



# Concepts of Return on Investment for Process Improvement

Presentation for PSM Conference

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# Typical Concerns

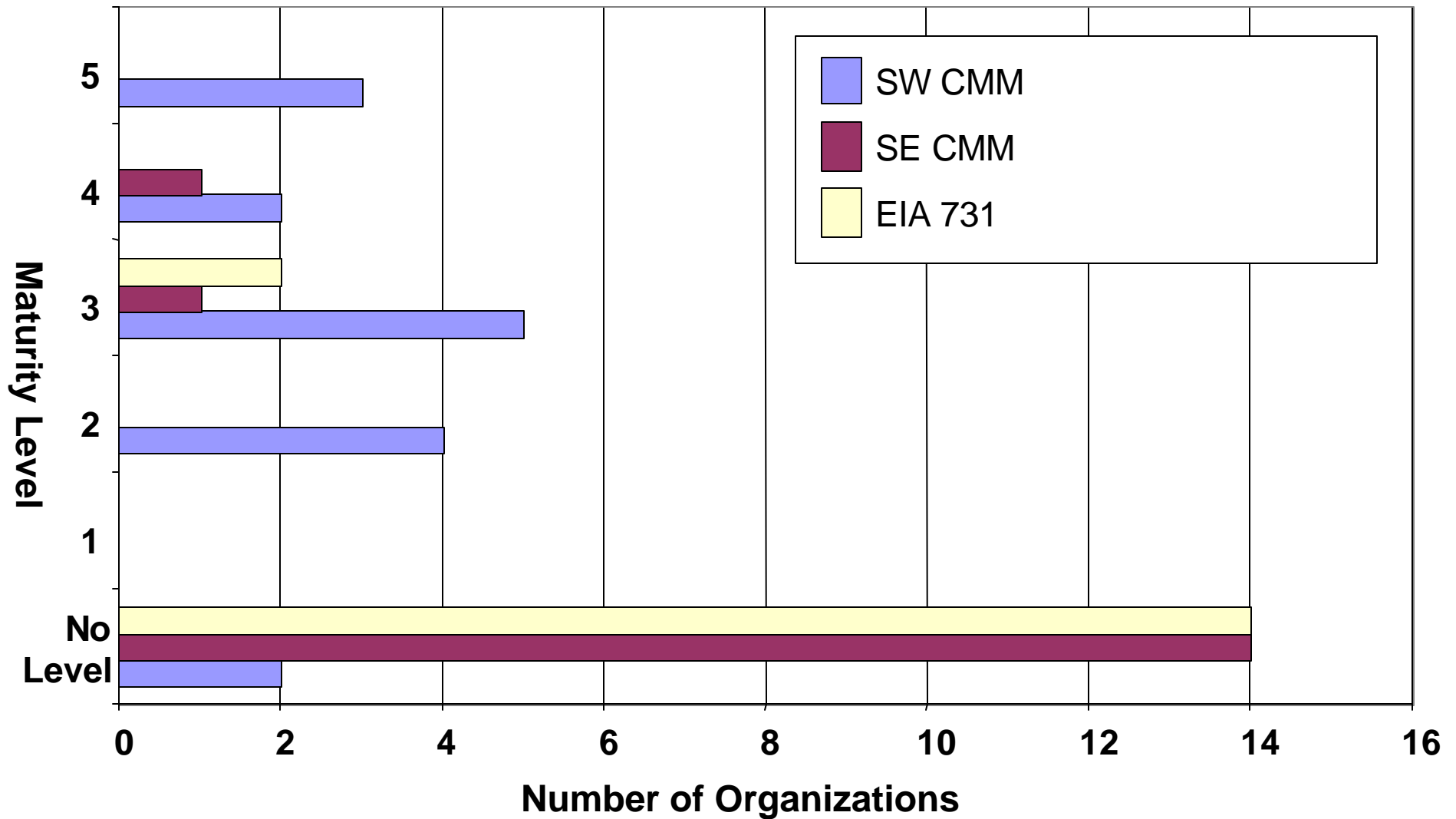
- How can I maximize my process improvement efforts?
- Which process improvement technologies are the most cost effective?
- How can I measure the return on investment (ROI) for process improvement initiatives?



# A Survey

- 
- What kind of organizations and projects are represented?
  - How is process improvement currently measured and justified?
    - What indicators?
    - Which initiatives?
  - How are benefits measured?
  - How are costs measured?

# Maturity Levels of Respondents



# Survey

## General Findings

- **Survey size was small, but relevant**
- **Respondents were evenly distributed across CMM Levels**
- **Little consistency in the definition of measures used among organizations**
- **Most of the organizations track SPI using a growth or improvement factor, rather than financially**
- **Very few organizations are tracking the true cost or benefit of their SPI initiatives**
- **No definitive patterns associated with CMM Maturity, or Government vs. Commercial Marketplace**  
**(Exception was Earned Value)**

