SEMA Course Overview

May, 2007
SEMA Education & Training

Measurement Courses

- Implementing Goal-Driven Measurement
- Managing Projects with Measurement
- Measuring for Performance-Driven Improvement - I
- Measuring for Performance-Driven Improvement – II (development)
Implementing Goal-Driven Measurement (IGDM)
SEMA Courses in Context of Measurement

Goal

Success criteria

Strategy to accomplish goal

Success indicators

Imp. Goal-Driven Meas.

Meas. for Perform. Driven Improvements

Analysis indicators

Tasks to accomplish goal

Managing Projects with Measurement

Progress indicators

For project manager

Roll-up for higher management

Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>80%</td>
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<tr>
<td>Task 2</td>
<td>60%</td>
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<tr>
<td>Task 3</td>
<td>40%</td>
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<tr>
<td>Task n</td>
<td>20%</td>
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Implementing Goal-Driven Measurement

**Purpose**

Identify and define indicators to support an organization’s business goals.

Learn how to determine *success, progress, and analysis* indicators that connect an organization’s high-level business goals to the data collected.

Connect to the Measurement and Analysis process area of Capability Maturity Model® Integration (CMMI®)

“*Indicators*” are charts and tables of measures that tell a story.
Implementing Goal-Driven Measurement Workshop

GOAL(s) => Questions => Indicators => Measures

**Goals**
Business => Sub-Goals => Measurement

**Questions**
What do I want to know or learn?

**Indicators**
SLOC     Staff-hours     Trouble Reports

**Definition Checklist**

**Infrastructure Assessment**

**Indicator Template**
Goal Questions
Perspective
Input/Measures
Algorithm
Assumptions
Interpretation
### Completed Indicator Templates are the output of GQ(I)M work.

#### Indicator Template

Document the why, what, who, when, where, and how

<table>
<thead>
<tr>
<th>Measurement Goal #</th>
<th>Objective</th>
<th>Questions</th>
<th>Visual Display</th>
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</thead>
<tbody>
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</table>

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Input(s)</th>
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<tbody>
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<td>Form(s)</td>
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<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Assumptions</th>
<th>Interpretation</th>
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<td>X-reference</td>
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<tr>
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<td>Probing Questions</td>
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<tr>
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<td></td>
<td>Evolution</td>
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</tbody>
</table>

- Templates are the output of GQ(I)M work.
Managing Projects with Metrics Course
Managing Project With Metrics

Purpose

Teach managers and practitioners how to use measurement as a foundation for informed decision-making.

Teach participants how to use measures and indicators to plan, track, and control projects.

First half: participants learn to use measures and indicators to monitor performance, support decisions, and manage supplier agreements.

Second half: measures and indicators are analyzed to diagnose problems and identify solutions during project execution.
Managing SW Project With Metrics

Key Components

Identify key areas of concern and uses of measurement for project management

Define indicators based upon what a project manager would want to know

Analyze indicators to obtain insight on the project

Developing a project dashboard

Demonstrate how to use measurement to support decision making

Understand data vulnerabilities and their impact on analysis and decision making
Project Management

Project Managers responsibilities

Produce a project that is

- on time
- within budget
- of acceptable quality
- does what it supposed to do
- customer likes it

Requirements

Resources

Constraints

Plan

Execute

Control

Ref: PMBOK

Indicators

Visibility, Insight, Indications
Managing Project With Metrics

Potential Audience

Project managers and staffers in program offices

individuals supporting managers of software-intensive systems development, maintenance, and acquisition
Managing Project With Metrics

Delivery Mode

• lectures and class exercises,

Length

• three days

Take-aways

• class notebook filled with helpful checklists, templates, and reference materials
Measuring for Performance-Driven Improvement - I (MPDI-I) Course
Measuring for Performance-Driven Improvement - I

**Purpose**

Statistical methods and creative problem solving methods are applied to process problems.

Emphasize how best to apply statistical tools and which tools work.

Course *does not* require statistics background.

Course exercises make use of a commercial statistical package and example data from real problems.

Participants learn a framework—in the form of tools, methods, and practices—for analyzing data to make more informed business decisions.
Measuring for Performance-Driven Improvement - I

DMAIC Roadmap

**Define**
- Define project scope
- Establish formal project

**Measure**
- Identify needed data
- Obtain data set
- Evaluate data quality
- Summarize & baseline data

**Analyze**
- Explore data
- Characterize process & problem
- Update improvement project scope & scale

**Improve**
- Identify possible solutions
- Select solution
- Implement (pilot as needed)
- Evaluate

**Control**
- Define control method
- Implement
- Document

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Basic Statistical Prediction Models

- ANOVA & MANOVA
- Correlation & Regression
- Chi-Square & Logit
- Logistic Regression
Measuring for Performance-Driven Improvement – I

Potential Audience

Professionals who need reliable quantitative information to guide acquiring, supporting, planning, or tracking software

