OPERATIONS MANAGEMENT

OPERATIONS MANAGEMENT

- Should understand:
  - The significance of operating systems in manufacturing and service organizations
  - The link between general business strategy and strategic operation management
  - The key issues faced by operations managers and be aware of the different approaches available for the design of operating systems
  - The role of operations consultancy

OPERATIONS MANAGEMENT

- The presentation consist of 5 parts:
  - 1. Introduction to Operations Management
  - 2. The Operating System
  - 3. Supply Chain Management
  - 4. Lean Systems Methods
  - 5. Operations Experience (Operations Simulation)

PART 1

INTRODUCTION TO OPERATIONS MANAGEMENT

INTRODUCTION TO OPERATIONS MANAGEMENT

Sub blocks:

1. Operations Management (introduction)
2. Operations Strategy
3. International Operations Strategies
4. Operations and the Internet

1 OPERATIONS AND SUPPLY CHAIN MANAGEMENT INTRODUCTION

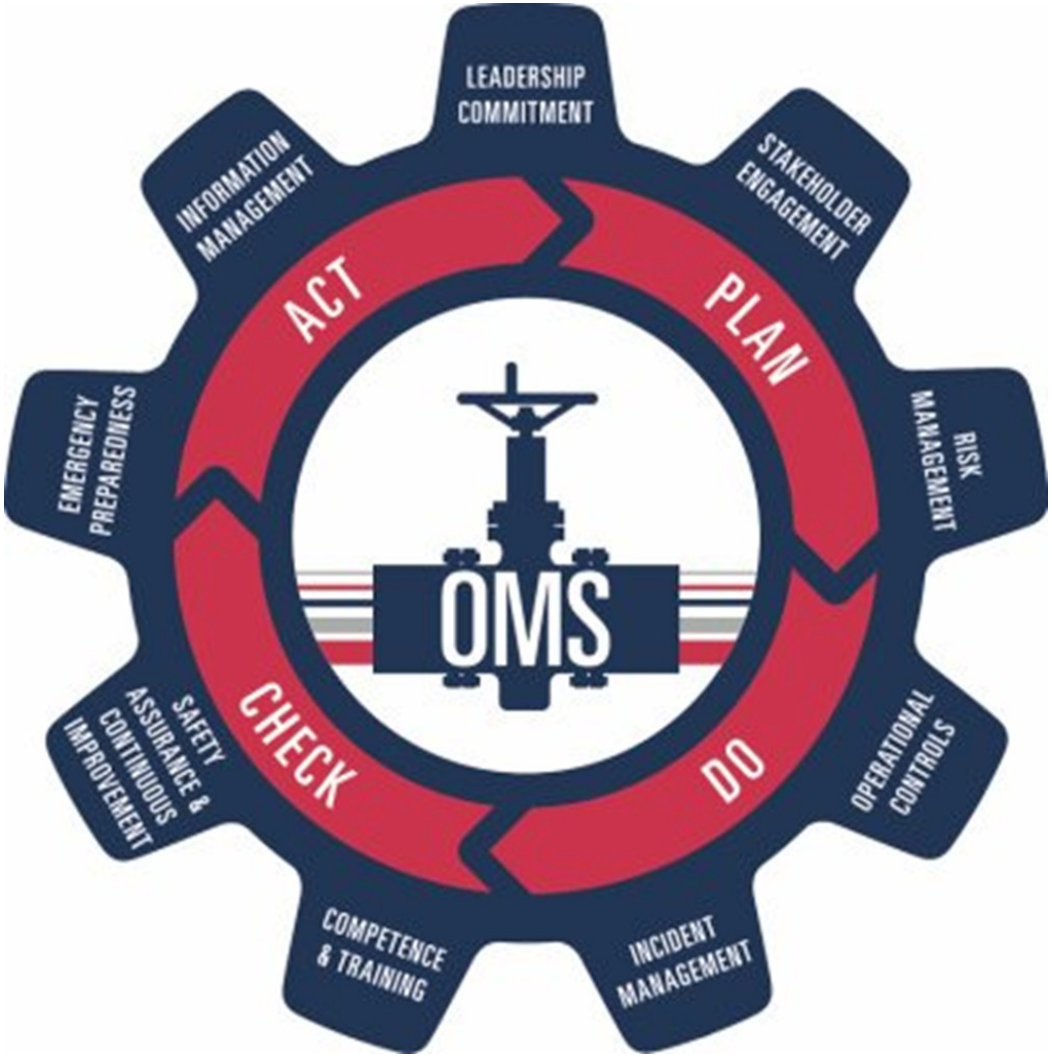
OPERATIONS MANAGEMENT
Introduction

- What is Operations Management, and what is the goal?
- How does Operations Management relate to Marketing, Finance and HRM?
- How does the internet and e-Business affects Operations Management?

OPERATIONS MANAGEMENT
Introduction

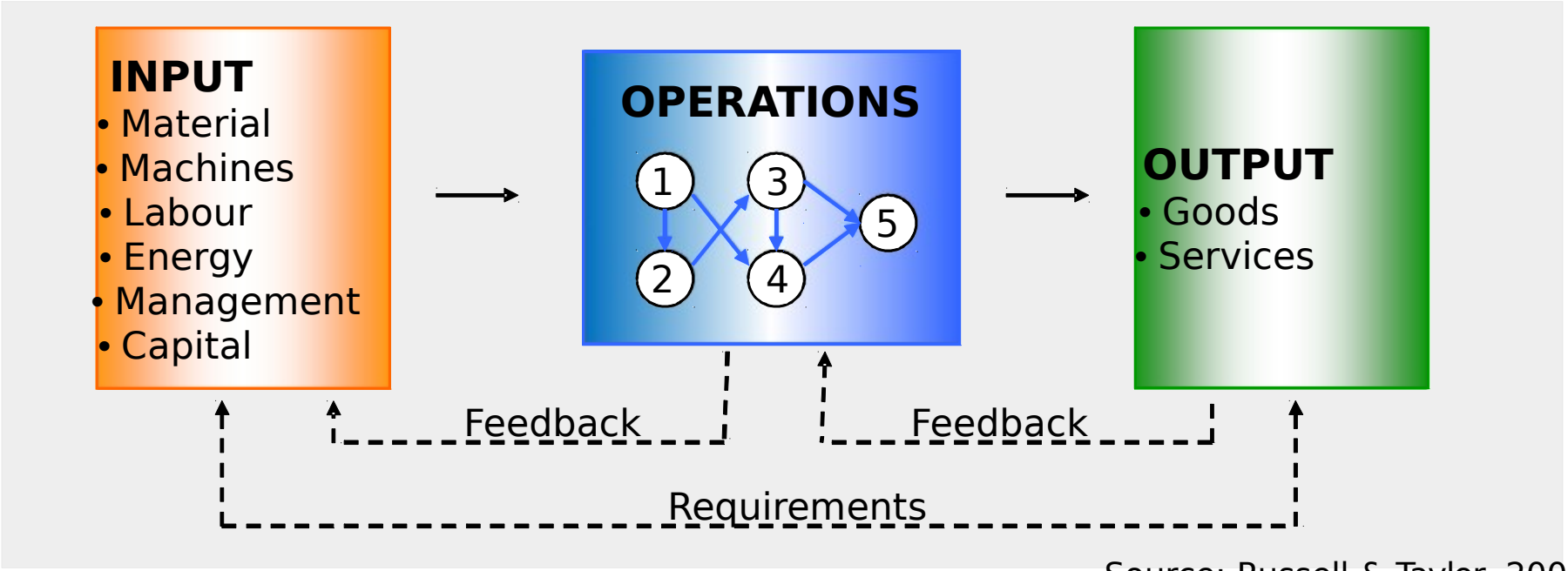
Operations management encapsulates the management of business processes that produce tangible goods or intangible services.

OPERATIONS MANAGEMENT



OPERATIONS MANAGEMENT
What is Operations?

- **Operations** can be defined as a transformation process where e. g. materials, labour is transformed into e.g. goods, services



Source: Russell & Taylor, 2009

OPERATIONS MANAGEMENT
Transformation processes

Transformation can be:

- Physical
- Locational
- Exchange
- Physiological
- Psychological
- Informational

Example:

