An FRA R&D Evaluation Framework for Grade Crossing and Trespass Prevention Evaluation Projects

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EVALUATION OVERVIEW

- Logic of Federal R&D Programs
- Roles of Evaluation
- Evaluation Standards
- CIPP Evaluation Framework
- Evaluation Framework for Suicide R&D
  - Context
  - Input
  - Implementation
  - Impact
- Evaluation as a key strategy tool
Why Evaluation? Assessing the logic of R&D Programs

ACTIVITIES

- Funded Activity “Family”
- e.g.,
- Scientific Research
- Technology Development

OUTPUTS

- Deliverables/Products
- Technical Report(s)
- Forecasting Model(s)

OUTCOMES

- Application of Research
- Data Use
- Adoption of Guidelines, Standards or Regulations

IMPACTS

- Reduced Accidents Injuries
- Changing Practices
- Emergent Outcomes
- Positive Knowledge Gains
- Negative Environmental Effects

Why Evaluation?
Assessing the logic of R&D Programs
# Roles of Evaluation

<table>
<thead>
<tr>
<th>When:</th>
<th><strong>FORMATIVE</strong></th>
<th><strong>SUMMATIVE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before</strong></td>
<td>• Before or during R&amp;D projects/programs</td>
<td>• After R&amp;D projects/programs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purpose:</th>
<th><strong>To guide:</strong></th>
<th><strong>To assess:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• program planning</td>
<td>• Completed projects or project lifecycles</td>
<td></td>
</tr>
<tr>
<td>• program design</td>
<td>• Accomplishments</td>
<td></td>
</tr>
<tr>
<td>• implementation strategies</td>
<td>• Impacts</td>
<td></td>
</tr>
<tr>
<td>To meet accountability requirements</td>
<td></td>
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</tr>
</tbody>
</table>

| Primary Focus: | **To improve programs** | **To prove program merit or worth** |
Program Evaluation Standards: Guiding Principles for Conducting Evaluations

- Utility (useful)
- Feasibility (practical)
- Propriety (ethical)
- Accuracy (valid)
- Accountability (professional)

Note: The Program Evaluation Standards were developed by the Joint Committee on Standards for Educational Evaluation and have been accredited by the American National Standards Institute (ANSI).
# Evaluation Framework: Roles and Types of Evaluation

<table>
<thead>
<tr>
<th>Evaluation Type</th>
<th>Context</th>
<th>Inputs</th>
<th>Implementation</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formative Evaluation (proactive)</strong></td>
<td>Identifies:</td>
<td>Assesses:</td>
<td>Monitors implementation</td>
<td>Assesses: +/- outcomes</td>
</tr>
<tr>
<td></td>
<td>• Needs</td>
<td>• Needs</td>
<td>Alternative approaches</td>
<td>Reassess: project and program plans;</td>
</tr>
<tr>
<td></td>
<td>• Problems</td>
<td>• Problems</td>
<td>Positions</td>
<td>Informs: Policy development</td>
</tr>
<tr>
<td></td>
<td>• Assets</td>
<td>• Assets</td>
<td>Alternative</td>
<td>Strategic planning</td>
</tr>
<tr>
<td></td>
<td>Helps set:</td>
<td>Develops:</td>
<td>Documents issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Goals</td>
<td>• Goals</td>
<td>Guides execution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Priorities</td>
<td>• Priorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summative Evaluation (retroactive)</strong></td>
<td>Assesses:</td>
<td>Assesses:</td>
<td>Assesses:</td>
<td>Assesses:</td>
</tr>
<tr>
<td></td>
<td>Original program goals &amp; priorities</td>
<td>Original procedural plans &amp; budget</td>
<td>Execution</td>
<td>Outcomes Impacts Side effects Cost-effectiveness</td>
</tr>
</tbody>
</table>
# Example Evaluation Questions – Railway Suicides

<table>
<thead>
<tr>
<th>Formative Evaluation</th>
<th>Context</th>
<th>Inputs</th>
<th>Implementation</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suicide prevalence?</td>
<td>Given rail suicide prevalence and trends, what potential countermeasures exist to reduce the frequency?</td>
<td>What aspects of the original countermeasures were implemented as planned and what had to be changed?</td>
<td>To what extent are railroad carriers using effective suicide countermeasures?</td>
</tr>
<tr>
<td></td>
<td>Demographics?</td>
<td>What are the strengths and weaknesses of each potential countermeasure?</td>
<td></td>
<td>What are the emerging outcomes (+ and -) of using one or multiple types of countermeasures?</td>
</tr>
<tr>
<td></td>
<td>Suicide trends?</td>
<td>What are the data gaps and how can they be filled?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Why rail?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Highest priority needs for reducing railway suicides?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summative Evaluation</th>
<th>To what extent did research efforts address highest priority needs?</th>
<th>What countermeasures were selected and why?</th>
<th>To what extent were suicide countermeasures carried out as planned?</th>
<th>What are the effects and impacts of the countermeasures on suicide prevention? Other areas (e.g. community involvement).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How did they compare to other possible alternatives?</td>
<td></td>
<td>Were they revised with an improved approach?</td>
<td></td>
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</tbody>
</table>

