How Do We Get On The Road To Maturity?

Debra J. Perry
Harris Corporation
How Do We Get On The Road To Maturity?

From this…

To this…

But how?
How Do We Get On The Road To Maturity?

Start?
How Do We Get On The Road To Maturity?

Government Communications
Systems Division: What We Do...

Aviation electronics

Space and ground satellite communications systems

Intelligence, surveillance, and reconnaissance

Communications and information networks

Operations and support services

We innovate, integrate, and manage technology.
ROI Need

- Convince management of payoff
- Convince other stakeholders management is convinced
- Convince other stakeholders process improvement helps them
ROI Need

- Convince management of payoff
- Convince other stakeholders management is convinced
- Convince other stakeholders process improvement helps them

Convince Management

- Share process improvement vision
- Provide external ROI
  - SEI data
  - Other companies' data
- Provide internal ROI
  - Harris examples
  - Other possibilities
Getting There  3 of 3

ROI Need
- Convince management of payoff
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Convince Management
- Share process improvement vision
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  - SEI data
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- Provide internal ROI
  - Harris examples
  - Other possibilities

Convince Other Stakeholders
- Show management support
- Educate and train
- Show value for them
ROI — Return on Investment

Convince Management of Payoff

- External Research
  - Read and Research
  - Attend SEI Courses
  - Hire consultants

- Internal Research
  - Develop a plan
  - Develop ROI

- Educate management

- Start or improve your process group
The Quality of a System is Highly Influenced by the Quality of the Process Used to Acquire, Develop and Maintain It

This Premise Implies a Focus on the Processes as well as on Products:

- This is a long-established premise in manufacturing
- Belief in this premise is visible worldwide in quality movements in manufacturing and service industries (e.g., ISO standards)
- This premise is also applicable to development

(Introduction to CMMI Version 1.2)
 Processes are Not Well Defined and Improvised by Practitioners and their Management

Process Descriptions are Not Rigorously Followed or Enforced

Performance is Highly Dependent on Current Practitioners

Understanding of the Current Status of a Project is Limited

Immature Processes Result in Fighting Fires:
  - There is no time to improve
  - Instead practitioners are constantly reacting
  - Firefighters get burned
  - Embers might rekindle later

(Introduction to CMMI Version 1.2)
Process Descriptions are Consistent with the Way Work is Actually Done

- They are Defined, Documented and Continuously Improved

- Processes are Supported Visibly by Management and Others

- They are Well Controlled – Process Fidelity is Evaluated and Enforced

- There is Constructive Use of Product and Process Measurement

- Technology is Introduced in a Disciplined Manner

(Introduction to CMMI Version 1.2)
Â Processes Enable you to Understand What is Going on
Â People Develop their Potential More Fully and are More Effective Within the Organization
Â By Defining, Measuring and Controlling the Process, Improvements are More Successful and Sustained
Â The Likelihood that Appropriate Technology, Techniques and Tools are Introduced Successfully Increases
Â More Benefit Information is Available in the August 2006 SEI Technical Report, Performance Results of CMMI-Based Process Improvement (CMU/SEI-2006-TR-004) at: http://www.sei.cmu.edu/publications/documents/06.reports/06tr004.html

(Introduction to CMMI Version 1.2)
How Do We Get On The Road To Maturity?

ROI At Different Levels

- Process Improvement Start Up
- Reaching Next Level of Maturity
- Out of Phase Defect Removal
- Reach Higher Levels of Maturity
- Optimization and Maintenance

Profiles of Level 5 CMMI Organizations

"Little has been done to study the return on investment (ROI) of high maturity organizations that have reached Level 5."
Convince Other Stakeholders Management is Convinced

- Show management is investing in process improvement
- Show management is enforcing compliance

Management should fund and provide oversight for process improvement efforts and review and reward process compliance.
**Stakeholders 2 of 2**

 Convince Other Stakeholders Management is Convinced
  - Show management is investing in process improvement
  - Show management is enforcing compliance

 Convince Other Stakeholders Process Improvement Helps Them
  - Relieves chaos
  - Reduces defects and rework
  - Facilitates improvements
  - Saves time and money

Toyota makes process improvement a way of life.
How Do We Get On The Road To Maturity?