-Manufacturing operations

-Transportation/warehousing

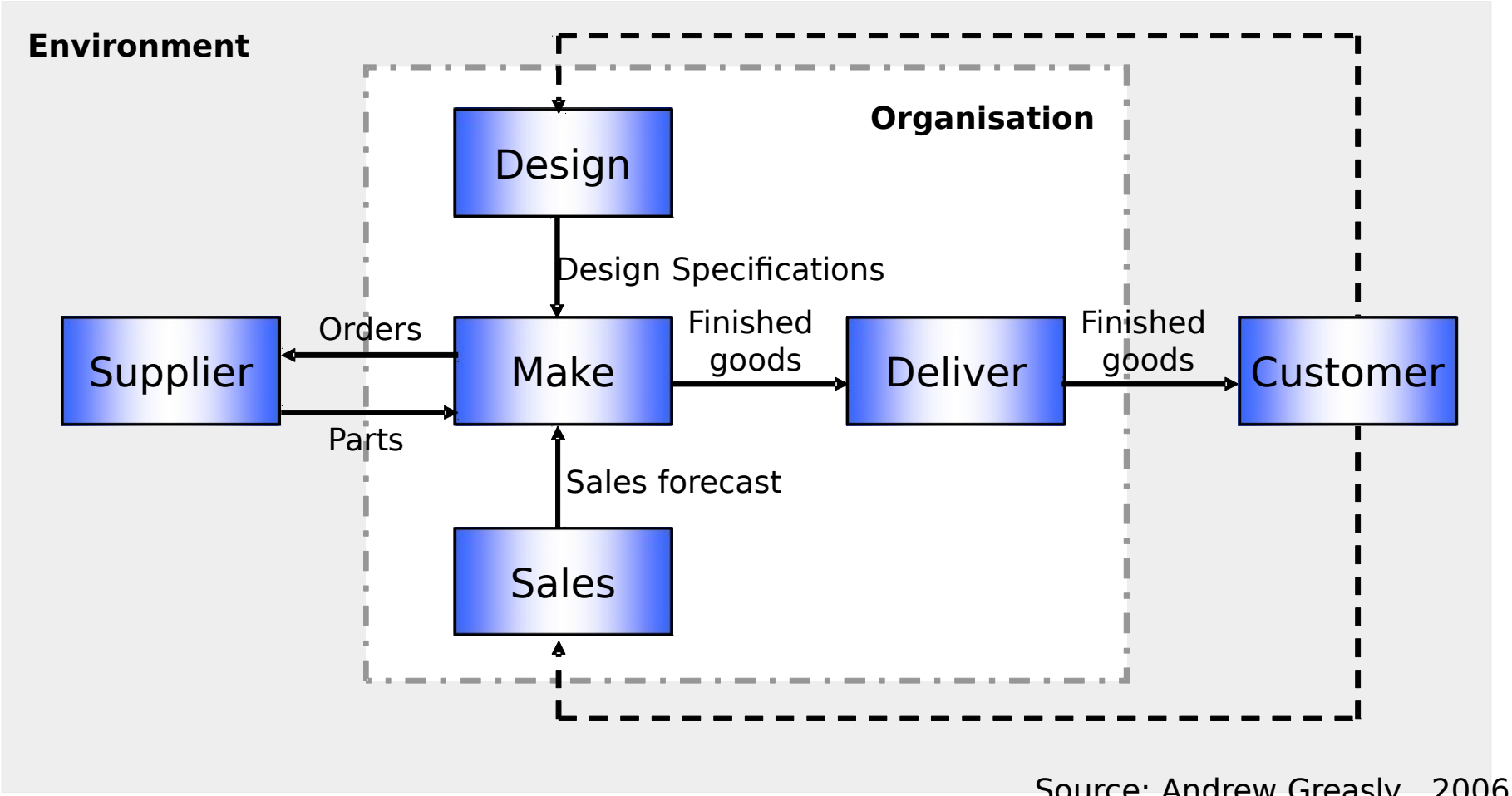
- Retail

- Health care

- Entertainment

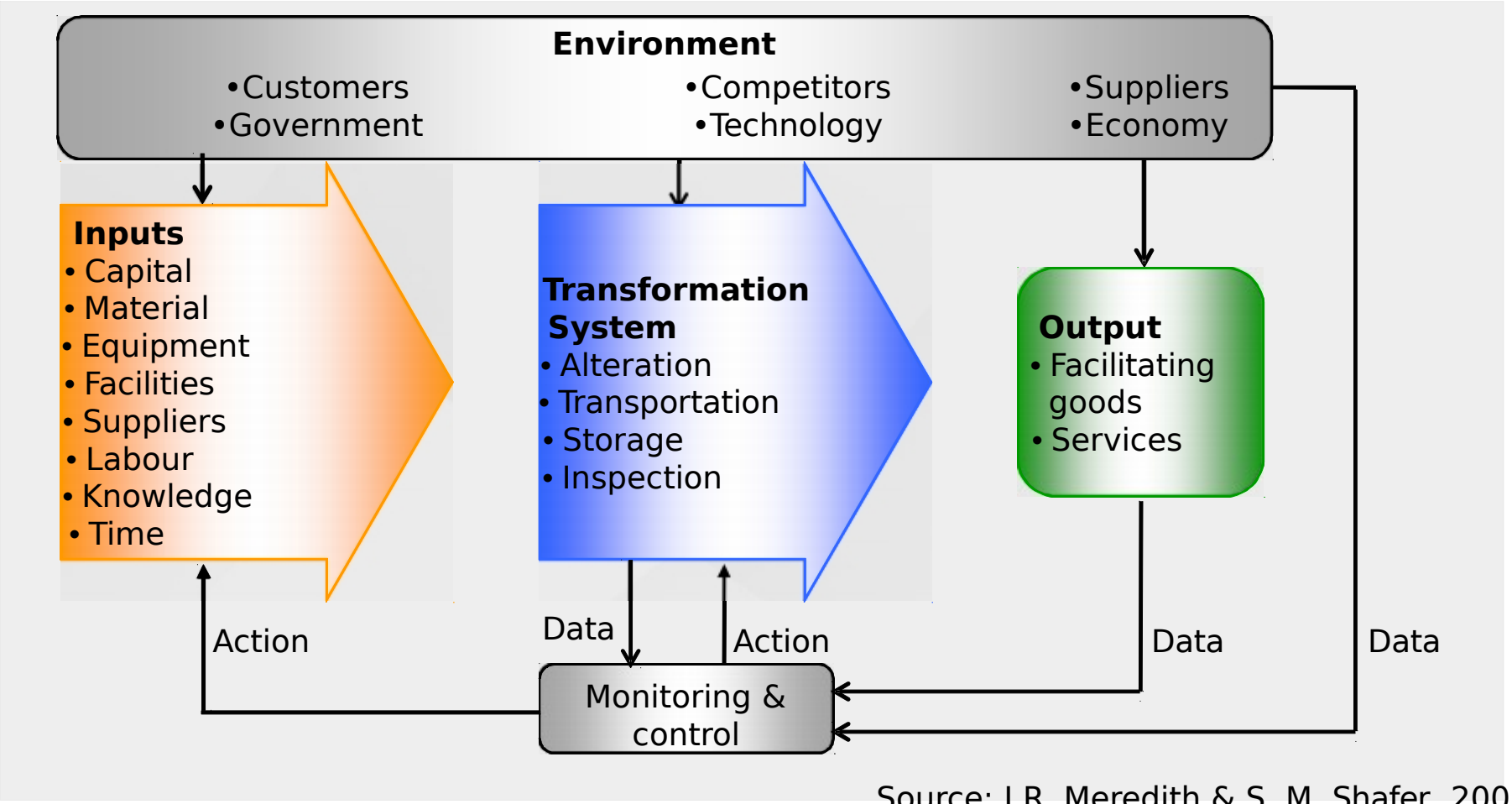
- Communication

OPERATIONS MANAGEMENT
Organisation perspective



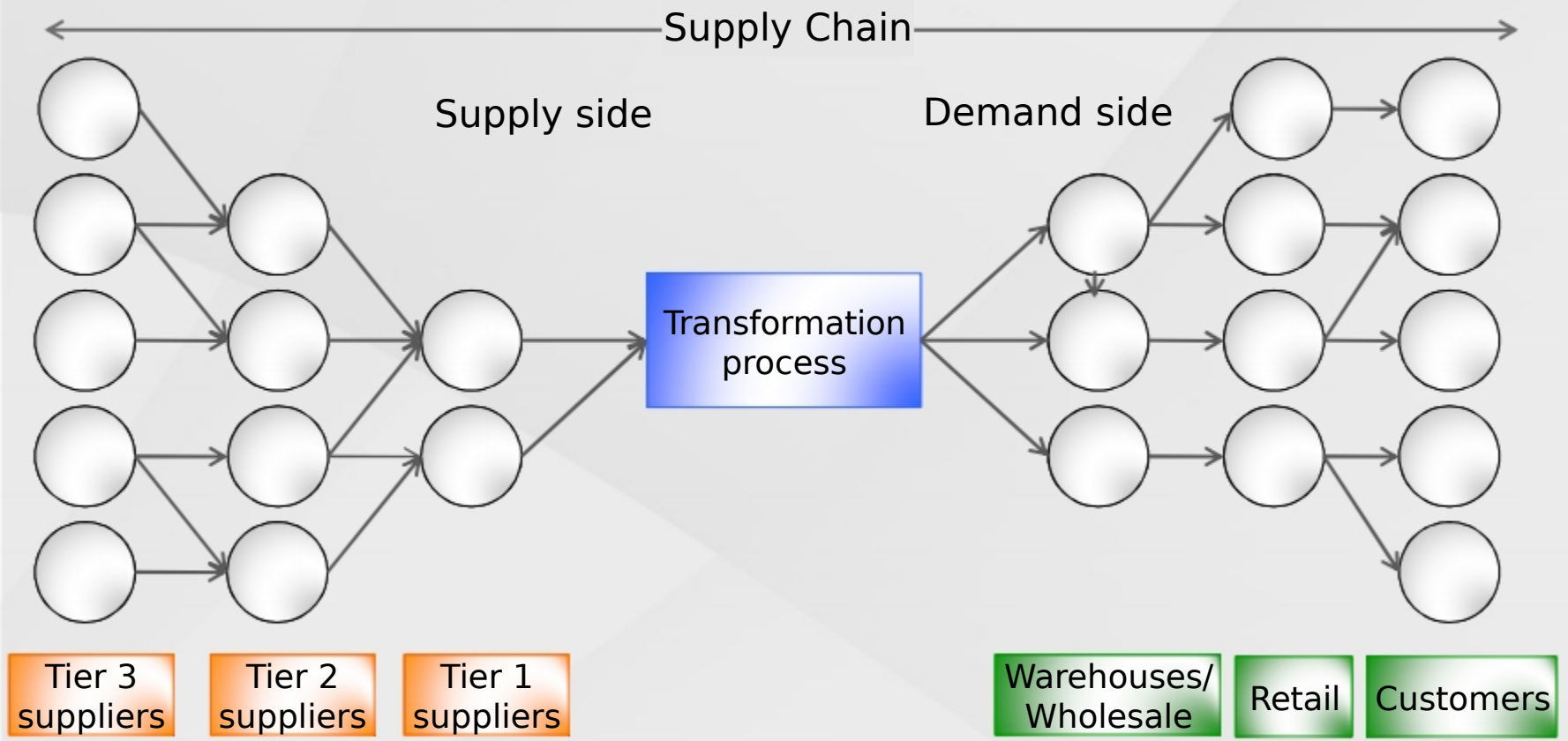
Source: Andrew Greasly, 2006

OPERATIONS MANAGEMENT
Systems perspective



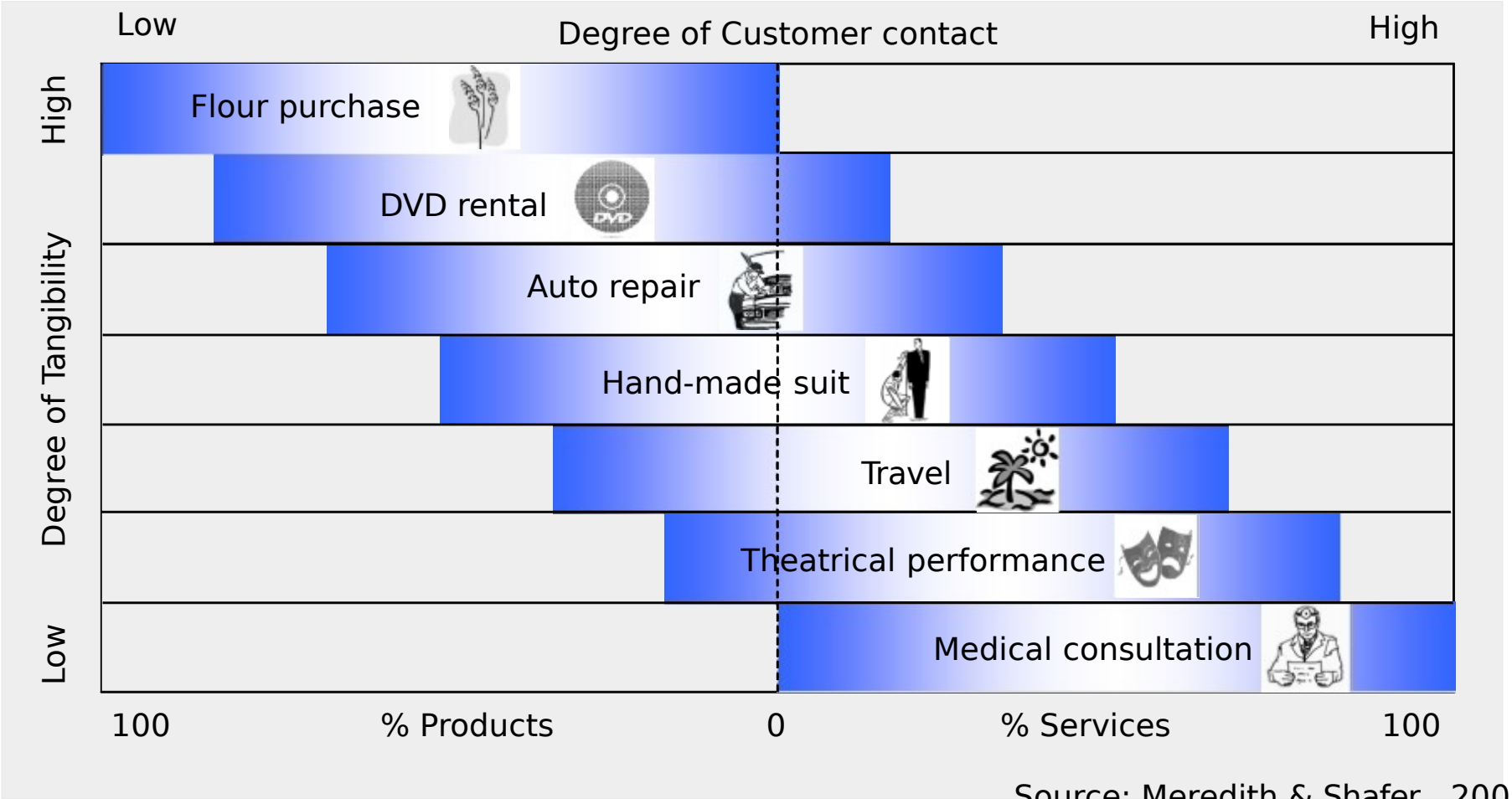
Source: J.R. Meredith & S. M. Shafer, 2007

OPERATIONS MANAGEMENT
Supply Chain perspective



Source: David Barnes, 2008

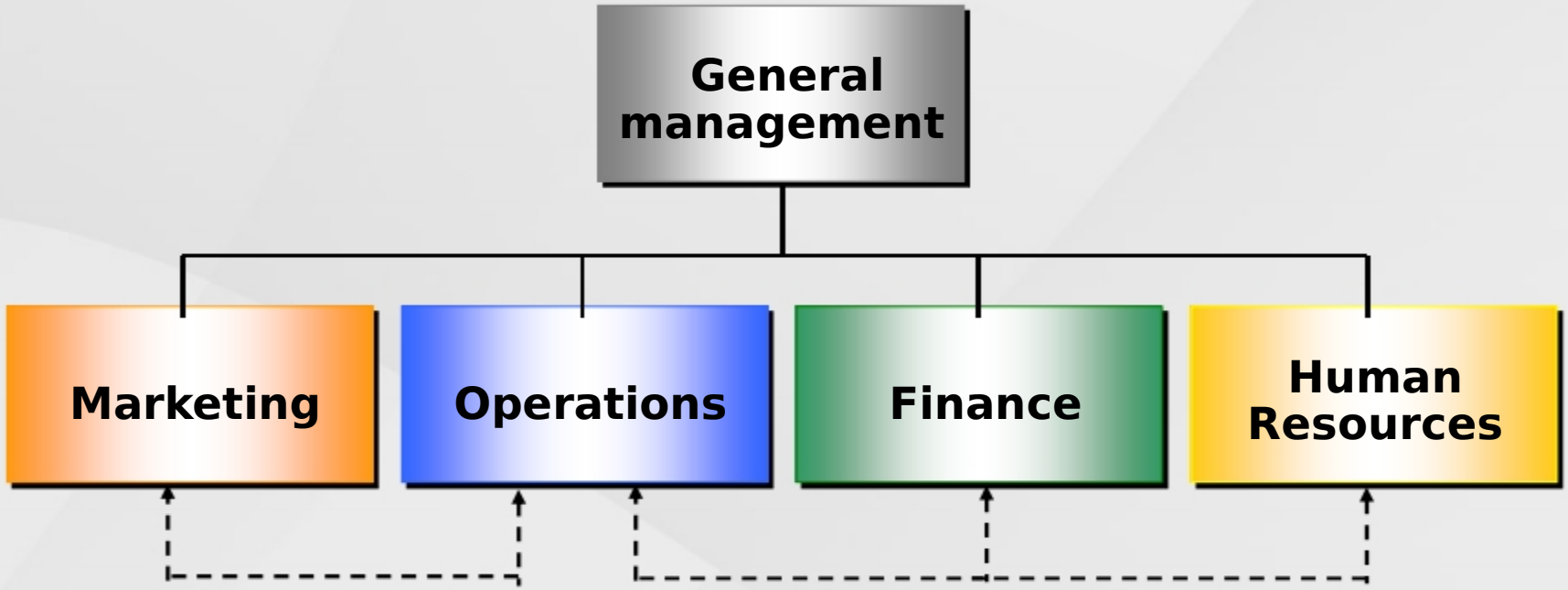
OPERATIONS MANAGEMENT
Range manufacturing to services



