

# **Towards Developing Accelerators in Half the Time**

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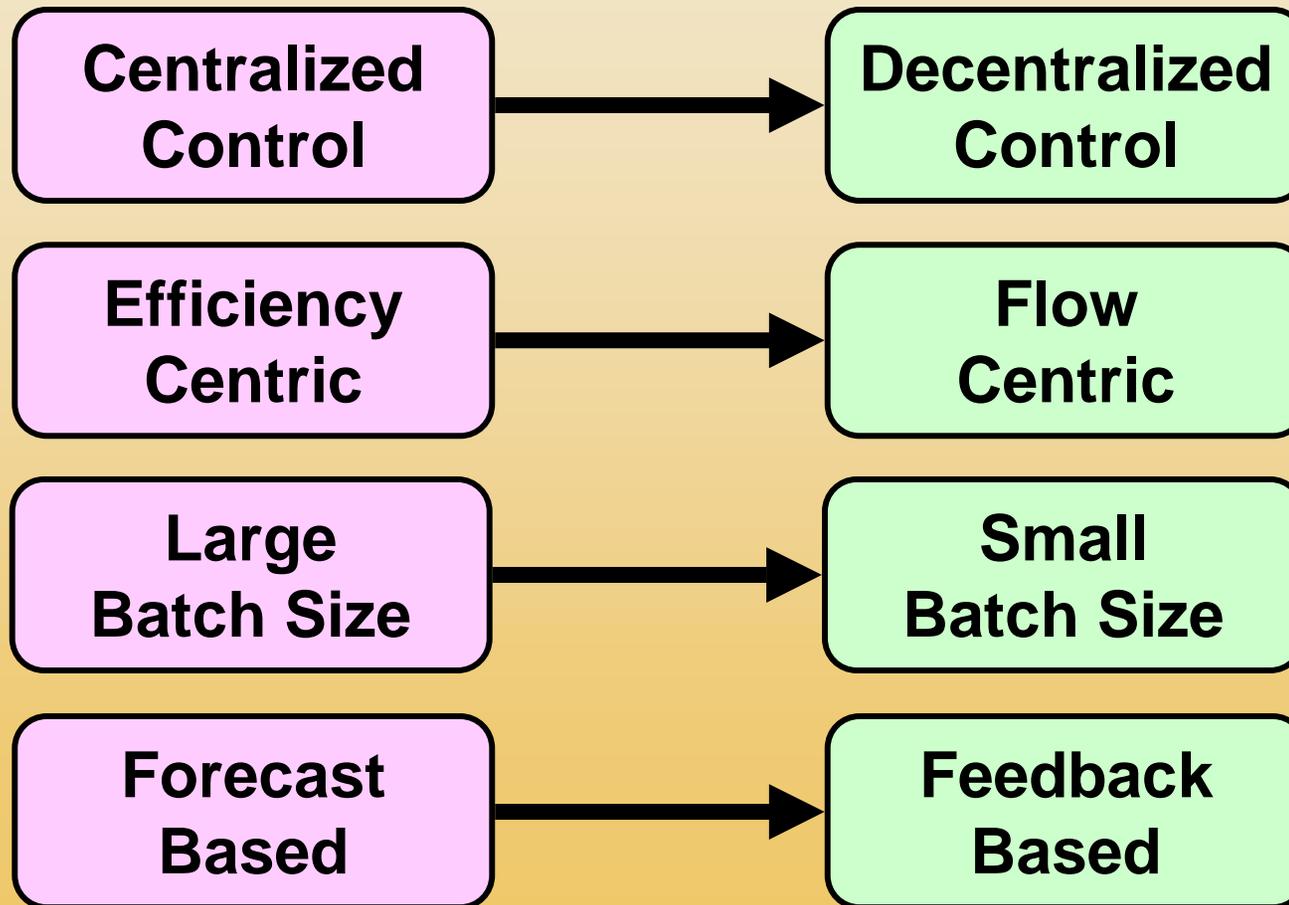
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# Overview

- In the 20th century, the dominant paradigm for product development used large batch sizes and sequential processes. This is sometimes called, “Big Up-Front Design” (BUFD).
- This approach results in delivering new technology using gold-plated megaprojects that are both slow and inefficient.
- Now, new approaches are fundamentally changing the way systems, both larger and smaller than accelerators, are being developed.
- This presentation will show you how thinking has changed.

