IFPUG 04

Identifying Your IT Organization's Best Practices

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TOPICS FOR DISCUSSION

- Business Goals and Objectives
- Identifying Best Practices –
  Performance Measurement
- Case Studies
  - Quantitative Risk Assessment
  - Qualitative Risk Assessment
  - Modeled Improvements
- CMMI

GOALS AND OBJECTIVES

GOAL

Establish a baseline in order to measure the impact of strategic business initiatives aimed at improving quality and reducing costs.

OBJECTIVES

- Establish a baseline rate for performance using function points.
- Generate industry accepted performance measures including rate of delivery, cost of delivery, time to market and defect density.
- Create profiles of performance to identify high impact factors which contribute to performance productivity.

THE BASELINE APPROACH

The established baseline should be a selection of representative projects, products or releases.

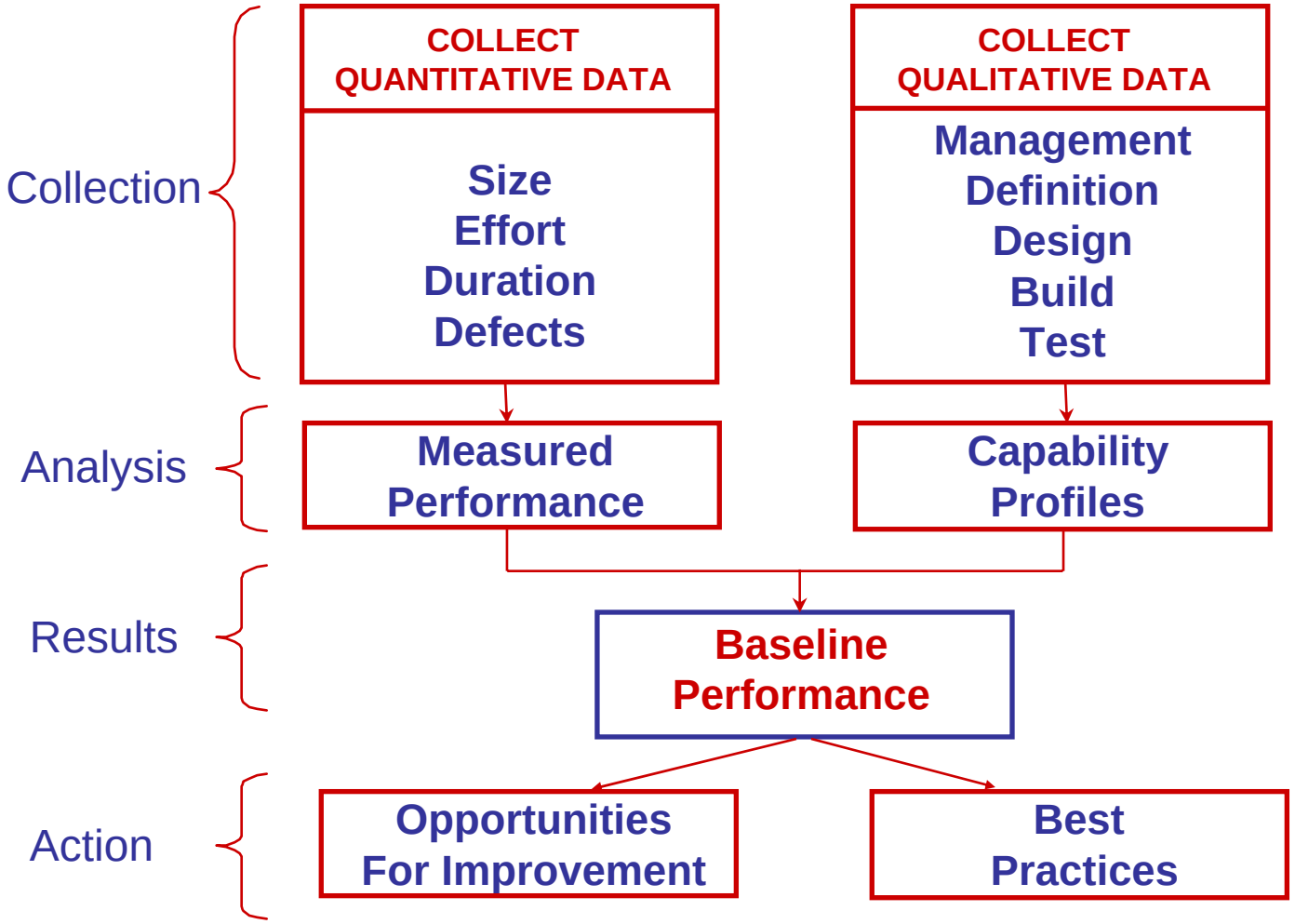
Quantitative Assessment

- Perform function point analysis on all selected projects by certified CFPSs.
- Collect data on project level of effort, cost and calendar start and stop times.
- Calculate productivity rates for each project, including functional size delivered per person month, cost per functional size, time to market delivery and defect density.

