

Vanishing Boundaries

**Adding Value by Blending
Manufacturing and Services**

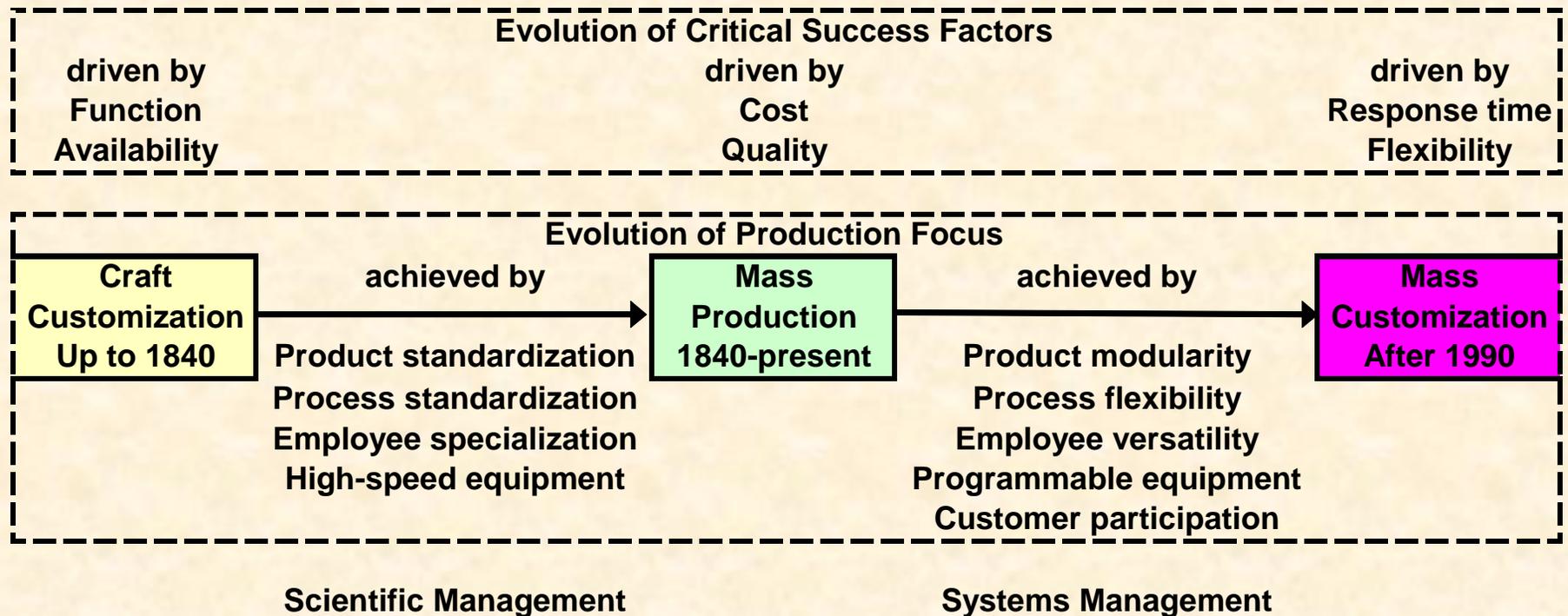
**From: Principle of Supply Chain
Management, 2E
Crandall, Crandall and Chen**

Introduction

- **Manufacturing – Product and process oriented**
 - Make and sell
 - High volume, standard products, low cost
- **Services – Customer oriented**
 - Sense and respond
 - High volume, custom products, high quality, fast response, flexibility, agility

From Age to Age

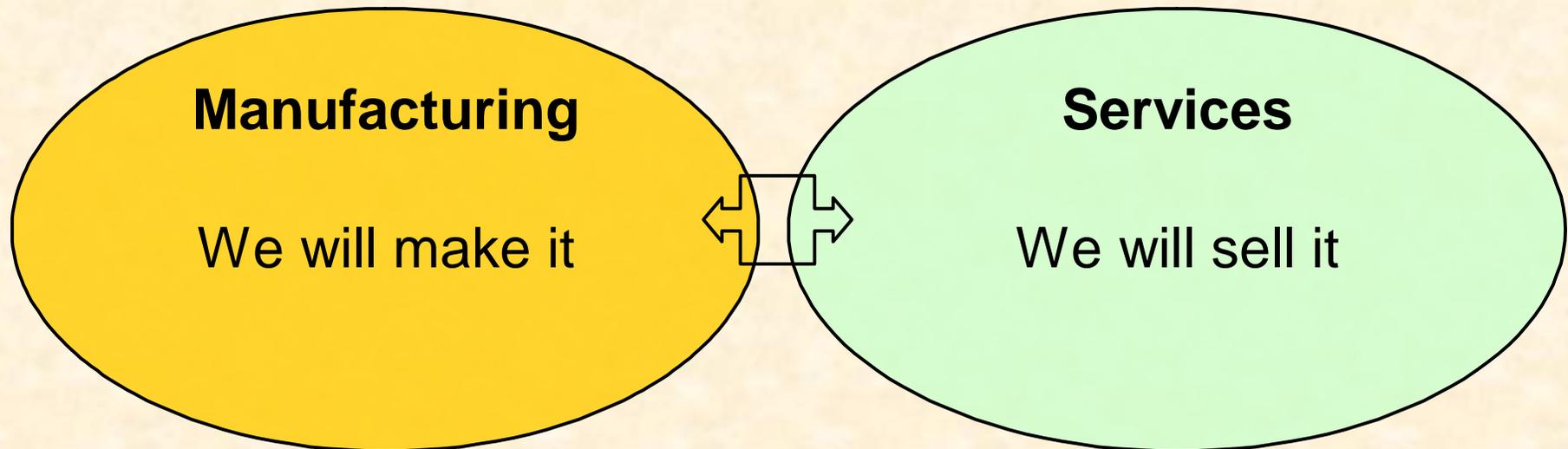
From the Craft Age to the Mass Customization Age



Evolution

- Vertical integration (from Henry Ford through World War II)
- Conglomerates (horizontal diversification through the 1960s and 1970s)
- Lean manufacturing and horizontal communications (1980s and 1990s)
- Focus on core competencies and outsource the rest (2000 forward)

