

# Data Analysis in Support of Goal Achievement

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# The Higher Maturity Focus

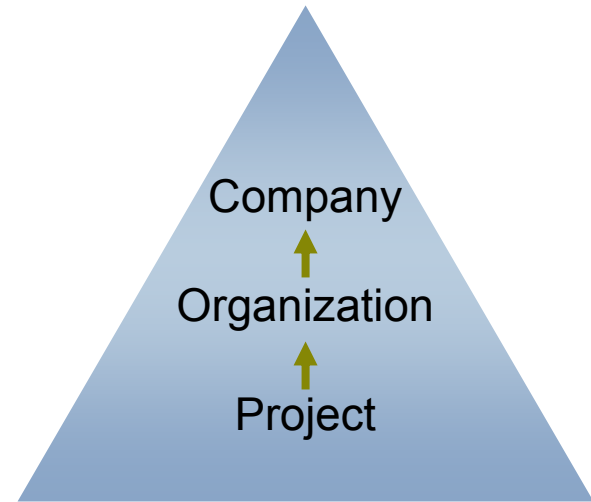


In a continuing effort to move an organization to higher maturity levels processes and procedures are deployed to projects that are new to the organization.

As those projects are integrated, the output of processes are monitored and analysis is performed on the data.

# Organizational Goals

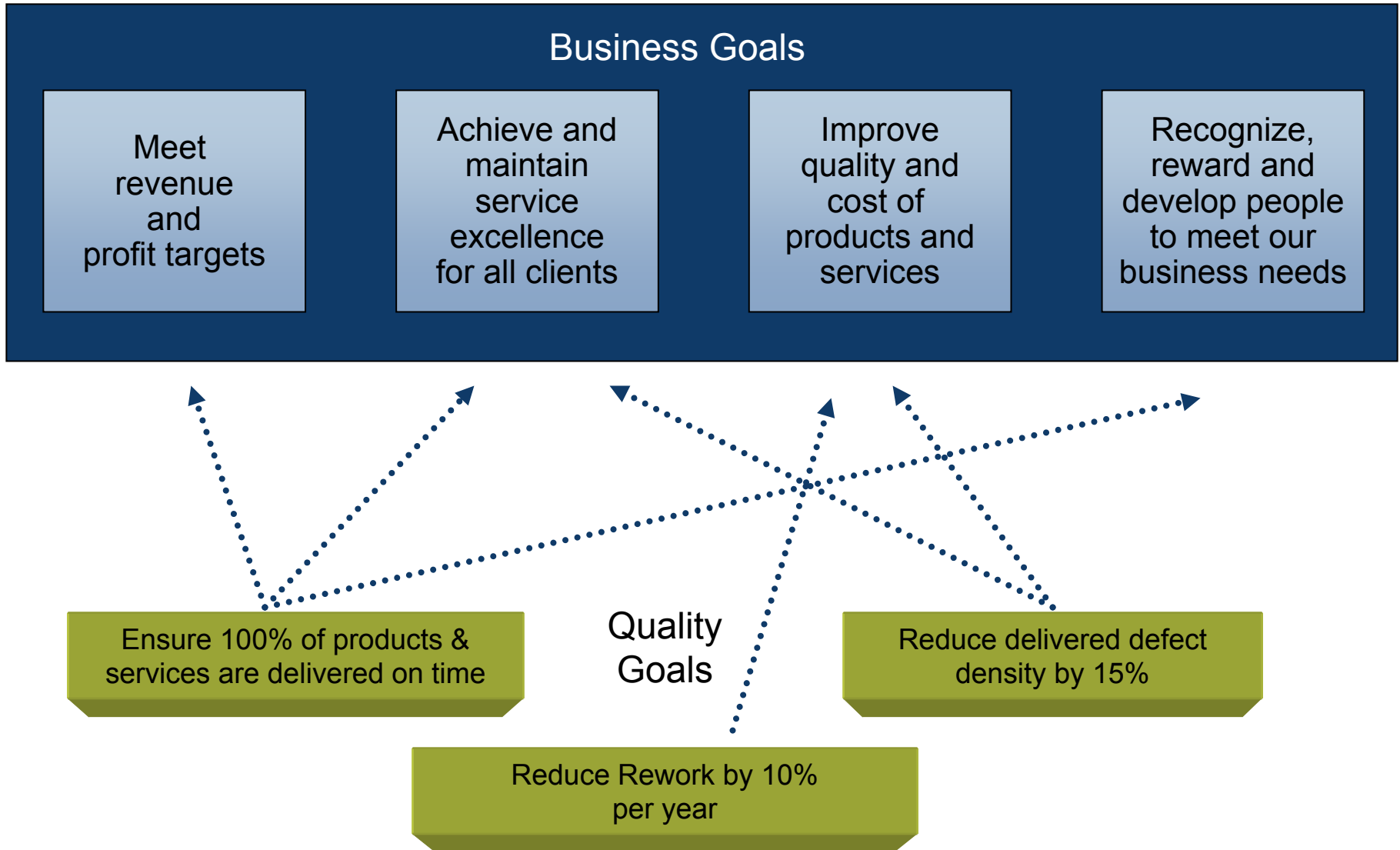
Senior Management identified goals to which an organization mapped its goals. The Projects in turn mapped their QM goals to the organization goals.



