Goals Workshop Introduction

January 26, 2022

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

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DM22-0077

Why We Are Here

Two thirds of software measurement programs fail within the first **12-18** months.

Failure is primarily due to organizational reasons, not technical reasons.

Programs fail because :

???

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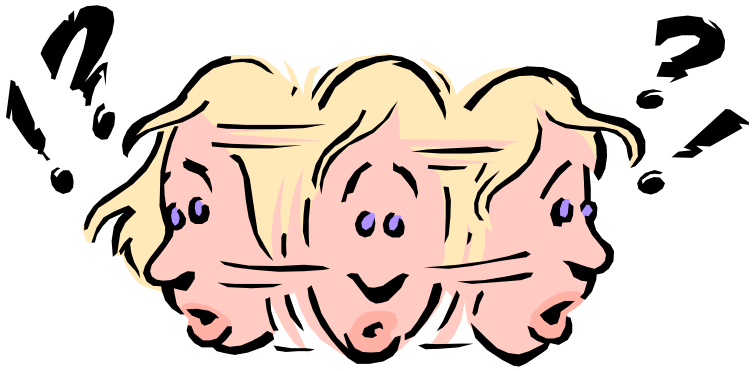
What are some problems getting measurement into practice?

Lack of management involvement

I don't believe the data

Lack of implementation



Target of measurement not well-defined

No consensus on application of measures

Wrong/difficult representations

Measures not validated or calibrated

Tendency to collect too much data

Fear of evaluation

Research programs not a good model for practitioners

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Problems *Using* Measurements

Invalid, incomplete, or incorrect data

- People make up the data.
- Data comes from different sources and is not calibrated.
- A “data call” virtually always has this result.

Wrong indicator

- “We already have defect data.”
- “I have to calculate it from two different charts.”
- The representation of the data confuses people.

Unclear goals or indicators

- The measure is not the goal. Is “more” better or worse?

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Goal-Driven Measurement

When using goal-driven measurement, the primary question is not:

"What indicators or measures should I use?"

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Goal-Driven Measurement

When using goal-driven measurement, the primary question is not:

"What indicators or measures should I use?"

rather, it is:

"What do I want to know or learn?"

Goal-driven measurement **is not based on a predefined set** of indicators or measures.

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Module Objective

Provide an overview of the goal-driven measurement methodology and workshop.

At the end of the module, you will

- Know some of the difficult points in a measurement program
- Have a mental **roadmap** how of the GQIM overcomes the barriers.
- Be able to use the tools GQIM provides

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Agenda

Workshop Objectives

Goal Driven Measurement Overview

Workshop Activities

- **Session 0: Introduction 45 min**
- Session 1 : Set Goals and SubGoals Workshop
- Session 2 : Success Criteria Workshop
- Session 3 : Goal Indicators Workshop
- Session 4 : Measurement Engineering Workshop
  - Wrap Up, Debrief, and Next Steps

  We request continuity and active participation from the workshop participants

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GQIM Workshop Objectives

To identify the information needs.

To define at least 4 key success indicators that apply to the management and risk reduction. Some examples might include one from each of the following areas:

- Cost/Schedule
- Safety/Reliability
- Quality
- Software Assurance/Security

The following meetings implement these indicators and define others.

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Overview of GQIM

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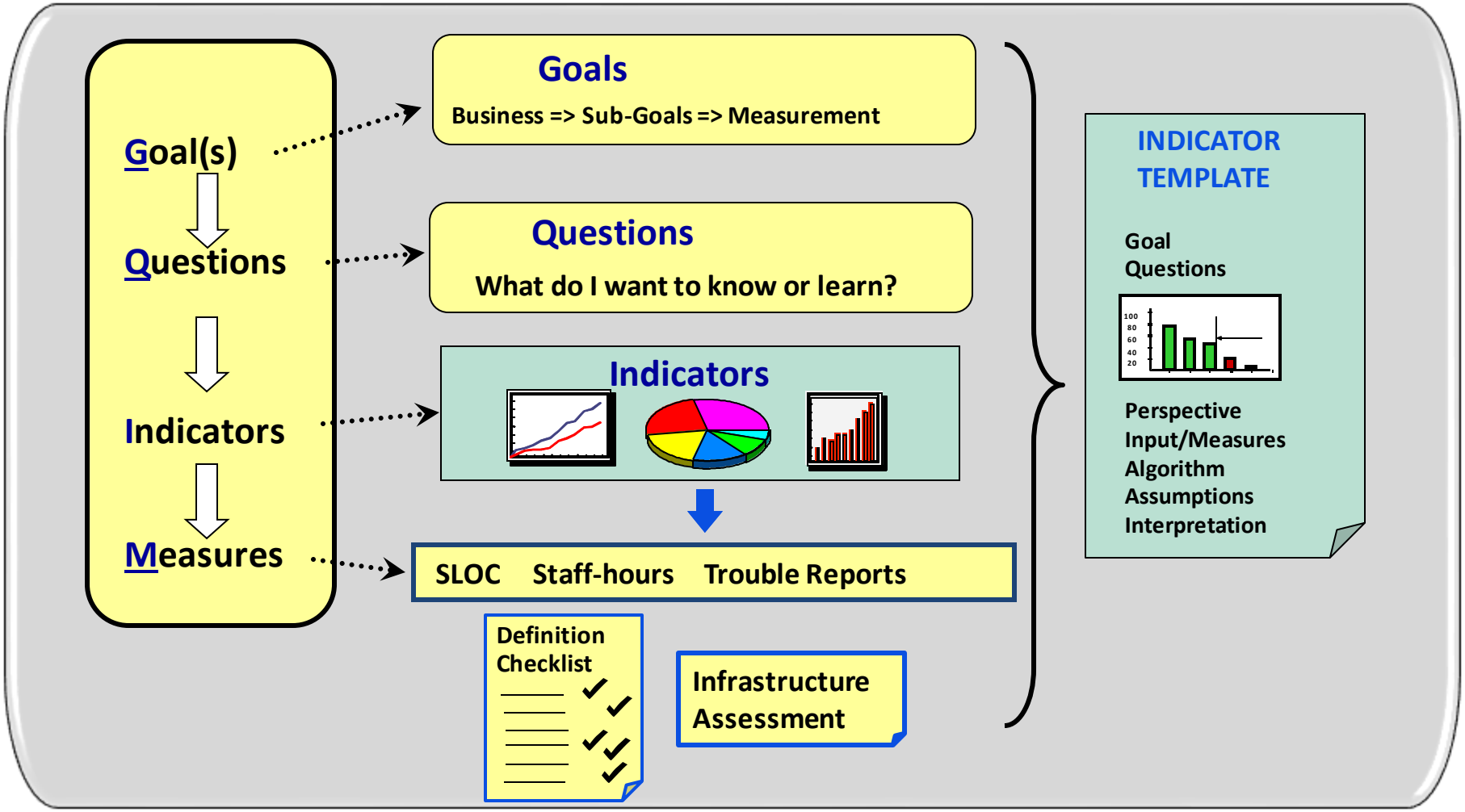
Goal-Driven Measurement Workshop



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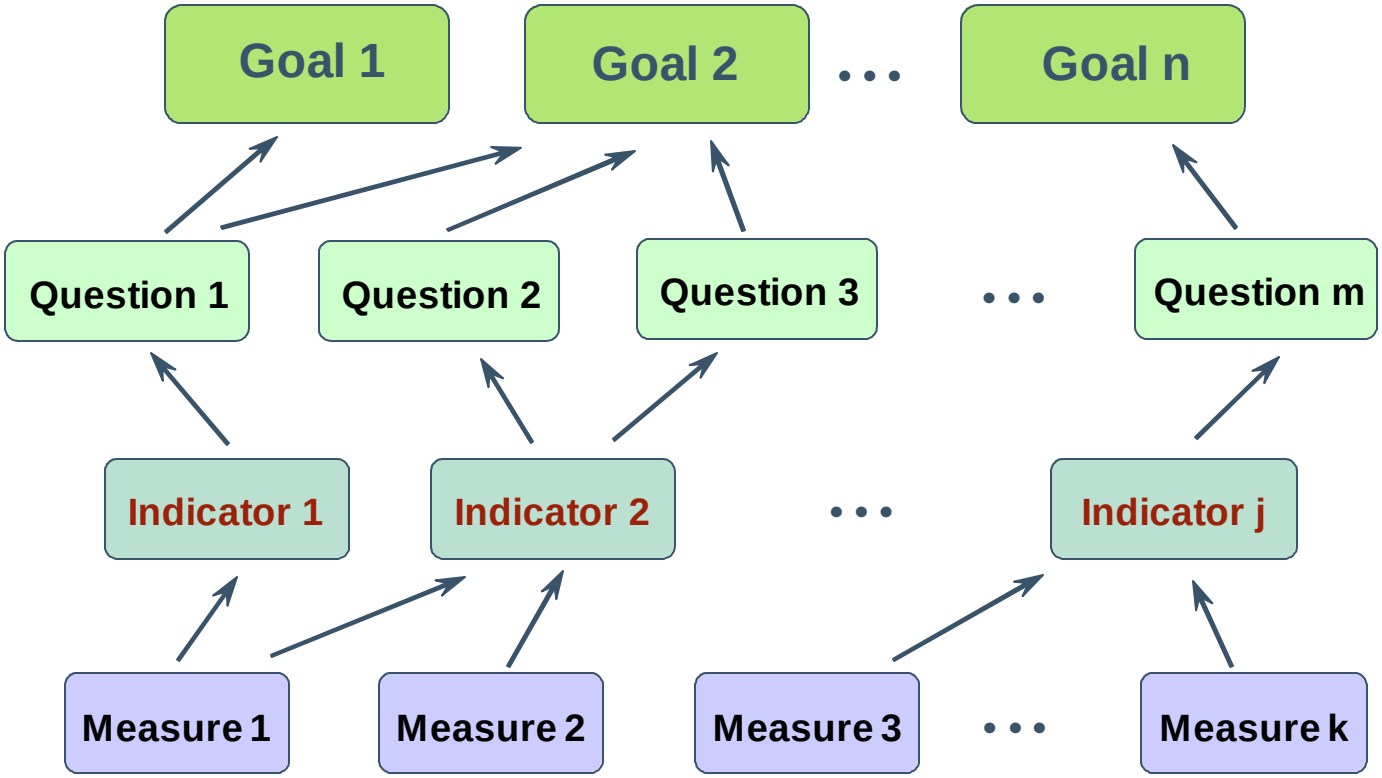
GQ(I)M Puts Each Measure in the Context of Addressing Goal-Related Questions



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GQIM Workshop Steps are Designed for Success

Step 1: Goals
Identify the goals

Step 2: Refinement
Question: Ask what you need to know?