Software engineering process group members

Process improvement working group members

Software measurement team members

Six Sigma black belts, green belts, or belt candidates

People who are willing to learn and need knowledge of statistics for analysis purposes
Measuring for Performance-Driven Improvement – I

Delivery Characteristics

Delivery Mode

- lectures and class exercises with hands-on use of job aids and a statistical package
- series of 1-day follow-on workshops on each of the DMAIC phases

Length

- five days

Take-aways

- class notebook filled with helpful checklists, templates, and reference materials; Toolkit of analysis methods including a decision job aid on when to use each statistical test or method, hands on experience using a statistics package
Measuring for Performance-Driven Improvement - II (MPDI-II) Course
Measuring for Performance-Driven Improvement – II

Purpose

Hands-on, problem-solving approach to using advanced data analysis in direct support of product and process development, with themes taken directly from the Design-For-Six-Sigma (DFSS) methodology

Emphasis is on the “what”, “when” and “why” of advanced statistical analysis tools and techniques

Class does presuppose statistical knowledge and statistical tool expertise gained from the Measuring for Performance-Driven Improvement – I class

Participants learn methods specific to satisfying customer and user needs via efficient development processes and optimal product designs
Measuring for Performance-Driven Improvement - II
DMADV Roadmap

- **Define**
  - Define project scope
  - Establish CCRs, CTQs, Design Goals
  - Establish formal project
  - Phase Exit Review

- **Measure**
  - CTQ Flowdown: ID Potential Design Drivers
  - Gather and Qualify Data
  - Specify performance bounds
  - Summarize & baseline data

- **Analyze**
  - Explore data; Model Design Dynamics
  - Focus on Significant Design Drivers
  - Innovate Design Alternatives
  - Select Best: Architecture Design Feature Set

- **Design**
  - Match Design and Implementation Plans
  - Reduce Design and Integration Risk
  - Deliver Features Using Closed Loop Control

- **Verify**
  - Verify System Performance-Demonstrate CTQs
  - Deliver New Design
  - (ongoing) Monitor and Learn via User Experience

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Basic Statistical Prediction Models

- **Continuous X Continuous**
  - ANOVA
  - Correlation
- **Continuous X Discrete**
  - ANOVA & MANOVA
- **Discrete X Continuous**
  - Correlation & Regression
- **Discrete X Discrete**
  - Chi-Square & Logit
  - Logistic Regression

MPDI-II
Measuring for Performance-Driven Improvement – II

Key Components

Six Sigma Define-Measure-Analyze-Design-Verify (DMADV) methodology for new product development

A single, hybrid case study used to demonstrate various advanced methods

Analytical methods

- Additional CMMI Process Performance Modeling statistical methods including: Chi-Square, Logit, Logistic Regression, and Dummy Variable Regression
- Monte Carlo simulation for modeling business cases and schedule uncertainty
- Discrete Event process modeling and simulation
- Voice of Customer techniques such as KJ and Kano analysis, and Quality Function Deployment
- Prioritization methods including the Analytic Hierarchy Process (AHP)
- Design of Experiments for optimal process and product design solutions
Measuring for Performance-Driven Improvement – II

Potential Audience

Professionals who need reliable quantitative information to guide acquiring, supporting, planning, or tracking software

Software, Hardware and Systems Engineers driving radical improvement

Engineering process group members

Measurement team members

Six Sigma Black belts, Green belts, or Belt candidates

Individuals implementing CMMI High Maturity practices

*People who have basic education and training in statistics and a statistical package*
Measuring for Performance-Driven Improvement – II

Logistics

Delivery Mode

Lectures and class exercises with hands-on use of job aids and tools such as: a statistical package, a process modeling and simulation tool, an add-on to MS Excel for Monte Carlo simulation, an MS Excel tool for Analytic Hierarchy Process, and a reliability growth modeling tool

Length

Five days

Take-aways

Class notebook filled with helpful checklists, templates, and reference materials; Toolkit of analysis methods including a decision job aid on when to use each statistical test or method
Types of Customer Engagements
Typical Customer Engagements

- **Public Offering**
  - Attend course at SEI

- **Tailored On-site Workshop**
  - Tailor course material
  - Present tailored course at customers location
  - Follow-up support

- **Consulting**
  - Consulting
  - Need for measurement related training
  - Attend public offering at SEI
  - Tailored workshop at customer’s site
  - Follow-up support
Customer Engagements - Workshops

Tailored Workshop

Pre-workshop Activities

Tailor Workshop

Travel

Conduct Workshop

Travel

Post workshop support

GQ(I)M material split into Multi Workshops

Pre-workshop Activities

Tailor Workshop material into multi workshops

Travel

Conduct Workshop

Travel

Tailor next Workshop

Post workshop support

Multi Workshops

New Material

Pre-workshop Activities

Tailor Workshop material

Travel

Conduct Workshop

Travel

Post workshop support

Develop New Workshop

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