Next, the process areas which supported those goals were identified:

- Organizational Capability
- Organizational Productivity
- Delivered Defect Density

# Organization Business and Quality Goals - Initial Year



# Organization Business and Quality Goals - Second Year

## Business Goals

Meet revenue and profit targets

Achieve and maintain service excellence for all clients

Improve quality and cost of products and services

Recognize, reward and develop people to meet our business needs

Meet sales targets

## Quality Goals

Ensure 100% of products & services are delivered on time

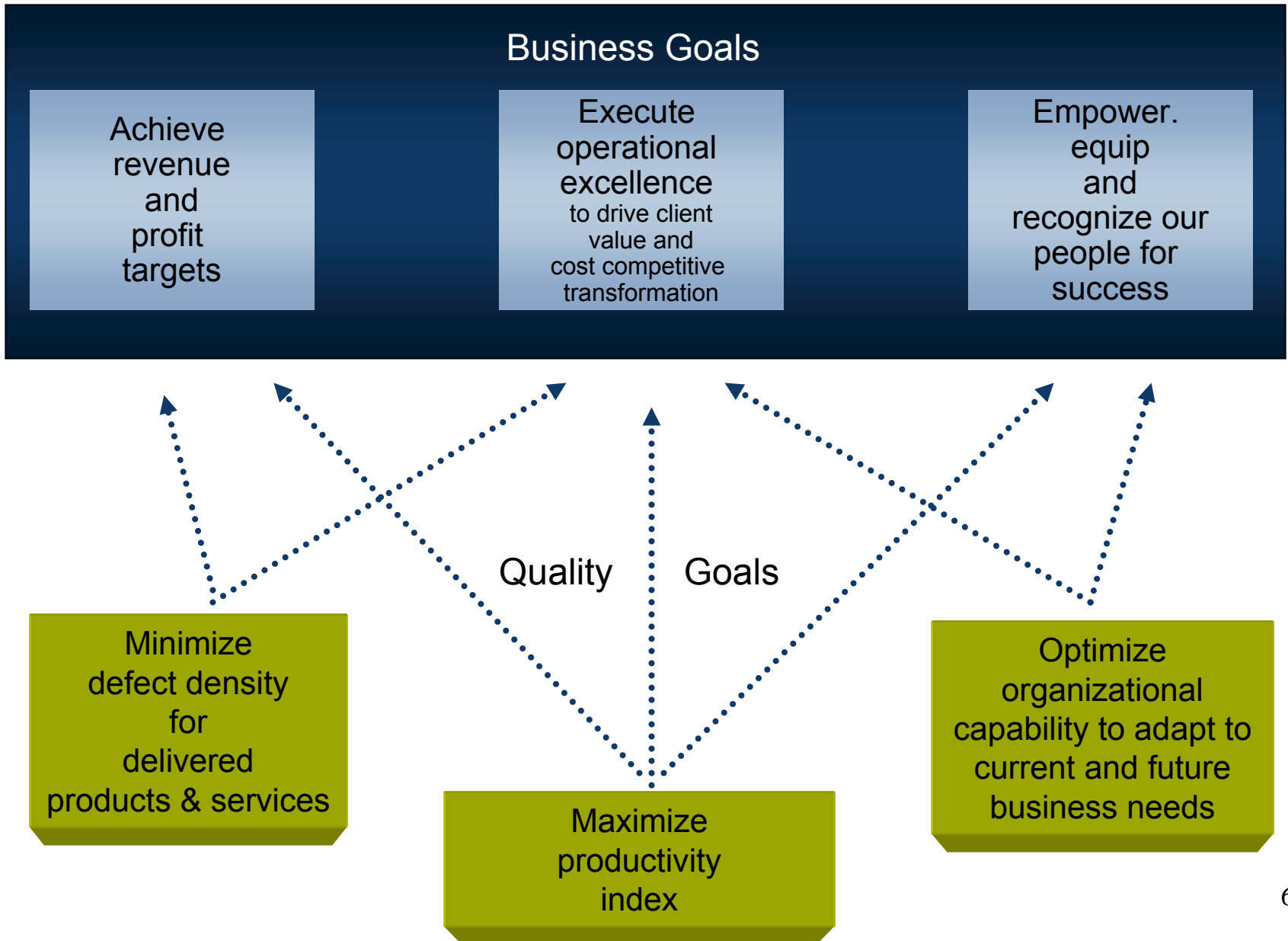
Reduce the variation of the "delivered defect density by function point" process by 30 percent while maintaining the average delivered defect density at or below the January baselined capability of 5.76 defects per 100 function points

