Evaluating NTS Programs –
Is there a better way?

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PACDEFF August, 2013
Overview

• The need for good evaluation techniques
• Common evaluation methods
• Other approaches:
  ▪ Behavioural monitoring
  ▪ Behavioural self assessment surveys
  ▪ Normal operations monitoring
  ▪ Program maturity
• Recent hybrid example from ITSR
• Conclusion
Improving evaluation methods – why?

Evaluating Effectiveness:
Behaviour change + risk reduction = return on investment

Identify HF Risk
Identify behavioural targets
Measure Current Performance
Customise and implement NTS training
Evaluate Effectiveness
Common evaluation methods

- Compliance Audits,
- Line Checks,
- Classroom assessment
- Course evaluations
- CBT
- NOTECHS
- LOFT
- LOSA
- Other alternatives...?
Behavourial Safety Monitoring

How it works:
• Define risks & behaviours to change
• Develop checklist of behaviours
• Peer to peer observations
• Pre and post intervention

Advantages:
• targets specific behaviours
• Participation influences behaviour
• Lots of data

Disadvantages:
• Not independent measure
• Valid behaviour markers?
• Is change sustainable over time?

Agnew&Snyder, 2002; Geller, 2001; Krause, 1997; McSween, 2003
Behavioural Monitoring – Case Study

Ramp operations UK airport / Marsh Consulting:
Defined target areas, trained observers, training intervention, conducted observations, publish and review results.

Claimed benefits:

- Desired level of human performance achieved (behaviour change)
- 9% increase in safety performance (risk reduction)
- Convinced insurer to decrease premium (value)
- Named ground handler of the year
Self Assessment Surveys

How it works:
- Survey asks how well/often you/others display this behaviour
- Pre and post intervention

Advantages:
- Can be generic or targeted behaviours
- Lots of data/baseline+ trends
- Reaches broad population
- Cheap and quick
- Informs TNA

Disadvantages:
- Perceptions only
- Inbuilt bias
Self Assessment Surveys - Case Study

Harris et al (2005) questionnaire - flight on errors made on approach/landing:
• if ever made the error themselves or if other pilots made the same error.
• Results = normative and in-depth view of human performance, from the operators themselves.

Sutton (2012) “hanger talk” pilot survey concluded: “surveys illicit similar naturalistic information to observation based TEM approaches used by airlines today”
Normal Operations Monitoring

How it works:
• Independent observers
• Observe behaviours which increase /decrease risk
• BM’s emerge from observations
• Train adaptive behaviours
• Continue observations post training

Advantages:
• Evidence based BM’s, measures behaviour, customised, in house, continuous data
• Targeted, risk focused

Disadvantages:
• resources intensive ,especially at start up
• Not suitable for highly cognitive tasks (eg ATC)
Normal Operations Monitoring- Case Study

Key differences from LOSA

- Neutral taxonomy, simplified TEM
- In house continuous data
- Only observable behaviours (not cognitive processes)
- Equal focus on successful (resilient) and unsuccessful behaviours
- Task based codes based on current rules (deviation from standard, not error)
- Successful/unsuccessful behaviours judged on outcomes
- Behaviour markers derived from observations evidence
- TEM relationships emerge from statistical analysis

Williamson, A Raggett L 2013
Evaluating Program Maturity

How it works:
• Self assessment based categorisation of a level of maturity
• Composite measure of many characteristics

Advantages:
• Holistic measure of program
• Promotes continuous improvement
• Shows how to progress to next level

Disadvantages:
• Un-validated models
• Based on consensus best practice
Evaluating Program Maturity - Case Study

- based on NTS practitioner interviews
- Shared vision of best practice

1. Baseline
   - Generic training
   - Informal links between SMS and HF NTS

2. Reactive
   - Generic HF NTS with some role customisation
   - Improving links between SMS and HF NTS

3. Managed
   - NTS is role specific, and focused on behaviour change
   - Targets behaviours based on risk
   - Formal system link SMS data into HFNTS

4. Proactive
   - Evaluation demonstrates behaviour change and risk reduction
   - Non training solutions are sought where appropriate
   - Indicators show continuous improvement

5. Optimising
   - Training is targeted, optimised, innovative, lower cost
   - HF fully integrated with SMS
   - Mature evaluation systems in place
   - Looks outside the organisation to identify best practice and new risks

O’Flanagan and Raggett, AAVPA 2012
RRM for Safety Critical Communications (SCC)

- safety critical communication incidents
- Poor uptake of existing RRM package
- demonstrate effectiveness with specific risk?

Targeted RRM for safety critical communication

1. Identify HF Risk
2. Measure Current Performance
3. Evaluate Effectiveness
4. Implement training Intervention
5. Customise RRM Modules
6. Streamline RRM

Strathfield Near-miss track workers
Kogarah Track Worker Fatality
Newbridge Collision
RRM for SCC project

Develop tools for measuring communication behaviors

Approach draws on a number of existing sources:

- RSSB observations of adaptive, maladaptive behaviors for Safety critical communications (SCC)
- Checklist /Behavioural monitoring methods
- Observational (LOSA) style programs
- Behavioural self assessment surveys
RRM for SCC project

- A technical skills (TS) checklist from network rules
- A non technical skills (NTS) checklist from work on communication error:
  - RSSB, 466 observations of signaller/driver comms plus questionnaire and structured interview
  - SCC behaviours markers were already in RRM
RRM for SCC project

Test tools and approach

- Sample of Network Controllers conversations
- 200 recordings sampled
- 68 complete exchanges assessed for NTS technical (RRM) skills
- (Technical skills not assessed)
RRM for SCC project

• Scoring:
  – “ticks” = desired behaviour demonstrated
  – “crosses” = behaviour should have been demonstrated, but was not
  – Combined score of +ve and –ve responses
RRM for SCC project

Training Intervention:

• BMs become the learning outcomes of targeted behaviour based training

Plus relevant, generic topics:

• Risk Perception
• Managing distraction
• Maintaining SA
RRM for SCC project - Next steps

- Increase industry partners and conduct trial
- Pre and Post self assessment
- Repeat behavioural measurement

Desirable behaviours

Goal State

Post Implementation Measure

undesirable behaviours

Baseline

Objectives

Rate your ability to display each skill by placing a tick on the 5-point scale.

<table>
<thead>
<tr>
<th>Behaviour Measurement</th>
<th>Behaviour Marker</th>
<th>Performance Criteria</th>
<th>Rating (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeps others informed</td>
<td>1.</td>
<td>Communicate all relevant information to the right people</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Provide the right information at the right time in the correct order</td>
<td>1</td>
</tr>
<tr>
<td>Communicates with accuracy and clarity</td>
<td>3.</td>
<td>Plan what I am going to say before I say it</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>Communicate facts in an up-to-date information</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5.</td>
<td>My speaking voice is clear and comprehensible to others</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6.</td>
<td>Avoiding unnecessary detail and waffle</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>7.</td>
<td>My communications are clear and unambiguous with little need for further clarification</td>
<td>1</td>
</tr>
</tbody>
</table>
Summary

• Start with the human risks to be managed (link to SMS)
• Decide which risks are best managed by training NTS
• Target behaviours based on evidence.
• Concentrate training on specific behaviours
• Assess behaviour change and risk reduction

Example:

How tailored NTS training has shown positive effects on error management in the Rail Industry

Case Study:

Queensland Rail

“Trainee drivers more than twice as likely to SPAD in their first 12 months if they had not had RRM training (compared to if they had) - 26.3% compared to 13.71%.”
Conclusion

Evaluating Effectiveness: Behaviour change + risk reduction = return on investment

Questions?