



Applying Goal-Driven Measurement to CMMI[®] Implementation

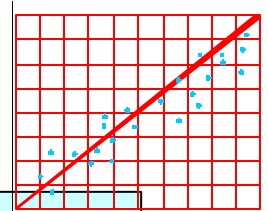
Jennifer Simmons – Integrated System Diagnostics, Inc.

Presentation Outline

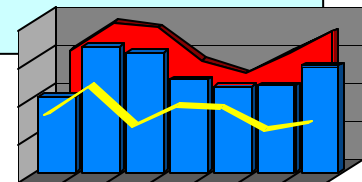
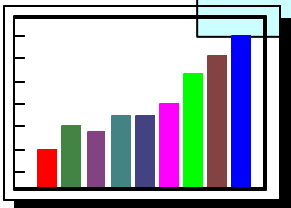
- “ Overview and potential issues in implementing the Measurement & Analysis (M&A) Process Area
- “ Overview and purpose of the Goal-Driven Measurement method
- “ Synergies between the M&A and the Goal-Driven Measurement method
- “ Applying the Goal-Driven Measurement Method to the CMMI practices
- “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

Measurement and Analysis (M&A)

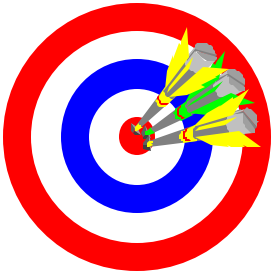
- “ Develop and sustain a *measurement capability* that is used to support management information needs.