# Survey

## Key Findings (cont.)

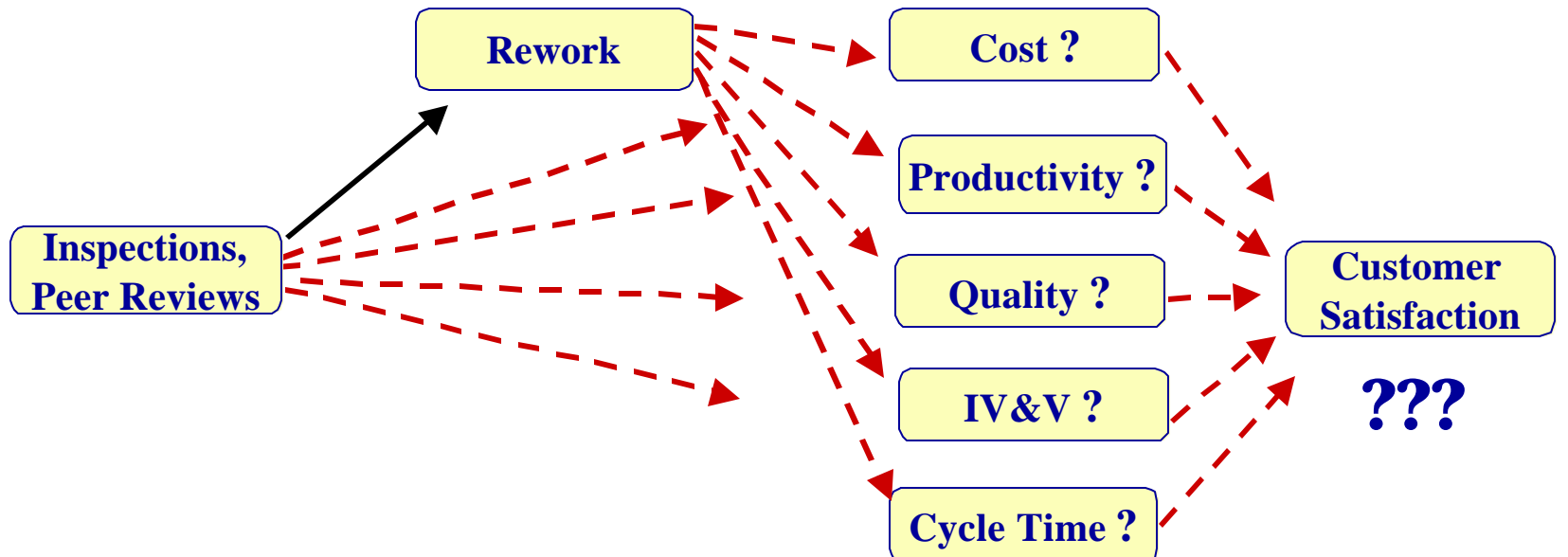
- **38% of respondents tracked the cost of SPI initiatives**
  - **Formal inspections tracked financially by just over half of those who perform them**
- **30% track financial benefits of indicators**
  - **Financial benefit of quality, productivity, or cycle time tracked by less than 20% of responding organizations**
- **38% of the respondents track rework above the project level**
  - **One organization tracks the cost of rework for all or most projects**
- **12% track the Cost of Quality at organizational and enterprise level**

# Survey Conclusions

- Responses reflect a strong engineering focus with a relatively low level focus on cost/benefit of SPI
- Respondents generally are not well positioned to calculate financial ROI of their SPI program
- Lack of standard measurement definitions and ROI process models inhibit progress in justifying SPI from a financial perspective

# The Problem With ROI

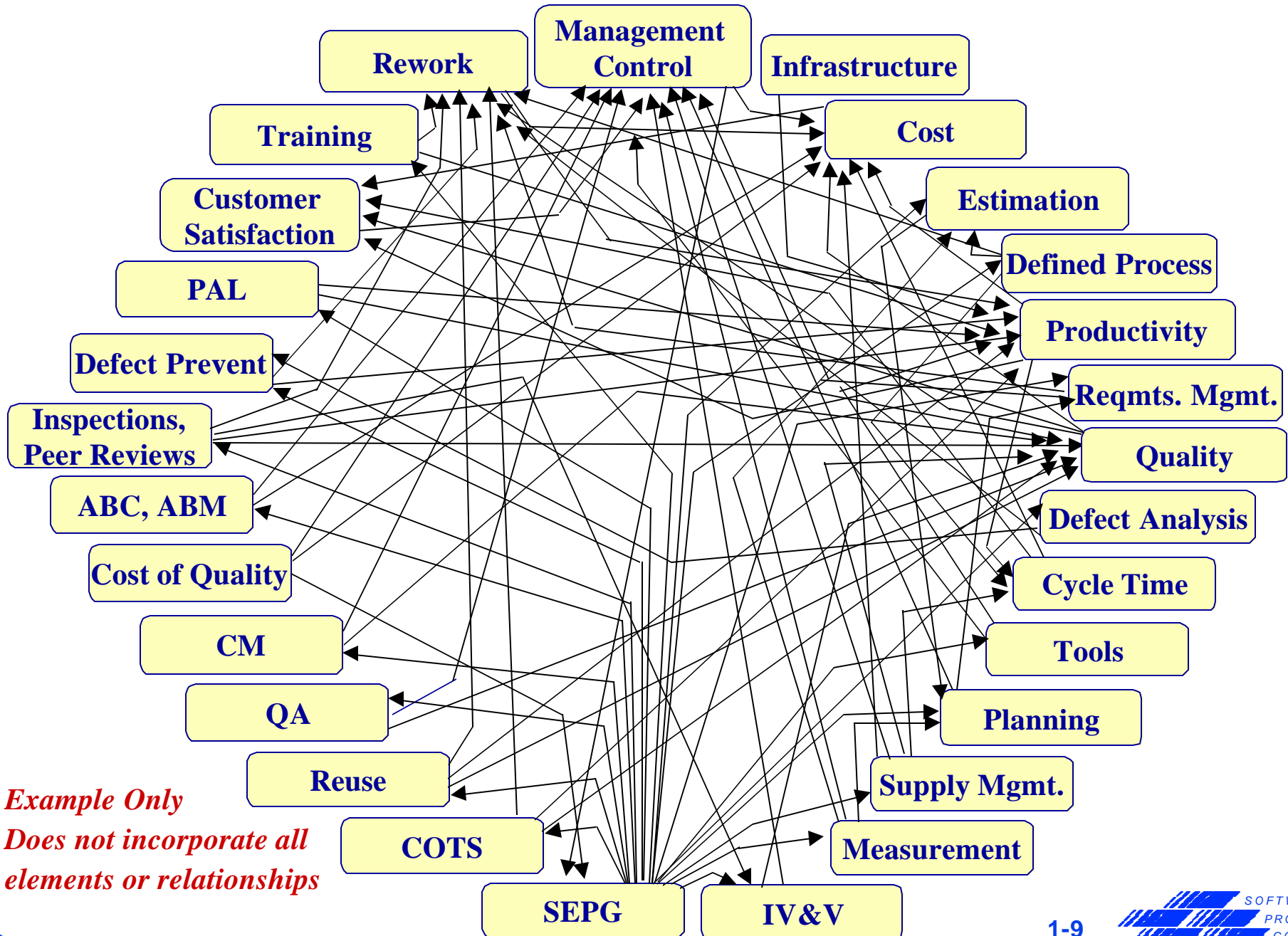
Multiple Relationships Make it Difficult to Assign the Benefits