Perform at or below 3% rework

Maintain the "delivered defect density by object" process capability at or below the January baselined capability of 8.48 defects per 100 objects

Reduce variation in productivity index

# Organization Business and Quality Goals - Third Year



# Maximize productivity index

Contributing Quantitative Management Goals:

**Minimize rework as percentage of total project effort**

**Minimize actual vs. plan variance in effort**

**Minimize actual vs. plan variance in delivery date**

## Derived Measures - Maximize productivity index

- Rework index =  $100 * (\text{Total project rework effort} / \text{Total project effort})$
- Effort variance =  $100 * (\text{Actual effort} / \text{Planned effort})$
- Delivery date variance =  $100 * (\text{Actual delivery date} - \text{Planned start date}) / (\text{Planned delivery date} - \text{Planned start date})$

**NOTE:** When planned start date is reached, neither the planned delivery date nor the planned start date may be changed.



# Optimize organizational capability to adapt to current and future business needs

Contributing Quantitative Management Goals:

**Optimize number of staff prepared to support future business needs**

**Optimize 'project management' effort as a percentage of total project effort**

# Derived Measures - Optimize organizational capability to adapt to current and future business needs

- Determine from Technology and Sales Groups what is the new technology (asked for or forecast); Number of organization employees; Number trained in specified technologies; Number of organization employees for whom technologies would apply
- Project management index =  $100 * (\text{Total project management effort}) / (\text{Total project effort})$

# Minimize defect density for delivered products and services

Contributing Quantitative Management Goals:

