

## CMMI Level 5: Return on Investment for Raytheon N TX

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#### **Achieving CMMI Level 5**

- We did it!
- How Did We Do It?
  - Achieve Engineering Goals.

This presentation describes the benefits of achieving CMM Level 4 in 2001, and then to achieve CMMI Level 5 in 2003.



#### We Did IT!



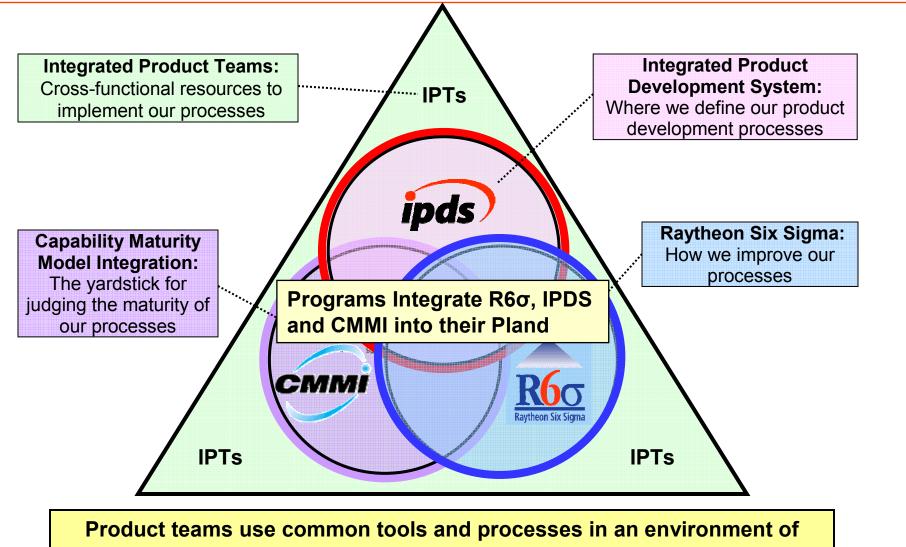
- Raytheon North Texas is the first site in Raytheon and fifth company in the world to achieve CMMI Level 5.
- -Measurable results are achieved *before* achieving Level 5.
- This Presentation shows the actual ROI of going to each level, as well as our ROI projection.

#### How Did We Use CMMI to Achieve?

- Why is Raytheon North Texas pro-active about achieving CMMI Level 5?
  - Because 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.

#### Raytheon

#### **Envision Improvement**



continuous improvement guided by industry "Best Practices"

# How Did We Achieve Performance Goals?

- How did we use CMMI to achieve our performance excellence goals?
  - -We picked performance goals that were important to us.
  - -The metrics data we collect characterizes the organizational performance in terms of our organizational goals and identifies opportunities of improvement.

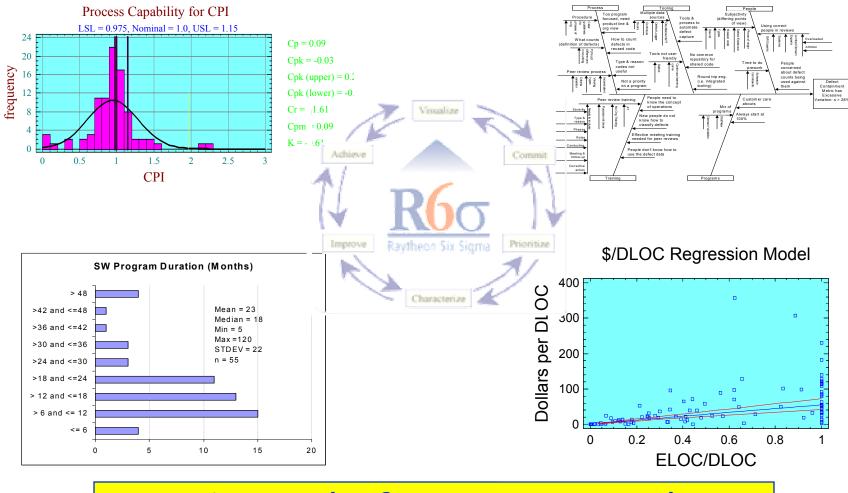
#### **SWEC SWIP Objectives**

- Meet Commitments (to Customer)
  - Intent: Meet the cost and schedule objectives of the programs we support.
  - Quantification: CPI and SPI
- SW Price
  - Intent: Price software engineering products competitively
  - Quantification: \$ / DLOC
- Deliver Quality
  - Intent: Deliver quality software engineering products
  - Quantification: In-phase Defects and Defect Density

