

LECTURE 4

PROCESS ANALYSIS

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PROCESSES CLASSIFICATION

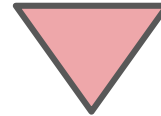
- **By customer interface**
 - Make-to-Stock
 - Make-to-Order
 - Assemble-to-Order
- **By process flow structure (layout or organization)**
 - Project
 - Job Shop
 - Batch Shop
 - Assembly Line
 - Continuous Process

PROCESS FLOW CHARTING

- Task/Operations



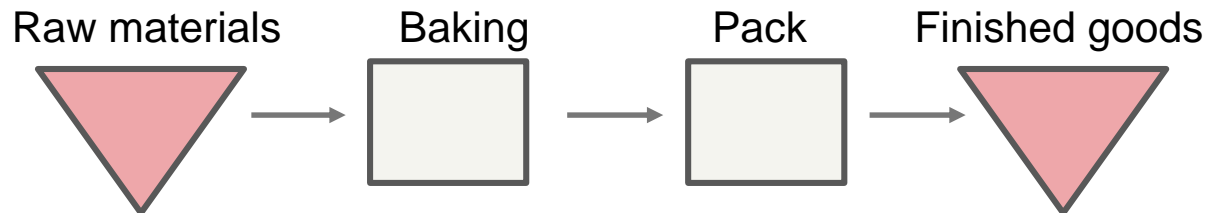
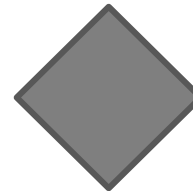
- Storage of goods (Inventory)



