



# PSM and Successful Software Measurement

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# Agenda

- ❖ High Level Review of Leading Measurement Principles
- ❖ What makes PSM Successful ?
- ❖ PSM Success Stories
- ❖ Summary
- ❖ Q & A

# High Level Review of Leading Measurement Principles

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# Software Strategy

## IT Business Strategy

### ***Vision:***

Increase User Satisfaction by Developing and Supporting Application Software More Efficiently with Higher Quality at an Effective Cost

### ***Goal:***

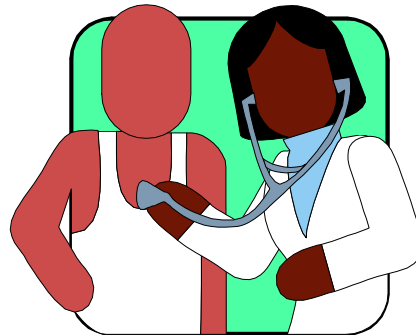
Create IT Measurements that are aligned with corporate business strategy



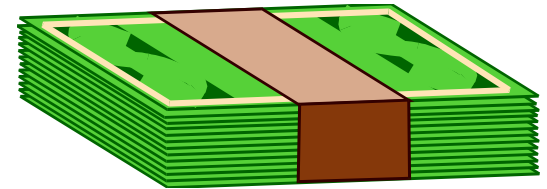
# Software Measurement Goals: Demonstrate Improvement...



Faster



Better



Cheaper

# Why Measure? Most typically...

- ❖ To evaluate risks and take corrective action
- ❖ To measure how much we deliver to customers.
- ❖ To find out how well we do it.
  - Are we competitive?
  - Are we improving?
- ❖ To evaluate tools, techniques.
- ❖ To estimate projects.
- ❖ To establish resource needs.
- ❖ To achieve cost efficiencies.



# Software Measurement Fundamentals

- ❖ Measure to understand differences (change) and to integrate things
- ❖ Measure the attributes of the object
- ❖ Measure more than one attribute to understand the object
- ❖ Measure more than one occurrence of the attribute to understand the attribute

# Software Measurement Definitions

## Definitions:

- ❖ Process:  
A model for accomplishing an objective
- ❖ Product:  
The tangible results of a process
- ❖ Project:  
The application of resources, with a given set of attributes, to a process to deliver a product



# Software Measurement Definitions

Measure: A basic quantitative value that describes the magnitude of a given element of the work process.

Measurement Indicator: A composite of one or more measures.

# IT Measures Should be Based On:

- ❖ Facts
- ❖ Important Needs (User Requirements)
  - Explicit Req ... What they say they need
  - Expected ... Always required usually not expressed
  - Elusive ... I'll know it when I see it
  - Exciting ... Exceeding expectations



# IT Measures Should be Based On:

- ❖ Eliminating Negative Consequences
  - Fear
  - Uncertainty
  - Doubt
- ❖ Producing Desired Results
  - Demonstrate WIIFM ... What is in it for me? For each level of customer that must implement the change



# Measurement is Step 1, then...

Management **MUST** Use the Information

- ❖ **Management** is responsible for the proper mix of people, environment, tools, and techniques that affect all processes
- ❖ **Management** chooses success or failure by the way it uses this management information



