

SYSTEMS

Measuring Systems Engineering
in the Systems Integration Work Environment

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LM/M&DS/Systems Integration

24 July 01

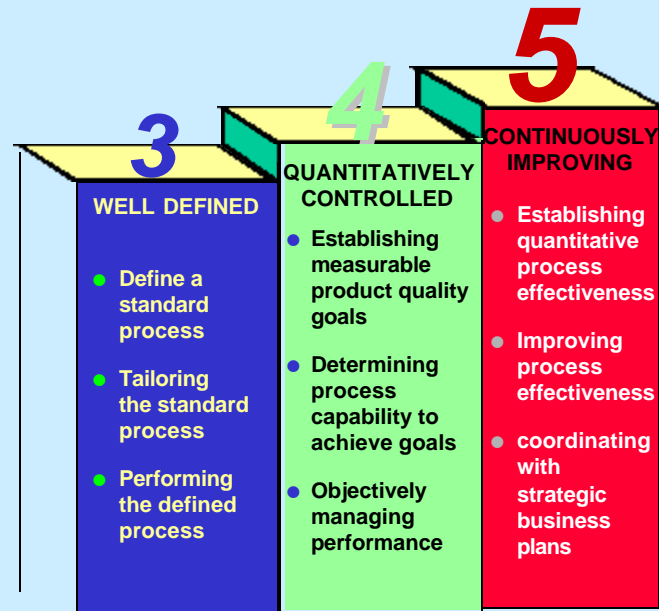
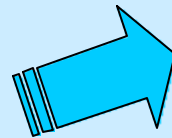
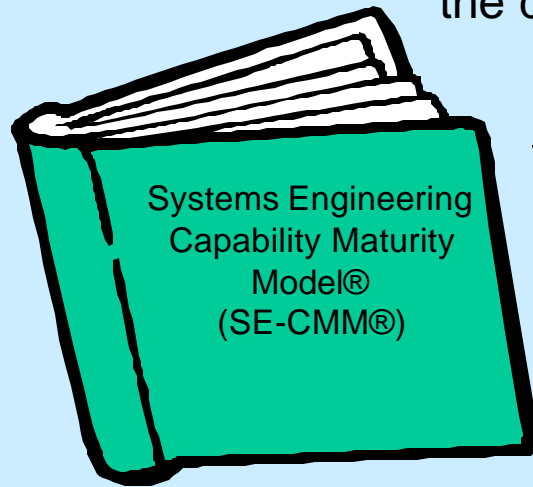
INTEGRATION

Agenda

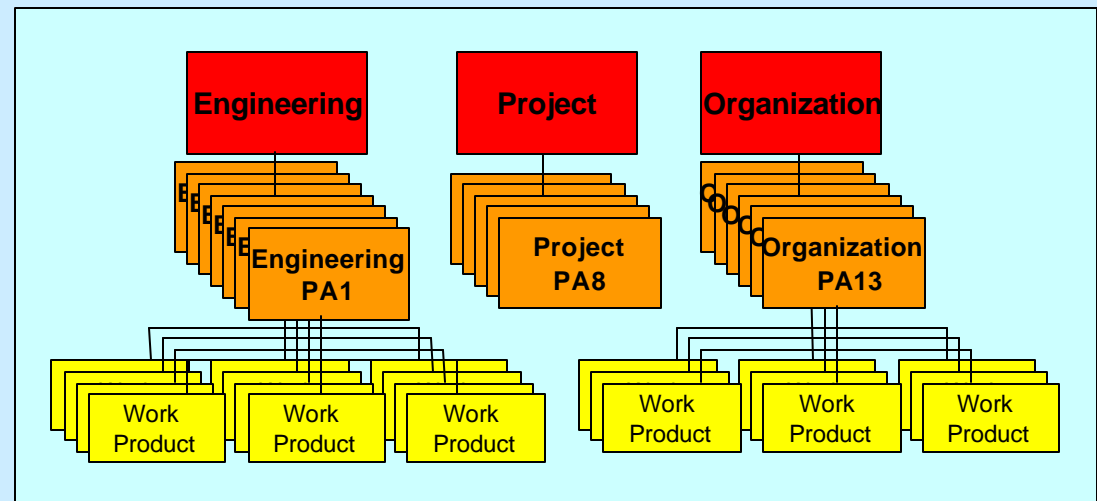
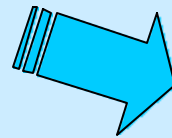
- Background
- Quantitative Management Process
- Approach
- Issues and Metrics
- Analysis considerations
- Reporting
- Interpretations
- Lessons Learned
- Summary

