# Master Degree Programme in Computer Science

# Enterprise Information Systems

## 2. Business Processes


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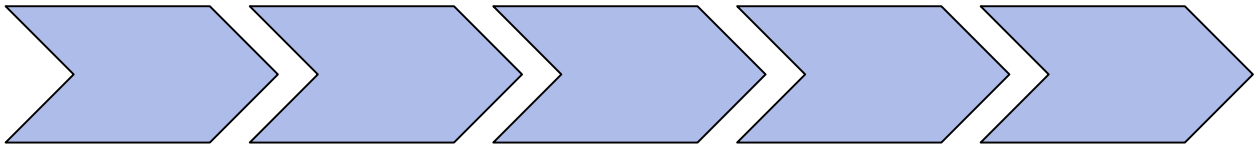
# Computerisation of Information Systems

1. Data Processing, Industrial Automation
   - EDP support for specific functions and activities (management / production)
2. Computerization of business processes
   - IT support to complex tasks or entire processes (eg .: CAD, CAM, CASE)
3. Monitoring / management / reorganization of business processes
   - BPR methodologies
   - ERP technologies
4. Internet, Communication
   - ICT
   - new business models

# Porter's Value Chain

- service process (primary activity):

  "Sequence of activities designed to produce value for the customer that is measured by the price that the customer is willing to pay for the product or service received"



- support process: supply to the primary activities with services and tools they need
- management and control process: definition of strategies, control and supervision processes

# Typical value chain in a manufacturing company


**Procurement**

**Technology development**

**Managing resources**

**Infrastructures**

buy-side

in-side.

sell-side

# Strategies of processes

## buy-side

object: interaction with suppliers
goal: to decrease costs of purchase (goods and services)
tools: B2B, e-procurement

## in-side

object: transformation of internal processes
goal: to decrease operating costs
tools: ERP

## sell-side

object: marketing, sales, customer care
goals: higher value perceived by the customer, lower transaction costs
tools: B2C, CRM

# Goals of (some) transformations

**LOOP FOREVER**

- case analysis & integrated project:
  - processes
  - computer applications
- target:
  - eliminating/reducing the wasted time
  - optimizing the use of resources
  - enlargement of the duties of business operators
  - development of interaction with suppliers
  - development of interaction with customers
- acquisition of information about:
  - internal processes
  - internal operators
  - customers
  - suppliers

**ENDLOOP**

# Functional classifications of business processes

- starting point: the value chain
- based on the required skills
- possible grid comparison between companies

Types of classification:

- inter-enterprise ← generic enterprise
- sectorial ← common to companies in the sector
- enterprise ← specific business enterprise
- normative ← standardization, best practices, ERP consulting (e.g.: UN/CEFACT – United Nations Centre for Trade Facilitation and Electronic Business)

# Ex.: classification processes in a consulting and IT- design business

1. Offer management
    1. acquisitions of customer information
    2. planning a visit by an area agent
    …
2. Order management
3. Post-sale management
4. Purchasing management
5. Management of relations with companies
6. Information about solvency of customers

# Description of Processes

- Activities, roles, interfaces
- Input (materials, resources, ...)
- Output (associated with a market value)
- Customers (internal or external c.)
- Actors
- Purpose, frequency
- ➢ Flow of execution (flowchart)
- ➢ Software support tools

# Decomposition of Processes

Description with increasing detail:

- macro-processes
- phases
- activities
- operations/actions

# Description / (re)design of business processes

- business (analysis) variables
- stages of analysis
- supporting methodologies & models

