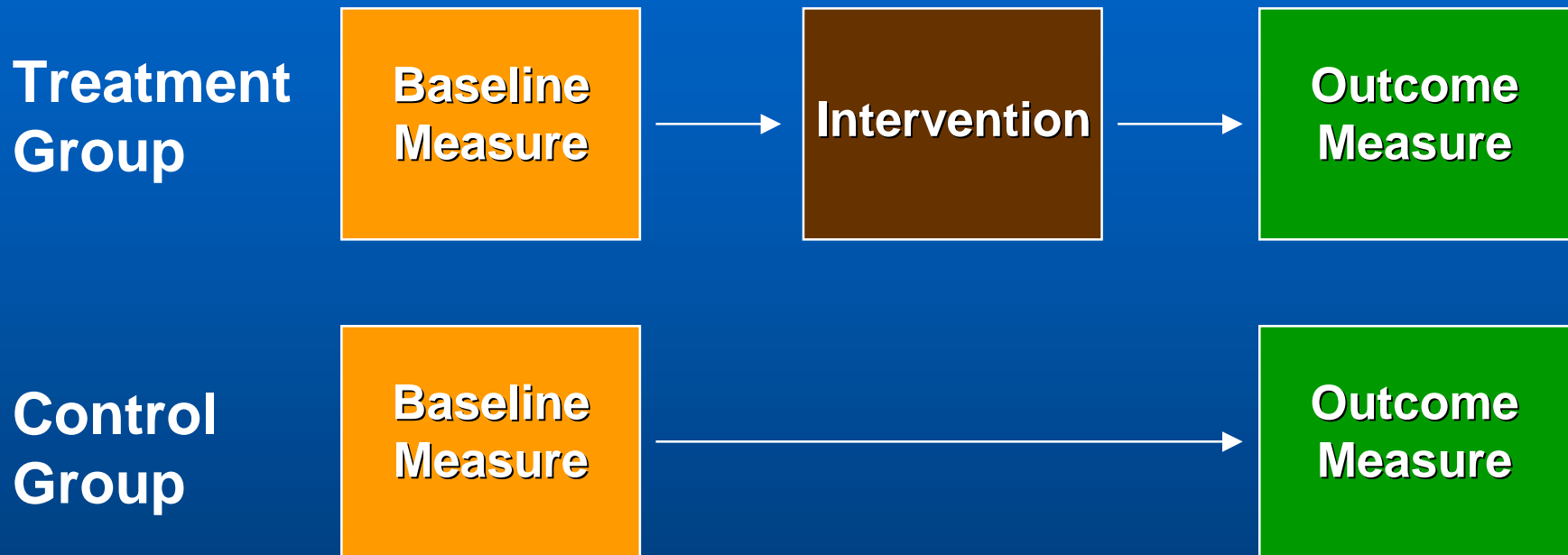
Before-and-after Design



- Most useful in demonstrating the immediate impacts of short-term interventions
- Over time, more circumstances can obscure the long-term effects of the intervention



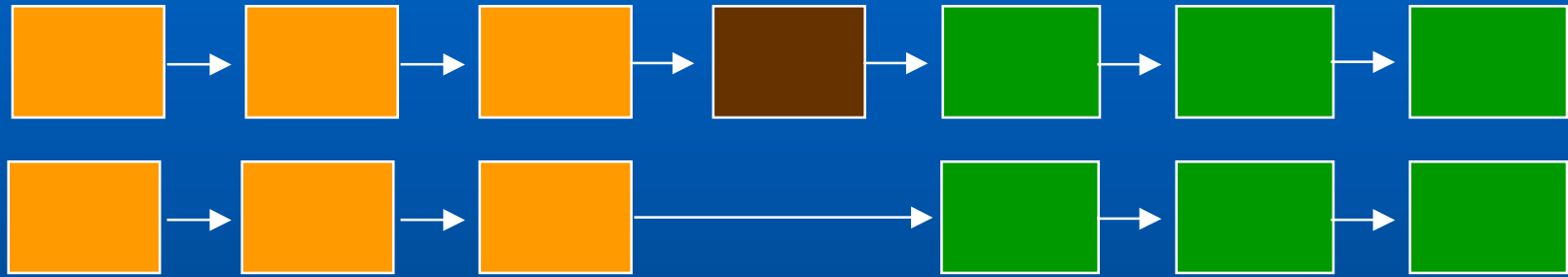
Quasi-experimental Designs: Control Group