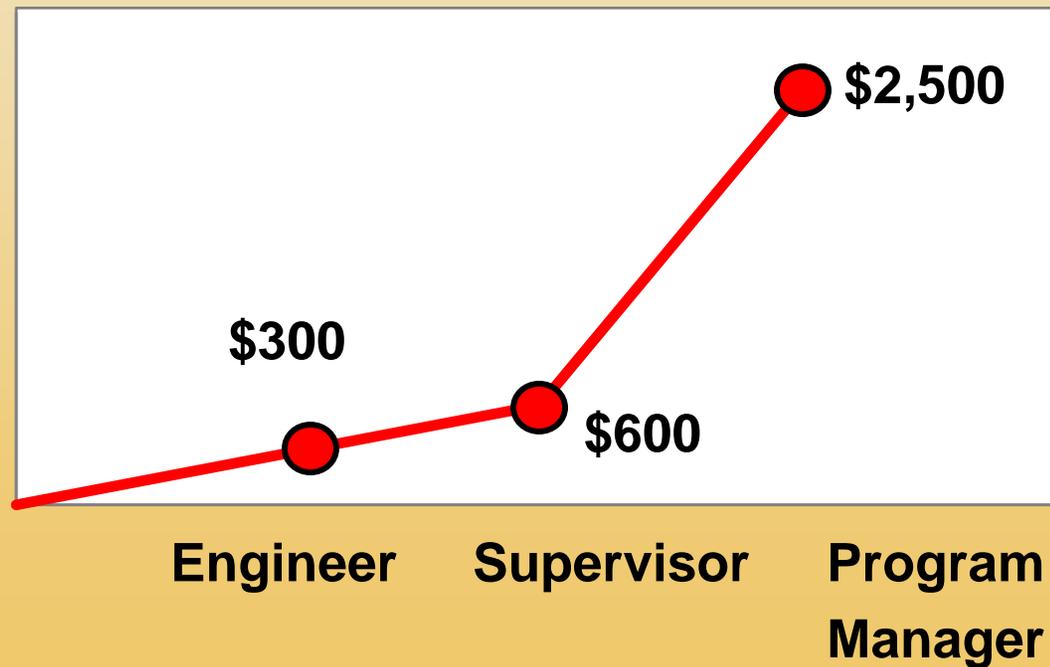
# The New Paradigm



# Decentralizing Control with Decision Rules

## Boeing 777 Weight Reduction Decision Authority

