

# **Concurrent Engineering: *Working Together....What, Why, How, and Beyond***

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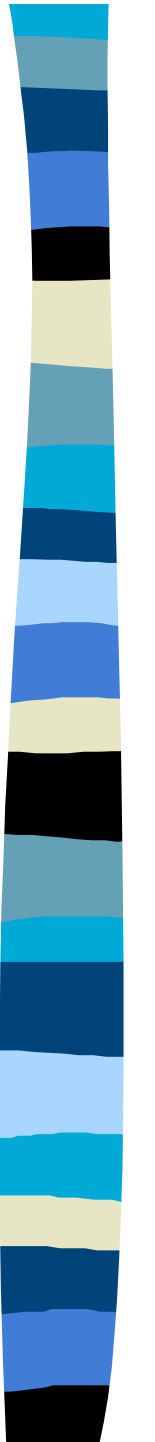
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# Objectives

- Present an overview of the implications of *Working Together*
- Preview extensions to the concept of *Working Together*
- Introduce a Theory of Management



# Theory

- An idea, hypothesis, prejudice
- If.....then.....
- Cause - Effect (Knowledge)
- Data requirements
- Challenges



# Discussion Points

- What is a “Blue Pen Company” and how does it differ from “Red Pen Companies”
- What is *Concurrent Engineering* ?
- What is *Working Together* ?
- Why should we *Work Together* ?
- How can we *Work Together* ?
- Moving beyond *Working Together*



# A Blue Pen Company

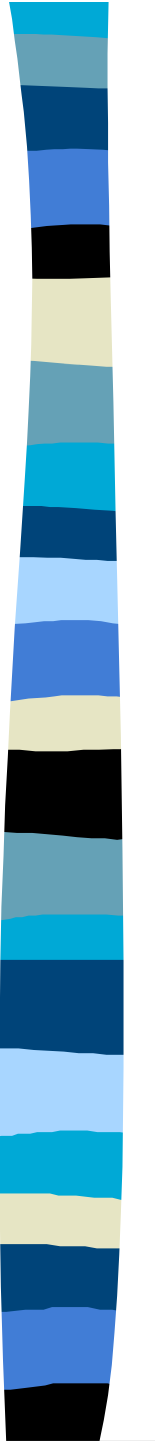
“When Pipp’s crew got done taking apart and reassembling the Toyota truck, they were speechless. They hadn’t once needed to pick up a mallet. The truck was entirely snap-fit. They had never seen anything like it.”

(Source: *Phophets in the Dark*, Kearns and Nadler, page 82)



# What is *Concurrent Engineering* ?

- Designing together
  - Designing for Manufacturability
  - Designing for Assembly
  - Designing for the Environment
  - Designing for X
- Computing together
- Analyzing together
- Sitting together



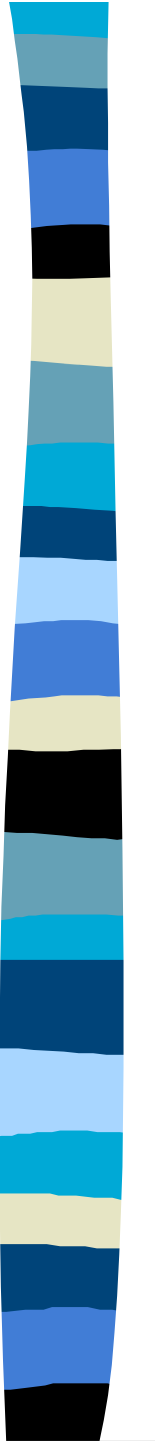
*Working Together*  
**is**  
*Concurrent  
Engineering*