- Adding a control group (group not getting intervention) reduces the likelihood of history effects

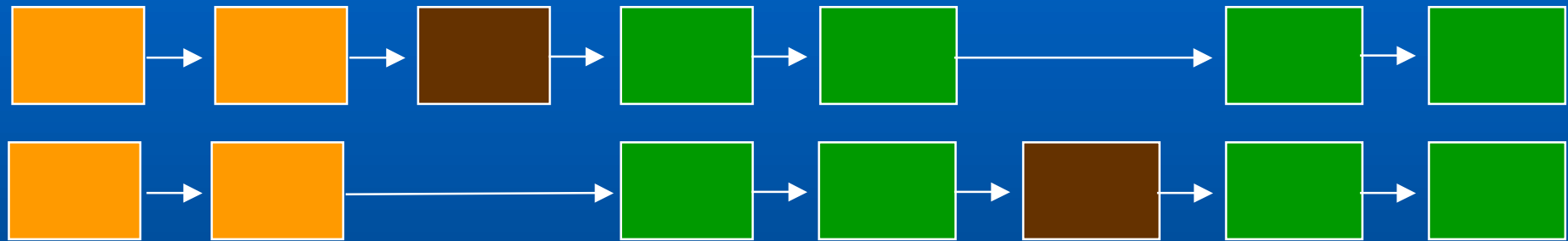


Other Quasi-experimental Designs: Multiple Time Series



- Adding multiple measurements (with control group) reduces the likelihood of history, maturation, regression-to-the-mean, testing, placebo and Hawthorne effects.

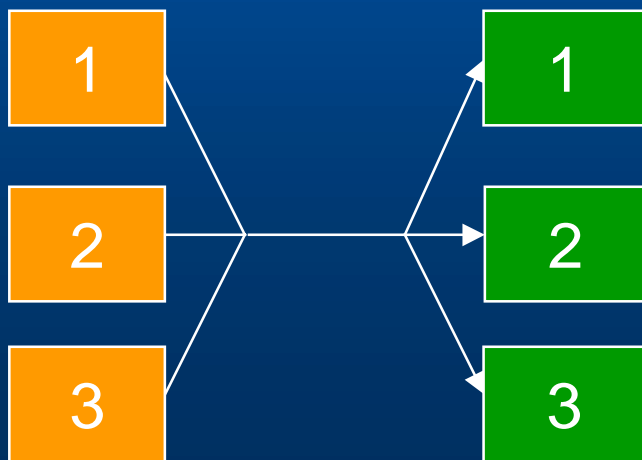
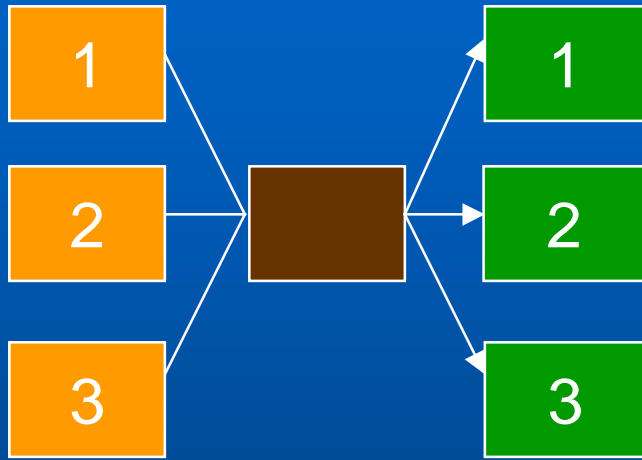
Other Quasi-experimental Designs: Staggered