- Flow of goods/customers

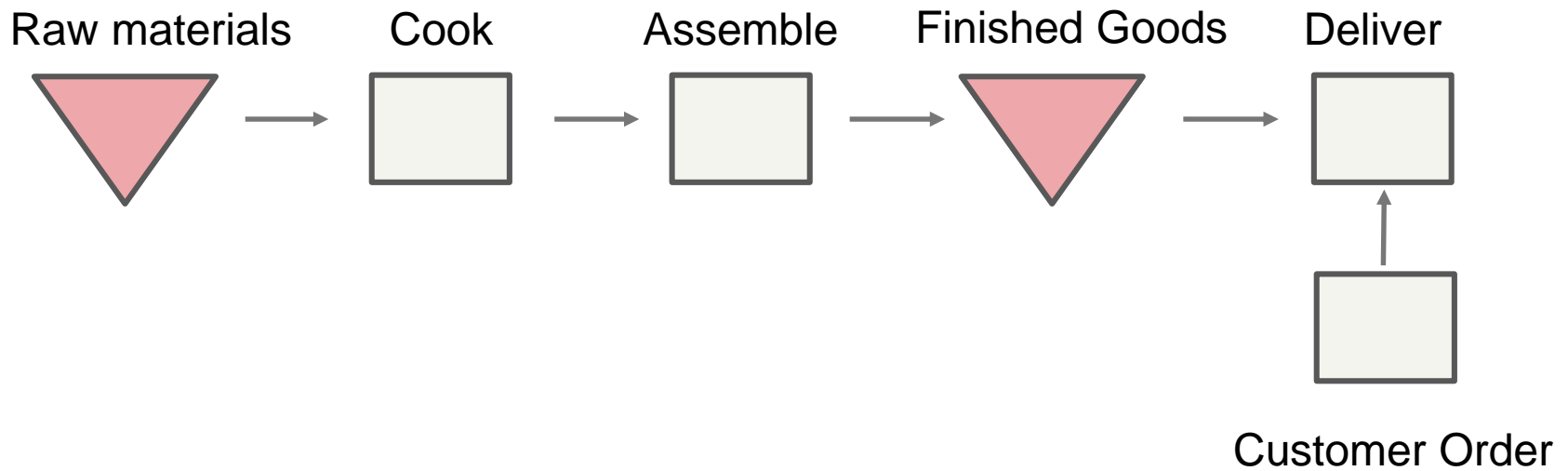


- Conditional / question



TYPES OF PROCESSES

- **Make-to-Stock: McDonald's Old process**



MAKE-TO-STOCK

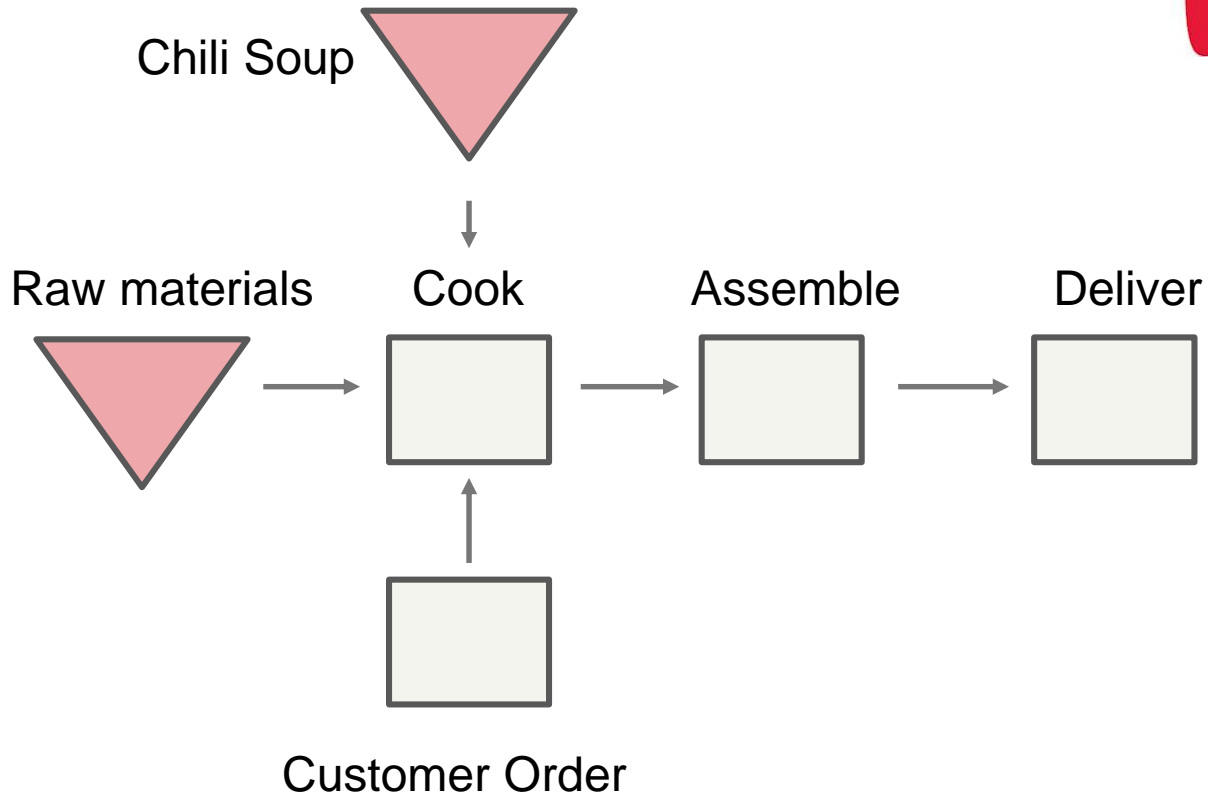
- Produce finished goods
- Customer buys from inventory
- **Advantage:** faster fulfillment of customer demand, lower cost, smooth production rate
- **Disadvantage:** inventory costs, less customization

MTS PERFORMANCE MEASURE

- **Service level (orders filled when requested)**
- **Inventory replenish time**
- **Inventory turnover**
- **Time to fill back orders**
- **Others, such as shrinkage rate**