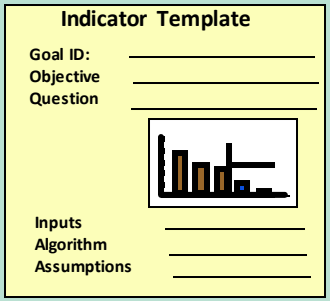
Step 3: Decomposition
State more specific sub-goals

Session 1

Session 3

Step 6: Indicators
Postulate measurement indicators that would illustrate progress towards the goal.

Indicator Template



Session 2

Step 4: Operationalize
Operationalize with entities and attributes

Step 5: Success Criteria
Clearly articulate the criteria you will use to decide if the goal has been met.

Session 4

Step 7: Strategies & Activities

Step 8: Identify the data elements

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

Step 9: Identify the actions needed to implement the 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 the plan
Measurement Plan (CDRL)

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Step 1 Elicit Business Goals

Business Goals	Examples
Very general statements	Improve the quality of delivered products.

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Step 2 Clarify Business Goals

Business Goals

Very general statements

Ask Clarifying Questions

Restate Goals

Restate goals based on answers to clarifying questions

Examples

Improve the quality of delivered products.

- Precision: What is the definition of quality?
- Attributes: What quality aspects needs improvement?
- Etc.

Show a measurable improvement in the quality of completed products within one year.

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Clarification Questions

Business Goal: Improve the quality of delivered products.

What would you like **to know** about the goal?

What is the motivation?
Do you know what the goal really means?
What decisions will you need to make?
What is the time frame?
How much is enough?

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Common Metric Program Goals

Goal	Motivation for Choosing the Goal
1) Improve the development process	
2) Improve software estimation	
3) Improve project tracking	
4) Minimize schedule	
5) Minimize development cost	
6) Improve software quality	
7) Improve software performance	
8) Improve productivity	

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Common Metric Program Goals

Goal	Motivation for Choosing the Goal
1) Improve the development process	•Establish conformance to standards •Raise the maturity level •Increase staff efficiency
2) Improve software estimation	•Accurate project proposals •Avoid cost overruns •Maximize requirements stability •Minimize risks
3) Improve project tracking	•Predict need for corrective action •Ensure conformance to standards
4) Minimize schedule	•Deliver products on schedule •Increase throughput of new products or features
5) Minimize development cost	•Deliver within budget •Maximize profit
6) Improve software quality	•Meet product requirements •Reduce delivered defects •Reduce time spent on rework
7) Improve software performance	•Meet performance goals •Minimize hardware performance requirements
8) Improve productivity	Reduce or stabilize staffing levels

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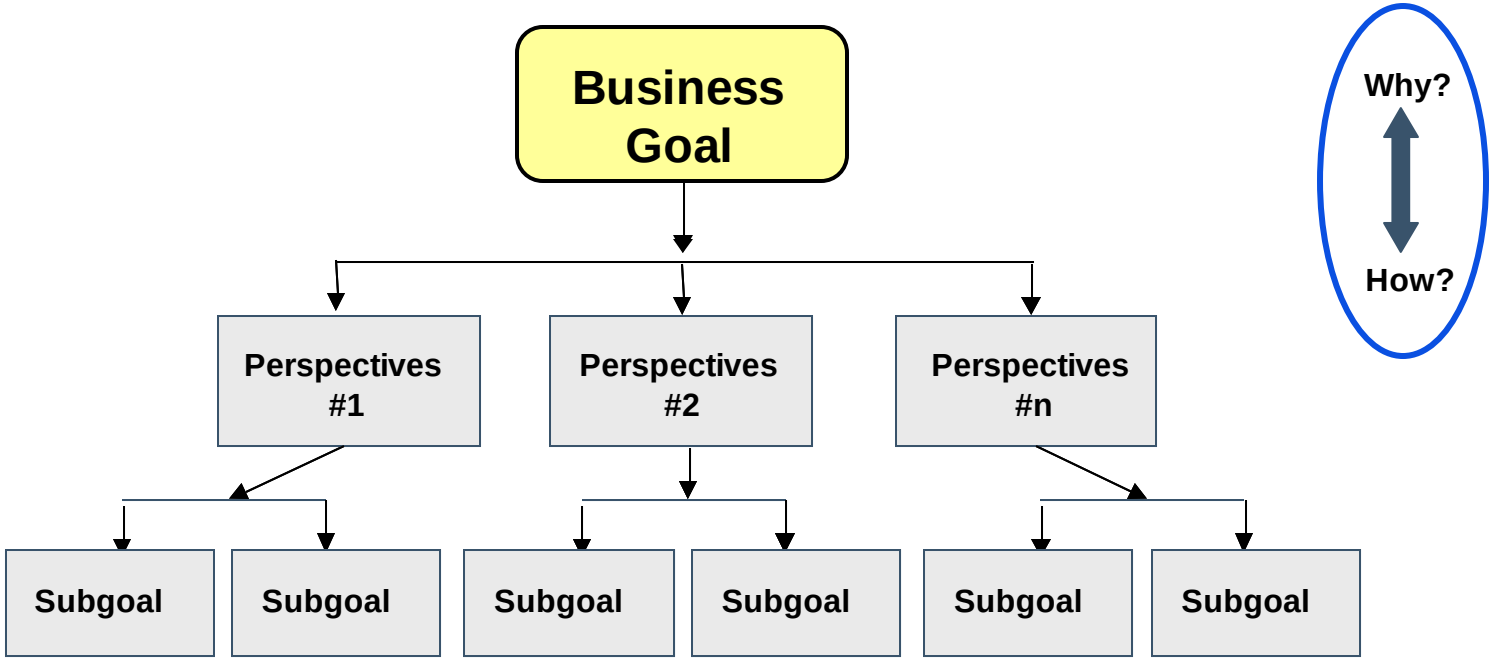
Step 3 Further Subdividing the Goal

Now that we have a business goal, what do we do with it?

- Indicators address the questions about the goals



From each perspective, what can be done to support the business goal?
How does each process step contribute to the business goal?

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Step 3: Examples

What does Quality mean to a

- Developer
- Requirements engineer
- CEO
- User
- Tester
- Regulator

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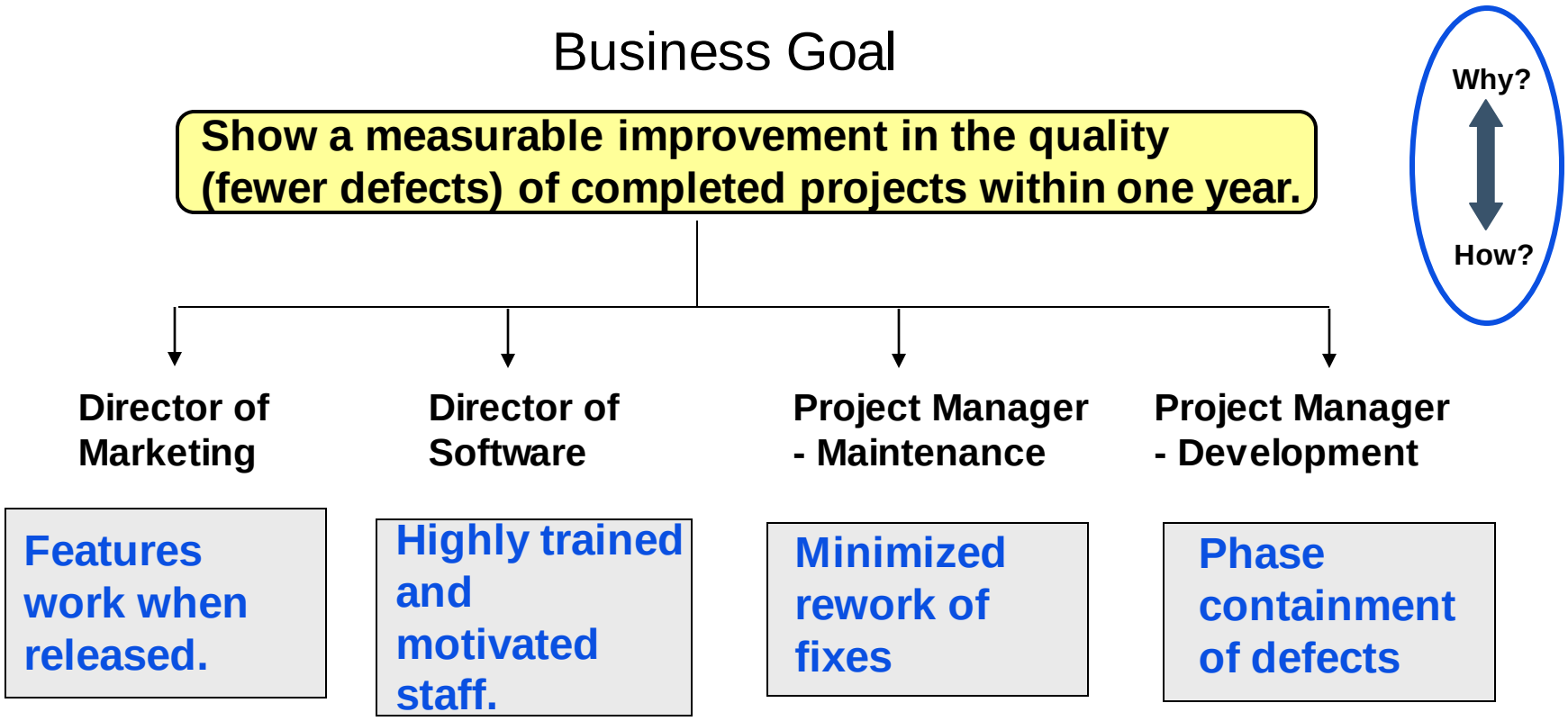
Goals to Subgoals Example



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Worksheet for Exercise 1

Business Goal: **Use 1 of the five goals and use your functional leader's perspective.**

Perspective: _____

Subgoal 1 _____

_____

Subgoal 2 _____

_____

Subgoal 3 _____

_____

Subgoal 4 _____

_____

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Your Measurement Handbook

1. Business Goals

   Show a measurable improvement in the quality (fewer defects) of completed projects within one year.

