

Vanishing Boundaries

**Adding Value by Blending
Manufacturing and Services**

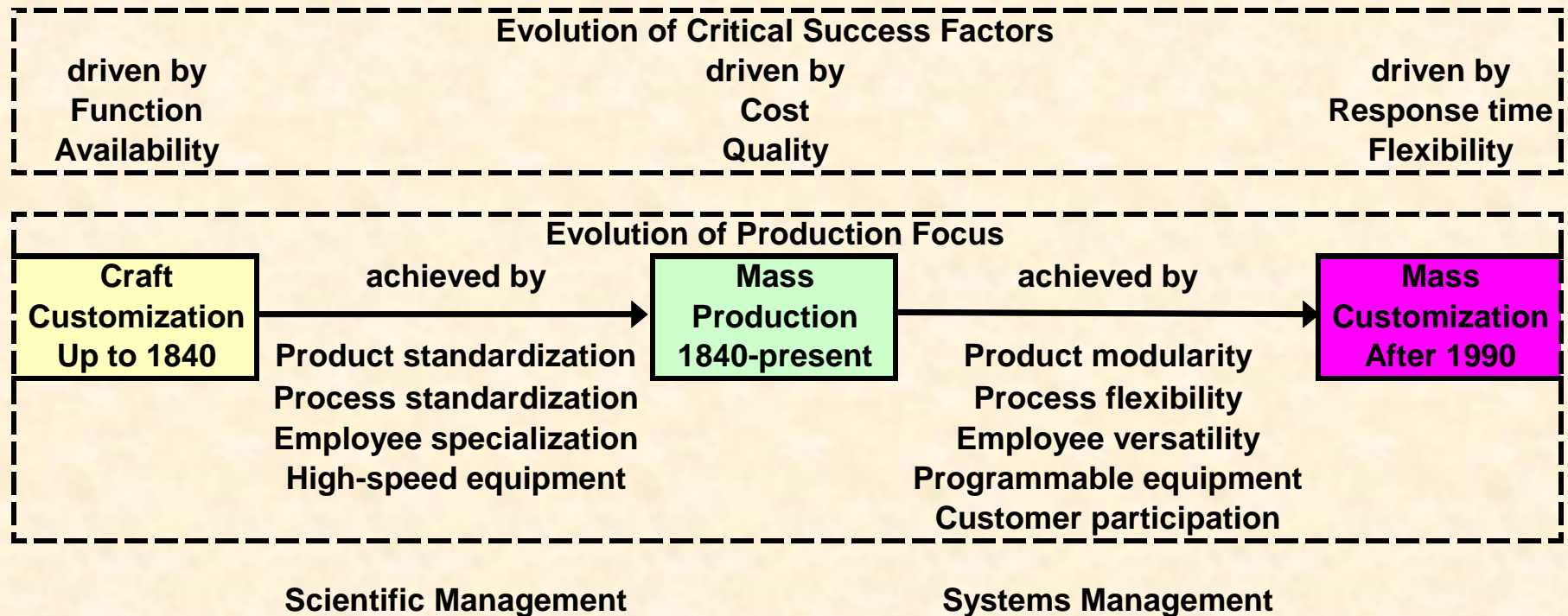
**From: Principle of Supply Chain
Management, 2E
Crandall, Crandall and Chen**

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

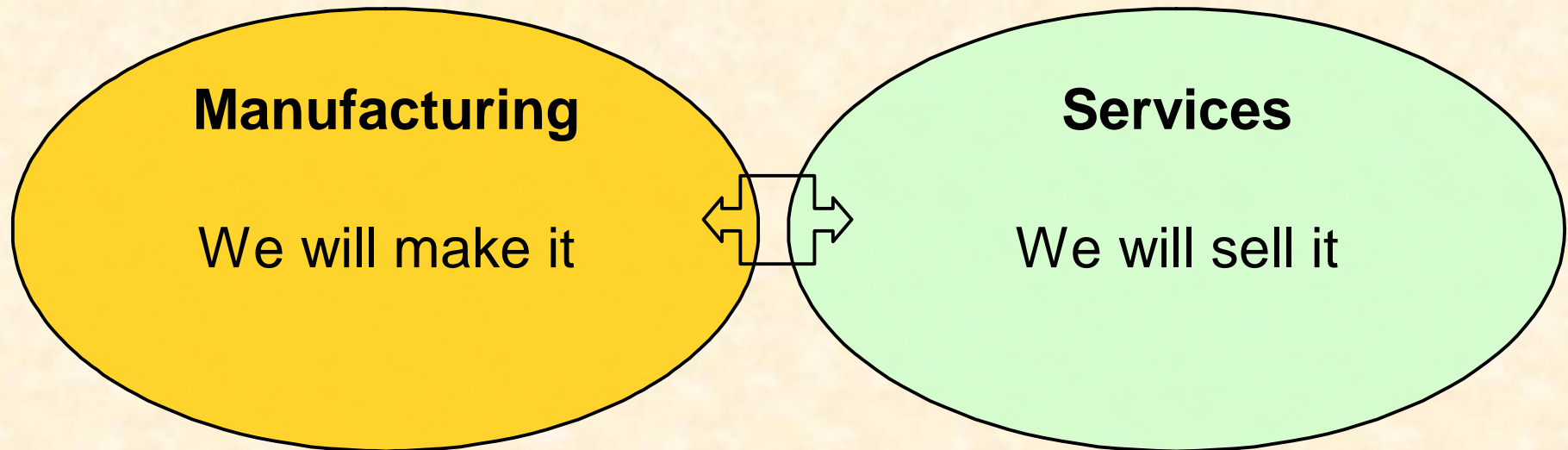
From the Craft Age to the Mass Customization Age