**Minimize defects per function point in delivered software products**

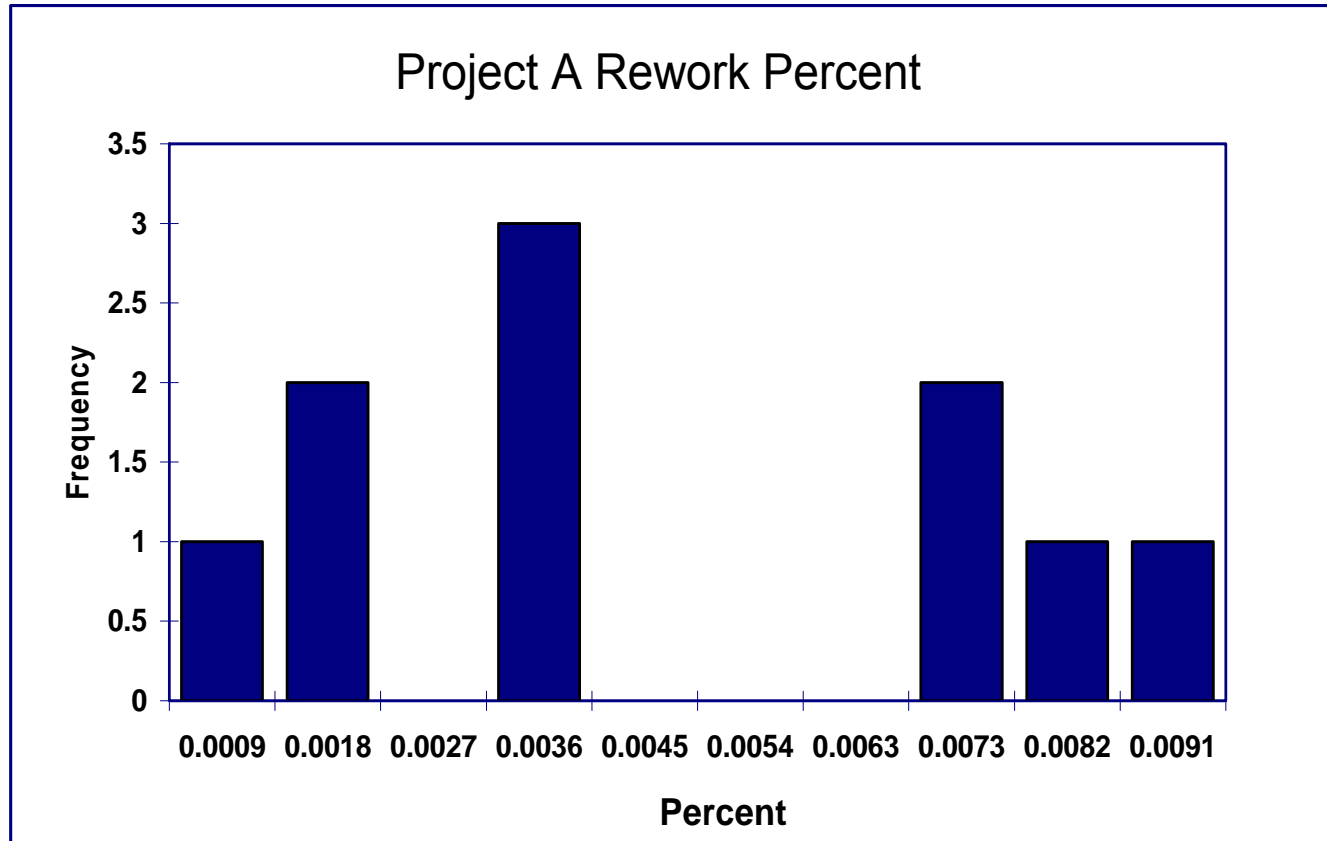
**Minimize defects per page of delivered documentation**

**Minimize defects per (service types set by individual projects) services provided**

# Derived Measures - Minimize defect density for delivered products and services

- Defect density = (Number of defects / Work product size) Function Point
- Defect density = (Number of defects / Work product size ) Pages of Documentation
- Defect density = (Number of defects / Work product size) Services (TBD – project specific)

# Data Analysis - data distribution



# HYPOTHESIS:

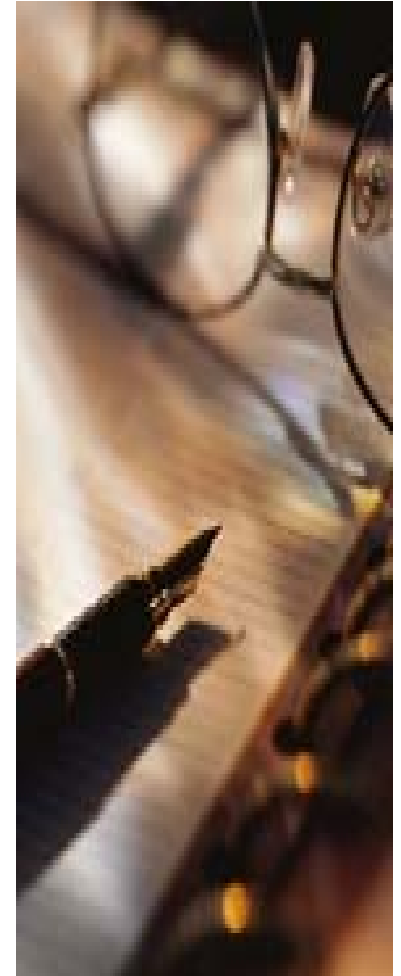
## Null Hypothesis -

$$H_0: \mu_1 - \mu_2 = \Delta_0$$

where  $\Delta_0$  is a predetermined, standard difference, but is usually set to zero (which makes the null hypothesis equivalent to  $\mu_1 = \mu_2$ ) and  $\mu_1$  and  $\mu_2$  are the means of the two populations of interest