- “ Supports all other Process Areas by:
 - Providing practices that guide the project’s and organization’s measurement needs and objectives.



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



M&A Specific Goal 1

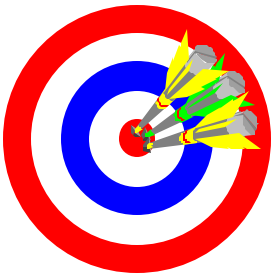


Measurement objectives and activities are aligned with identified information needs and objectives.

- ” **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

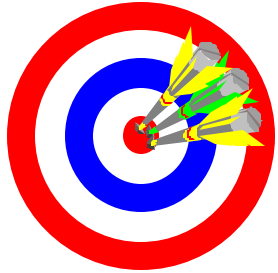


Measurement results that address identified information needs and objectives are provided.

- ” **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



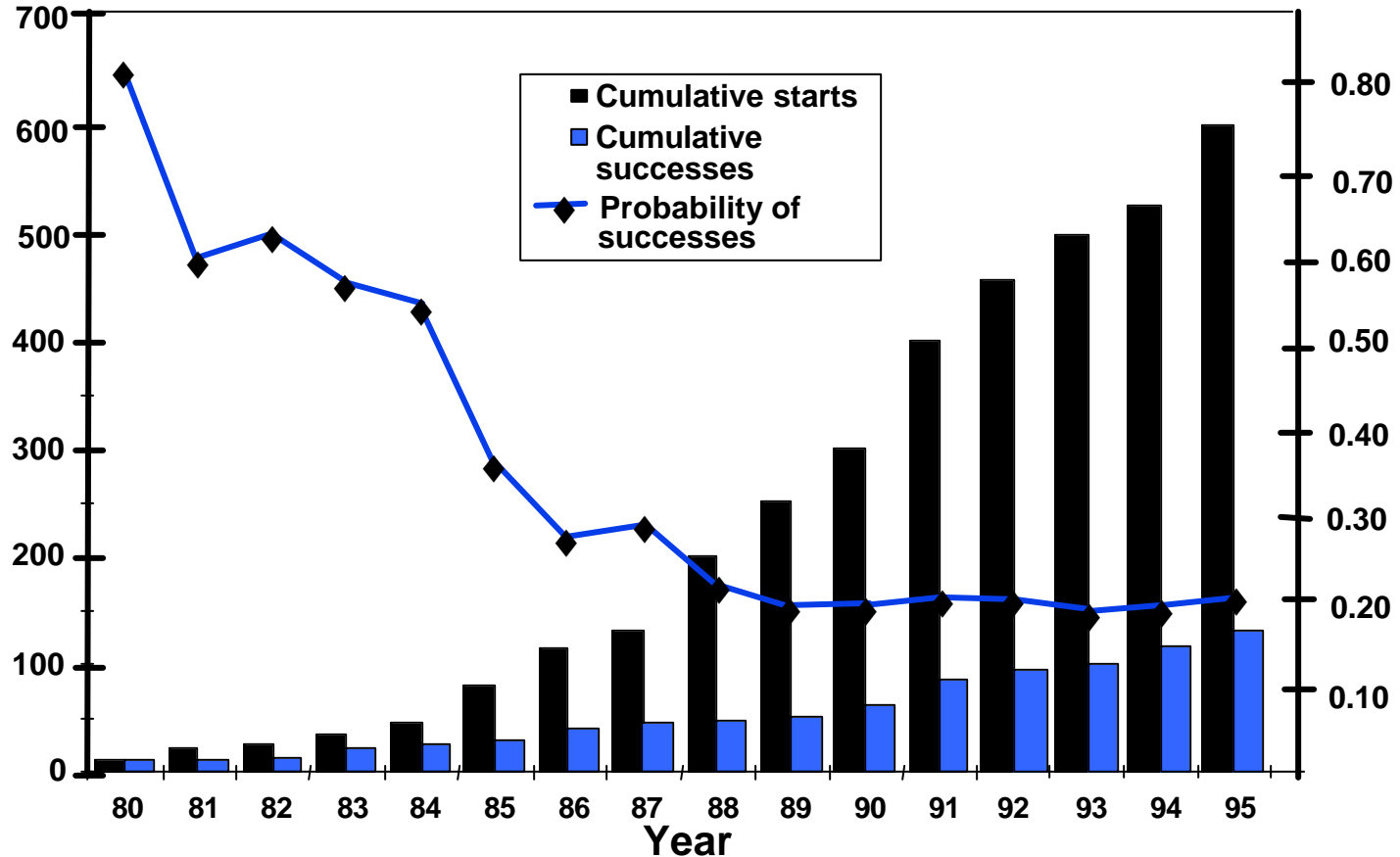
Institutionalize a **Managed** M&A Process