Background

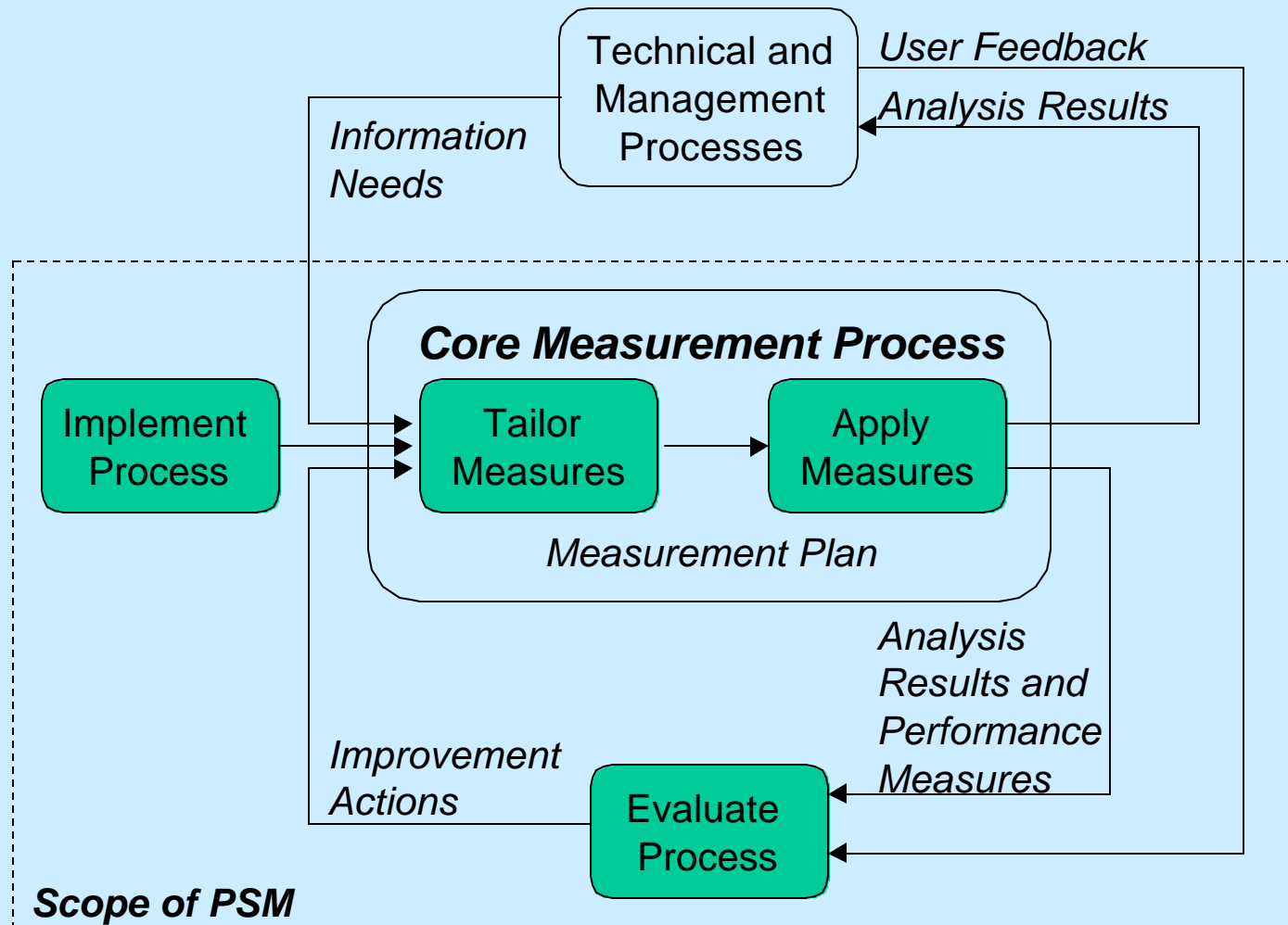
Model defines the capability levels and the domain