- History effects greatly reduced
- Accommodates intervention modifications before other group(s) receives intervention



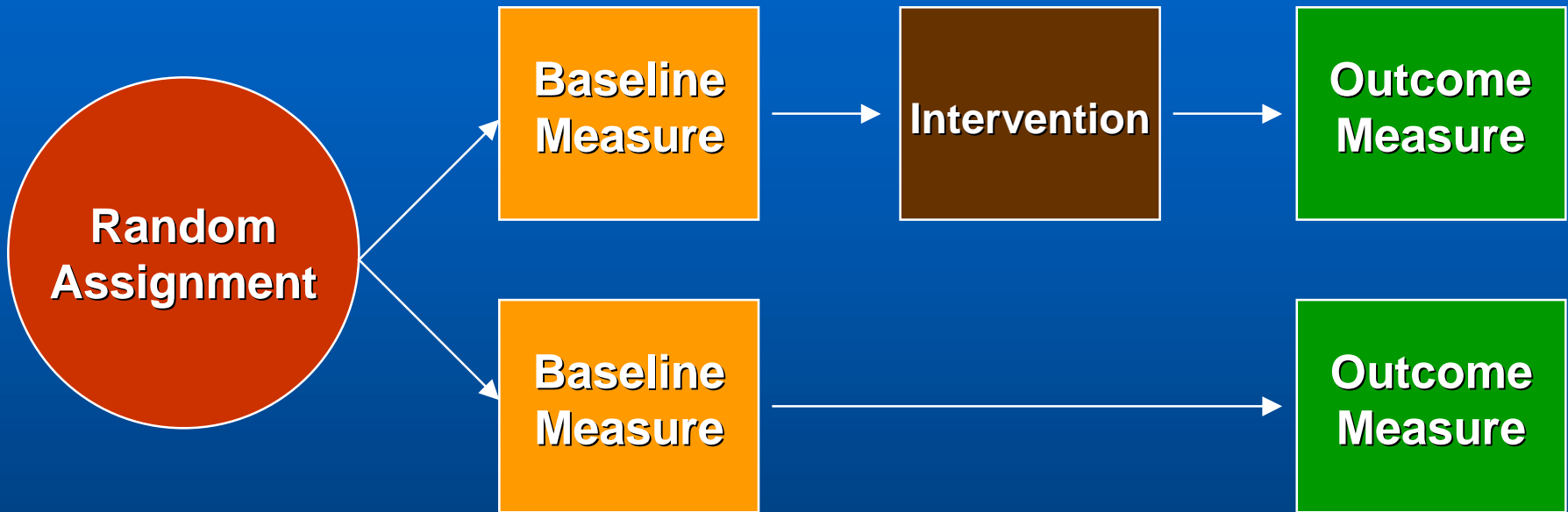
Other Quasi-experimental Designs: Multiple Outcome



- Can demonstrate the multiple effects of the intervention
- Implementation measures can be part of the multiple outcome measures
- Better able to detect unintended consequences of intervention



Experimental Design



- Random assignment greatly reduces the likelihood of selection effects

Measurement/Indicators Selection: Implementation Evaluation

- Intervention Components Implemented
- Quality & Usefulness
- Acceptance
- Obstacles/unintended consequence
- Time & resources
- Extent of Involvement
- Procedural modifications



Measurement/Indicators Selection: Short-term/Intermediate Evaluation

- Awareness
- Attitudes
- Knowledge
- Behaviors
- Near-miss events
- Other production indicators
- Intervention Component-specific perceived quality and effectiveness



Measurement/Indicators Selection: Longer-term Evaluation

- Number of injuries/illnesses
- Number of exposures
- Level of severity
- Number of recordables
- Absenteeism
- Health care claims
- Productivity
- Costs/ROI



Overview of Implementation Evaluation Objectives

- Refine/redirect intervention strategies/methods
- Improve implementation process
- Identify potential moderators/mediators
- Monitor impact to organization
- Transfer knowledge and lessons learned



Overview of Effectiveness Evaluation Objectives

- Does Intervention(s)
 - Reduce hazardous exposures
 - Injuries/illnesses
 - Lost work days
 - Health care claims
- Cost/benefit?
- Scientifically sound information for decision makers
- Intervention provides safer working environment?