Qualitative Assessment

- Conduct Interviews with members of each project team.
- Collect Project Profile information.
- Develop Performance Profiles to display strengths and weaknesses among the selected projects.
- Link Performance Profiles to productivity performance levels.

QUANTITATIVE & QUALITATIVE



Case Study 1

Profile: Large Financial Institution, Org. Improvement

Quantitative Assessment

PROJECT COSTS

Segment	Average Cost/FP
Overall	$748.05
New Development	$870.15
Enhancement	$704.06
A 39	$835.64
A 89	$1,205.83
A 35	$467.86
A 04	$659.42
A 74	$463.22
A 52	$865.14
A 32	$668.00
A 88	$445.23
A 71	$782.94
A 31	$1,693.57

- New development is more expensive than enhancement. The most expensive project was also the least productive project (5.9 FP/EM).
- Five (50%) of the projects had a lower Cost/FP than the overall average.

PRODUCTIVITY RATES OVERALL AND TYPE

Segment	Productivity (FP/EM)	Productivity Range	Industry Average (FP/EM)
Overall	13.4	5.9 - 22.5	12.4
New development	11.5	8.3 - 21.4	14.1
Enhancement	14.2	5.9 - 22.5	11.8

- Average productivity was higher than the Industry Average for projects of similar size and profile.
- New Development was less productive than Enhancement productivity and lower than the Industry Average.
- Enhancement productivity exceeded Industry Average.
- Large range variance indicates a people-dependent environment.

TIME-TO-MARKET OVERALL AND TYPE

Segment	Average Time-To-Market (Months)	Time-To-Market Range	Industry Average Time-To-Market (Months)
Overall	6.7	1.8 - 10.5	4.6
New development	5.6	3.2 - 8.2	4.0
Enhancement	7.1	1.8 - 10.5	4.9

- Average Time-To-Market was longer than the Industry Average for projects of similar size.
- New Development projects were delivered to the market in less time than Enhancement projects.
- From a project perspective, 2 (20%) were delivered faster than the Industry Average and 8 (80%) took longer to complete.
- Client's longer Time-To-Market compared to the Industry is due a combination of 1) using fewer FTEs than the industry for projects of similar size and 2) the majority of projects being less productive.

QUANTITATIVE – SUMMARY

- Data collected must be accurate and consistent
- No single measure tells the whole story
- Outliers should be identified, removed from the baseline
- Data results should be reviewed with the project team

Qualitative Assessment

IDENTIFY KEY VARIABLES

MANAGEMENT

- Team Dynamics
- High Morale
- Project Tracking
- Project Planning
- Automation
- Management Skills

DEFINITION

- Clearly Stated Requirements
- Formal Process
- Customer Involvement
- Experience Levels
- Business Impact

DESIGN

- Formal Process
- Rigorous Reviews
- Design Reuse
- Customer Involvement
- Experienced Development Staff
- Automation

BUILD

- Code Reviews
- Source Code Tracking
- Code Reuse
- Data Administration
- Computer Availability
- Experienced Staff
- Automation