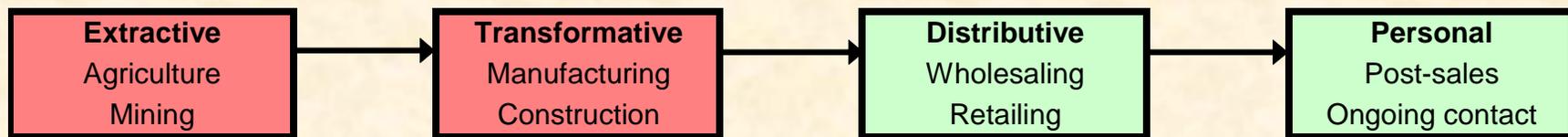
Manufacturing-Services Boundary



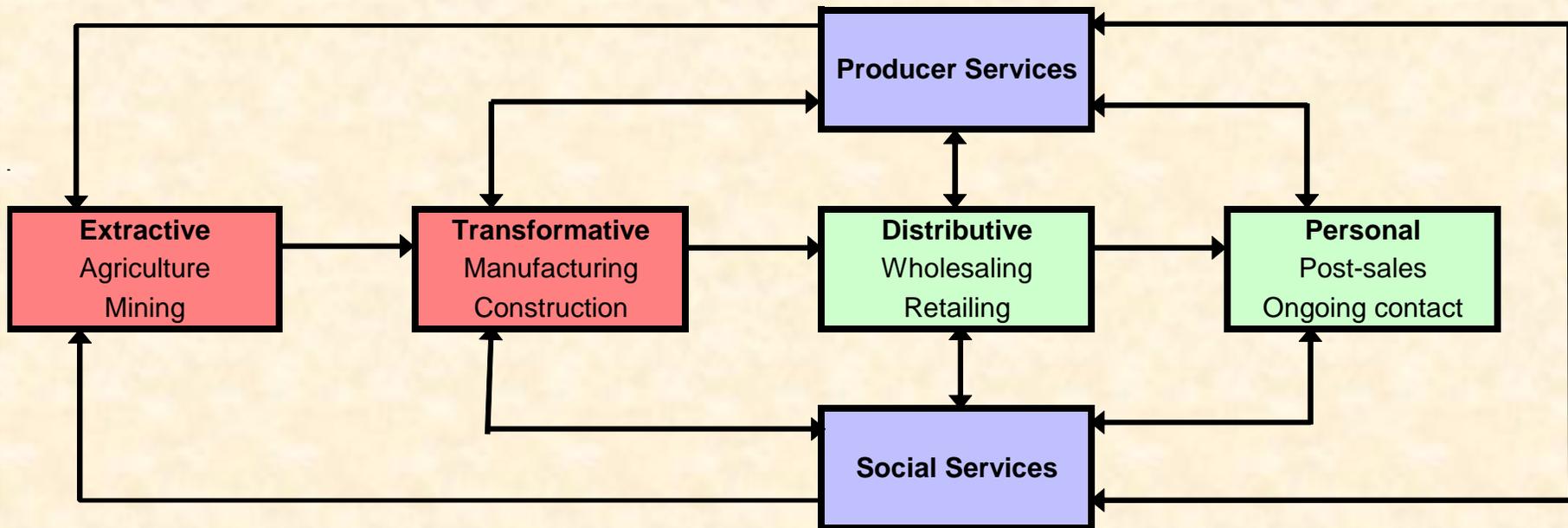
The boundary is clear

Traditional Interface of Manufacturing and Services

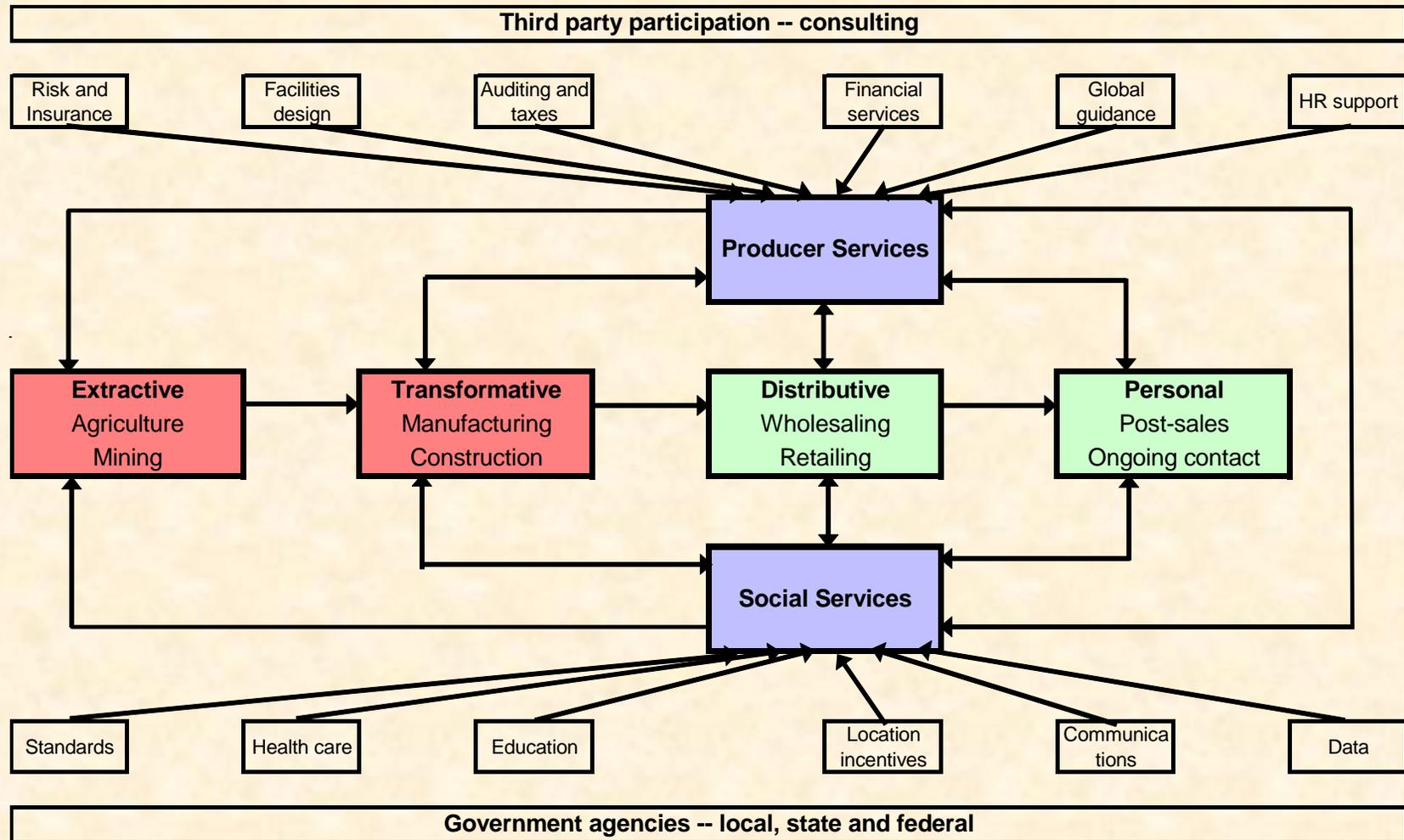
Basic Supply Chain



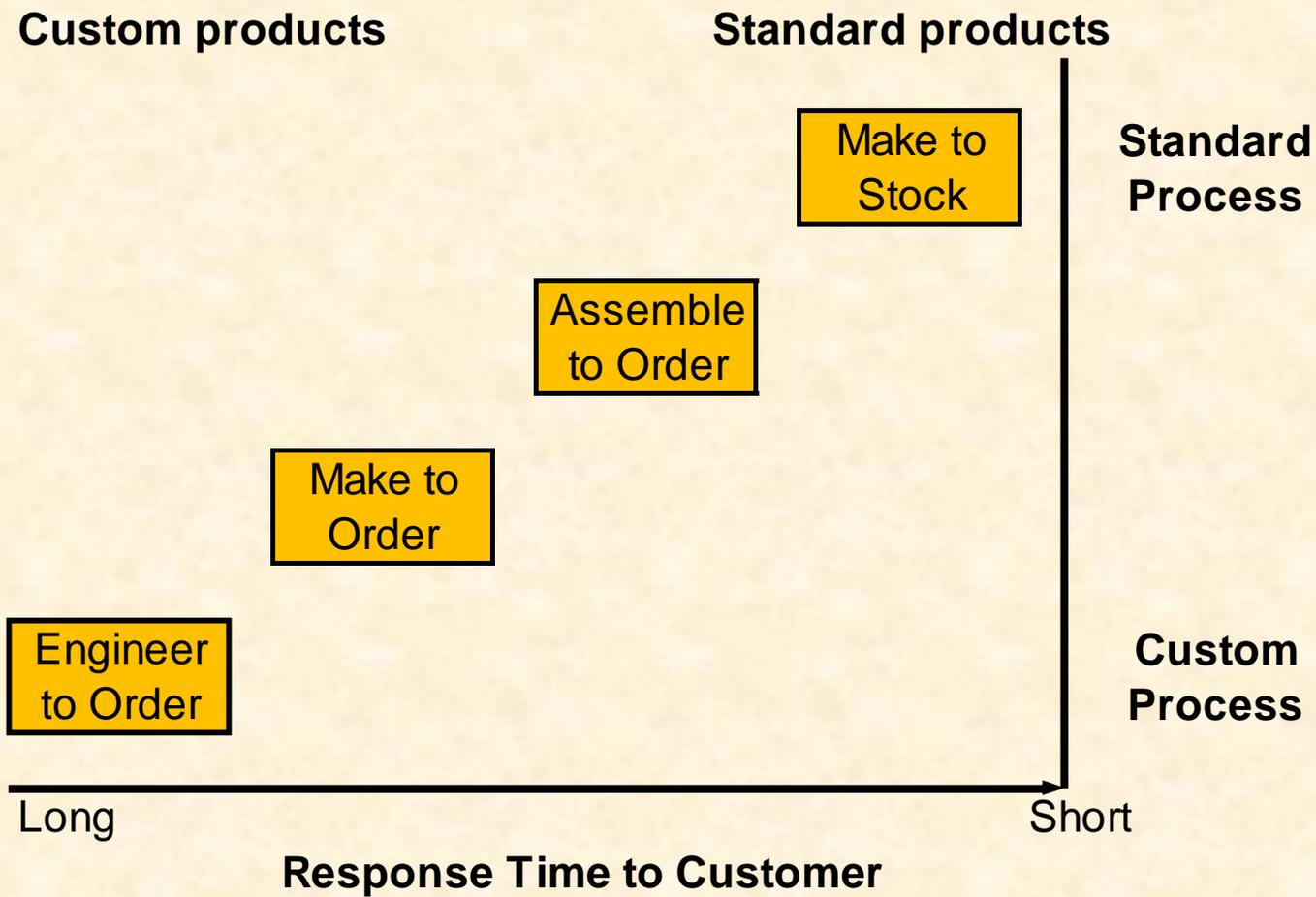
Added Support Services



Added service sectors



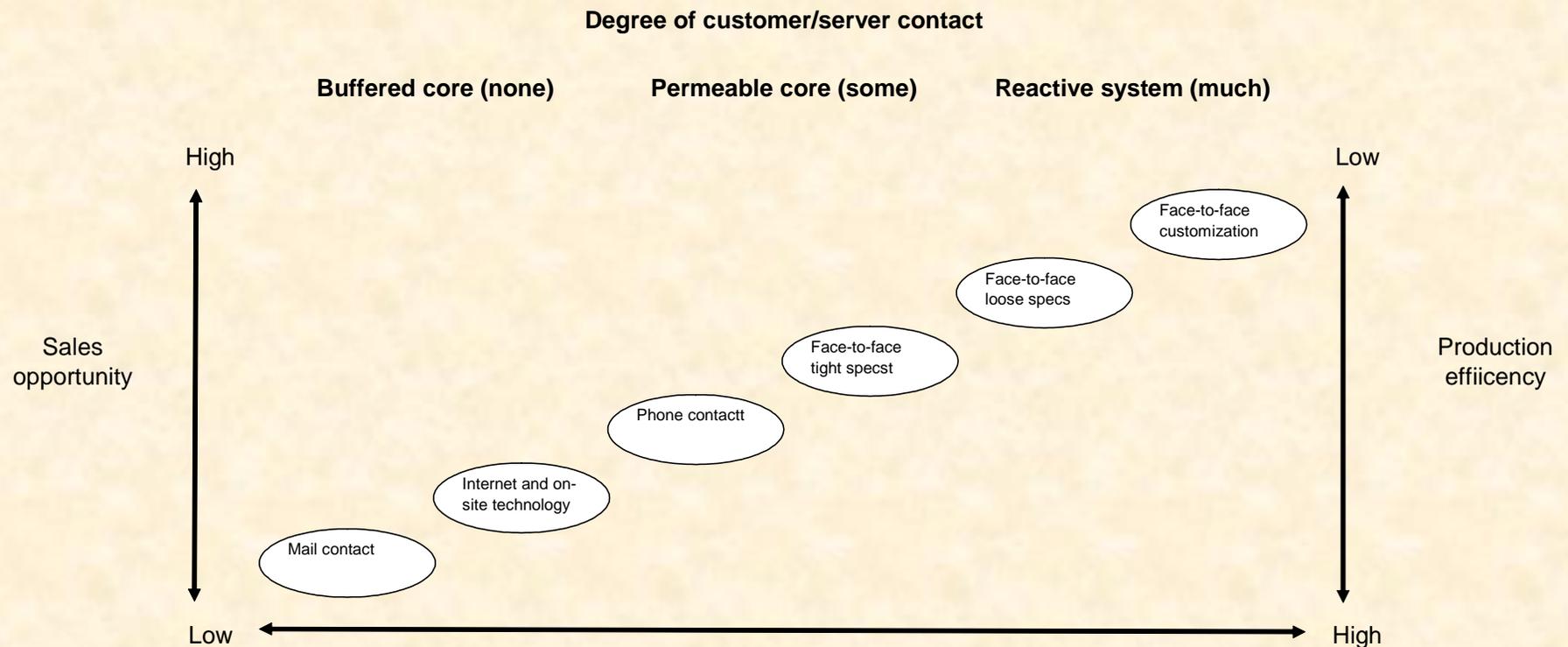
Traditional Manufacturing Processes



Schmenner Service Matrix

				Degree of Contact with, and Customization for, the Customer		
		Challenges for Management		Low	High	Challenges for Management
Relative Throughput Time	Degree of Labor Intensity	Low	Marketing, making service "warm," attention to physical surroundings, managing fairly rigid hierarchy with need