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

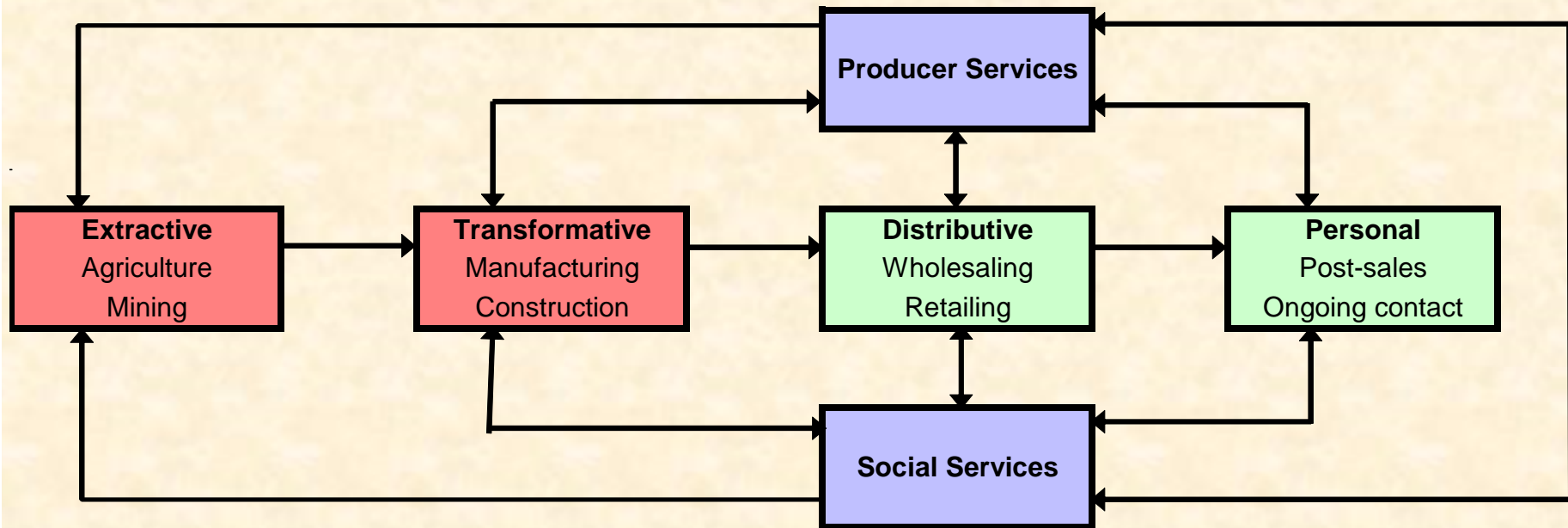


The boundary is clear
Traditional Interface of Manufacturing and Services

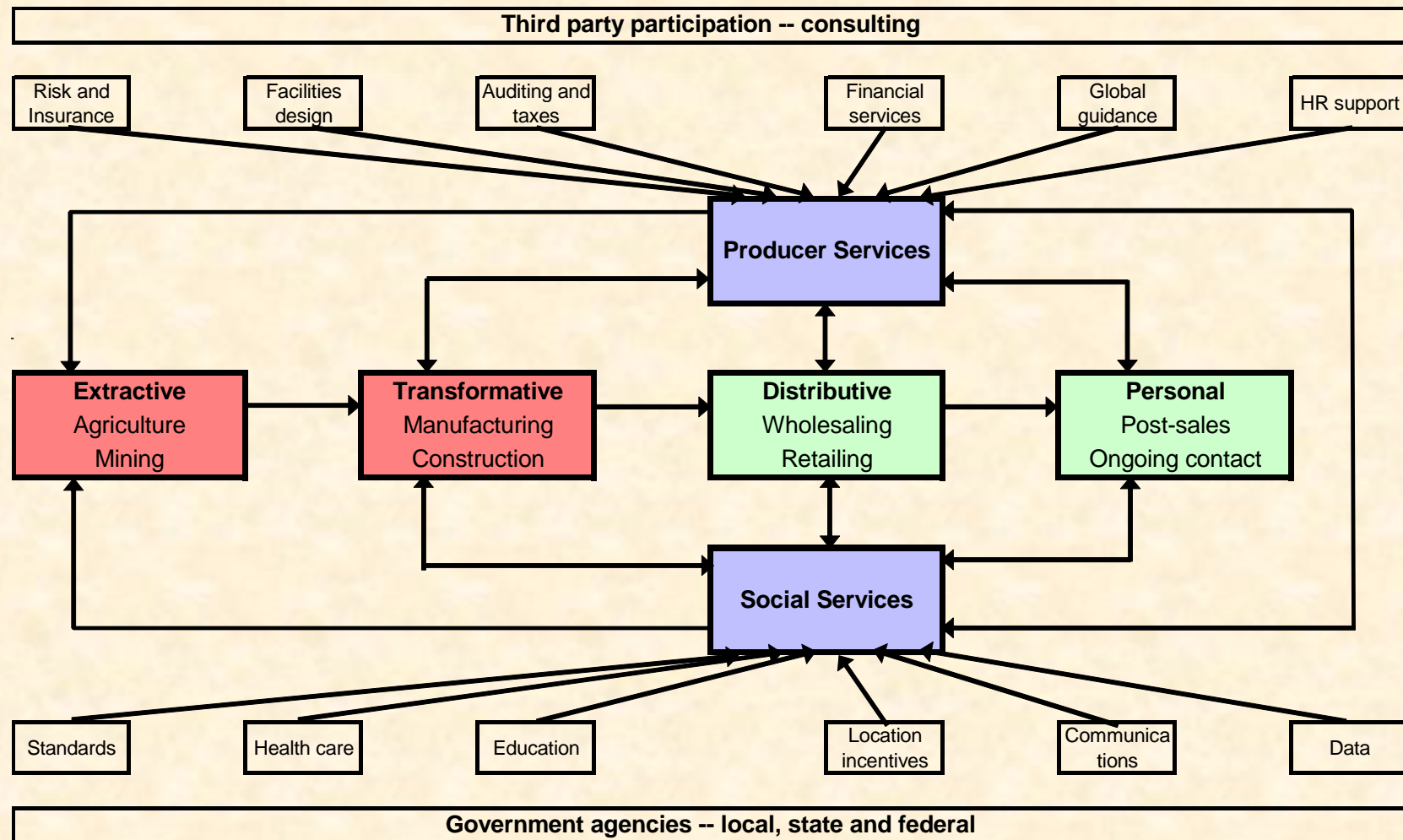
Basic Supply Chain



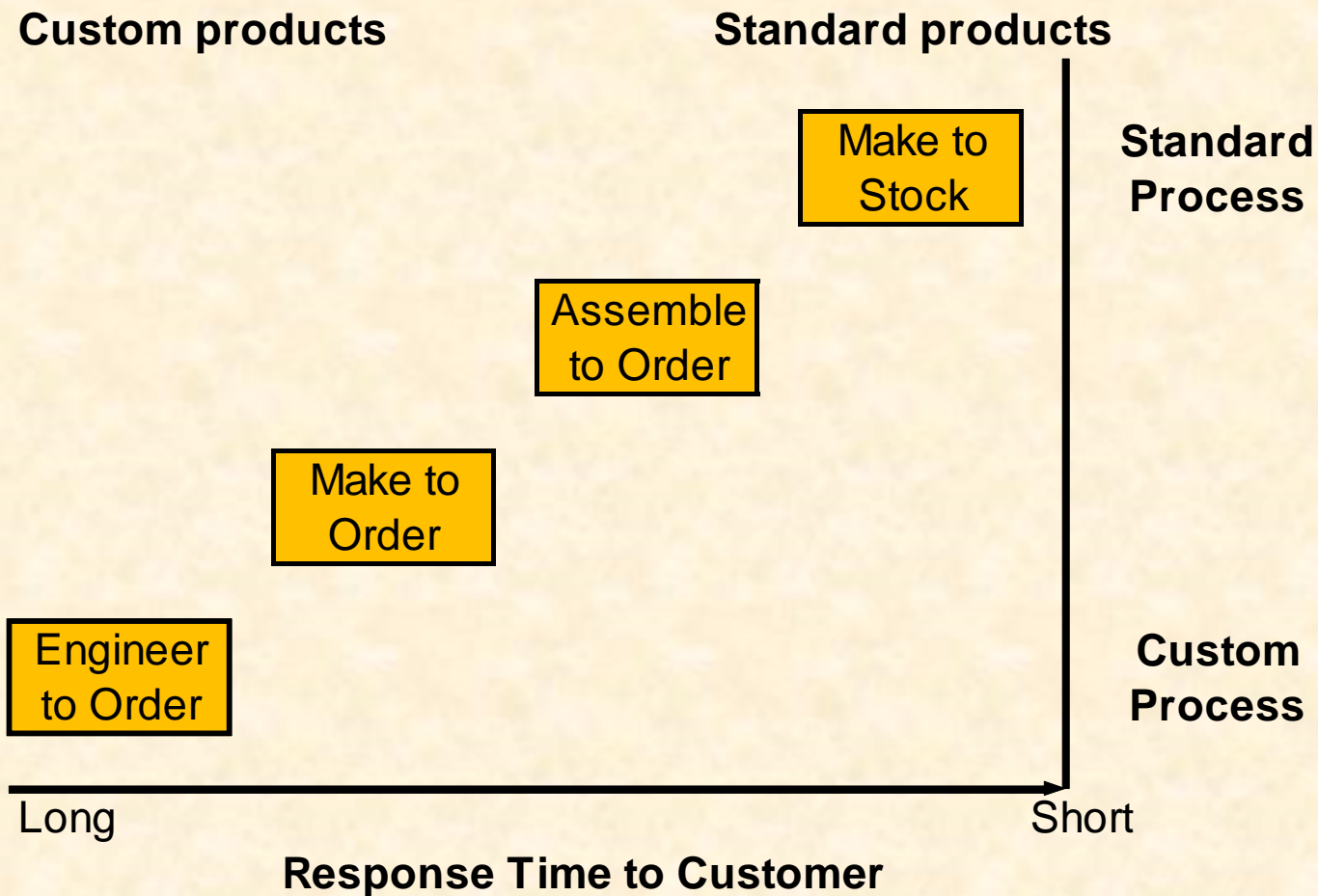