#### We have been executing statistical process control on the overall process using these measures for years.

#### **Raytheon**

## Organization Process Analysis



Use R6<sub>5</sub> Tools for Metrics Analysis

#### **Improvement Results**

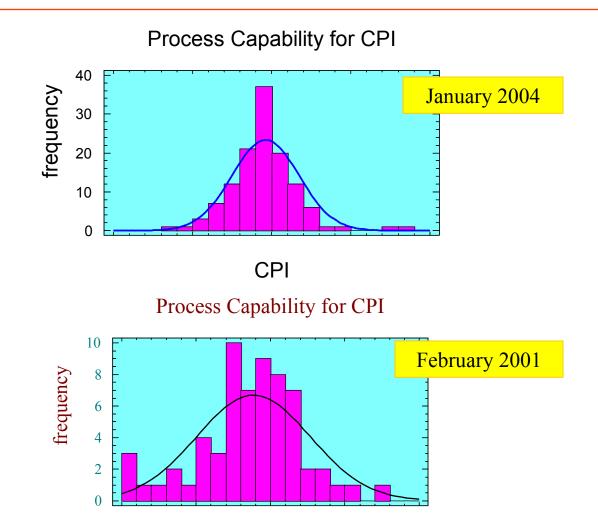
- Demonstrated the linkage between R6 $\sigma$  and CMMI Levels 4 & 5.
- Characterization included over 300 applications of R6σ tools such as ANOVA, cause and effect, regression analysis, histograms, Cpk, hypothesis testing, logical process mapping, and others.
- Identified five projects to reduce variation 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

#### **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%

#### Raytheon

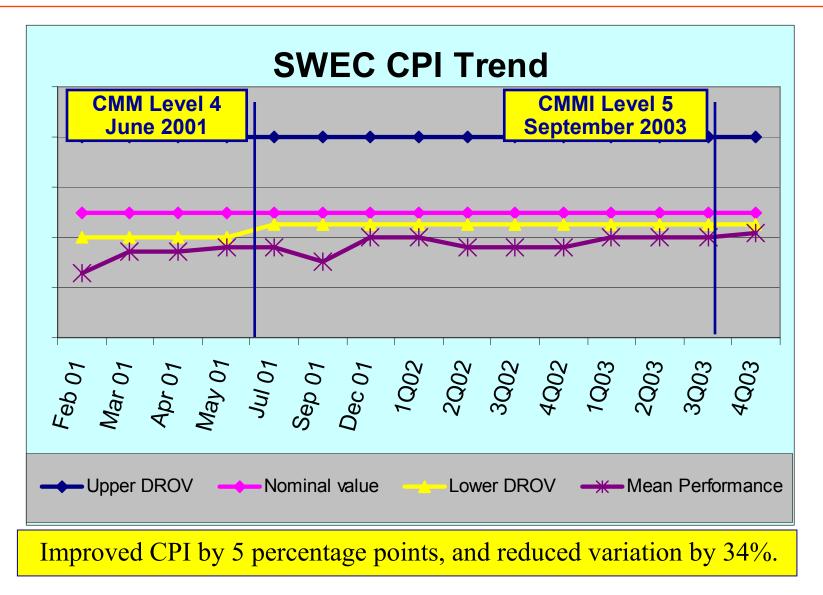
### **Cost Performance Index**



We no longer have CPI special cause variation on the low end!