Practical Considerations

- **Time management**
- **Getting cooperation from workplace parties**
- **Ensuring there is time and money allocated**
- **Access to information**
- **Capabilities of evaluators**
- **Keeping focused**
- **Literature review**
- **Credibility and utility of the evaluation**



Ethical Considerations

- **Assignment to intervention groups**
- **Informed consent**
- **Confidentiality and anonymity**
- **Conflicts faced by evaluators**



Unintended Consequences of Interventions and Evaluations

- **Unplanned side effects**
- **Can be beneficial or harmful**
- **Can be measurable or unmeasurable short-term, intermediate or long-term unanticipated outcomes resulting from the intervention or evaluation**
- **Examples**



Unintended Consequences of Interventions and Evaluations (cont'd)

Desirable Goal	Program	Unintended Consequences
Reduce traffic fatalities and injuries	Air Bag Motor Vehicle Safety Standard	Increased head and chest injuries to children and small adults
Reduce children's access to household chemicals and medications	Poison Prevention Packaging Act	Reduced access for elderly population
Reduce back injuries	Mandatory back belt policy	Increased back injuries because of false sense of support
Reduce injures	Mandatory PPE policy	Increased injures associated with certain tasks



Extent of S&H Evaluation Research

- Proportion of injury prevention programs that include an evaluation
- Review random sample (n=250) safety conference abstracts
- Classified invention evaluations by level of scientific rigor

Smith, C.A. & Shannon, H.S. (2003). How much science is there in injury prevention and control. *Injury Prevention*, 9, 89-90



Extent of S&H Evaluation Research

- 8% (20/250) reported evaluations with any outcome measures
- 2% (5/250) used “true” outcomes

“Results show that there are few outcome and intermediate evaluations of safety interventions”

Smith, C.A. & Shannon, H.S. (2003). How much science is there in injury prevention and control. *Injury Prevention*, 9, 89-90



NSC S&H Program Evaluation Survey: Objectives

- How the effectiveness of S&H interventions are determined
- Types of processes involved in evaluating S&H interventions
- Types of obstacles encountered when S&H intervention evaluations
- Activities/services most valuable to building evaluation capacity in organizations