SE-CMM was the model that the SI chose for the formal assessment

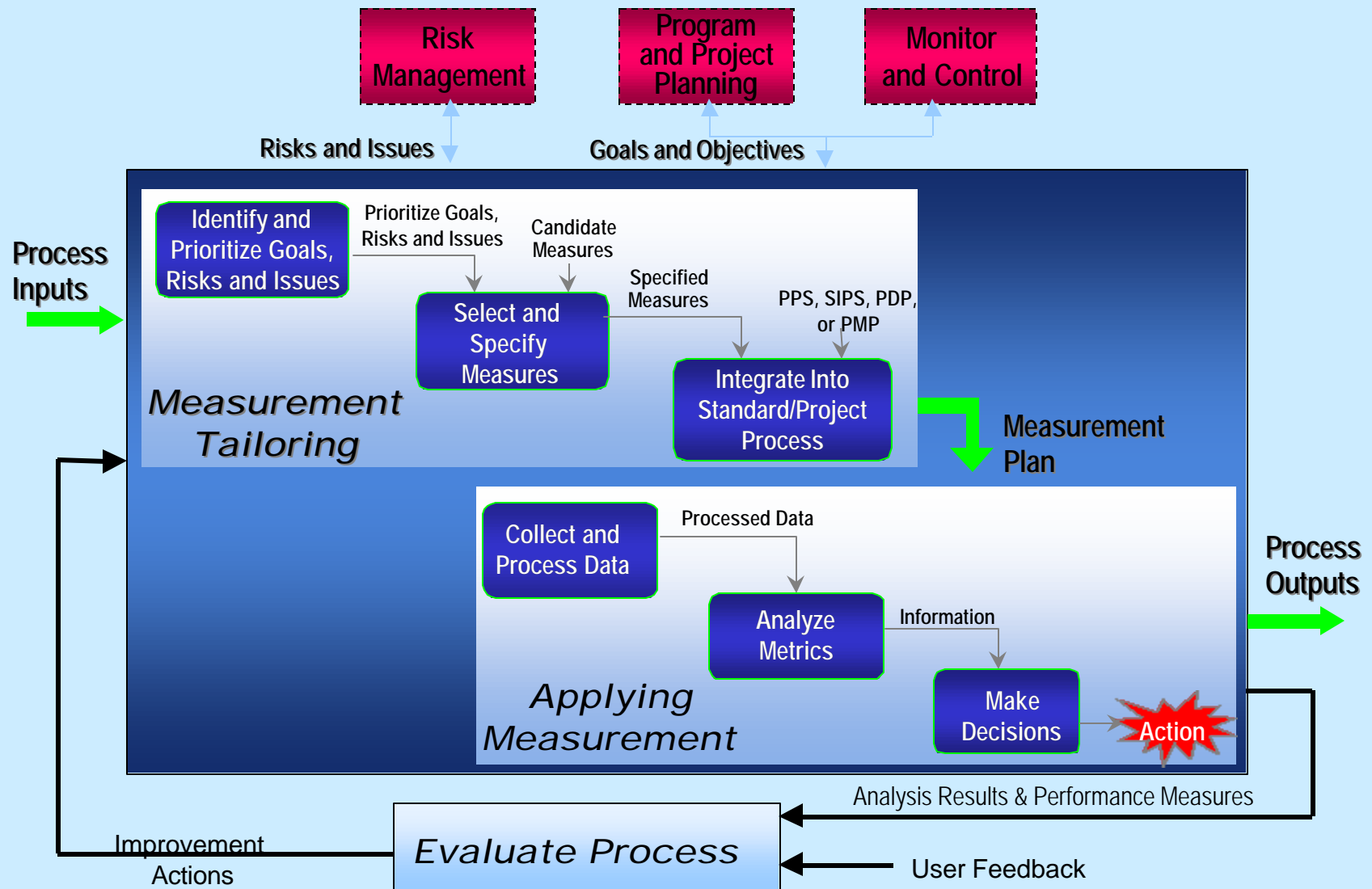


PSM Process

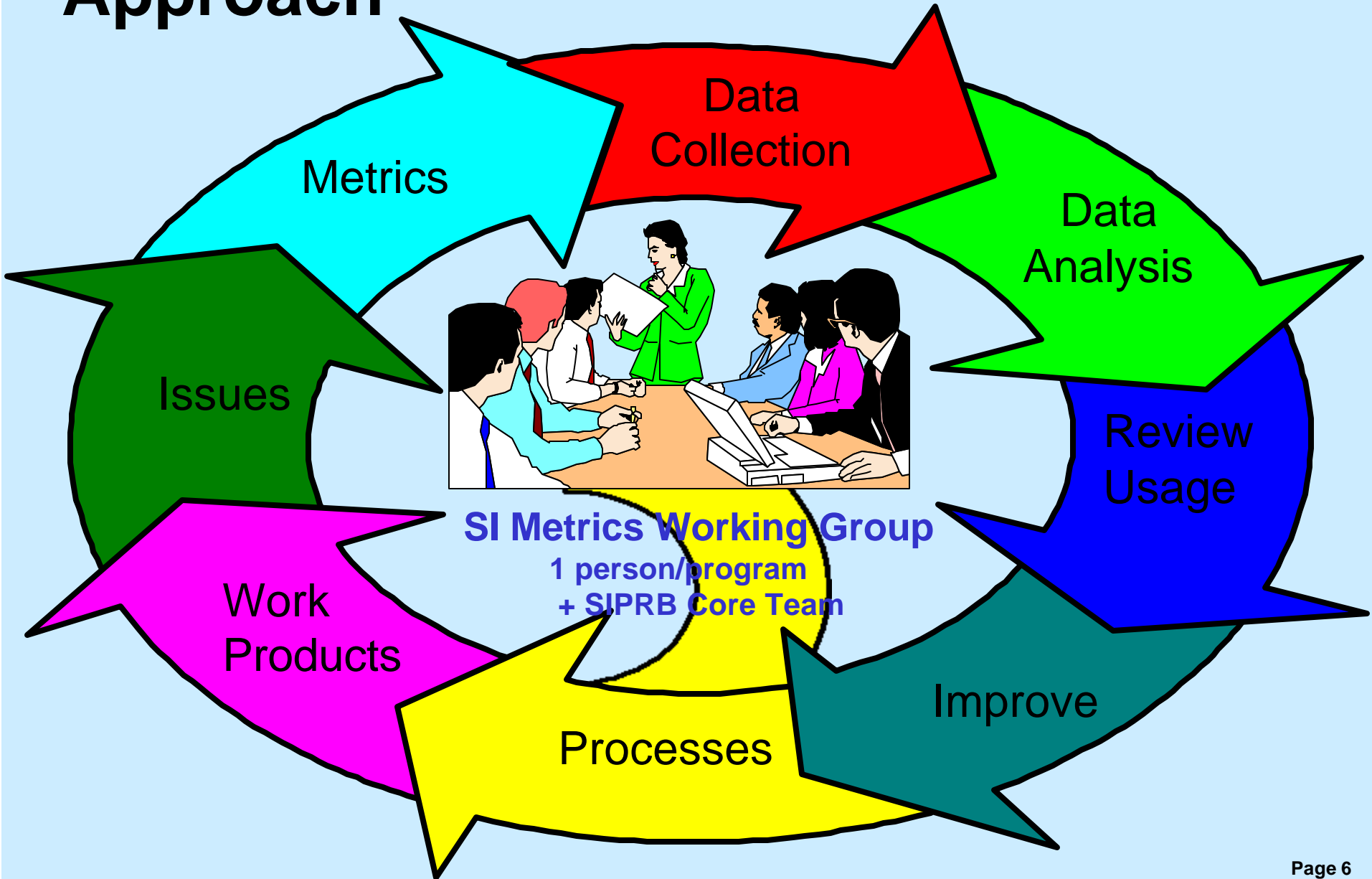


Basis of the SI Quantitative Management Process