# What is *Working Together* ?

- Picking up nails
- Cutting wood
- Investment
- Volunteering



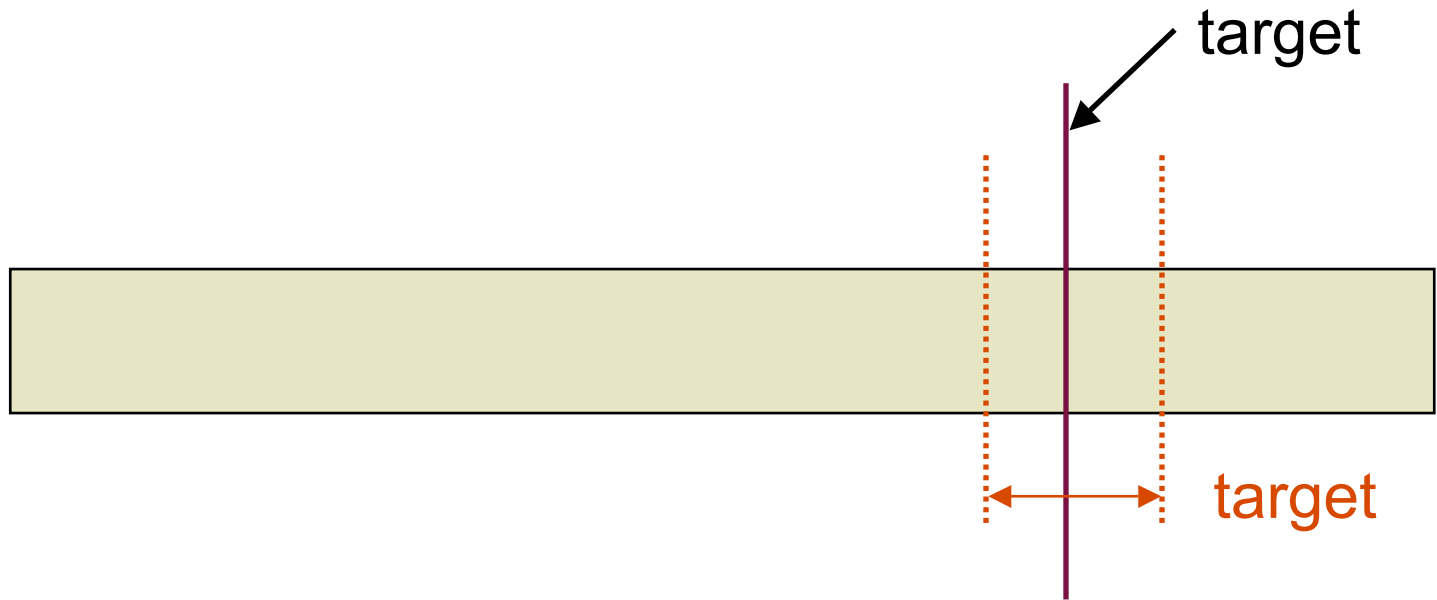
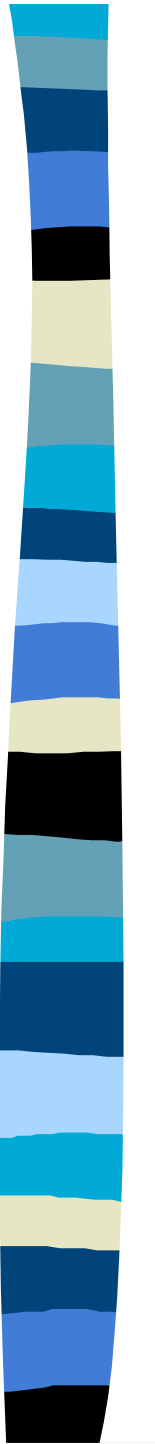


# Picking up nails

Spending time (yours)  
to  
Save time (others)

*Minimizing Loss to  
Society*

# Cutting Wood





# Investment

- Spending \$ to save \$
- Spending time to save **time**
- Spending resources to save **resources**



# Volunteering

- Investment
- *Want to do*
- Offering ideas, money, time, blood,.... to others
- Motivation: Intrinsic (internal forces)

