“LEAN”

The Beginning

&

The Scientific Foundation

SeaSpin

Seattle & Eastside Area Software Process Improvement Network

.... The Sport and Politics of Software Process

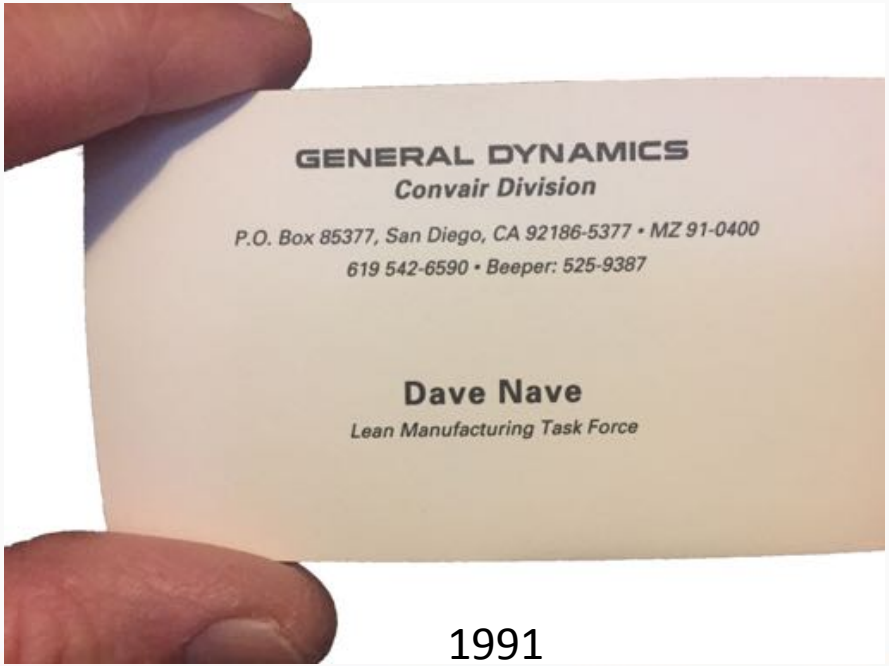
January 8, 2019

DAVE NAVE

BOARD OF DIRECTORS

THE DEMING COOPERATIVE

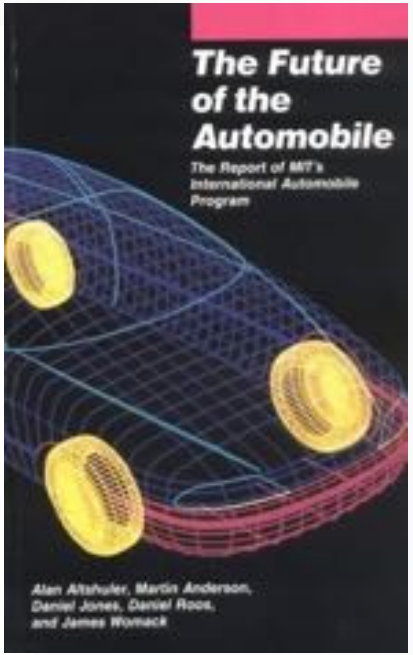
BEEN THERE – DONE THAT



1991

WHERE DID THE TERM "LEAN" COME FROM?

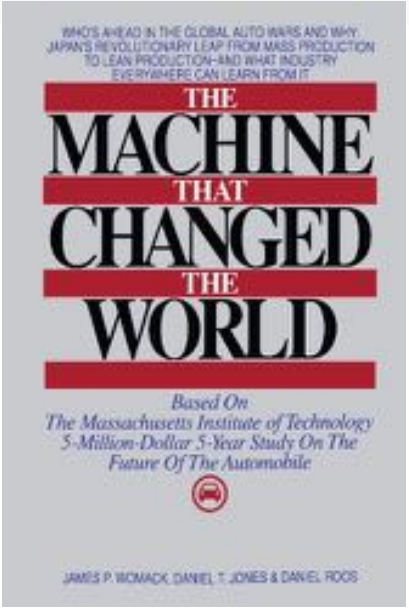
- **Previous book: *The Future of the Automobile***
  - **Guardedly Optimistic - Technology**
- **Study on Factory Only**
- **Concerned about Auto Industry and World Economy**
  - **Same Techniques Since Henry Ford**
  - **Industry Not learning**
  - **Trade Barriers & Competitive Impediments**



