

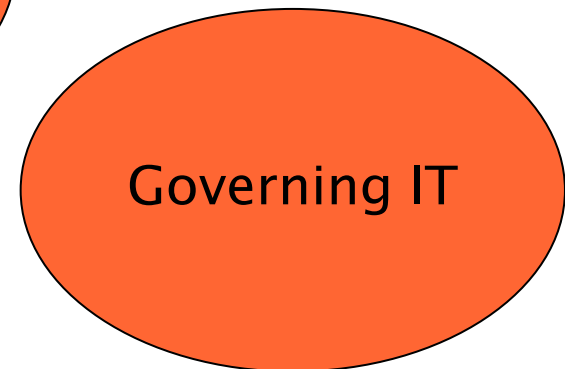
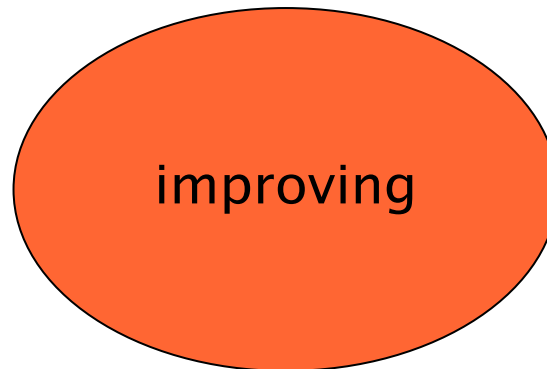
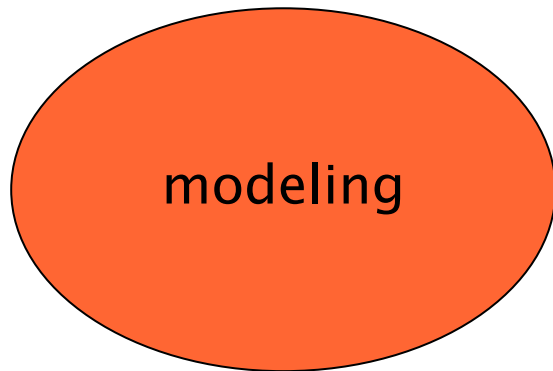
High level models



SoftEng
<http://softeng.polito.it>

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Goal

- Understand what is common to (most / all) organizations
- To support analysis and search of IT applications that support processes

“Most businesses have just three core processes:

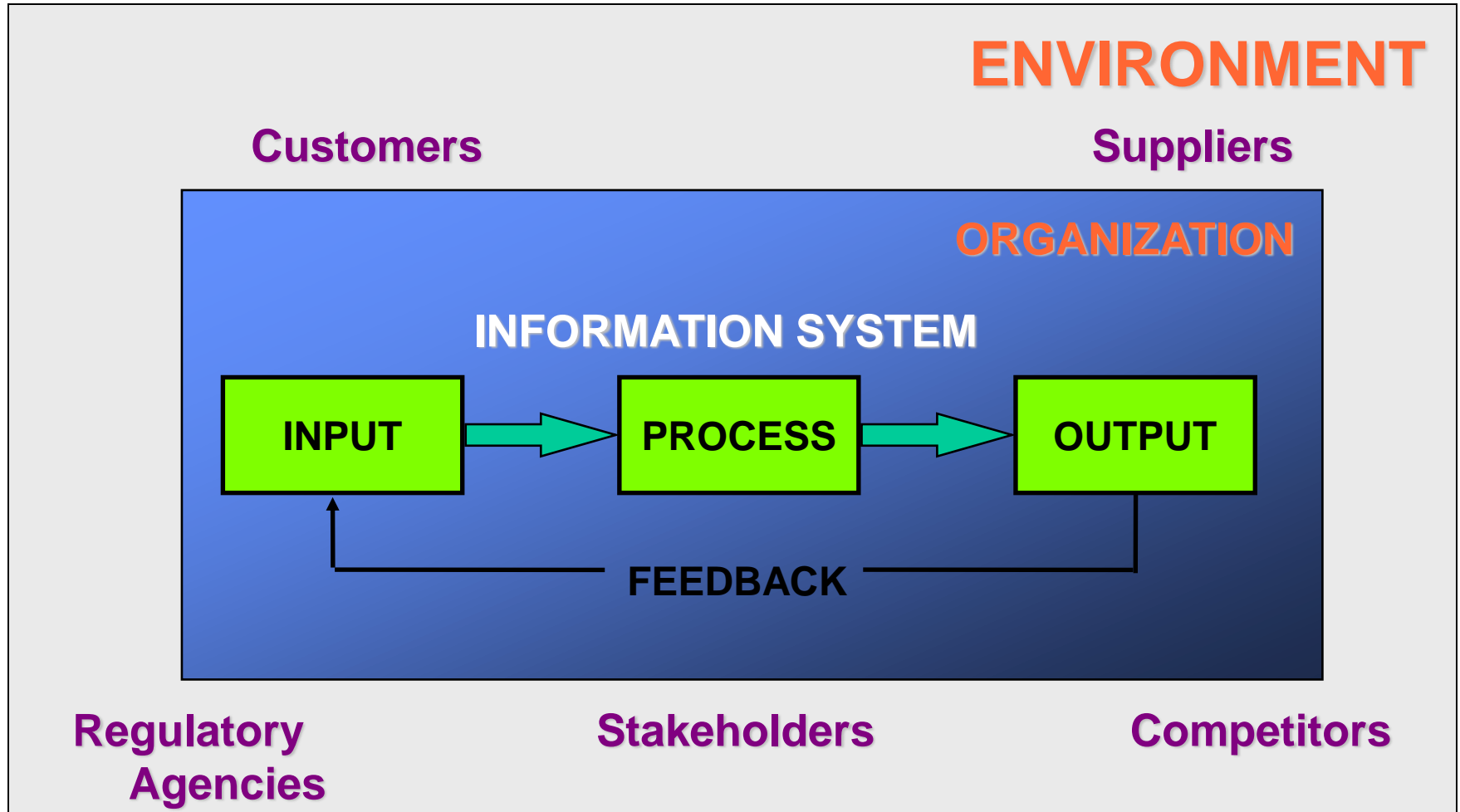
1. Sell stuff
2. Deliver stuff
3. Making sure you have stuff to sell and deliver”

Geary Rummler

High level models

- Control loop model
- CRASO Model
- Anthony's pyramid
 - ◆ Business functions
 - ◆ Organizational levels
- T Model + Business domains
 - ◆ Support
 - ◆ Primary
 - ◆ Managerial

Control loop model



■ Input

- ◆ The capture or collection of raw data from within the organization or from its external environment for processing in an information system

■ Output

- ◆ The distribution of processed information to the people who will use it or to the activities for which it will be used

- Processing

- ◆ The conversion, manipulation, and analysis of raw input into a form that is more meaningful to humans

- Feedback

- ◆ Output that is returned to the appropriate members of the organization to help them evaluate or correct input

-
- Very simplistic view on IS
 - ◆ Processes information from input to output (cfr CRASO)
 - Important view on context and environment
 - ◆ Organizations (and the related IS) are influenced / interfaced with 5 types of actors