for standard operating procedures	The Service Factory Airlines, trucking, hotels resorts and recreation	The Service Shop Hospitals, auto, and other repair services	Capital decisions, technological advances, managing demand to avoid peaks and to promote off-peaks, scheduling delivery of service
	High	Hiring, training, methods development and control, employee welfare, scheduling workforces, control of often geographically spread locations, start-up of new units, managing growth	Mass Service Retailing, wholesaling, schools	Professional Services Physicians, lawyers, accountants, architects	Fighting cost increases, maintaining quality, reacting to customer intervention in process, improving people delivering service, managing flat hierarchy with loose subordinate-superior relationships, gaining employee loyalty	

Chase Customer Contact Model



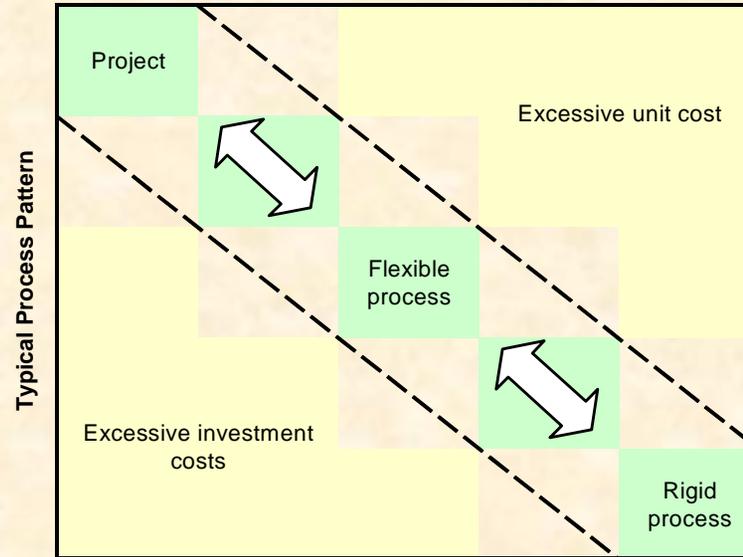
From Operations Management for Competitive Advantage (Tenth Edition), Chase, Jacobs and Aquilano 2004

Composite Model

Product and Service Variety and Volume

High	Variety - number of items	Low
Low	Volumes of individual units	High
MTO	Product and service orientation	MTS

Low	Low	Low	Low
Importance of structured flow	Level of capital intensity	Emphasis on low unit cost	Emphasis on efficiency
High	High	High	High

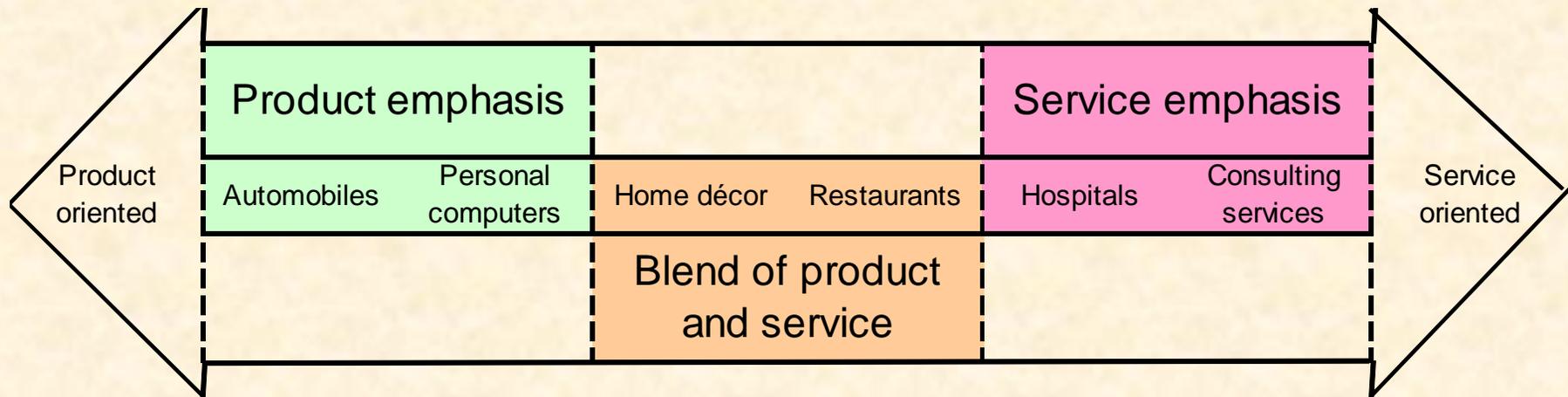


High	High	High	High
Degree of customer contact	Degree of labor intensity	Relative throughput time	Degree of process flexibility
Low	Low	Low	Low