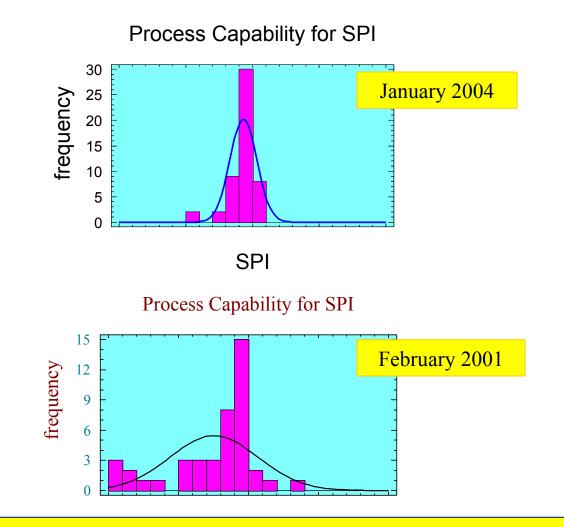


#### **Cost Performance Index**





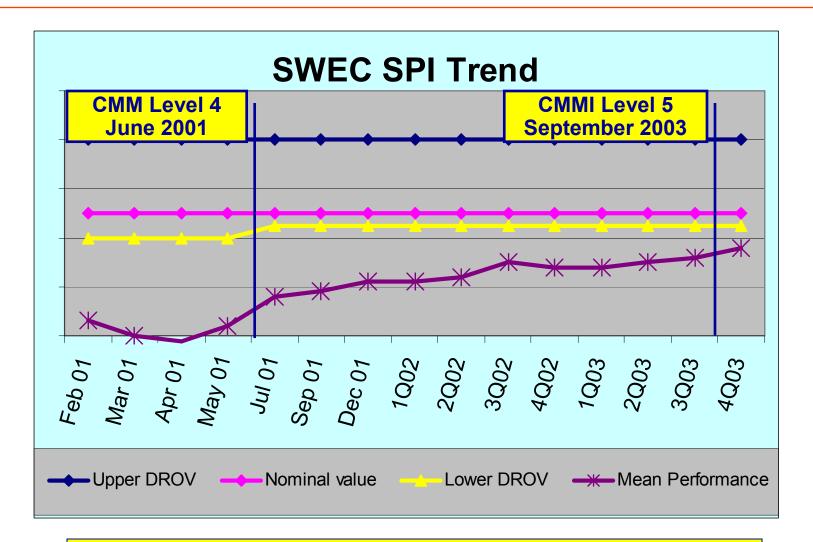
### **Schedule Performance Index**



We are still moving in the right direction!