2. Subgoals by Perspectives

   Director of Marketing
   Subgoals:

   Director of Software
   Subgoals:

   Project Manager - Maintenance
   Subgoals:

   Project Manager - Development
   Subgoals:

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Step 4 Operationalize Goals

Components of an Operationalized Goal

Dimension	Definition
Object of study (item of interest)	What will be analyzed.
Purpose	Why the object will be analyzed.
Quality focus	The property/attribute of the object that will be analyzed.
Viewpoint or Perspective	Who uses the data collected. Who is interested in the results.
Context	In which environment. Under what constraints

Ref.: Solingen & Berghou

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Purpose of Measurement

Measurement can be used to:

- understand
- predict
- plan
- control
- compare
- assess

- improve
- characterize
- monitor
- evaluate
- control and change

some productivity or quality aspect of the object of interest.

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Quality Focus

The particular attribute of the object of study that will be characterized, evaluated, etc.

Examples of properties or attributes that can be analyzed

- cost
- size
- reliability
- test coverage
- responsiveness
- correctness
- peer review effectiveness
- process compliance
- time-to-market
- quality
- customer satisfaction
- defect removal

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Viewpoint or Perspective

Why is this important?

The goal of ***improving productivity*** may take on entirely different meanings, depending on who you are and where you sit:

To a software engineer:	increase the SLOC produced per staff hour
To a manager:	meet a given project schedule
To the corporation:	increase revenues or returns on investment (Where do I invest my working capital?)

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Exercise 2 Operationalize Goal Statements

1. Break up into your assigned teams.

2. For two of your goals or subgoals:

   Express your goals in a structured statement that identifies the object, purpose, quality focus, and perspective, environment and constraints. Use the following worksheets.

Worksheet for Operationalized Goals

Goal or Subgoal: _____

Object of Interest

Purpose

Quality Focus & Perspective

Environment & Constraints

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Template (Worksheet)

Goal or Subgoal: _____

Object of interest: _____

Purpose:

_____ *the* _____ *in order to* _____ *it.*

Quality Focus & Perspective:

Examine the _____

from the point of view of (the) _____.

Environment & Constraints:

_____, _____, _____, _____,

_____, _____, _____, _____

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Example Operationalized Goal – 1

Object of interest:

The peer review process at plant XYZ.

Purpose:

Evaluate the static analysis process in order to identify opportunities for improving its effectiveness.

Quality Focus & Perspective:

Examine the controllable factors, costs, and results from the point of view of a process improvement team.

Environment & Constraints:

New development. Military avionics. 8000 people in plant. 2000 software developers. Customer is the DoD.

Constraints: Examine projects completing unit testing January 1, 2020 - June 30, 2022. Exclude reused modules.

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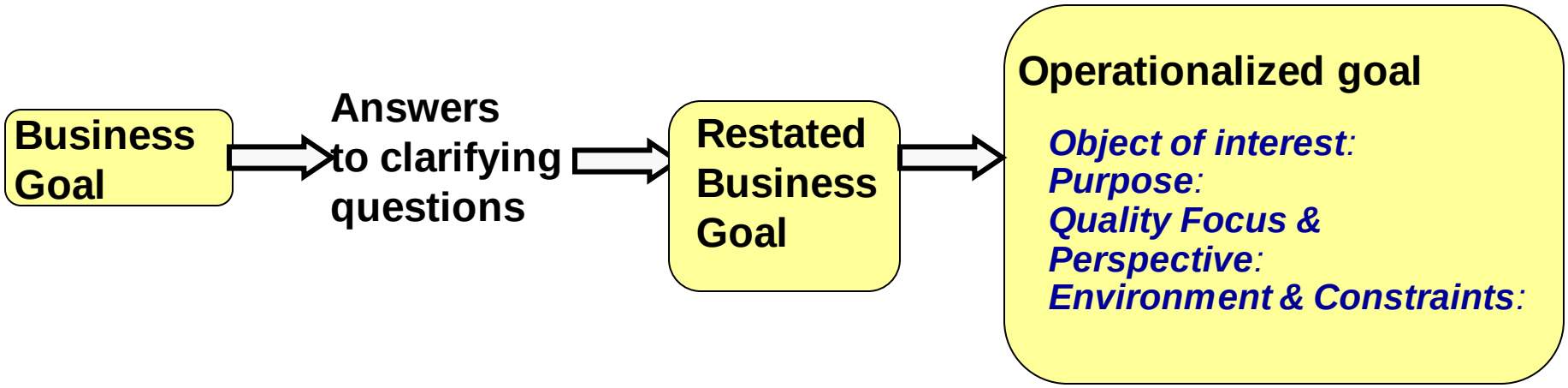
What we have so far



What we need to find out:

- How do you define success?
- How do you know if the goal has been achieved?
- What are the measurable attributes of success?

Success Criteria

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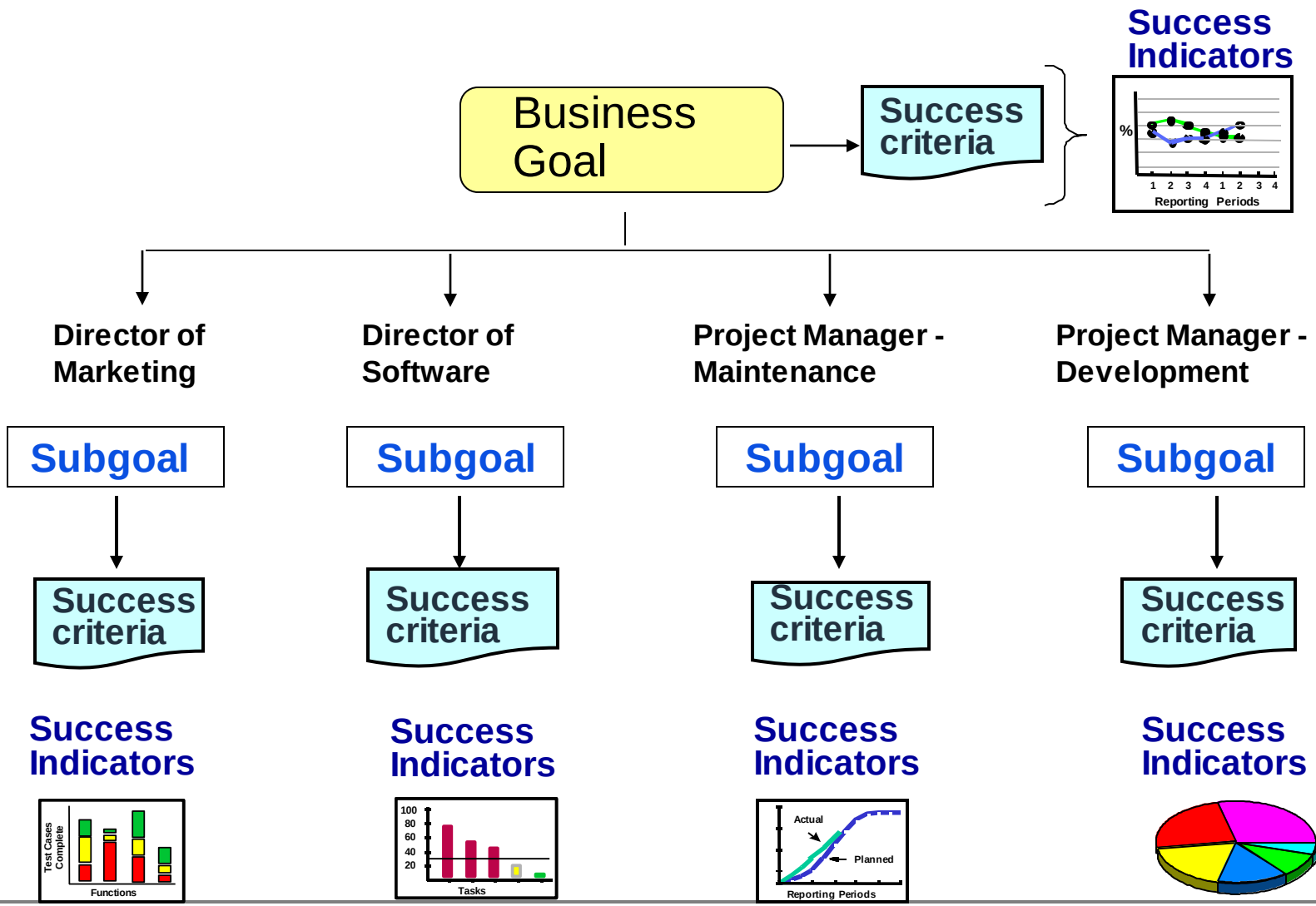
Step 5 Success Criteria at Multiple Levels



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Deriving Success Criteria

President's definition of quality:

Does what it supposed to do => no errors in intended functions

Doesn't do what it shouldn't => no non-intended functions

The people who use it, like it => user acceptance

Customer's definition of quality:

Defect-free products => no defects in delivered products

All requirements implemented

Time Frame: Measurable improvement within one year.