TYPE OF PROCESSES

- Make-to-Order: Wendy's



MAKE-TO-ORDER

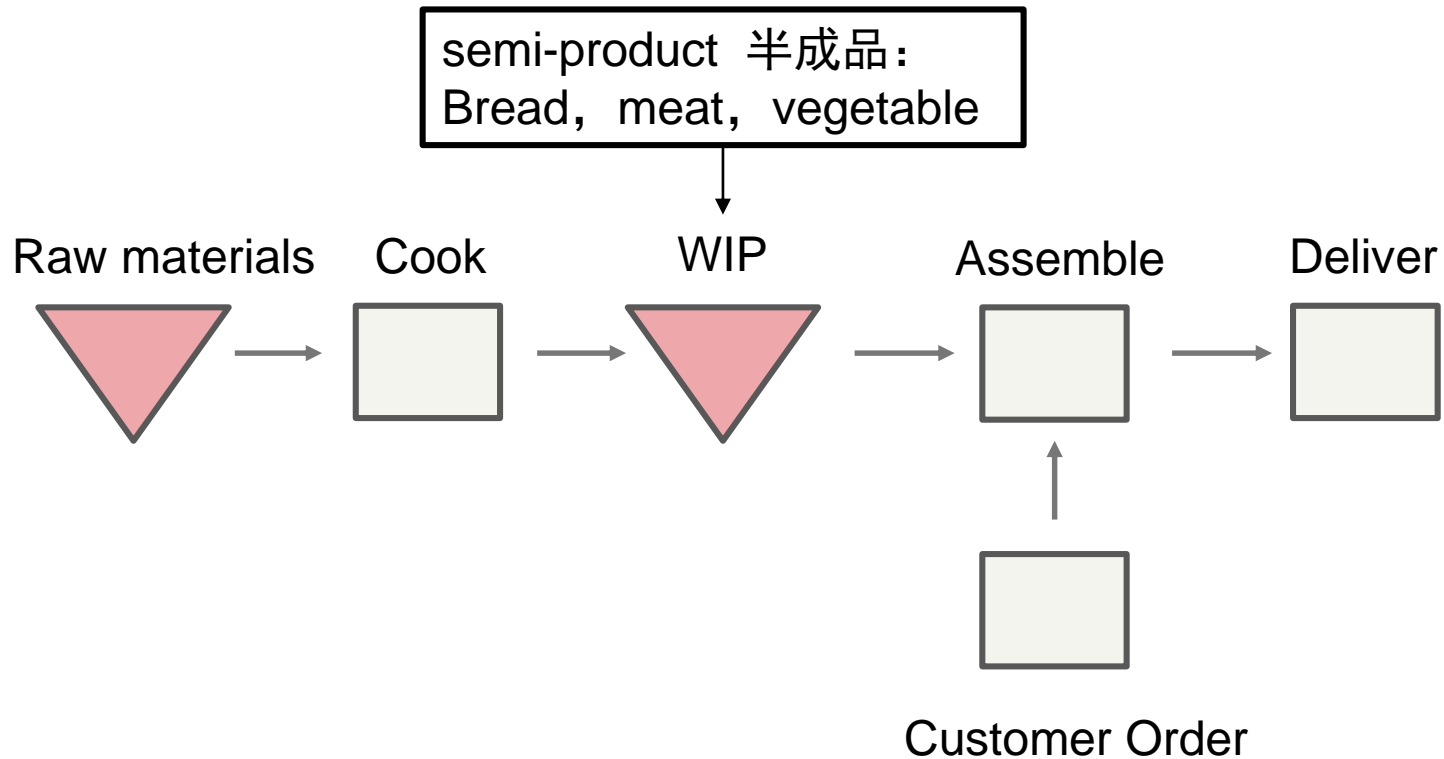
- Start production after customer orders
- No finished goods inventory
- **Advantage:** higher flexibility to customize order; no finished goods inventory costs
- **Disadvantage:** intermittent production (i.e., lumpy demand pattern), longer lead time

MTO PERFORMANCE MEASURES

- **Lead time**
- **Orders completed on time:**
 - Customer request date
 - Promise date