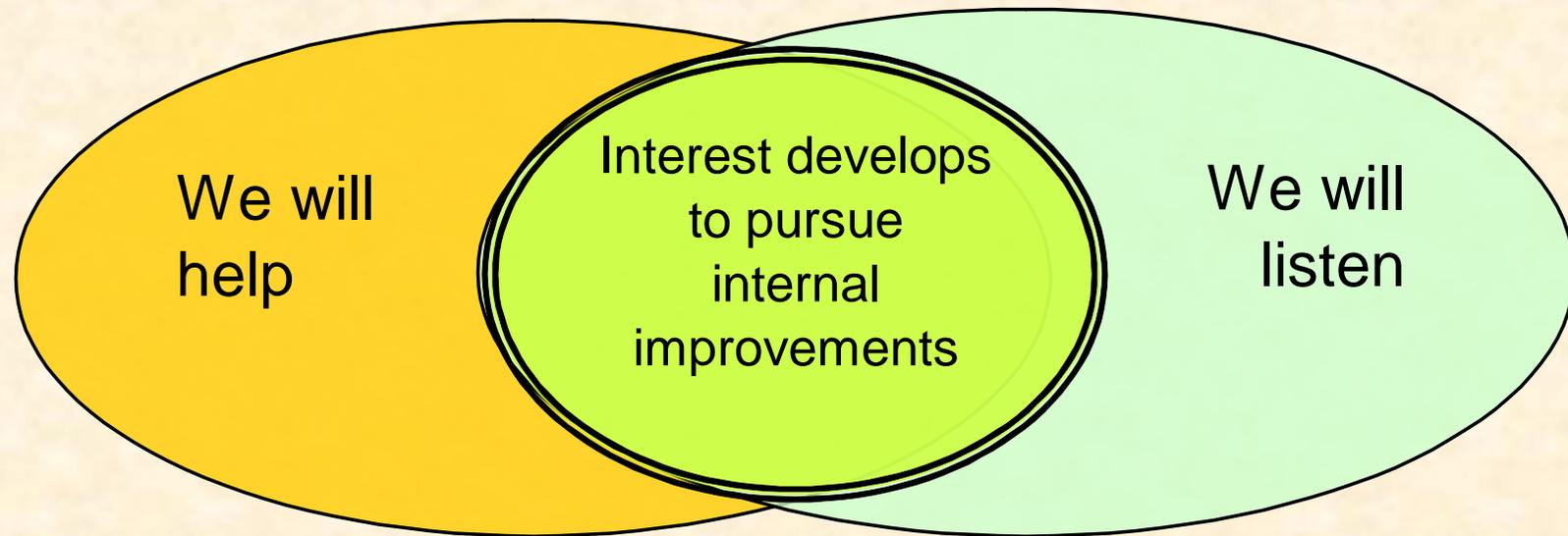
Short	Length of product or service life	Long
Short	New product development time	Long
Short	New service development time	Long

Product and Service Expected Life and Development Time

Product – Service Continuum



Move to internal improvements



The boundary begins to blur
Increased overlap from internal improvements

Manufacturing Objectives

- Reduce product costs
- Reduce inventories
- Increase resource utilization
- Improve quality
- Reduce response time
- Reduce product development time

Internal

External

Services Objectives

- Customer acquisition
- Customer retention
- Customer relationship management
- Service quality
- Response time reduction
- Flexibility,agility – mass customization