Added Support Services



Added service sectors



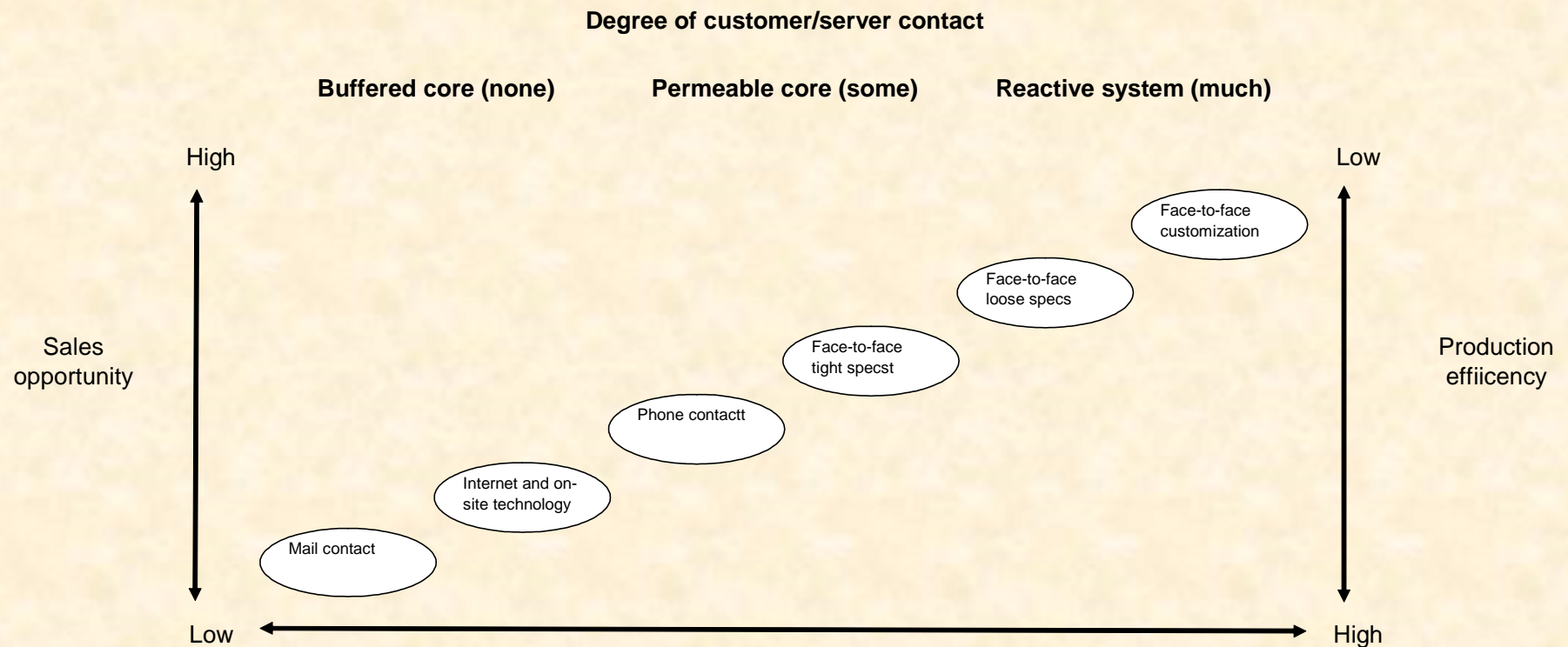
Traditional Manufacturing Processes



Schmenner Service Matrix

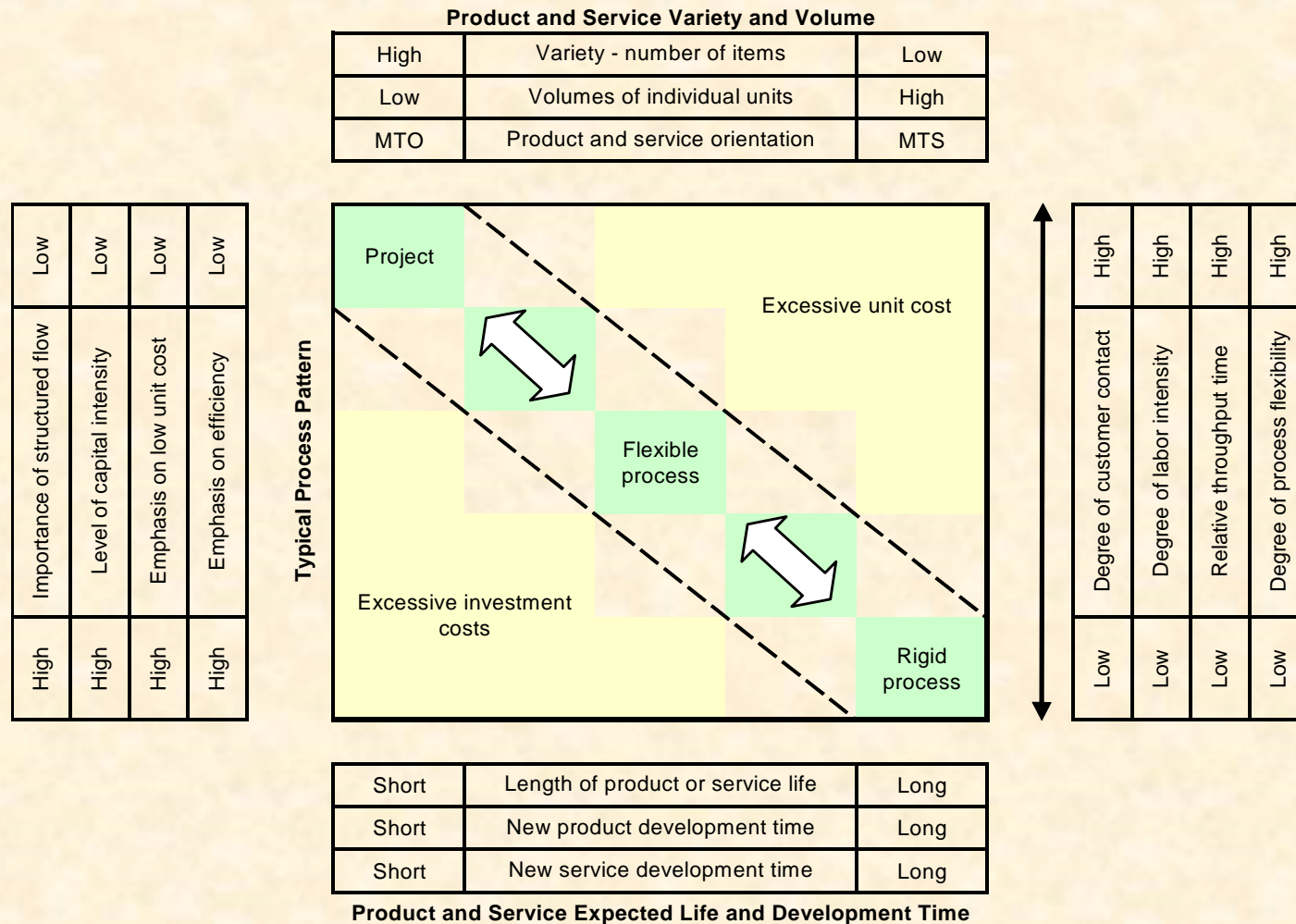
| | | | Degree of Contact with, and Customization for, the Customer | | | |
|--------------------------|---------------------------|------|--|--|---|--|
| | | | Challenges for Management | Low | High | Challenges for Management |
| Relative Throughput Time | Degree of Labor Intensity | Low | Marketing, 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