What are the lessons learned?
CONTEXT EVALUATION
Context Evaluation: Preliminary studies

→ No reporting requirements (prior to June, 2011)
→ Unknown prevalence
→ Root causes unknown

• Prevalence studies
  – Coroner records, railroad company records, media reports

• Psychological autopsies (retrospective and prospective)
  – Causal analysis
Context Evaluation: Key Findings

• Prevalance:
  – Trespass, suicide, and grade crossing fatalities make up over 96% of all rail related fatalities
  – Minimum of 175 suicides per year on railway rights of way
  – 25-50% trespasser fatalities likely to be suicides
  – Railway suicides are underreported

• Poor quality data
  – Inconsistent procedures for cause of death determination
  – Railway suicide rates are unreliable

• Clusters or possible “hot spots” of suicides
  – Geographic influences unclear (nearby mental facilities?)
  – Possible media influences?

• Demographics of decedents similar to non-rail suicides
Context Evaluation: Key Findings

- High cost to railroad companies
  - Time and schedule delays/costs
  - Impact on crews
- High need area for many RR companies
  - New interventions underway
- Untested countermeasures
- Uncertain as to why rail
Context Evaluation: Key Need Areas

• Data Quality
  – “You can’t manage what you can’t measure.”
  – Need for more consistent and reliable system of suicide determination, nationally and internationally
  – Need to better understand location and demographics of “hot spots”

• Media influence
  – Need for media reporting guidelines

• Impacts of Suicides
  – Need to better understand impact of railway suicides on individuals and railway companies (schedule and time delays, impacts on crews exposed)

• Development and Use of Effective Countermeasures
  – Need to evaluate utilization, effectiveness and impact of suicide countermeasures’ effectiveness
INPUT EVALUATION
Input Evaluation:  
FRA R&D Suicide Prevention Program Areas

- Data collection improvements
  - GIS Mapping study
  - Common criteria for cause of death determination

- Media reporting study
  - Current reporting of railway fatalities, esp. suicides
  - Consistency with known guidelines
  - Outcome: recommendations for improvement

- Potential Countermeasures (under review)

- Global Railway Alliance for Suicide Prevention (GRASP)
Input Evaluation: GRASP – Stakeholders contacted

- **International**
  - Rail Safety Standards Board (RSSB), UK
  - TrackSAFE, Australia
  - Trafikverket (Swedish Transport Administration), Sweden
  - Transport Canada
  - VTT Traffic Safety, Finland
  - University of Quebec at Montreal
  - Community Safety Partnerships (UK)
  - Network Rail (UK)

- **US Government**
  - Center for Disease Control (CDC)
  - Federal Railroad Administration (FRA)
  - Federal Transit Authority (FTA)
  - National Institute of Mental Health (NIMH)
  - Substance Abuse and Mental Health Safety Administration (SAMHSA)
  - Volpe Center (DOT)
  - Federal Working Group on Suicide Prevention

- **Academic**
  - George Washington University
  - Harvard School of Public Health
  - Kansas City University of Medicine

- **Non-Profit**
  - American Association of Suicidology
  - Suicide Research Prevention Center (SPRC)

- **Railroad Industry**
  - Amtrak
  - Association of American Railroads (AAR)
  - Caltrain
  - Long Island Railroad
  - Massachusetts Bay Commuter Railroad (MBCR)
  - Metra
  - Metrolink
  - New Jersey Transit
  - Norfolk Southern
IMPLEMENTATION EVALUATION
Implementation Evaluation: FRA R&D Suicide Prevention Program Areas

• Pilot project(s) for cause of death determination
  – Review of fatality reporting for improved cause of death determinations
  – Possible application of Ovenstone Criteria

• Evaluation(s) of on-going suicide countermeasure implementations

• Community based interventions
IMPACT EVALUATION (TBD)
Conclusion: Evaluation as a Key Strategy Tool

• Quality evaluation asks questions that matter.
  ➔ About processes, products, programs, policies, and impacts
  ➔ Then develop appropriate and rigorous methods to answer them.

• Evaluation measures the extent to which, and ways, programs goals are being met.
  ➔ What’s working, and why, or why not?

• Evaluations help refine program strategy, design and implementation.
  ➔ Inform others about lessons learned, progress, and program impacts.

