Staged or Continuous: Which Model Should I Choose?

NDIA 2003 CMMI[SM] Conference

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Which Model Should I Choose?

Which model representation should I choose:

- Continuous?
- Staged?
- Both?
  - Constaguous?
  - Staginuous?
- Neither?

Actually, "Which model should I choose", is the wrong first question.

What model representation you should choose depends upon your organization's quality goals, objectives, and strategy.

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Presentation Objectives

Describe motivation for quality strategies.

Describe how to choose the right quality strategy for your situation.

Present advantages and disadvantages of staged and continuous models.

Describe how to choose the right quality model for your situation.

Answer any of your questions.

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Agenda

The Quality Crisis

Revolutionary Improvement

Choosing the Right Quality Strategy

Choosing the Right Model

Mature Quality Organizations

Questions and Answers

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The Quality Crisis

The cost of poor quality:

- **"In most companies the costs of poor quality run at 20 to 40 percent... In other words, about 20 to 40 percent of the companies' efforts are spent in redoing things that went wrong because of poor quality" (*Juran on Planning for Quality*, 1988, pg. 1)**

- **Crosby's Quality Management Maturity Grid states that if an organization doesn't know it's cost of quality, it's probably at least 20%. (Crosby, *Quality is Free*, 1979, pg. 38-39)**

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The Quality Crisis

According to Dr. Juran:

1. "There is a crisis in quality. The most obvious outward evidence is the loss of sales to foreign competition in quality and the huge costs of poor quality."

2. "The crisis will not go away in the foreseeable future."

3. "Our traditional ways are not adequate to deal with the quality crisis."

4. "To deal with the crisis requires some major breaks with tradition."

• Quoted from Juran, Joseph. "The Quality Trilogy", Quality Progress, 1986

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Some Quality Lessons Learned

Most organizations have about 33% in costs of poor quality (e.g., rework, waste, scrap, etc.)

About 80% of all quality efforts have no measurable results.

According to Dr. Juran, most failures in quality are due to a poor choice of strategy.

In order to choose a quality strategy wisely, organizations need to know how to manage for quality.