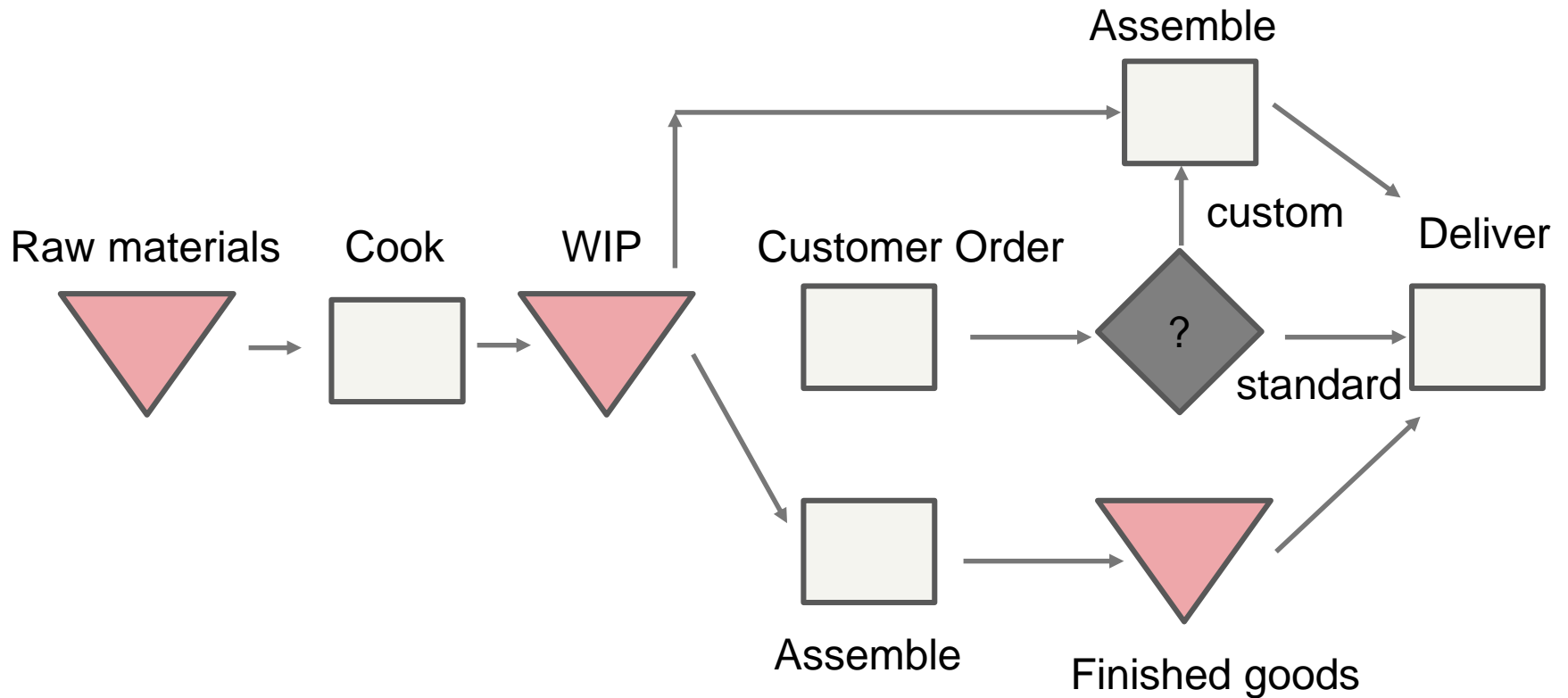
TYPE OF PROCESSES

- Assemble-to-Order: McDonald's New way



TYPES OF PROCESSES

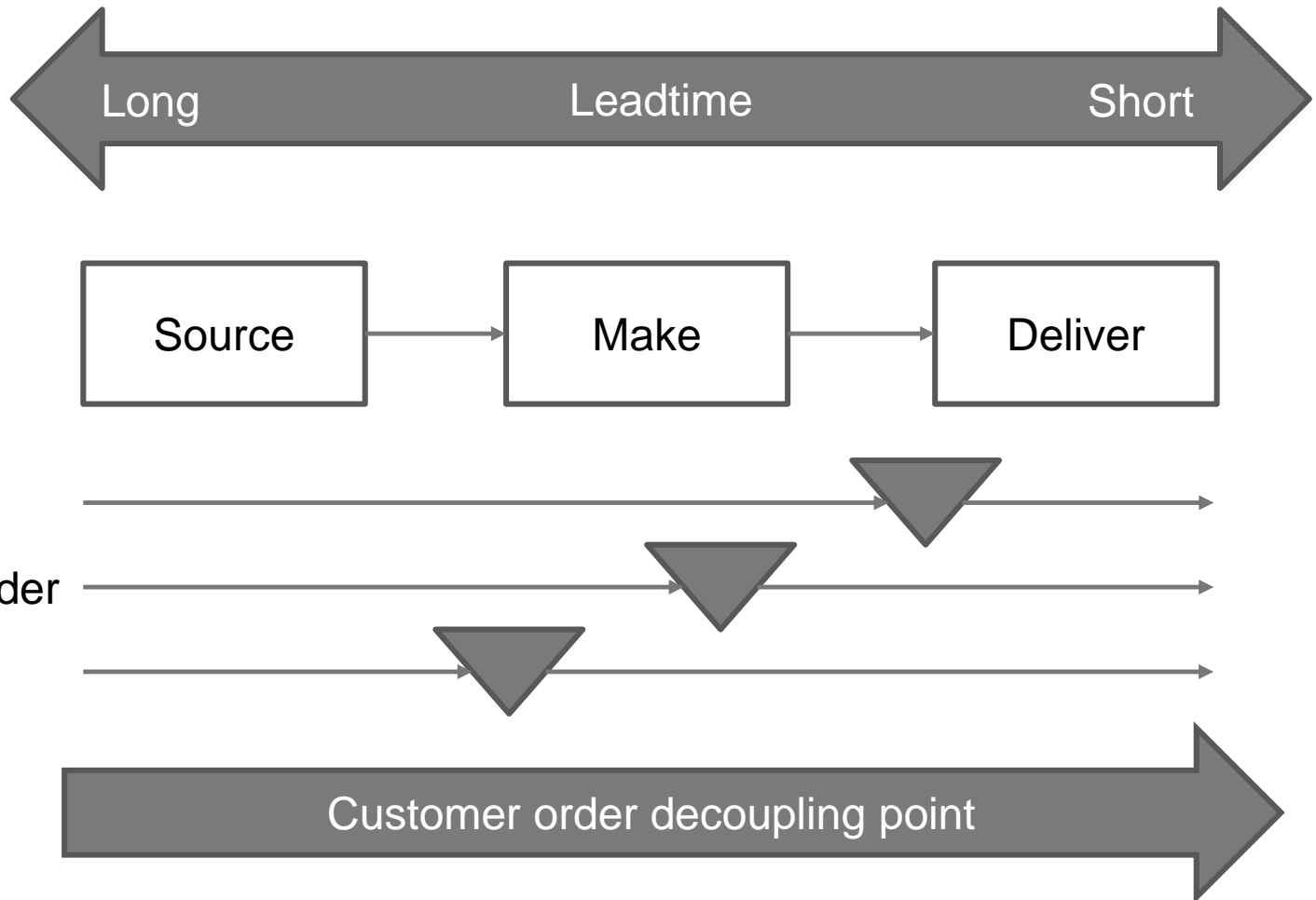
- The hybrid way: Burger King



WHAT TYPES ARE THESE PROCESSES

- the SHUFE canteen
- A Michelin 3-star restaurant
- Dell sells desktop computer when a customer made an order
- The book publishing process

POSITIONING INVENTORY IN SUPPLY CHAIN



OPERATIONAL ISSUES IN MAKE-TO-STOCK AND MAKE-TO-ORDER

- **Make-to-Stock:**
 - Demand forecast
 - Inventory control
- **Make-to-Order:**
 - Delivery lead time management
 - Capacity management

PROCESS FLOW STRUCTURE

- **Defines the layout of the machines, workers etc.**
- **It impacts technology decisions, productivity and therefore the competitive edge for the firm**
 - Project: building construction
 - Job Shop: print shop
 - Batch Shop: bakery
 - Assembly Line: automobile production
 - Continuous Process: oil refinery
- **They differ in terms of**
 - Flow, flexibility, number of products, capital investment, variable cost, labor intensity and skill and volume

PROJECT

- **Technically, a project is not a process flow structure since there is no flow: quantity of product = 1**
- **The inputs are brought to the project location as they are needed**
- **Suitable for unique products**
- **Coordinated using project management techniques**
- **Other examples:**
 - Consulting project
 - Shooting a movie