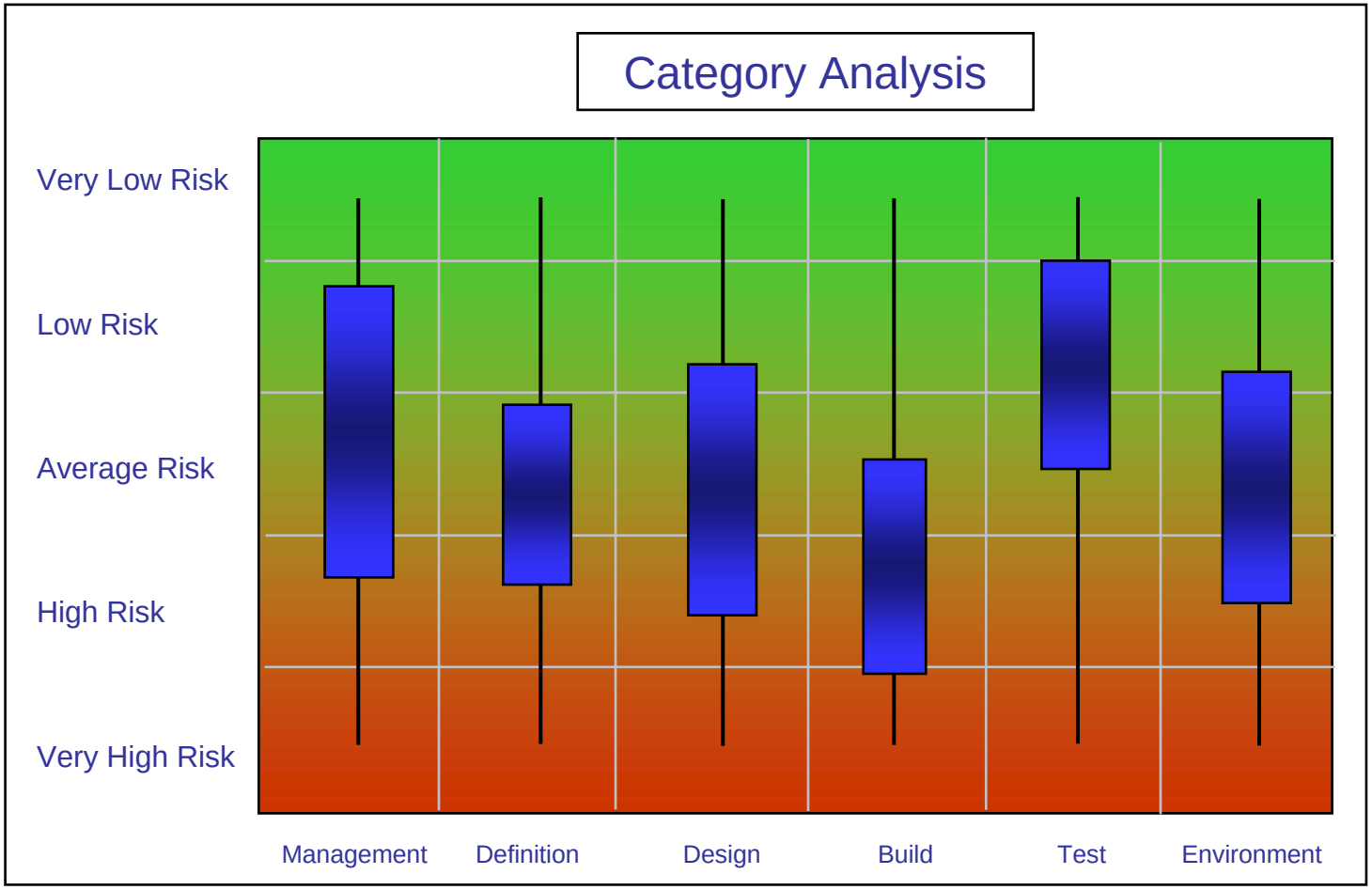
TEST

- Formal Testing Methods
- Test Plans
- Development Staff Experience
- Effective Test Tools
- Customer Involvement