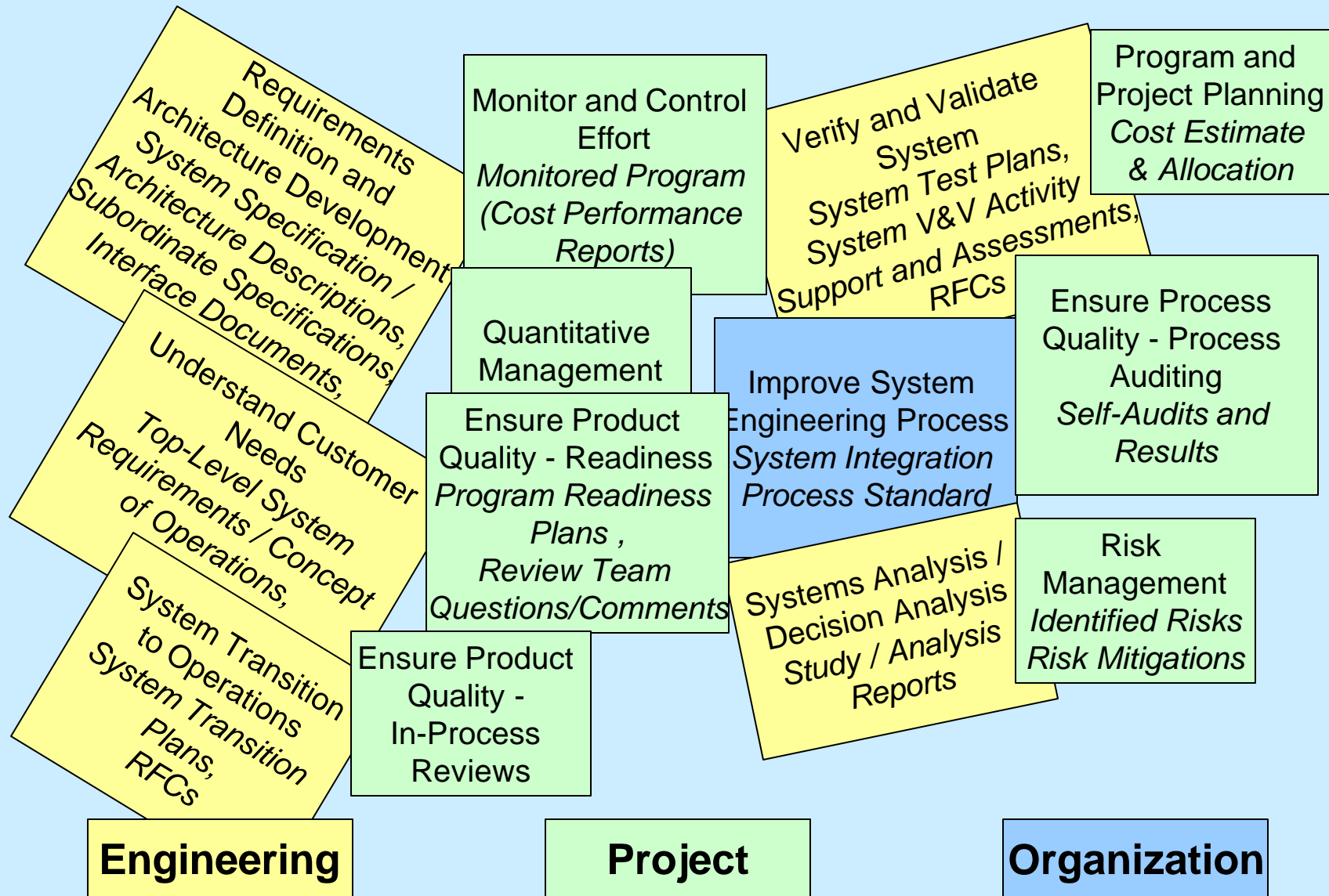
SI Quantitative Management Process



Approach



Processes and Work Products



Issues and Metrics

Customer Satisfaction

Award Fee Percent

Product Quality

Approval Rates

Resources and Cost

- Cost Variance
- Effort

Process Performance

- Award Fee Comments*
- Program * /Process Tailoring*
 - Self-Audit Findings*
 - Rework Effort Percent*
 - Cycle Time Variance**
- System Engineering Productivity*