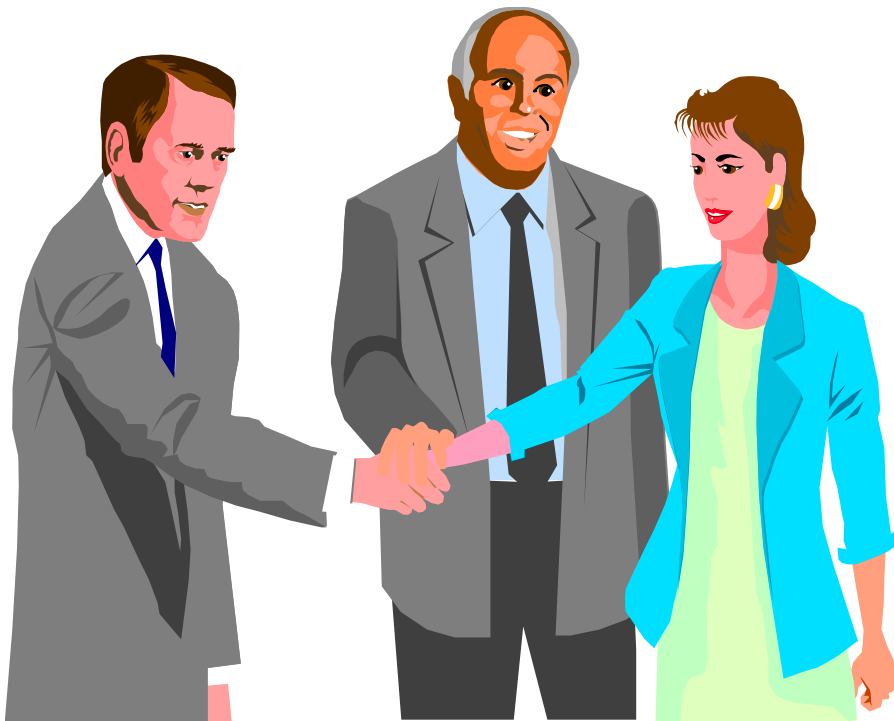
# Step 2. Management Responds to Measures → PI Actions

PI (Process Improvement):

- ❖ The implementation of all software process improvement is the responsibility of the project manager (first line manager)
- ❖ Until workers change the way the work is performed the measurements don't change
- ❖ Define Insanity



# Successful Software Measurement Depends on...



- ❖ Management Vision
- ❖ Management Leadership/  
Commitment
- ❖ Measurement  
Administration
- ❖ Measurement Principles
- ❖ Measurement Analysis
- ❖ Maintain & Adjust
  - Process
  - Measures

# Measurement Critical Success Factors

- ❖ Collect meaningful, valid, reliable measures
- ❖ Use consistent measures
- ❖ Management must require and use the derived measurement information
- ❖ Management must be willing to change the process

# Software Measurement Indicators

## Performance Indicators

- ❖ Reflect critical success factors
- ❖ Patterned after corporate mission & objectives
- ❖ Focus management's attention where needed
- ❖ Sustain process improvement
- ❖ Eliminate guesswork
- ❖ Improve analysis with more facts





# Successful Software Measurement Reminders...

- ❖ Focus on the process, not the people
- ❖ Focus on the product, not the projects
- ❖ Understand & improve the processes, then productivity, quality and cost will improve
- ❖ Mistakes are stepping stones to growth. Encourage the pioneers who are trying to improve the process



If you go tiger hunting in India, you better be prepared to catch a tiger!



# Software Measurement Concepts

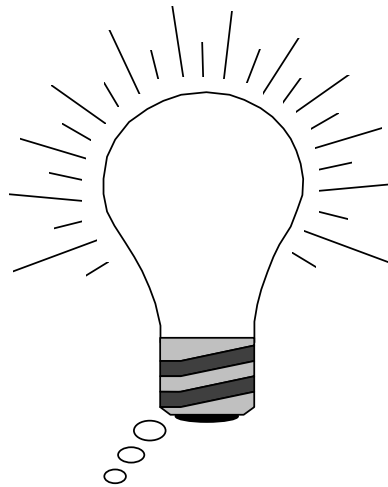


- ❖ If you are under budget and schedule, you will attract attention
- ❖ If you build it right, you will attract a following
- ❖ If you do both, they will erect a statue in your honor

# Software Measurement Concepts

- ❖ Technology Delivers Promises
- ❖ People and Processes Deliver Results
  - In order to achieve better/different results, management must change one or more of the project attributes

# Software Measurement Concepts



**Dilbert cartoon goes here**

**Dilbert cartoon goes here**



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# What Makes PSM Successful?