JOB SHOP

- Flexible operations that have several activities
- It is not necessary for all activities to be performed, and sequence may be different for different products.
- Work flow not standardized and intermittent, heterogeneous product, intensive labor



BATCH SHOP

- Similar to a job shop, except that the sequence tend to be in a line and is less flexible.
- Dominant flows can be identified, although activities are disconnected and may be interrupted.
- Usually produce in batches



ASSEMBLY LINE

- **Uninterrupted, fixed linear sequence of operations (often paced: throughput)**
- **Large capital investment, use of automation**
- **Very efficient, high-volume, standardized product**
- **Inflexibility in product and volume**
- **Discrete products (automobiles, appliances, computers, etc.)**



CONTINUOUS PROCESS

- High standardized and automated
- Flexibility limited
- High volumes of production
- Commodity products (low cost as the “order winner”)
- Paper, oil, electricity industries, etc.



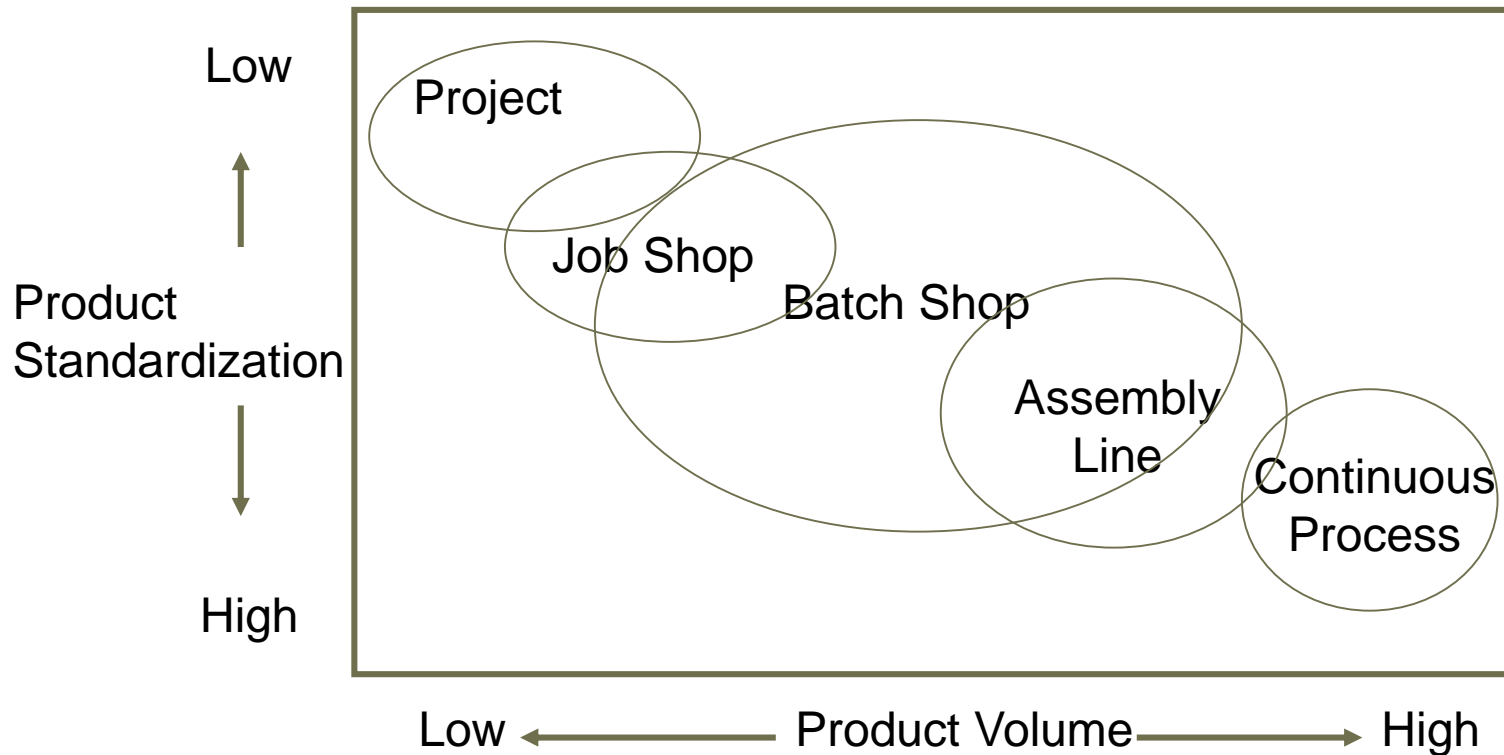
WHAT ARE THESE PROCESS FLOW STRUCTURES?