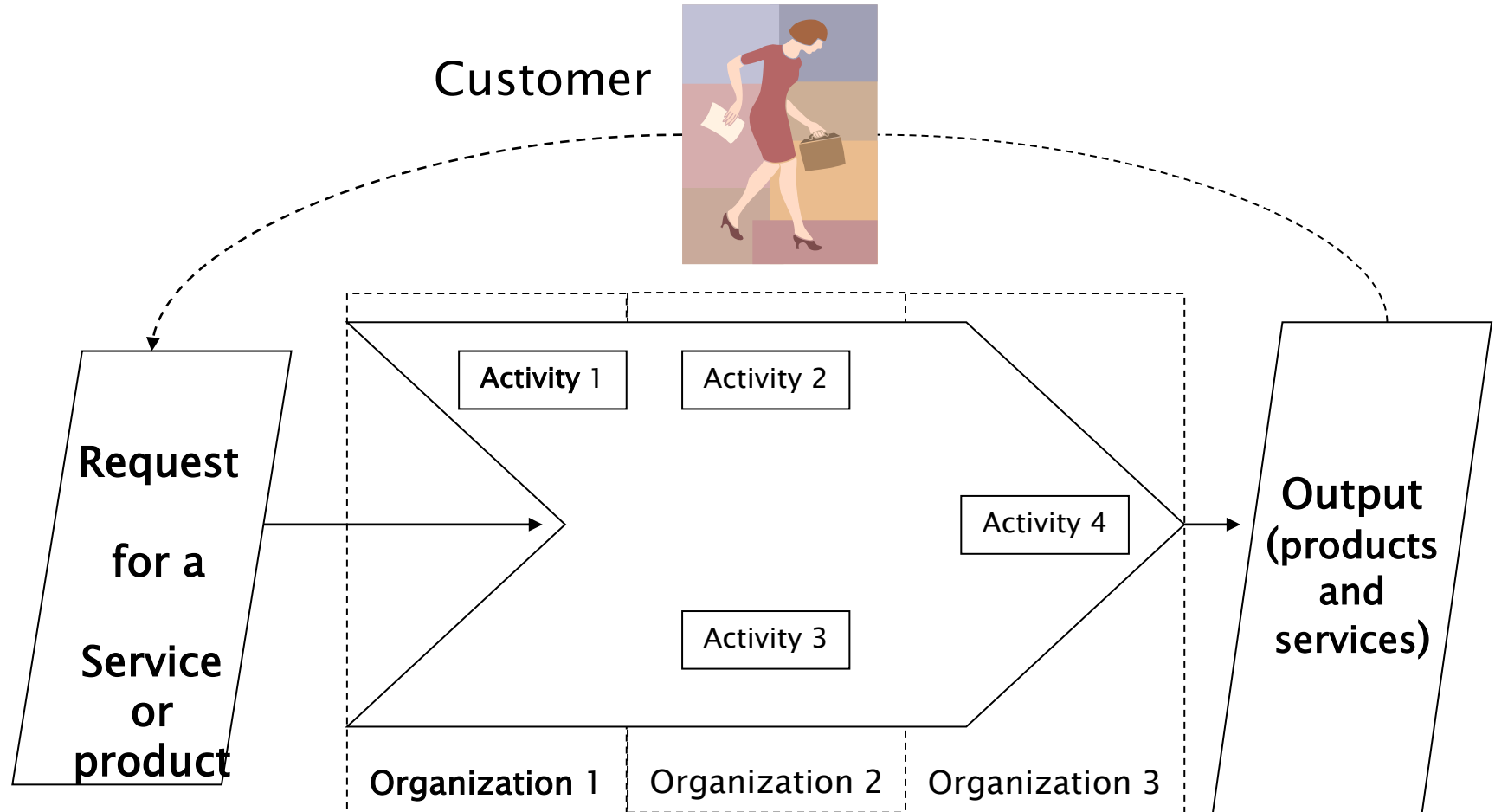
CRASO Model

- Business process = CRASO
 - ♦ Customer
 - ♦ Request
 - ♦ Activity
 - ♦ organiSation
 - ♦ Output

CRASO

- Simple high level model shows
 - ♦ Activities
 - ♦ Actors / roles doing activities
 - ♦ Material / immaterial objects treated by activities