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# ***PSM Project Objectives***

## ***Help Projects Succeed By:***

- ***Developing Effective Measurement Practices That Address Software and Systems Technical And Management Issues***
- ***Transitioning into General Use an Integrated Measurement Approach That Results In Performance Improvements***



# ***PSM Project-Level Objectives***

- ***Help Project and Technical Managers Meet Cost, Schedule, and Technical Objectives***
- ***Provide a Basis for Objective Communication and Informed Decision Making***
- ***Establish a Foundation for Organization and Executive-Level Performance Measurement***



# How PSM Based Measurement Helps Organizations

- ❖ Objective Insight into Issues and Processes
- ❖ Objective Information to Identify and Manage Risk
- ❖ Early Detection and Resolution of Problems
- ❖ Objective Team and Organizational Communications
- ❖ Ability to Assess Organizational Performance
- ❖ Ability to Objectively Defend and Justify Decisions

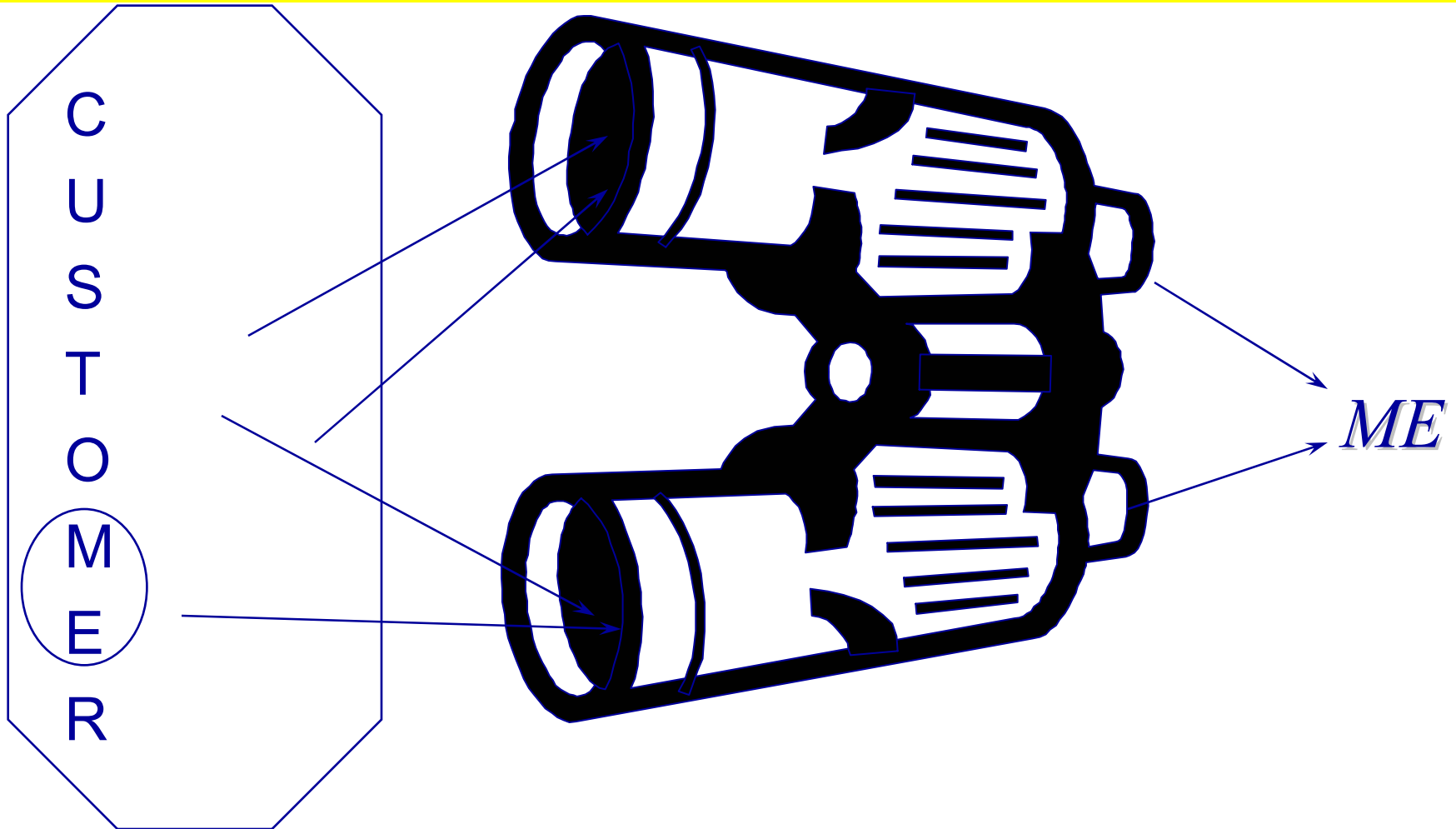


# Critical Success Factors

- ❖ Sponsor
- ❖ Champion
- ❖ MANAGEMENT SUPPORT
- ❖ Project Plan
- ❖ Pilot Team to show how and establish value
- ❖ Pilot Quality Improvement Processes
- ❖ SELL, SELL, SELL (WIIFM!)



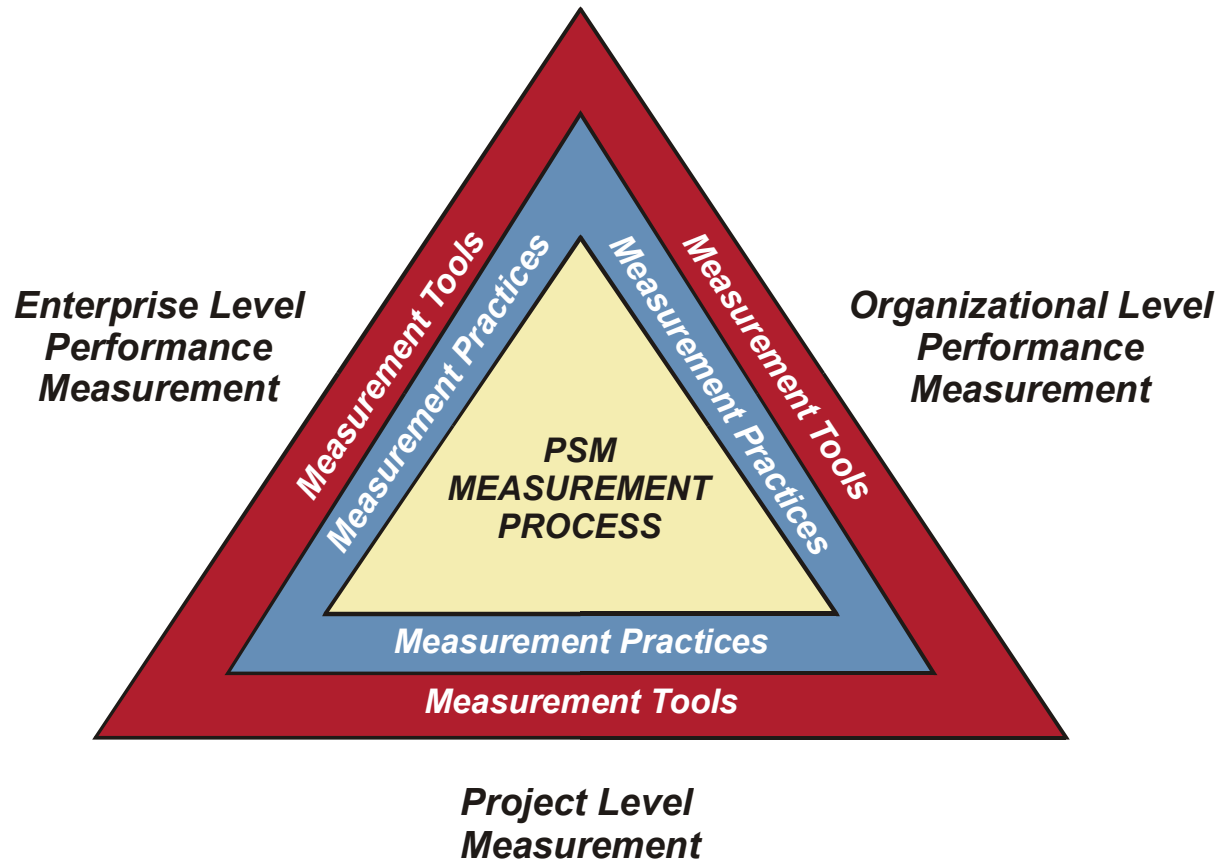
# Customer Focus



# The PSM Measurement Approach



# ***PSM's Multi-Level Measurement Process Provides Flexibility***





# ***PSM's Multi-Level Measurement Process Provides Accountability***



# PSM Key Concepts

- ❖ Measurement is a Process - Not a Pre-Defined List of Graphs or Reports
- ❖ PSM is Flexible - Adapted to Meet Specific Project Issues
- ❖ PSM Supports the Integrated Information Needs of Both Acquirer and Supplier Organizations
- ❖ PSM Addresses the Relationships and Tradeoffs Between Project Objectives