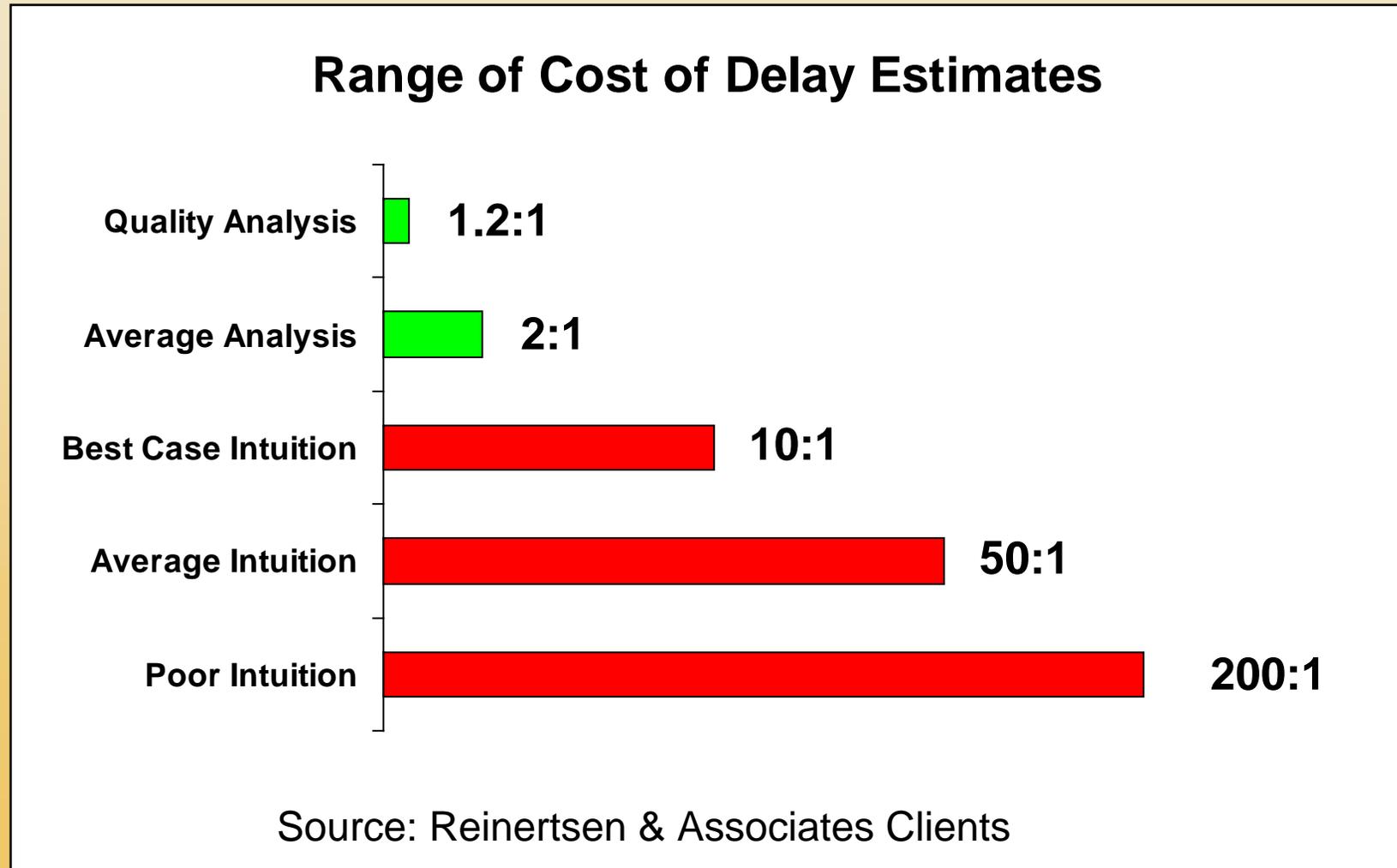
Dollars  
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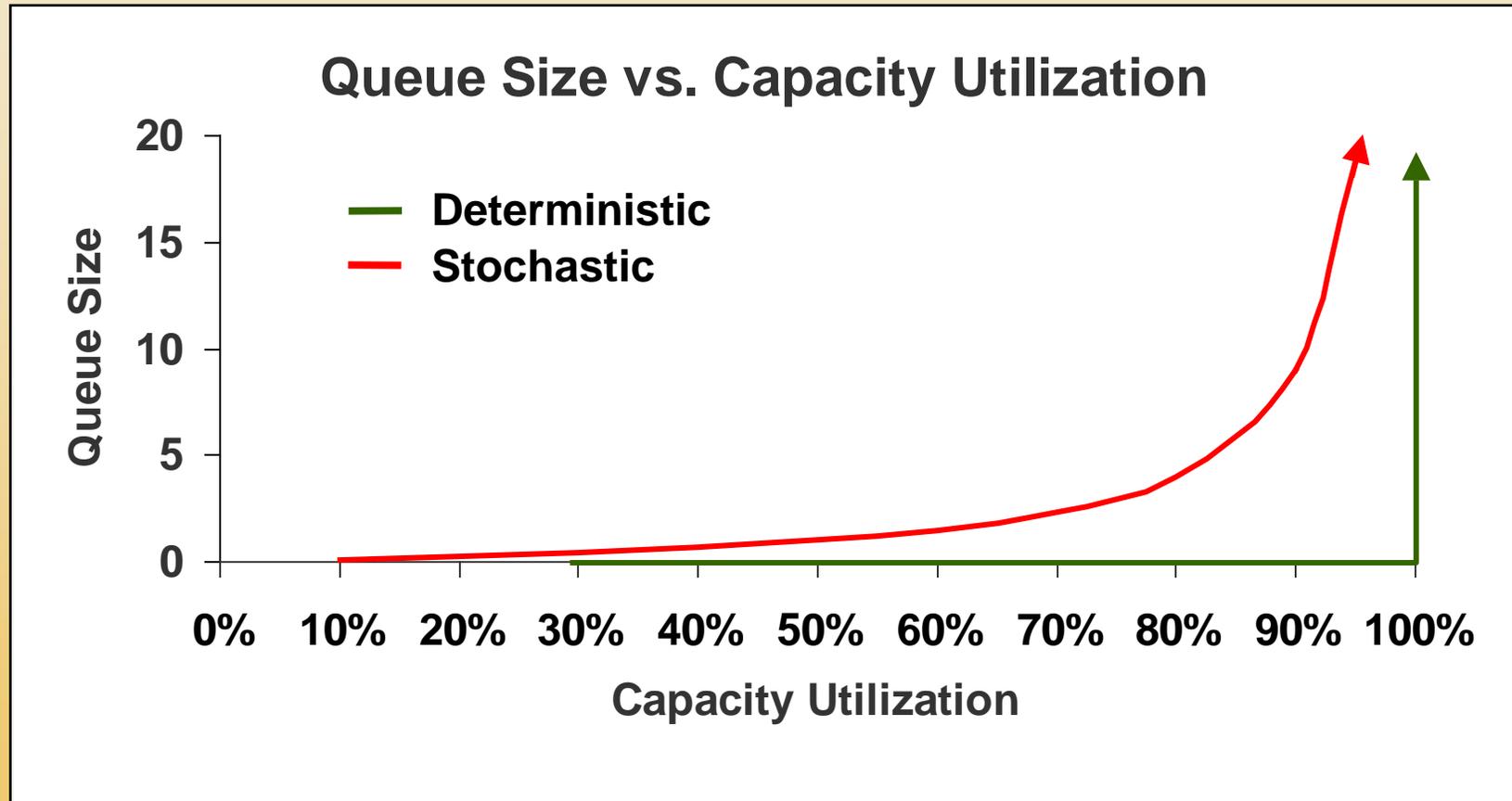
# Decentralizing Control