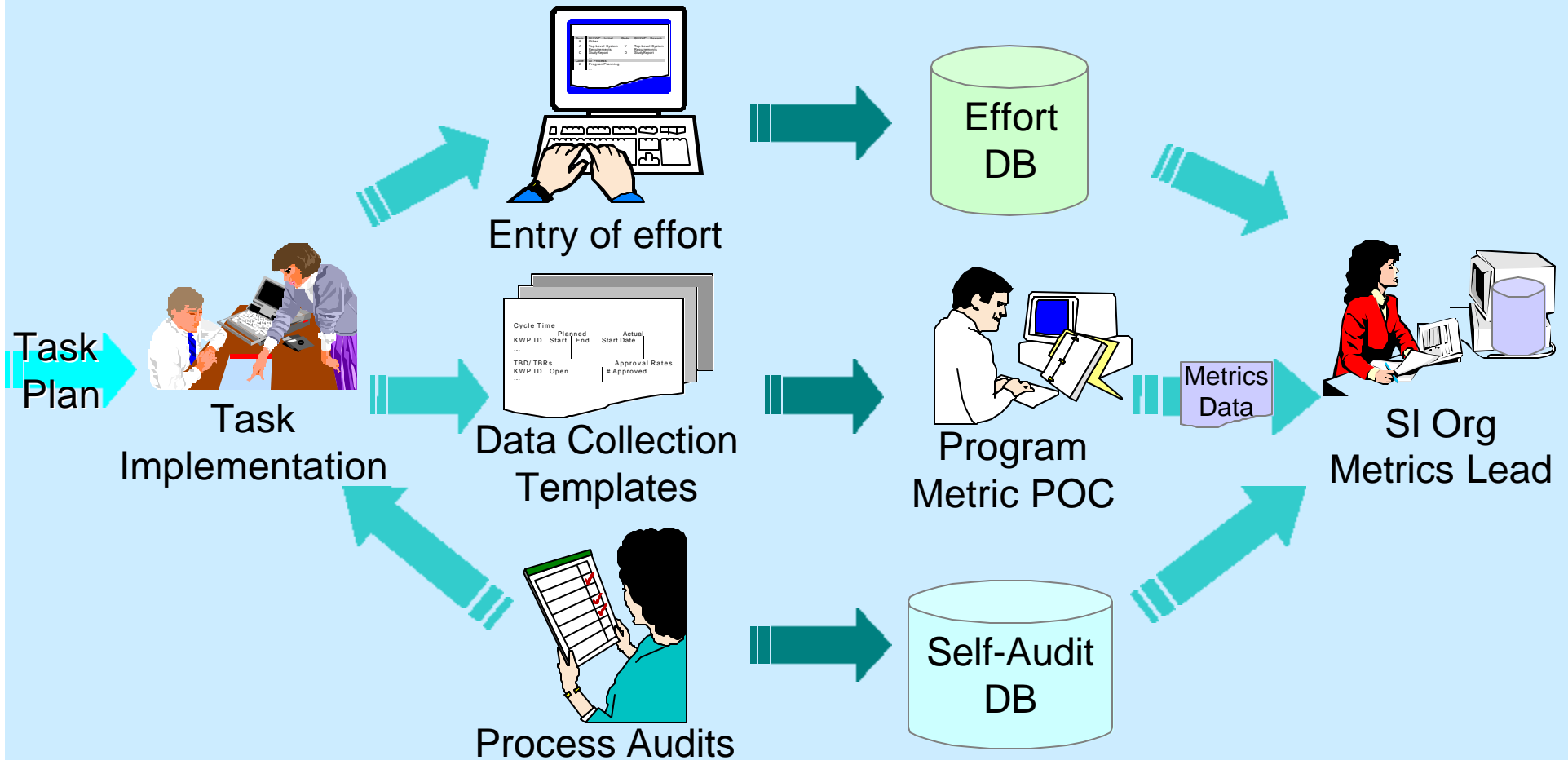
Schedule and Progress

- Requirements Verification (Percent Overdue)**
- Self-Audit Progress**
- TBD/TBR (Percent Overdue)**