1984

NEED TO COMPARE OLD & NEW TECHNIQUES

- **New Study On Entire Set Of Tasks (1985-1990)**
  - Market Assessment
  - Product Design
  - Detailed Engineering
  - Coordination of Supply Chain
  - Operation of Individual Factories
  - Sales and Service of Finished Goods
- **A Wealth of Benchmarking Data**



1990

THE TERM ”LEAN PRODUCTION”

- **John Krafcik (factory specialist)**
  - **First American Engineer Hired at the Toyota-General Motors Joint Venture, NUMMI**
  - **MBA, MIT Sloan School of Management**
- **Coined The Term “LEAN PRODUCTION” Because The Toyota Production System Uses Less of Everything Compared to Mass Production**

STUDY CONCLUSION

LEAN

MASS PRODUCTION

TOOK "*THE MACHINE THAT CHANGED THE WORLD*" ON THE ROAD

Found Two Problems:

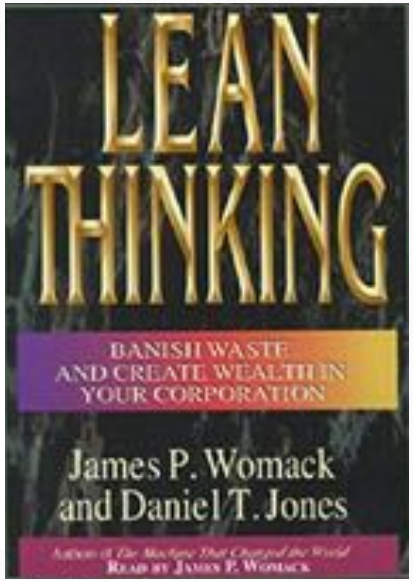
1. **Managers Have Lost Sight Of Value For The Customer And How To Create It**
2. **By Focusing On Their Existing Organizations And Outdated Definitions Of Value, Managers Create Waste, And The Economies Of Advanced Countries Continue To Stagnate**

AUDIENCES ASKED

- **How Do We Do Lean?**
  - **“What Are The Key Principles to Guide Our Actions”**
  - **“How Do We As Managers, Employees, Investors, Suppliers and Customers take a stuck-in-the-mud production organization and make them Lean?”**
- **Many Books Describing ‘Techniques’**
- **The Thought Process To Tie All Methods Together Into A Complete System Was Left Largely IMPLICIT!**

LEAN PRINCIPLES

1. Precisely Specify ***Value*** by Specific Product
2. Identify The ***Value Stream*** for each Product
3. Make ***Value Flow*** without Interruption
4. Let Customer ***Pull*** Value From The Producer
5. Pursue ***Perfection***



1996

VALUE - DEFINED

- **Specific Product** (a good or a service, often both)
- **Meets The Customer Needs**
- **At A Specific Price**
- **At A Specific Time**

VALUE DISTORTIONS – ONE (America)

- **Value Definition; Technology, Core Competencies, and Strategic Intentions**
- **Practices For Short-term Competitive Problems Were Clever Ways to:**
  - **Eliminate Jobs**
  - **Divert Revenue From Downstream Customers**
  - **Extract Profits From Upstream Suppliers**
- **Usually Labelled as ‘Lean’ - They Are Only ‘Mean’**

VALUE DISTORTIONS – TWO (Germany)

- Ignore Short-term Financial Performance
- Value Defined as Product Features & Processing Methods
  - Defined by Engineers
  - Design Complexity
  - Complex Machinery
- "The Customer Will Want It Once We Explain It"
- Failure Explained Away As: "The Customers Weren't Sophisticated Enough To Grasp the Merits Of the Product"