Generic Practices:

- GP 2.1** Establish an organizational policy (Commitment)
- GP 2.2** Plan the process (Ability)
- GP 2.3** Provide resources (Ability)
- GP 2.4** Assign responsibility (Ability)
- GP 2.5** Train people (Ability)
- GP 2.6** Manage configuration (Directing Implementation)
- GP 2.7** Identify & involve stakeholders (Directing Implementation)
- GP 2.8** Monitor & control the process (Directing Implementation)
- GP 2.9** Objectively evaluate adherence (Verification)
- GP 2.10** Review status with higher-level management (Verification)

Measurement Program Success Rate

No. of companies



Source: Rubin, Howard, "Debunking Metric Myths," *American Programmer*, February, 1993

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?”

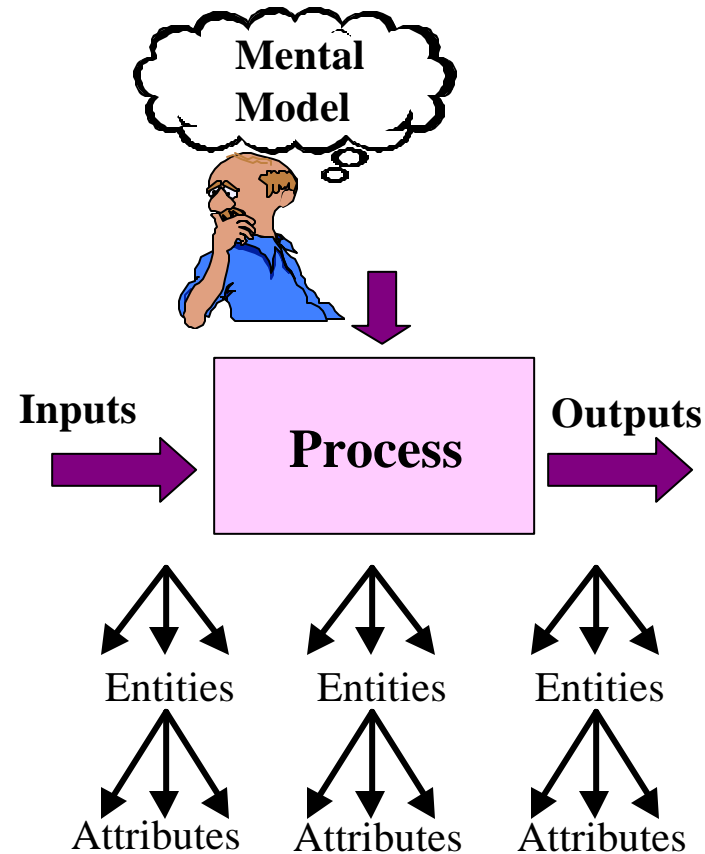
Underlying Concept #1

Measurement goals are derived from business goals



Underlying Concept #2

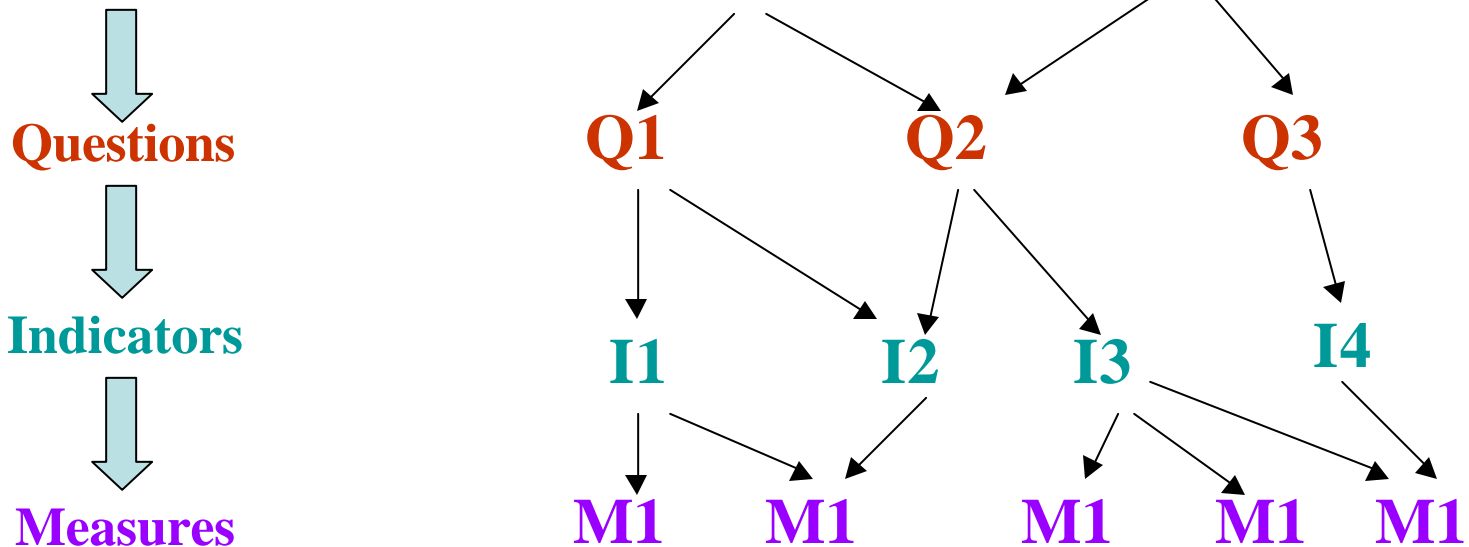
An evolving mental model provides context



Underlying Concept #3

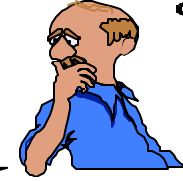
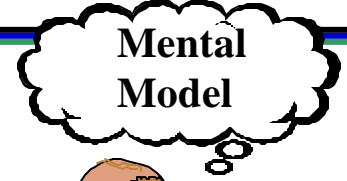
GQ(I)M translates informal goals into executable measurement structures