# Business (analysis) variables

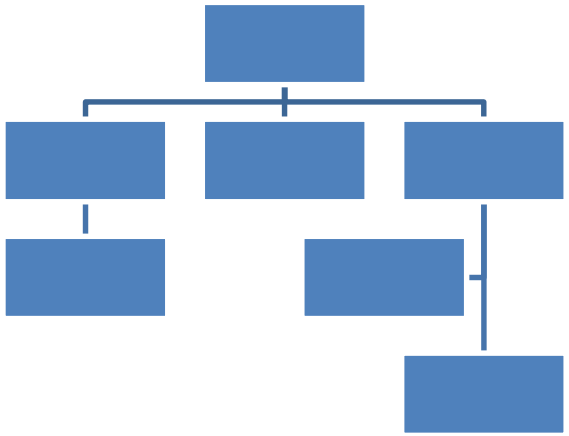
1. activity flow ⇒ WHAT MUST BE DONE AND HOW?
   - sequence , logics, duration, control structure, ...
2. organization ⇒ WHAT ROLES ARE REQUIRED? WHAT FOR?
   - defining roles and granularity, allocation of activities on the organizational structure
3. human resources ⇒ WHO IS WHO? (ROLE OF INDIVIDUALS)
   - allocation of responsibilities to individuals
4. measurement of performances ⇒ HOW MUCH ...?
   - governance and evaluation of the process

# An.Var. 1: flow of activities

- different methods / models of description
- possible elements of description:
  - nature of the flow (physical, informational, control)
  - activity (type, duration, volume, technologies)
  - sequencing / control structure
  - actors (type, action taken on the flow)
  - events (type, timing, consequences, triggers)
  - objects (nature, possibly temporal evolution)

# An.Var. 2: organizational structure

- organizational chart (organization chart, organigram, organogram)
- Property tables
  - mandate, tasks, processes
  - workforce, volumes



- Linear Responsibility Charting (**LRC**)
  - table where, for each process, the specific role played by each facility in the process is specified

# Linear Responsibility Charting: responsibility roles
(adapted from Wikipedia)

- Responsible: who do the work to achieve the task
- Accountable (also Approver or final approving Authority): who is in charge for the correct and thorough completion of the deliverable or task, and the one who delegates the work to those responsible. In other words, an accountable must sign off (approve) work that responsible provides. There must be only one accountable specified for each task or deliverable
- Consulted (or Counsel): Those whose opinions are sought, typically subject matter experts, and with whom there is two-way communication
- Informed: Those who are kept up-to-date on progress, often only on completion of the task or deliverable; and with whom there is just one-way communication