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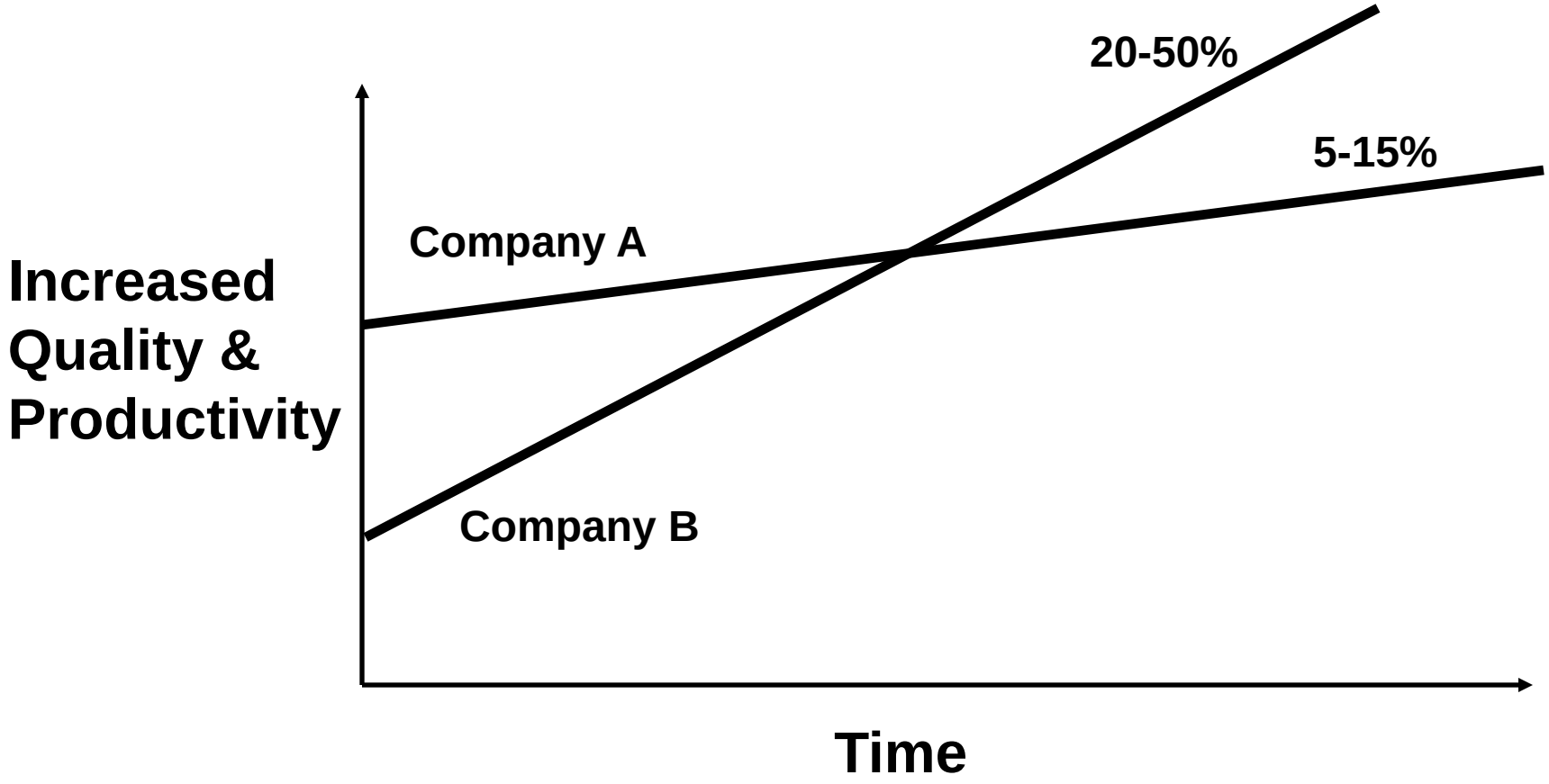
Evolutionary vs. Revolutionary Improvement



• Adapted from *Juran on Leadership for Quality*, Juran, 1989

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Revolutionary Improvement

MEASUREMENT	WORLD-CLASS BENCHMARK
Costs of Poor Quality (COPQ)	Reduced from ~33% to ~15% (e.g., cut COPQ in half)
Defect Removal Efficiency	70-90% defect removal before test
Post-Release Defect Rate	Six Sigma (i.e., .01 Defects Per Million)
Productivity	Doubled (e.g., in 5 years at ~20% a year)
Return on Investment	7:1 - 12:1 ROI
Schedule / Cycle Time	Reduced by 10-15% (e.g., per year)

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Quality Objectives

What are your organization's quality objectives?

- Customer Satisfaction?
- Time to market?
- On-Time Delivery?
- Cost Savings?
- ROI?
- Productivity?
- Performance?
- Cycle time?

How fast does your organization want to improve?

How important is your budget and cost savings?

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Juran's Definition of Quality

"Fitness for Use"

Product Features that Meet Customer Needs

- Provide customer satisfaction
- Create product salability
- Compete for market share
- Respond to customer needs
- Higher quality costs more

Freedom from Deficiencies

- Eliminate defects, errors, & waste
- Avoid product dissatisfaction
- Effect is on costs
- Higher quality costs less

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Fundamental Quality Strategies

Managing for Finance	Managing for Quality
Financial Planning: Setting business goals; budgeting	**Quality Planning:** Setting quality goals; design in quality
Financial Control: Cost control; actual vs. planned	**Quality Control:** Planned vs. actual quality goals; taking action on difference
Financial Improvement: Cost reduction; mergers; acquisitions	**Quality Improvement:** Waste and rework reduction; eliminate & prevent defects

- Adapted from "Juran on Leadership for Quality: An Executive Handbook", Juran, 1989.