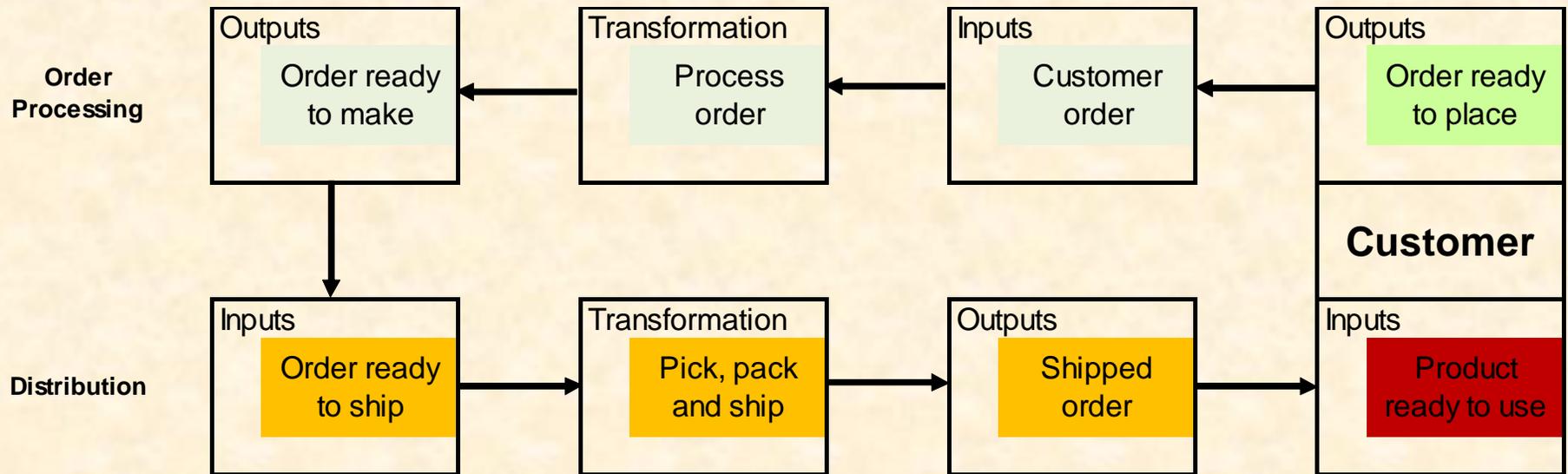
External

Internal

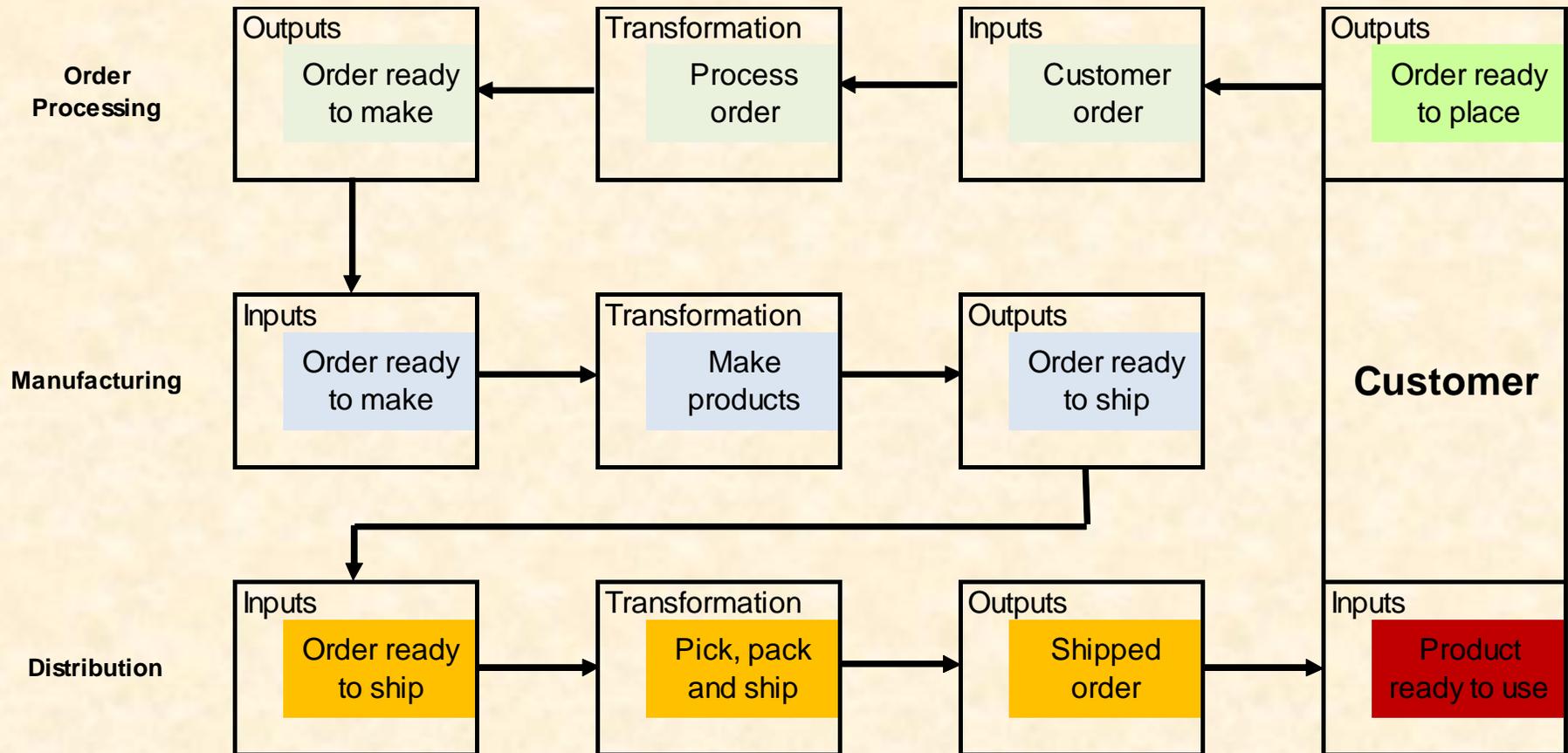
Internal Improvements

- Manufacturing companies looked at internal service operations
- Manufacturing companies looked down the supply chain toward customers
- Shift from job specialization to job enlargement
- Emphasis on cost reduction and resource utilization
- Transition from transactions to processes
- Management programs became ways to improve

Order Processing without Manufacturing

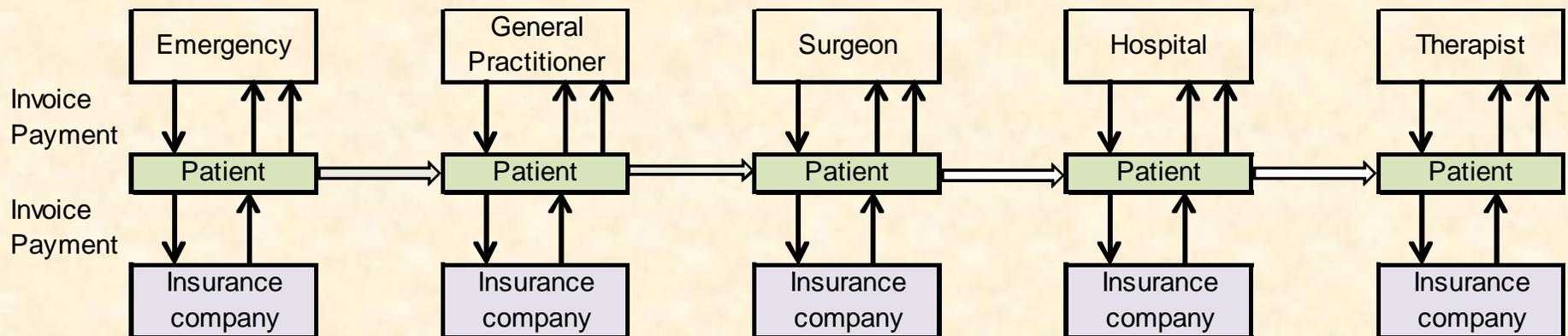


Order Processing with Manufacturing



Patient Flow

Looks like manufacturing flow but without the coordination to move the product (patient) through the transformation steps smoothly



Programs that work in Services

- Quality improvement programs
 - Total quality management (TQM)
 - Six Sigma
- Cost reduction programs
 - Just-in-Time (JIT)
 - Lean production
- Lead Time Reduction programs
 - Quick response (QR)
 - Collaborative Planning, Forecasting and Replenishment (CPFR)

