

Measuring the Impact of Training Efforts at NIST

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NIST Training Efforts

- We began tracking NIST-wide training efforts in 2006
 - With support and input from Measurement Services Advisory Group (MSAG) and Conference Facilities in 2007
- Technology Services began having discussions about
 - Training – as related to Technology Transfer efforts
 - Effective measures of impact for training as a part of our Baldrige journey
 - Output (counting) vs Outcome (measuring impact)

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Technology Services Course Examples

- Weights and Measures Enforcement
 - Specifications and Tolerances for Commercial Devices (Handbook 44)
 - Scales
 - Vehicle-Tank & Loading-Rack Meters
 - Grain Moisture Meters
 - Railway Track Scales-AREMA (Rick)
 - Small Volume Provers
 - Checking the Net Contents of Packaged Goods (Handbook 133)
 - Price Verification
- Standards in Trade Workshops
 - Middle East, North Africa, and Pakistan on Standards, Codes, and Conformity Assessment for Life Safety and Building Construction
 - Oil and Gas for South America
 - US-China: Intelligent Transportation Systems
 - Support of the Asia Pacific Partnership (APP) on Harmonization of Test Procedures
- Training for US Trade Representatives, Standards Attaches, Foreign Commercial Service Officers

FY: 2007

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Measurement Course Examples

- TS Laboratory/Metrology Seminars
 - Basic Metrology - States
 - Basic Mass - Industry
 - Intermediate Metrology
 - Advanced Mass, Advanced Mass Hands-on
 - 6 Regional Measurement Assurance Programs
 - MSC - NIST Seminars: Accreditation (NVLAP), Practical Measurement Assurance
 - NCSLI - Balance & Scale Tutorials
- Summer Institute for Teachers
- Display Metrology
- Laser Measurements
- ARFTG Microwave Measurements
- Microwave Measurements for Emerging Materials
- Near-Field Antenna Measurements and Microwave Holography
- Instrumentation, Metrology, and Standards for Nanomanufacturing
- Gage Blocks
- MSC - NIST Seminars: Pressure and Vacuum, Fluid Flow, Uncertainties
- Mini-Workshop on ITS-90 Fixed Points
- The Role of NIST in Improving the Accuracy of Natural Gas Flow Measurements
- Spectrophotometry
- Time and Frequency Metrology Seminar
- High-Frequency Characterization of Printer-Circuit Board materials
- Optimum CMOS Integrated LNA Design Techniques for Handsets

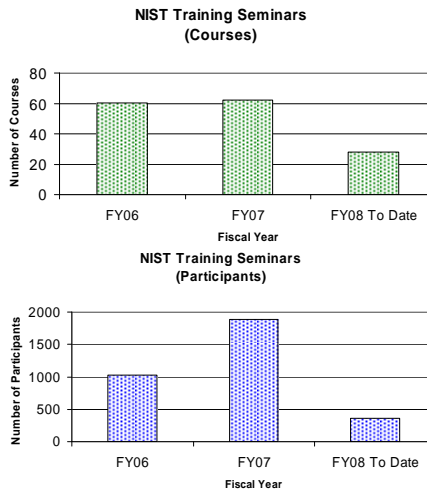
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Initial Measures

- Initial measures include tracking
 - Number of courses and participants (and trends)
 - Responsible division(s)
 - Location of courses
 - Customer satisfaction measures where available
- 2006: 60 courses and > 1000 participants.
- 2007: > 60 courses and > 1800 participants.

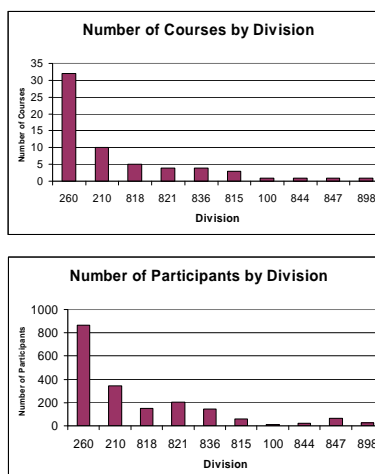


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Initial Measures – Internal Assessment