Source: Meredith & Shafer, 2007

OPERATIONS MANAGEMENT
Operations within organisation

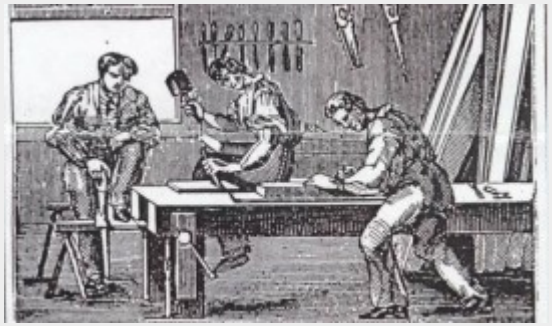
OPM basics



Source: Own compilation

OPERATIONS MANAGEMENT
History of Operations Management

- **Craft production** is the process of handcrafting products or services for individual customers.



- **Mass production** is the high-volume production of a standard product for a mass market.

- **Lean production** is an adaptation of mass production that prizes quality and flexibility.

OPERATIONS MANAGEMENT
Productivity and Competitiveness

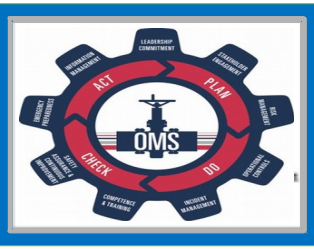
- **Competitiveness** = degree to which an countries can produce goods and services that meet the test of international markets.

- **Productivity** = ratio of output to input

$$\text{Productivity} = \frac{\text{Output}}{\text{input}} = \frac{\text{Output}}{\text{Labour}}$$

OPERATIONS MANAGEMENT
Globalisation

Source: Russell & Taylor, 2009



2 OPERATIONS STRATEGY

OPERATIONS STRATEGY
Introduction

- What is the relation between business strategy and operations strategy?
- What methods/tools do you know to relate both strategies?
- What approaches do you know of international operating businesses?

OPERATIONS STRATEGY
Ability to execute strategy

- … in the majority of cases – about 70% - the real problem isn ’t bad strategy but … bad execution.

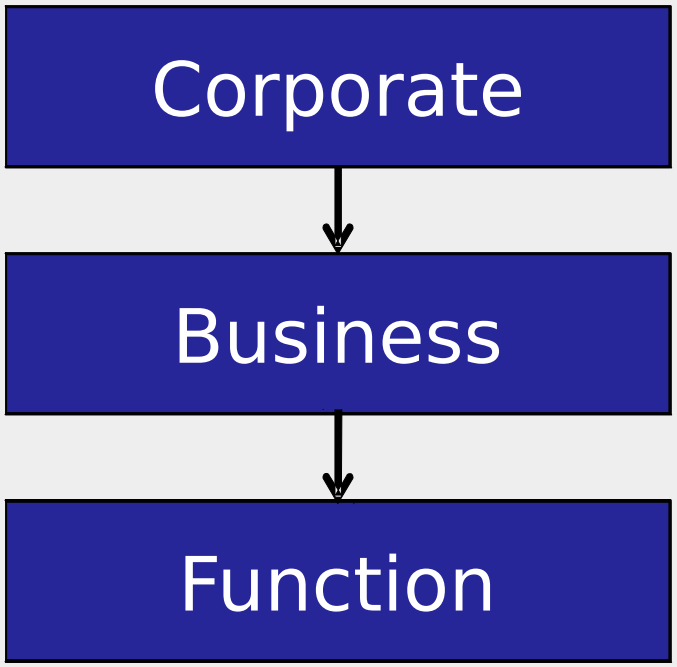
OPERATIONS STRATEGY
Strategy and strategy formulation

- Strategy is a common vision that unites an organisation, provides consistency in decisions, and keeps the organisation moving in the right direction.

- Strategy formulation consist of four basic steps:
  - Defining the primary task
  - Assessing internal- and external forces
  - Determining order winners and order qualifiers
  - Positioning the company

OPERATIONS STRATEGY
Strategy planning

- Strategy planning hierarchy:



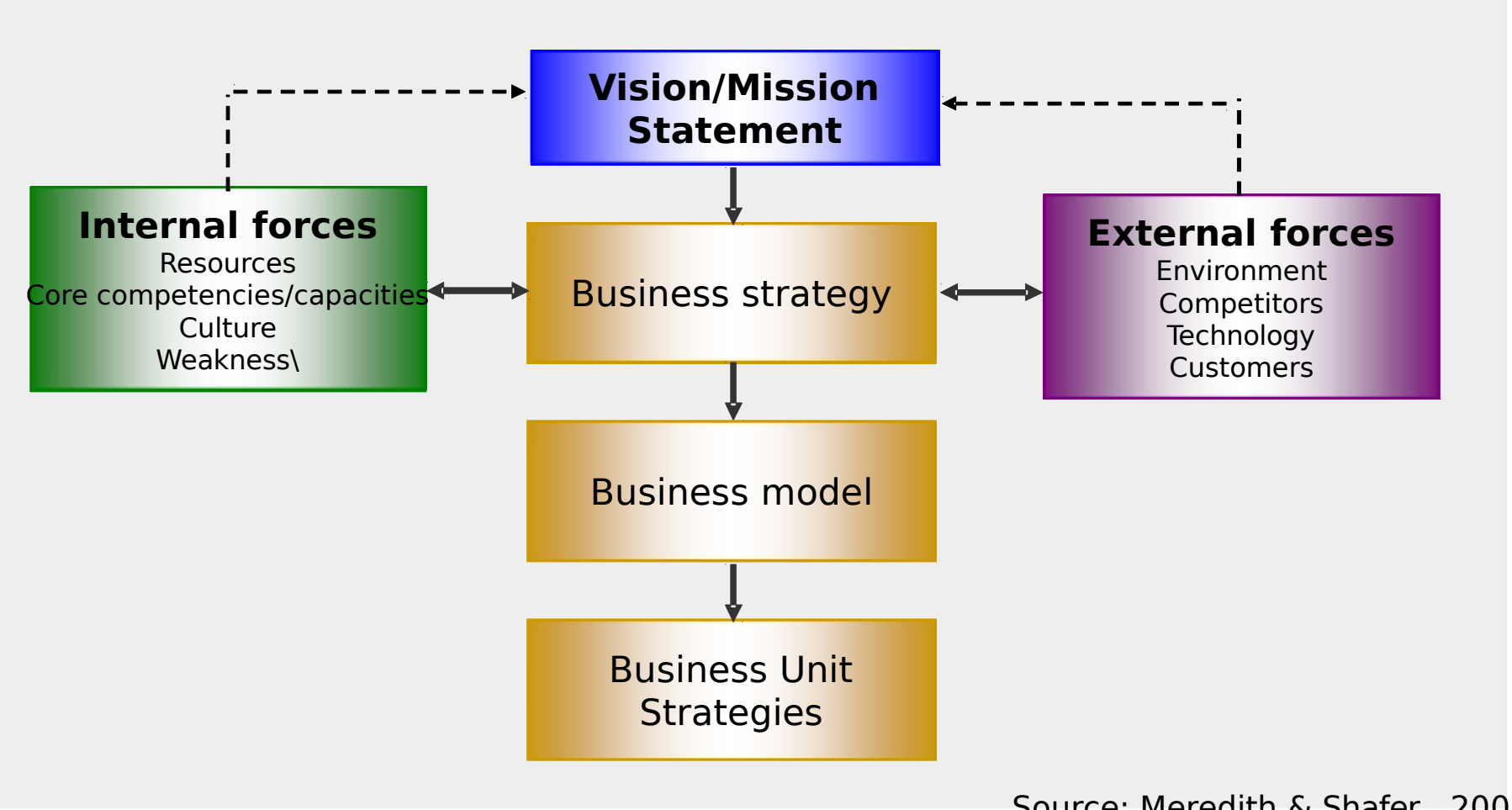
What business shall we be in? What resources are needed?

How do we compete in the business? What is the mission?

How does the function contribute to the business? What are the objectives?

Source: own compilation

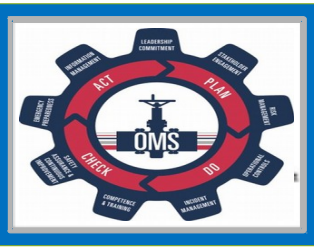
OPERATIONS STRATEGY
Strategy formulation



Source: Meredith & Shafer, 2007

OPERATIONS STRATEGY
Business and product strategies

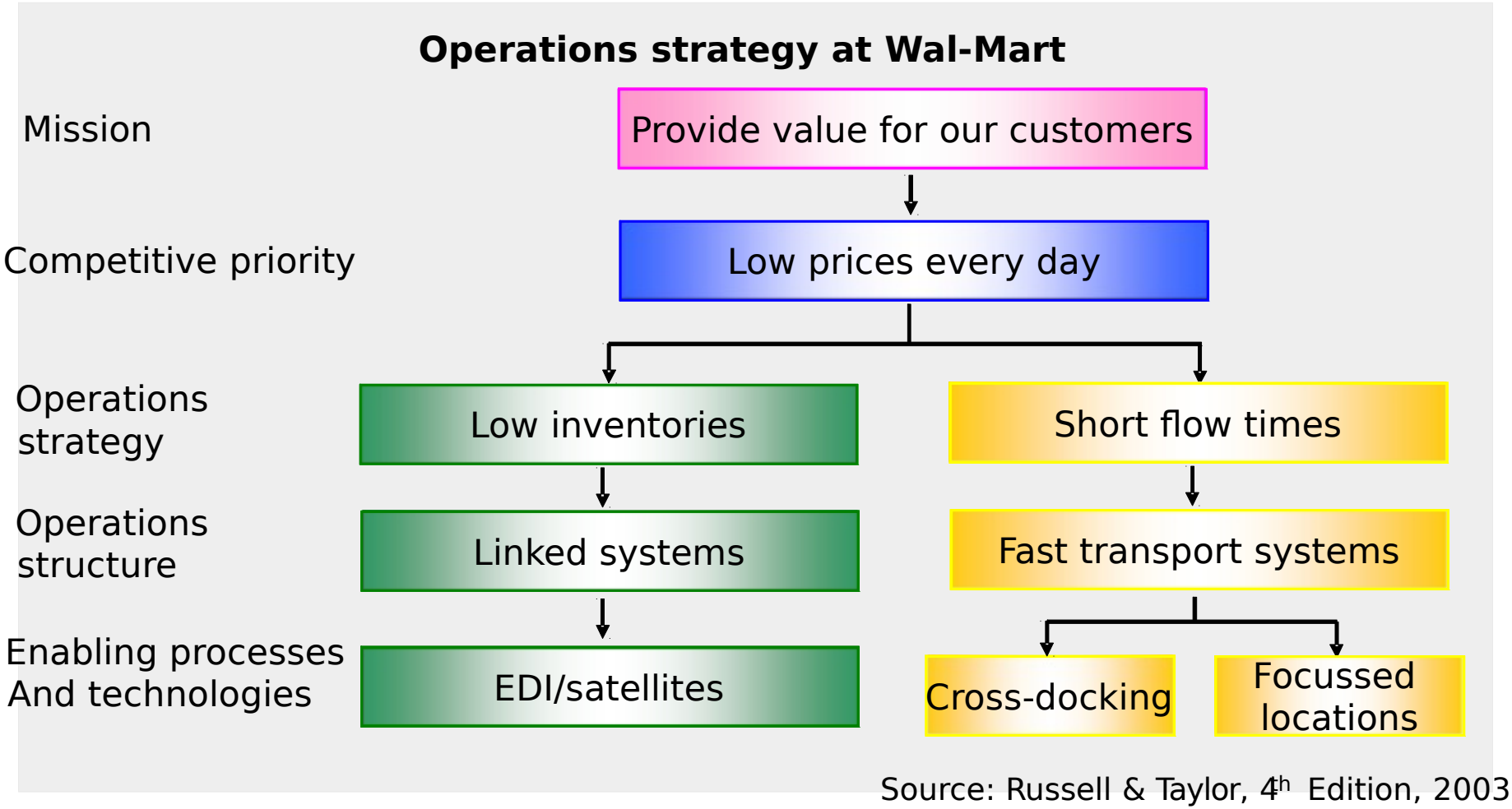
- Business strategy based on introduction (Maidique and Patch):
  - First-to-market: Product available before competition. Price: high = skimming, low = volume
  - Second-to-market: Quickly imitating first, learn from mistakes, provide improved version.
  - Cost-minimalisation or late-to-market: Wait till demand is high and compete on price.
  - Market segmentation: Focussing on serving niche markets with specific needs. Flexible manufacturing.