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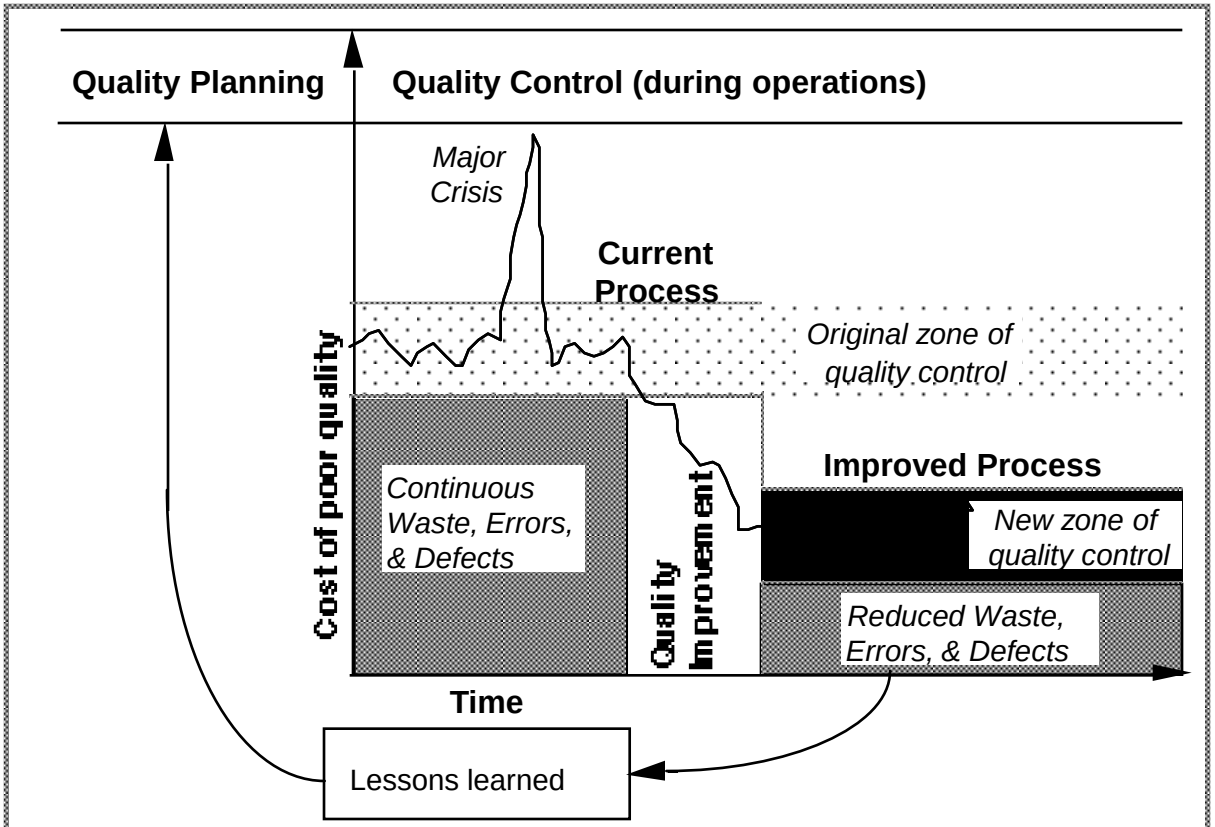
The Juran Trilogy for Quality Management



• Adapted from *Juran's Quality Control Handbook*, J.M. Juran, 4th Edition

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Quality Planning Strategies

Maturity Models (Staged) for Process Improvement:

- CMMI℠ for Systems
- CMM® for Software
- Crosby Models

Quality Planning:

- Juran's Quality Planning Process
- Quality Function Deployment (QFD)
- Strategic/Product/Project Planning
- Visioning

Key Measurements and Benchmarking:

- Cost, defects, effort, schedule, size
- COQ, cycle time, productivity, quality, ROI

Reuse and Tailoring Off-The-Shelf Products

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Quality Control Strategies

Measurement and Data Analysis:

- Comparing actuals to estimates (i.e., plans)
- Taking corrective action when out of control
- Performance indexes (e.g., cost, schedule, etc.)

