Practical Experience in Developing a CMMI Based Measurement Program

George Georgaras, General Dynamics Canada
Bob MacIver, Software Productivity Consortium

7th Annual PSM Conference
Keystone, CO
July 15, 2003
Abstract

- Practical experience and lessons learned using PSM to plan and begin implementation of a sustainable CMMI-based, top down measurement program

- How management is involved

- How they developed the measurement plan and organization

- Experiences with defining and implementing the chosen measures using PSM’s guidelines
Why measurement improvement is important to management:

- **Current environment**
  - Primary defense subcontractor for Canada
  - Customers are governments around the world
  - Multiple Business Areas
  - Diverse product applications
  - Wide range in size: $K to $M to $B

- **Executive management commitment**
  - Consistency in reporting for management decision-making
    - Across all programs and functions
    - Aligned at all management levels
  - Transitioning to CMMI and higher order maturity
Where We Are

Commitment

Time

Institutionalization

Adopt and Fully Document

Trial Use

Select and prioritize measures

Understanding

Framework and Infrastructure

Training and Workshop

Commitment

Awareness

We are here
Information Model Used for Planning

Adapted from ISO/IEC CD 15939, Information Technology

- Establish Commitment
- Plan
- Measurement Plan
- Experience Base
- Core Processes
- Technical & Management Processes
- Information Needs
- Measurement Database
- Perform
- Analysis Results And Performance Measures
- Improvement Actions
- Evaluate
- User Feedback
- Information Product
- Requirements for Measurement

Adapted from ISO/IEC CD 15939, Information Technology

July 15th 2003
Good News!

Measurement Framework is Adaptable

Sarbanes-Oxley Act Compliance

Groundbreaking Congressional legislation in response to corporate corruption scandals

Treadway Commission
(National Commission on Fraudulent Financial Reporting)
Committee of Sponsoring Organizations (COSO’s) report, “Internal Control – Integrated Framework” is the standard to measure against
Current Status

Ready… Aim …

• Initial focus was on commitment and training
  – Strong involvement by executive and program management
  – Exec Management briefing, PSM and workshop for users
• Measurement plan in place
  – Based on ISO/IEC 15939
  – Provides comprehensive measurement framework
• Infrastructure is well underway
  – Organizational hierarchy, initial staffing for measurement are in place
  – Projects, other supporting organizations are involved
• Some experience gained in defining base measures and information products
Poop!
(We Got Bogged Down)

Why were definition and implementation of measures progressing so slowly?

- PSM is an excellent method for conceptualizing and discretely defining measures
  - Defining individual information products is difficult and slow
- We have user needs at three levels of decision-making
  - Higher order information products require numerous supporting indicators at lower levels
- People often cannot clearly articulate their information needs and indicators ("I’ll know it when I see it")
  - Counterproductive to spend a lot of effort in defining something that is likely to change
  - Need to let them experiment and tune the measures first
The Solution

• We needed to increase the speed of building and implementing measures
  – Get some early successes to show the benefits
  – Begin changing the culture
• Reusing existing information needs and measures is more effective than starting with a clean slate
• Key is not to reinvent the wheel
• Examine, prioritize, standardize and update existing measures
Existing Measures

• Numerous initiatives involving measurement and tools are in various stages of planning, implementation and use
  – Executive management’s stated needs
  – Company incentives
  – Company Mission and Policy Statements/Indicators
  – Project Management improvements including PMI
  – Standard Operational Performance Reviews
  – Standard Software Tracking and Oversight Reports
  – HR – Employee Satisfaction
  – EC/Finance – Sarbanes-Oxley guidelines
• Created measurement analysis poster to present current situation
Existing Measures (2)

• Each initiative has multiple measures and indicators
  – Many express unstated information needs, not clearly aligned with business case
  – Many overlap
    • Created by different processes
    • May have different definitions for same indicators
  – Most not multi-layered – cannot drill down
  – Many are useful
  – Others lack clarity
  – Most need better definition and statement of purpose
  – Some should be deleted
Speeding up the Pace

1. Prioritize the existing measures
2. Ensure alignment with business needs and clarity of purpose
3. Ensure that the indicator clearly measures the intended purpose
4. Exercise the measure to ensure its effectiveness, modify as needed
   - Use Information Model’s feedback loops
5. If not a good measure, delete it
6. If appropriate, approve the measure as a standard
7. Complete the documentation per PSM standards
Examples of what we expect to find in our new process
Cash Flow – Current Picture

Corporate Cash Flow

Project Cash Flow
  Actual/Plan
  Net Cash

Payment Milestones
  Milestone and Value
  Actual/Plan Date

Event Capture Plan
  Event and Value
  (Capture Actions, Date, OPI)

Suggested improvements:
  • Establish consistency among related indicators
  • Define information product for each level
  • Define or reuse base measures as required (high level)
A Useful Chart to Get Message Out

Information Model

- Adapted from ISO/IEC CD 15939, Information Technology – Software Measurement Process

Many existing measures have only the indicator

 Entities

Adapted from ISO/IEC CD 15939, Information Technology – Software Measurement Process
Cash Flow – Needed Framework

- Provides relevant information at each management level
- Allows ‘drill down’ to find root cause of anomalies in lower levels
- Ensures consistency of data across all functions, at all levels
The Awesome Power of a Chart

What do these standard images mean?

- Blue
- Green
- Yellow
- Red
- N/A

Can you trust the data?
An example of why we would want to provide better definitions. What do the colors really mean? How were they derived?

Project Scoreboard

<table>
<thead>
<tr>
<th>Success Factors</th>
<th>Current</th>
<th></th>
<th>Prior</th>
<th></th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GD</td>
<td>Customer</td>
<td>GD</td>
<td>Customer</td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td>G</td>
<td>G</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>G</td>
<td>Y</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Technical</td>
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<td>G</td>
<td>G</td>
<td>G</td>
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<tr>
<td>Manpower</td>
<td>B</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Cash Flow</td>
<td>R</td>
<td>Y</td>
<td>Y</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

Blue: Exceeds plan  
Green: Meets plan  
Yellow: Risk of not meeting plan  
Red: Unlikely to meet plan  
NA: Not applicable

Look at the “Current” and “Prior” columns for customer:  
If 3 greens of 6 = green in current column, Why do 3 greens out of 6 = yellow in prior column?  
In the GD “Prior” column, why do 4 yellows and 2 greens = green?

The measurement analyst or lower level managers should be prepared to show charts that answer the obvious questions: Why is it that color, what’s causing it, how and when will it become green?  
In this case, related data exists, but there is no one-to-one mapping.

Is excess staffing good or bad?  
What does this mean? Is it (+/- 5%, 10%, 20%?), or is it simply a guess?

Opportunities for quick improvement
Lessons Learned

• Start with management commitment and involvement
• Involve an expert
• Augment PSM with ISO/IEC 15939 and CMMI M&A Practice Area
• Time and effort spent in gaining commitment, training, workshops and planning are good investments
• Be inclusive – get management and projects involved early and often
  – Sr. Mgmt reviews, sponsor, project champions, standards committee, process owners
• Do not assume that different tools or systems implement the same measure in the same way (LOC, man-month, etc)
• It takes a lot of effort to do it right – get proper staffing, and delegate
• The best way to build a measurement culture is to get people measuring – find a way to expedite the process of producing usable measures for decisions
Questions?