OPERATIONS STRATEGY
Strategic decisions

- Strategic decisions affect:
  - Capacity: lead-times, responsiveness, operating costs
  - Facilities: where put production facilities
  - Human resources: skill levels, training requirements
  - Quality: target quality, what type of systems
  - Sourcing: suppliers selection, relationship/cooperation
  - Operating systems: technologies, processes, supporting systems

OPERATIONS STRATEGY
Strategy implementation



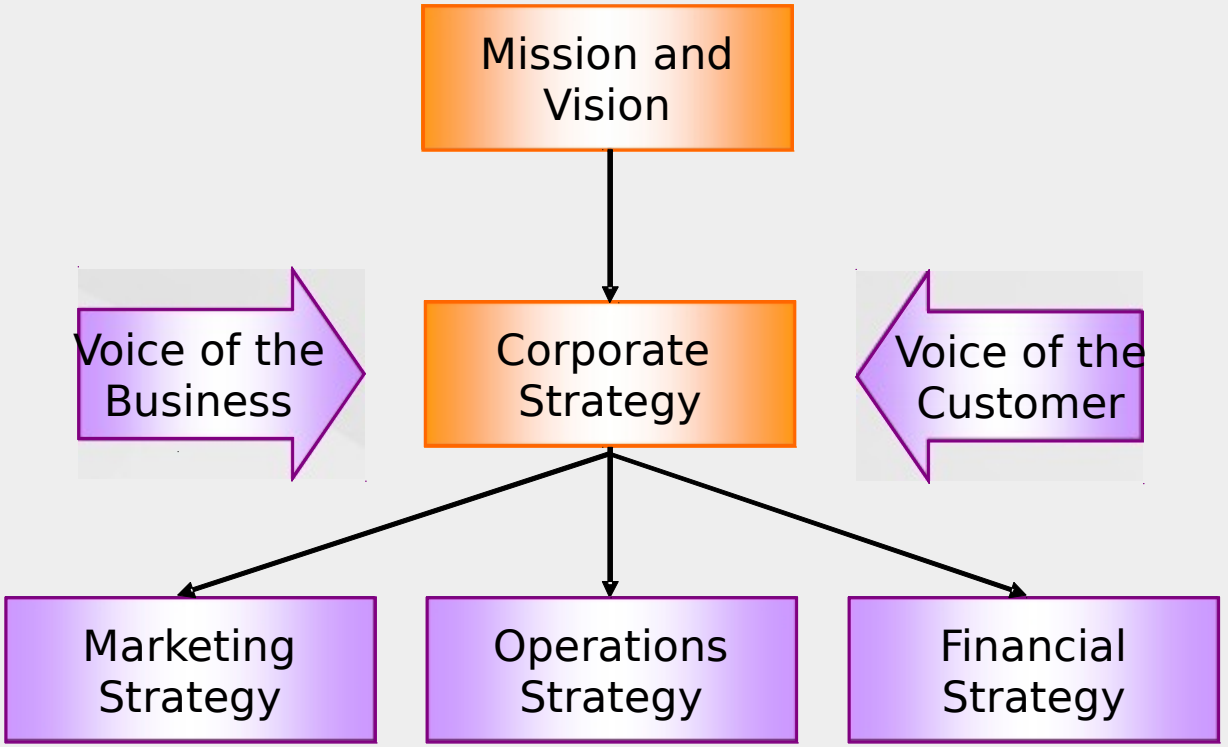
Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS STRATEGY
Strategy deployment

- After a strategy is defined the work only begins:
  - Strategy can be hard to understand;
  - Strategy can be to general, or unrealistic;
  - Areas and persons may interpret the same strategy differently.

- How to implement a strategy:
  - The strategic planning hierarchy;
  - The aggregate project plan;
  - Policy deployment;
  - Balanced scorecard.

OPERATIONS STRATEGY
Strategic planning hierarchy



Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS STRATEGY
From Vision to Targets

Vision : Which future developments are important for my organisation?

Mission : Given the Vision, which role can this organisation play in future developments?

Strategy : Given the Vision and Mission how can the organisation organise the activities in the most successful way

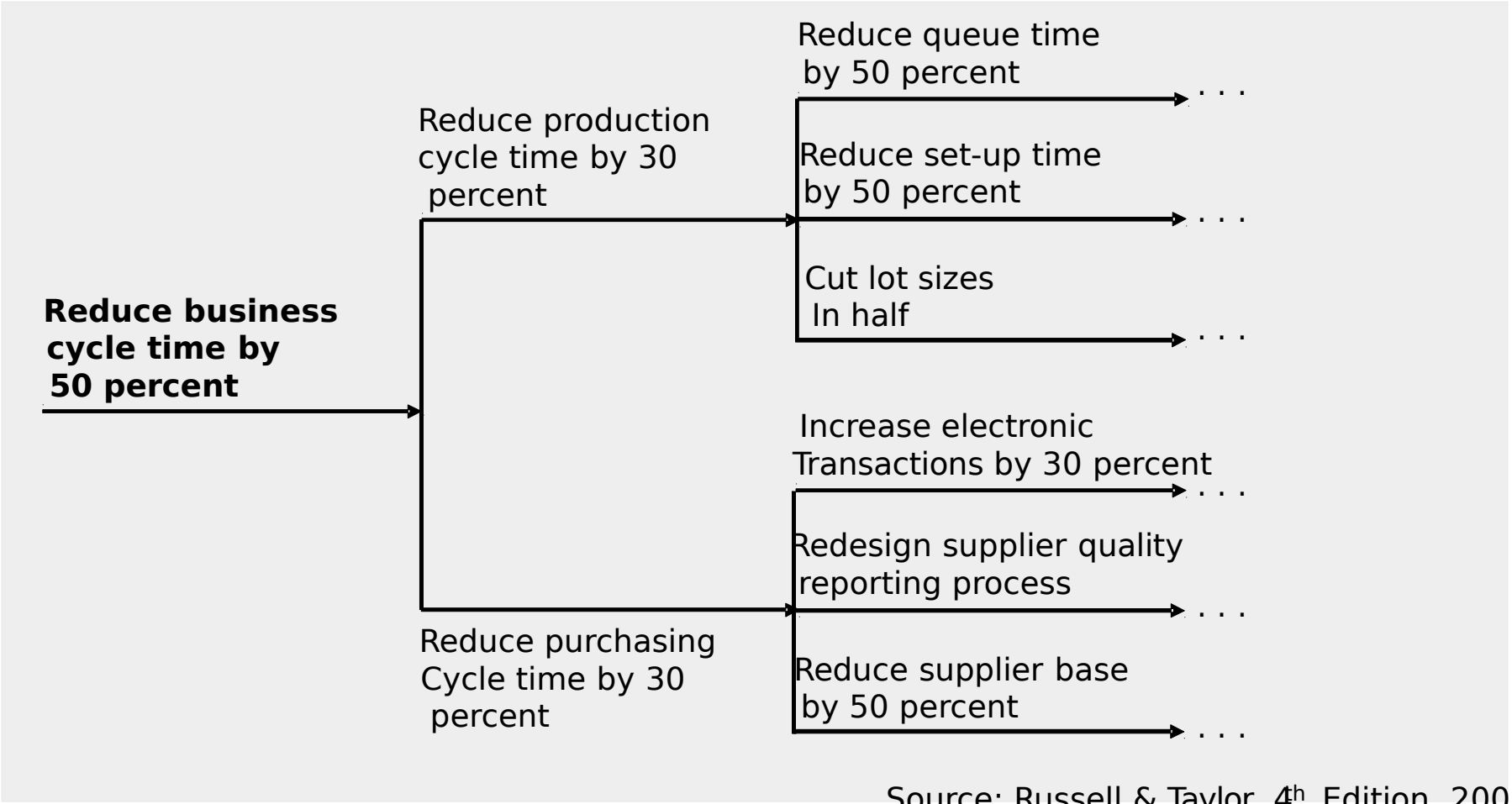
Culture : Given the Vision and the Mission, what is the desired culture?

Slogan : How can we tell in 3 to 8 words where we, as an organisation, stand for?

Operational target setting : define the quantitive targets, critical success factors, performance indicators, norms and contingency .

Source: Own compilation

OPERATIONS STRATEGY
Policy deployment



Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS STRATEGY
Policy deployment

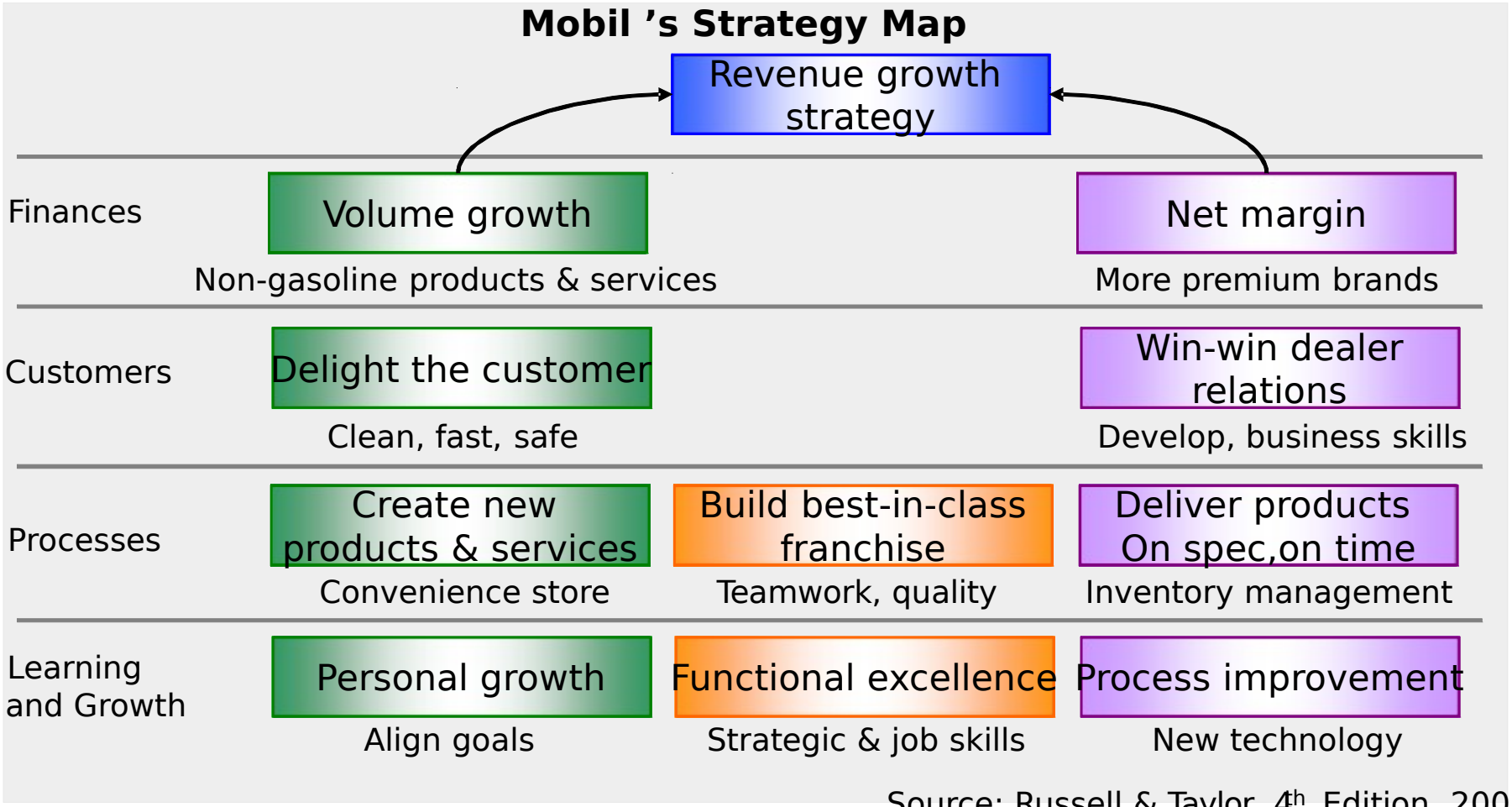
What	Who	When	Measure	Resource
Improve work work flow	Bill Wray	9-1-2003	Average queue time per job	€ € 5,000
....				

Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS STRATEGY
Balanced Scorecard

- Balanced scorecard developed by Robert Kaplan and David Norton examines an organisation in four critical areas:
  - Finance: How should we look to our shareholders?
  - Customer: How should we look to our customers?
  - Processes: At which process must we excel?
  - Learning and growing: How will we sustain our ability to change and improve?

OPERATIONS STRATEGY
Balanced Scorecard



Source: Russell & Taylor, 4th Edition, 2003

3 INTERNATIONAL OPERATIONS STRATEGIES

INTERNATIONAL STRATEGIES
Introduction

- How does internationalisation influences Operations Management?

INTERNATIONAL STRATEGIES
Generic international strategies

- Generic strategies:

- Market Access strategy: In order to access and serve markets outside home country

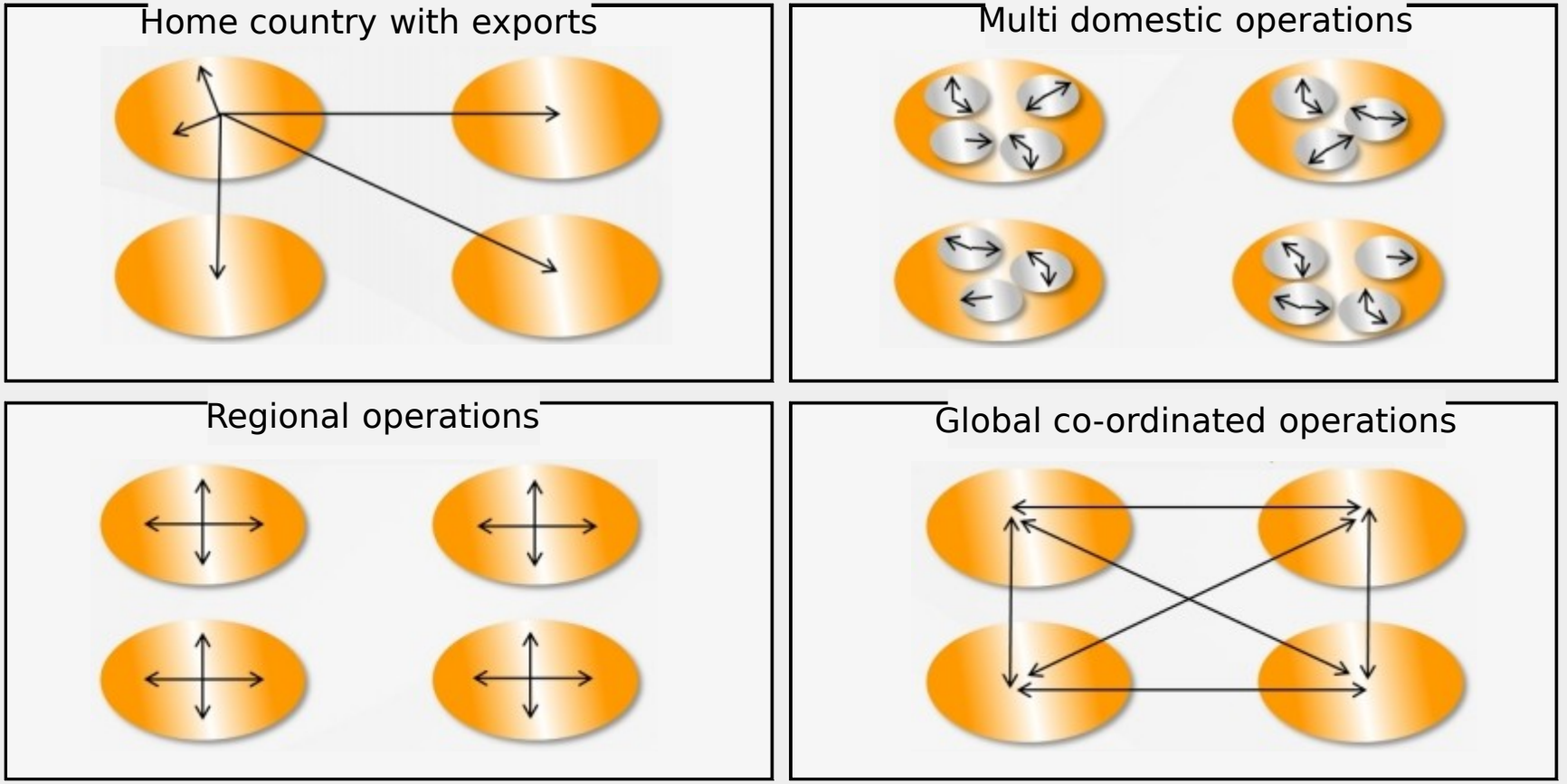
- Resource Seeking strategy: In order to access and utilize specific resources outside home country

  - Flaharty & Ferdows

INTERNATIONAL STRATEGIES
Entering foreign markets

- An organisation might enter the foreign market by:
  - **Direct exports** to the country: special attention to communication, delivery, service, tailoring products
  - **Joint venture** involving local partner: using sales channels and distribution, special attention to choice of partner (and ownership)
  - Establishing a **sales subsidiary** : first real stage of direct foreign investment, direct control, special attention to communication local-home
  - Establishing a **production facility** : Major step involving significant direct investment, involving, product, process and in- and outbound logistics.

INTERNATIONAL STRATEGIES
Configurations for Operations



Source: Barnes, 2008

INTERNATIONAL STRATEGIES
Competitive advantages

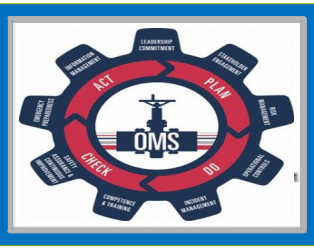
- Sources of competitive advantage can be developed by strategic actions in international operations:

  Global sourcing : Basic input resources from lowest cost location or sourcing sophisticated products from the best suppliers

  Location : Near customer facilities or concentrated locations

  Network effects : Configuring supplier network or managing the supply network

  Competition : A trigger to improve operations and/or focussing how and where to compete



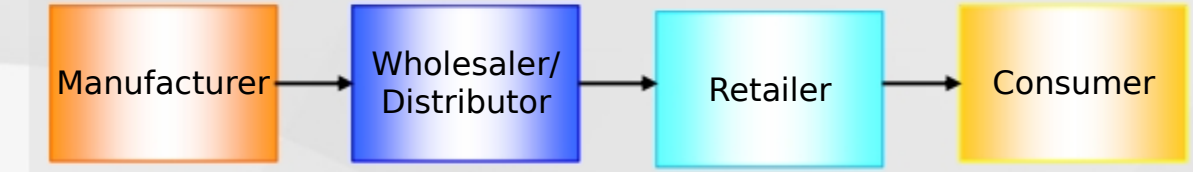
4 OPERATIONS AND THE INTERNET

OPERATIONS AND THE INTERNET
Introduction

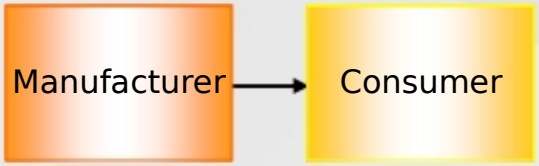
- How does the internet influences Operations Management?

OPERATIONS AND THE INTERNET
E-Business and the Value Chain

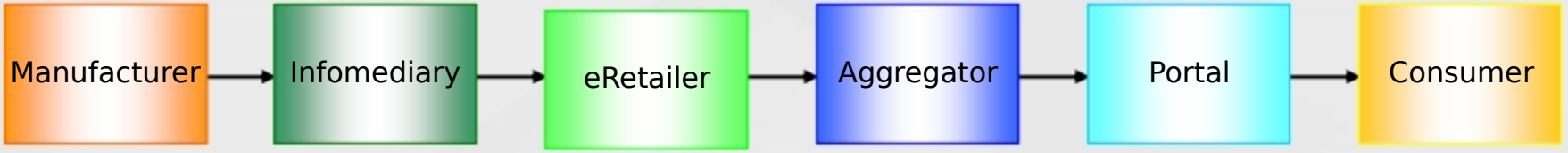
- **E-Business** is changing the value chain, instead of expected elimination, new steps are created.



Traditional Value Chain



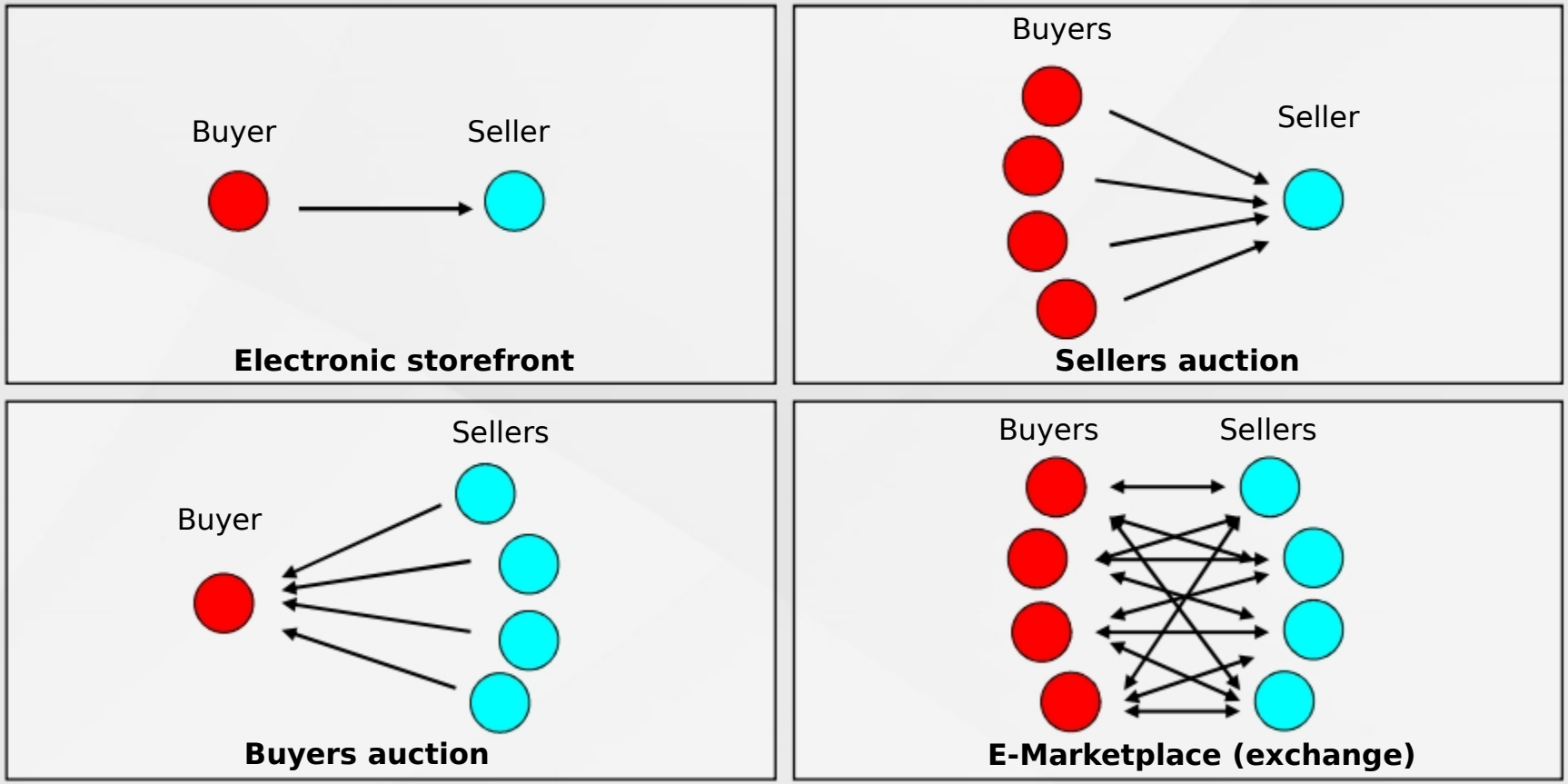
Value Chain with Intermediaries Eliminated