Measurement Goals

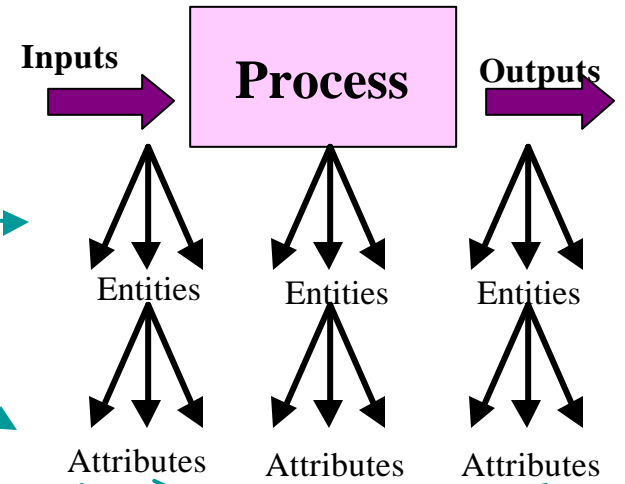
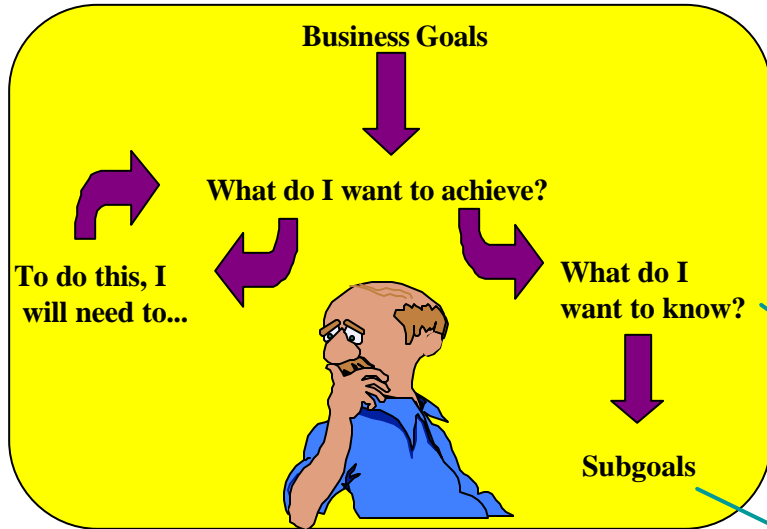


GQ(I)M = Goal-Question-Indicator-Measure

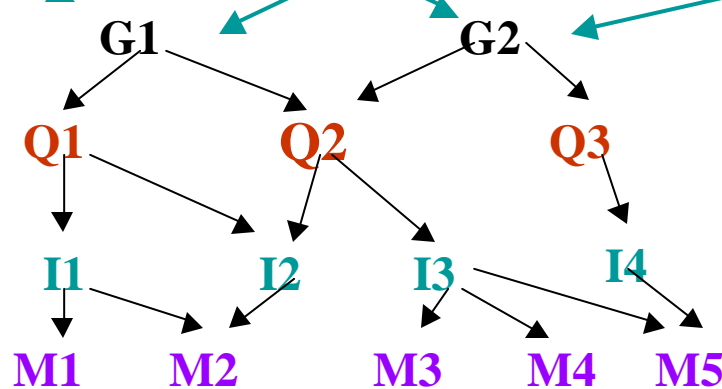
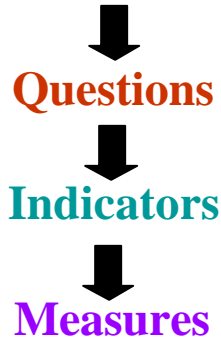
These Concepts...