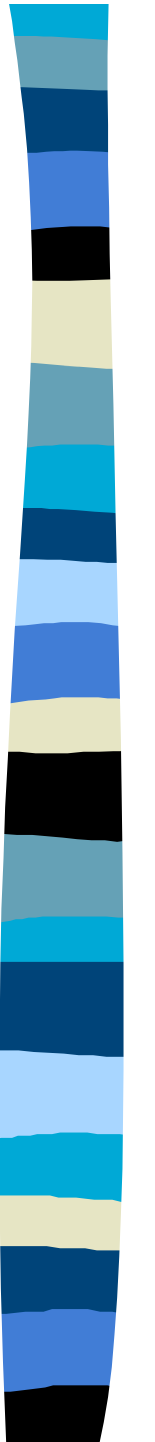
**The paradigm of  
*Desirability***



# Mandatory (Being Volunteered)

- *Must do*
- Meeting requirements  
(providing what is asked for)
- Motivation: Extrinsic (external forces)

**The paradigm of  
*Acceptability***



# Acceptability & Desirability

- Being volunteered
- *Meet* requirements
- Black & White
- Absolute
- Vocabulary - *good, cheap, fast*
- *Reactive*
- *Fix or Rework*
- Success vs. *Failure*
- *Problem* Mindset
- Volunteering
- *Exceed* requirements
- Shades of grey
- Continuous
- Vocabulary - *better, cheaper, faster*
- *Proactive*
- *Improve*
- *Learning*
- *Opportunity* Mindset



# Why should we *Work Together* ?

- Better, faster, cheaper
- Investment opportunities
- The *mathematics*



# The *mathematics*

$$1 + 1 = 2$$

“Additivity”

Working Independently

$$1 + 1 < 2$$

“Non-Additivity”

Working Apart

$$1 + 1 > 2$$

“Non-Additivity”

Working Together





# Expectations

*“Our expectations are not high enough”*

David Kearns



# Who should *Work Together ?*

- Engineering & Manufacturing
- Manufacturing & Quality
- Employees & Management
- Companies & Suppliers
- Companies & Customers
- Companies & Communities
- Companies & The Future



**How can we *Work Together* ?**

**Utilize the Management Theories of**

**Dr. W. Edwards Deming**

**and**

**Dr. Genichi Taguchi**



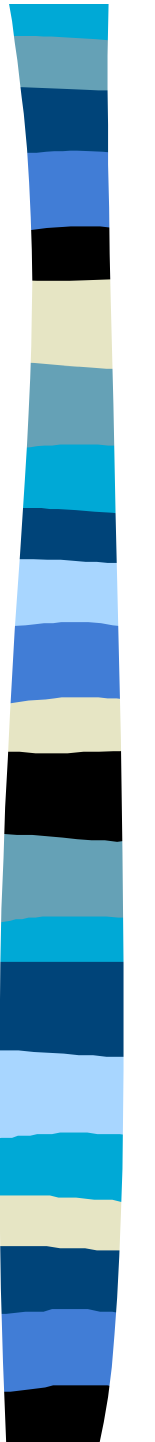
# How can we *Work Together* ?

- See systems
- Appreciate psychology
- Acknowledge variation
- Have a Theory of Knowledge
- Differentiate Acceptability & Desirability

(Deming's "*System of Profound Knowledge*")

