US Special Operations Command

The overall classification of this briefing is:

UNCLASSIFIED
**Measuring Training ROI: Silver Bullet Or Urban Legend**

**US Special Operations Command Macdill AFB, FL**

**12. DISTRIBUTION/AVAILABILITY STATEMENT**
Approved for public release, distribution unlimited

**13. SUPPLEMENTARY NOTES**
OVERVIEW
MEASURING TRAINING ROI: SILVER BULLET OR URBAN LEGEND

- SILVER BULLET OR URBAN LEGEND?
- EVALUATION MODELS
- COURSES OF ACTION (ALTERNATIVES)
- EFFECTIVENESS EVALUATION
- COST EVALUATION
- COST-EFFECTIVENESS EVALUATION
SILVER BULLET OR URBAN LEGEND?

- SILVER BULLET OR URBAN LEGEND?
  - ANTECDOTES
  - ROI DEFINED
  - EVALUATION LEVELS

- EVALUATION MODELS
- COURSES OF ACTION (ALTERNATIVES)
- EFFECTIVENESS EVALUATION
- COST EVALUATION
- COST-EFFECTIVENESS EVALUATION
SILVER BULLET OR URBAN LEGEND?
ANTECDOTES

“The biggest value that Training ROI ever produced was to sell books for a few authors, so unless you are one of those authors, forget all you have heard and read about. Training ROI is perhaps the least meaningful metric that you can determine when it comes to training, rated just below “smile” sheets. It is NOT indicative of the contribution that training makes to an organization.”


The problem is that nobody is quite sure what the appropriate metrics are for measuring ROI for learning. Is it student throughput or time to mastery? Is it dropout rates or full-time equivalents returned to the workforce? One thing is certain: many smart people are completely befuddled by the topic.”

Marcia L. Conner, Learnativity.com, “How do I measure return on investment (ROI) for my learning program?, 5 Apr ‘02”

“To some people--me included--the traditional concept of training ROI is obsolete. Astute training managers employ business metrics, not evaluation levels, I believe. Business unit managers value time more than ROI. Major decisions are based on descriptive business cases, not pro forma budgets. Senior executives tend to be more interested in the top line (dramatic growth from new markets and innovation) than the bottom line (the accounting fiction of profits).”

Jay Cross, CEO of Internet Time Group, “A Fresh Look at ROI,” Jan 01

“The reason why I won't do an ROI study is that any major change effort within an organization requires not just training, but many other factors.”

SILVER BULLET OR URBAN LEGEND?
ROI DEFINED

BCR = PROGRAM BENEFITS / PROGRAM COSTS

BCR: BENEFITS COST RATIO

ROI% = NET PROGRAM BENEFITS / PROGRAM COSTS x 100

ROI: RETURN ON INVESTMENT

Training Change
Effectiveness

Training Change
Cost

SILVER BULLET OR URBAN LEGEND?
EVALUATION LEVELS

KIRKPATRICK’S FOUR LEVELS OF EVALUATION

1. LEVEL 1: CUSTOMER REACTION
2. LEVEL 2: LEARNING
3. LEVEL 3: BEHAVIOR
4. LEVEL 4: RESULTS
5. LEVEL 5: ROI

PHILLIPS’ FIFTH LEVEL

TRAINING EVALUATION LEVEL ATTRIBUTES

<table>
<thead>
<tr>
<th>DATA VALUE</th>
<th>CUSTOMER FOCUS</th>
<th>FREQUENCY OF USE</th>
<th>DATA COLLECTION</th>
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</thead>
<tbody>
<tr>
<td>HIGHEST</td>
<td>CLIENT</td>
<td>LEAST</td>
<td>HARDEST</td>
</tr>
<tr>
<td>LOWEST</td>
<td>CONSUMER</td>
<td>MOST</td>
<td>EASIEST</td>
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</tbody>
</table>

SILVER BULLET OR URBAN LEGEND?