# Example of LRC

organizational unit

process, task, step

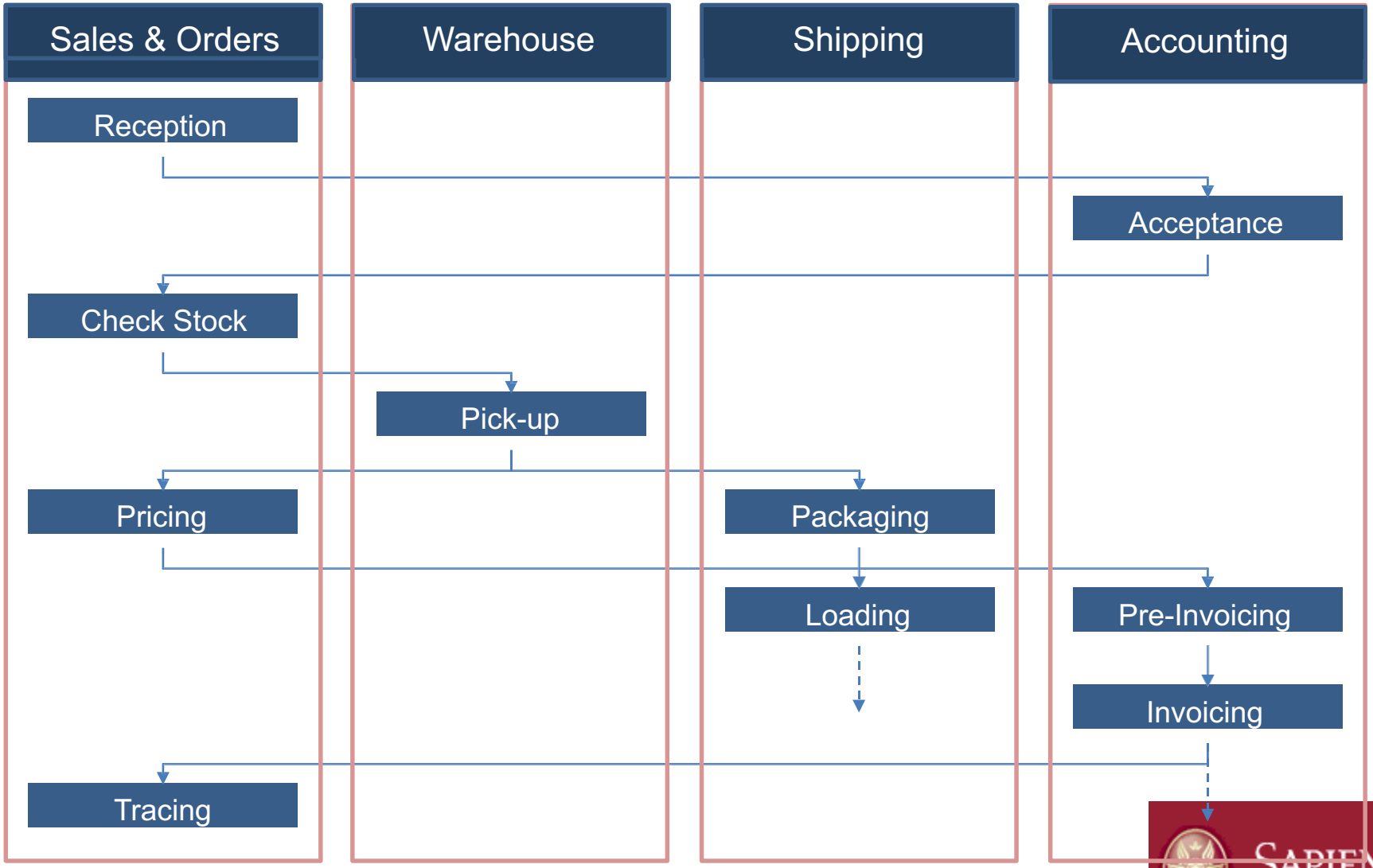
| | Subsidiary | Commercial management | Delivery management | Warehouse | Shipment | Accounting |
|---|---|---|---|---|---|---|
| order reception | E | D | I | I | | I |
| order fullfillment | I | | D | E | I | |
| warehouse shipping | | | I | D | E | I |
| invoice filling | | | I | | | DE |
| ... | ... | ... | ... | ... | ... | ... |

Decide, Execute, Support, Informed

# RATSI: another LRC alternative scheme

- Responsibility: who is in charge of making sure the work is done
- Authority: who has final decision power on the work
- Task (Execute): who actually does the work
- Support (Consulted): who is involved to provide support to the work (two-way communication)
- Informed: who is informed about the evolution of the work (one-way communication)

# Responsibility Activity Diagram (RAD): Flow & Roles



# An.Var. 3: Human Resources (HR)

- Gibson:

  *HRs determine the difference between the actual result and the maximum theoretically possible, for a given process configuration*

- technology support→ flexibility
- know-how: assets of the organization

# An.Var. 4: measure of performances

1. Ranking of values (mission of the organization)
2. Encouragement and promotion
3. Planning and control
   objectives of efficiency and effectiveness: evaluation metrics (especially for sell side processes) which are not aligned with the structure of the organization:
   - Key Performance Indicator (KPI)
   - Balanced Score Card