• Evaluation improves likelihood of program success by:
  – Identifying and involving intended users
  – Clarifying intended uses and potential misuses
  – Measuring outcomes and impacts
  – Anticipating potential outcomes (+ and -)
QUESTIONS?

Michael.Coplen@dot.gov
# Evaluation Standards

*Guiding principles for conducting evaluations*

<table>
<thead>
<tr>
<th>Utility (useful)</th>
<th>Feasibility (practical)</th>
<th>Propriety (ethical)</th>
<th>Accuracy (valid)</th>
<th>Evaluation Accountability (professional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Evaluator Credibility</td>
<td>• Project Management</td>
<td>• Responsive &amp; Inclusive Orientation</td>
<td>• Justified conclusions &amp; decisions</td>
<td>• Evaluation Documentation</td>
</tr>
<tr>
<td>• Attention to Stakeholders</td>
<td>• Practical Procedures</td>
<td>• Formal Agreements</td>
<td>• Valid Information</td>
<td>• Internal Metaevaluation</td>
</tr>
<tr>
<td>• Negotiated Purposes</td>
<td>• Contextual Validity</td>
<td>• Human Rights &amp; Respect</td>
<td>• Reliable Information</td>
<td>• External Metaevaluation</td>
</tr>
<tr>
<td>• Explicit Values</td>
<td>• Resource Use</td>
<td>• Clarity &amp; Fairness</td>
<td>• Explicit Program &amp; Context Description</td>
<td></td>
</tr>
<tr>
<td>• Relevant Information</td>
<td></td>
<td>• Transparency &amp; Disclosure</td>
<td>• Information Management</td>
<td></td>
</tr>
<tr>
<td>• Meaningful Processes &amp; Products</td>
<td></td>
<td>• Conflicts of Interest</td>
<td>• Sound Design &amp; Analyses</td>
<td></td>
</tr>
<tr>
<td>• Timely &amp; Appropriate Reporting</td>
<td></td>
<td>• Fiscal Responsibility</td>
<td>• Explicit Evaluation Reasoning</td>
<td></td>
</tr>
<tr>
<td>• Concern for Consequences &amp; Influence</td>
<td></td>
<td></td>
<td>• Communication &amp; Reporting</td>
<td></td>
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</tbody>
</table>

**Note:** The Program Evaluation Standards were developed by the Joint Committee on Educational Evaluation and have been accredited by the American National Standards Institute (ANSI).
Extra Slides
FRA Publications

• Evaluation Implementation Plan for FRA Office of Research and Development
  – [http://www.fra.dot.gov/eLib/details/L04865#p3_z5_gD_kevaluation](http://www.fra.dot.gov/eLib/details/L04865#p3_z5_gD_kevaluation)

• Demographic Profile of Intentional Fatalities on Railroad Rights-of-Way in the United States
  – An estimation of the yearly number of suicides on the railway and basic demographics of those individual
  – Report: DOT/FRA/ORD-13/36
  – [https://www.fra.dot.gov/eLib/Details/L04734](https://www.fra.dot.gov/eLib/Details/L04734)

  – An A better understanding of the characteristics that make railway suicide victims unique from other suicide victims
# The Research-Evaluation Continuum

<table>
<thead>
<tr>
<th>Primary Purpose:</th>
<th>Research</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>contribute to knowledge</td>
<td>-</td>
<td>program improvement</td>
</tr>
<tr>
<td>improve understanding</td>
<td>-</td>
<td>decision-making</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Audience:</th>
<th>Research</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>scholars</td>
<td>-</td>
<td>program funders</td>
</tr>
<tr>
<td>researchers</td>
<td>-</td>
<td>administrators</td>
</tr>
<tr>
<td>academicians</td>
<td>-</td>
<td>decision makers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of Questions:</th>
<th>Research</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>hypotheses</td>
<td>-</td>
<td>practical</td>
</tr>
<tr>
<td>theory driven</td>
<td>-</td>
<td>applied</td>
</tr>
<tr>
<td>preordinate</td>
<td>-</td>
<td>open-ended, flexible</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources of Data:</th>
<th>Research</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>surveys</td>
<td>-</td>
<td>interviews</td>
</tr>
<tr>
<td>tests</td>
<td>-</td>
<td>field observations</td>
</tr>
<tr>
<td>experiments</td>
<td>-</td>
<td>documents</td>
</tr>
<tr>
<td>pre-ordinate</td>
<td>-</td>
<td>mixed sources</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria:</th>
<th>Research</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>validity</td>
<td>-</td>
<td>utility</td>
</tr>
<tr>
<td>reliability</td>
<td>-</td>
<td>feasibility</td>
</tr>
<tr>
<td>generalizability</td>
<td>-</td>
<td>propriety</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>accuracy</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>accountability</td>
</tr>
</tbody>
</table>
Evaluation Resources

American Evaluation Association (http://www.eval.org)