EVALUATION FRAMEWORKS
- ANALYSIS OF ALTERNATIVES
- TRAINING SYSTEMS REQUIREMENTS ANALYSIS
- M&S RETURN ON INVESTMENT
- TRAINING RETURN ON INVESTMENT
- THE HYBRID MODEL

COURSES OF ACTION (ALTERNATIVES)
- EFFECTIVENESS EVALUATION
- COST EVALUATION
- COST-EFFECTIVENESS EVALUATION
EVALUATION FRAMEWORKS
ANALYSIS OF ALTERNATIVES (AOA)

PLANNING

(3) ACQUISITION ISSUES
(4) ALTERNATIVES
(5) EFFECTIVENESS MEASURES DETERMINATION

RESOURCING

(1) PURPOSE, BACKGROUND AND SCOPE
(2) ORGANIZATION AND MANAGEMENT

ANALYSES

(6) EFFECTIVENESS ANALYSIS
(7) COST ANALYSIS
(8) RISK ASSESSMENT
(9) AFFORDABILITY ASSESSMENT

REPORTING

(10) ALTERNATIVE COMPARISONS
(11) GENERATE AOA REPORT/BRIEF

EVALUATION FRAMEWORKS
TRAINING SYSTEMS REQUIREMENTS ANALYSIS (TSRA)

TRAINING SITUATION ANALYSIS (TSA)

1. DETERMINE TRAINING REQUIREMENT
   - EXISTING SKILLS/KNOWLEDGE
   - REQUIRED SKILLS/KNOWLEDGE

2. DETERMINE TRAINING OBJECTIVE
   - TRAINING ANALYSIS
   - TASK & SKILLS ANALYSIS

TRAINING SYSTEMS ALTERNATIVES REPORT (TSAR)

3. EVALUATE ALTERNATIVE
   - COST & RESOURCE CONSTRAINTS
   - TRAINING EFFECTIVENESS ANALYSIS
   - TRAINING TECHNOLOGY ASSESSMENT
   - MEDIA ANALYSIS
   - CRITERIA
     - COST VS. BENEFIT
     - TRAINING EFFECTIVENESS
     - USER ACCEPTANCE
     - RETURN ON INVESTMENT

TRAINING SYSTEM FUNCTIONAL DOCUMENT (TSFD)

4. SPONSOR DECISION
   - USER ACCEPTANCE

TRAINING DEVISE REQUIREMENTS DOCUMENT (TSRD)

5. DETERMINE FUNCTIONAL DESCRIPTION
   - MEDIA ANALYSIS
   - CLASSROOM MEDIA TRAINING
   - INTERACTIVE MULTI-MEDIA INSTRUCTION TRAINING
   - SIMULATION/STIMULATION TRAINING
   - DISTRIBUTED LEARNING
   - TECHNICAL TRAINING EQUIPMENT TRAINING
   - EMBEDDED TRAINING
   - NONE

Training System Plan
Engineering Specs

NAWC Training Systems Division. Training Systems Requirements Analysis Analysis Webpage, 30 August 2007
EVALUATION FRAMEWORKS
M&S RETURN ON INVESTMENT

BENCHMARK
(1) DETERMINE REQUIREMENTS
(2) SET STANDARDS OF PERFORMANCE
(3) SET BASELINE

PLANNING
(4) DESIGN M&S APPLICATION
(5) DESIGN METRICS

ANALYSES
(6) COLLECT DATA
(7) ANALYZE DATA
(8) DETERMINE ROI

REPORTING
(9) INITIATE CORRECTIVE ACTION

AFAMS. Return on Investment of Modeling and Simulation (M&S) Workshop Briefing, April 2008
EVALUATION FRAMEWORKS
TRAINING RETURN ON INVESTMENT (ROI)

1. REACTION/SATISFACTION
2. LEARNING
3. APPLICATION/IMPLEMENTATION
4. BUSINESS IMPACT

Phillips and Stone. How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators, 2002, page 34
COURSES OF ACTION (ALTERNATIVES)

- SILVER BULLET OR URBAN LEGEND?
- EVALUATION MODELS
- COURSE OF ACTION (ALTERNATIVES)
  - TRAINING SPECTRUM
  - AC-130U ILLUSTRATION
- EFFECTIVENESS EVALUATION
- COST EVALUATION
- COST-EFFECTIVENESS EVALUATION
CONSTRUCTIVE
real people trained by providing inputs to simulated systems (machine-to-machine)

VIRTUAL
real people training by operating simulated systems

LIVE
real people trained by operating real systems

ALTERNATIVES?
- MATERIAL
  - NEW
    - SYSTEMS
    - SOFTWARE
    - COURSWARE
  - MODIFICATIONS
    - OBsolescence
    - Concurrency
- NON-MATERIEL

COURSES OF ACTION
TRAINING SPECTRUM

AFAMS. Return on Investment of Modeling and Simulation (M&S) Workshop Briefing, April 2008
COURSES OF ACTION
AC-130U ILLUSTRATION