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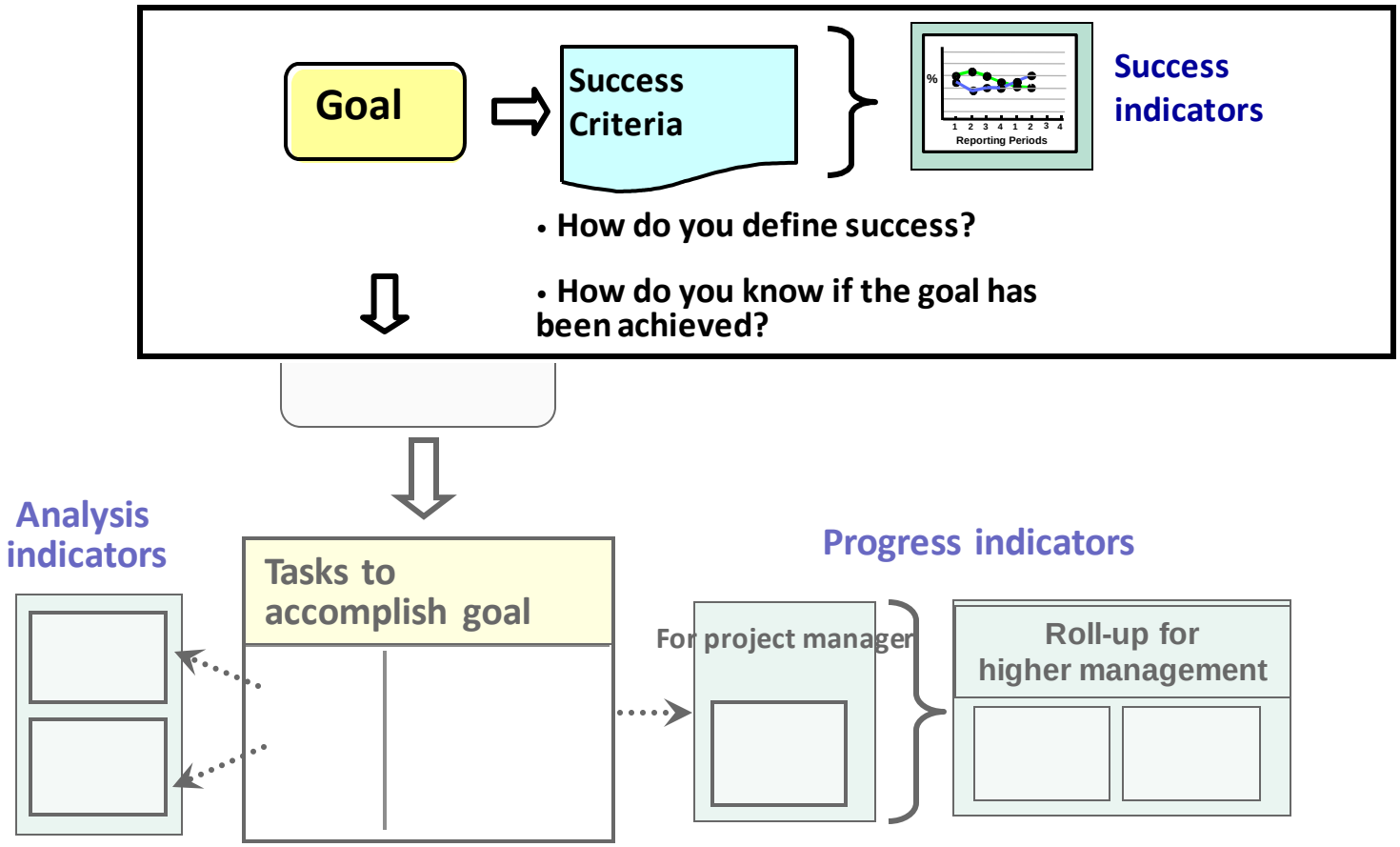
Step 6 Visualize Success Criteria => Hypothesize **Indicators**



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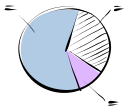
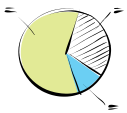
What Are Indicators?

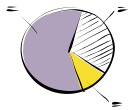
An indicator is usually a graph or table that you define for your organization or project needs.



An indicator is a representation of a measure or group of measures that provides information about a project issue.



Indicators frequently make comparisons between two values, such as planned and actual values.



An indicator is a measure or combination of measures that provides insight into the software process, a project, or the product itself.

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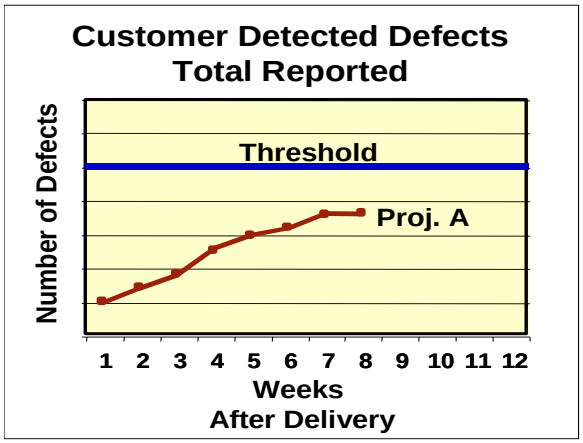
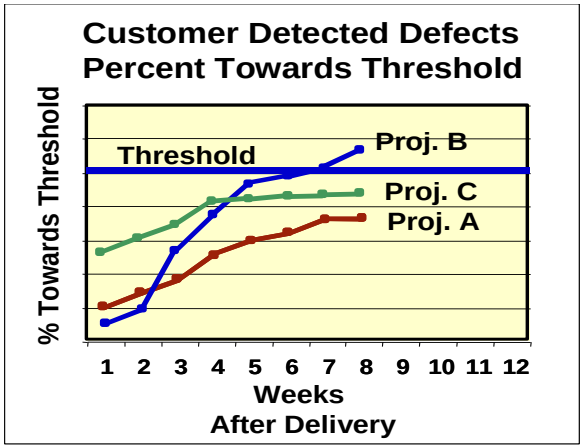
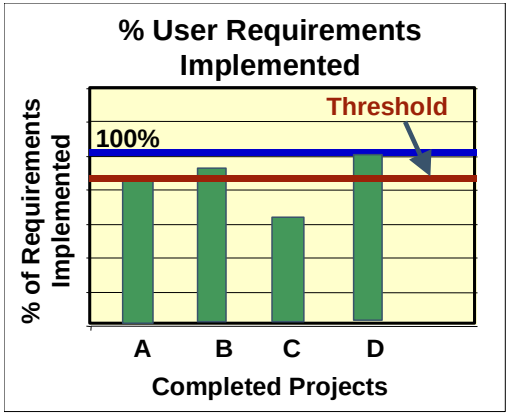
Sample Success Indicators (from case study)

Related to Defects

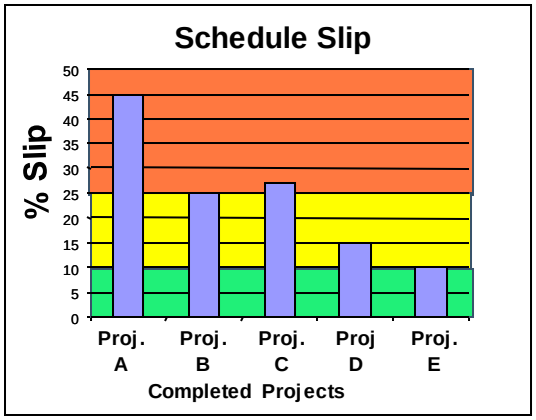




Related to Requirements



Related to Schedule



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Indicator - Challenges and a Solution

Many of the potential benefits that an organization can derive from a sound measurement program are often not achieved due to inconsistent construction and interpretation of indicators derived from measurement data.

The indicator template is a

- tool an organization can use to direct its data collection and measurement and analysis processes
- comprehensive template that provides guidance for the development and precise description of an indicator