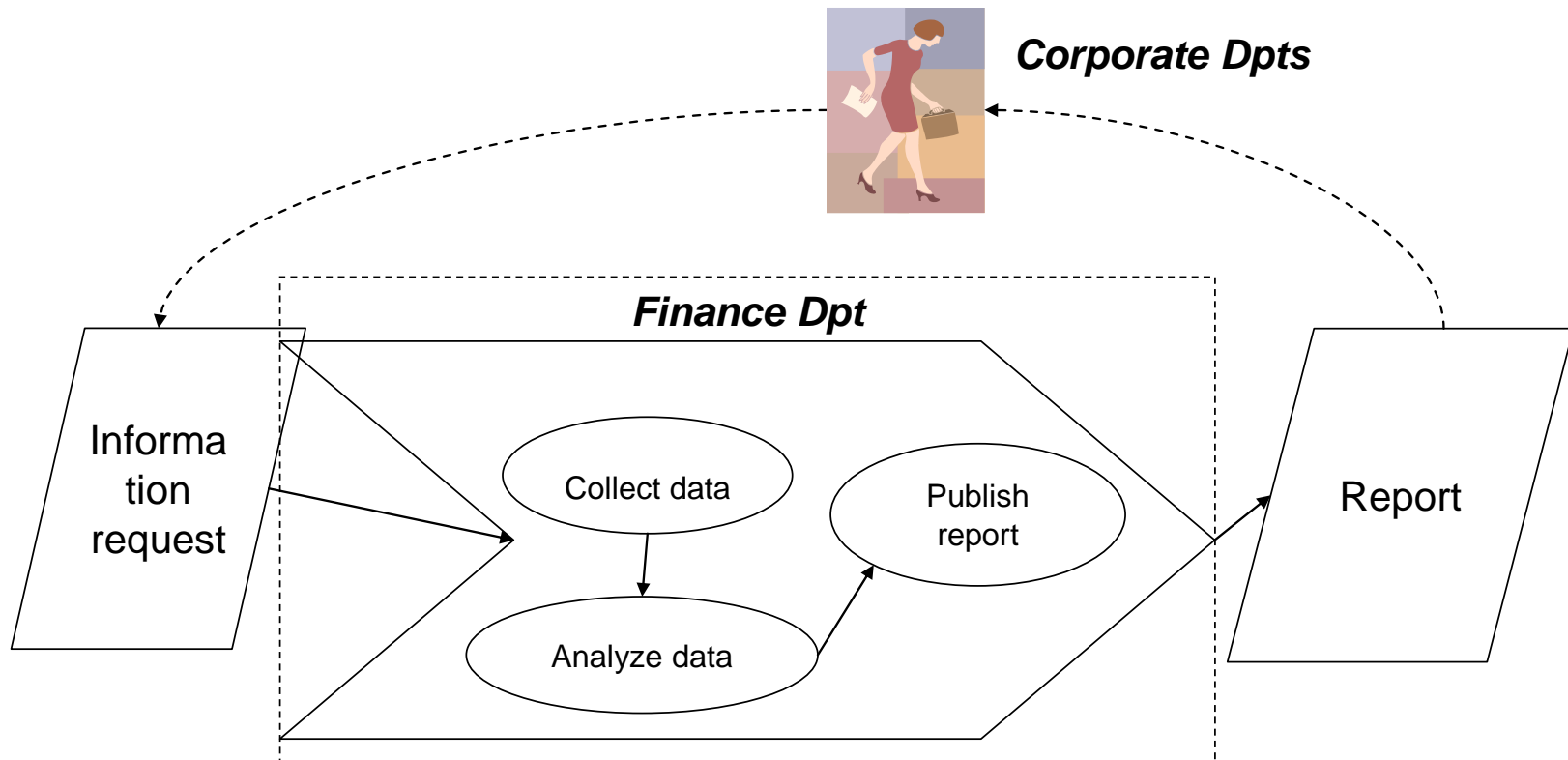
CRASO



Process span

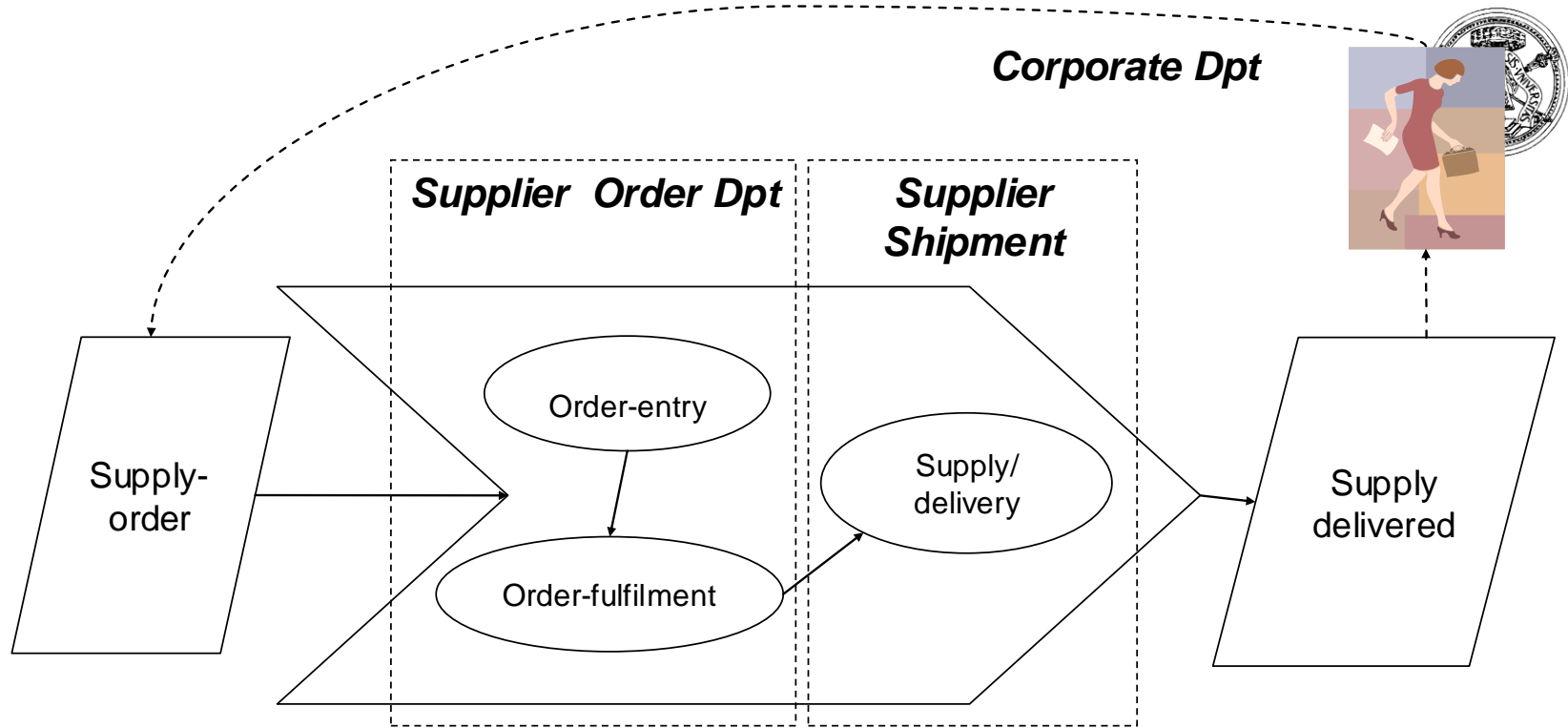
- Mono – organizational
 - ◆ Mono–functional
 - Involves one business function only
 - ◆ Inter–functional
 - Involves many business functions in same organization
- Inter–organizational
 - Involves many organizations
 - Ex: order item from an external supplier