WHY NOT LIVE TRAINING?
- SAFETY
- SECURITY
- SCENARIOS
- COST

COST

CLASSROOM/ COURSEWARE INSTRUCTION
DESKTOP TRAINERS
PART TASK TRAINERS
FLIGHT TRAINING DEVICES
FULL MOTION SIMULATORS
FLYING HOURS

EFFECTIVE

CONSTRUCTIVE VIRTUAL LIVE

UNCLASSIFIED
SOAL
UNCLASSIFIED

EFFECTIVENESS EVALUATION

- SILVER BULLET OR URBAN LEGEND?
- EVALUATION MODELS
- COURSES OF ACTION (ALTERNATIVES)
- EFFECTIVENESS EVALUATION
  - ATTRIBUTES
  - METRICS
- COST EVALUATION
- COST-EFFECTIVENESS EVALUATION
EFFECTIVENESS EVALUATION

ATTRIBUTES

- **JOINT TRAINING**
  - RIGHT INFORMATION
  - RIGHT AUDIENCE
  - ADAPTABLE
  - RESPONSIVENESS
  - INTEROPERABILITY
  - LEARNING TRANSFERANCE
  - PERSISTENT/REINFORCED
  - NETWORKED
  - EXPEDITIONARY
  - EFFICIENCY

- **MODELING & SIMULATION**
  - REUSE
  - READINESS
  - EFFICIENCY
  - RISK REDUCTION
  - EFFECTIVENESS
  - MONEY
  - ENVIRONMENT
  - LIVES
  - TIME

JCS. Joint Functional Concept for Joint Training, July 2007

AFAMS. Return on Investment of Modeling and Simulation (M&S) Workshop Briefing, April 2008
EFFECTIVENESS EVALUATION
METRICS

KIRKPATRICK’S FOUR LEVELS OF EVALUATION

LEVEL 5
ROI

LEVEL 4
RESULTS

LEVEL 3
BEHAVIOR

LEVEL 2
LEARNING

LEVEL 1
REACTION

OBJECTIVE 1 – MISSION IMPACT/OUTCOME

OBJECTIVE 2 – TASK APPLICATION/PERFORMANCE

OBJECTIVE 3 – LEARNING ATTAINMENT

OBJECTIVE 4 – CUSTOMER REACTION/SATISFACTION

OBJECTIVE 1 – MISSION IMPACT

MEASURES OF EFFECTIVENESS

1-X: MSN EFFECTIVENESS (OUTPUT-ORIENTED)

e.g.: SAFETY
      ENVIRONMENTAL IMPACT
      TARGET NEUTRALIZED

DATA SOURCES

- ACTION/IMPROVEMENT PLANS
- ASSIGNMENTS RELATED TO PROGRAM
- FOLLOW-UP
  - PROGRAM SESSIONS
  - QUESTIONNAIRES
- PERFORMANCE
  - CONTRACTING
  - MONITORING

ISOLATING TRAINING EFFECTS DIFFICULT

Phillips and Stone. How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators, 2002, page 34
OBJECTIVE 2 – TASK APPLICATION

MEASURES OF EFFECTIVENESS

2-X: TASK EFFECTIVENESS
(INPUT ORIENTED)

e.g.: TIME
RESOURCES
READINESS
RISK REDUCTION

DATA SOURCES

- ACTION/IMPROVEMENT PLANS
- ASSIGNMENTS RELATED TO PROGRAM
- OBSERVATIONS ON-THE-JOB
- FOLLOW-UP
  - FOCUS GROUPS
  - INTERVIEWS
  - PROGRAM SESSIONS
  - QUESTIONNAIRES
  - SURVEYS
- PERFORMANCE
  - CONTRACTING

ISOLATING TRAINING EFFECTS DIFFICULT

Phillips and Stone. How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators, 2002, page 34
## OBJECTIVE 3 – LEARNING

### MEASURES OF EFFECTIVENESS

<table>
<thead>
<tr>
<th>Measure</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1: Training Proficiency Ratio</td>
<td>Assessments</td>
</tr>
<tr>
<td>3-2: Training Throughput Ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self</td>
</tr>
<tr>
<td>3-3: Training Applicability Ratio</td>
<td>Trainer</td>
</tr>
<tr>
<td>3-4: Training Appropriateness Ratio</td>
<td>Tests</td>
</tr>
<tr>
<td></td>
<td>Formal</td>
</tr>
<tr>
<td></td>
<td>Criteria Referenced</td>
</tr>
<tr>
<td></td>
<td>Performance Based</td>
</tr>
<tr>
<td></td>
<td>Simulation</td>
</tr>
<tr>
<td></td>
<td>Exercises/Activities</td>
</tr>
</tbody>
</table>