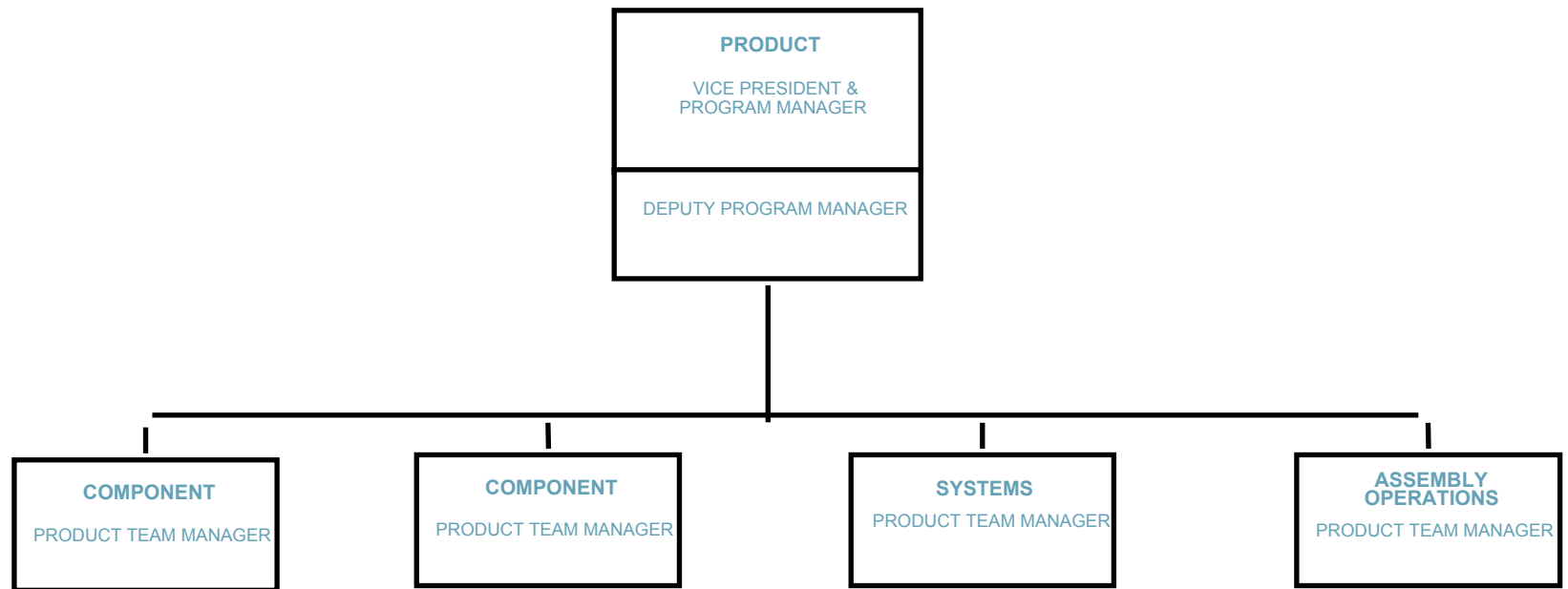
# Seeing Systems

- Education
- Organizations
- Products
- Water Logic



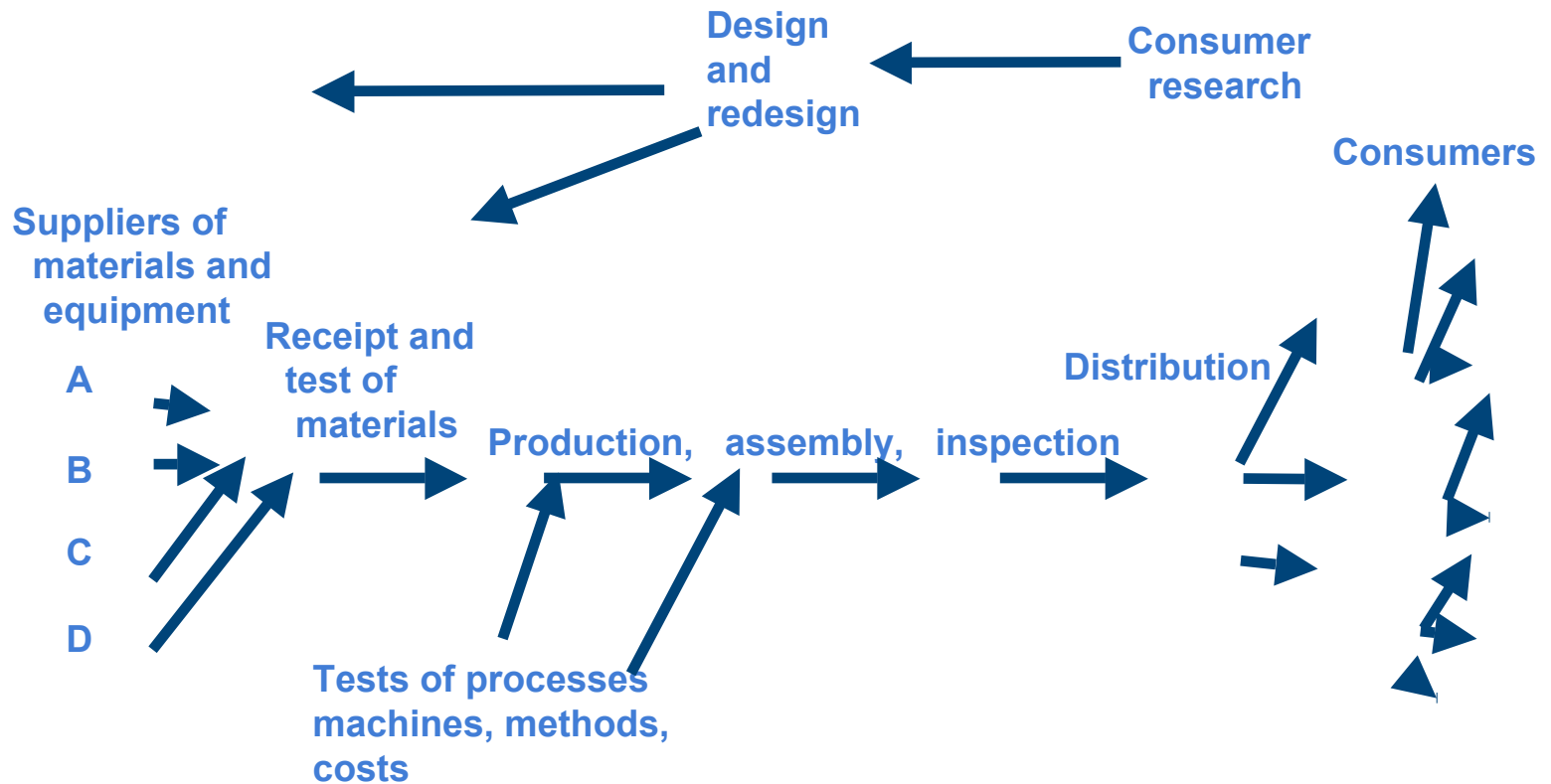