ENVIRONMENT

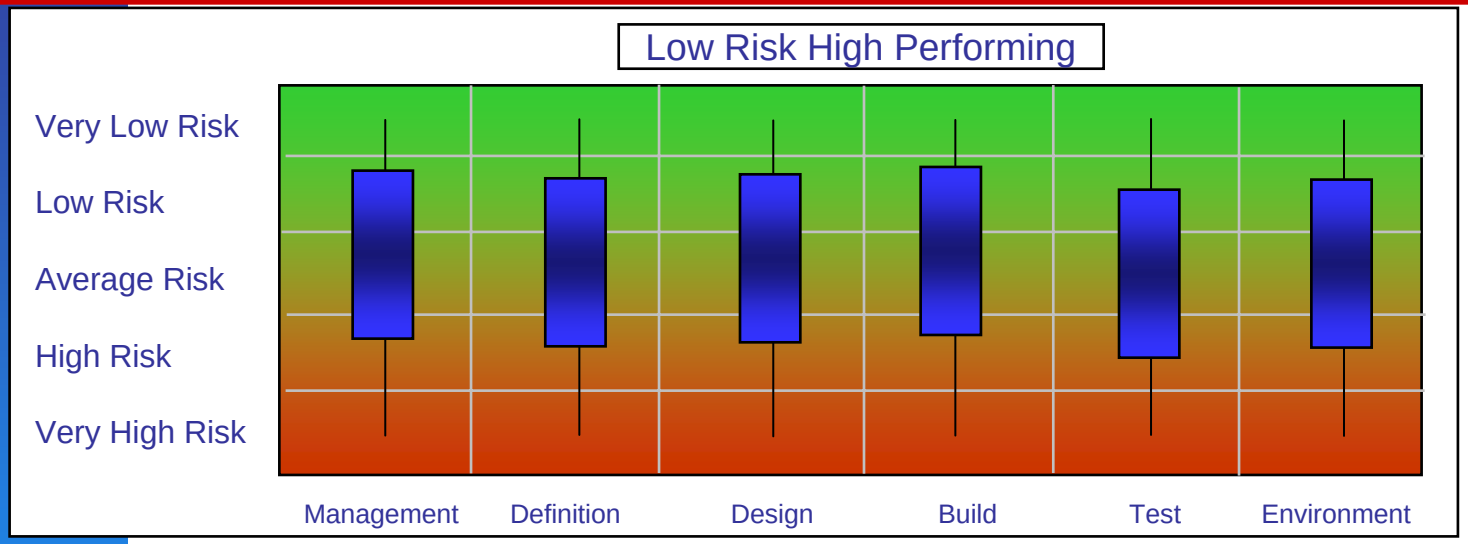
- New Technology
- Automated Process
- Adequate Training
- Organizational Dynamics
- Certification

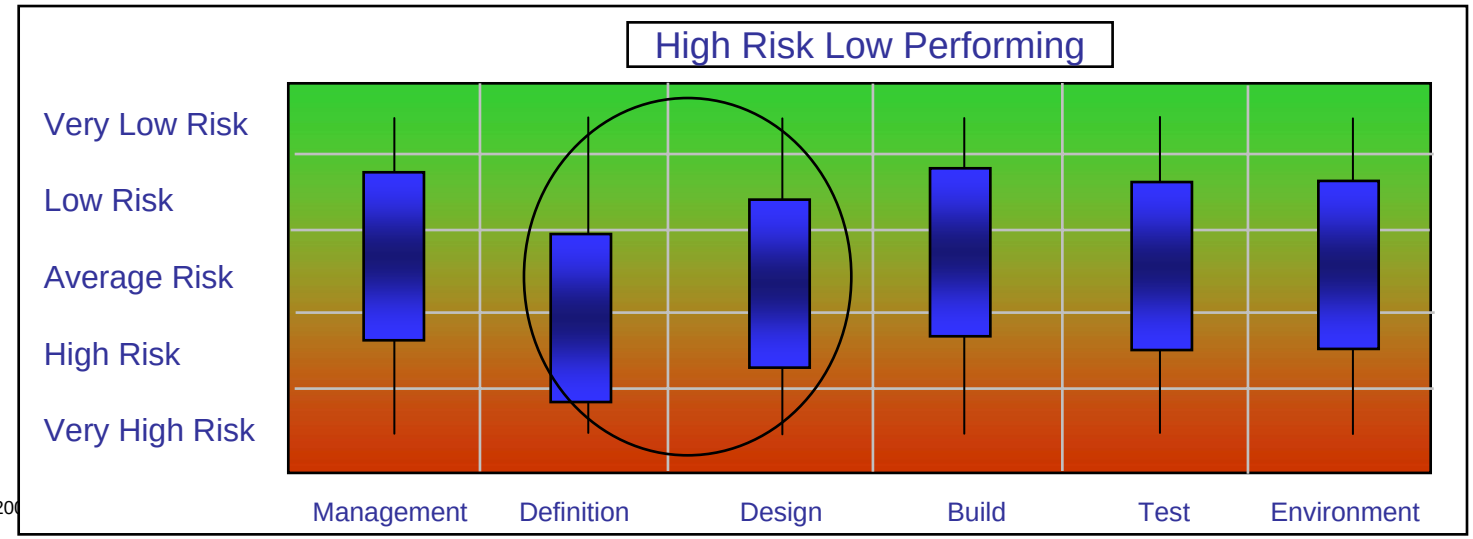
The length of the boxes indicates that there was a high level of inconsistency in all categories. This is indicative of a "people-dependent" versus a "process-dependent" environment.