Most of Configuration Management:

- Configuration Control
- Status Accounting
- Configuration Audits

Project Tracking and Oversight

Quality Assurance:

- Process and product audits

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Quality Improvement Strategies

Early Defect Detection:

- In-Process Inspections
- Reviews and Walkthroughs

Reduce the Cost of Poor Quality

Quality Improvement Processes (e.g., Juran, Six Sigma, Lean, etc.)

Early Testing

Configuration Management (e.g., Defect Tracking)

Defect Prevention

Risk Management

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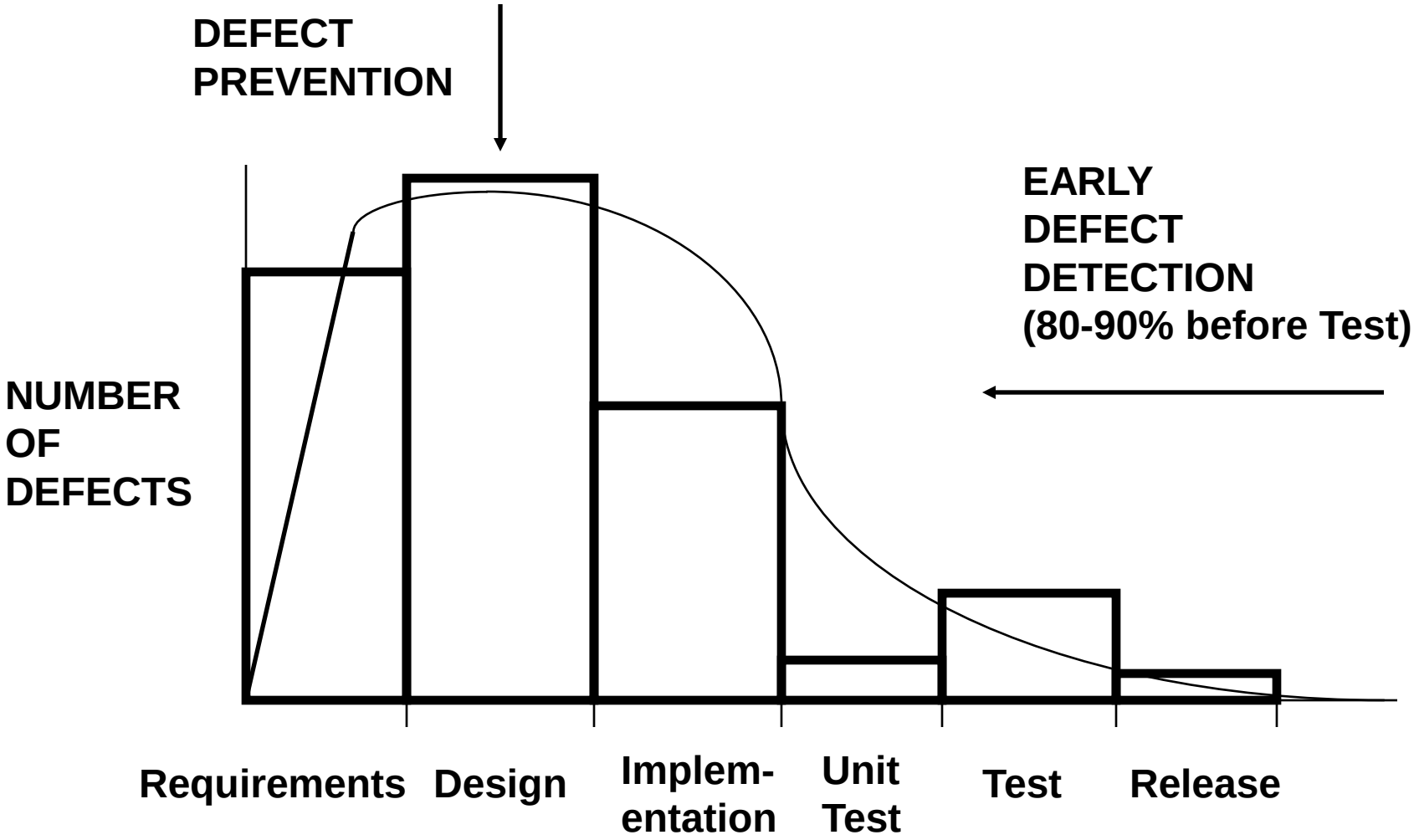
Best-in-Class Strategies