PROCESS SELECTION DECISION

- **Market condition**
- **Production volume**
- **Capital investment**
- **Product characteristic**
- **Variable cost (such as labor)**
- **State of technology**
- **Product life cycle:**
 - Prototypes are usually in a project / job shop, mass production are in assembly line
 - Bread was first produced in traditional bakeries, now in modern automated bakeries.

PRODUCT-PROCESS MATRIX: FRAMEWORK DESCRIBING LAYOUT STRATEGIES



CLASSIFICATION OF SERVICE PROCESS

Service can be classified in terms of content:

- **Financial service**
- **Education service**
- **Healthcare service**
- **Transportation service**

AN OPERATIONAL CLASSIFICATION

- **Service can also be classified in terms of customer contact**
- **Customer contact refers to the physical presence of the customer in the system.**
- **A high customer contact service means that the creation of the service requires the customer staying in the system for a long time.**
- **In general, a high customer contact system is more difficult to control and more variable.**

MAJOR DIFFERENCES BETWEEN HIGH- AND LOW- CONTACT SYSTEMS

Operational Consideration	Consulting Service (High Contact)	Applying for private passport at bureau of public security (Low Contact)
Worker Requirement	Personable, diagnostic skills	Clerical skills
Facility Layout	Should accommodate the customer's physical and psychological needs and expectation	The facility should focus on production efficiency
Quality Control	Quality in the eye of customers, so variable	Quality standards are generally measurable, fixed
Time Standard	Service time depends on customer needs, time standard loose	Work is performed on customer surrogates (e.g. forms), time is tight
Capacity Planning	To avoid lost sale, capacity must be set to meet peak demand	Capacity set at some average demand level