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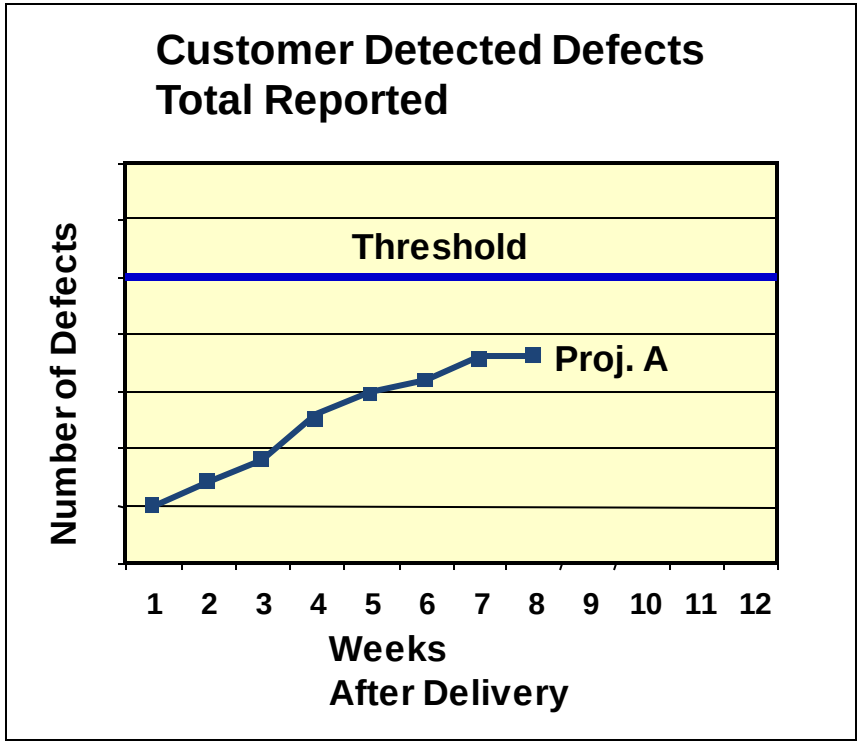
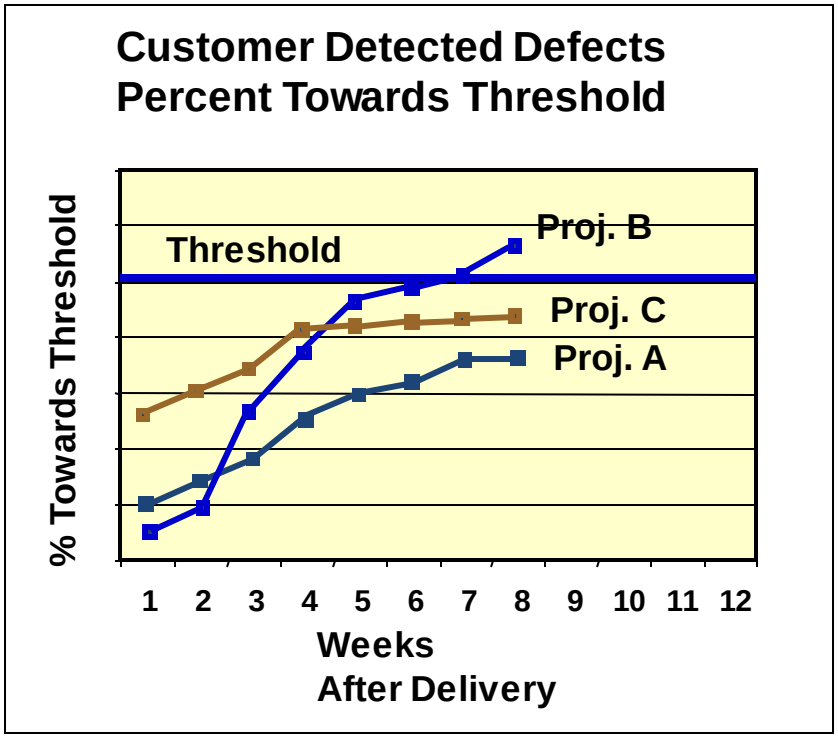
Customer Discovered Defects

Success Criteria: Less than "X" number of total customer-reported defects 90 days after initial delivery.





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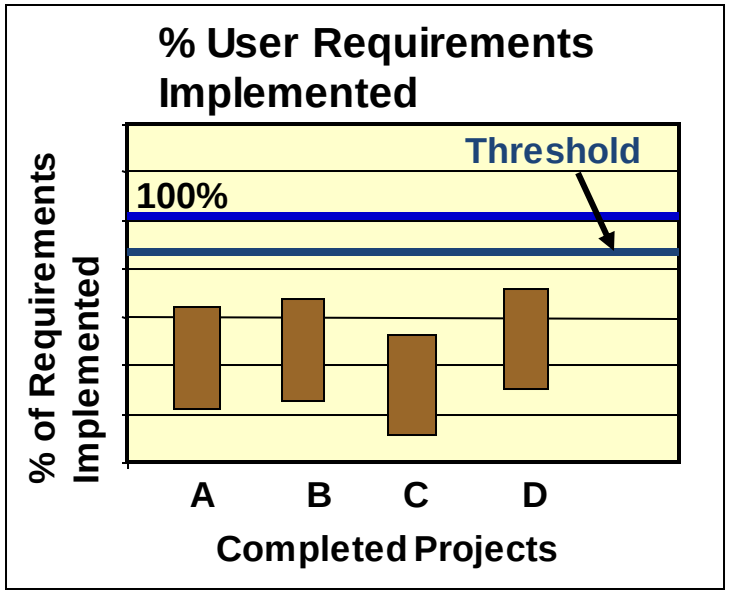
User Requirements Implemented

Success Criteria: Customer satisfaction

- "Y" % of customers' requirements were implemented in the final product.



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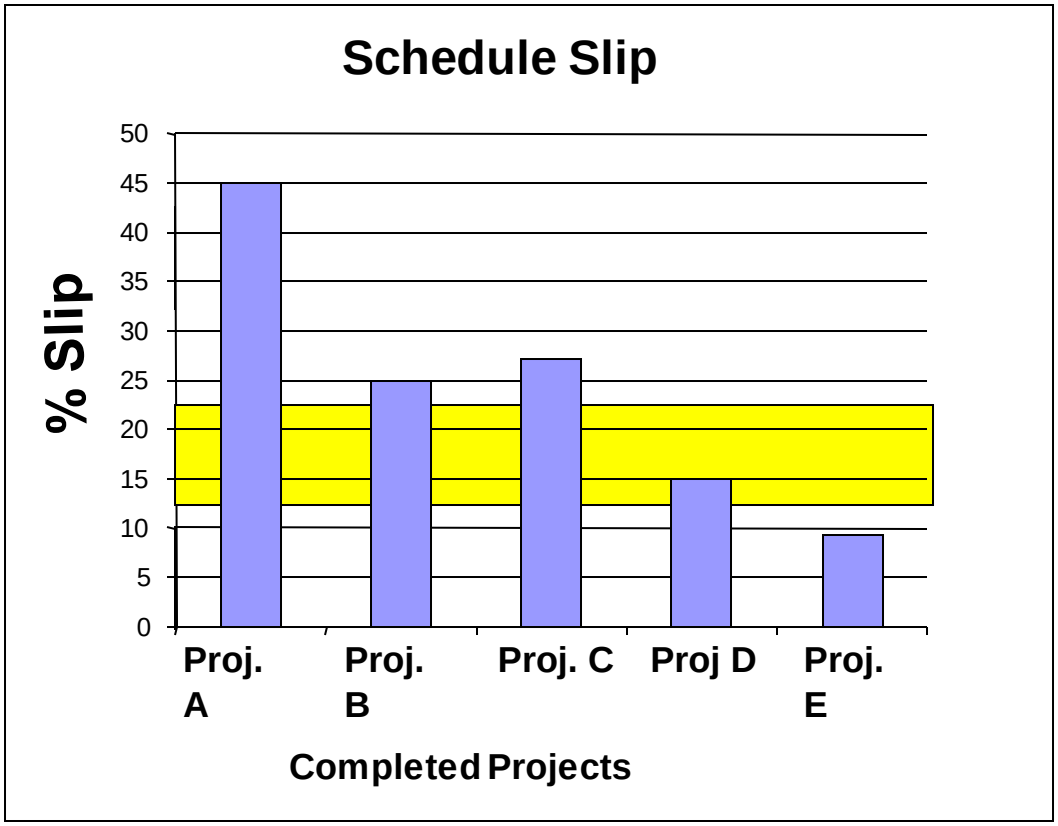
Schedule Slip Rate

Success Criteria: Customer satisfaction

- schedule slip rate less than M%
- thresholds for yellow and red



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Exercise 3 Success Criteria and Indicators

1. Break up into your assigned teams

2. For one of your operationalized goals:

   Develop success criteria by addressing the following questions
   - How do you define success?
   - How do you know if the goal has been achieved?
   - What are the measurable attributes of success?

3. Sketch some displays that will help you address your success criteria and communicate the results of analyses to others.

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Ex3 Worksheet – Success Criteria & Indicators

Operationalized Goal Statement

Object of interest

Purpose

Perspective & Quality Focus

Environment and Constraints

Success Criteria:

1. _____
2. _____
3. _____
4. _____
5. _____

Indicators: Sketch of indicators (charts, tables, etc.) that will address your success criteria.

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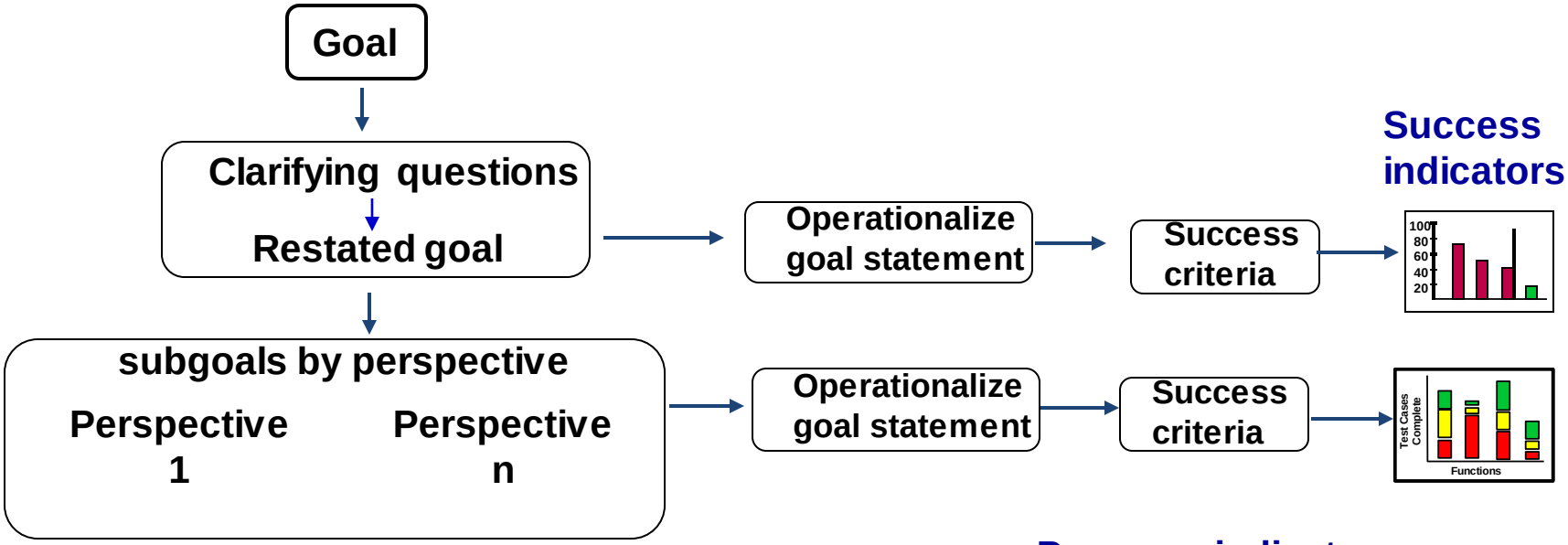
Step 7 Strategy and Activity Priorities

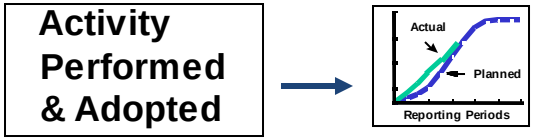
What are your strategies, priorities, activities? Prioritize!