Programs not as much used in Services

- Product standard costs
- Activity-based costing
- Materials requirements planning (MRP)
- Capacity requirements planning (CRP)
- Performance measures – capacity utilization
- Performance measures – labor utilization

Manufacturing and Service Programs

Evolution of Continuous Improvement Programs - Manufacturing and Services Oriented

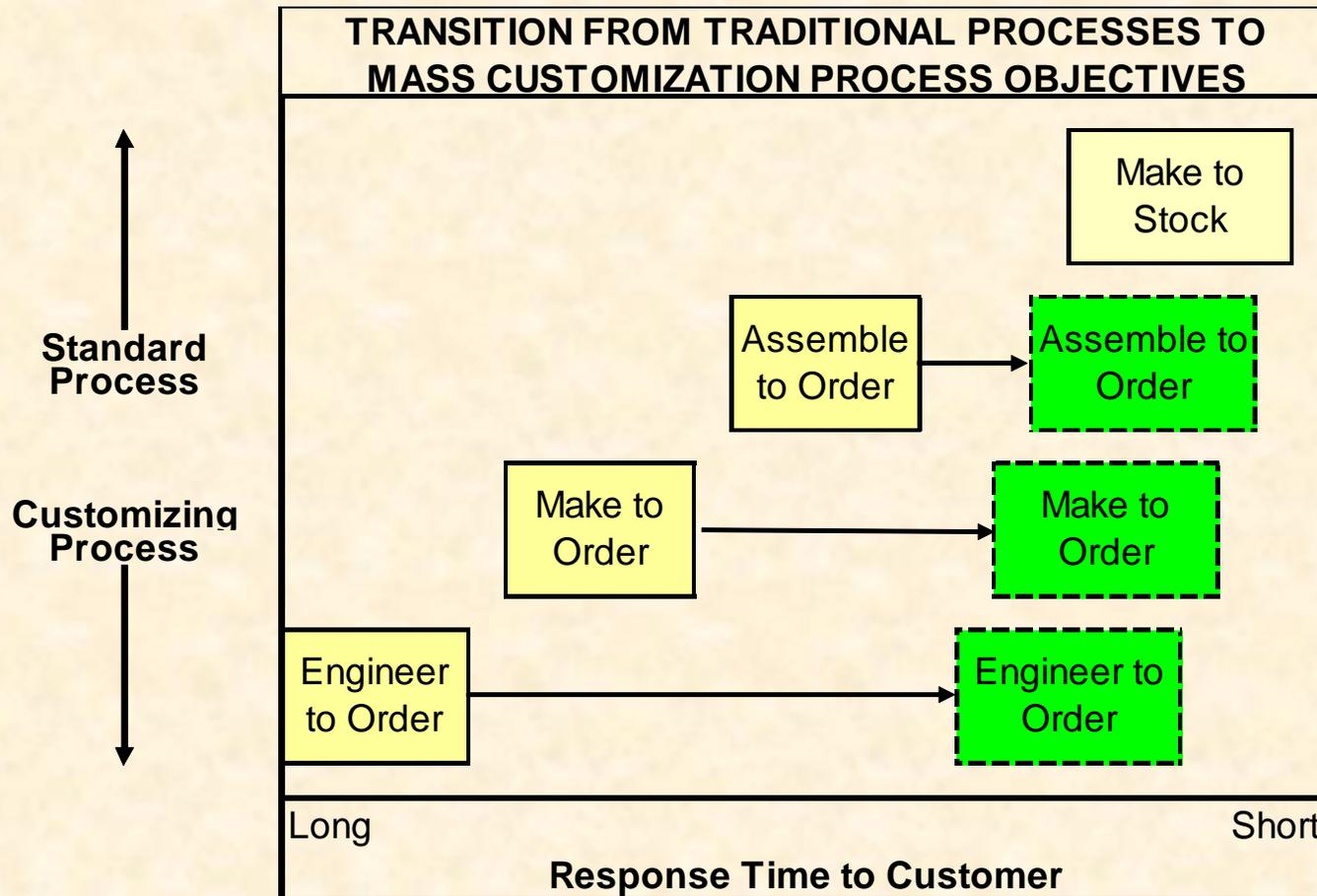
Program Focus	1975	1980	1985	1990	1995	2000	2005
Planning	MRP		MRP II		ERP		ERP Exp.
Execution		CIM		MES	WMS	APS	
Cost reduction		JIT			Lean		Lean SS
Quality of goods	SPC			TQM		Six Sigma	
Measurement - tangibles		ABC	ABM		BSC		
Integration				S&OP	SCM	SCM Exp.	SCM-SOA
Measurement - intangibles					BSC		
Quality of services				TQM		Six Sigma	
Customer						CRM	
Response time			QRS	ECR	VMI	CPFR	
Flexibility					Mass Cust	Agile	
Communications		EDI			I-EDI	B2B	B2C
	1975	1980	1985	1990	1995	2000	2005

Origin in manufacturing

Combined

Origin in services

Future Manufacturing Processes



To Achieve Mass Customization

Actions Necessary to Achieve Mass Customization

Make to Stock

- Provide product variety
- Adapt product mix to specific markets
- Forecast specific model demand

Assemble to Order

- Develop modular components
- Computerize order processing and assembly schedules
- Develop quick response distribution system

Make to Order

- Integrate order processing, assemble and fab schedules
- Reduce lot sizes for component parts
- Computerize component fabrication process

Engineer to Order

- Integrate design process and manufacturing (CAD/CAM)
- Reduce response time for suppliers
- Develop cost estimating and pricing process