## Alternative Hypothesis -

$$H_1: \mu_1 - \mu_2 \neq \Delta_0 (\mu_1 \neq \mu_2)$$



# Two Sample t-test Calculator

## Comparison of Means

*Enter significance level ( $\alpha$ ):*

**0.05**

*Enter sample size 1 ( $n_1$ ):*

**10**

*Enter sample size 2 ( $n_2$ ):*

**10**

*Enter first sample mean ( $\bar{y}_1$ ):*

**0.0044**

*Enter second sample mean ( $\bar{y}_2$ ):*

**0.0157**

*Enter difference of interest ( $\Delta_0$ ):*

**0**

*Enter sample standard deviation ( $S_1$ ):*

**0.011**

*Enter sample standard deviation ( $S_2$ ):*

**0.032**

Cut-off values for:

2-sided alternative:

**-2.2010**

**2.2010**

Test Statistic ( $t_0$ ):

**-1.0670**

P-value:

Two sided alternative:

**0.3088**

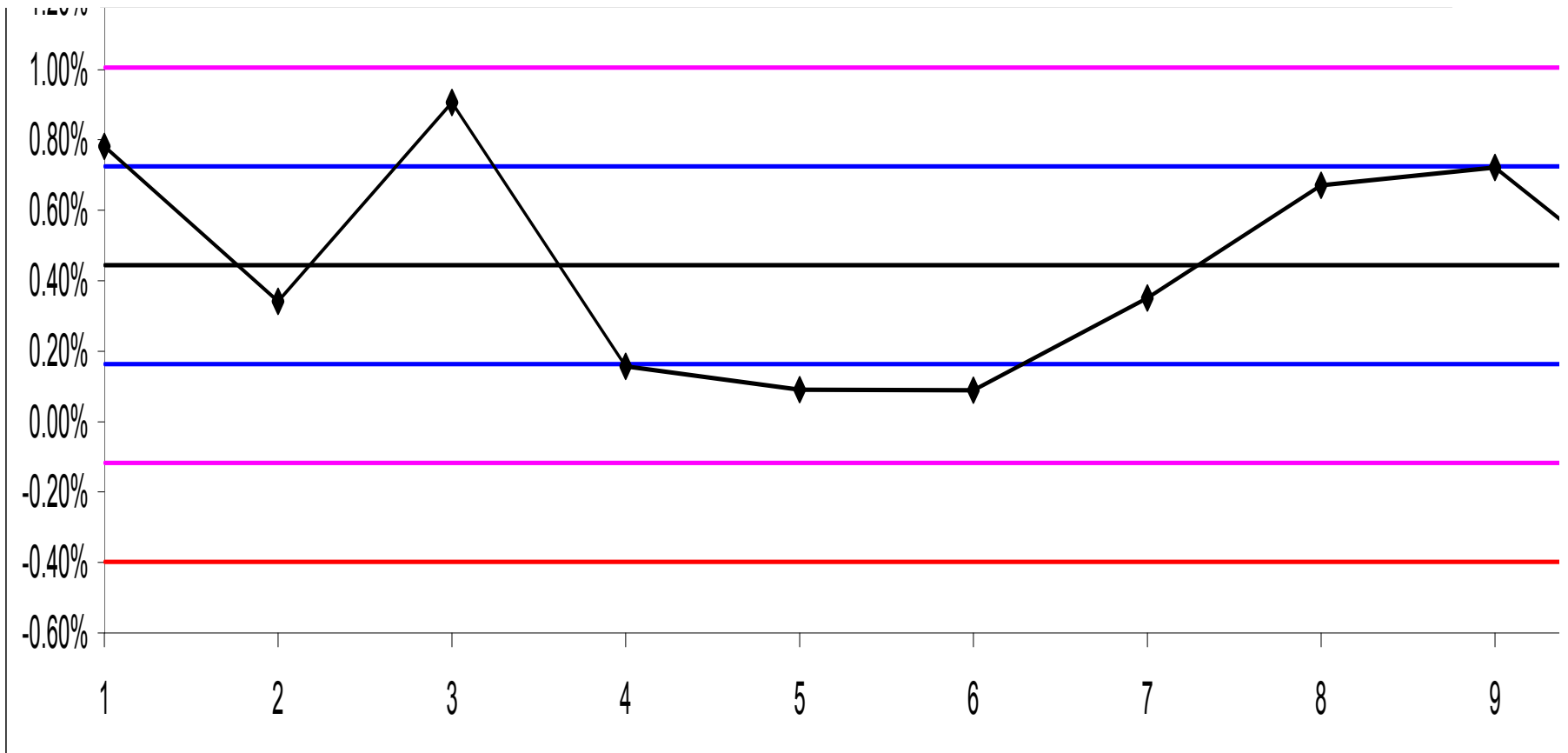
Confidence Interval for  $\mu_1 - \mu_2 = \Delta_0$ :