- **All projects have multiple important objectives.**
- **These objectives interact with each other.**
- **Thousands of small decisions will influence whether we achieve these objectives.**
- **The team members, who make these decisions, need good decision support information.**
- **Economic frameworks provide this, enabling fast, fact-based, decentralized, and transparent economic decisions.**

# Almost Any Analysis Beats Intuition

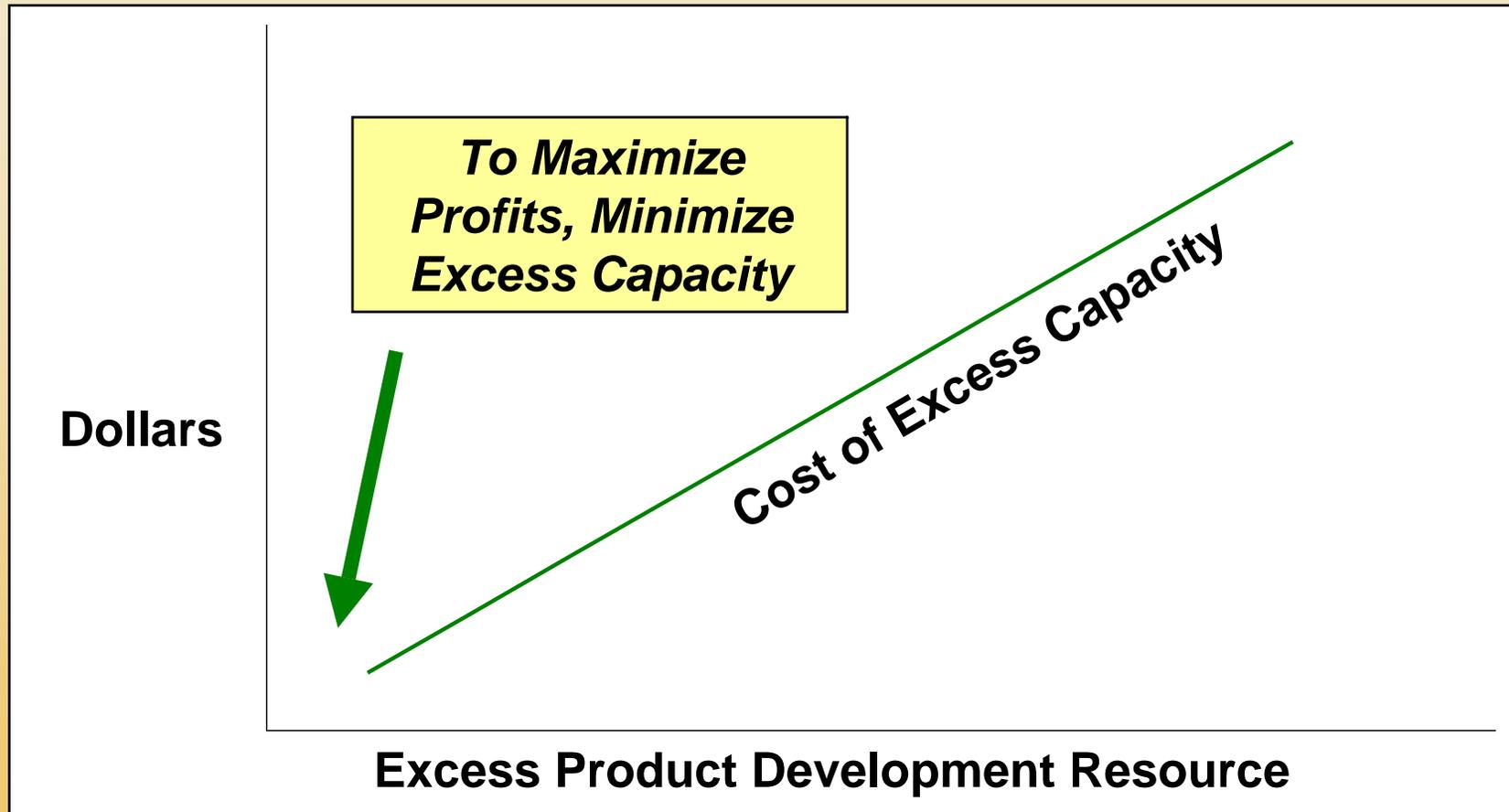


# The Effect of Capacity Utilization

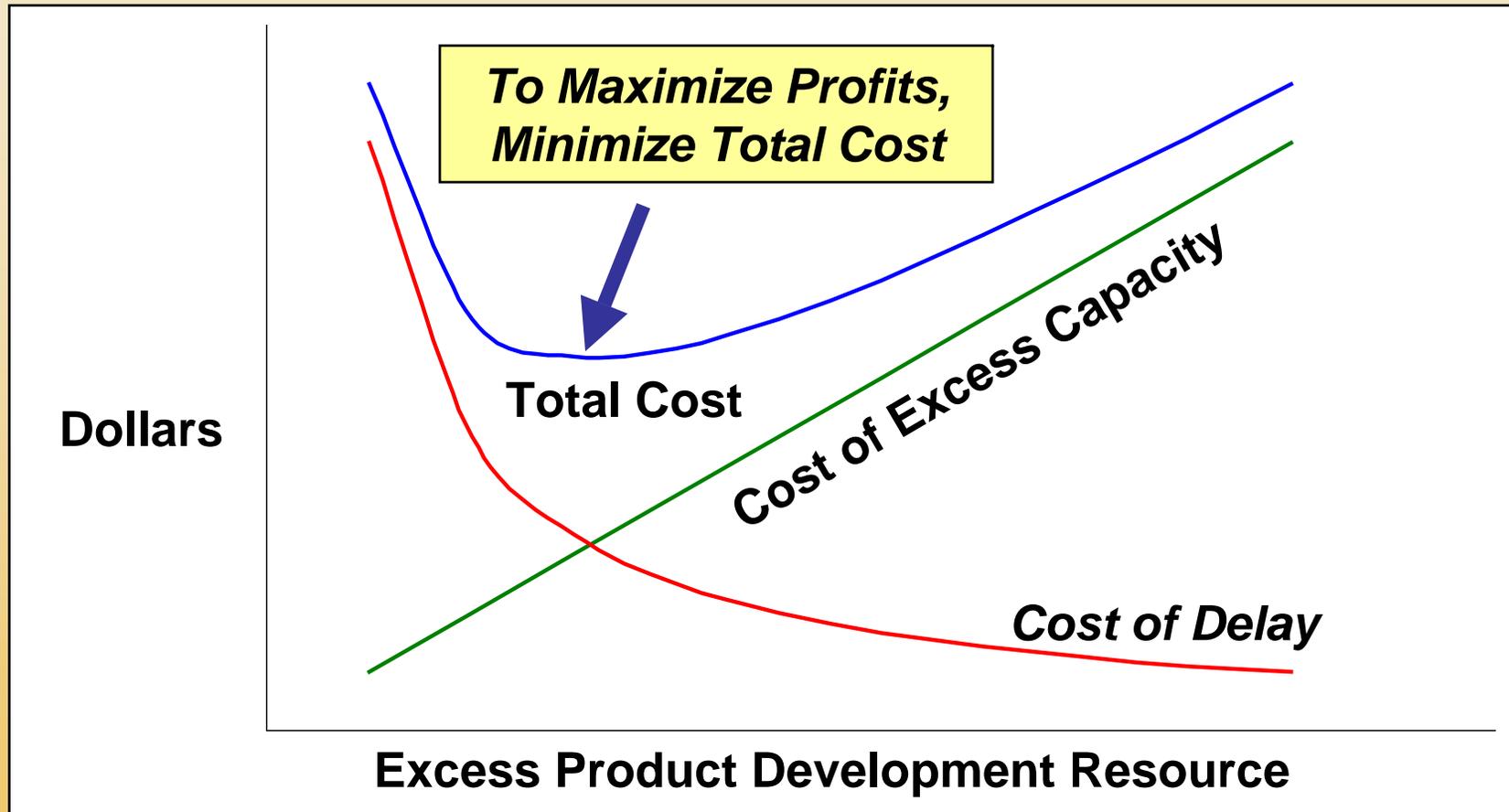


Note: Assumes M/M/1/Infinite Queue

# Efficiency-Centric View



# Flow-Centric View

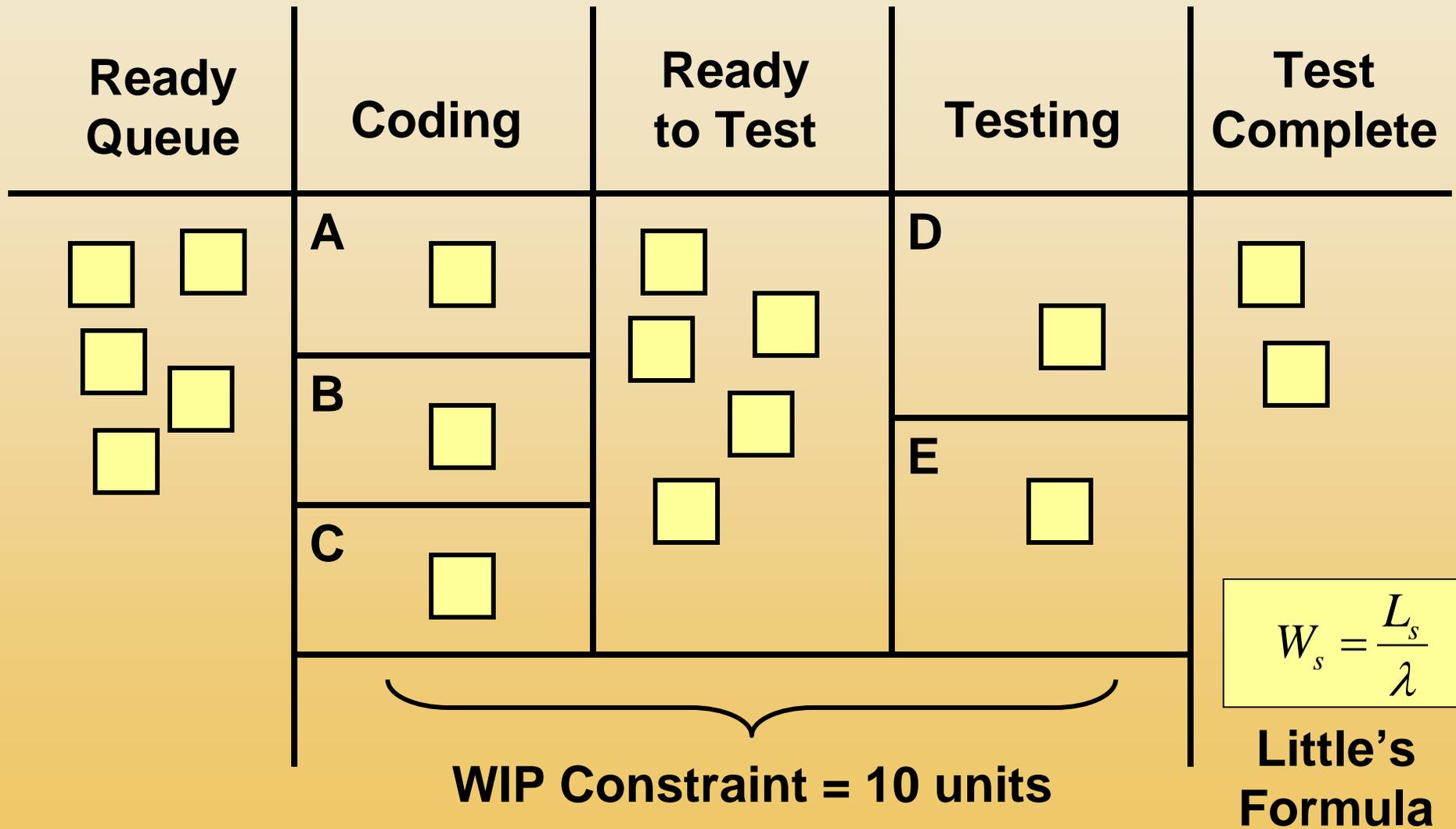


Although I label this view as Flow Centric, it is actually optimizing total cost by including the effect of Cost of Delay.