** Metrics recently dropped due to usage*

Metrics were selected to monitor processes and provide data for credible BOEs

Data Collection



Metric data collection and reporting are done a monthly basis

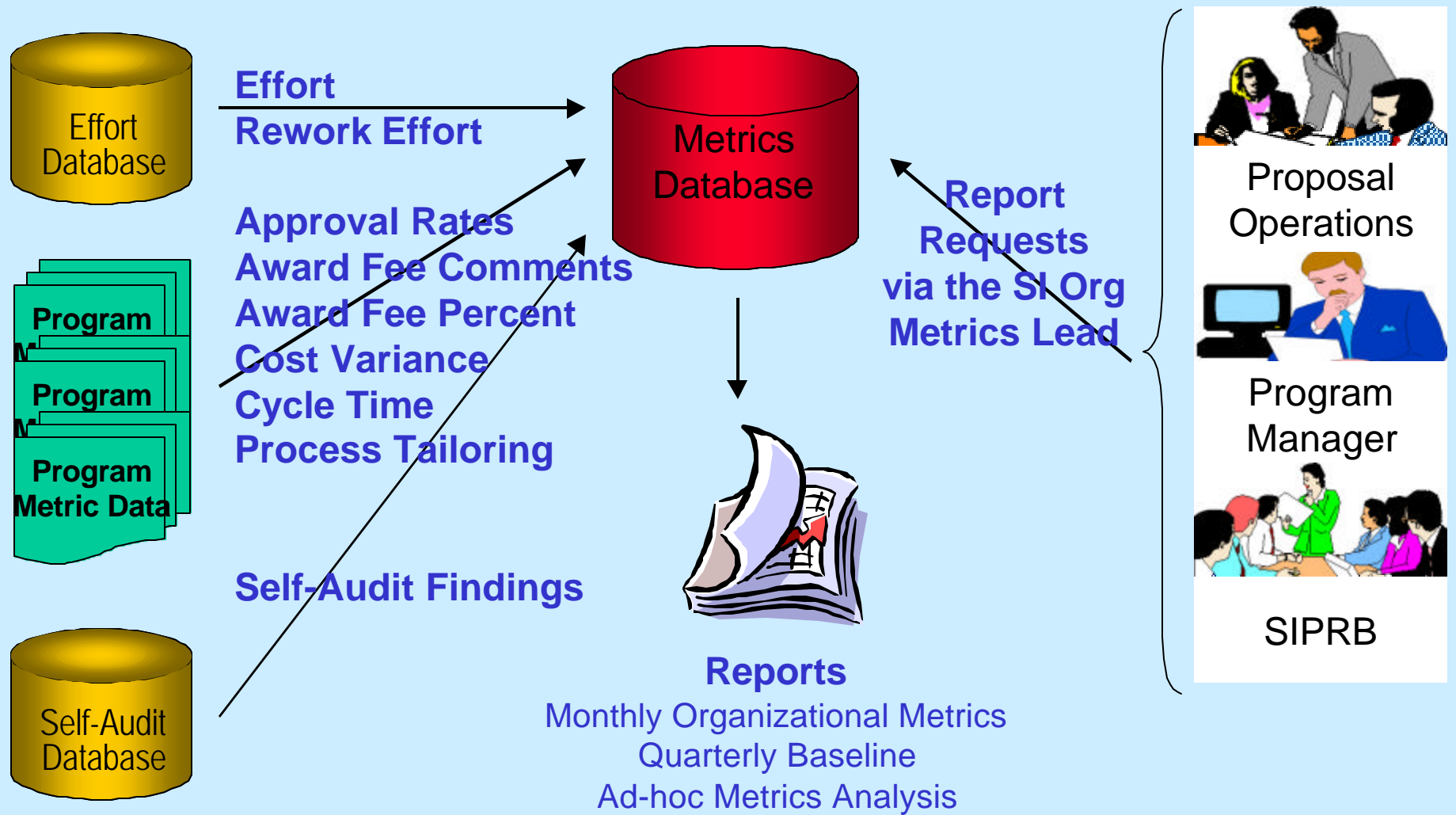
Analysis Considerations

- All metrics are analyzed on a monthly basis
 - ◆ Process Tailoring is analyzed on a semi-annual
 - ➔ Data based on information from individual program compliance matrices
- Metrics results are based on current month, except :
 - ◆ Rework Effort Percent is based on rolling quarter
 - ◆ System Engineering Productivity and Award Fee Percent are based on rolling annual
 - ➔ Award Fee Percent and Award Fee Comments are based on individual program Award Fee schedules on a semi-annual basis
- The metric results are summarized as red, yellow or green based on thresholds
 - ◆ A yellow result will only occur if a goal is established
 - ➔ Green represents goal and yellow represents 80% of data points

Process Thresholds

- Management alert limits that indicate the range of expected results
- Thresholds can be based on historical data or business needs
 - ◆ Historical data thresholds establish upper and lower thresholds around 80% - 90% of the data points
 - ➔ There should be at least twelve data points
 - ➔ Thresholds depend on the stability of the process
 - ◆ Business needs thresholds are based on business goals
 - ➔ Thresholds should fall within established historical data thresholds
 - ➔ If not within historical data thresholds, improve process so that process capability and business needs fall within same range
- The range between the upper and lower thresholds is the process capability

Data Analysis and Reporting