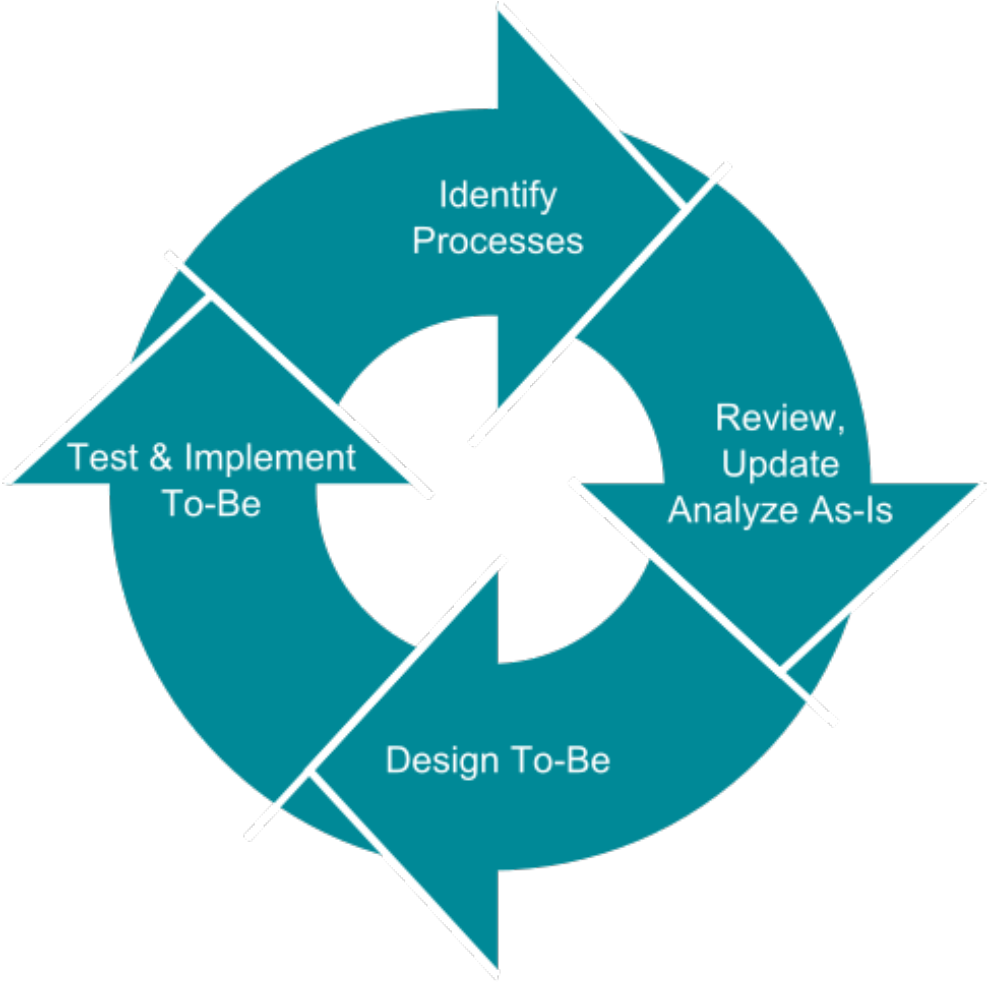
# BPR for continuous improvement

**Business Process Reengineering**

is a comparative analysis and evaluation of performances (e.g., through benchmarking), based on the definition of new targets.

A clear indication of the new performance expectations comes with the redesign of processes.

[ref.: Hammer, 1990]




Business Process Reengineering Cycle

# Business Process Reengineering: phases

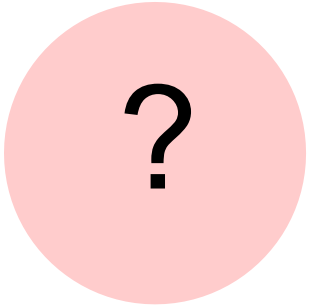
1. assessment of existing situation
   AS IS
2. comparison (or other.) And diagnosis (vision)
   TO BE
3. redesign
   GAP (actions to be undertaken)