Two-sided confidence interval:

**-0.0346**

**0.0120**

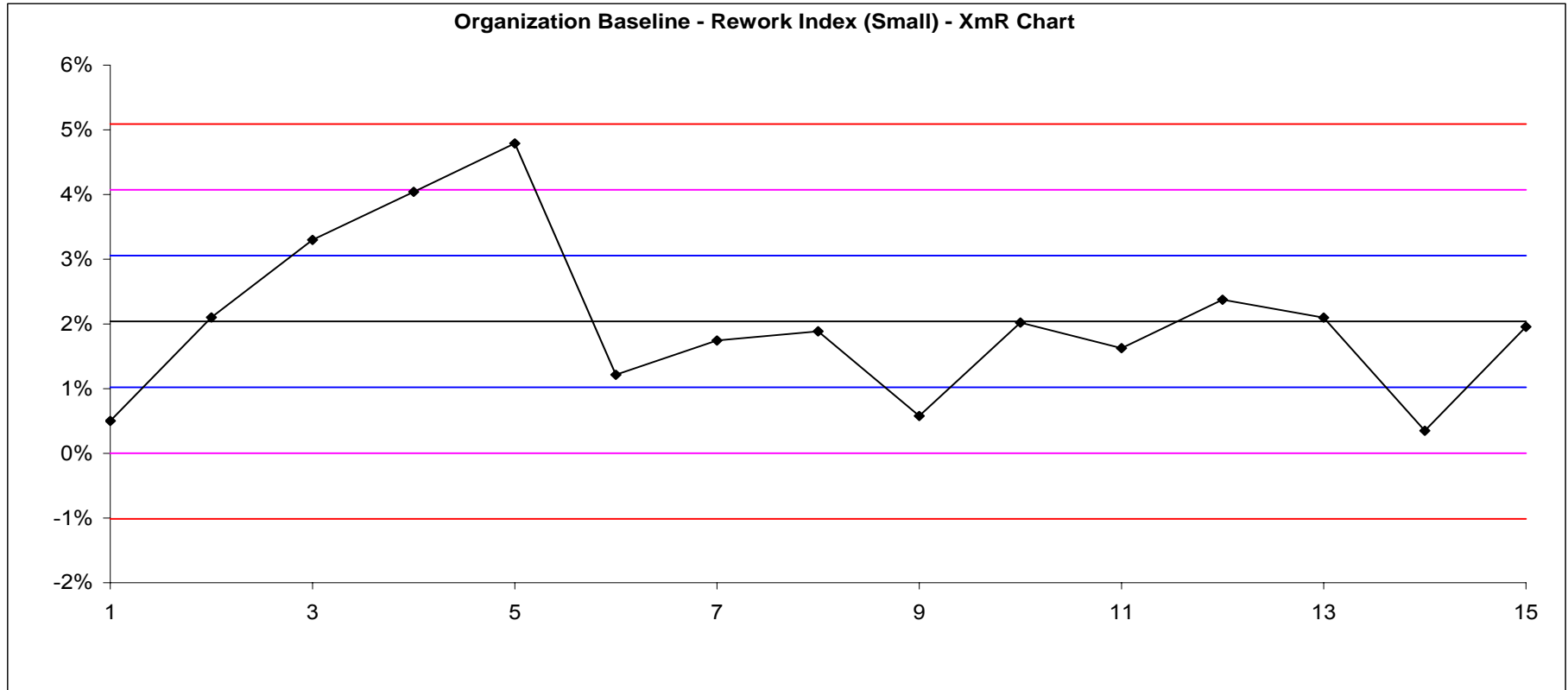
# Maximize Productivity Index - Rework Index