Interpretation



Approval Rates

Evaluate the quality of a work product
Measures the # work products approved with the # submitted

Rework Effort Percent

Evaluate the quality of the development process for work products

- Increasing Approval Rates = Decreasing Rework Effort Percent
- Decreasing Approval Rates = Increasing Rework Effort Percent + Cycle Time)

Process Improvement

Low approval rates on work products may indicate that the process to develop the work products needs improved

In-Process Reviews

Approval Rates indicate the effectiveness of In-Process Reviews (enough time, too much time, thoroughness)

Interpretation



Award Fee Comments

*Customer comments are mapped to processes
Our customer's view on how well we perform
our processes*



Self Audit Findings

*Findings from Self Audit Process audits,
categorized according to reason types
An indicator of how well we perform processes*

Process Improvement

Both Award Fee Comments and Self-Audit Findings indicate processes that may be consideration for improvement.

- Repeat Comments or Self-Audit Findings =
Actions taken were not successful

Lessons Learned

- Use of templates for measurement plans, data collection, and guidelines for reporting provide consistency across the SI organization
- The use of semi-annual metrics utility surveys helps determine the usefulness of the standard metrics
- Monthly SI Metrics Working Group meetings helps promote awareness of metrics usage across the organization

Summary

- Method is one way of measuring system engineering
 - ◆ Successful in achieving twelve SE-CMM L5 ratings and one SE-CMM L4 rating



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