High vs Low Analysis

PROFILE COMPARISON HIGH VS. LOW





PROFILE COMPARISON HIGH VS. LOW

HIGHER PERFORMING PROJECTS DELIVERED MORE FUNCTIONALITY PER EFFORT MONTH IN LESS TIME THAN LOW

Category	High	Low
Types of Projects	Mixed	Mixed
Average Size (FPs)	148	113
Average Duration (Months)	5.0	7.0
Average Rate of Delivery	22.0	9.2
Average number of FTEs	2.4	1.8
Contributing Factors		
Development staff very experience with the design methods used.	100%	33%
Full agreement on project deliverables, methodologies and schedule.	100%	33%
No staff turnover during the project.	100%	67%
Project Managment Experience fron Very Hgih to Averqge	100%	67%
More formal process used to gather requirements.	100%	67%
Requirements were very clear and stable.	100%	67%
Fully automated source code management.	100%	67%
Project team had successfully deployed applications using target technology suite.	100%	67%
Office environment conducive to software development.	100%	67%
Projects were not impacted by legal or statutory restrictions.	67%	0%
Project benefited from existing design deliverables.	67%	0%
Structured data analysis performed	67%	33%
Analysts had a higher degree of experience with the business.	67%	33%
Significant reuse of code.	67%	33%

Modeled Improvements

MODELED IMPROVEMENTS

DCG modeled the impact of implementing the improvements to correct those areas detracting from productivity. The modeling was done from several perspectives: Management improvements, Design Improvements, Definition improvements, Build improvements, Test improvements, Environment improvements, SEI CMM specific improvements, and All Recommendations (Synergy Effect).

The modeling is based on the 6 projects that had an unfavorable delivery rate compared to projects of similar size in the Industry. Improvements are measured from the following baseline:

Average Project Size:	133 Function Points
Average Productivity:	10.7 FP/EM
Average Time-to-Market:	6.9 Months
Average Cost/FP:	$938.69
Projected Delivered Defects/FP:	.0301

Modeled Improvements

Current improvement initiatives (SEI) are appropriately targeted at the large majority of the "weak spots" revealed by the baseline results.

Perspective	Productivity	Time-To-Market	Defects/FP	Cost/FP
Management	8.10%	0.00%	0.00%	-7.44%
Definition	16.20%	0.00%	0.00%	-15.70%
Design	30.80%	-25.00%	-25.00%	-23.55%
Build	10.70%	0.00%	0.00%	-9.67%
Test	24.40%	-25.00%	-25.00%	-20.25%
Environment	5.30%	0.00%	0.00%	-5.04%
SEI CMM Specific	131.50%	-50.00%	-75.00%	-56.78%
All	169.20%	-50.00%	-75.00%	-62.89%

	Baseline Productivity	SEI Productivity Improvements
Average Project Size	133	133
Average FP/EM	10.7	24.8
Average Time-To-Market (Months)	6.9	3.5
Average Cost/FP	$934.58	$467.29
Projected Delivered Defects/FP	0.0301	0.0075

Case Study 2

Profile: Entertainment, Midsize, Optimum Performance

INDUSTRY DATA

Since the sample size is relatively small a category analysis by size or project type is not conclusive. The largest sample size in any one category is represented by three new development projects in the medium size range.

	SMALL (<300 FPs)		MED (300-1000 FPs)		LARGE (>1000 FPs)	
	CL	IND AVG	CL	IND AVG	CL	IND AVG
PRODUCTIVITY (FP/EFFORT)	27.59	18.23	10.47	10.48	4.46	3.37
EFFORT (STAFF MONTHS)	10.30	14.64	42.53	42.49	276.72	366.57
DURATION (CALENDAR MONTHS)	12.71	15.49	11.17	11.69	13.37	14.98