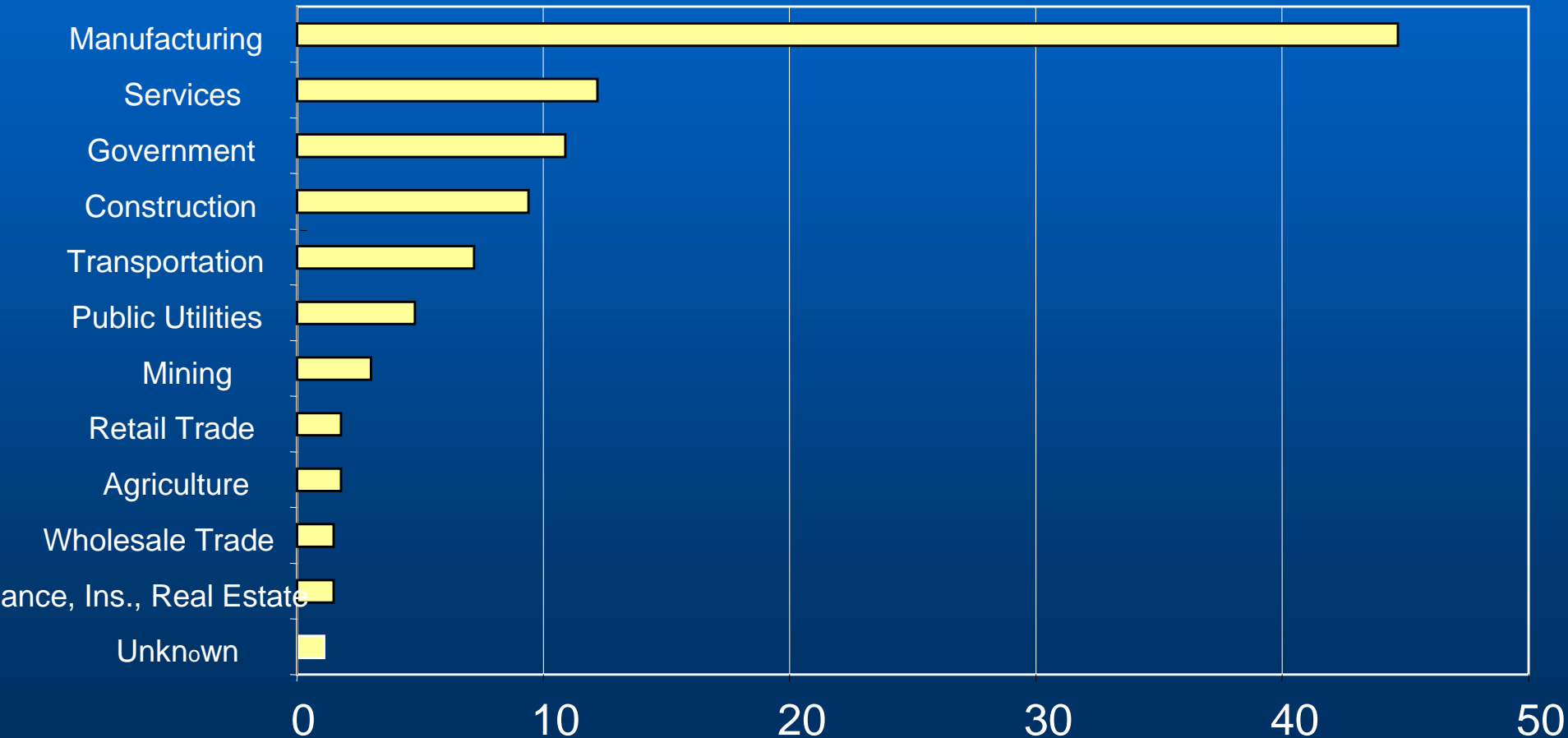
NSC S&H Program Evaluation Survey: Methodology

- Online , twenty-item questionnaire
- Made available Safety & Health Magazine subscribers (Directors, Managers, Engineers, R/L Managers, R/L specialists)
- 5,788 potential respondents
- Invitations to participate were sent via email w/link to questionnaire, 3-week follow-up invitations
- 1,980 (34%) undeliverable
- Participants offered a downloadable article on evaluation research published in Injury Insights
- 541 (14%) respondents completed questionnaire