- Technology Services has largest number of courses and participants (64 %)
 - Support for weights and measures
 - enforcement officials
 - laboratories
 - Support for standards in trade
- Only about 50 % of the courses are tracked by Conference Facilities (they only track fee-based conferences and workshops)
- Management requests for data include tracking participants by organization type and location (e.g., defense in CA, biotech in MN)
- No centralized tracking of data or measures



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Evolving Measures

- Part of our TS Baldrige journey
 - Beginning to implement formal learning evaluation methods and techniques¹
 - Also tracking requests for training and conducting needs assessments—by group
 - New course evaluation forms
- Levels include:
 - Level 1: REACTION
 - Customer Satisfaction
 - Level 2: LEARNING
 - Increased knowledge or skill
 - Level 3: BEHAVIOR
 - Application
 - Level 4: RESULTS
 - Impact
 - Level 5: Return on Investment

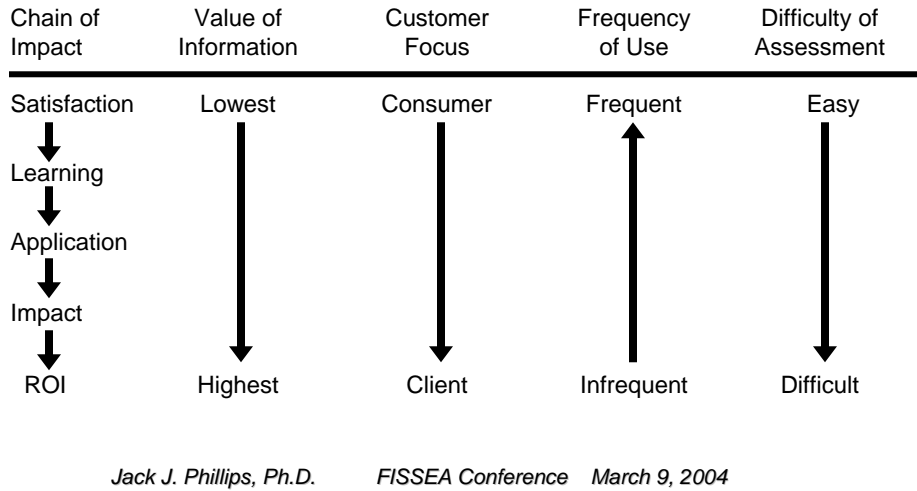
¹Training Evaluation methods based on formal work by Phillips, Kirkpatrick

Evaluation Levels

Level	Measurement Focus
1. Reaction & Planned Action	Measures participant satisfaction with the program and captures planned actions
2. Learning	Measures changes in knowledge, skills, and attitudes
3. Application	Measures changes in on-the-job behavior
4. Business Impact	Measures changes in business impact variables
5. Return on Investment	Compares program benefits to the costs

Jack J. Phillips, Ph.D. FISSEA Conference March 9, 2004

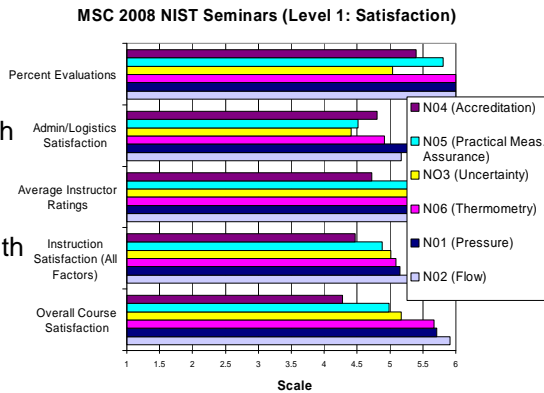
Characteristics of Evaluation Levels



Evolving Measures – Example

Measurement Science Conference – NIST Seminars

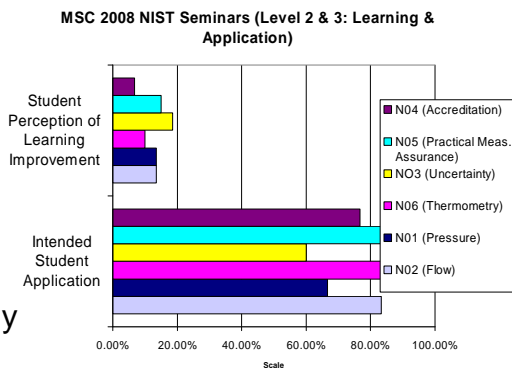
- Historically by count and satisfaction:
 - 6 seminars
 - 105 participants
 - People were *happy* with the experience
- Now multiple levels:
 - Level 1: Satisfaction with
 - Logistics
 - Instruction
 - Data: near 100%



