Measuring the Economic ROI and Benefits of CMMI-based Improvements in Private Industry

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Introduction to ABB

- ABB is a multi-national corporation that develops products, largely software-intensive, for the power and automation technology market segments
- ABB products include: motors, drives, robots, instruments, control systems, low voltage devices, protective relays, power monitoring and control systems, and many more
- ABB’s products help operate Utilities, power generation plants, process industries, manufacturing plants, and other industrial organizations
- Currently, the ABB Group of companies operates in more than 120 countries and employs around 120,000 people
Organizational Structure of ABB

- **Power Technologies Division**
  - Power Systems
  - Medium-Voltage Products
  - High Voltage Products
  - Transformers
  - Utility Automation Systems

- **Automation Technologies Division**
  - Automation Products
  - Manufacturing Automation
  - Process Automation
Process Improvement Motivation at ABB

- Primary customers of ABB are commercial organizations (Utilities and Industrials) non-DOD
- Motivation to improve is driven by commercial competitive advantage
Implementing Continuous Process Improvement

- Define Medium-term Process Improvement Plan (PIP) and identify organization’s business goals
- Conduct internal CMMI Appraisal
- Develop Strategic Action Plan (SAP) prioritizing process improvement activities using Business Goals
- Implement PIP and SAP
- Monitor ROI
- Re-start cycle
Mission

- To assist ABB organizations to improve their product development processes by implementing a sustained continuous process improvement culture using the Capability Maturity Model Integration (CMMI) and the IDEAL Model
ASPI Support at ABB

Product Development Units in ABB Globally in PT and AT Divisions

Support ABB Development Units in the Continuous Improvement of their Product Development Processes

USCRC ASPI Team

CECRC ASPI Team

SECRC ASPI Team

CEPG
IDEAL Model

Initiation Stage

- Identify the Business Goals of development organization
- Develop the organization’s Process Improvement Plan (PIP) for medium-term and long-term
- Assess the organizational readiness for process improvement
  - Sponsor
  - Change Agent
  - Relevant stakeholders affected
- Identify metrics associated with process improvement in organization
  - Metrics will define measurements that will be taken to evaluate economic benefits of process improvement activities
  - On-time delivery, COPQ, cycle-time, first-yield, etc.
Example of Organizational Business Goal

- Improve design process and procedures to assure zero defect designs - Continued Product Quality Improvement

  - **Measure:**
    - a) Zero Defects for 6 months after product release as measured by customer complaints
    - b) Zero Product Advisory Letters for 2 years after product release
    - c) COPQ (R&D) reduction by 15% from 2003 (Productivity gain of 3%)
    - d) Case Tracking/Software Action Request (bug) reduction by 10% from 2003
Example of Organizational Business Goal

- Product quality improvement. The measures:
  - R & D COPQ (cost of poor quality) to be reduced by 25% from 2002,
  - Case Tracking/SAR (bug) reduction by 50% from 2002.
Diagnostics Stage

- Use business goals to identify scope of appraisal
- Determine scope of the appraisal
- Perform an internal Class “B” Appraisal
- Identify strengths and weaknesses in processes
Establishing Stage

- **Create SAP**
  - Used to document the shared understanding of the expectations, priorities, and goals of the process improvement project

- **Prioritize Improvement Activities**
  - Business Objectives
  - “Low-Hanging Fruit”

- **Identify and Allocate Resources**
  - Each activity run as a project
  - Change Agent / Process Owner = Project Manager
  - **BUDGET**, as well as **TIME**, must be allocated for personnel to perform work on the project
    - Schedule is developed
    - Resource conflicts are identified and negotiated
Strategic Action Plan

Activity Title

Description:

Resource Requirements:

Effort Estimate:

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Resources</th>
<th>Effort</th>
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Deliverables:

Risks:

Description:

Mitigation Plan:
Acting Stage

- Define Procedures
  - Define Process
  - Identify relevant stakeholders and responsibilities
  - Include Metrics as part of the process

- Review and Pilot Improved Procedure

- Formalize and Train Procedure

- Institutionalize Metrics Program
  - Collect metrics
  - Analyze metrics
  - Report metrics
  - Monitor metrics program (ASPI)
Define Procedures

Purpose

Define the process to be implemented to satisfy the scope of the Metrics program.

- Maintain the strengths of the processes identified during the appraisal
- Identify areas for improvement (Weaknesses identified)
- Agree on the process to meet the business needs.
Institutionalize

- **Training**
  - The rationale behind the procedure
  - How the new process is performed
  - The roles and responsibilities within the procedure
  - How to obtain help

- **Monitoring**
  - Provide answers to any questions
  - Provide help when problems are identified by identifying solutions quickly
  - Monitor the status of the project
    - Business objectives are being obtained
    - Procedure is being implemented
Metrics Process
Learning Stage

- Year/Cycle end Meeting
  - Review progress with respect to SAP
  - Review progress with respect to PIP
  - Review process improvement project
  - Review updated process improvement metrics
    - Were metrics collected properly?
    - Enough resources to collect metrics?
  - Discuss economic benefits of process improvement activity reviewing metrics and organization’s business goals
    - Were metrics adequate to measure business goals?
    - Were business goals achieved?
  - Discuss how to make corrective actions for things that did not work
  - Begin plans for next cycle
Lessons Learned

- All managers collect some form of metrics on their projects
  - Usually is not formalized
  - Do not always have defined performance objectives
  - Many times are not part of the development process
- Need constant (weekly) meetings to ensure that the metrics are being collected and analyzed
  - Ensure that everyone is aware of and performing their responsibilities
  - The collection and analysis of metrics needs to be institutionalized within the process
  - Verify that the metrics being collected and analyzed support the identified business objectives
Lessons Learned - 2

- Change is the only consistent constant factor in any process improvement activity
  - Need to ensure that all appropriate stakeholders have buy-in to the process and the metrics that are being collected
  - Make sure to keep management informed and involved
  - Have alternative (mitigation) plans available
- Processes need to be defined, implemented, and verified prior to automating the process
- Train everyone in the process to ensure successful implementation
- Determine as simple metrics as possible
Questions ?