Value Chain introducing New Intermediaries

Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS AND THE INTERNET
E-Business transactions



Source: Russell & Taylor, 4th Edition, 2003

OPERATIONS AND THE INTERNET
Impact of e-Business

- Better customer relationship
- More efficient processes
- Lower costs of materials
- Information technology synergy
- Better and faster decision making
- New forms of organisations
- Expanded supply chain
- Higher customer expectations
- New ways of doing business
- Globalisation

PART 2

THE OPERATING SYSTEM

THE OPERATING SYSTEM MANAGEMENT

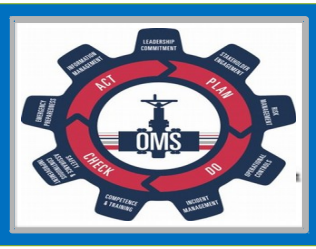
Sub blocks:

5. The Operating System

6. Operations Planning

7. Enterprise Resource Planning (ERP)

8. Business Process Redesign (BPR)



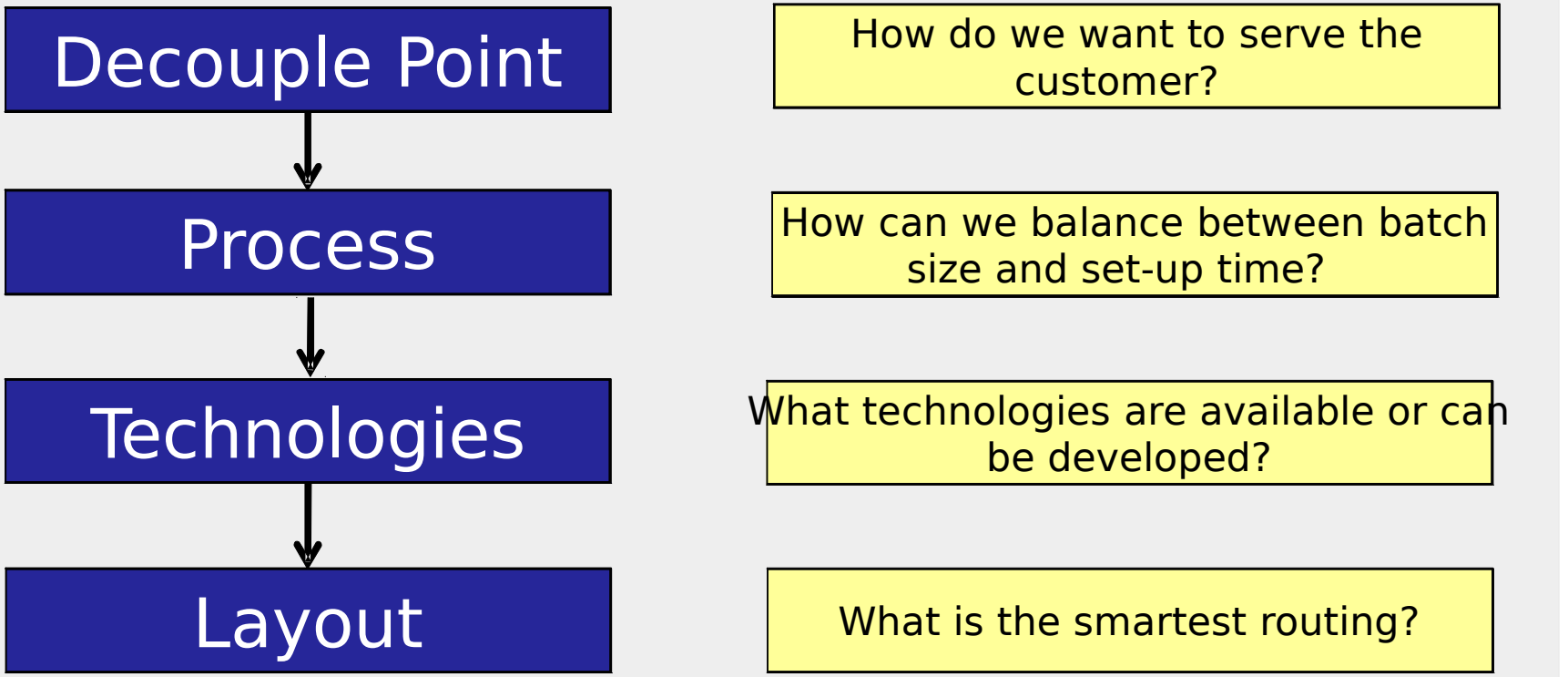
5 THE OPERATING SYSTEM

THE OPERATING SYSTEM
Introduction

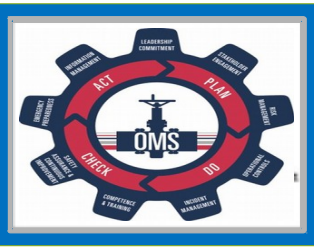
- What decisions must be made for organising the operations process?
- What is the importance of the layout of the process?
- What is the importance of innovation?

THE OPERATING SYSTEM
Planning hierarchy

- Decision steps in designing the operating system:



Source: own compilation



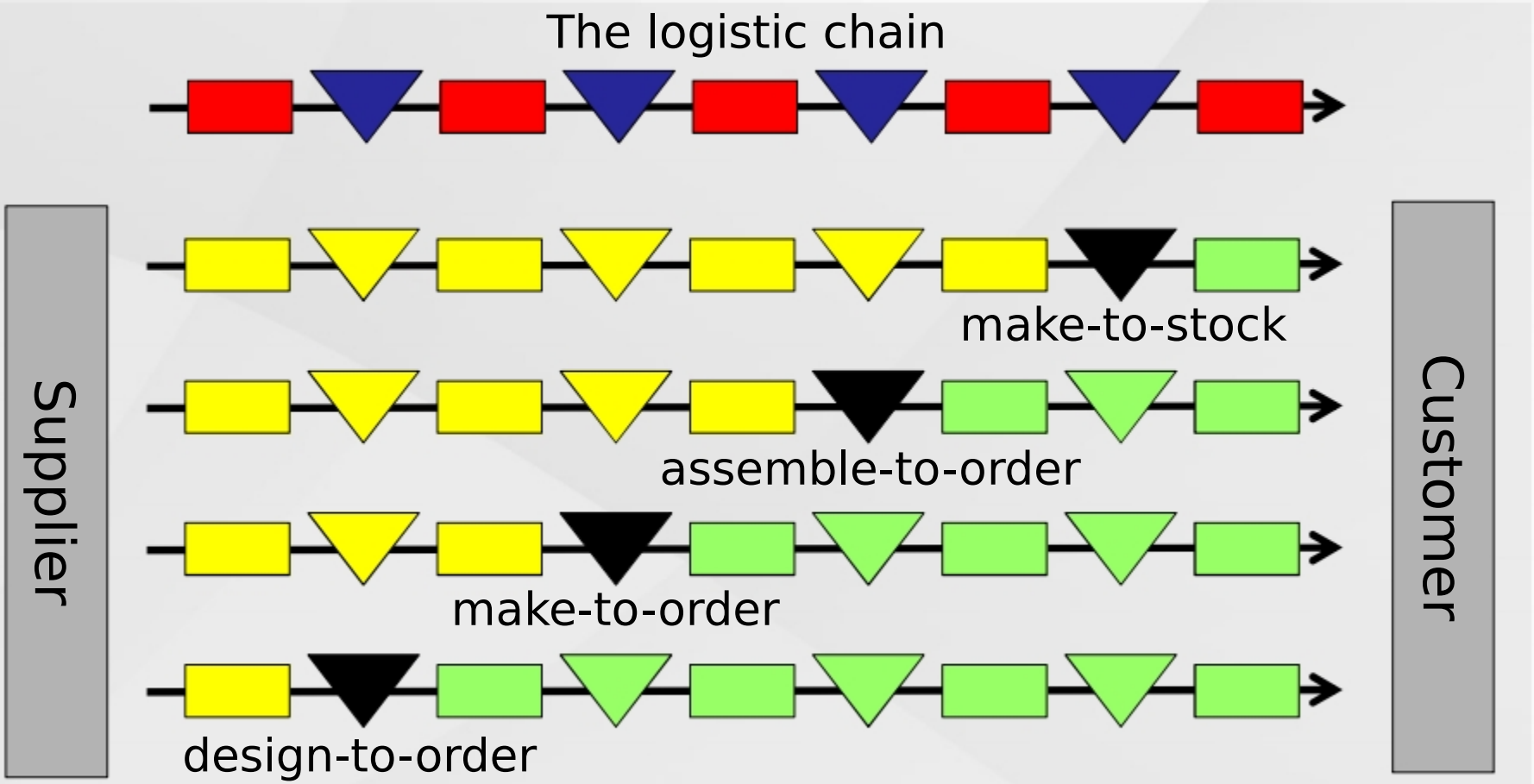
THE OPERATING SYSTEM
Process strategy

- **Process strategy** is an organisation ’s overall approach for physical producing goods and services.

- **Process strategy** includes:
  - **Vertical integration** : The degree to which a firm produces parts that go into its products
  - **Capital intensity** : mix of capital and labour resources used in the production process
  - **Process flexibility** : the easy at which can be responded to changes in demand,
  - **Customer involvement** : The role of the customer.

THE OPERATING SYSTEM
Customer-decoupling-point

OPM basics



Source: Own compilation

THE OPERATING SYSTEM
Customer-decouple-point

Examples from manufacturing industry

Make-to-order	Assemble-to-order	Make-to-stock
		
Ship building industry	Car building industry	Many industries

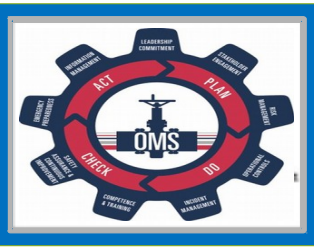
Source: Own compilation

THE OPERATING SYSTEM
Customer-decouple-point

Examples from food/service industry

Make-to-order	Assemble-to-order	Make-to-stock
		
Catering industry	Fast food industry	Pre-prepared Food industry

Source: Own compilation

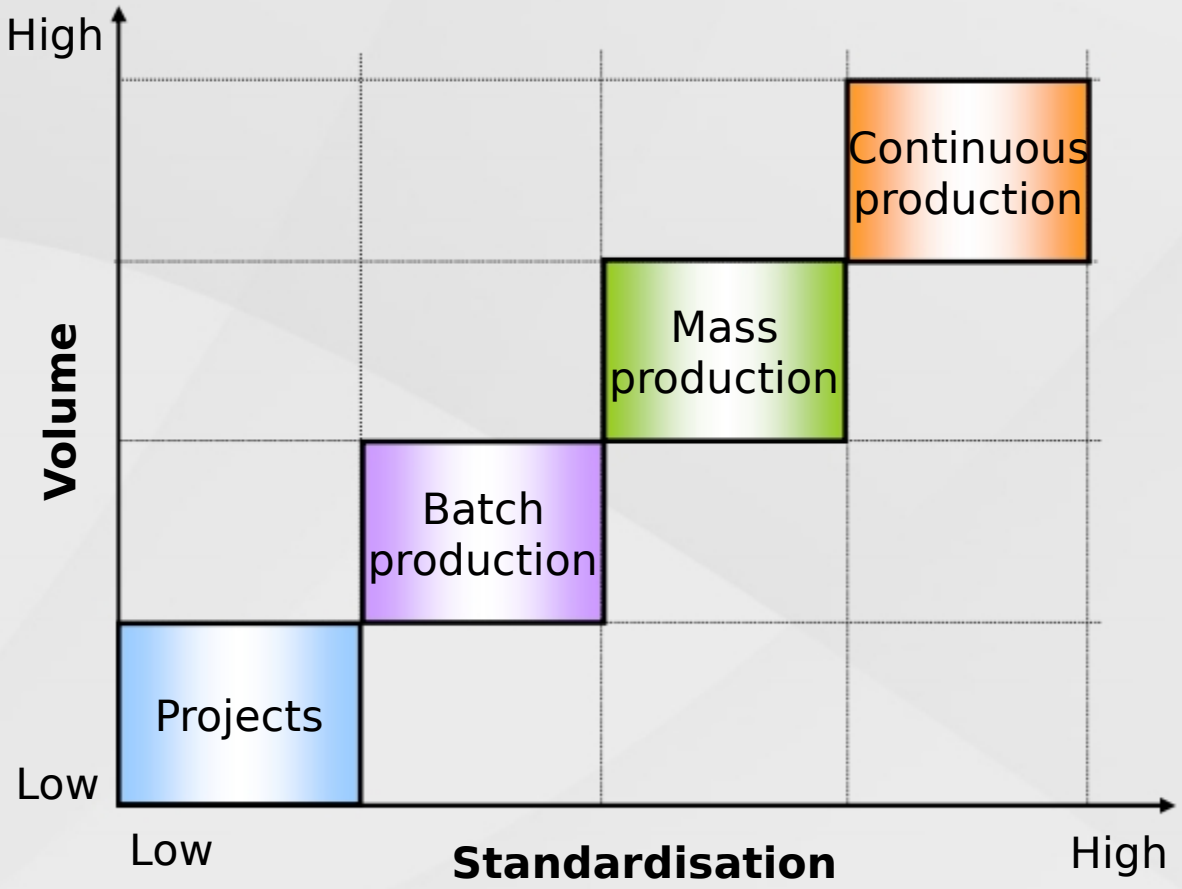


THE OPERATING SYSTEM
Process selection

- Production process can be classified into:
  - **Project** : is a one-at-a-time production of a product to customer order;
  - **Batch production** : processes many different jobs at the same time in groups (or batches);
  - **Mass production** : produces large volumes of a standard product for a mass market;
  - **Continuous production** : is used for very high-volume commodity products.