# AS-IS/TO-BE grid (typical case)

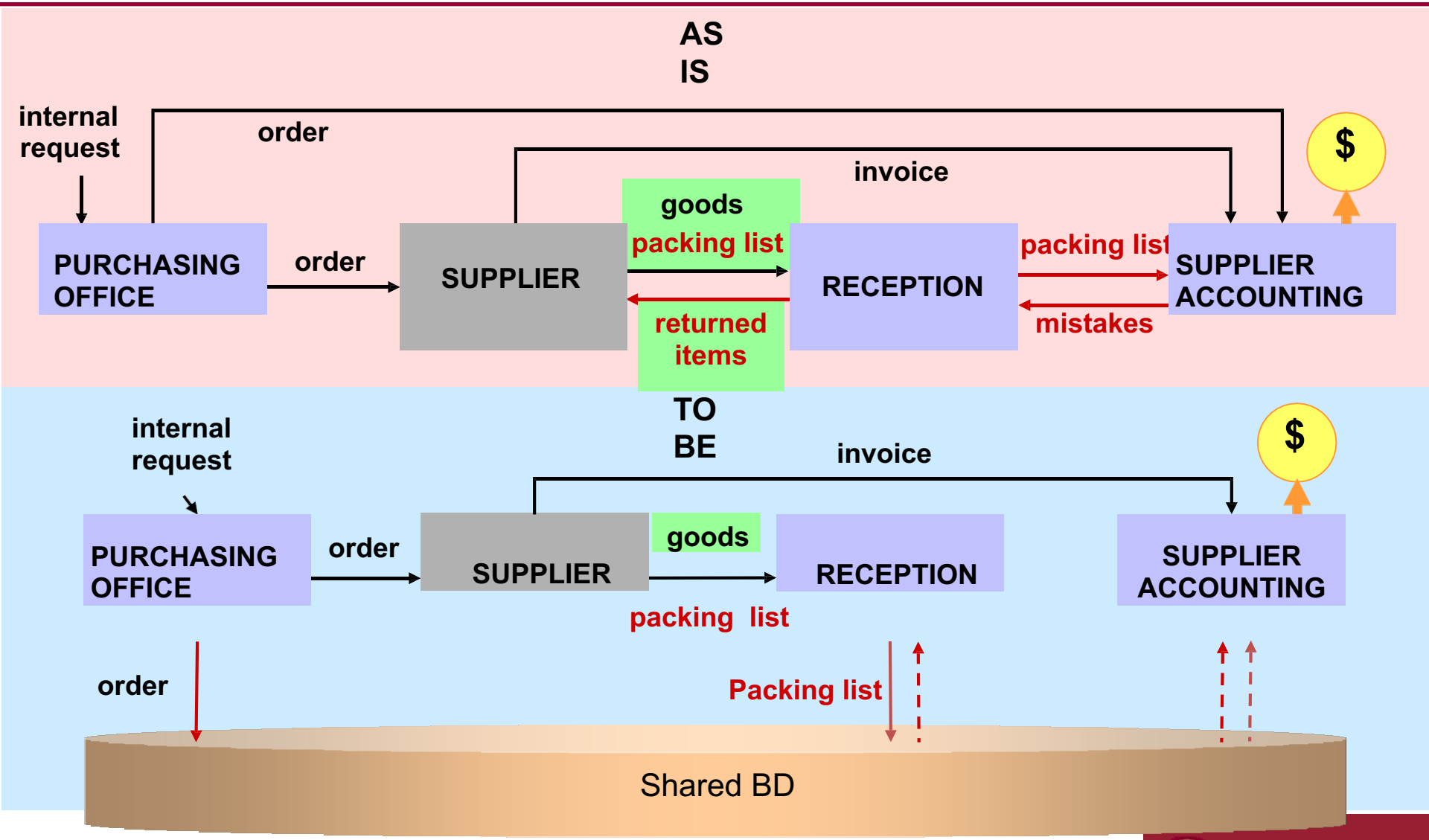
| Organization Variables | AS IS Existing process | TO BE Vision new process | GAP actions to be undertaken |
|---|---|---|---|
| **Activity Flow** | 1. Fragmented Flows<br>2. Isolated I.S. | 1. Unified Flows<br>2. Integrated I.S. | 1. Redesign of Flows<br>2. DW & Integr.devel. |
| **Organization** | functional | process-based | redesign of the organization |
| **Human Resources** | single specialization | multifunction competencies | training |
| **Measure of performances** | costs | time,<br>service level,<br>time-to-market | new monitoring procedures |

# cs – Ford

- about to start reorganization of purchases (assuming 20% saving)
- acquisition of Mazda (~ 1/5 of Ford)
- comparison between the two purchasing offices
  - – Ford employees: 500
  - – Mazda employees: 5



# cs – Ford (continued)



# 1. Assessment of pre-existing situation

1. Identification of macroprocesses
   value chain
   normative models (best practices)
2. Details of processes
   breaking down into phases / activities (hierarchy d., flow d.)
3. Crossing processes/organizational units
   Organigrams
   Linear Responsibility Charting (LRC)
   Responsibility Activity Diagram (RAD) [flow d./org.unit]
4. Evaluating Process
   costs, resources (provider KPIs)
   value, performance (customer KPIs)