- Share Process Improvement Vision
- Provide External ROI
  - SEI data
  - Other companies’ data
- Provide Internal ROI
  - Harris examples
  - Other possibilities
Find a Strong Leader with Clout and Credibility

Develop a Vision – What Will Motivate?
- Fewer problem programs
- Faster, cheaper, better
- Need CMMI to compete

Develop a Plan

Determine Estimated ROI

Present the Plan to Management

Be Determined!

Get Management Commitment
Enhance the Current Processes to:

- Improve efficiency and value for all stakeholders
- Reduce cost and rework
- Provide predictable program execution
- Increase competitive advantage
How Do We Get On The Road To Maturity?

Process Improvement Steps

- Establish Process Group, if Possible
- Document Current Processes
- Institutionalize Processes
- Determine Process Improvement Goals
  - Short term goals (start with PP, PMC, MA)
  - Long term goals (add PAs, plan for SCAMPI)
  - Estimate ROI
- Prioritize Process Improvement Goals
- Develop Process Improvement Plan
  - Determine process improvement measurements
  - Begin measurement collection efforts
### Results of CMMI®-Based Improvement 2006

<table>
<thead>
<tr>
<th>Improvements</th>
<th>High</th>
<th>Low</th>
<th>Median</th>
<th>Number Data Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>87%</td>
<td>3%</td>
<td>34%</td>
<td>29</td>
</tr>
<tr>
<td>Schedule</td>
<td>95%</td>
<td>2%</td>
<td>50%</td>
<td>22</td>
</tr>
<tr>
<td>Productivity</td>
<td>329%</td>
<td>11%</td>
<td>61%</td>
<td>20</td>
</tr>
<tr>
<td>Quality</td>
<td>132%</td>
<td>2%</td>
<td>48%</td>
<td>34</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>55%</td>
<td>-4%</td>
<td>14%</td>
<td>7</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>27.7:1</td>
<td>1.7:1</td>
<td>4.0:1</td>
<td>22</td>
</tr>
</tbody>
</table>
Award fees increased by 55% compared to an earlier SW-CMM ML2 baseline.

Customer Satisfaction Continues to Improve

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Defect Prevention Using PSP and CAR at CMMI ML5

Improvements in:

Quality

Integrating PSP\textsuperscript{sm} and CMMI\textsuperscript{®} Level 5. Gabriel Hoffman, Northrop Grumman IT. May 1, 2003
Appraised at CMMI ML 5 in December 2002

Results
met 25+ milestones in a row
earned a rating of "Exceptional" in every applicable category on a formal Contractor Performance Evaluation Survey

Hours Invested: 124 in Defect Prevention (CAR)
Hours saved: 1650 hours (15 hours per defect)
ROI: 13:1

Integrating PSP™ and CMMI® Level 5. Gabriel Hoffman, Northrop Grumman IT. May 1, 2003
## PROCESS IMPROVEMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Expenditures</td>
<td>$207,000</td>
</tr>
<tr>
<td>Training costs</td>
<td>$69,000</td>
</tr>
<tr>
<td>Execution of Inspections</td>
<td>$358,000</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$634,000</td>
</tr>
<tr>
<td>Savings from Inspections</td>
<td>$2,524,000</td>
</tr>
<tr>
<td>Total Cost Savings</td>
<td>$1,890,000</td>
</tr>
</tbody>
</table>
Process Maturity Profile by Reporting Organization Categories

- Commercial/in-house: 100% = 496
- Contractor for Military/Government: 100% = 248
- Military/Government Agency: 100% = 38

Number of Appraisals

- Not Given: 7.9% (9), 8.5% (10)
- Initial: 2.8% (3), 4.4% (5)
- Managed: 35.1% (45), 30.2% (38)
- Defined: 28.4% (36), 36.3% (45)
- Quantitatively Managed: 4.4% (5), 3.6% (4)
- Optimizing: 21.4% (25), 16.9% (20), 5.3% (7)
### Industry Published SCAMPI Results