PROFILE SCORES

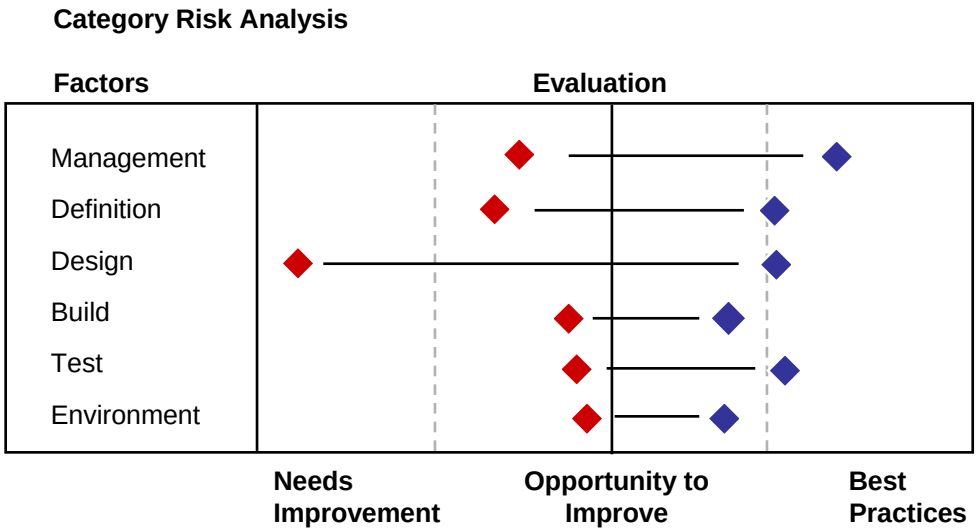
Profile scores reflect the “goodness” of the development practices for a given project. Six categories are evaluated and scored. The higher the score the higher the probability of a successful delivery.

Project	Profile Score	Mgmt	Def	Des	Build	Test	Env
Project 1	75.9	84.09	76.92	77.27	65.38	81.25	65.38
Project 2	60.3	68.18	64.10	56.82	61.54	59.38	50.00
Project 3	60.0	61.36	33.33	81.82	57.69	65.63	65.38
Project 4	54.5	61.36	64.10	45.45	61.54	50.00	42.31
Project 5	39.4	68.18	20.51	50.00	53.85	25.00	46.15
Project 6	35.3	38.64	20.51	15.91	69.23	43.75	38.46
Project 7	31.4	36.36	30.77	4.55	42.31	43.75	46.16

PROFILE COMPARISON HIGH vs. LOW

Selected Projects (Performance Comparison)

	♦ Low --	♦ High --
Size	408	331
Productivity	8.5 FP/PM	17 FP/PM
Duration (months)	10	9



Attributes of High - Effective Project Management, clear and stable requirements, rigorous reviews, design reuse, code reuse, test plans.

Case Study 3

Profile: Large Int'l. Service Org., CMM Impact

IDENTIFYING OPPORTUNITIES FOR IMPROVEMENT

Establishing a baseline of performance is the first step towards identifying and making improvements in software development practices

Function point analysis is one of the key measures commonly used in a baselining activity

- Evaluate productivity and quality performance levels
- Identify characteristics of top performers
- Educate and train organization on best practices
- Set reasonable targets and goals
- Monitor progress

MODELED PERFORMANCE

- A composite model was developed using data points from all selected development projects.
- Averages were computed for size, productivity and duration.
- Industry average and best practice models were developed for similar size projects

	CL Average	Industry Average	Best Practices
FP Size	567	567	567
Productivity	6.9	7.26	22.68
Duration	12	14	10
Defect Density	n/d	.12	.02

BEST PRACTICES
PATH TO IMPROVEMENTS

Best Practices Attributes

Historical based estimating
Defect tracking
Experienced PMs
Effective requirements gathering
Reviews and inspections
Experienced developers
User involvement
Formal methodologies
Rigorous testing
Formal test plans
Training
Effective SDLC

CL average performance levels are within industry average ranges.

Executing industry Best Practices could have a significant impact on productivity