VALUE DISTORTIONS – THREE (Japan)

- **Value is *WHERE*** (geographically) **Value is Created**
- **Design and Make Their Product At Home**
  - **To Satisfy Societal Expectation about Long-term Employment**
  - **Stable Supplier Relations**
- **Yet Most Customers Like Products Designed For Local Needs**
- **Immediate Needs of Employees & Suppliers Took Precedence of the needs of the Customer**

IDENTIFY THE VALUE STREAM

- **All The Actions Required to Bring A Specific Product Through Three Critical Management Tasks**
  - **Detailed Design and Engineering to Product Launch**
  - **Information Management From Order-Taking Through Detailed Scheduling to Deliver**
  - **Physical Transformation of Raw Materials to Finished Product in The Hands Of The Customer**

FLOW VALUE

- **Small Lot Size – Small Work-In-Process (Queues)**
- **Quick Change Over Tools**
- **Miniaturize Machines**
- **Sequence ‘Value Added’ Activities Located Near Each Other**

PULL

- **No One Upstream Should Produce A Good Or Service Until The Customer Downstream Asks For It**
  - **The Principle Is Simple, The Practice Is More Complicated**
  - **“PULL” Is Mostly Described Through Examples**

PERFECTION

- There Are Always Ways To Improve
- As Activities Become More Flexible And Responsive To Customer ‘Pull’, People Find New Ways To Eliminate Effort, Time, Space, and Errors

TO RECAP

M.I.T. Researchers Found:

1. **Automotive Technology Is Hopefully Adequate**
   - **They Wrote a Book**
2. **A New Way To Make Things**
   - **They Wrote a Book**
3. **Principles For Transformation Identified**
   - **They Wrote a Book**

- **How to 'Spread The Word?'**

ONE AUTHOR STARTS A TRAINING COMPANY

Founded in 1997 by management expert James P. Womack, PhD, LEI conducts research, teaches educational workshops, publishes books and ebooks, runs conferences, and shares practical information about lean thinking and practice.

BANISHING WASTE OR CREATING VALUE ? ? ?

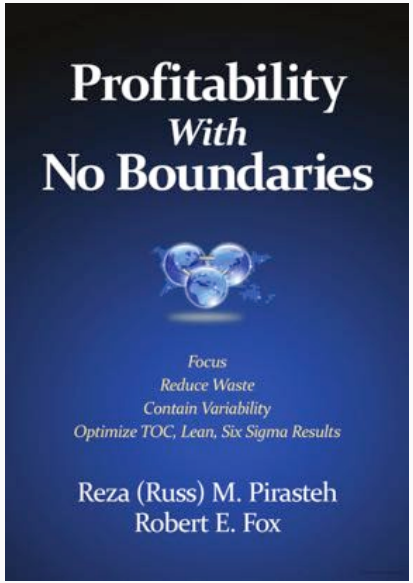
- **Over time, with best intention and an internal focus, problems created ‘Solutions.’**
- **Are those ‘Solutions’ still needed?**

Removing waste does not add value,

it only uncovers the value already there.

THE MYTH OF 'WASTE'