→ Direct Relationship  
- - -> Potential Relationship

How do we show relationships to profitability and value?

# ROI Conundrum



*Example Only  
Does not incorporate all  
elements or relationships*

# Key Indicators

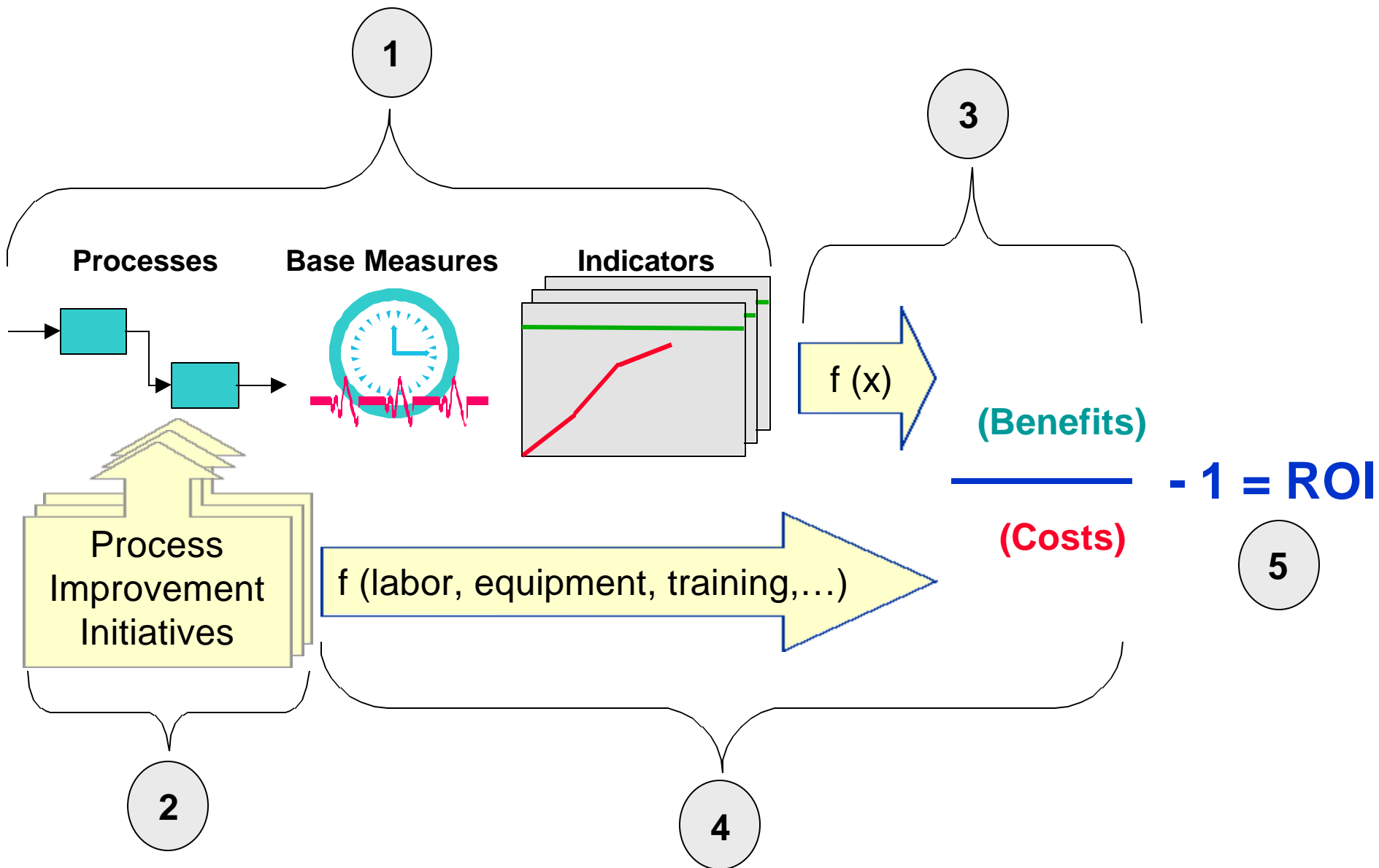
## Primary Indicators

- ✓ Quality
- ✓ Productivity