# Seeing Organizations as Systems

## The Hierarchical View (*work for*)



# Seeing Organizations as Systems

## The Process View (*work with*)

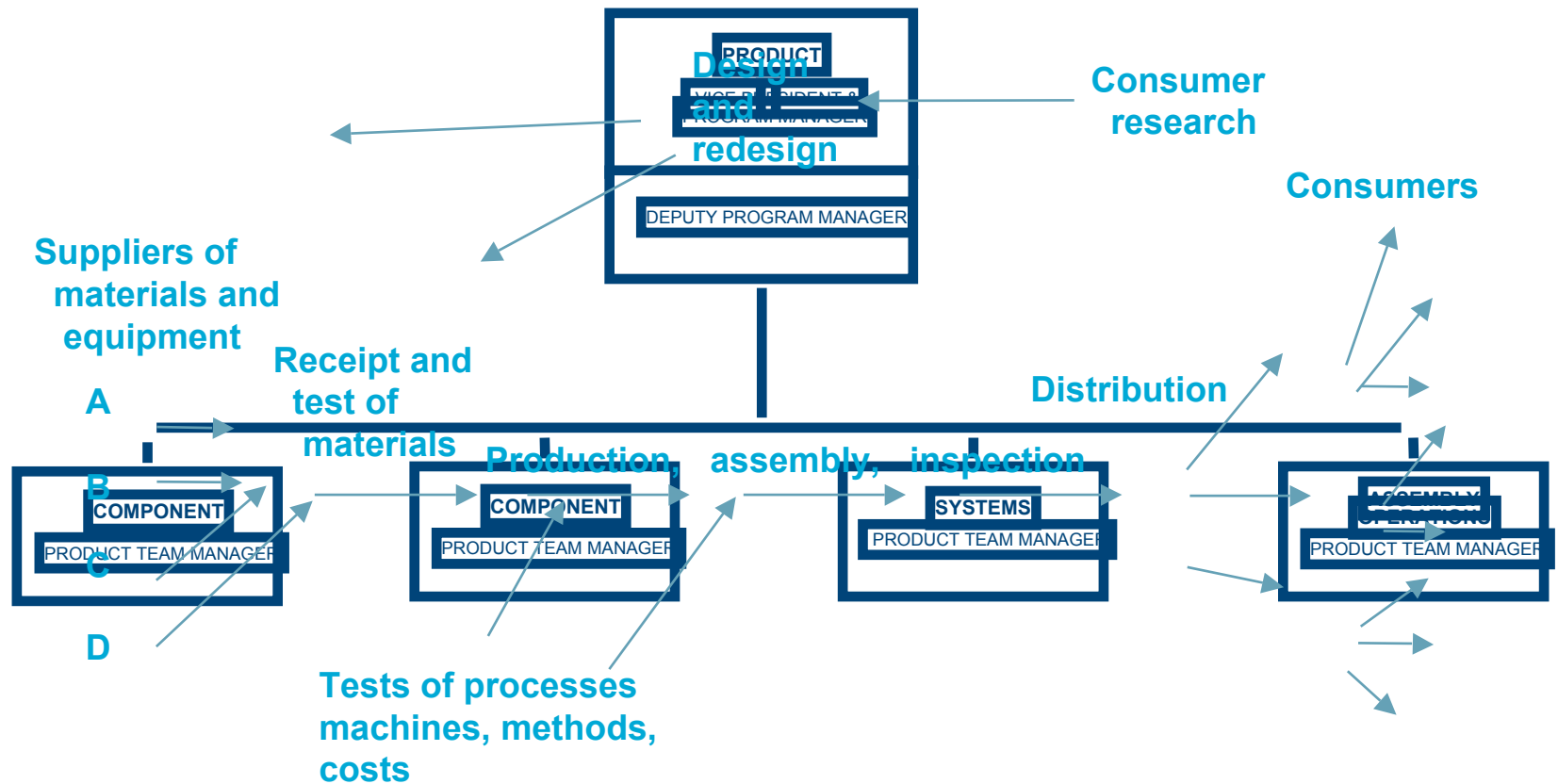