Projects > 45 FTEs

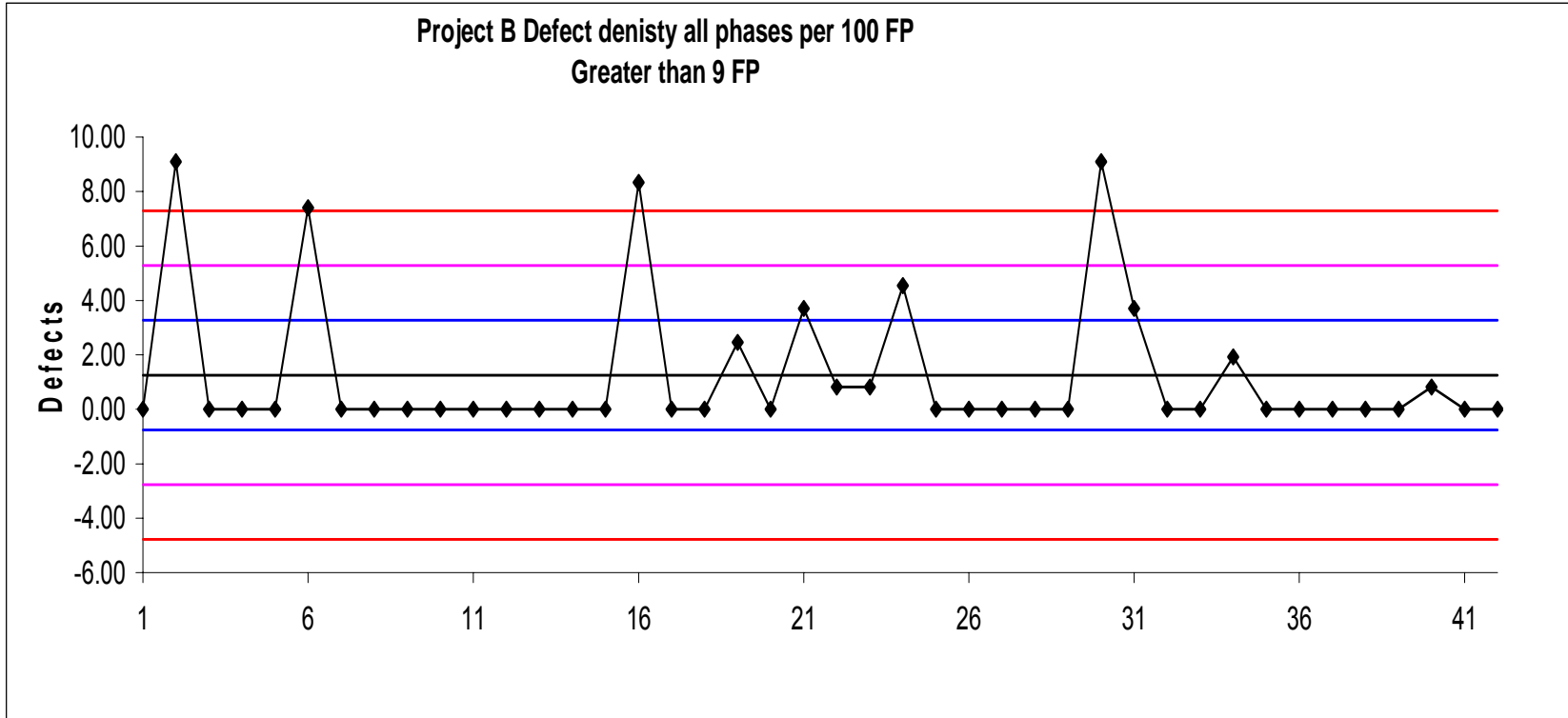


# Maximize Productivity Index - Rework Index



Projects < 45 FTEs

# Defect Density - stratified by FP size



# Organization Baselines and Performance Models

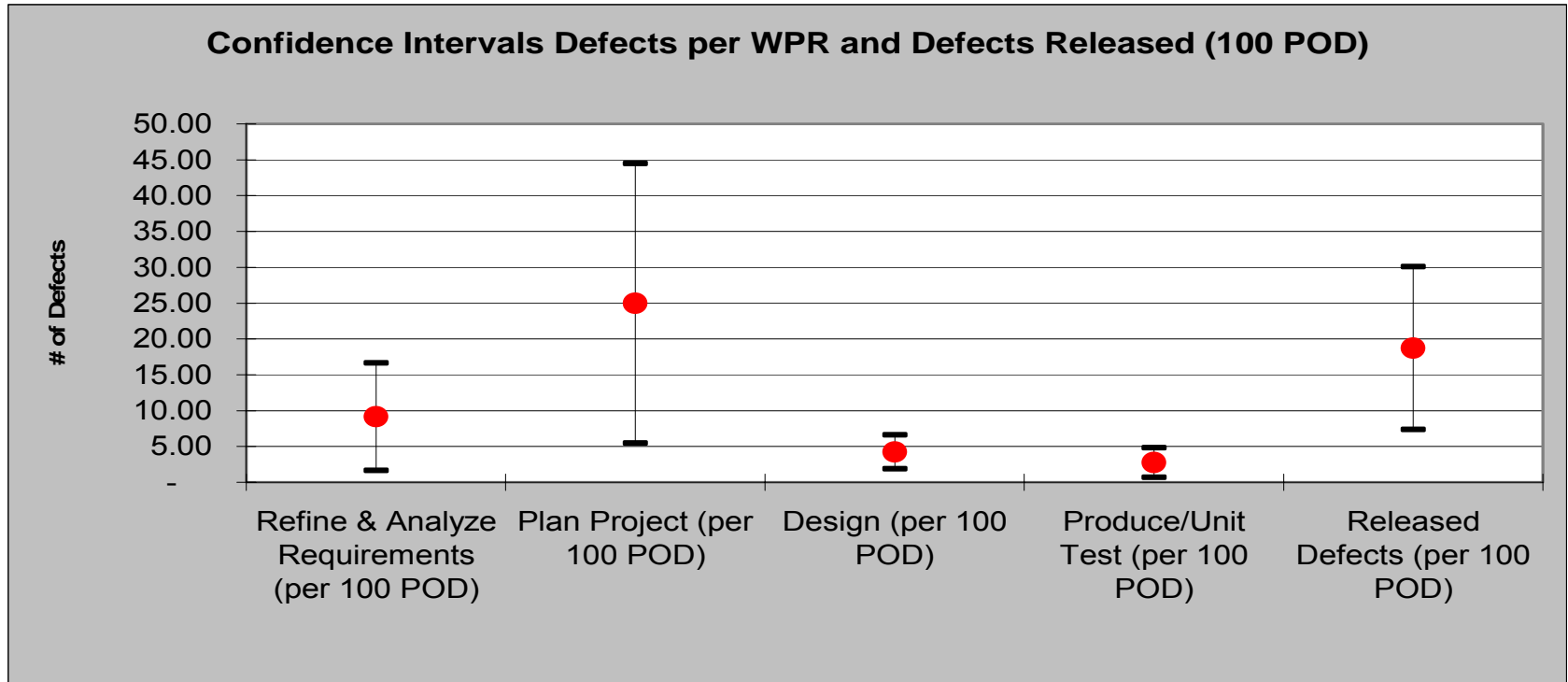


Establishing the Organizational Process Capability Baselines and Models provided insight into process capability. Knowing the current situation enables us to set more realistic goals for the organization and subsequently the projects.

Baselines and models enable projects to gauge their progress towards these goals, and to also predict future process behavior and perform estimates.



# Organization Process Performance Model



Models are derived from the capability baselines. The models are used to predict process and subprocess performance. Multiple models have been developed and are stored in an organizational repository, along with the baselines. The models and baselines are used to determine if the projects are making progress toward the organizational goals.

## Defect Detection - different model type

	<b>Expected Defects</b>	<b>Variation</b>
<b>Prep Time &gt; 100 Min</b>	25	5
<b>Prep Time 50 &lt; PT &lt;= 100 Min</b>	12	2
<b>Prep Time PT &lt; 50 Min</b>	3	.2

# Questions

*Questions?*