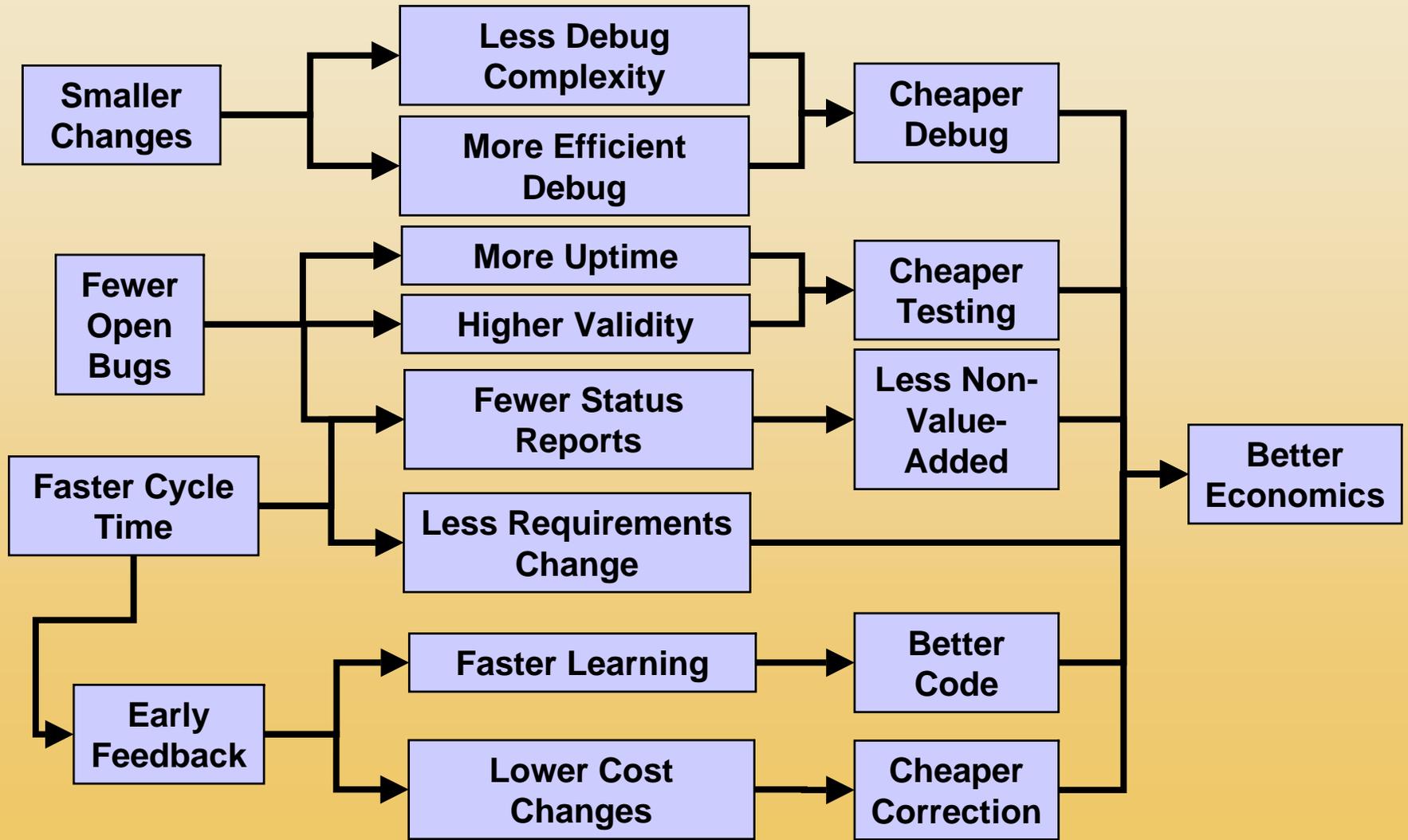
# Managing Queues

- **Product development queues are typically invisible and unmanaged.**
- **They hurt all aspects of economic performance:**
  - **Cycle time**
  - **Quality**
  - **Efficiency**
- **In a system with variability, capacity utilization is the primary driver of cycle time.**
- **To manage queues we must make them physically and financially visible.**