- ✓ Cycle Time
- ✓ Cost
- ✓ Customer Satisfaction

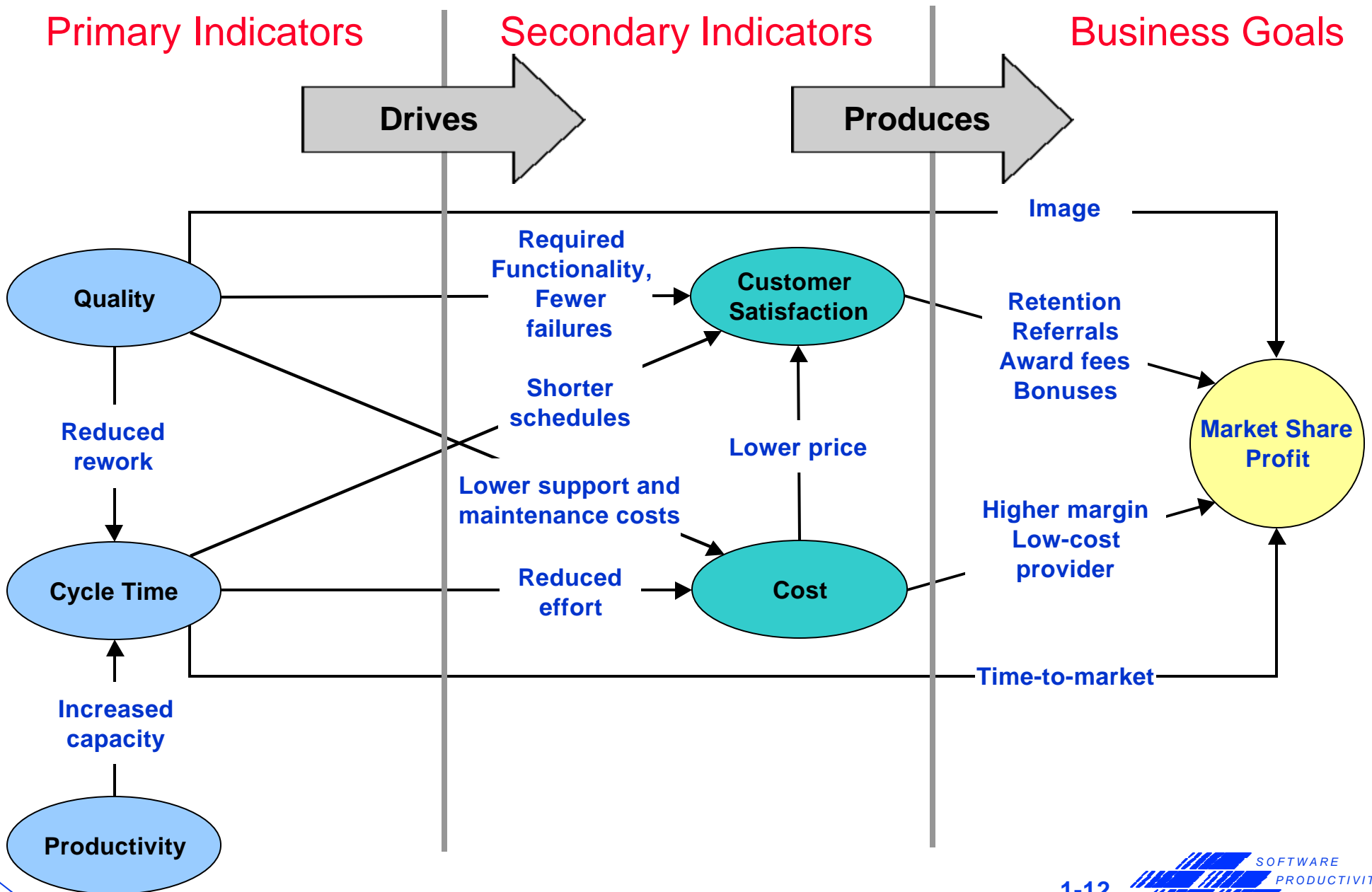
## Other Important Indicators

- ✓ Cost of Quality
- ✓ Cost of Rework

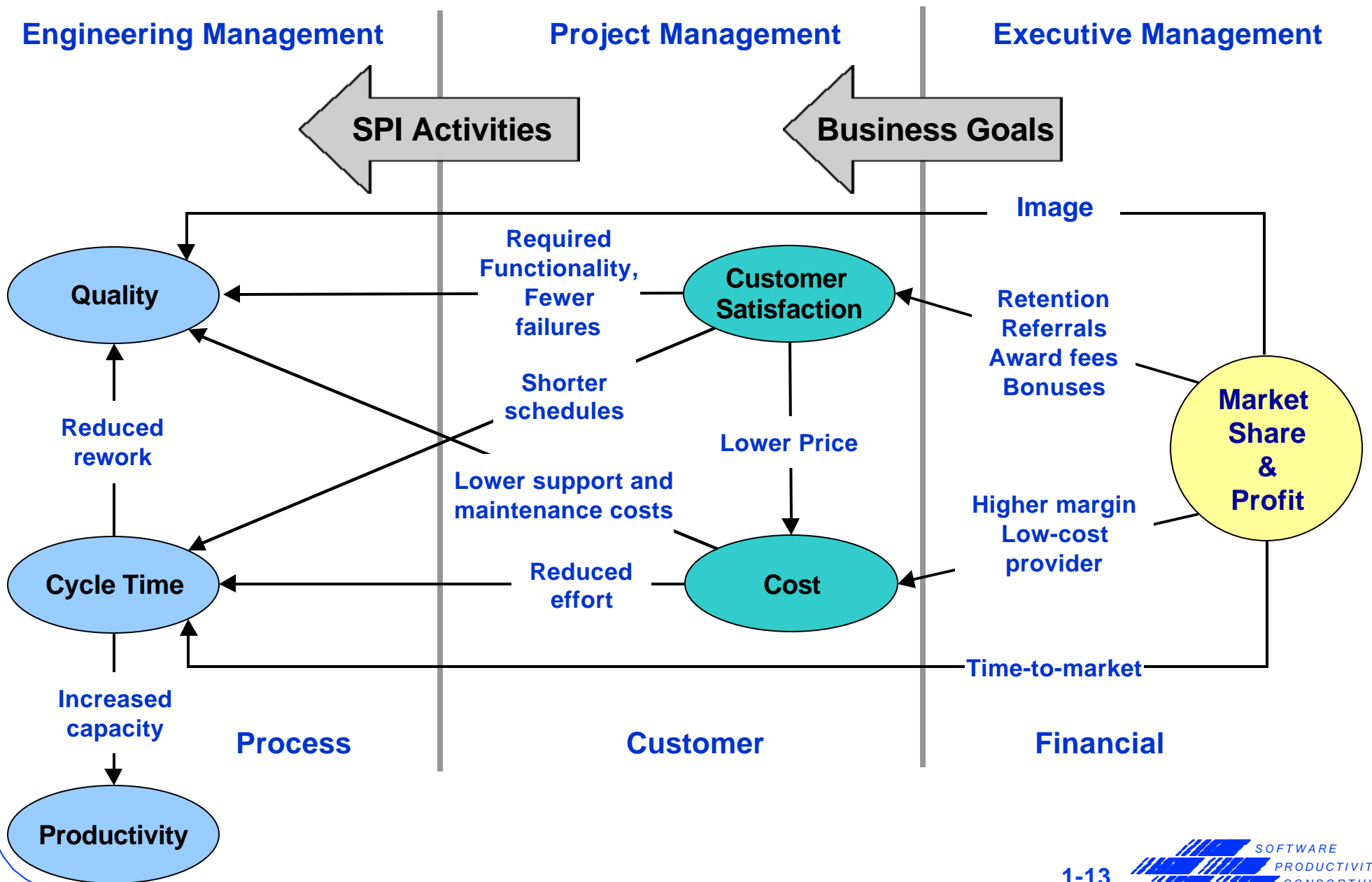
# Conceptual ROI Model



# Indicator Relationships

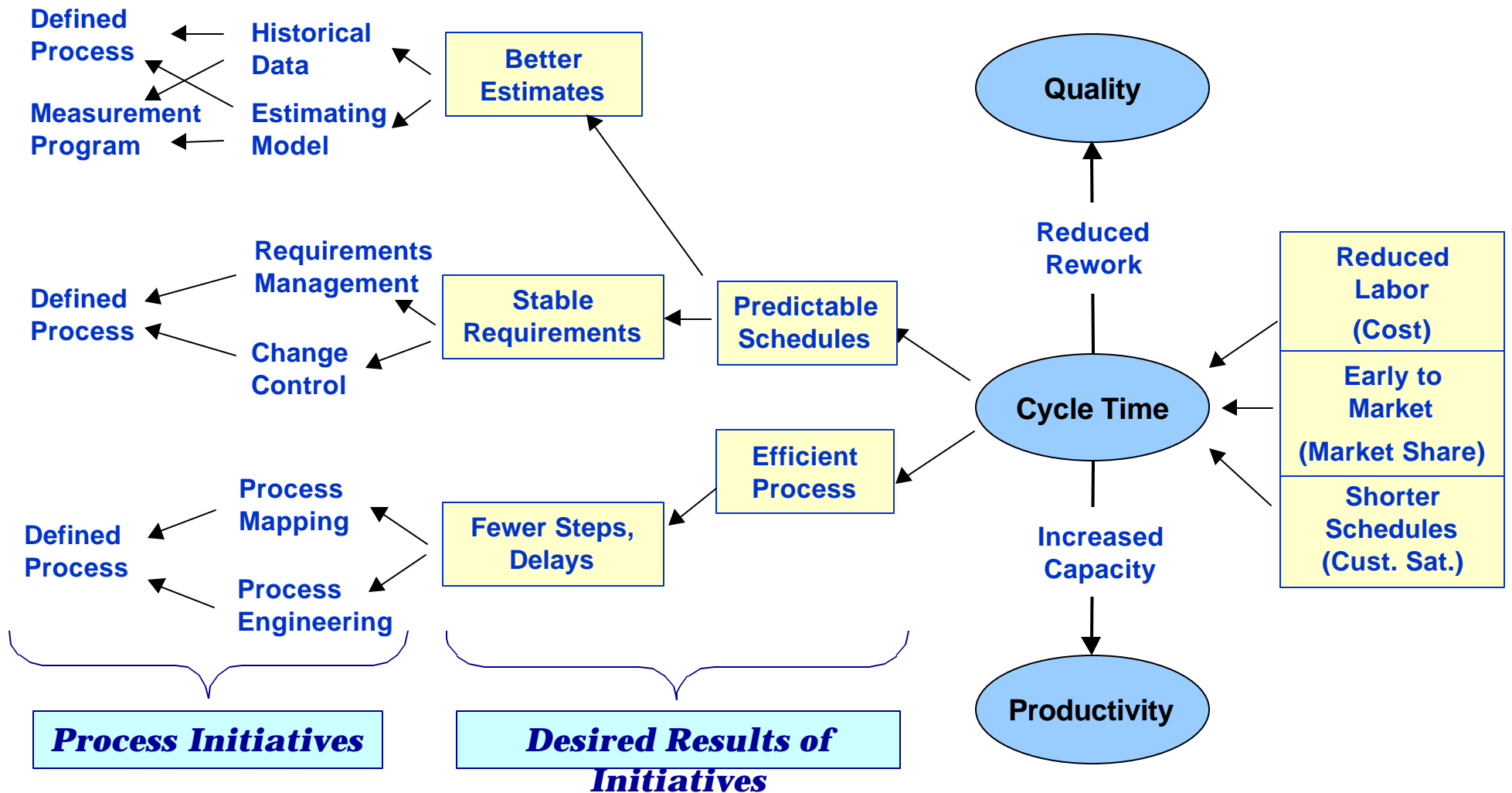


# Focusing ROI on the Business



# Mapping Indicators to Initiatives

## (Cycle Time Example)



# Cost of Quality (COQ)

- What is the cost of poor quality?
- What are the key drivers?
- What is the cost of achieving higher quality?
- Which should be the highest priorities?
- How successful are the efforts designed to drive the COQ downward?