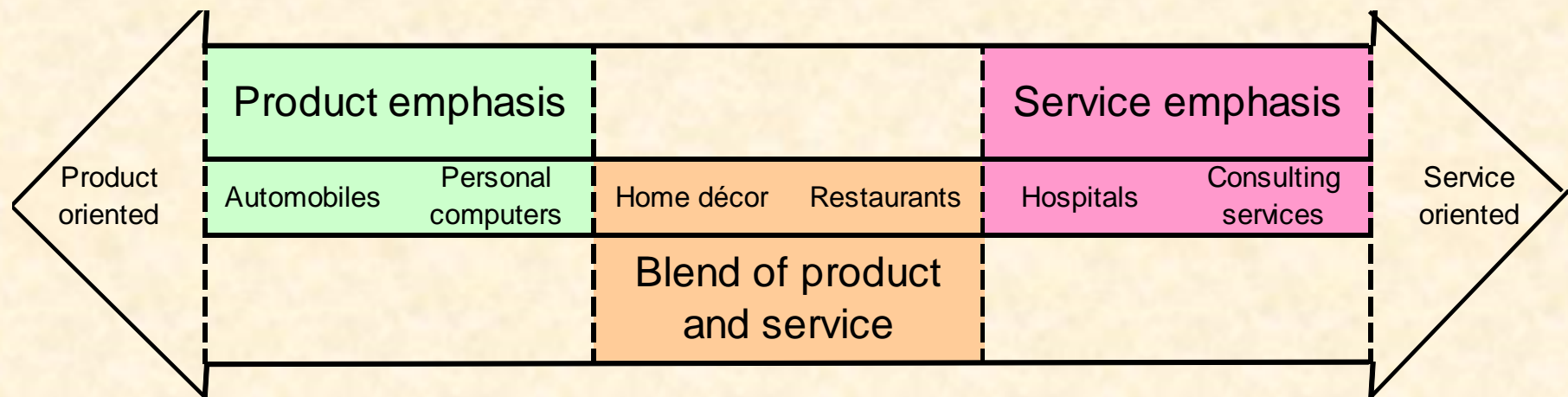


From Operations Management for Competitive Advantage (Tenth Edition), Chase, Jacobs and Aquilano 2004