<table>
<thead>
<tr>
<th>Federal Contractor</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Delta 6/06</th>
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</thead>
<tbody>
<tr>
<td>BAE</td>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Boeing</td>
<td></td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Computer Sciences Corporation</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>General Dynamics</td>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>3</td>
<td>4</td>
<td>0/2</td>
</tr>
<tr>
<td>Northrop Grumman (including Mel.)</td>
<td></td>
<td>36</td>
<td>15</td>
</tr>
<tr>
<td>Raytheon</td>
<td>2</td>
<td>5</td>
<td>0/0</td>
</tr>
<tr>
<td>SAIC</td>
<td></td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Sikorsky Aircraft</td>
<td>1</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
â‚¢ Program Collected Metrics
â‚¢ Program Analyzed Metrics
â‚¢ Program Made Process Improvement Changes
â‚¢ Process Changes Improved Metrics
How Do We Get On The Road To Maturity?

Level 4

Indicates a problem

- Voice of the Process
  - Predictable & quantitatively understood
  - Statistics & quantitative techniques to manage processes & results
  - Address “Special Causes”

Control chart

Level 5

- Voice of the Customer
  - Continual & measurable process improvement to meet business objectives
  - Incremental & innovative process improvements
  - Address “Common Causes”

Capability Control Chart

Original zone of quality control

Chronic waste

Quality improvement

New zone of quality control

Less chronic waste
How Do We Get On The Road To Maturity?

**Objective:** Monitor key functional processes for predictability and measurable improvement (e.g., 10% productivity, 20% quality)

**Stable performance** (within control limits*)

**Predictable average of 9.1 rejections per month** (capability)

**Changes made:**
- Team personnel changes
- Stakeholder participation formalized
- Peer Review process deployed more formally
- Return to Green

Re-calculated limits due to process changes:
- Stable performance (within tighter control limits*)
- Predictable average of 2.5 rejections per month (capability) shows 73% measurable improvement

* not enough data points to classify as statistical control but can use trial limits
After process improvements implemented:

- Average cost performance improved **10%**
- Lower end of predictable performance range improved 33%

**BENEFITS:** Higher productivity, cost stability, higher award fees
How Do We Get On The Road To Maturity?

Rework ROI
- Estimate rework cost
- Estimate defect reduction
- Estimate cost avoidance

UPS ROI
- Estimate cost for downtime
- Determine cost of UPS
- Estimate savings

Automation ROI
- Estimate manual effort
- Estimate automated effort
- Estimate savings

Other Suggestions?
How Do We Get On The Road To Maturity?

- Convince Other Stakeholders
  - Show Management Support
  - Educate and Train
    - Motivate to change
    - Communicate vision
    - Teach Tools and Techniques
    - Reward compliance
  - Show Value for Them
What You Measure You Will Improve.

Author unknown

Harris Process Compliance Monitor

- Monitors all required processes
- Appropriate tailoring allowed
- Artifacts of compliance entered into tool
- Online product-centric evidence collection, objective auditing
- Online real-time project and organizational monitoring of process compliance
- Required compliance
### Process Compliance Color Scores

<table>
<thead>
<tr>
<th>Assessment Status Colors</th>
<th>Process Compliance Colors</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NY</td>
<td>Not Yet</td>
<td>To be appraised at a later date (i.e., the process has not yet been executed by the program and cannot be appraised)</td>
</tr>
<tr>
<td>NA</td>
<td>Not Applicable</td>
<td>Outside the scope of the project (e.g., Code and Unit Test Process is not applicable to a production-type program)</td>
</tr>
<tr>
<td>NS</td>
<td>Not Scored</td>
<td>Pending an appraisal</td>
</tr>
<tr>
<td>FI</td>
<td>Fully Implemented</td>
<td>Direct artifacts are present and appropriate (Note 2) No weaknesses noted (Note 1)</td>
</tr>
<tr>
<td>LI</td>
<td>Largely Implemented</td>
<td>Direct artifacts are present and appropriate (Note 2) One or more weaknesses noted (Note 1)</td>
</tr>
<tr>
<td>PI</td>
<td>Partially Implemented</td>
<td>Direct artifacts are missing in the initial scoring audit or direct artifacts are present but inadequate (Note 3) One or more weaknesses noted (Note 1)</td>
</tr>
<tr>
<td>NI</td>
<td>Not Implemented</td>
<td>Direct artifacts are missing for more than 30 days from the initial scoring audit</td>
</tr>
</tbody>
</table>

**Note 1:** A weakness ("gap") is considered if it is an impact to or risk of implementation of the process statement  
**Note 2:** An appropriate artifact is the IPM Expected Artifact or equivalent that demonstrates implementation of the process statement  
**Note 3:** An inadequate artifact does not demonstrate implementation of the process statement
How Do We Get On The Road To Maturity?