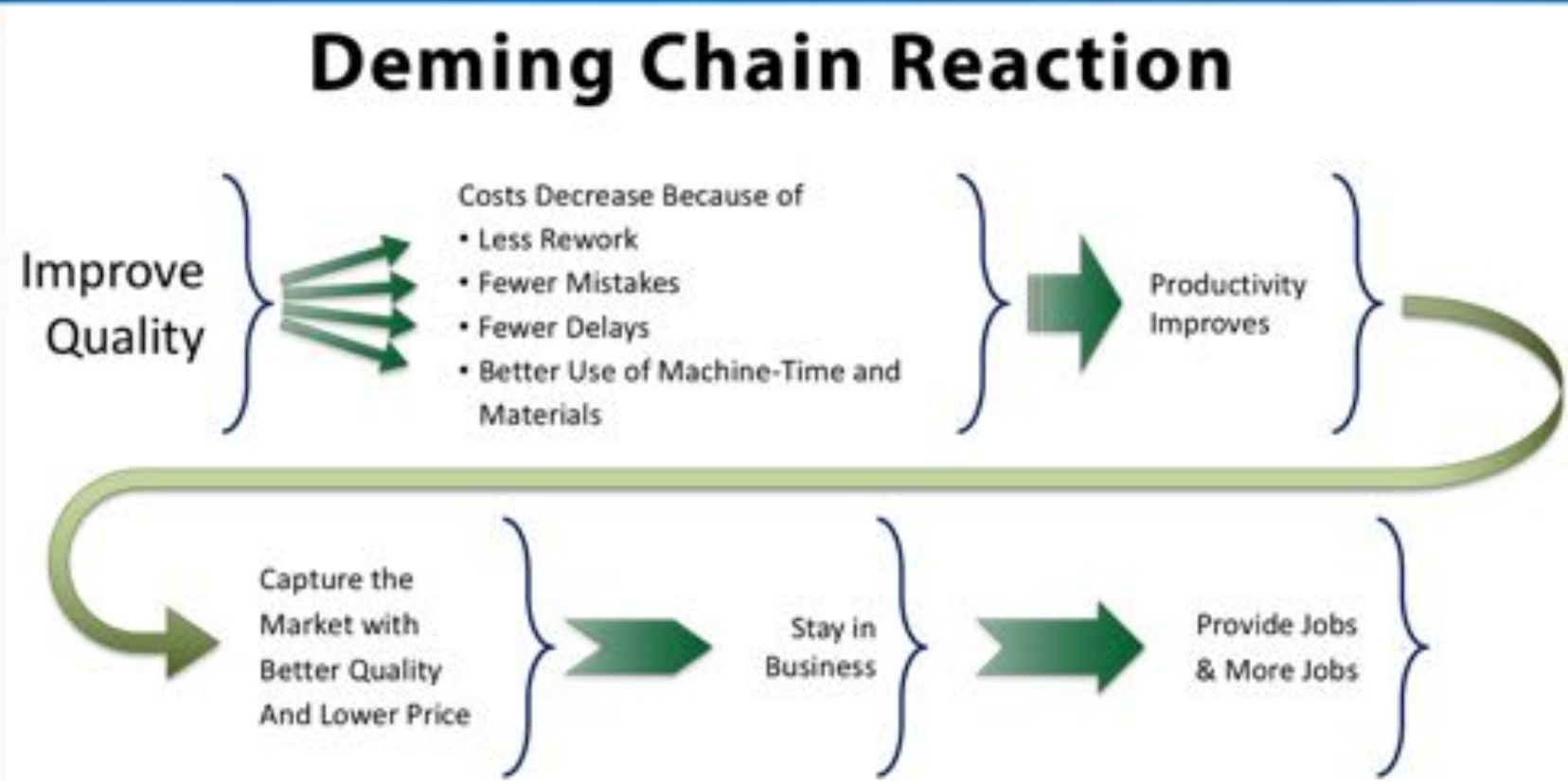
- **Lean Is Misunderstood in United States and Europe - In Part By Taiichi Ohno's Successful Efforts To Mislead And Confuse Non-Japanese Companies.**
- **He Went To Great Lengths To Confuse Western Visitors As To Why His System Worked. He Feared They Would Copy It Before Japan Could Fully Compete With Western Companies.**



2011

TAIICHI OHNO BELIEFS

- **Workers Were Local Experts, And Should Be Treated Accordingly**
  - **His System (TPP/LEAN) Not Only Uses Their Physical Strength, But Also Their Knowledge and Skills**
- **Main Objective: Sell More Cars**
  - **Improve Quality → Reduce Cost → Increase Profits**
  - **Superior Quality + Reliability = Increased Sales**


Deming Chain Reaction
Improve Quality
Costs Decrease Because of
• Less Rework
• Fewer Mistakes
• Fewer Delays
• Better Use of Machine-Time and Materials
Productivity Improves
Capture the Market with Better Quality And Lower Price
Stay in Business
Provide Jobs & More Jobs

The Intellectual Foundation of Modern Improvement

- **The Underlying Science of Making Things Better**
- **The CONTEXT for Lean, Six Sigma, and others**

”As to methods there may be a million and then some, but principles are few. The man who grasps principles can successfully select his own methods. The man who tries methods, ignoring principles, is sure to have trouble.”