Critical Success Factors

Concepts

- Customer participation
- Design modularity
- Variance control

Supply Chain

- Linked infrastructure
- Collaborative relationships
- Information flow

People

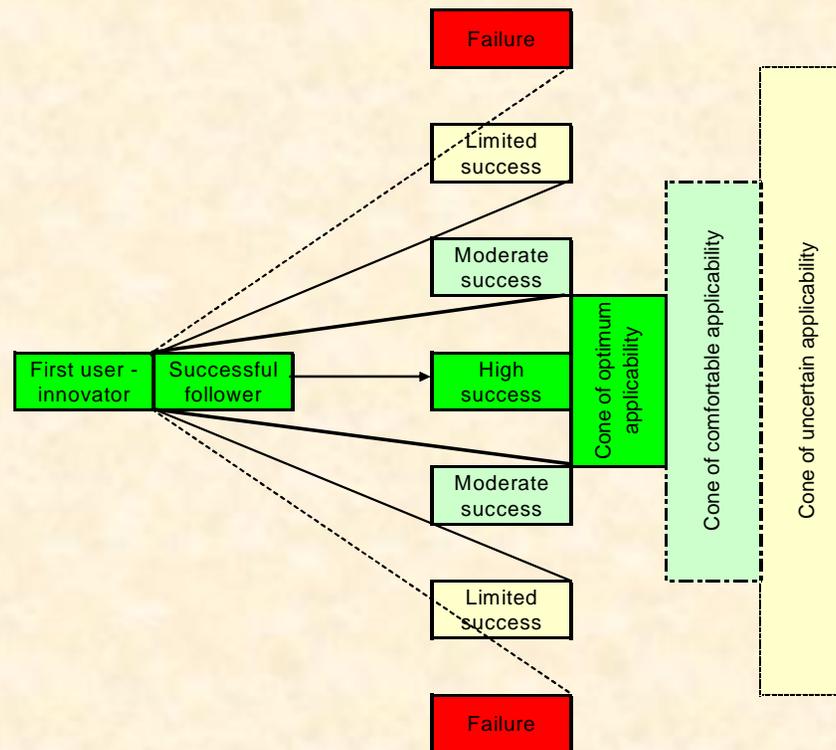
- Cross-training
- Flat organizations
- Employee empowerment

Technology

- CAD/CNC/CAM
- Product configurators
- Data communications

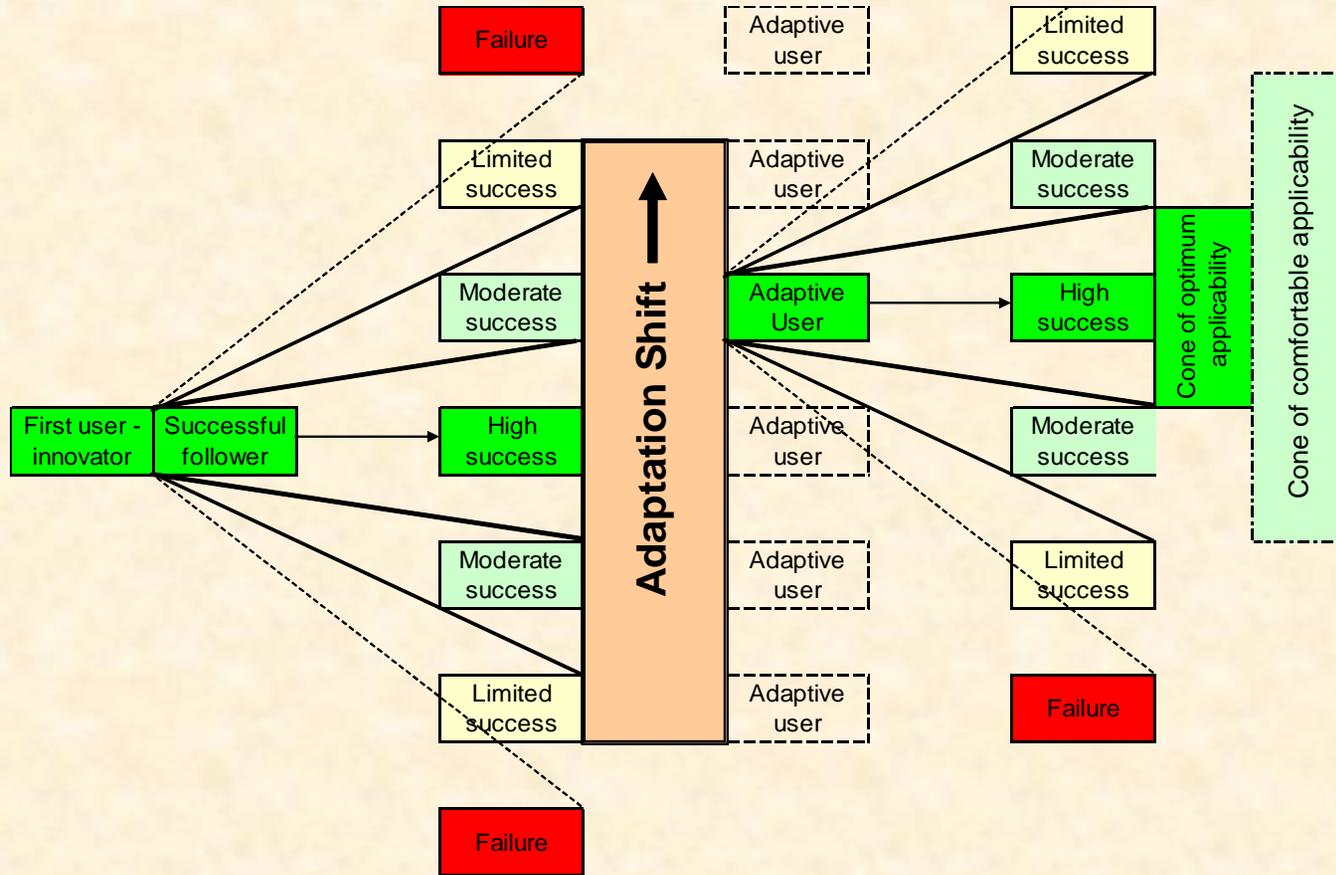
Program Applicability Cone

Program Extensions: The Limits of Their Applicability



The first users or innovators of a management program do it successfully because they apply it to a specific set of conditions. As the program is applied in more remote conditions, the likelihood of success diminishes.

Adaptive Users



Adaptive users can make a program fit a different set of conditions and create new "cones" with altered application areas

The Composite Company (Virtual Supply Chain)



Use a sense and respond
strategy to provide an
integrated product/service
package

The boundary vanishes
Manufacturing and services with congruent interests

Today's Limitations

⊙ **Technologies**

- IT being actively developed
- Movement from transaction to process slow

⊙ **Infrastructure**

- Policies, practices and procedures evolving
- Vertical to horizontal organization slow
- Outsourcing is a major disruption

⊙ **Culture**

- Recognition of need evolving
- Change management techniques needed

Supply Chain Change Agents

Relative Participation of Key Change Agents in Improvement Programs