Process Compliance

A. Represents overall process compliance score for program
   - Based on lowest color score, harsh, but in keeping with CMMI standards

B. Depicts scoring distribution over all process items
   - More insight on overall project score

C. Depicts score for each process executed or being executed by this program
   - 3 columns identify types of processes
   - In PCM, point+click on underlined acronym drills down to scoring details for process

Project Evidence

This page allows users to edit project evidence.

Baseline: Rev.45 27-Jul-05

Li Project Score

Scoring Distribution


Export Project Status
How Do We Get On The Road To Maturity?

- Practical Software and Systems Measurement
- SEI Training Courses on Process Improvement
- Six Sigma Training
- Provide Technical Expertise
- Train Them to:
  - Follow the processes
  - Collect consistent measures
  - Analyze data
  - Suggest improvements
- Train for Appraisals

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• Process Improvement Proposal: Business Intelligence Implementation
• Invest in Tool, Save in Usage
• Current Estimates for Creating Metrics and Reports Monthly ~$1.5 million per Year
• Current Estimate for Incorporating BI ~$2M
• Time Saved Each Month Can be Used Elsewhere
• Other benefits
  • Consistent, timely, accurate data
  • Flexibility in reporting
  • Easier new analysis
Without a Vision, There Can Be no Improvements
- State, Share and Spread the Vision Of Process Improvement

Management Acts Based on the Bottom Line
- Show and Tell how process improvement can improve their business (ROI)

Other Stakeholders Tend to Follow Management
- Convince Other Stakeholders that management is convinced and is watching

Teams Want Improvement
- Show and Tell how process improvement will help them (ROI)
Debra J. Perry  
SW Engineer  
Division Process Group  
Harris Corporation  
debra.perry@harris.com  
321-727-6830

Harris Corporation  
http://www.harris.com/  
P.O. Box 37  
Melbourne, Florida 32902-0037
BACKUP SLIDES
• Page 9-12 Introduction to CMMI Version 1.2
http://www.sei.cmu.edu/products/courses/p44b.html

• Page 13 Profiles of Level 5 CMMI Organizations

• Page 15 No Satisfaction at Toyota
http://www.fastcompany.com/magazine/111/open_no-satisfaction.html
• Page 20 - Performance Results of CMMI®-Based Process Improvement 2006
  http://www.sei.cmu.edu/pub/documents/06.reports/pdf/06tr004.pdf

• Page 21 - Lockheed Martin results

• Page 22 - Integrating PSP\textsuperscript{sm} and CMMI® Level 5. Gabriel Hoffman, Northrop Grumman IT. May 1, 2003


Page 26 - SEI CMMI Published Appraisal Results [link](http://sas.sei.cmu.edu/pars/)
Getting There: Tips and Considerations for Marching Toward CMMI Maturity Level 4 or 5 by Gary Natwick, Debbie Perry and Sophie Boyd, SEPG Conference 26-29 March 2007
### Process Improvement Plan