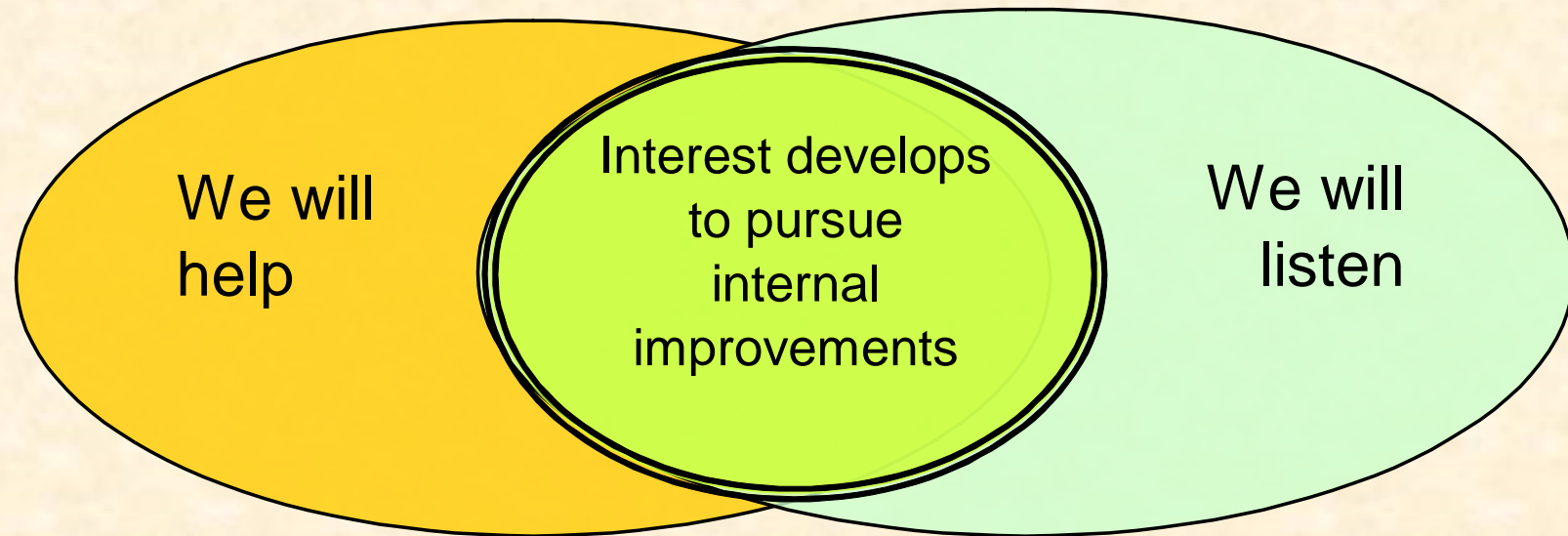
Composite Model



Product – 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

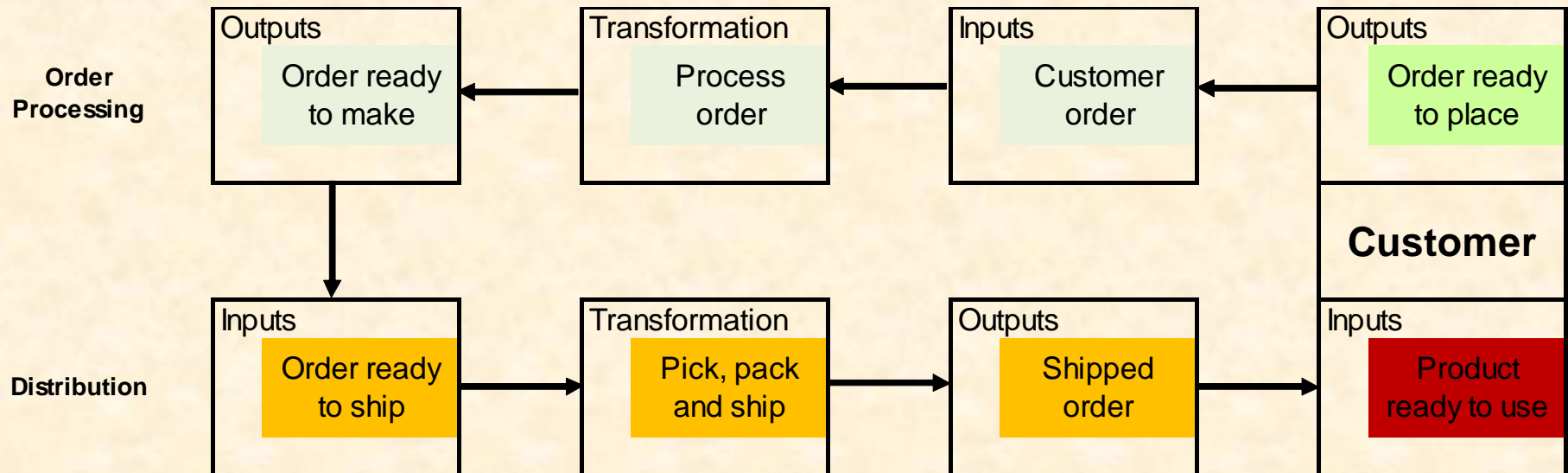
External

Internal

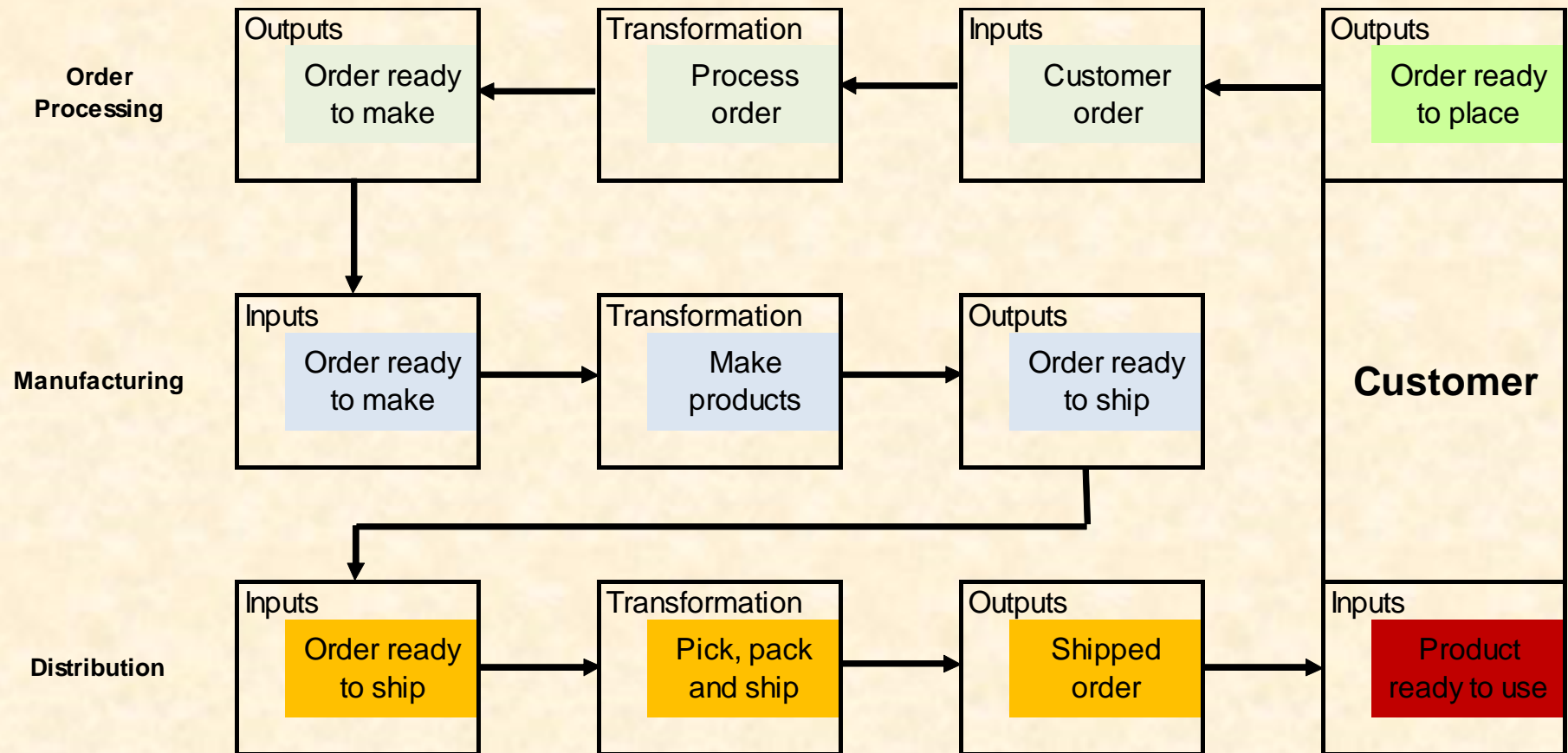
Internal Improvements

- 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

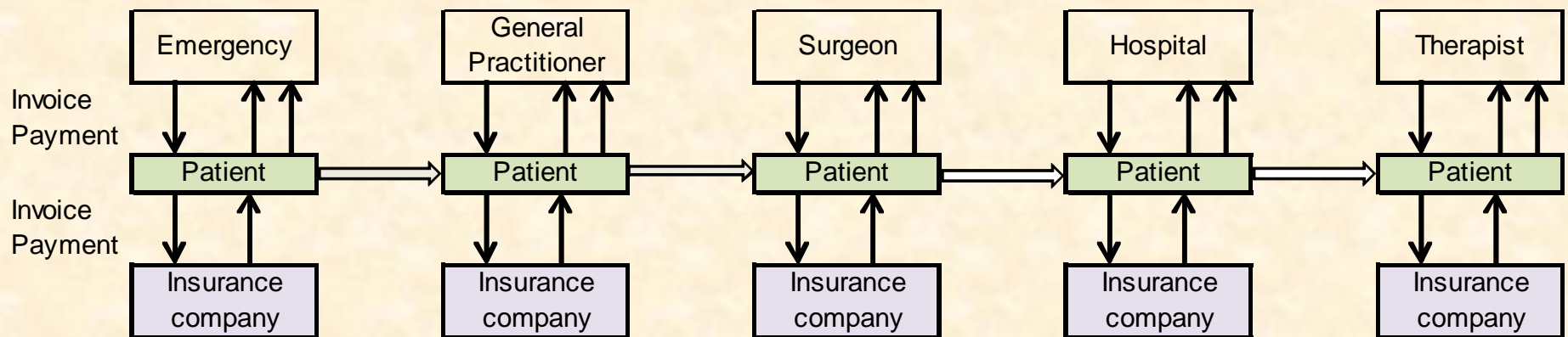


Order Processing with Manufacturing



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

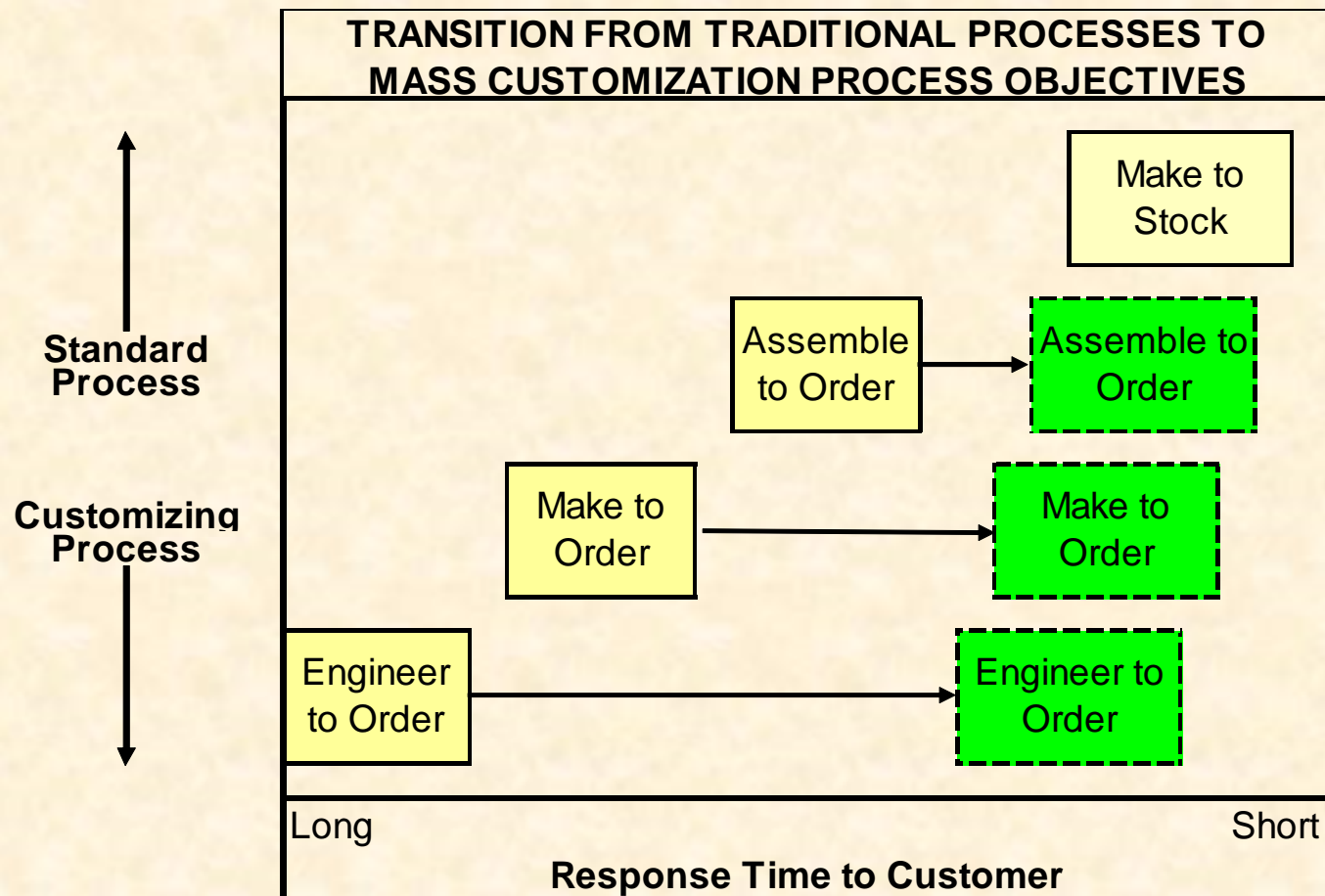
- Product standard costs
- Activity-based costing
- Materials requirements planning (MRP)