— Harrington Emerson —

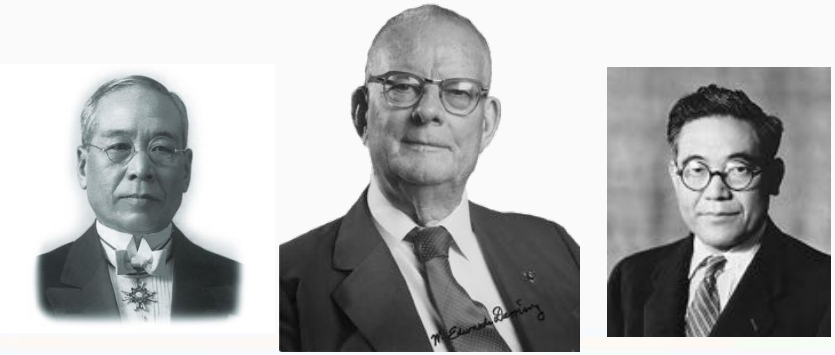
The Intellectual Foundation of Modern Improvement

- **Modern management is a collection of unique and unrelated 'best practices,' often without regard to how they interact with each other or the rest of the business.**
- **Learn about blind spots in modern management methods and improvement efforts. Explore how leaders create organizations that serve a useful purpose, produce dynamic and meaningful change, and manage them well.**

LOBBY OF THE TOYOTA MOTOR COMPANY HEADQUARTERS

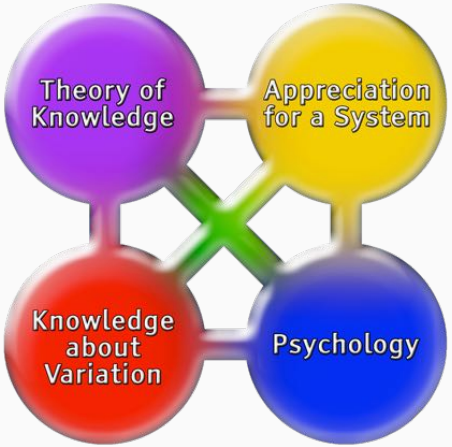
- **Pictures**
  - **Sakichi Toyoda** (Founder)
  - **Kiichiro Toyoda** (Son of Founder)
  - Between Them, a Larger Picture of **Dr. W. Edwards Deming**

Why would the premier company in efficiency put an American in a most prestigious position – with their founders?



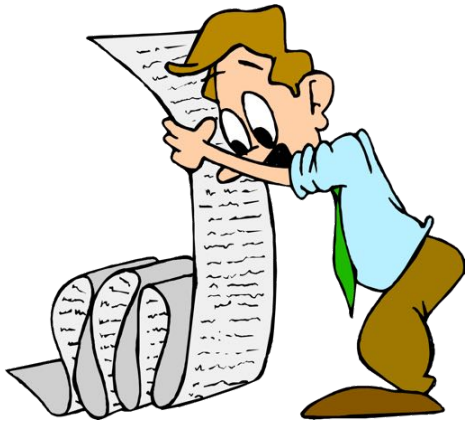
QUALITY OF THE COMPANY, THE MANAGEMENT TEAM

- What is variation telling us?
- How to work as a System?
- Understanding people and their interactions with each other, circumstances, systems.
- Knowledge in terms of how it is created & revised.