<table>
<thead>
<tr>
<th>Level</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Process</td>
<td>Capability</td>
<td>Change</td>
</tr>
<tr>
<td>Process</td>
<td>Not Understood</td>
<td>Stable and</td>
<td>Optimized</td>
</tr>
<tr>
<td>Capability</td>
<td>Quantitatively</td>
<td>Controlled</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>Proactive</td>
<td>Predictive</td>
<td>Continuous</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td>Improvement</td>
</tr>
<tr>
<td>Improvement</td>
<td>Project</td>
<td>Division and</td>
<td>Division and</td>
</tr>
<tr>
<td>Focus</td>
<td></td>
<td>Project</td>
<td>Project</td>
</tr>
<tr>
<td>Measurement</td>
<td>Monitor and</td>
<td>Decision</td>
<td>Systemic</td>
</tr>
<tr>
<td>Focus</td>
<td>Control</td>
<td>Making</td>
<td>Issues</td>
</tr>
<tr>
<td>Analysis</td>
<td>Comparative</td>
<td>Statistical</td>
<td>Causal</td>
</tr>
<tr>
<td>Benefits</td>
<td>Repeatable</td>
<td>Predictable</td>
<td>Innovation and</td>
</tr>
<tr>
<td></td>
<td>Practices</td>
<td>Results</td>
<td>Improvement</td>
</tr>
</tbody>
</table>

- **Level 3**: Process
- **Level 4**: Capability
- **Level 5**: Change
- **Level 3**: Not Understood Quantitatively
- **Level 4**: Stable and Controlled
- **Level 5**: Optimized
- **Level 3**: Proactive
- **Level 4**: Predictive
- **Level 5**: Continuous Improvement
- **Level 3**: Project
- **Level 4**: Division and Project
- **Level 5**: Division and Project
- **Level 3**: Monitor and Control
- **Level 4**: Decision Making
- **Level 5**: Systemic Issues
- **Level 3**: Comparative
- **Level 4**: Statistical
- **Level 5**: Causal
- **Level 3**: Repeatable Practices
- **Level 4**: Predictable Results
- **Level 5**: Innovation and Improvement
### ROI for Management Example

#### Profiles of Level 5 CMMI Organizations

<table>
<thead>
<tr>
<th>Benefit Category</th>
<th>Benefit Range/Time ($ saved/months to realize)+</th>
<th>Optimization and Maintenance</th>
<th>Out-of-Phase Defect Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Avoidance</td>
<td>Starting Up: 2 to 12% savings/18 to 20 months*</td>
<td>Reaching the Next Level: 3 to 16% savings/16 to 18 months</td>
<td>Flat</td>
</tr>
<tr>
<td></td>
<td>Productivity Gains: 5 to 10% annually*</td>
<td></td>
<td>Flat</td>
</tr>
<tr>
<td></td>
<td>Faster Time-to-Market: Not applicable during startup</td>
<td>Improved ability to predict/meet schedule</td>
<td>Improved ability to predict/meet schedule</td>
</tr>
<tr>
<td></td>
<td>Quality Improvement: Not enough data</td>
<td>8 to 18% fewer errors/post release</td>
<td>12 to 26% fewer errors/post release</td>
</tr>
<tr>
<td></td>
<td>Estimated ROI: 15 to 51%/18 to 20 months</td>
<td>18 to 103%/15 to 18 months</td>
<td>12 to 36%/annually</td>
</tr>
<tr>
<td></td>
<td>Minimum Time (to achieve ROI): 18 months</td>
<td>15 months</td>
<td>Performed on an annual basis</td>
</tr>
<tr>
<td>Other benefits:</td>
<td>Fewer customer complaints</td>
<td>Increased customer praise</td>
<td>Continued customer praise</td>
</tr>
<tr>
<td></td>
<td>Improved competitive positioning</td>
<td>Perceived competitive gaps closed</td>
<td>Perceived competitive gaps closed</td>
</tr>
</tbody>
</table>

* (Profiles of Level 5 CMMI Organizations)
### Management Example 2 of 2

#### ROI for Management Example

(Profiles of Level 5 CMMI Organizations)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>($ expended/months to complete) +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting Up</td>
<td>$1 to 1.5M/ 18 to 20 months</td>
<td>$1.5 to 2.5M/ 18 to 22 months</td>
<td>$2.5 to 3M/ 20 to 24 months</td>
</tr>
<tr>
<td>Reaching the Next Level</td>
<td>$0.75 to 1M/ 12 to 16 months</td>
<td>$1 to 1.5M/ 15 to 18 months</td>
<td>$1.5 to 2M/ 18 to 21 months</td>
</tr>
<tr>
<td>in Process Maturity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimization and Maintenance</td>
<td>$0.35 to 0.5M/ 12 months++</td>
<td>$0.5 to 0.75M/ 12 months++</td>
<td>$0.75 to 1M/ 12 months++</td>
</tr>
<tr>
<td>Out-of-Phase Defect Focus</td>
<td>$0.5 to 0.78M/ 12 months++</td>
<td>$0.78 to 1.0/ 12 months++</td>
<td>$1.0 to $1.3M/ 12 months++</td>
</tr>
</tbody>
</table>

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we want to achieve the performance excellence goals required by our business. We are focused on achieving performance excellence and recognition as the preferred supplier for new business.