Evolving Measures – Example

Measurement Science Conference – NIST Seminars

- Now: more new measures
 - Level 2: Learning assessments
 - Student perceptions
 - Optional: Testing
 - Optional: hands-on proficiency
 - Level 3: Intent to apply learning
 - MSC: 60 % intended to apply something they learned



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Evolving Measures – Example

Measurement Science Conference – NIST Seminars

- Follow up to determine Impact of student application at 45 days (Level 4)
 - Self-reporting in follow up surveys (32 % response rate)
 - Two key questions
 - Begin identifying impact OR begin to identify system barriers
- Include “needs assessments” for additional training
- If you have applied something, what did you apply and has there been an impact? Please describe.
- If you have not applied anything, but intended to do so, what were/are the barriers that have prevented your implementation? Please explain.

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Evolving Measures – Example

Measurement Science Conference – NIST Seminars

- What did you apply? Impact?
 - ...achieved A2LA accreditation....
 - ...revising our quality manual...
 - ...helped locate some problem areas in the lab.
 - ...used to throw away glass thermometers ...
 - ...Make my assessment more presentable to my leadership....
 - ...New control charts are easier to understand and record data on....
- Barriers that prevented implementation?
 - #1 response: TIME
 - ...don't allow sufficient time....
 - Identified large steps we have to make [for accreditation] before we begin...

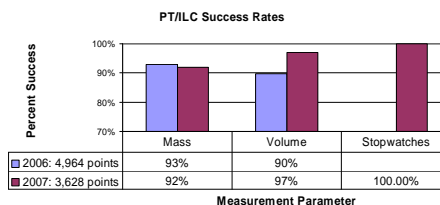
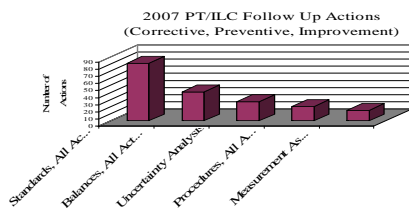
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Evolving Measures – Example

State Laboratory Program – NIST Seminars

- Follow up to determine Impact of student application (Level 4)
 - Assessment of interlaboratory comparison results over time
 - Reporting Improvement Actions
 - Targeted needs for improvement
 - Demonstrate improved measurement results
 - Correlation with training?
 - NIST: Publish procedures, **focused training**,
 - Laboratory: improvement action initiative; what gets measured gets done

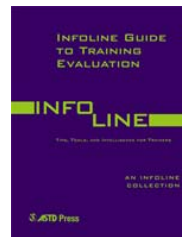
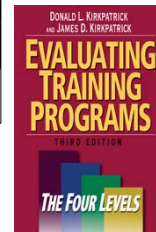
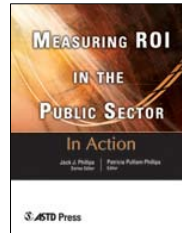


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References for Measuring Training Results

- Measuring ROI in the Public Sector, In Action
 - Jack J. Phillips, Patricia Pulliam Phillips
- Evaluating Training Programs, 3rd Edition, The Four Levels
 - Donald L. Kirkpatrick and James D. Kirkpatrick
- Infoline Guide to Training Evaluation
 - ASTD Infoline Collection
- All available from the American Society for Training & Development



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Conclusions

- Using standardized methods for course evaluations helps us evolve from tracking Output to tracking Outcome, thus measuring impact to the measurement system
- A coordinated effort at tracking training efforts can provide opportunity to share impact (and identify opportunities for internal improvements)
- Focus on Outcomes allows us to assess course objectives and focus on participant application and Impact
- Still need to find creative ways to measure Return on Investments

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