# 2. Comparison and Diagnosis

1. quantitative comparison – parameterization
   – parameters: efficiency, effectiveness
   –(productivity, durability, level of service)
   tables:
   – activity, parameter, metric, value
   – activities, metrics, value(“we”), value(“other-org”)
2. qualitative comparison
   –identifying causes of diversity
   tables:
   – activities, appearance(“we”), appearance(“other-org”)

# Benchmarking

- search for best practices which can guarantee a higher performance
- structured process that determines operational changes with the ultimate goal of better performance
- search for information within the considered organization making it possible to compare its performance with those of other organizations

# 3. Redesign of processes

1. definition of “vision”
   - usually based on best practice
   - description “to be” similar to the “as-is”
   - quantification new targets
   - indication of the organizational gap
2. change analysis
   - org.var. versus stakeholders (interested internal and external entities)
3. assessing the costs and benefits
   - based on metrics defined a priori

# BPR Summary: org. variables versus phases

| Organization Variables | Existing Situation | Comparison and diagnosis | Redesign |
|---|---|---|---|
| **Activity Flow** | • macroprocesses<br>• processes<br>• activities, phases | • benchmarking with best practice<br>• integrability analysis | • Customization of Best Practices<br>• prototyping, demos, simulation |
| **Organization** | • structure<br>• mechanisms<br>• management style | • benchmarking<br>• role of corporate units in processes | • structure<br>• mechanisms<br>• management style |
| **Human Resources** | • inventory of HR<br>• openness to change | • comparison with competitors and/or bic<br>• diagnosis | • new values & motivations<br>• training programs<br>• hiring |
| **Measure of performances** | • identification of strategic performances | • comparison with competitors and/or bic<br>• diagnosis | • new goals<br>• new KPI |