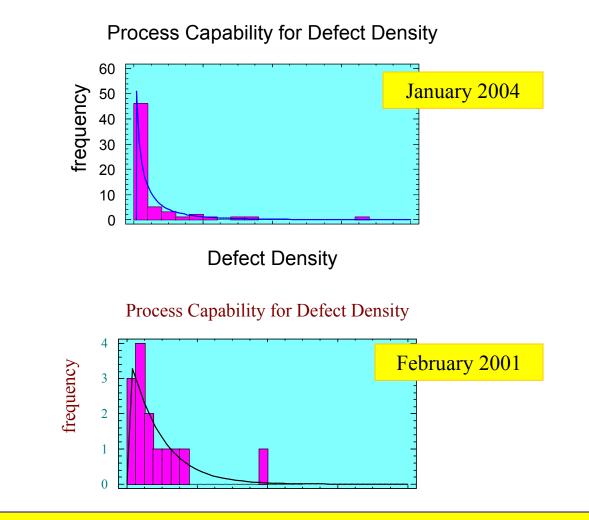
#### **Schedule Performance Index**



**Improved SPI by 8 percentage points, and reduced variation by 50%** 



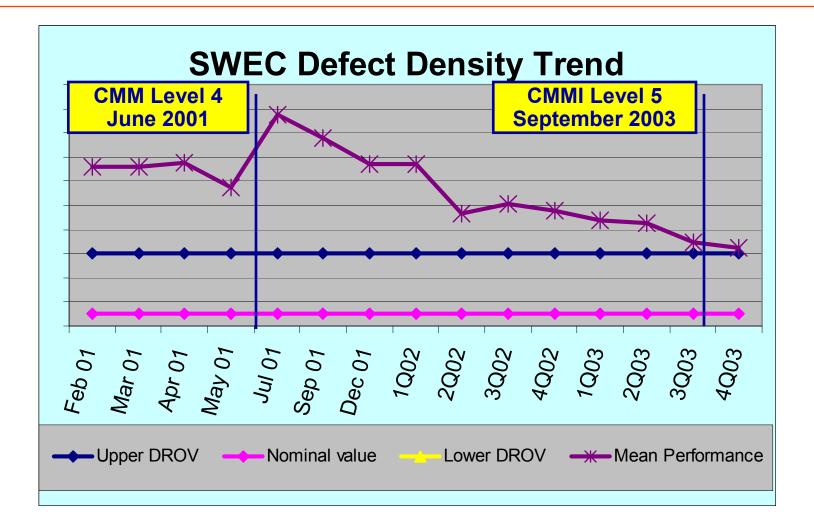
## **Defect Density**



**Continuing improvement in mean and variation.** 



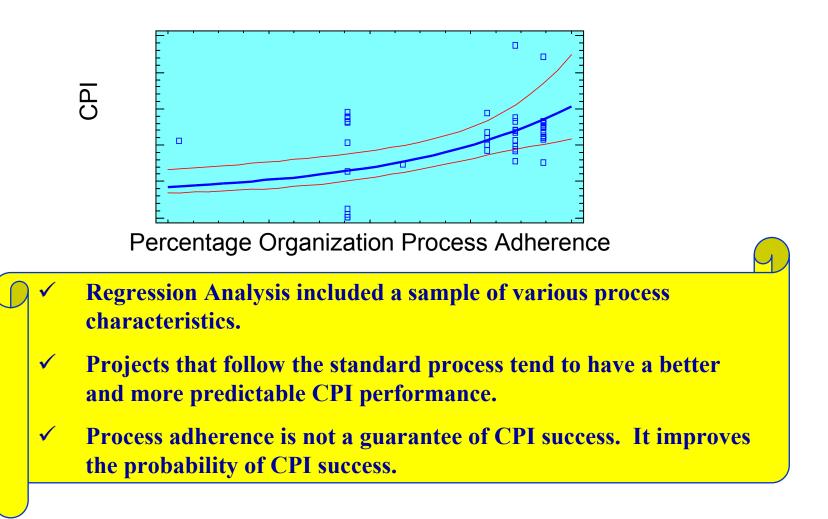
#### **Defect Density**



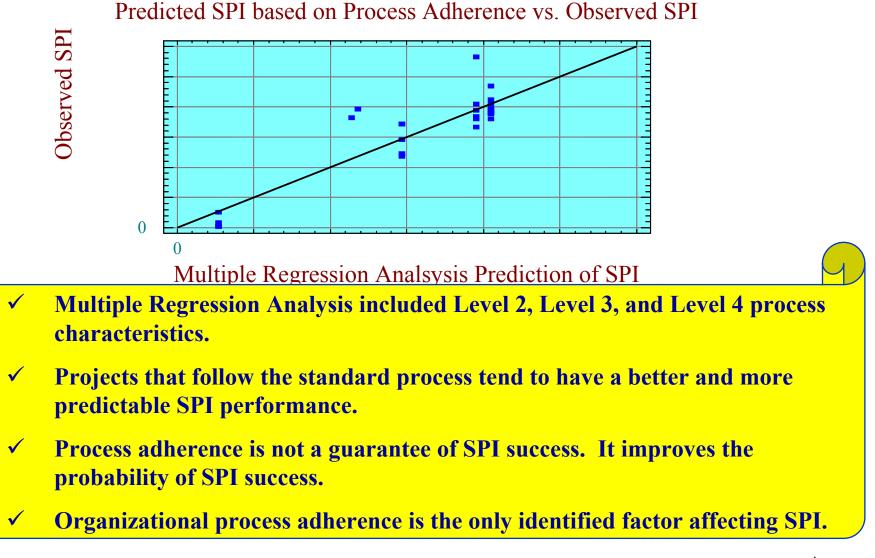
Improved Defect Density by 44 percentage points, and reduced variation by 31%

#### **Characterize – CPI Analysis**

Plot of Regression Model



#### **Characterize – SPI Analysis**



#### Results

- Our improvements were recognized as organizational strengths in the appraisal.
- "This accomplishment leads the way for Raytheon to distinguish ourselves from the competition and achieve customer satisfaction through superior program execution. There is no higher illustration of customer focus than this level of excellence."

Colin Schottlaender, Raytheon NCS President