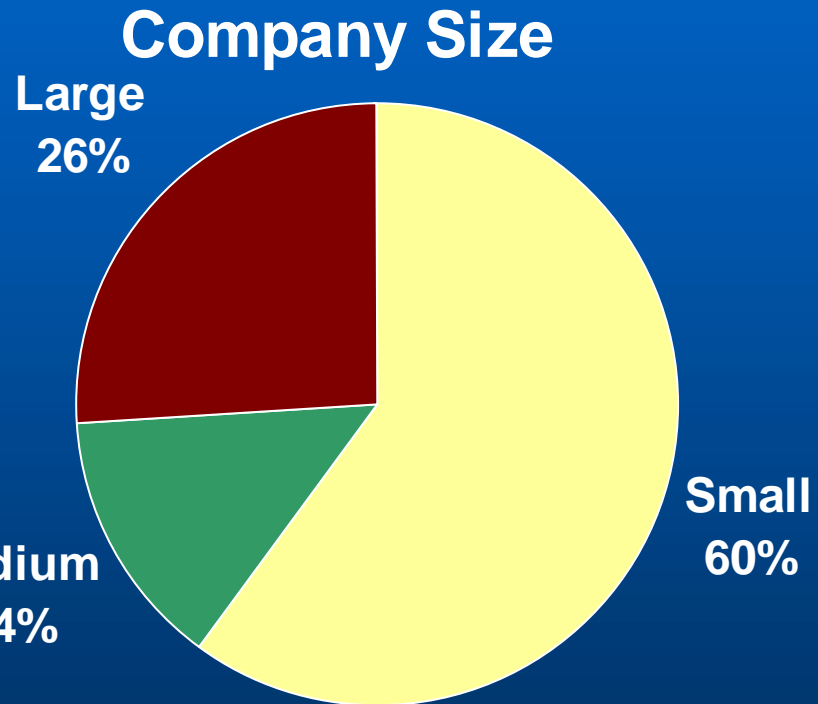


NSC S&H Program Evaluation Survey: Findings-Demographics

Industry



NSC S&H Program Evaluation Survey: Findings-Demographics

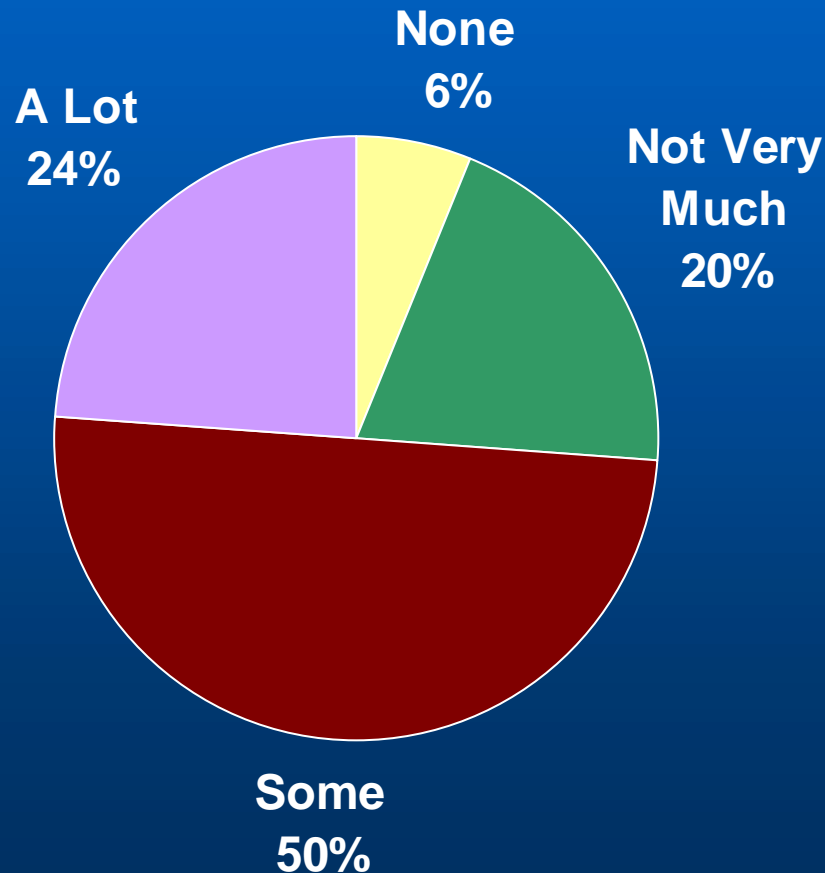


Small= <500
Medium= 500-1000
Large= 1000+



NSC S&H Program Evaluation Survey: Findings-Demographics

Evaluation Training



NSC S&H Program Evaluation Survey: Findings-Effectiveness Criteria

Criteria	Total selected	Percent
Decrease in injury rates	427	86.1
Decrease in compensation claims	364	73.4
Company compliance with OSHA standards	340	68.5
Employee compliance with policies & procedures	316	63.7
Employee feedback	303	61.1
Safety management system audit	300	60.5
Active employee participation in S&H programs	196	39.5
Management satisfaction with S&H initiatives	184	37.1
Lower health care costs	134	27.0
Lower absenteeism rates	84	16.9
Other criteria	42	6.5