THE OPERATING SYSTEM
Production process selection

OPM basics

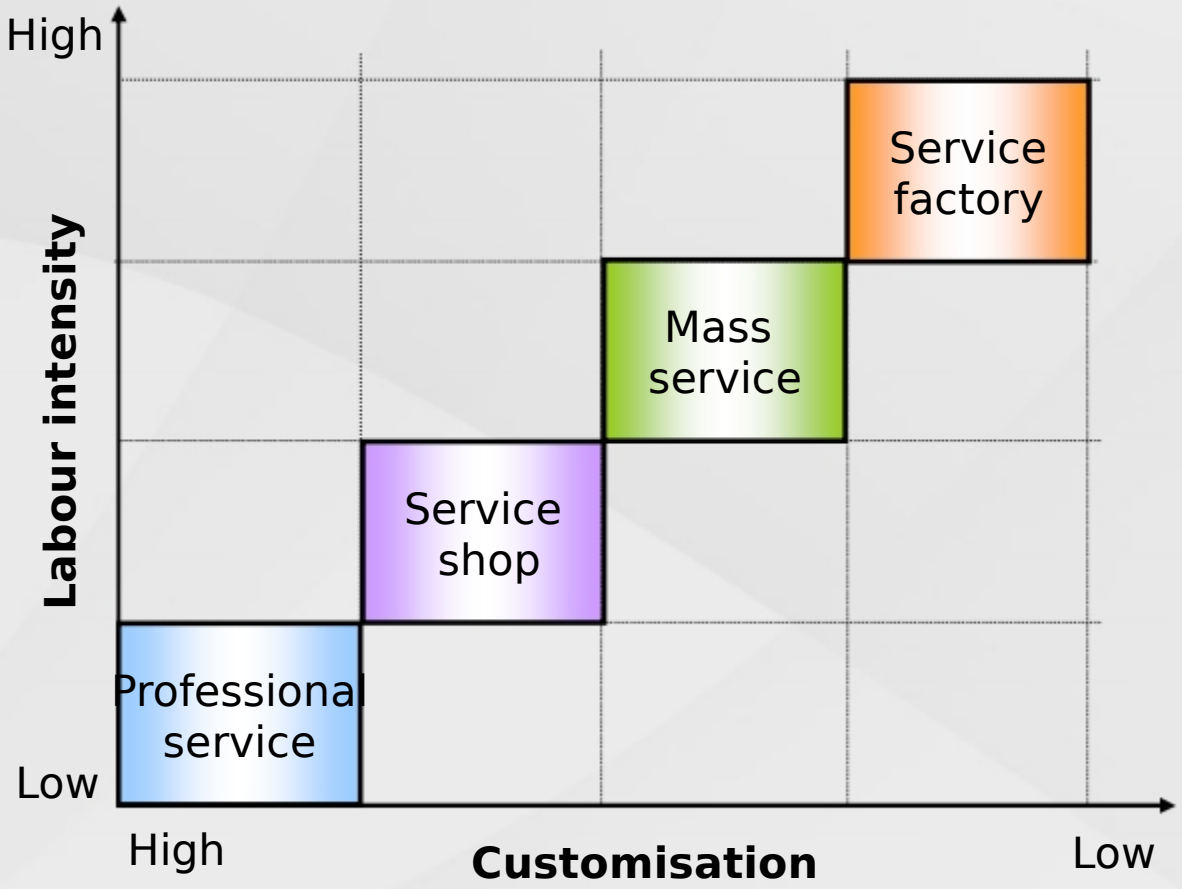


Examples

Continuous production	Production of oil, electricity, paper, steel, foodstuffs.
Mass production	Production of automobiles, televisions, personal computers, fast food.
Batch production	Machine shops, bakeries, education, furniture making.
Projects	Building ship, rock concert, development new product.

Source: Russell & Taylor, 2009

THE OPERATING SYSTEM
Service process selection



Examples

- Electricity distribution
- Retail store
- Education
- Medical consult

Source: Russell & Taylor, 2009

THE OPERATING SYSTEM
Manufacturing technology (1 of 3)

- **Computer numerical controlled** (CNC) machines are controlled by software instructions in the memory of a computer.

- **Conveyors** are intelligent, fast and flexible transport systems to route the product through the process.

THE OPERATING SYSTEM
Manufacturing technology (2 of 3)

- **Automatic guided vehicles** (AGV) is a driverless truck that follows a path of tape, rail or wires embedded in the floor or wireless radio commands.

- **Automated storage and retrieval systems** (ASRS) can automatic store and retrieve goods (automated warehouses).

THE OPERATING SYSTEM
Manufacturing technology (3 of 3)

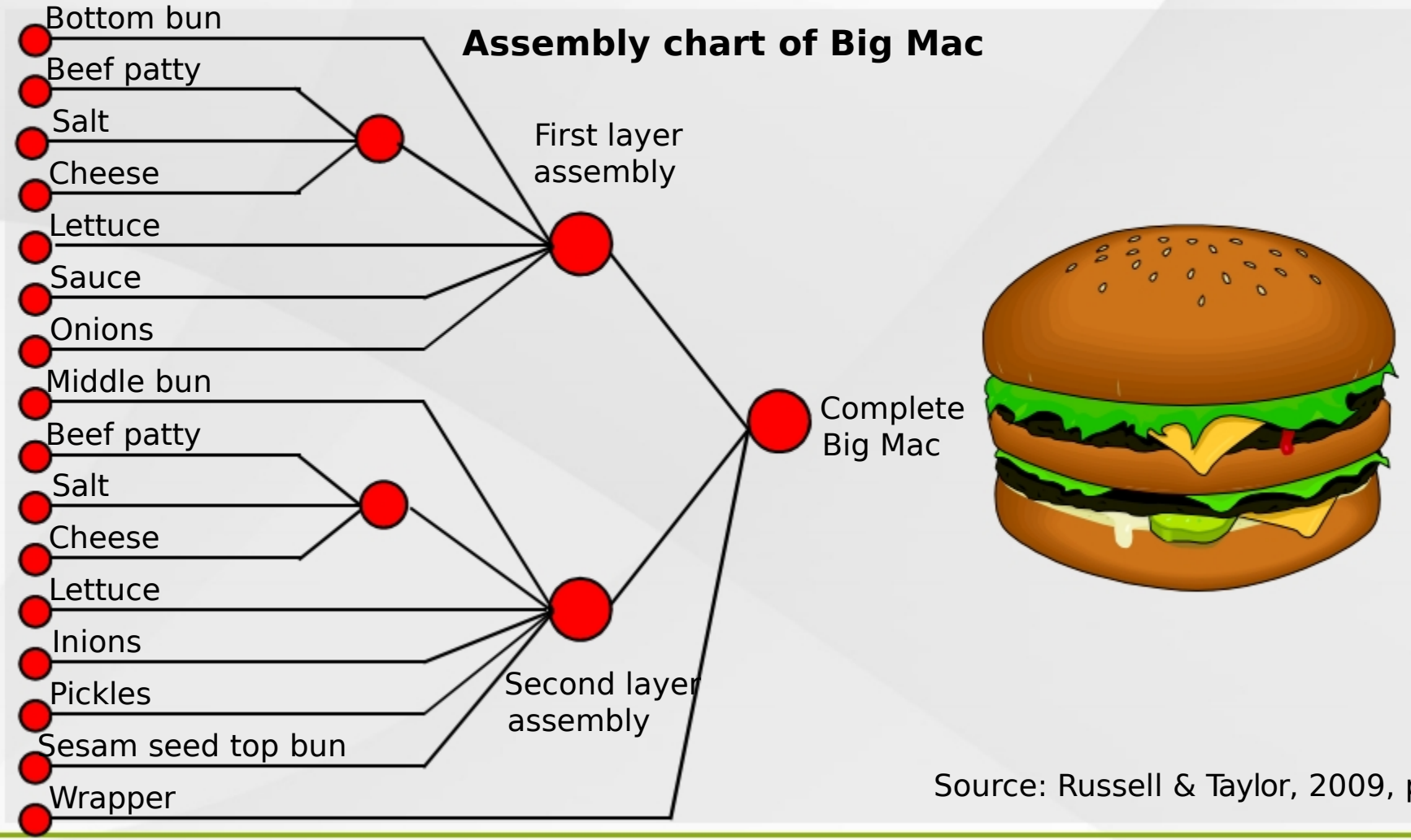
- **Flexible manufacturing systems** (FMS) consists of numerous programmable machine tools connected by an automated material handling system.

- **Robots** are manipulators that can be programmed to move work pieces or tools along a specified path.

THE OPERATING SYSTEM
Process plans

- Process plans may include:
  - **Blueprint** is a detailed drawing of product design;
  - **Bill of material** (BOM) is a list of the materials and parts that go into the products;
  - **Assembly charts** shows how a product is to be assembled;
  - **Operating process charts** shows how a product is to be fabricated;
  - **Routing sheet** is list of machines of work stations that shows the routing of a product.