- Reference: "A Software Quality Strategy for Demonstrating Early ROI", Olson, 1995

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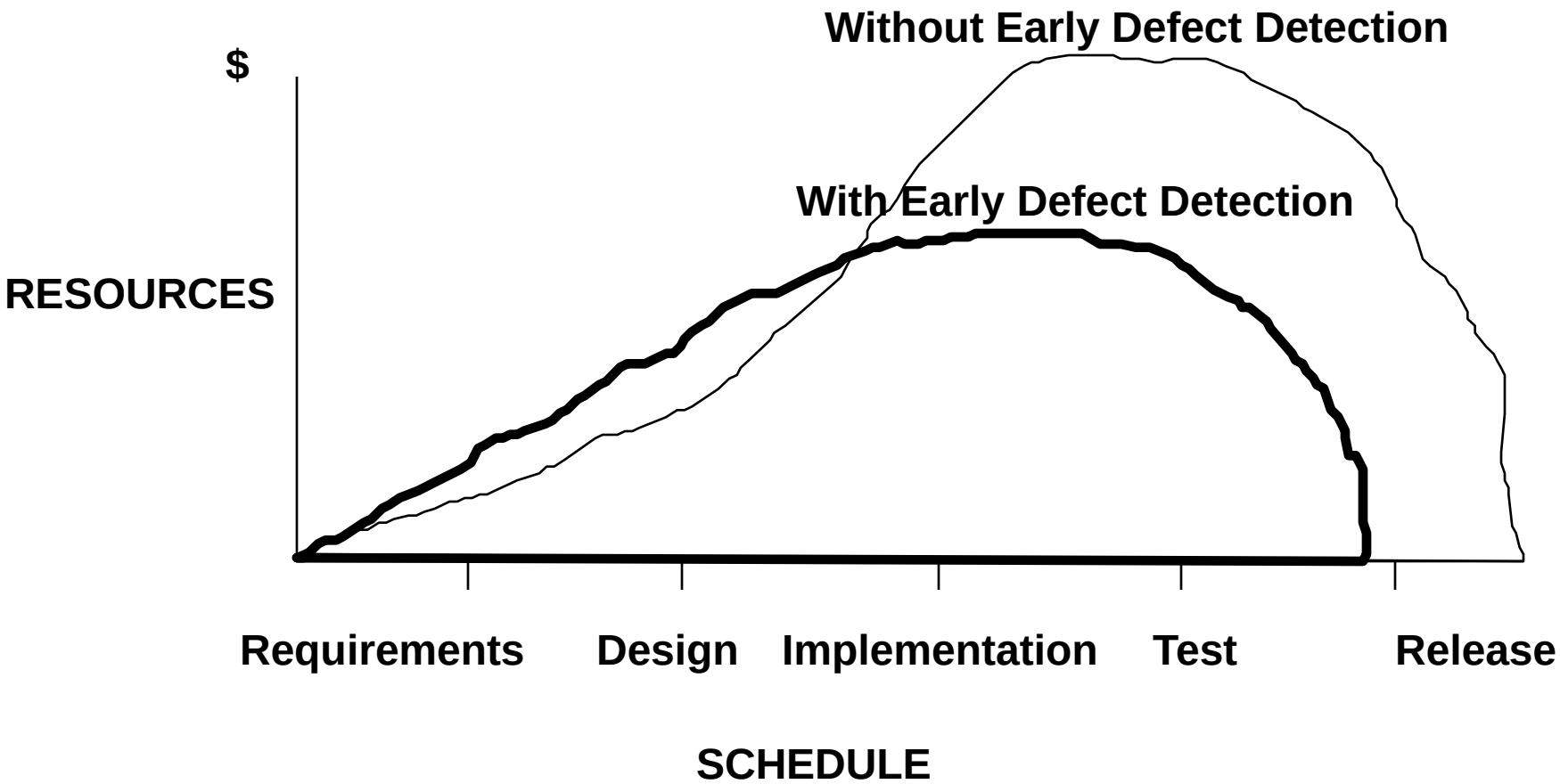
Early Defect Detection Shortens the Schedule