CUSTOMER CONTACT

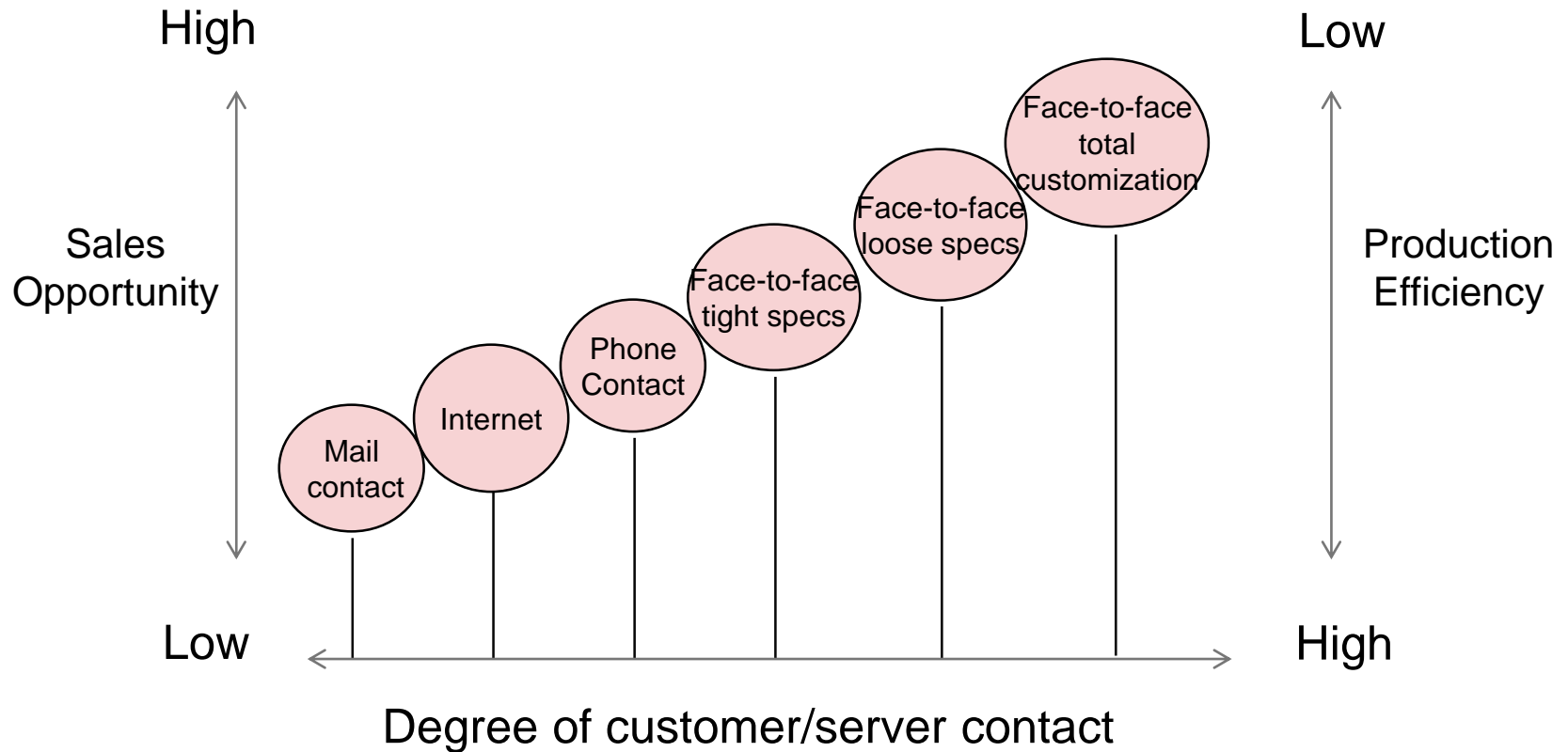
Low customer contact

- Higher production efficiency
- Workers with technical skills
- Focus on paper handling
- Office automation
- Lower sales opportunity

High customer contact

- Lower production efficiency
- Workers with diagnostic skills, more flexible and personable
- Focus on client mix
- Client/worker teams
- Higher sales opportunity

SERVICE-SYSTEM DESIGN MATRIX



MANAGING CUSTOMER-INTRODUCED VARIABILITY

Types of Variability:

- Arrival
- Request
- Capability
- Effort
- Subjective Preference

MANAGING CUSTOMER-INTRODUCED VARIABILITY

Classic Accommodation

- Expand Capacity

Low-Cost Accommodation

- Create self-service

Classic Reduction

- Require Reservation

Uncompromised Reduction

- Target customers with required level of capability or preferences

Further reading:

Francis X. Frei, “Breaking the Trade-Off between Efficiency and Service”, Harvard Business Review, 84, No. 11 (Nov 2006), pp. 97

	Classic Accommodation	Low-Cost Accommodation	Classic Reduction	Uncompromised Reduction
Arrival	Keep plenty of employees	Automate tasks, Create self-service Hire lower-cost labor	Require reservation, Provide off-peak pricing	Create complementary demand to smooth arrival
Request	Train employees to handle many kinds of requests	Automate tasks, Create self-service Hire lower-cost specialized labor	Require reservation, Persuade customers to compromise	Limit service breadth
Capability	Do the work for the customer	Self-service that requires no special skill	Require customers to increase capability	Target customers based on capability
Effort	Do the work for the customer	Self-service with extensive automation	Use rewards and penalties	Target customer based on motivation, normative approach to motivate
Subjective Preference	Make the employees know differences in expectations	Self-service that permit customization	Persuade customers to adjust expectation	Target customers based on preference

APPLYING BEHAVIORAL SCIENCE

- **Finish strong**
- **Segment the pleasure; combine the pain**
- **Let the customer choose**
- **Pay attention to norms and rituals**



Further reading:

Chase, R. B. and S. Dasu. "Want to Perfect Your Company's Service? Use Behavioral Science." Harvard Business Review 72, no. 6, pp. 78-84

SUMMARY

- **Understand the characteristic of service process**
- **Understand the service system design matrix**
- **Techniques for managing service processes**