# Visual WIP Control Boards



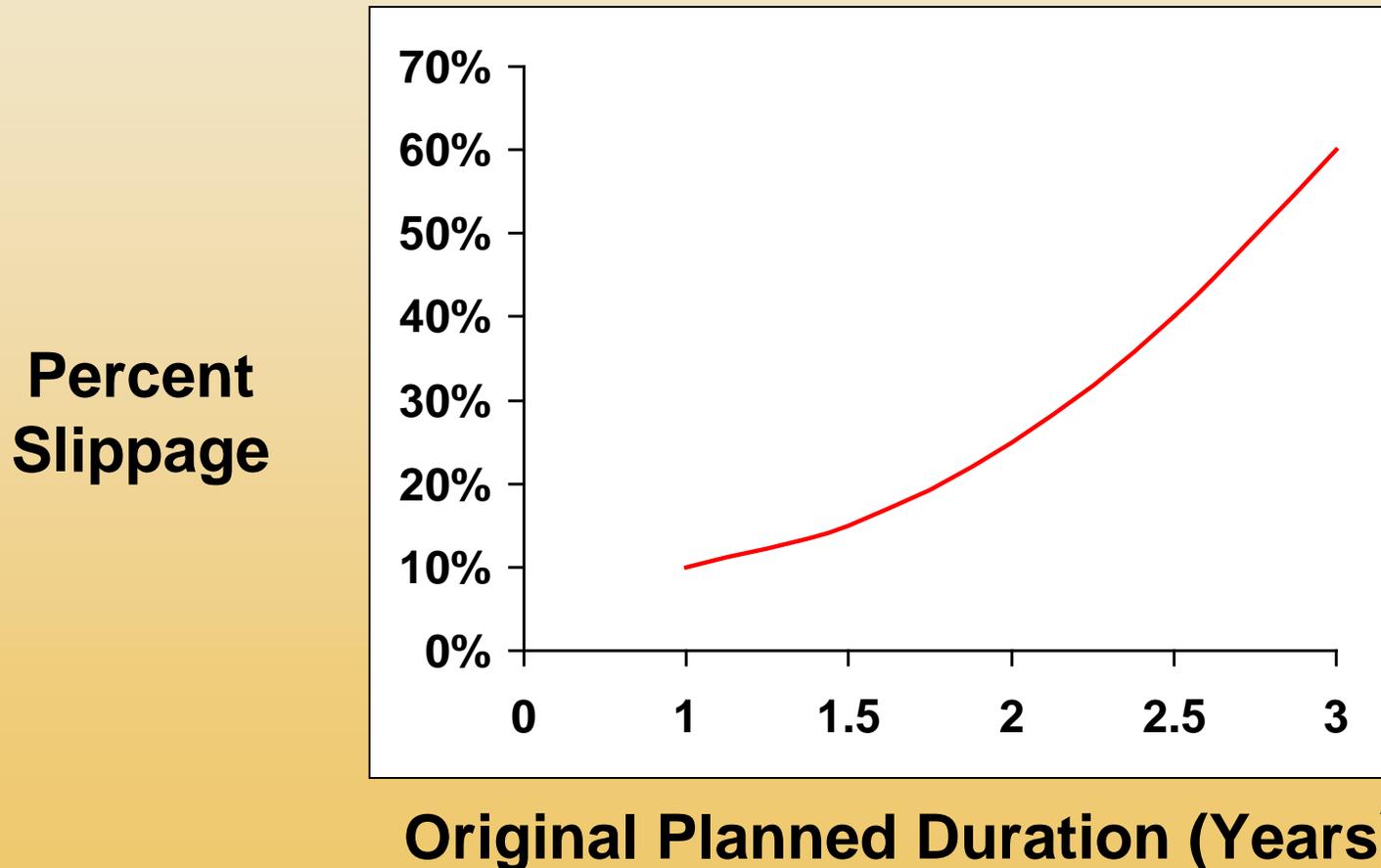
# Benefits of Small Batch Testing



# Reducing Batch Size

- **Reducing batch size improves all aspects of product development performance:**
  - **Cycle time**
  - **Quality**
  - **Efficiency**
- **The key to enabling small batch sizes is to reduce the transaction cost per batch.**

# Megaprojects Geometrically Increase Slippage



**Megaprojects magnetically attract increases in scope and gold plating.**

# The Large Batch Lottery

- A lottery ticket pays \$200 to the winning two digit number.

## Large Batch Approach

Pay \$2.00 to pick both digits at the same time.

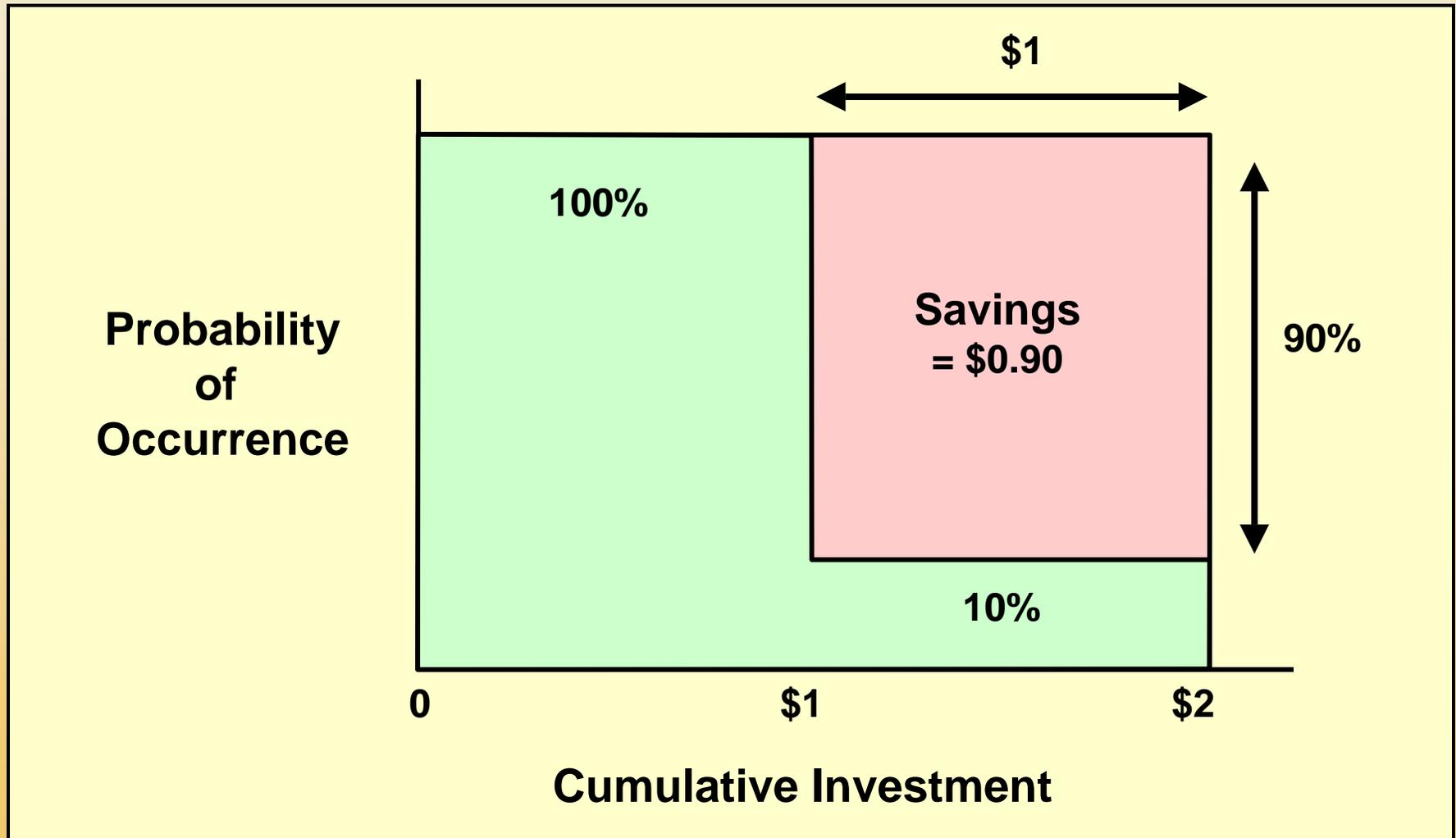
## Small Batch Approach

Pay \$1.00 for 1st digit.

Get feedback.