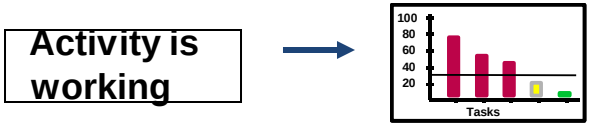
Strategies & Activities

- Determine strategy & activities
- Assess impact of strategy
- Prioritize strategy

Progress indicators



Analysis indicators



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Step 7A: Output Strategies and Activities

Step 7A

Input

Subgoal: Requirements are fully defined and accepted.

- **Brainstorm strategies and activities**
- **Assess impact of strategy**
- **Prioritize strategies**

Output (prioritized strategies)

1. **Improve documentation of requirements**
   - **Activity:** Ensure completeness, clarity, correctness, etc. of document
   - **Activity:** Ensure documented requirements contain no "TBDs"
2. **Improve processing and managing of requirements**
3. **Improve training**
4. **Improve requirements solicitation**

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Ex4 Strategies and Activities

1. Break up into your assigned teams.
2. Select one of your subgoals.
3. Develop some strategies that will address your subgoal.
4. Assess the impact of your strategies.
5. Prioritize your strategies.
6. Postulate some activities/tasks for your strategies.

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Ex4 Worksheet

Viewpoint (Who are you?)

Subgoal: _____

- Strategy 1: _____ (in priority order)

  Impact of Strategy: _____

  Activities: _____

  _____

- Strategy 2: _____

  Impact of Strategy: _____

  Activities: _____

  _____

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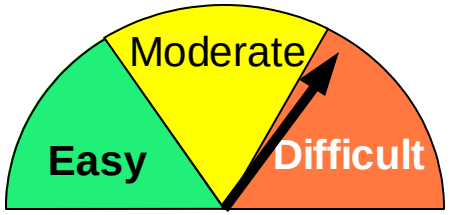
Analysis Indicators
Example Requirements Review

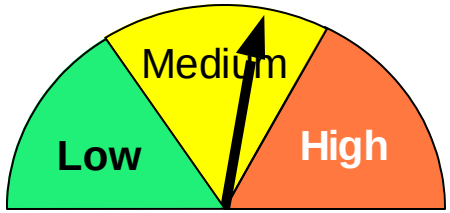
Activity 1: **ensure completeness, clarity, correctness, and so forth of document.**

Use Requirement Evaluation Tool

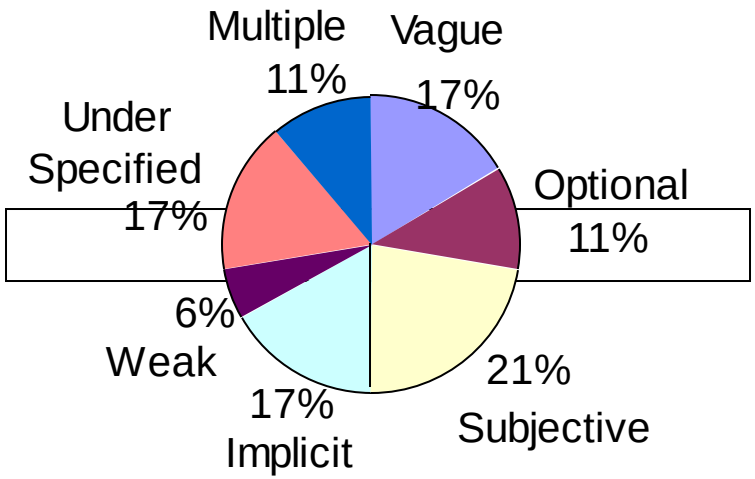
Readability



Defect Density



Requirement Defects



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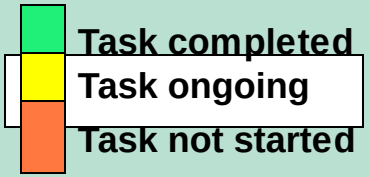
Progress Indicators

Strategy: **Improve documentation of requirements.**

Decision: **Buy and use automated tool**

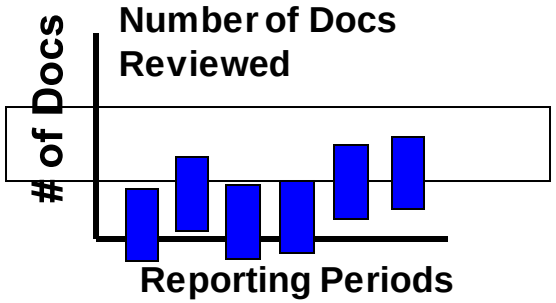
Legend



Activities to implement decision:

- Obtain the document analysis tool
- Training on how to use the tool
- Institutionalize the use of the tool
- Project has evidence that the tool is used

Progress Indicator AFTER Implementation



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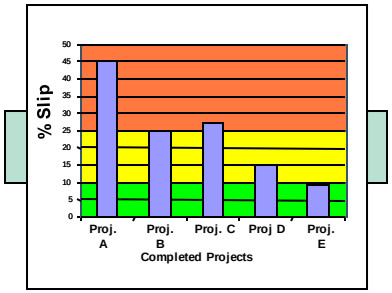
Results Overview

Success indicators

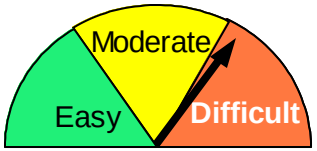
Goal: Improvement in the quality of delivered products.

Success criteria

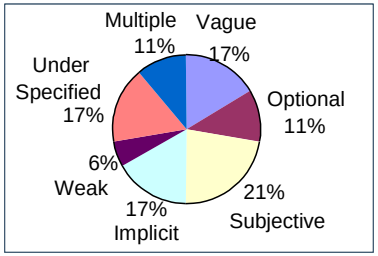


Strategy: Improve documentation of requirements

Analysis indicators



Requirements Defects



Tasks to accomplish goal

Ensure completeness, clarity, correctness, and so forth of document

- Buy analysis tool.
- Train staff.
- Use tool.

Progress indicators

- **Obtain the tool**
- **Train to use tool**
- **Institutionalize**

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Exercise 5 Progress And Analysis Indicators

1. Break up into your assigned teams.
2. Select one of your tasks/activities.
3. Identify quantifiable questions related to this activity that you would like answered.
4. Prepare sketches of displays (analysis indicators) that will help you address your questions and communicate the results of analyses to others.
5. Sketch some displays (progress indicators) that may be used to track “progress” of this activity.
6. Prepare an outbriefing.

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Ex 5 Worksheet

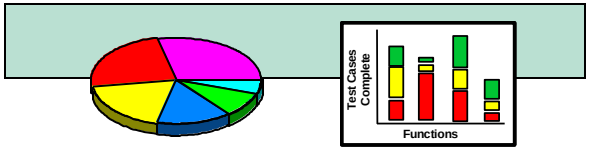
Subgoal: _____

Strategy: _____

Activities: _____

Questions: Things you would like to know about the activity.

Analysis indicators



Progress indicators

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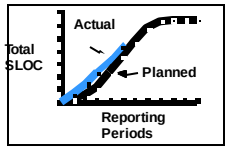
Step 8 Data and Infrastructure Assessment

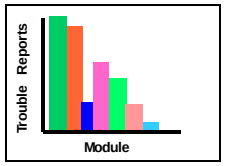
What data supports which indicators?

Where does that data come from?

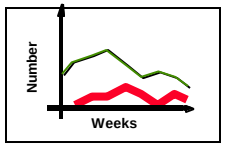
Success



Progress



Analysis



Required Data Elements

- Size
- Effort
- Defects
- .....
- .....
- .....

Definition Checklist

Cross Reference Matrix

Indicators	a	b	c	d	e	Availability	Source
Size	X					+	QA
Effort	X					0	CM
Defects		X	X		X	-	QA
.....		X		X			
.....			X				
.....		X		X	X		

Success

Progress

Analysis

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Example: Precise Definitions

Attribute 2 of Staff-Hour Checklist

Hour Information	Totals include	Totals exclude	Report totals
Regular time			✓
Salaried	✓		
Hourly		✓	
Overtime			✓
Salaried			
Compensated (paid)	✓		
Uncompensated (unpaid)		✓	
Hourly			
Compensated (paid)		✓	
Uncompensated (unpaid)		✓	

Ref: Software Effort & Schedule Measurement: A Framework for Counting Staff-hours and Reporting Schedule Information

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Sources for Data

What software processes are sources for data?