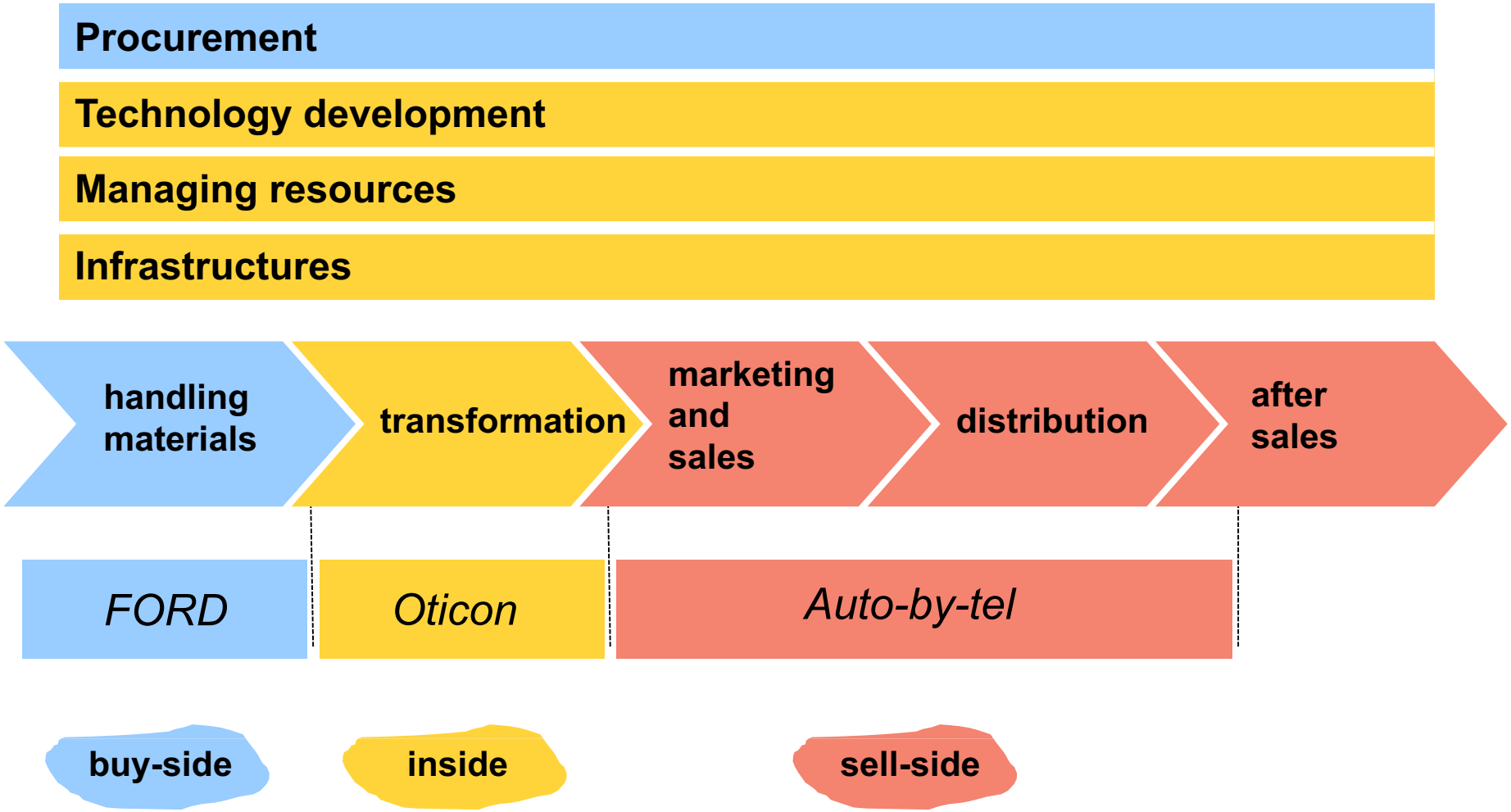
# Qualitative comparison

| Organization Variables | company: Alpha | company: Beta |
|---|---|---|
| **Activity Flow** | • Fragmented and sequential flow<br>• Information Systems: NOT integrated<br>• Information: NOT shared | • Unified flows<br>• Information Systems: integrated<br>• Information: shared |
| **Organization** | • Functional | • Functional |
| **Human Resources** | • Specialized on specific activities | • Multifunctional specialization |
| **Measure of performances** | • Minimize costs | • Minimize average duration |

# Quantitative comparison

| Activity | Metrics | company: Alpha | company: Beta |
|---|---|---|---|
| 1. order reception | #orders/employee | 400 | 600 |
| 2. warehouse order processing | Kg/employee | 100 | 80 |
| 3. shipment | Kg/employee | 200 | 100 |
| 4. invoice emission | sales/employee (x € 1000) | 1200 | 2000 |
| Total Value of aggregate process | sales/employee (x € 1000) | 300 | 500 |
| | average duration (minutes) | 1000 | 300 |

# Case Studies – positioning



# cs – Oticon hearing aids (Denmark)

- up to 1985, among the 5 largest companies in the sector
- 1985 technologies and market changes
  - loss of large shares of the market
  - strategies: cost-cutting, change of presidency
- 1991 change strategy
  - sales service to the end customer (bypassing healthcare facilities)
  - BPR: project-based organization (team leader)
  - provision of open space; dynamic rearrangement
  - IT for document management (supported by technology)
- results
  - reduced time to market 6 months
  - 9 times more profits than in 1990

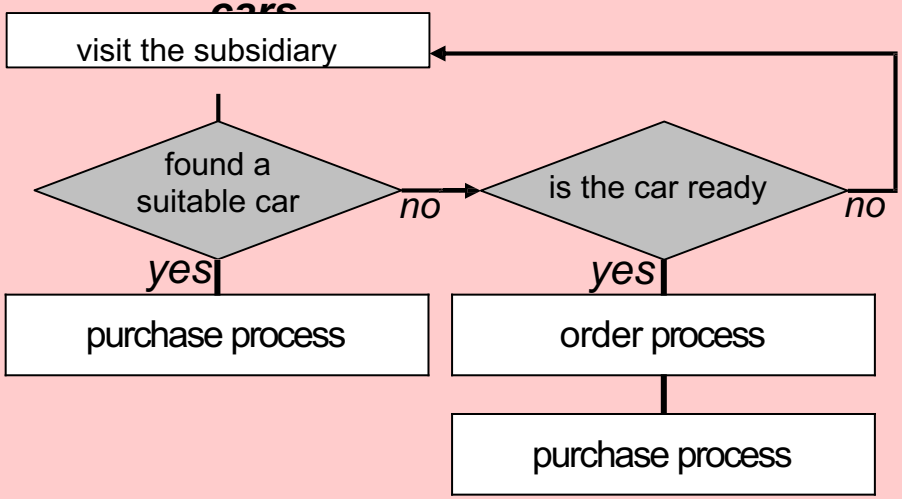
# cs – Oticon (continued)