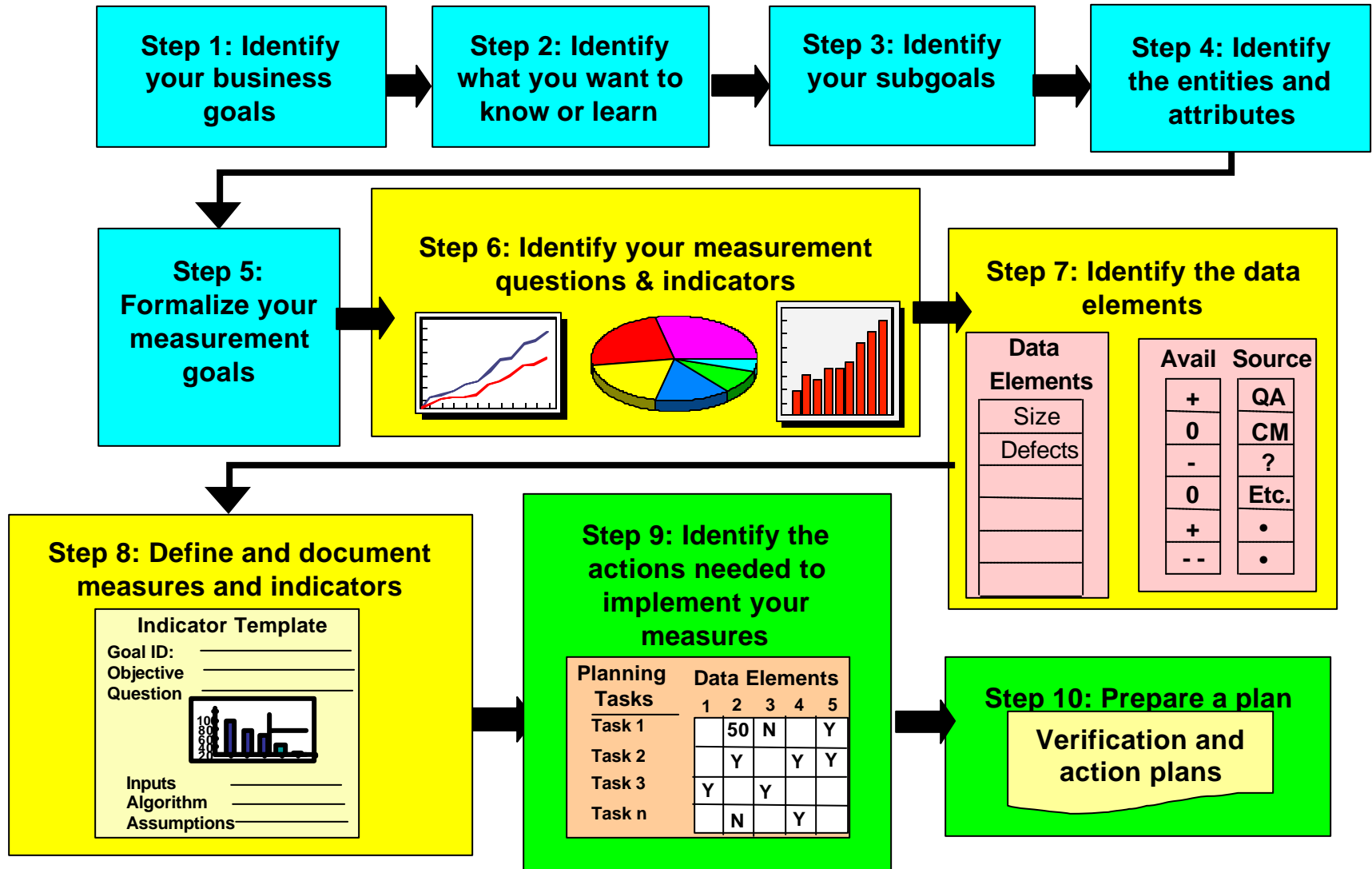
....lead to a process model for selecting measures



Measurement Goals



Goal-Driven Measurement Method Steps



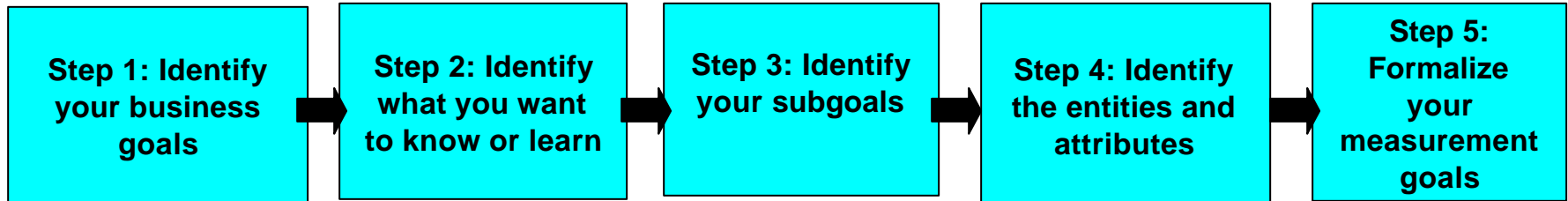
Method and M&A Process Synergies

- “ 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.

Applying the Method to M&A – 1 of 4

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

Indicators help you identify measures!

SP1.2-1 – Specify measures to address the measurement objectives.

Measurement objectives are refined into precise quantifiable measures.

Step 6: Identify your measurement questions & indicators




Step 7: Identify the data elements

Data Elements		Avail	Source
Size	Defects	+	QA
		0	CM
		-	?
		0	Etc.
		+	•
		--	•

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.