- Capacity requirements planning (CRP)
- Performance measures – capacity utilization
- Performance measures – labor utilization

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. | Origin in manufacturing |
| 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 | Combined |
| Measurement - intangibles | | | | | BSC | | | Origin in services |
| 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 | |

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

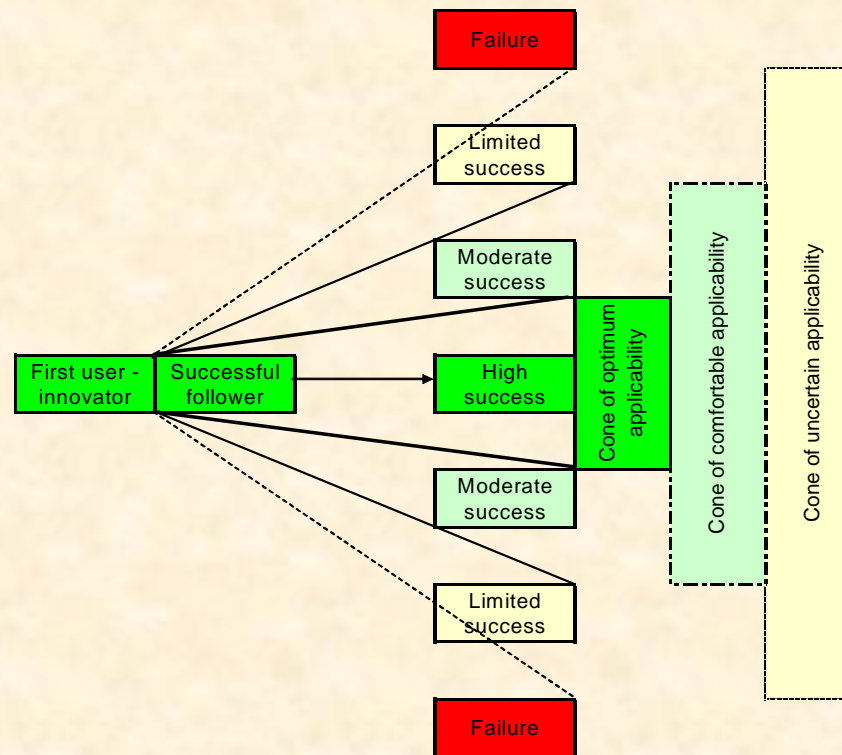
- Cross-training
- Flat organizations
- Employee empowerment