| Organization Variables | AS IS | TO BE | GAP |
|---|---|---|---|
| **Activity Flow** | • sequential<br>• paper archives | • parallelization<br>• digital archives | • flow redesign<br>• I.S. development |
| **Organization** | • functional | • project team | • ... |
| **Human Resources** | • hierarchy<br>• inamovibilità | • egalitarianism<br>• dynamic placement | • ... |
| **Measure of performances** | • accuracy<br>• efficiency | • time-to-market | • ... |

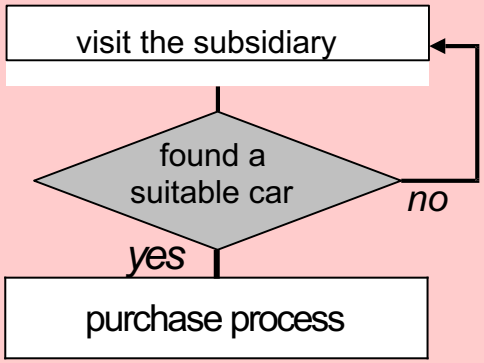
# cs – Auto by tel

## AS IS

***Process: selling new cars***

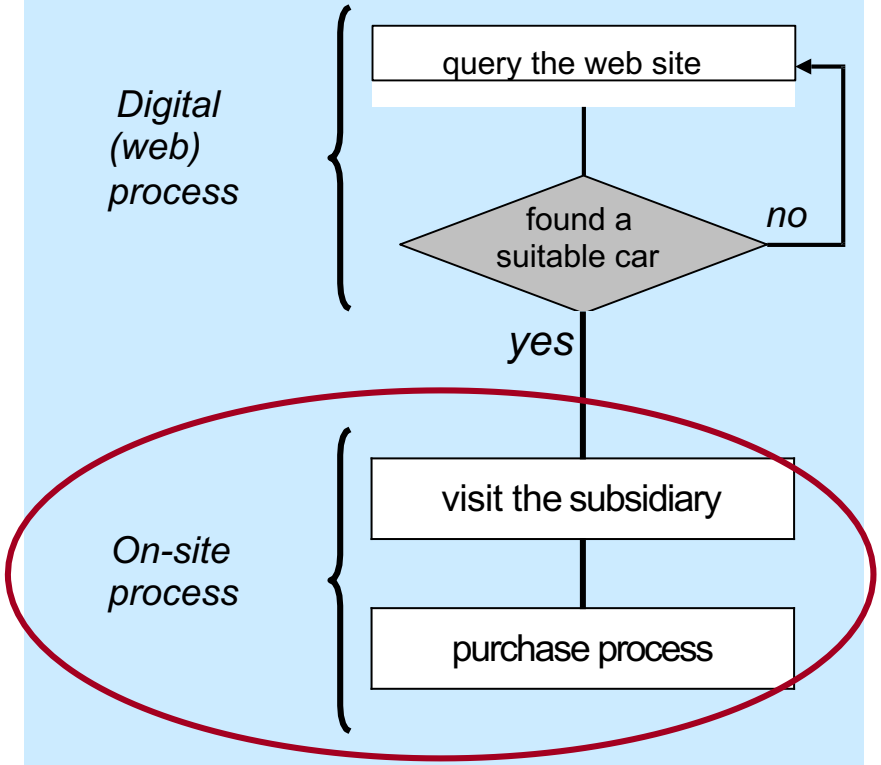



***Process: selling used cars***




## TO BE

***Process: selling new and used cars***

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