• 3000 members in 2001
• over 7700 members today
• all 50 states
• over 60 countries
• $95/year membership, includes
  – American Journal of Evaluation
  – New Directions in Evaluation
  – online access to full journal articles
Evaluation Resources

• Affiliate Evaluation Associations
  – Washington Research and Evaluation Network (WREN)
  – Federal Evaluator’s Network

• Evaluation Journals
  – American Journal of Evaluation (AJE)
  – New Directions for Evaluation (NDE)
  – Evaluation Review
  – Evaluation and the Health Professions

• The Evaluator’s Institute (http://tei.gwu.edu/courses_dc.htm)
  – George Washington University

• The Evaluation Center (http://www.wmich.edu/evalctr/)
  – Western Michigan University
Evaluation Resources


“Intended use for intended users”
Program Evaluation Standards: Guiding Principles for Conducting Evaluations

• **Utility (useful):** to ensure evaluations serve the information needs of the intended users.

• **Feasibility (practical):** to ensure evaluations are realistic, prudent, diplomatic, and frugal.

• **Propriety (ethical):** to ensure evaluations will be conducted legally, ethically, and with due regard for the welfare of those involved in the evaluation, as well as those affected by its results.

• **Accuracy (valid):** to ensure that an evaluation will reveal and convey valid and reliable information about all important features of the subject program.

• **Accountability (professional):** to ensure that those responsible for conducting the evaluation document and make available for inspection all aspects of the evaluation that are needed for independent assessments of its utility, feasibility, propriety, accuracy, and accountability.

*Note: The Program Evaluation Standards were developed by the Joint Committee on Standards for Educational Evaluation and have been accredited by the American National Standards Institute (ANSI).*
Stakeholder Involvement: Ethical Guidelines

“When planning and reporting evaluations, evaluators should include relevant perspectives and interests of the full range of stakeholders.”

*Guiding Principles* from the American Evaluation Association

“Persons involved in or affected by the evaluation should be identified, so that their needs can be addressed (Utility 1).

From Research to Impact: Knowledge for Action Theories in Evaluation

- **Knowledge Utilization**
  - How can the program be used?

- **Diffusion**
  - What methods should we use to communicate these programs?

- **Implementation**
  - What factors best support the implementation? Challenges/barriers?

- **Transfer**
  - How will knowledge transfer occur from the pilot site to other work sites?

- **Translation**
  - How can we shape our communications to make them more accessible to our target audiences?

Input Evaluation: GIS Mapping

Census data for this specific census tract
Input Evaluation: Effects of Media Coverage

- **Goal**: Development *and use* of common media guidelines to minimize copycat incidents
- **Current Use**: Guidelines exist in the US, but are often not followed (see [www.sprc.org/sites/sprc.org/files/library/sreporting.pdf](http://www.sprc.org/sites/sprc.org/files/library/sreporting.pdf))
- **Considerations**: Identify types of reporting that result in copycat activity; identify ways to encourage use of guidelines; train rail staff to discuss incidents with media in a way that encourages better reporting practices

### NYC Subway Suicide Pact: New York Romeo and Juliet Leap in Front of Train Rather than Separate
- [Latin Post](http://chevanstonrogerspark.blogspot.com) – 7/31/2013

### Metra Train Suicide AKA “Trespasser Fatality” or Metracide
- [chevanstonrogerspark.blogspot.com](http://chevanstonrogerspark.blogspot.com) – 12/16/2012

### Bluffton couple killed by train in suicide pact
- [The Journal Gazette](http://chevanstonrogerspark.blogspot.com) – 8/8/2013
## Input Evaluation: GRASP – Suicide Prevalence by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Railway Suicide Fatalities per Year</th>
<th>Railway Trespass Fatalities per year</th>
<th>Suicides by all Means per year by gender[^3]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany[^1]</td>
<td>955 (11.8 per million)</td>
<td>Not available</td>
<td>Male: 179 per million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female: 60 per million</td>
</tr>
<tr>
<td>Sweden[^1]</td>
<td>48 (5.1 per million)</td>
<td>Not available</td>
<td>Male: 187 per million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female: 68 per million</td>
</tr>
<tr>
<td>United Kingdom[^2]</td>
<td>220 (3.5 per million)</td>
<td>40 (0.6 per million)</td>
<td>Male: 109 per million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female: 30 per million</td>
</tr>
<tr>
<td>Canada[^1]</td>
<td>42 (1.3 per million)</td>
<td>46 (1.2 per million)</td>
<td>Male: 173 per million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female: 54 per million</td>
</tr>
<tr>
<td>United States</td>
<td>246 (0.8 per million)</td>
<td>501 (1.6 per million)</td>
<td>Male: 177 per million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Female: 45 per million</td>
</tr>
</tbody>
</table>