# PSM Measurement Principles (1)

- Use Issues and Objectives to Drive the Measurement Requirements
- Define and Collect Measures Based on the Technical and Management Processes
- Collect and Analyze Data at a Level of Detail Sufficient to Identify and Isolate Problems
- Implement an Independent Analysis Capability



# PSM Measurement Principles (2)

- Use a **Systematic Analysis Process** to Trace the Measures to the Decisions
- Interpret the Measurement Results in the **Context** of Other Project Information
- **Integrate** Measurement Into the Project Management Process Throughout the Life Cycle
- Use the Measurement Process as a Basis for **Objective Communications**
- Focus Initially on **Project-Level Analysis**



# PSM Software Measurement Steps

- ❖ Identify Audiences/Sponsors
- ❖ Identify Goals/Objectives
- ❖ Define measurements Based on Objectives
- ❖ Prototype Reports
- ❖ Develop an Implementation Plan
  - Staffing
  - Data Collection Procedures/Standards
  - Data Collection Frequency
  - Data Reporting Procedures/Standards
  - Data Reporting Frequency



# PSM Software Measurements Steps

- ❖ Goals and Targets
  - Where Are We?
  - Process Improvement
  - Quality Improvement
  - Project Control Through Better Estimating
  - Monitor Trends
    - *Portfolio Size*
    - *Portfolio \$ Value*
    - *Support Ratio*
    - *Quality (Defects)*



# PSM Success Stories

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# PSM Success Stories #1: Contract Award based on FP (1)

## *Problem:*

- ❖ Contractor is awarded the contract to redesign three existing systems to make them more efficient, and eliminate overlapping functionality.
- ❖ The contract stipulated the use of software measures and function point analysis in the project management approach.
- ❖ The contractor is given a 'functional size' by the government for managing the product development, with no details about how the FP number had been derived. (Essentially, the contractor had no trust in the validity of the functional size number.





# PSM Success Stories #1: Contract Award based on FP (2)

## *Approach:*

- ❖ Consultant and company liaison met with the project manager to discuss the problem and identify the information needs:
  - Information needed → Verified product size.
  - Measurement category → functional size
  - Measure used → function points.
  - Scope of measurement → measured the size several modules that had been through redesign and were approved by the customer. On completion, the remaining module sizes were extrapolated to a total estimated functional size.

## *Results::*

- ❖ The functional size estimated = 25% larger than was originally given.
- ❖ By deleting duplicate requirements; plus streamlining processes, the contractor was still be able to meet the required delivery date.



# PSM Success Stories #1: Contract Award based on FP (3)

## *Client Manager Testimonial:*

- ❖ "I just wanted you to know that we have been very pleased with this effort. We have a long-standing customer demand to reconcile our project size with a function point analysis done by the Government. Until (Quality Plus) stepped up, we had no way to address this. I don't have full command of the analysis of their data yet, but their methodology and documentation are very solid and will be close to unimpeachable when we go back to the customer. As for working relationships, both the process and the personalities have been a nice fit for our small, but hardworking team. That's made this easy to support this initiative. They've done a really good job for us." **S.M.,  
Major Defense Contractor, 2002**



# PSM Success Stories #2: Outsourcing Contract Award (1)

## *Problem:*

- ❖ Contractor awarded the contract to manage all IT development processes and the IT staff (outsourcing)
- ❖ The contract stipulated the use of software measures and function point analysis in their project management approach. The contractor was given a 'functional size' to manage (based on 'backfiring' LOC into FP).
- ❖ The contract stipulated contractor achievement of a 25% increase in productivity over 5 year life of the contract
- ❖ Contractor had no trust in the functional size validity, nor did they know current capabilities of the inherited staff.