Source: *The New Economics*, Deming, page 58

Chart first used by Dr. W. Edwards Deming in August 1950 in Japan

# Seeing Organizations as Systems

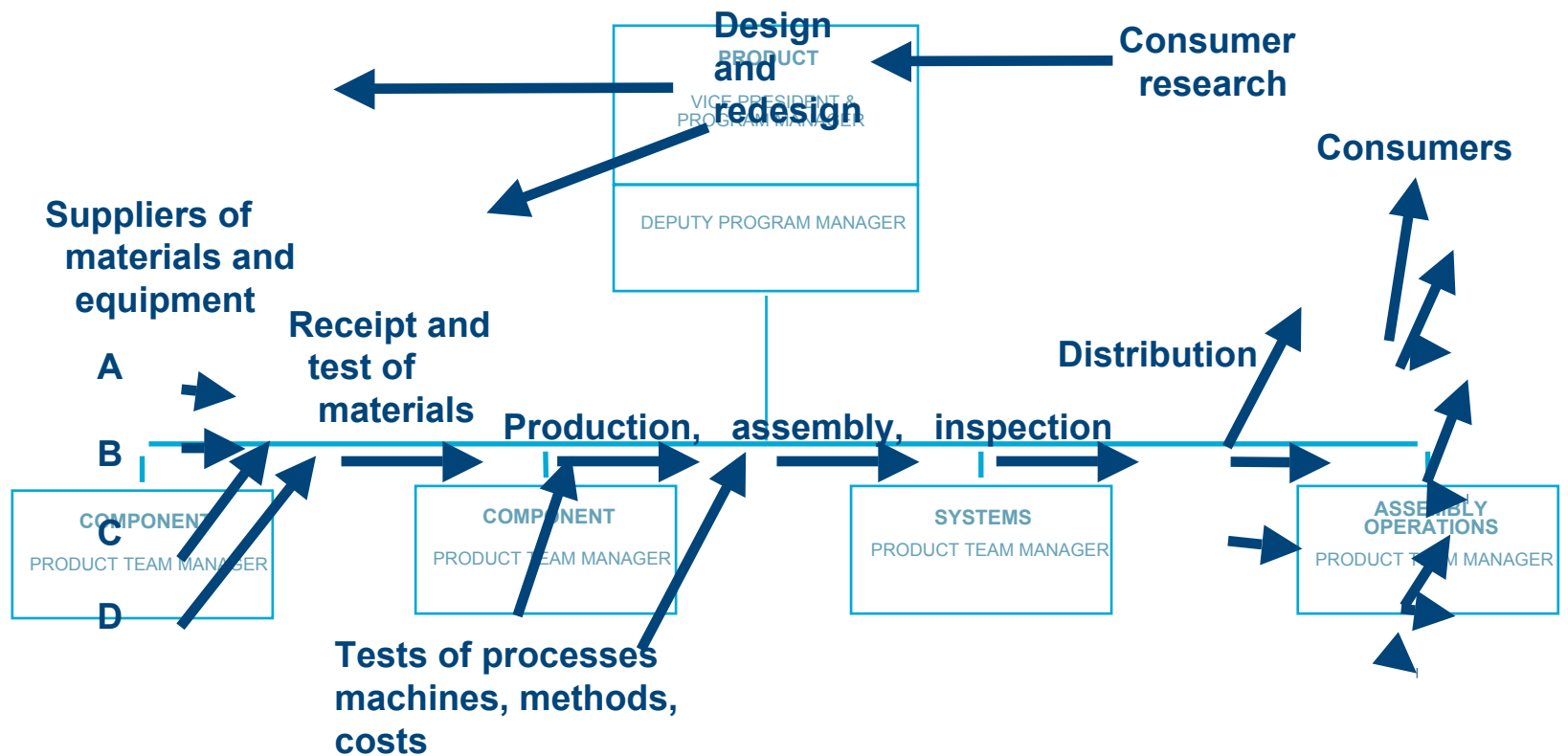
## *A Vertical Emphasis (Red Pen Co.)*



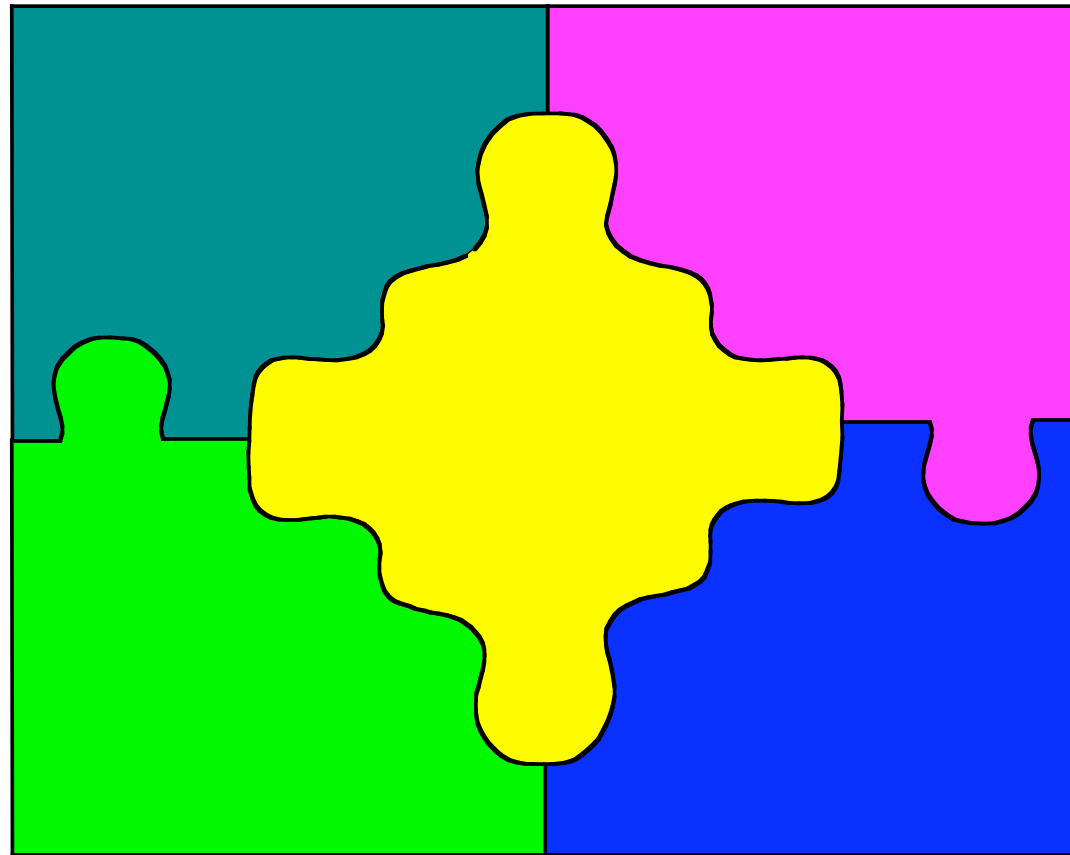
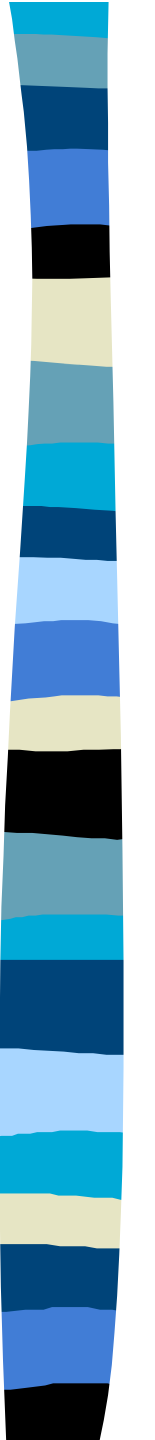