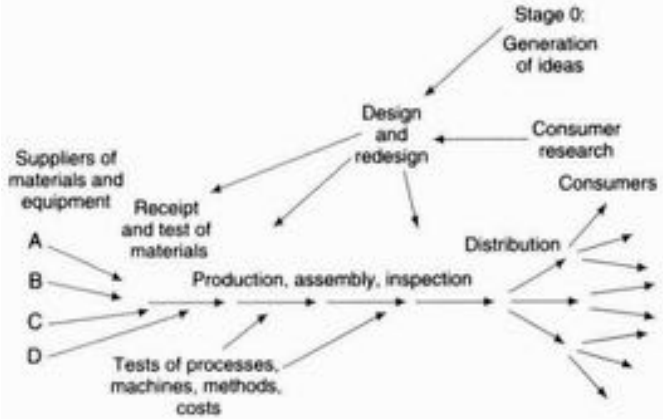
KNOWLEDGE ABOUT VARIATION

- What does variation tell us about the process?
  - The individuals in the process?
- Economic Control?
- Stability?
- Types of Actions?



APPRECIATION FOR A SYSTEM

- **Interdependent components working together towards the AIM of the system**
- **Obligation of a component is to contribute its best to the system, not to maximize its own production, profit, sales, or any other competitive measure**



KNOWLEDGE OF PSYCHOLOGY

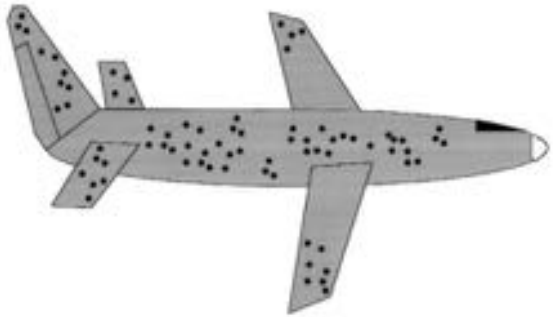
- **Understand people and their interactions with:**
  - **Each other**
  - **Circumstances**
  - **Systems**

THEORY OF KNOWLEDGE

- **Justified True Beliefs (Plato)**
- **Knowledge in terms of how it is created & revised vs. necessary elements of knowledge**
- **Three elements of perceptual knowledge (C.I. Lewis)**
  - **Perceptual data**
  - **The concept by which data is classified**
  - **The act of interpreting data by means of the concept**

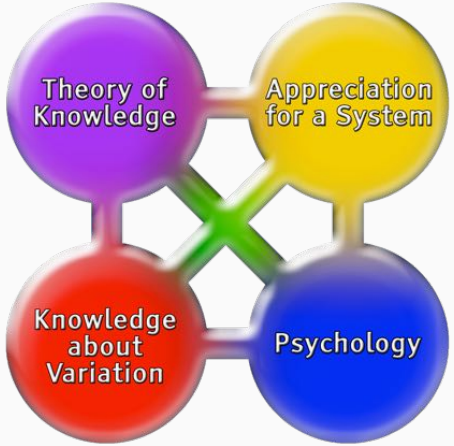
THEORY OF KNOWLEDGE (continued)

- **The mind legislates for reality**
- **We make choices of concepts, or theory, we use to interpret experiences and predict**
- **The choice of concept rests upon usefulness for action**
- **No true value in anything measured**
- **Rational thinking**



QUALITY OF THE COMPANY, THE MANAGEMENT TEAM

- **What is variation telling us?** About the process? About individuals in the process? Economic control? Stability? Types of Actions?
- **How to work as a System?** Interdependencies? Obligations of components?
- **Understanding people and their interactions with each other, circumstances, systems.**
- **Knowledge in terms of how it is created & revised.** How the choice of concepts rests upon usefulness for action.