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Phillips and Stone. *How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators*, 2002, page 34
### MEASURES OF EFFECTIVENESS

#### 4-1: STUDENT COURSE REACTION RATINGS

- 4-1-1: COURSE OVERALL
- 4-1-2: COURSE CONTENT
- 4-1-3: COURSE METHODOLOGY
- 4-1-4: COURSE FACILITY
- 4-1-5: COURSE INSTRUCTION
- 4-1-6: COURSE CHANGE ASSESSMENT

#### 4-2: ADMINISTRATION REACTION RATINGS

- 4-1-1: CURRICULUM OVERALL
- 4-1-2: CURRICULUM CONTENT
- 4-1-3: CURRICULUM METHODOLOGY
- 4-1-4: CURRICULUM FACILITY
- 4-1-5: CURRICULUM INSTRUCTION
- 4-1-6: CURRICULUM CHANGE ASSESSMENT

### DATA SOURCES

- **INITIAL**
  - INTERVIEWS
  - QUESTIONNAIRES

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Phillips and Stone. *How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators*, 2002, page 34
EFFECTIVENESS EVALUATION
METRICS

TRAINING ISOLATION/MONETARY CONVERSION

TRAINING EFFECTS ISOLATION

- CONTROL GROUPS
- TREND LINE ANALYSIS
- FORECASTING
- PARTICIPANT ESTIMATE
- SUPERVISOR ESTIMATE
- MANAGEMENT ESTIMATE
- CUSTOMER INPUT
- EXPERT ESTIMATE
- SUBORDINATE INPUT
- OTHER FACTORS IMPACT

TRAINING “$” CONVERSION

- CONVERTING
  - OUTPUT TO CONTRIBUTION
  - COST OF QUALITY
  - EMPLOYEE TIME
- HISTORICAL COSTS
- INTERNAL/EXTERNAL EXPERTS
- INTERNAL/EXTERNAL DATABASES
- PARTICIPANTS’ ESTIMATES
- LINKING WITH OTHER MEASURES
- SUPERVISOR/MANAGER ESTIMATES
- TRAINING STAFF ESTIMATES

Phillips and Stone. How To Measure Training Results: A Practical Guide To Tracking The Six Key Indicators, 2002, page 34
COST EVALUATION
OVERVIEW

- SILVER BULLET OR URBAN LEGEND?
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- COST EVALUATION
  - ATTRIBUTES
  - METRICS
- COST-EFFECTIVENESS EVALUATION
**COST EVALUATION ATTRIBUTES**

- **Research and Development** – All costs required to research and develop a system before committing it to production (engineering design, manufacturing of test articles, testing to prove the design, contractor ST&E, engineering development equipment, software development, intelligence design, data, etc).

- **Investment/Production** – Costs associated with the fabrication, assembly and delivery of a system (prime mission equipment, support equipment, initial spares, modification to existing platforms, intelligence production, integration costs, data, etc).

- **Operations & Support** – Includes all direct and indirect costs required for operation and support of a system (cost of personnel, materials, facilities, depot maintenance, inventory management control, intelligence support, data, etc).

- **Disposal** – Cost to dispose of the system after its useful life (disposal or long-term storage costs, environmental and related costs, development and manufacturing cleanup costs, etc).

**GOAL: CHANGE = REDUCED LCC**

**LCC = Total Ownership Cost**
COST EVALUATION
METRICS

- MEASURES OF COST
  - BREAK EVEN
  - PAYBACK
COST-EFFECTIVENESS EVALUATION

OVERVIEW

■ SILVER BULLET OR URBAN LEGEND?
■ EVALUATION MODELS
■ COURSES OF ACTION (ALTERNATIVES)
■ EFFECTIVENESS EVALUATION
■ COST EVALUATION
■ COST-EFFECTIVENESS EVALUATION
  ➢ ATTRIBUTES
  ➢ METRICS