# Elements of COQ

**Cost of Poor Quality  
(Non-conformance)**



**Cost of Achieving  
Higher Quality**

**Cost of  
Internal Failure**

**Defects Discovered  
Prior to Shipment**

**Cost of  
External Failure**

**Defects Discovered  
After Shipment**

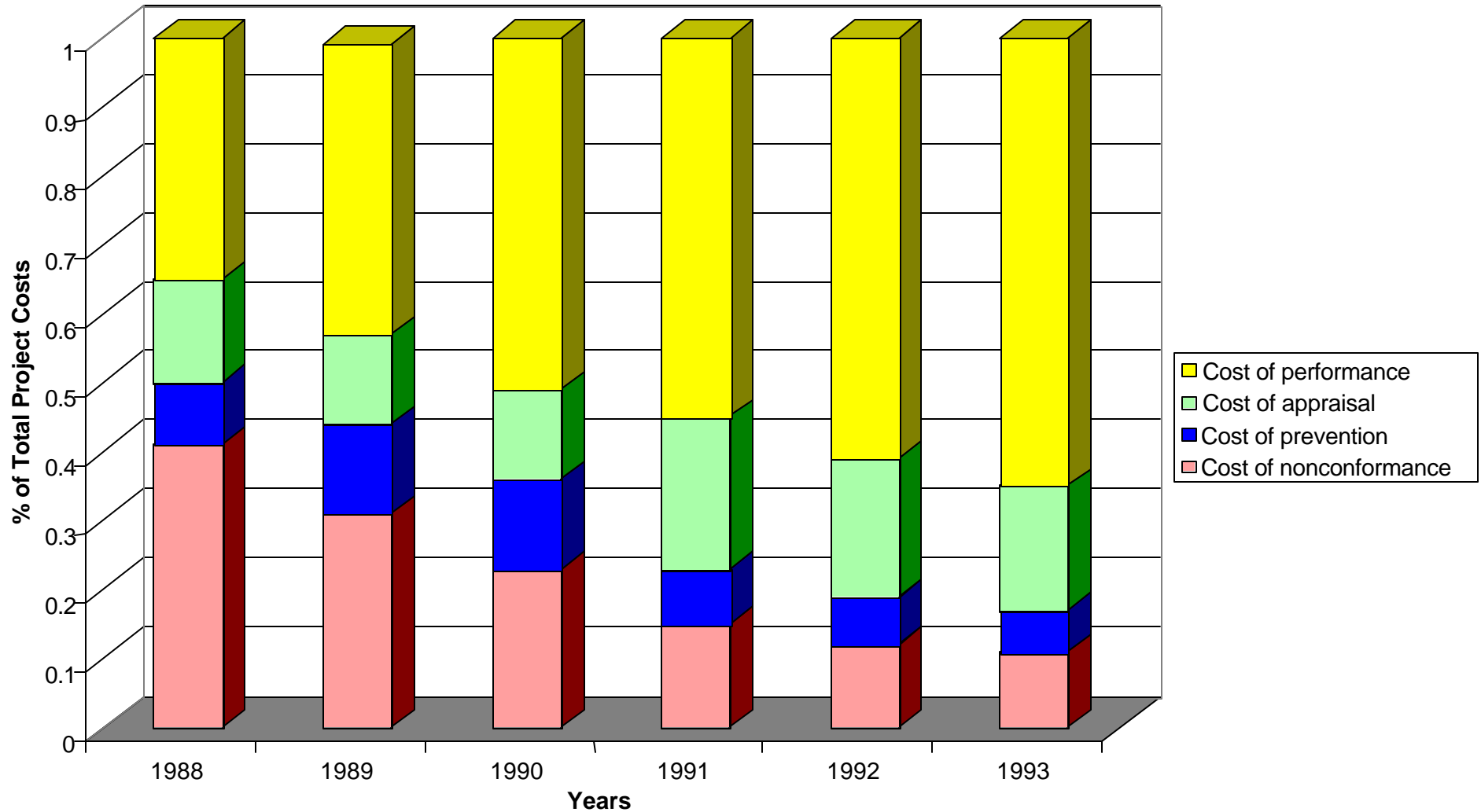
**Appraisal Costs**

**Testing, Inspections,  
Quality Audits,  
Assessments**

**Prevention Costs**

**SEPG, SQA, CM,  
Reqmts. Management,  
Defect Prevention,  
Training, Risk Mgmt.**

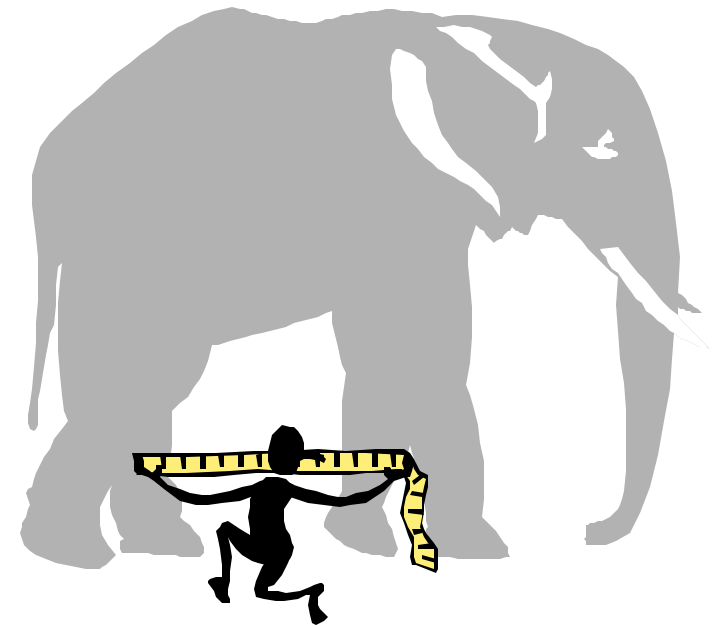
# Reducing the Cost of Quality



Adapted from: Dion, R., *Process Improvement and the Corporate Balance Sheet*, IEEE Software, July 1993