High/Low analysis showed positive results as well

MEASURING THE IMPACT OF CMM

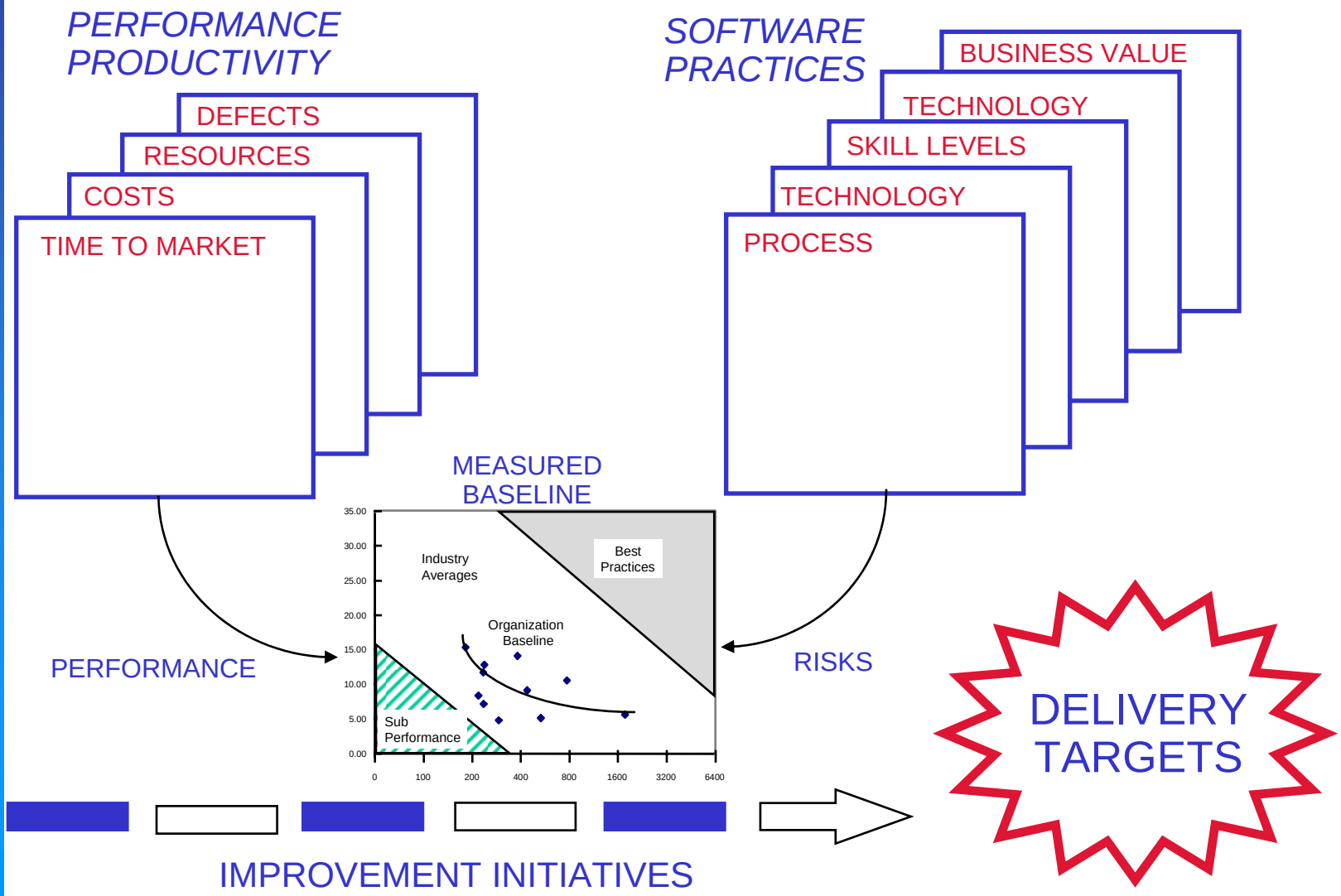
A model was developed to simulate CL performing at a higher level of maturity (CMM Level 3)
Impact levels can be translated into cost savings and used to compute a ROI for advancing to CMM level 3

	CL Average	CMM Level 3	Impact
FP Size	567	567	
Productivity	6.9	10.6	+ 53%
Duration	12	12	--
Defect Density	.12*	.06	- 50%

* Industry average

The model shows a 53% improvement in productivity and a 50% reduction in defects.

BASELINE PERFORMANCE



CMMI® – Level 2 MEASUREMENT and ANALYSIS

- Specifying the objectives of measurement and analysis such that they are aligned with identified information needs and objectives
- Specifying the measures, data collection and storage mechanisms, analysis techniques, and reporting and feedback mechanisms
- Implementing the collection, storage, analysis, and reporting of the data
- Providing objective results that can be used in making informed decisions, and taking appropriate corrective actions

BEST PRACTICES – SUMMARY

- Identify specific goals and objectives relative to business and technical strategies
- Baseline current levels of performance to help determine areas for improvement and current best practices
- Become aware of industry best practices data points
- Maximize your improvement opportunities by focusing on the high impact areas
- Continue to measure performance and monitor progress