NSC S&H Program Evaluation Survey: Findings-Evaluation Design

Evaluation Design	Total selected	Percent
Before & after comparisons	295	54.5
Combining quantitative & qualitative data	232	42.9
Using more than one effectiveness measure	202	37.3
Comparisons between short- & long-term evaluation measures	146	27.0
Using statistical tests	130	24.0
Using a logic model	62	11.5
Comparisons between a group that receives a program and a group that does not	58	10.7
Other	15	2.8



NSC S&H Program Evaluation Survey: Findings-Barriers to Evaluation

Barriers	Total selected (%)	Importance*
Lack of personnel	256 (47.3)	1
Lack of time	237 (43.8)	2
Lack of management commitment	179 (33.1)	3
Competing priorities	148 (27.4)	4
Lack of money	130 (24.0)	5
Lack of evaluation expertise	106 (19.6)	6
Other barriers	46 (8.5)	7
Not sure how helpful evaluation would be	58 (10.7)	8

* - Based on the selection of the top-three choices



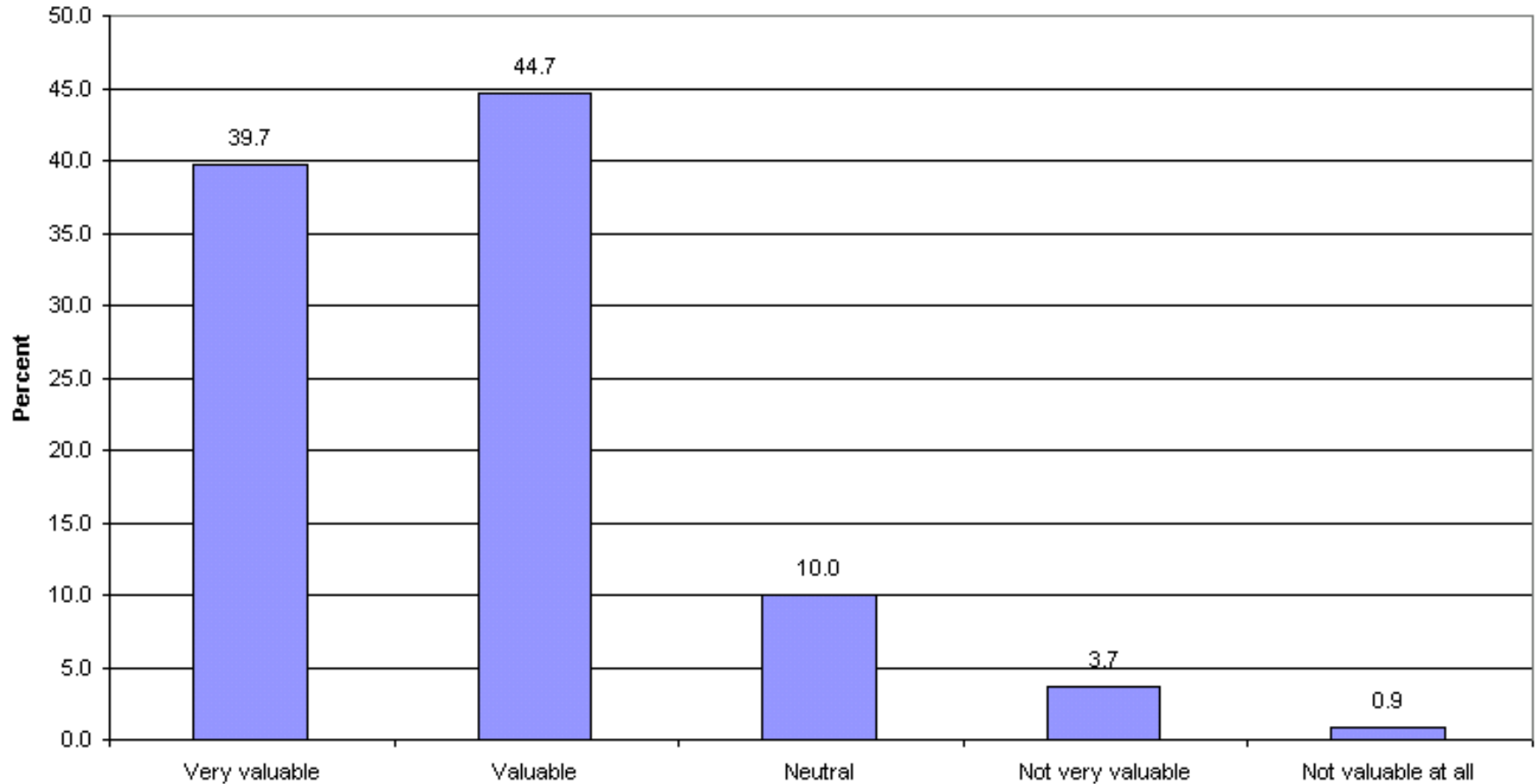
NSC S&H Program Evaluation Survey: Findings-Enabling Factors