Decide if you wish to buy the 2nd digit for \$1.00

# Value of Feedback



# Rapid Feedback

- **Most companies do not explicitly measure or manage their feedback loops.**
- **Rapid feedback enables us to exploit the value emerging information.**
- **We can accelerate feedback by:**
  - **Reducing batch size**
  - **Limiting in-process inventory**
  - **Using colocated, cross-functional teams.**
- **We can enable early risk reduction by investing to create a strong testing infrastructure.**

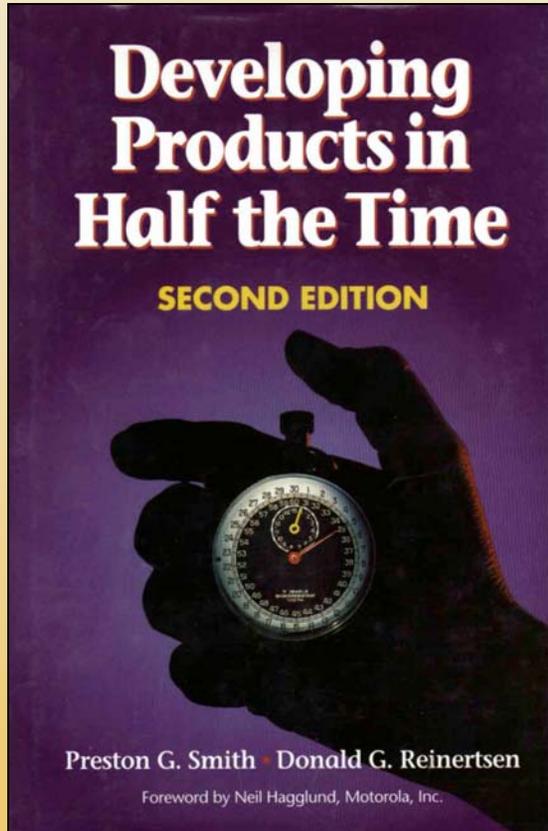
# Product Architecture

- **Architecture is an unappreciated dimension of design. It enables:**
  - **Reuse of subsystems.**
  - **Parallel development.**
  - **Reduced system integration problems.**
- **It gives us the ability to concentrate variability.**
- **Interface management is the crucial skill:**
  - **Buffer risky subsystems with interface margin.**
  - **Decouple subsystem development.**
- **Good product architecture enables the use of good development process architecture.**

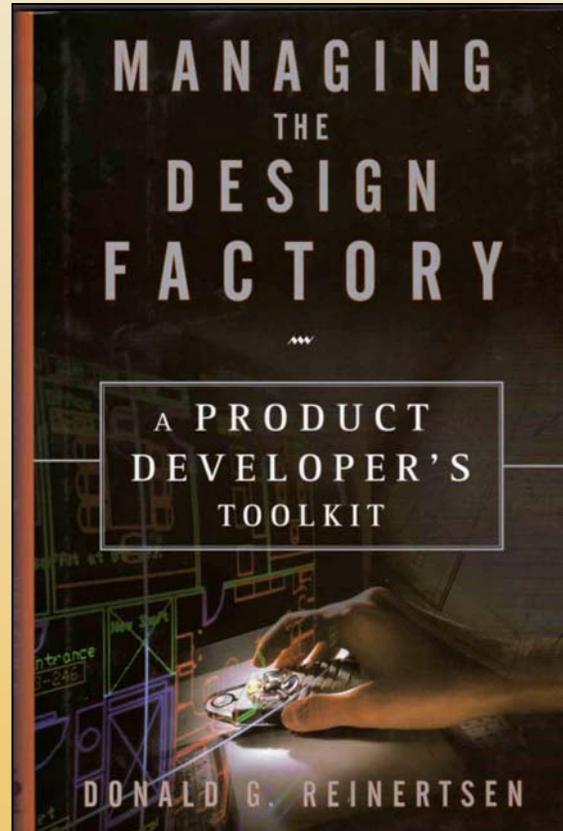
# Summary

- **With good decision support information we can get fast, fact-based, correct, and transparent decisions.**
- **We can simultaneously improve quality, cycle time, and efficiency by:**
  - **Making queues visible**
  - **Reducing batch size**
- **Fast feedback allows us improve speed and efficiency by truncating unproductive paths quickly.**
- **Good product architecture can enable efficient and rapid development with low risk.**
- **Strong testing environments facilitate early risk reduction.**
- **We should use as much science in the design of our development processes, as we use in the design of our products.**

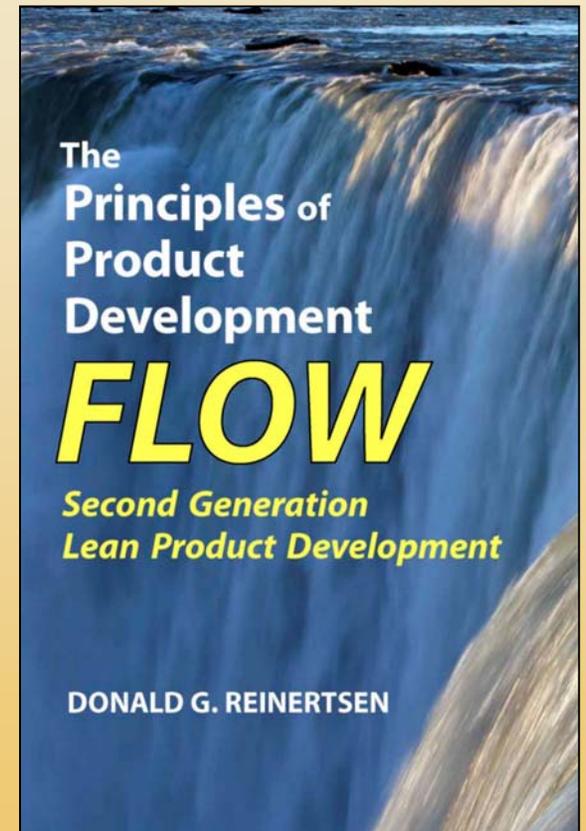
# Going Further



1991 / 1997



1997



2009