Technology

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

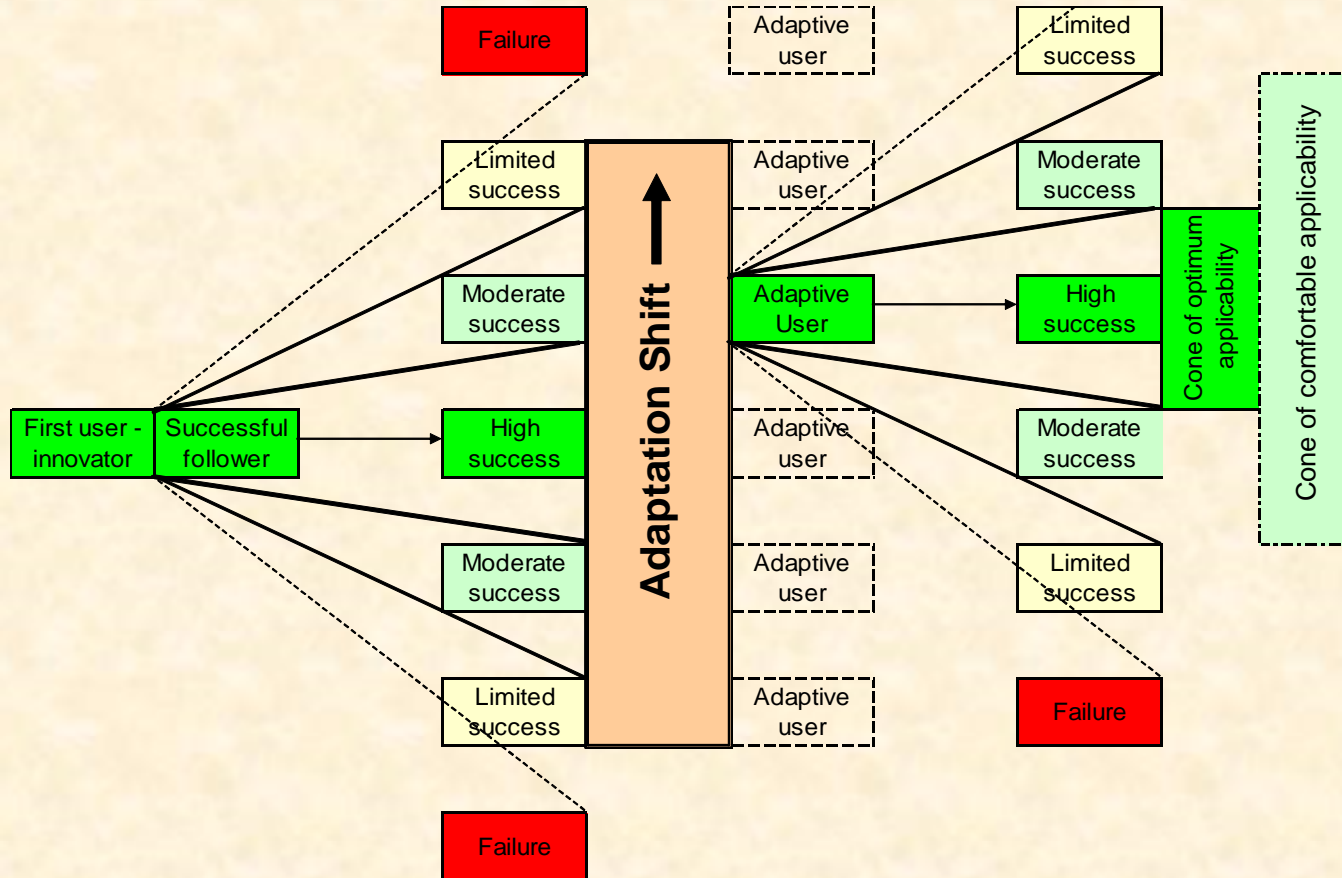
Program Applicability Cone

Program Extensions: The Limits of Their Applicability



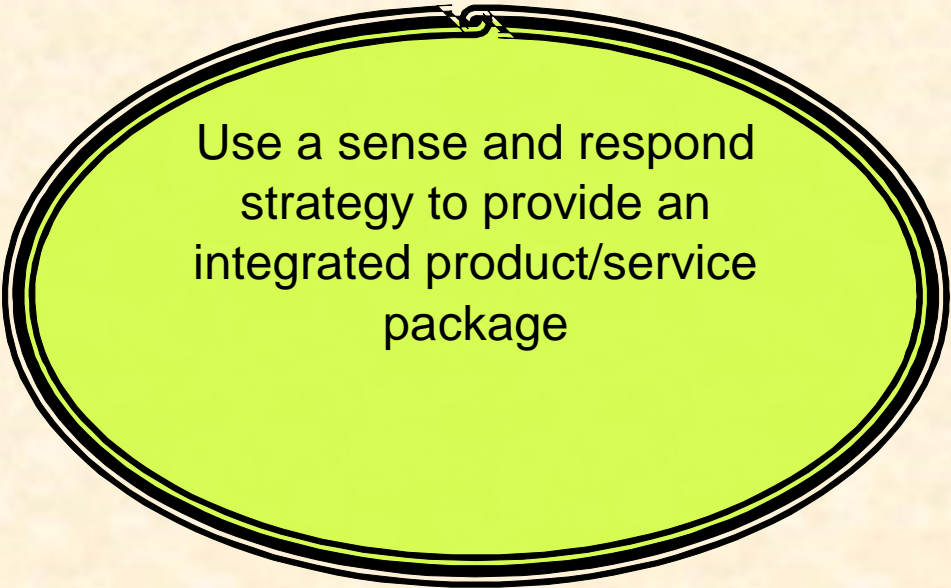
The first users or innovators of a management program do it successfully because they apply it to a specific set of conditions. As the program is applied in more remote conditions, the likelihood of success diminishes.

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