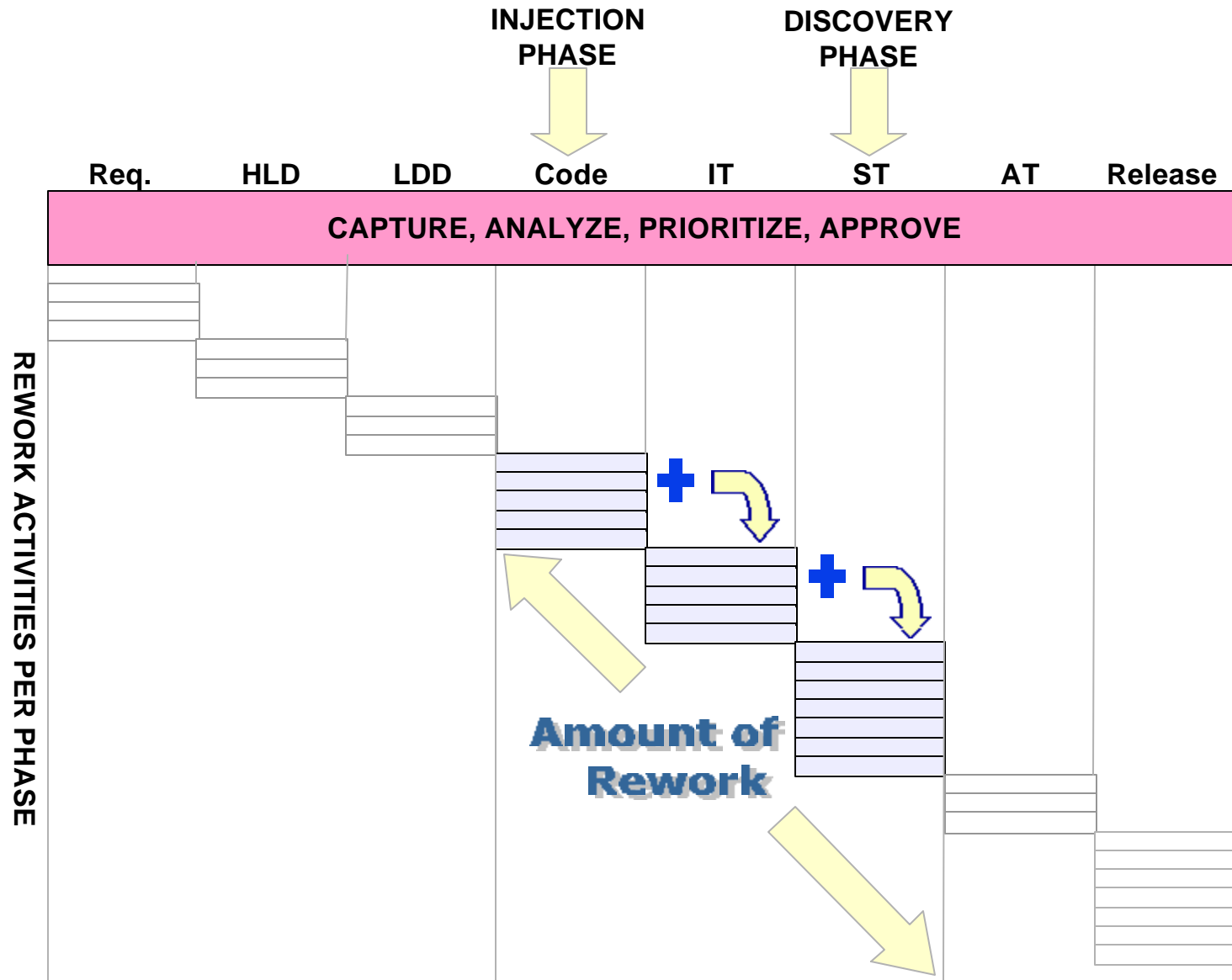
# Cost of Rework

- Typically 30% to 50% (or more) of project cost for lower maturity organizations
- Only one respondent (of 16) tracks Cost of Rework on all or most projects
- True Cost of Rework is not well known in most organizations



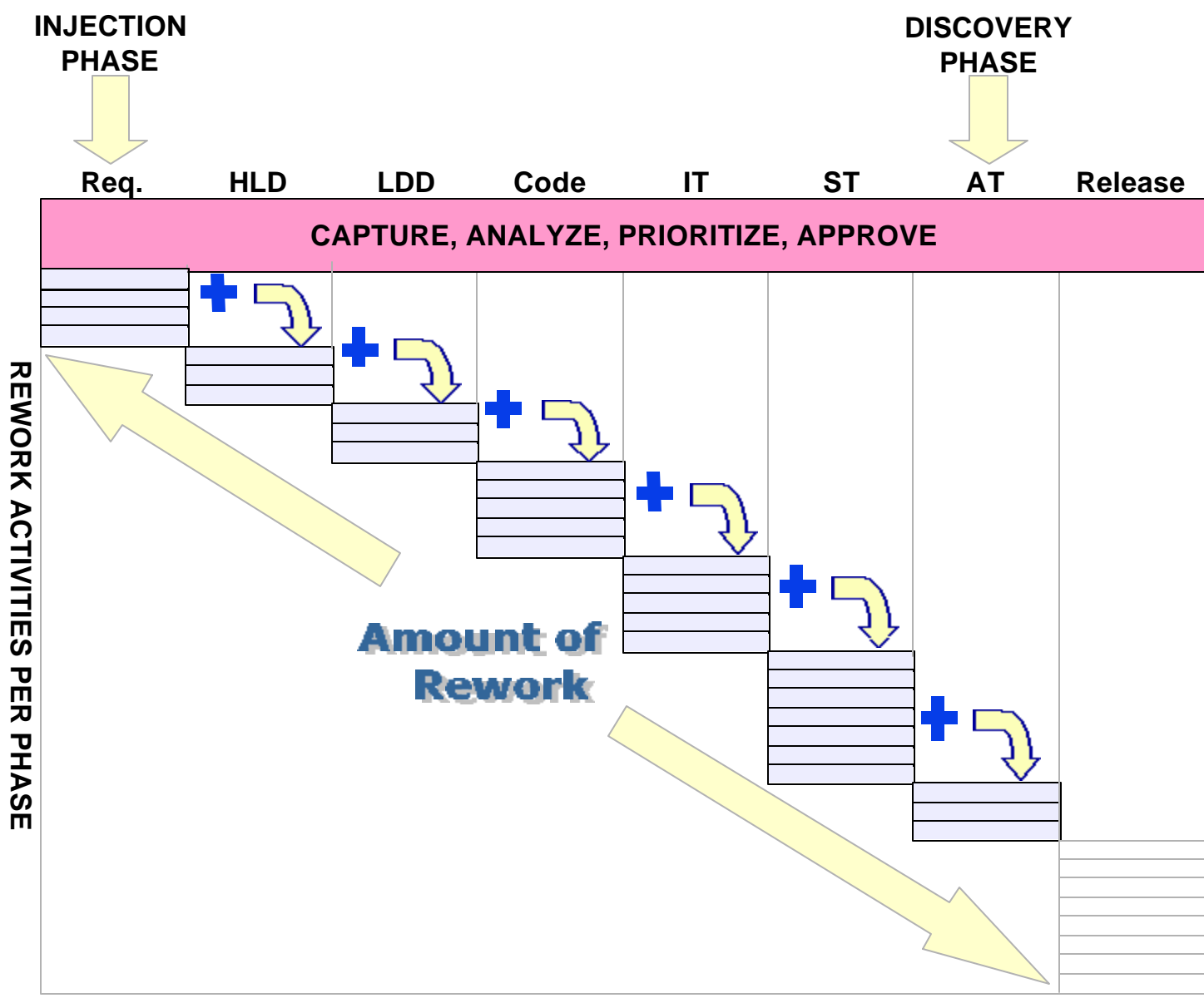
# Cost of Rework

## Coding Defects Found in System Test



# Cost of Rework

## Requirements Defects Found in Acceptance Test



# Summary

- **Measurement programs are typically focused on engineering effectiveness rather than business case**
- **Organizations generally are not well positioned to calculate financial ROI of their SPI program**
- **ROI Conundrum can be resolved by focusing on costs and benefits separately**
- **A focus on Cost of Quality and Cost of Rework can provide significant results**
- **Data indicate ROI is a 'growth area'**
  - **Provides a means for focusing SPI investments on business goals and priorities**
  - **Helps in establishing effective measurement programs/habits**