	Planned	Actual
Size	✔	Configuration Management
Effort	✔	Labor Tracking
Quality	✔	Problem Tracking
Schedule	✔	Configuration Management

✔ = estimates from project management

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Availability Codes (Example)

Code	Meaning
+	Available
0 00	Not explicitly available - can be derived from other data - can be obtained via minor effort
-	Not available now
- -	Impossible to obtain or extremely difficult

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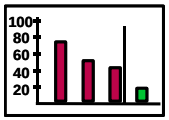
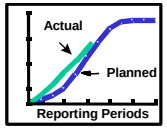
Assess Gaps

What we have so far





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

What we still need

- Develop the analysis process
- Define the collection process
- Define storage and access
- Identify users of the data
- Define data security procedures
- Develop an action item checklist
- Prioritize the work
- Etc.

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Mapping of Data Elements and Indicators

Data Elements Required	Indicator a	b	c	d
Readability defects	X			
Total defects		X		
Readability thresholds	X			
Defect density thresh.		X		
# of docs reviewed			X	
Reporting period	X	X	X	X
Proj. A: total req.				X
Proj A: req. implemented				X
Proj A: req. threshold				X
Proj. B: total req.				X
Proj B: req. implemented				X
Etc.				

Indicator

a = Readability
b = Defect density
c = # docs. reviewed
d = Req. implemented

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Availability & Source

	Data Element	Availability	Source
1	# Readability defects	+	Defects Database
2	Total defects	0	Defects Database
3	Readability thresh.	+	Project File
4	Defect density thresh.	+	Project File
5	# of documents rev.	0	Proj. Managers
6	Reporting period	+	
7	Proj. A: total req.	+	Project File
8	Proj A: req. imp.	0	Project File
9	Proj A: req. threshold	+	Project File
10	Proj. B: total req.		
11	Proj A: req. imp.		
12	Etc.		

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Exercise 6 Identifying Data and Availability

1. Review the indicators from the previous step.

2. Use the worksheet to identify and list the data elements that you will collect to construct your indicators.

3. Use the worksheets to assess the availability and source for each data item.

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Ex6 Worksheet—Mapping of Data Elements and Indicators

Data Elements Required	Indicator									
	a	b	c	d	e	f	g	h	i	j

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Ex6 Worksheet

Data Element	Availability	Source
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

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Step 9 Prioritize Work

Typical Planning tasks

	Data element 1	2	3	4	5	6	7
Data elements defined	Y	Not Doc'd	60%	Not Doc'd	Y?	N	N
Data collection procedure defined	Y	Y	Y	N	Not Doc'd	N	50%
How data are to be stored and accessed defined	Y	Y	N	Y	Y	N	N
Data collection forms defined	Y	Y	N	N	Y	N	N
Process guide for collecting the data prepared.	Y	Y	20%	Not Doc'd	50%	N	N
Responsibility for collecting and entering the data assigned	Y	Y	N	Y	80%	50%	N
How the data will be analyzed defined	Y	Y	N	N	N	N	N
How the data to be reported defined	Not Doc'd	Not Doc'd	N	50%	Y	N	N
Process guide for analyzing and reporting the data prepared	Y	Y	N	Y	N	N	N
Responsibility for analyzing and reporting the data assigned	Y	Y	N	N	Y	N	Y
Supporting tools identified and made available	Y	90%	N	50%	70%	N	N

- Can start immediately
- Put off until later
- In between

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An Action Item Checklist – 1

- ☑ **Define the data elements.**
- ☑ **Define the data collection procedure.**
- ☑ **Define how the data are to be stored and how the data will be accessed**
- ☑ **Create forms and procedures for collecting and recording the data**
- ☑ **Prepare a process guide for collecting the data**
- ☑ **Assign responsibility for collecting the data and entering it into the database**

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An Action Item Checklist – 2

- ☑ **Define how the data will be analyzed.**
- ☑ **Define how the data will be reported.**
- ☑ **Prepare a process guide for analyzing and reporting the data.**
- ☑ **Assign responsibility for analyzing and reporting the data.**
- ☑ **Identify the supporting tools that must be developed or acquired to help you automate and administer the process**

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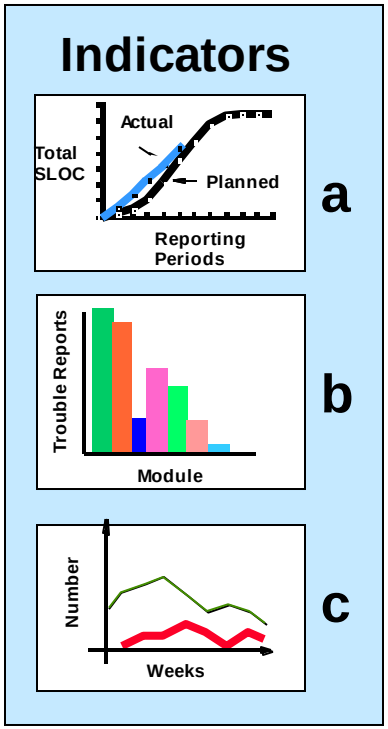
Identify Actions Needed to Implement Your Measures



List of **data elements**

Available source

1
2
3
4
5
6

Planning Tasks

Data element defined

Collection procedure definition

Collection frequency definition

Etc.

Data Element

1	2	3	4	5	6

a = Success indicators
b = Progress indicators
c= Analysis indicators

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Prioritization of Work

Typical Planning tasks

	Data element 1	2	3	4	5	6	7
Data elements defined	Y	Not Doc'd	60%	Not Doc'd	Y?	N	N
Data collection procedure defined	Y	Y	Y	N	Not Doc'd	N	50%
How data are to be stored and accessed defined	Y	Y	N	Y	Y	N	N
Data collection forms defined	Y	Y	N	N	Y	N	N
Process guide for collecting the data prepared.	Y	Y	20%	Not Doc'd	50%	N	N
Responsibility for collecting and entering the data assigned	Y	Y	N	Y	80%	50%	N
How the data will be analyzed defined	Y	Y	N	N	N	N	N
How the data to be reported defined	Not Doc'd	Not Doc'd	N	50%	Y	N	N
Process guide for analyzing and reporting the data prepared	Y	Y	N	Y	N	N	N
Responsibility for analyzing and reporting the data assigned	Y	Y	N	N	Y	N	Y
Supporting tools identified and made available	Y	90%	N	50%	70%	N	N

- Can start immediately
- Put off until later
- In between

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Exercise 7 Planning Tasks

1. Review the action item checklist.

- ☑ **Define the data elements.**
- ☑ **Define the data collection procedure.**
- ☑ **Define how the data are to be stored and how the data will be accessed**
- ☑ **Create forms and procedures for collecting and recording the data**
- ☑ **Prepare a process guide for collecting the data**
- ☑ **Assign responsibility for collecting the data and entering it into the database**

- ☑ **Define how the data will be analyzed.**
- ☑ **Define how the data will be reported.**
- ☑ **Prepare a process guide for analyzing and reporting the data.**
- ☑ **Assign responsibility for analyzing and reporting the data.**
- ☑ **Identify the supporting tools that must be developed or acquired to help you automate and administer the process**

2. Analyze these tasks to determine if they are sufficient to obtain the required measures (data elements) for your indicators.
3. Modify the existing tasks and add new tasks as required.
4. Use the worksheet to list new or modified tasks as well as the rational why needed.
5. Outbrief your new and modified planning tasks.

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Worksheet

New or Modified Planning Task	Rationale (Why needed)

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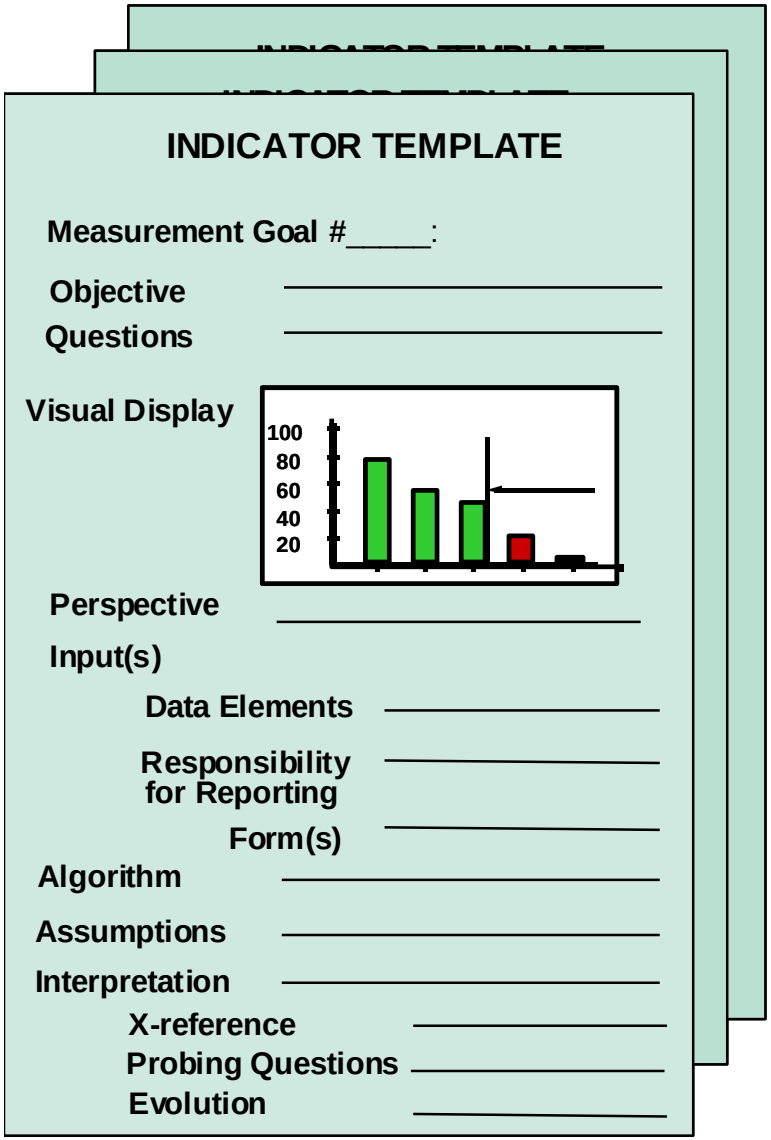
Document Indicator

Attribute / construction information in indicator template



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Exercise 8 Indicator Template

1. Break up into your assigned teams.

2. Review the indicators.

3. Use the Indicator Template as a guide, develop an indicator template for your organization. Add and define any new attributes as required.