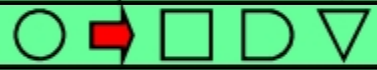
THE OPERATING SYSTEM
Assembly chart



Source: Russell & Taylor, 2009, p. 228

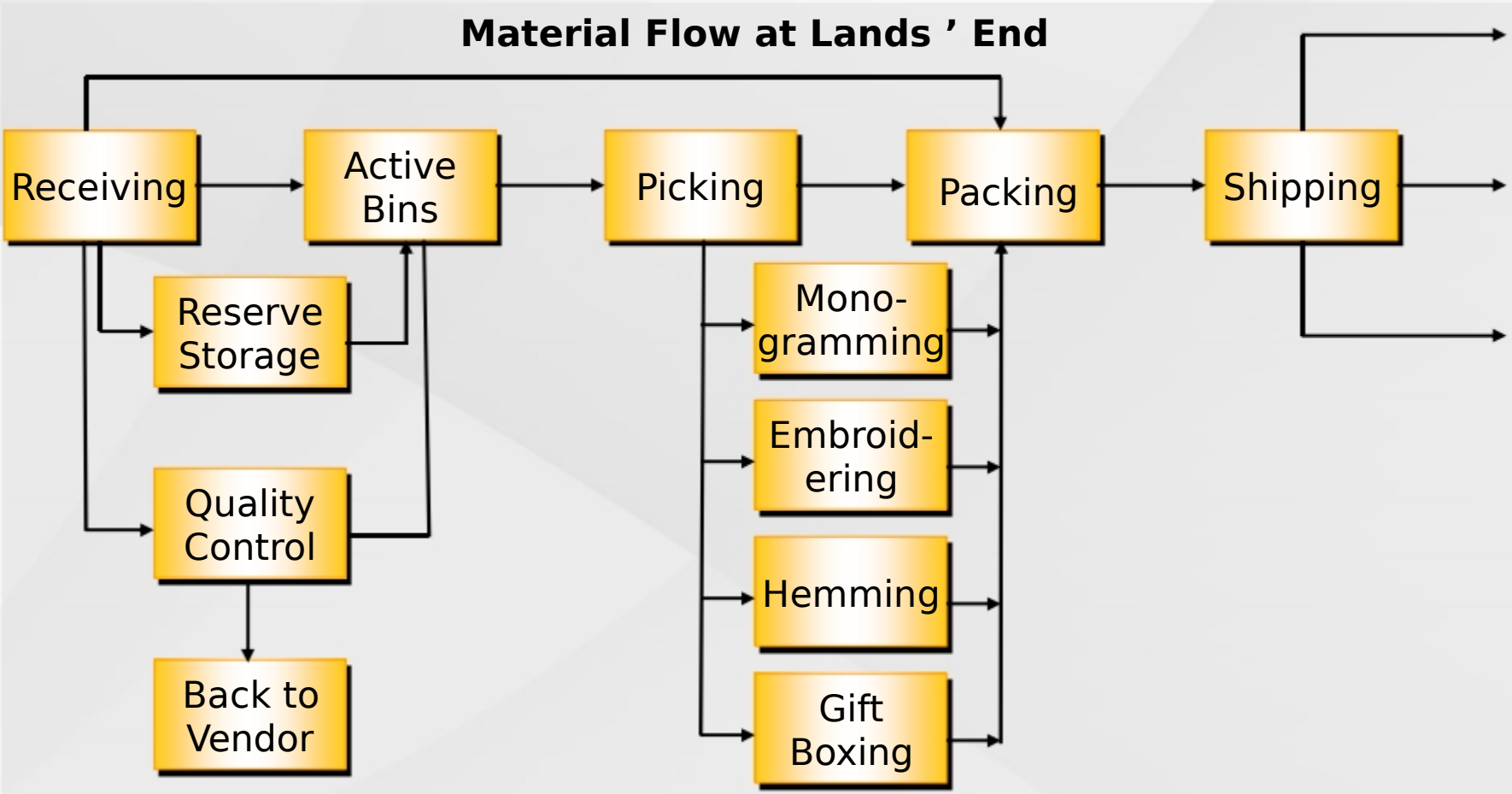
THE OPERATING SYSTEM
Process flow chart

Process flow chart of apple processing

Date: 9-30-02 Analyst TR		Location: Graves Mountain Process: Applesauce		
Step	Process step	Description of process	Time (min)	Distance (Ft)
1		Unload apples from truck	20	
2		Move to inspection		100
3		Weight, inspect, sort	30	
4		Move to storage		50
5		Wait until needed	360	
6		…		
..				
	Page 1 of 13	Total	410	150

Source: Russell & Taylor, 2009, p. 230

THE OPERATING SYSTEM
Process diagram



Source: Russell & Taylor, 2003, p. 134

THE OPERATING SYSTEM
Facility layouts

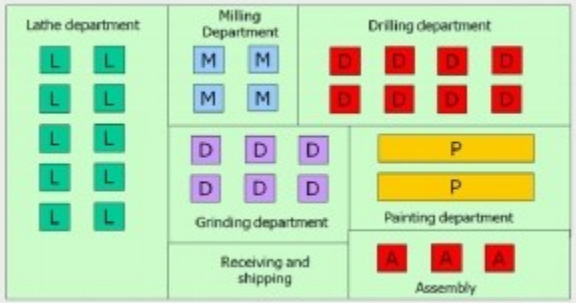
- Effective facility layouts:
  - Minimize material handling costs
  - Utilize space and labour efficiently
  - Eliminate bottlenecks
  - Facilitate communication and interaction
  - Reduce manufacturing/service cycle time
    - Eliminate waste
    - Incorporate safety
  - Promote product and service quality
  - Provide visual control and flexibility
  - Increase capacity

THE OPERATING SYSTEM
Basic types of production layouts

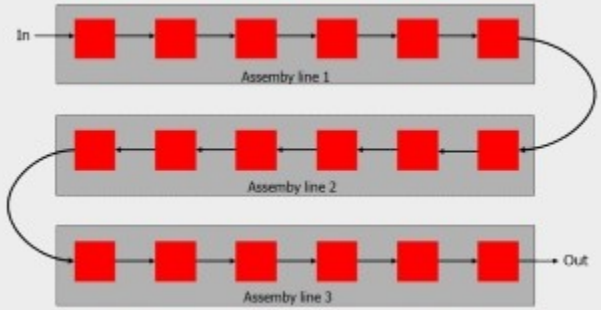
- Basic types of **production layouts** :
  - **Process layouts** (*functional layouts*) are flexible and groups similar activities together according to the process or function they perform.
  - **Product layouts** (*assembly lines*) are efficient and arrange activities in a line according to the sequence of operations for a particular product or service.
  - **Fixed position layouts** are used for projects in which the product can not removed (too heavy, too fragile, too bulky).

THE OPERATING SYSTEM
Different layout types

Process layout

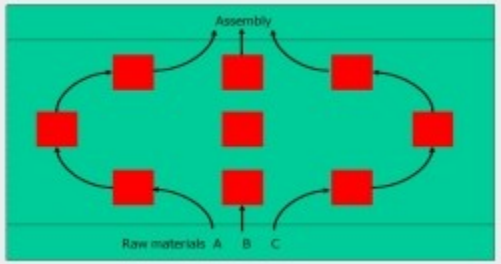


Product layout



Fixed position layout

Hybrid layout

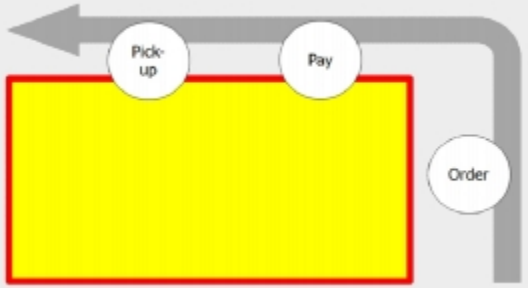


Adopted from: Russell & Taylor, 2009

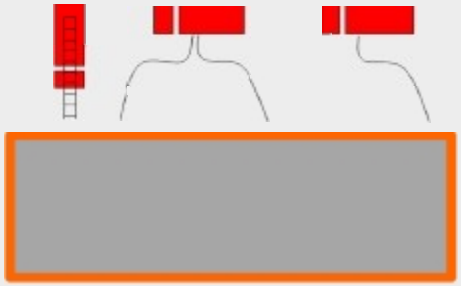
THE OPERATING SYSTEM
Different layout types services

Process layout

Product layout



Fixed position layout



Cellular layout

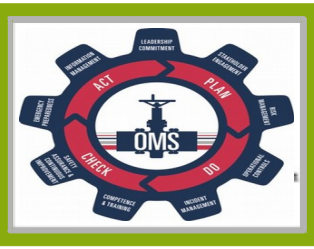
Adopted from: Russell & Taylor, 2009

THE OPERATING SYSTEM
Service layout

- Service layouts are mostly similar to process layouts.

- Differences could be:
  - Minimise the flow of customer (banking);
  - Minimise the flow of paperwork (government);
  - Maximise profit per unit of display space (retail);
  - Maximise customer flow (grocery).

- Service layouts are often visible to customer, so they must be aesthetically pleasing as well as functional.



THE OPERATING SYSTEM
Line balancing

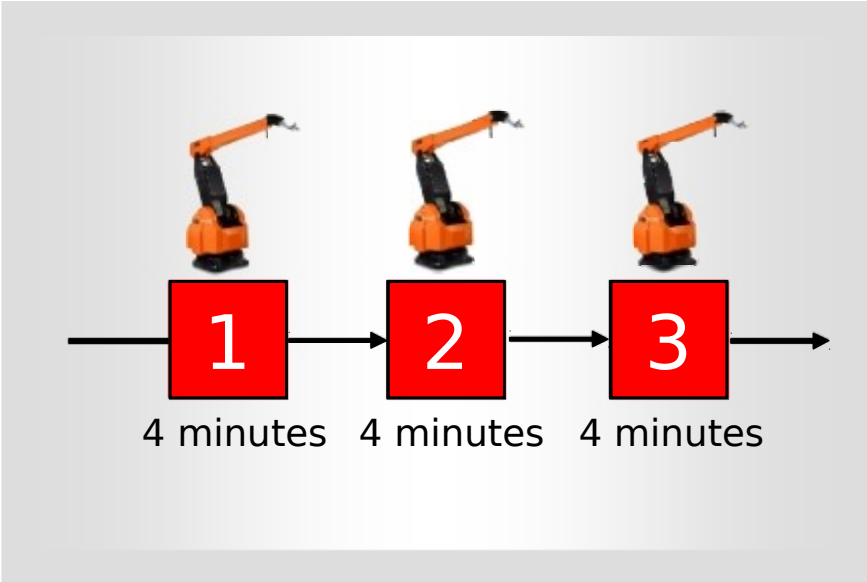
- **Line balancing** tries to equalize the amount of work at each work station.

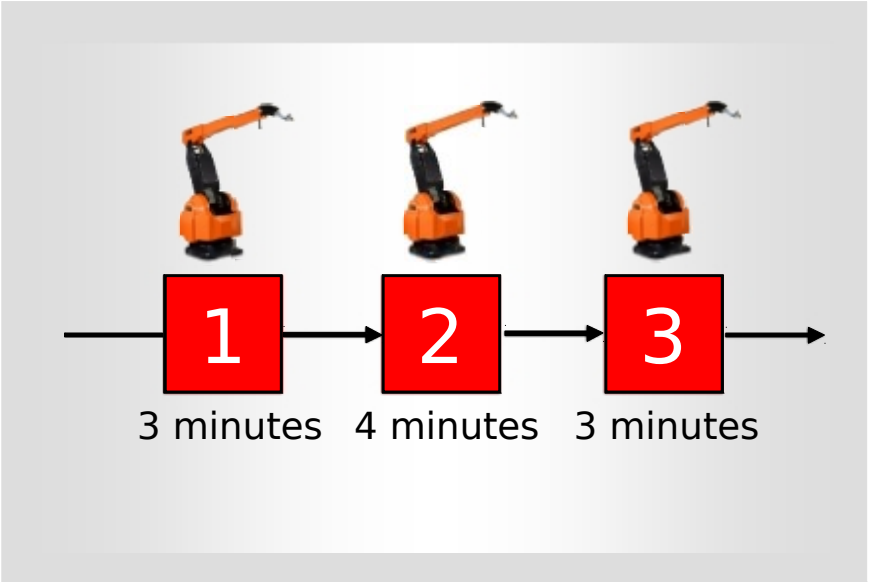
- **Cycle time** refers to the maximum amount f time the product is allowed to spend at each workstation if the targeted production rate is to be reached.

- **Idle time** is the time a workstation is performing no operation.

- **Balance delay** is the total idle time of the line.

THE OPERATING SYSTEM
Line balancing

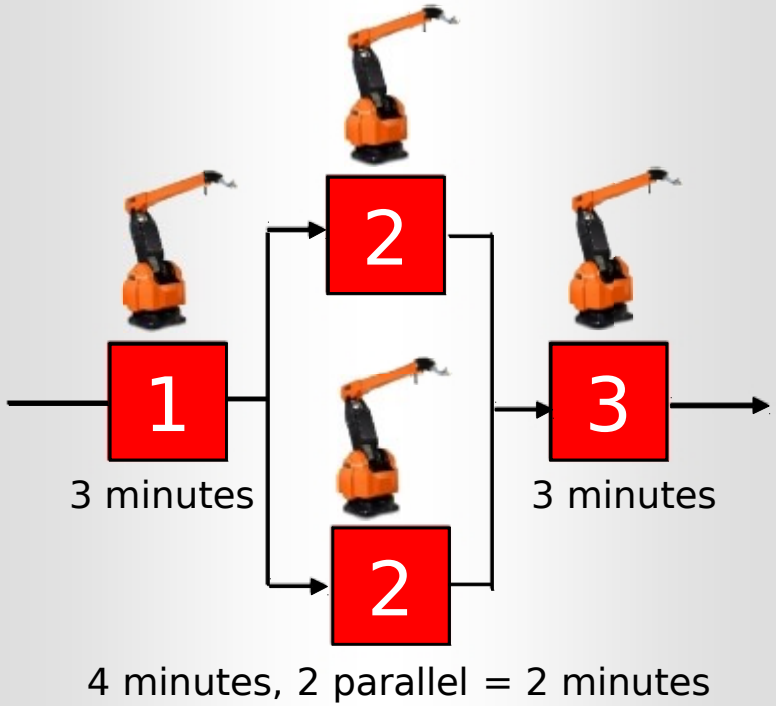




- Flow time = 4 + 4 + 4 = 12
- Cycle time = max{ 4, 4, 4} = 4
- Idle time = 0
- Balance delay = 0

- Flow time = 3 + 4 + 3 = 10
- Cycle time = max{3, 4, 3} = 4
- Idle time = 1
- Balance delay = 2

THE OPERATING SYSTEM
Line balancing



- Flow time = 3 + 2 + 3 = 8
- Cycle time = max{ 3, 2, 3} = 3
- Idle time = 1
- Balance delay = 1