# PSM Success Stories #2: Outsourcing Contract Award (2)

## *Approach:*

- ❖ The company liaison and Quality Plus consultant met with the project manager to identify information needs and plan the measurement process to be used.
- ❖ Information Needed → product size.
- ❖ Measurement category → functional size
- ❖ Measure used → function points.
- ❖ Measurement scope → portfolio sizing estimate

## *Results:*

- ❖ Portfolio functional size was estimated to be 50% less than originally provided. This knowledge enabled the project manager to manage resources to meet contract demands.



# PSM Success Stories #2: Outsourcing Contract Award (3)

- ❖ Further information need → process performance.
- ❖ Measurement category → process performance.
- ❖ Measure used → productivity (= work effort / function points)
- ❖ Measurement scope → Productivity was tracked and measured for the first year of the contract.

## *Results:*

- ❖ This knowledge enabled the project manager to identify needs in staff knowledge and training to make the necessary changes to meet contract demands.

# PSM Success Stories #3: “Just start Measuring...” (1)

## *Problem:*

- ❖ Contractor awarded a contract to manage the IT processes.
- ❖ The contractor completes an ‘internal’ review, noting many deficiencies -- among them lack of project controls.
- ❖ Manager of IT says when asked about his information needs  
→ “Just start measuring and I’ll tell you what I like!”



# PSM Success Stories #3: “Just start Measuring...” (2)

## *Approach:*

- ❖ Consultant met with the project manager to identify the information needs and plan the measurement process to be used.
- ❖ Information needs → Product & portfolio size
- ❖ Measurement Category → Functional Size
- ❖ Measures used → portfolio size (FP), cost, delivery rate, resources, and quality (defects) as the measures to start with.

# PSM Success Stories #3: “Just start Measuring...” (3)

- ❖ 2nd information need → Cost to develop and maintain software.
- ❖ Measurement category → ‘Resources and Cost’
- ❖ Measures → ‘Cost per FP’. The manager wanted to use cost based on fully burdened labor rate established by the financial department.
  
- ❖ 3<sup>rd</sup> information need → ‘Process Performance’.
- ❖ Measurement category → ‘Process Efficiency’
- ❖ Measure → ‘Productivity’
- ❖ This entailed implementing a time reporting mechanism to record work effort.





# PSM Success Stories #3: “Just start Measuring...” (4)

- ❖ 4<sup>th</sup> information need → resources available.
- ❖ Measurement Categories → Problem Report Status, Effort, Staff Experience
- ❖ Measures → ‘Schedule and Progress’ , ‘Resources and Cost’
  
- ❖ 5<sup>th</sup> information need → quality of the software developed.
- ❖ Measurement Category → Functional Effectiveness’
- ❖ Measure → ‘Defects per FP’.



# PSM Success Stories #3: “Just start Measuring...” (5)

## *Results:*

- ❖ The organization was able to reallocate resources for a more equitable workload, which increased both quality of delivered software and speed of delivery.
- ❖ A short time later the organization underwent a major reorganization. The CIO had an “all hands meeting” and told the staff the results of the measurement process enabled him to justify resource needs and thus saved jobs.
- ❖ Later the IT department went through preliminary steps towards outsourcing (to save money). The measurement process data showed that the organization’s internal resources and processes were better than those of the outsourcer. The outsourcing deal was cancelled.



# Summary

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# Summary

- ❖ **PSM provides a solid foundational approach for all types of measurement challenges**
- ❖ **PSM's Information Needs, Measurement Category and Measures structure sets up a GQM type of hierarchy, making measurement sensible and logical**
- ❖ **PSM combines the best of the best in measurement philosophies and approaches**
- ❖ **PSM results in successful measurement because it works to solve Measurement Process Issues...**

# Summary

## Meaningful, Valid, Reliable Measures:

- ❖ Are related to corporate goals and strategies
- ❖ Are clearly defined
- ❖ Source data is available
- ❖ Measure what they are supposed to measure
- ❖ Are related to customer requirements and satisfaction

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