**Operational Results**

- Achieving CMMI Level 5 Certification for Raytheon image and competitive advantage is one thing, but look at the operational results.
- "Meeting Commitments" all improved concurrent with SEI CMMI Level 5 certification: Across the organization, we improved:
  - CPI by 5 percentage points, and reduced variation by 34%.
  - SPI by 8 percentage points, and reduced variation by 50%.
  - Defect Density by 44 percentage points, and reduced variation by 31%.

**Improvement Results**

- Demonstrated the linkage between R6σ and CMMI Levels 4 & 5.
- Characterization included over 300 applications of R6σ tools such as ANOVA, cause and effect, regression analysis, histograms, Cpk, hypothesis testing, logical process mapping, and others.
- Identified five projects to reduce variation in organizational performance and support the CMMI Level 5 timeline.
- Enabled CMMI Level 5 certification.
  - Improvement of Business Performance was recognized by Assessment Team as global strength in the CMMI Level 5 Assessment.
  - Contributed ROI of 3:1 through significant cost avoidance realized by organization improvements.
To Be Top-Tier is to See With New Eyes

- Process improvement is built into the system
  - Evidence Books used as patterns from previous appraisals were not sufficient to meet later expectations
  - Needed to add more evidence as our understanding of what makes a good process has grown
- The culture has changed
  - Process improvement is the object of many CAR and Six Sigma projects
  - Process people are not the first to go when budgets are cut
- It gets easier each time
  - Familiarity leads to quicker startup
  - Less training needed, less resistance to change

Projects Gain

- Produced more value-added products with reduced effort and time
  - Instead of overrunning budgets and schedules, products are delivered early and on budget
- Needed less “help” from senior management
- Lots of new work began pouring in
  - Communications with other groups was easier
  - Meshed well with cost reduction efforts
  - Easier to understand the role of Systems Engineering in Software Development

Project Leaders Gain

- More up front thinking means less work later
  - Fewer problems and risks along the way
  - Improved processes added slack to cost and schedule curves
    - Fewer replan exercises
    - Easier to give back resources
    - Easier to help other projects
  - Other projects consulted us to find out why things were going so well

Individuals Gain

- Better understanding of how to get job done
- Less stress
- Less time doing rework
- Easier to transfer from project to project
- Easier to understand need of Systems Engineering in Software Development
- Concerns were escalated more quickly to the proper level of attention
- More enthusiastic about looking for improvement opportunities
- Down side: SPIN meetings are much less popular
### Industry Investment In Process Maturity

#### GCSD vs. Industry Headcount from SEI Survey (December 2004)

<table>
<thead>
<tr>
<th>Year</th>
<th>GCSD</th>
<th>FY05</th>
<th>GCSD</th>
<th>FY06</th>
<th>REQ</th>
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<tbody>
<tr>
<td></td>
<td>0.0%</td>
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- **Industry Median**: 1.9% of Organization
- **Northrop-Grumman (Melbourne)**: 1.5% of Engineering

Where does your company fit?
How Do We Get On The Road To Maturity?

Process Improvement Flowchart

1. Document Processes
2. Determine Measures
3. Determine Goals
4. Collect Data
5. Analyze Data
6. Define Process Improvement
7. Process Improved? (Yes/No)

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How Do We Get On The Road To Maturity?

ROI Process Flowchart

1. Determine Scope
2. Estimate Current Costs
3. Estimate Change Benefits
4. Calculate ROI
5. Present to Management
6. Change Approved?
   - Yes
   - No
   - Track Actual Costs
   - Present to Management

Approved?

- Yes
- No

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