4. Select one of your indicators and fill out your indicator template.

5. Outbrief your indicator template.

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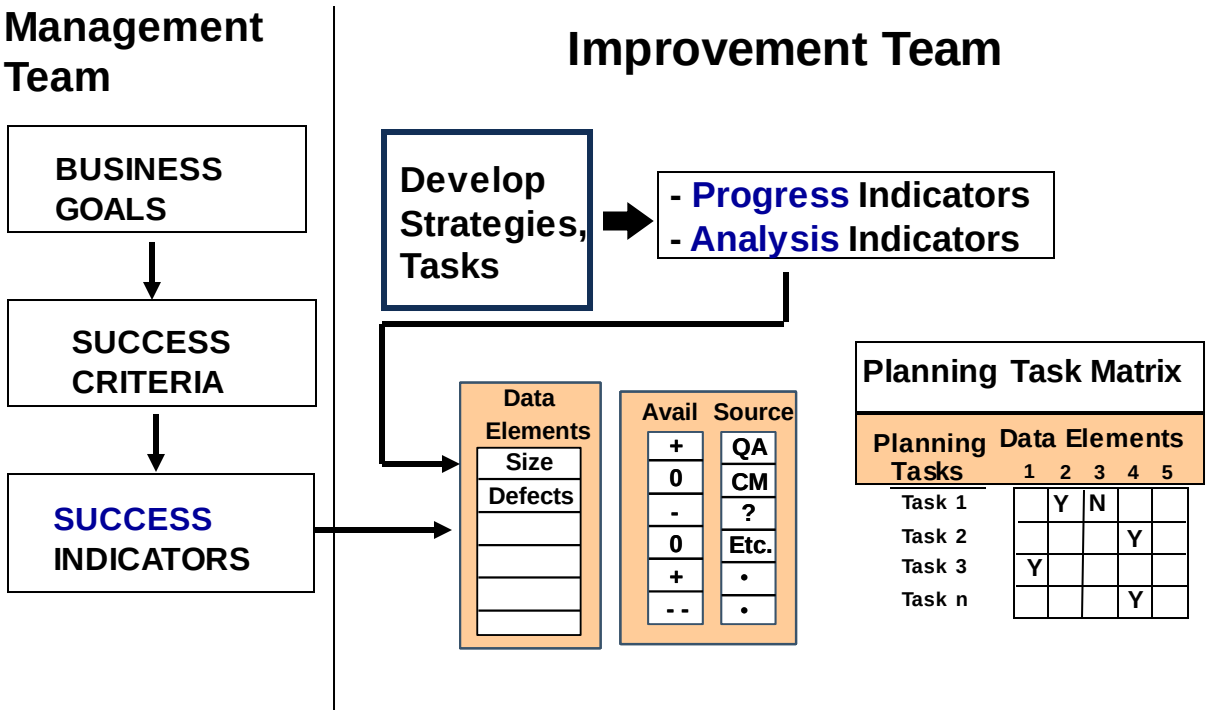
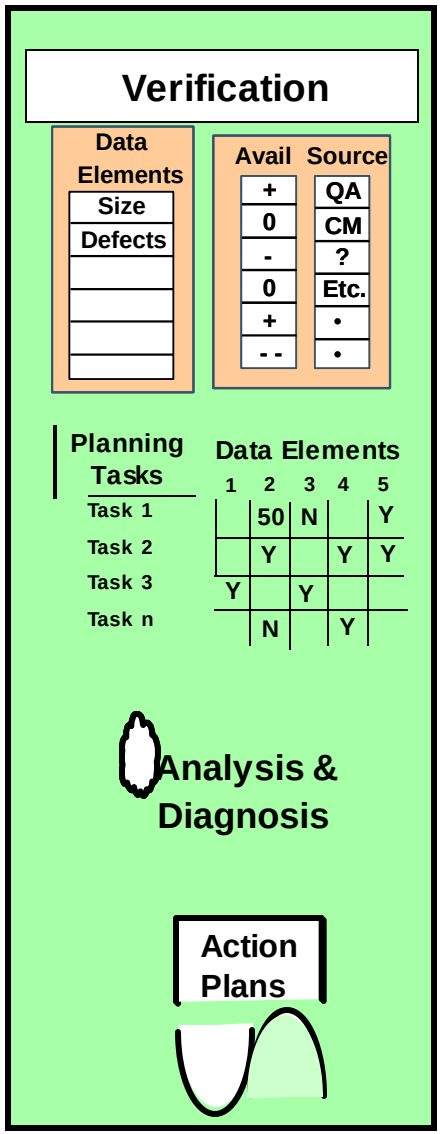
Step 10: Develop Plans





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SW Measurement Implementation Plan Template 1

1. Objective
2. Description
   - Background
   - Goals
   - Scope
   - Relationship to other software improvement efforts
   - Relationship to other functional activities
3. Implementation
   - Activities, products, and tasks
   - Schedule
   - Resources
   - Responsibilities
   - Measurement and monitoring
   - Assumptions
   - Risk management
4. Sustained Operation
5. Appendixes
   - Indicator templates

Ref: Goal-Driven Software Measurement: A Guidebook, Pg 96-98

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Getting Started – 1

Assign responsibility.

Define the measurement program objectives.

Identify related and current improvement efforts.

Identify measurement best practices.

Identify/define initial measures to collect and the collection process, analysis process, reporting process, and evolution process.

Adapted from *Software Metrics: Establishing a Company-Wide Program* by Grady & Caswell

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Getting Started – 2

Obtain approval of the initial set of measures and collection of these measures.

Prepare and conduct initial pilot projects.

Implement the software measures/measurement process organization-wide.

Seek tools to aid in automatic data collection and analysis.

Create a measurement repository/database for storing data.

Adapted from *Software Metrics: Establishing a Company-Wide Program* by Grady & Caswell

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Getting Started – 3

Establish training classes in software measurement.

Publicize success stories and lessons learned.

Revise organization regulations, policies, procedures, and practices.

Obtain feedback.

Continuously improve and evolve the measurement process.

Adapted from *Software Metrics: Establishing a Company-Wide Program* by Grady & Caswell

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A Piloting Strategy

1. Define the measurement approach.
2. Identify pilot projects or activities.
3. Plan the implementation.
4. Conduct the pilots:
   - brief stakeholders
   - provide training
   - implement and support the measurement activity
   - evaluate the results and refine the approach
5. Conduct additional pilots until the measurement approach has stabilized.
6. Move to broad-scale implementation.

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Summary

Software measurement must not be a strategy unto itself.

To be effective, software measurement should be integrated with an overall strategy for software process improvement.

Design a consistent measurement process that

- is linked to organizational goals and objectives
- includes clearly communicated definitions
- continuously evolves

Start small, with common goals and issues, and test the designed process before broad use.

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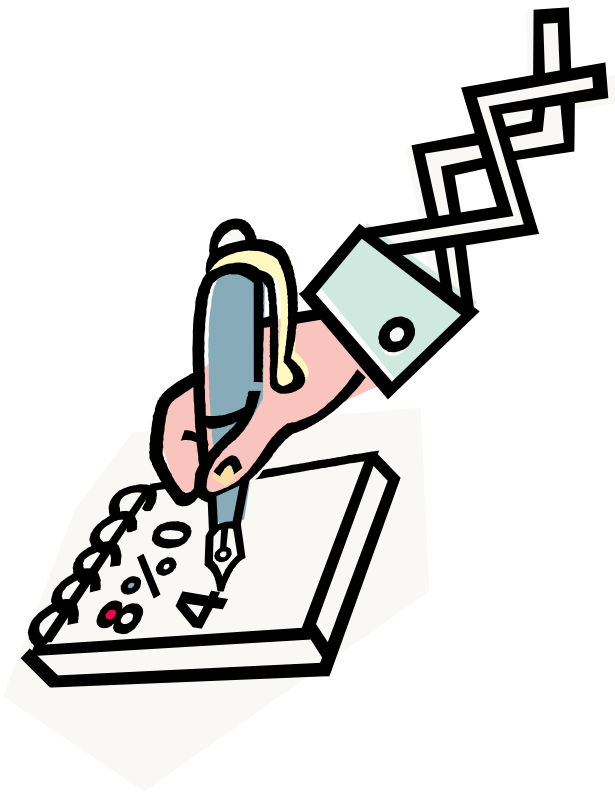

MEMO

Two Old SEI Proverbs

If all you want is a number, any number will do.

If you don't know what your numbers represent, no number will help.

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Remember, velocity is a vector (speed and direction)

"Would you tell me, please, which way I ought to go from here?"
"That depends a good deal on where you want to get to," said the Cat.

"I don't much care where–" said Alice.
"Then it doesn't matter which way you go," said the Cat.

"–so long as I get SOMEWHERE," Alice added as an explanation.
"Oh, you're sure to do that," said the Cat, "if you only walk long enough."

-Through the Looking Glass

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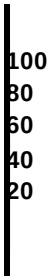
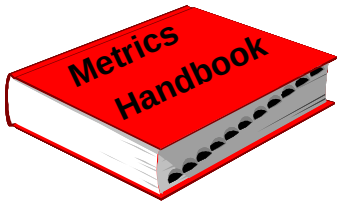
Indicator Documentation



Documents the why, what, who, when, where, and how.



INDICATOR TEMPLATE

Measurement Goal #_____:

Objective _____

Questions _____

Visual Display

Perspective _____

Input(s)

Data Elements _____

Responsibility for Reporting _____

Form(s) _____

Algorithm _____

Assumptions _____

Interpretation _____

X-reference _____

Probing Questions _____

Evolution _____

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