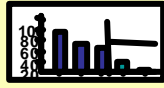
SP1.4-1 – Specify how measurement data will be analyzed and reported.

- Select and prioritize the analyses of the data.
- Select appropriate data analysis methods and tools.
- Specify procedures for analyzing the data.

Step 7: Identify the data elements

Data Elements		Avail	Source
Size		+	QA
Defects		0	CM
		-	?
		0	Etc.
		+	•
		--	•

Step 8: Define and document measures and indicators

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

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.



Step 9: Identify the actions needed to implement your measures

Planning Tasks	Data Elements				
	1	2	3	4	5
Task 1		50	N		Y
Task 2		Y		Y	Y
Task 3	Y		Y		
Task n		N		Y	



Step 10: Prepare a plan

Verification and action plans



**Implementing
Goal-Driven
Measurement!!**

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

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.

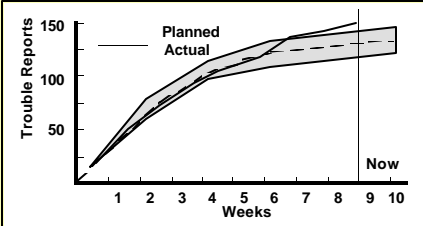
Indicator Templates

Indicator Name/Title _____ **Date** _____

Objective _____

Questions _____

Visual Display



Input(s)

Data Elements _____

Definitions _____

Data Collection

How _____

When/How Often _____

By Whom _____

Form(s) _____

Data Reporting

Responsibility for Reporting _____

By/To Whom _____

How Often _____

Algorithm _____

Assumptions _____

Interpretation _____

Probing Questions _____

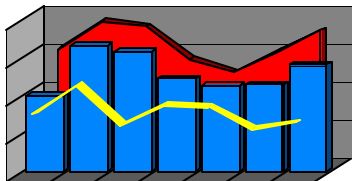
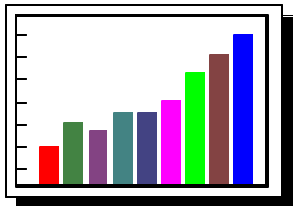
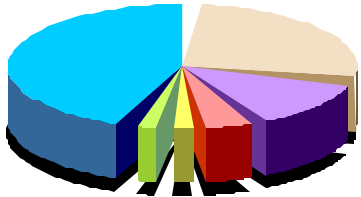
Analysis _____

Evolution _____

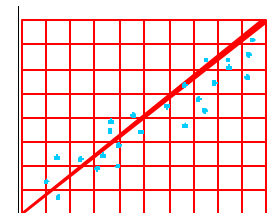
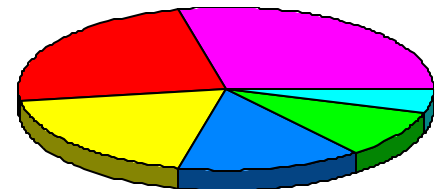
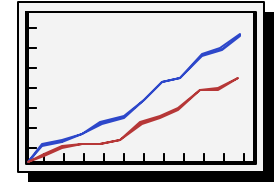
Feedback Guidelines _____

X-reference _____

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

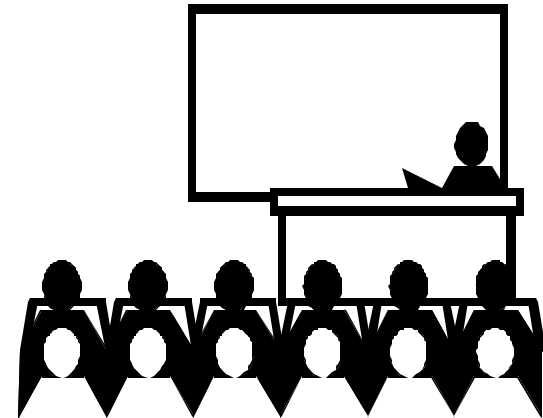


Method Guidance

- “ Goal-Driven Software Measurement – A Guidebook
Handbook CMU/SEI-96-HB-002

- “ Public and On-Site Training
 - Offered by ISD and SEI

- “ ISD Public Offerings:
 - Feb 4-6 2003, Huntsville, Alabama
 - May 6-8 2003, St Louis, Missouri
 - Dec 9-11 2003, Tampa, FL



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