Applying Goal-Driven Measurement to CMMI® Implementation

Jennifer Simmons – Integrated System Diagnostics, Inc.
Presentation Outline

" Overview and potential issues in implementing the Measurement & Analysis (M&A) Process Area
" Overview and purpose of the Goal-Driven Measurement method
" Synergies between the M&A and the Goal-Driven Measurement method
" Applying the Goal-Driven Measurement Method to the CMMI practices
" Additional benefits of applying the method
" Goal-Driven Measurement method guidance
" Questions
Measurement and Analysis (M&A)

“Develop and sustain a measurement capability that is used to support management information needs.

“Supports all other Process Areas by:

- Providing practices that guide the project’s and organization’s measurement needs and objectives.

**Capability:** Quality of being capable; ability; capacity

*Macmillan Dictionary*
M&A Specific Goal 1

Measurement objectives and activities are aligned with identified information needs and objectives.

" SP1.1 – Establish and maintain measurement objectives that are derived from identified information needs and objectives.
" SP1.2 – Specify measures to address the measurement objectives.
" SP1.3 – Specify how measurement data will be obtained and stored.
" SP1.4 – Specify how measurement data will be analyzed and reported.

These practices address the need for an organization to plan for the organizations measurement & analysis activities!
M&A Specific Goal 2

Measurement results that address identified information needs and objectives are provided.

" SP2.1 – Obtain specified measurement data.
" SP2.2 – Analyze and interpret measurement data.
" SP2.3 – Manage and store measurement data, measurement specifications, and analysis results.
" SP2.4 – Report results of measurement and analysis activities to all relevant stakeholders.

These practices ensure that the measurements are captured, communicated and used!
M&A Generic Goal 2

Institutionalize a Managed M&A Process

Generic Practices:

- Establish an organizational policy (Commitment)
- Plan the process (Ability)
- Provide resources (Ability)
- Assign responsibility (Ability)
- Train people (Ability)
- Manage configuration (Directing Implementation)
- Identify & involve stakeholders (Directing Implementation)
- Monitor & control the process (Directing Implementation)
- Objectively evaluate adherence (Verification)
- Review status with higher-level management (Verification)
Measurement Program Success Rate

Source: Pitts, David, “Metrics, Problem Solved?”, Crosstalk, December 1997
Source: Howard A. Rubins, Rubin systems Inc.
Potential Issues Implementing M&A

"Agreeing on and applying a consistent measurement & analysis approach.

"Identifying information needs and objectives.

"Identifying and specifying correct measures.

"Communicating the measures to the intended users.

"Developing processes and methods to define, collect and analyze the measures.

"Integrating the measurement and analysis activities into the processes used by the organization.

"Institutionalizing the measurement and analysis activities.
The Goal-Driven Measurement Method

A methodology that helps an organization identify and define measures that support the organization’s business objectives and information needs.

Produces measures that provide insight into the management issues that are most important.

Develops measures that are traceable back to the business objectives and information needs.

When using goal-driven measurement, the primary question is not: “What measures should I use?” but...

“What do I want to know or learn?”
Underlying Concept #1

Measurement goals are derived from business goals

Business Goals

What do I want to achieve?

To do this, I will need to...

What do I want to know?

Subgoals
Underlying Concept #2
An evolving mental model provides context
Underlying Concept #3

GQ(I)M translates informal goals into executable measurement structures

GQ(I)M = Goal-Question-Indicator-Measure

Measurement Goals

Questions

Indicators

Measures

G1

Q1

I1

M1

G2

Q2

I2

M1

G3

Q3

I3

M1

I4

M1
These Concepts...

.....lead to a process model for selecting measures
Goal-Driven Measurement Method Steps

Step 1: Identify your business goals

Step 2: Identify what you want to know or learn

Step 3: Identify your subgoals

Step 4: Identify the entities and attributes

Step 5: Formalize your measurement goals

Step 6: Identify your measurement questions & indicators

Step 7: Identify the data elements

Step 8: Define and document measures and indicators

Step 9: Identify the actions needed to implement your measures

Step 10: Prepare a plan

Verification and action plans

Data Elements
- Size
- Defects

Avail Source
- QA
- CM
- ?
- 0
- +
- -
- Etc.

Indicator Template
- Goal ID:
- Objective Question
- Inputs
- Algorithm
- Assumptions

Planning Tasks
<table>
<thead>
<tr>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
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Method and M&A Process Synergies

" Measures are based on business objectives and information needs.

" Measures are integrated with the work processes used by the project and the organization.

" Traceability between information needs and objectives and measures.

" Planning for measurement and analysis.

" Procedures for measurement collection, analysis and reporting.

" Communication and use of measurement data.
SP1.1-1 – Establish and maintain measurement objectives that are derived from identified information needs and objectives.

- Identify sources for measurement objectives.
- Document information needs and objectives.
- Prioritize information needs and objectives.
- Document, review and update measurement objectives.
- Maintain traceability of the measurement objectives to the information needs and objectives.
Applying the Method to M&A – 2 of 4

SP1.2-1 – Specify measures to address the measurement objectives. Measurement objectives are refined into precise quantifiable measures.

Indicators help you identify measures!

Step 6: Identify your measurement questions & indicators

Step 7: Identify the data elements

Data Elements
- Size
- Defects

Avail Source
- QA
- CM
- ?
- Etc.
- +
- 0
- -

Step 8: Define and document measures and indicators

Indicator Template
- Goal ID:
- Objective
- Question

Inputs
- Algorithm
- Assumptions
Applying the Method to M&A – 3 of 4

**SP1.3-1** – Specify how measurement data will be obtained and stored.
- Identify sources of data.
- Identify measures that are needed but not available.
- Specify how to collect and store the data.
- Create data collection and mechanisms.

**SP1.4-1** – Specify how measurement data will be analyzed and reported.
- Select and prioritize the analyses of the data.
- Select appropriate data analysis methods and tools.
- Specify procedures for analyzing the data.
**Applying the Method to M&A – 4 of 4**

**GP 2.2 Plan the Process** – Establish and maintain the plan for performing the measurement and analysis process.

**GP 2.5 Train People** – Train the people performing or supporting the measurement and analysis process as needed.

Examples of training include:
- Data collection, analysis and reporting processes.
- Development of goal-related measurements.

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**Step 9: Identify the actions needed to implement your measures**

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**Step 10: Prepare a plan**

Verification and action plans

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Implementing Goal-Driven Measurement!!
Additional Method Value

” Structured, defined approach for implementing a formal measurement program in an organization.

” Helps define processes and associated measures based on, and traceable to, business needs and objectives.

” Measurement collection and definition checklists.

” Indicator templates.
# Indicator Templates

<table>
<thead>
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![Graph showing planned vs. actual trouble reports over weeks](image)

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<td>When/How Often</td>
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<td>By Whom</td>
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<td>By/To Whom</td>
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<td>How Often</td>
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CMMI Technology Conference – November 14th, 2002  
Applying Goal Driven Measurement to CMMI Implementation - 21
Avoids Potential Measurement Problems

- Collecting metrics that are irrelevant
- People don’t know how to use the data
- People don’t know what to collect
- Not getting people involved
- Getting valid data
- Redundant measures that are not quite the same
- Implementation / collection tools
- Lack of management involvement
- Fear of evaluation
- Tendency to collect too much data
- Usefulness of measures not accepted
- Lack of implementation
- No consensus on application of measures
- Measures not validated or calibrated
Goal-Driven Software Measurement – A Guidebook
Handbook CMU/SEI-96-HB-002

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- Offered by ISD and SEI

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