Enabling factors	Total selected (%)	Importance*
Availability of printed and electronic information	316 (58.4)	1
More organizational resources	273 (50.5)	2
Stronger management commitment	194 (35.9)	3
Availability of seminars and workshops	216 (39.9)	4
Improved knowledge how to use evaluation results	211 (39.0)	5
Availability of consultations & technical assistance	95 (17.6)	6
Other	23 (4.3)	7

* - Based on the selection of the top-three choices



NSC S&H Program Evaluation Survey: Findings-Overall Value of Evaluation



Evaluation Capacity Building

The **intentional work** to **continuously** create and sustain overall organization **processes** that make **quality** evaluation and its uses **routine**.



Bibliography

- Department of Health and Human Services (2001). *Guide to evaluating the effectiveness of strategies for preventing work injuries: How to show whether a safety intervention really works*. Cincinnati, OH: NIOSH Publications Dissemination [DHHS (NIOSH) Publication No. 2001.119]
- Goldenhar, L.M., LaMontagne, A.D., Katz, T., Heaney, C. & Landsbergis, P. (2001). The intervention research process in occupational safety and health: An overview from the National Occupational Research Agenda Intervention Effectiveness Research Team. *Journal of Occupation and Environmental Medicine*, 43, 616-622.
- National Safety Council (2002). How is your safety program working? Evaluation concepts and methods for assessing safety program effectiveness. One-day workshop offered by the Research and Statistical Services Group of the National Safety Council.
- Patton, M.Q. (1997). *Utilization-focuses evaluation: The new century text* (3rd ed.). Newbury Park, CA: Sage Publications.
- Vojtechy, M.A. & Schmitz, M.F. (1986). Program evaluation and health and safety training. *Journal of Safety Research*, 17, 57-63.
- Wadsworth, Y. (1997). *Everyday evaluation on the run*. St. Leonards, Australia: Allen & Unwin



Mei-Li Lin, Ph.D. Jonathan Thomas

National Safety Council

Research & Statistical Services Group

1121 Spring Lake Drive, Itasca, IL 60143

630-775-2372

thomasj@nsc.org





*National Safety Council
Research & Statistical Services Group*

Safety Intervention Evaluation: A Systematic Approach

Thank You!

*Control Banding Workshop:
Validation & Effectiveness*

March 2, 2004 Cincinnati, OH

The politics of evaluation

- Evaluation is **NOT** political under the following conditions:
 - No one cares about the intervention
 - No one knows about the intervention
 - No money is at stake
 - No power or authority is at stake
 - No humans are involved



Role of the evaluator

- Advocate learning through evaluation
- Demonstrate competency
- Work closely with stakeholders