- Adapted from Fagan, M. "Advances in Software Inspections", IEEE Transactions on Software Engineering, July 1986

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Choosing the Right Strategy

Strategies	Advantages	Disadvantages
Quality Planning	• Logically, the right first thing to do • Most quality problems are planned that way • Greater long term benefits	• Larger investment up front • Measurable results take longer • More difficult to sell to top management • More difficult to implement successfully
Quality Control	• Implements plans and improvements	• Doesn't have direct benefits like planning and improvement
Quality Improvement	• Early ROI • Quality effort pays for itself early on • Arouses greater enthusiasm • Provides lessons learned to planning	• Systemic quality problems may not be fixed • Cheaper in the long run to redesign broken processes

- Adapted from "Juran on Leadership for Quality: An Executive Handbook", Juran, 1989.

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Which Model Should I Choose?

What model you should choose depends upon your organization's quality goals, objectives, strategy.

<u>Examples</u>:
An organization on a tight budget that needs cost savings and quick ROI should pick a quality improvement strategy. This could lead to selecting a continuous model (e.g., a PA).

An organization that wants to be best-in-class in the long term and wants an orderly way to get there should select a quality planning strategy. This could lead to selecting a staged model.

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Choosing the Right Model

MODEL	ADVANTAGES	DISADVANTAGES
CMMI[SM] Staged	• Built in strategy • Process areas build on each other • Greater long term benefits • Most quality problems are planned that way • DoD business	• Larger investment up front • Measurable results can take longer • Can be more difficult to sell to top management • Can be more difficult to implement • More expensive appraisals
CMMI[SM] Continuous	• Selected process areas can directly meet business objectives • Can achieve faster results • Smaller investment up front • Easier to sell	• Systemic quality problems may not be addressed • May lack longer term benefits • Lack of strategy built in • May implement processes in the wrong order • Possible short term thinking

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Mature Quality Organizations

There is always room for improvement (e.g., even in a Maturity Level 5 organization).

Mature quality organizations use many improvement strategies.

Mature quality organizations use many models (e.g., both staged and continuous models or "Constaguous").

Continuous thinking (i.e., process maturity or process capability) existed before CMMI℠. For example, some organizations have enhanced the CMM® this way (e.g., applying the CMM® to systems engineering).

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Quality Maturity

STAGE	SUMMARY	COQ	BA	DCF	SEI
Prevention	"We know why we have happy customers."	5%	800	20%	5
Wellness	"Quality planning, control, and improvement are routine."	10%	700	40%	4
Progressive Care	"Management commitment and continuous improvement resolve quality problems."	18%	600	60%	3
Intensive Care	"We don't know why we have quality problems, but they hurt."	25%	400	80%	2
Comatose	"What quality problems?"	33%	200	100%	1

- Acronyms are (COQ=Cost of Quality; BA=Baldrige Award; DCF=Dilbert Correlation Factor; SEI=SEI CMMI/CMM)
- Based on "The Eternally Successful Organization", by Crosby, the SEI, the Baldrige Award, & Dilbert Comics

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Summary

Best-in-class quality organizations use successful quality strategies.

Quality improvement strategies are a great way to obtain early results and start demonstrating early ROI (especially early defect detection).

In order to make quality "stick" for the long term, quality planning strategies are best.

Managing for quality requires quality planning, control, and improvement strategies.

Choose a model that implements the organizations quality objectives and strategy.

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