LEAN – The Beginning

First Year

- Pay-For-Performance
- Every department is a cost center
  (Profit & Loss center)
- Every department to create improvements for their department

	Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A				
Area B				
Area C				

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		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i ii iii	+ + +			
Area B					
Area C					

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Area A	i ii iii	+ + +			
Area B	i ii		+ +		
Area C					

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Area A	i ii iii	+ + +			
Area B	i ii		+ +		
Area C	i ii iii			+ + +	

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Area A	i	+	—		
	ii	+	—		
	iii	+	—		
Area B	i		+		
	ii		+		
Area C	i			+	
	ii			+	
	iii			+	

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	ii	+	—	+	
	iii	+	—	—	
Area B	i		+		
	ii		+		
Area C	i			+	
	ii			+	
	iii			+	

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i		+		
	ii		+		
Area C	i			+	
	ii			+	
	iii			+	

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i			+	
	ii			+	
	iii			+	

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	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ +	— — — —	0	— —

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ +	— — — —	0	— —
Distribution of Benefits		-.67	-.67	-.67	-2

LEAN – The Beginning

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- $2M

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ +	— — — —	0	— —
Distribution of Benefits		-.67	-.67	-.67	-2

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—

Second Year

- Pay-For-Performance
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- **Only implement savings to company**

LEAN – The Beginning

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ + +	—	+	+ + +

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ + +	—	+	+ + +
Distribution of Benefits		1	1	1	3

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	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ + +	—	+	+ + +
Distribution of Benefits		1	1	1	3

Second Year

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- **Only implement savings to company**

+ $3M

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- $2M

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Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
Area B	i	—	+	—	—
	ii	+	+	—	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
Net Effect of plans		+ + +	—	+	+ + +
Distribution of Benefits		1	1	1	3

Second Year

- Pay-For-Performance
- Every department is a cost center
  (Profit & Loss center)
- Every department to create improvements for their department
- **Only implement savings to company**

+ $3M

Third Year

- Every department to make changes that will benefit entire company

	Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A				
Area B				
Area C				

Third Year

- Every department to make changes that will benefit entire company

	Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A i	+	−	−	−
ii	+	−	+	+
iii	+	−	−	−
iv	−	+	+	+
v	−	+	+	+
Area B				
Area C				

LEAN – The Beginning

Third Year

- Every department to make changes that will benefit entire company

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
	iv	—	+	+	+
	v	—	+	+	+
Area B					
Area C					

LEAN – The Beginning

Third Year

- Every department to make changes that will benefit entire company

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
	iv	—	+	+	+
	v	—	+	+	+
Area B	i	—	+	—	—
	ii	+	+	—	+
	iii	+	—	+	+
	iv	+	—	+	+
Area C					

LEAN – The Beginning

Third Year

- Every department to make changes that will benefit entire company

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	−	−	−
	ii	+	−	+	+
	iii	+	−	−	−
	iv	−	+	+	+
	v	−	+	+	+
Area B	i	−	+	−	−
	ii	+	+	−	+
	iii	+	−	+	+
	iv	+	−	+	+
Area C	i	+	−	+	+
	ii	−	−	+	−
	iii	−	−	+	−
	iv	+	+	−	+

LEAN – The Beginning

Third Year

- Every department to make changes that will benefit entire company

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
	iv	—	+	+	+
	v	—	+	+	+
Area B	i	—	+	—	—
	ii	+	+	—	+
	iii	+	—	+	+
	iv	+	—	+	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
	iv	+	+	—	+
Net Effect of plans		+ + + +	0	+ + + +	+ + + + + + + +

LEAN – The Beginning

Third Year

- Every department to make changes that will benefit entire company

		Effect on Area A	Effect on Area B	Effect on Area C	Net Effect on the Company
Area A	i	+	—	—	—
	ii	+	—	+	+
	iii	+	—	—	—
	iv	—	+	+	+
	v	—	+	+	+
Area B	i	—	+	—	—
	ii	+	+	—	+
	iii	+	—	+	+
	iv	+	—	+	+
Area C	i	+	—	+	+
	ii	—	—	+	—
	iii	—	—	+	—
	iv	+	+	—	+
Net Effect of plans		+ + + +	0	+ + + +	+ + + + + + + +
Distribution of Benefits		2.67	2.67	2.67	8

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