△ EFFECTIVENESS

△ COST
## COST-EFFECTIVENESS EVALUATION

### ATTRIBUTES

#### PROBABILITY OF RISK

<table>
<thead>
<tr>
<th>Process Past Performance</th>
<th>Observed Process Characteristics</th>
<th>Level/Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>The process…</td>
<td>The process looks like…</td>
<td></td>
</tr>
<tr>
<td>...Risk events are imminent and cannot be avoided under current conditions – incapable process</td>
<td>Lack of planning and management for any process change; any success is due to individual effort/knowledge</td>
<td>5 Nearly Certain</td>
</tr>
<tr>
<td>...expects risk events and most of them are likely to occur – incapable process</td>
<td>Process management based on experience with similar processes; successful practices used</td>
<td>4 Highly Likely</td>
</tr>
<tr>
<td>...anticipates risk events but may not avoid them – marginally capable process</td>
<td>Tech and management aspects of process documented; standards used; sub-processes understood and used to improve process</td>
<td>3 Likely</td>
</tr>
<tr>
<td>...has usually avoided or resolved risk events in similar cases – capable process</td>
<td>Quantitative management of process capability; trends are predicted</td>
<td>2 Unlikely</td>
</tr>
<tr>
<td>...will effectively avoid or resolve risk events using standard practices – highly capable process</td>
<td>Continuous improvement is norm; best practices used; process capability expanded routinely</td>
<td>1 Remote</td>
</tr>
</tbody>
</table>

#### IMPACT OF RISK

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Schedule</th>
<th>Cost</th>
<th>Level</th>
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</thead>
<tbody>
<tr>
<td>Minimal/No Impact</td>
<td>Minimal/No Impact</td>
<td>Minimal/No Impact</td>
<td>1</td>
</tr>
<tr>
<td>Acceptable; Some Margin Reduction</td>
<td>Meets milestones</td>
<td>Increase &lt;5%</td>
<td>2</td>
</tr>
<tr>
<td>Acceptable; Significant Margin Reduction</td>
<td>Minor milestone slip</td>
<td>Increase 5-7%</td>
<td>3</td>
</tr>
<tr>
<td>Acceptable, No Margin Remaining</td>
<td>Major milestone slip</td>
<td>Increase &gt;7-10%</td>
<td>4</td>
</tr>
<tr>
<td>Unacceptable</td>
<td>Not Meet Milestones</td>
<td>Increase &gt;10%</td>
<td>5</td>
</tr>
</tbody>
</table>
## COST-EFFECTIVENESS EVALUATION

### METRICS

<table>
<thead>
<tr>
<th>ALTERNATIVES</th>
<th>OBJECTIVE 1</th>
<th>OBJECTIVE 2</th>
<th>OBJECTIVE 3</th>
<th>OBJECTIVE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MSN IMPACT</td>
<td>TASK PERF.</td>
<td>LEARNING</td>
<td>REACTION</td>
</tr>
<tr>
<td>#1 (BASE CASE)</td>
<td>MOE 1-1</td>
<td>MOE 1-2</td>
<td>MOE 2-1</td>
<td>MOE 2-2</td>
</tr>
<tr>
<td>#2</td>
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<td>#6</td>
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</tbody>
</table>
SUMMARY

1. BENCHMARK CURRENT TRAINING PROGRAM
   - TRAINING PROGRAM EFFECTIVENESS (INCLUDE CAPABILITY GAPS)
   - TRAINING PROGRAM COST

2. TREAT TRAINING AS EXPENSE
   - COMPARE TRAINING PROGRAM COSTS (CURRENT vs NEW)
   - DETERMINE PAYBACK OF NEW TRAINING PROGRAM, IF ANY

3. ISOLATE THE BENEFITS
   - COMPARE TRAINING PROGRAM EFFECTIVENESS (CURRENT vs. NEW)
   - DETERMINE BENEFITS OF NEW TRAINING PROGRAM, IF ANY

4. AVOID THE “ROI” RATIO
   - ONE NUMBER MEANS NOTHING
   - CONSIDER THE FOLLOWING EXPRESSIONS (OBJ. 3) OF RETURN:
     - ___ % IMPROVED PROFICIENT
     - ___ % IMPROVED THROUGHPUT
     - ___ % INCREASES SKILLS VALUED BY COMMAND
     - ___ % INCREASED TRAINING SPECIFIC PEOPLE IN SPECIFIC FUNCTIONS
QUESTIONS?

**Dilbert**

**My simulator is too slow. I need to upgrade it.**

**I need a cost-benefit analysis including the cost of all alternatives, and vice president approval.**

**It was easier to get a second job and pay for the upgrade myself.**