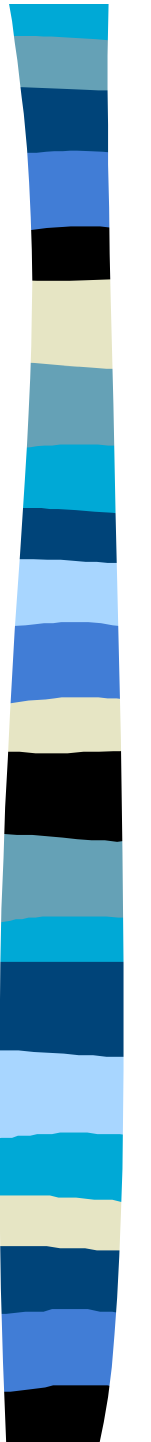
# Seeing Organizations as Systems

## *A Horizontal Emphasis (Blue Pen Co.)*



# Seeing Products as Systems (to manage)





## Water Logic

(Source: Dr. Edward de Bono)

- Where is *this* leading to ?
- What is *this* a part of ?
- Where did *this* come from ?

## Rock Logic

- *This* is a ..... (a piece)
- *Event* focussed



# Moving Beyond *Working Together*

- From “*Working Together*” to “*Thinking Together*”
- From a focus on “*Continuous Improvement*” to a focus on “*Continuous Investment*”
- From “*Rock Logic*” to “*Water Logic*”



# Moving Beyond *Working Together*

- *“Recognize and reward all parts”* instead of *“recognizing and rewarding some parts”*
- Believe *“sharing knowledge is more powerful”* instead of *“knowledge is power”*
- Focus on *“investment”* instead of *“reduction”*

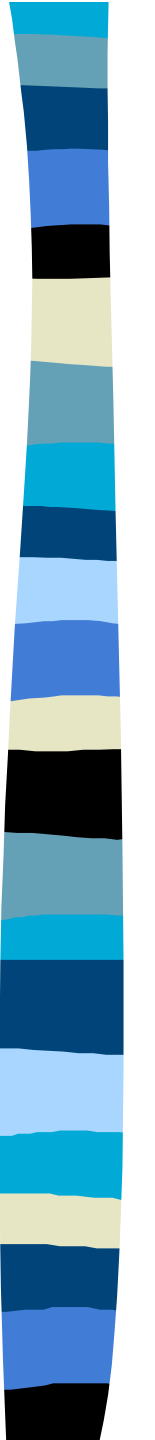


# The Benefits

1 + 1 = ???

“Non-Additivity”

Working Together  
Designing Together  
Building Together  
Learning Together  
Thinking Together  
Leading Together



# Discovery

*“The real act of discovery consists not of finding new lands, but in seeing with new eyes.”*

**Marcel Proust**