Intra-function process



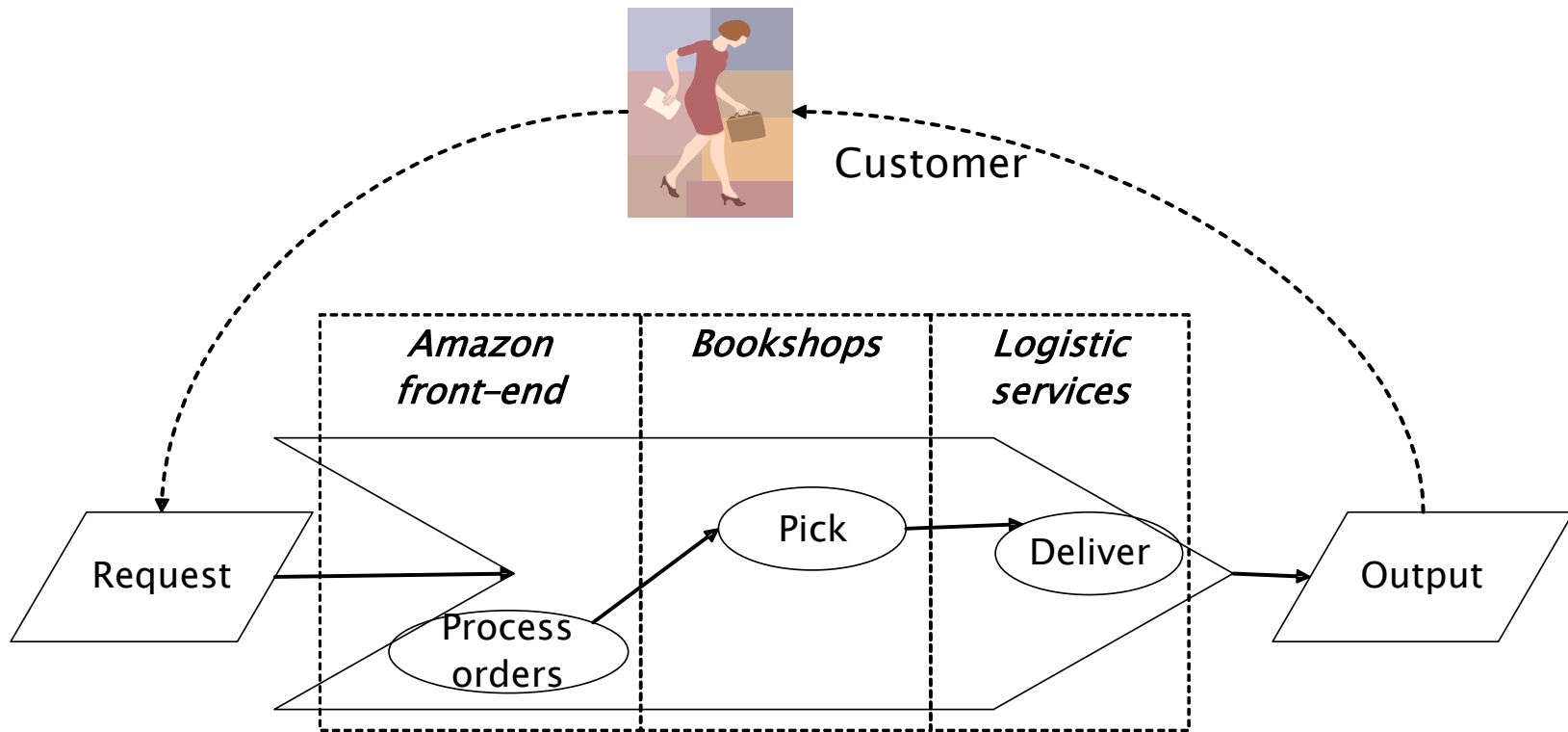
Business Process	Customer	Request	Activities performed (summary)	Organizations involved (summary)	Output (summary)
Management reporting	Corporate Departments	Information request	Data-collection Data-analysis Report-publication	Finance	Report

Inter-function process



Business Process	Customer	Request	Activities performed (summary)	Organizations involved (summary)	Output (summary)
Production Planning	Sales-dpt	Production-request	Assemble-production-plan, Give-information, Negotiate and execute the plan	Production-planning-dpt, Materials- management-dpt, Factories	Approved production plan

Inter-organization process

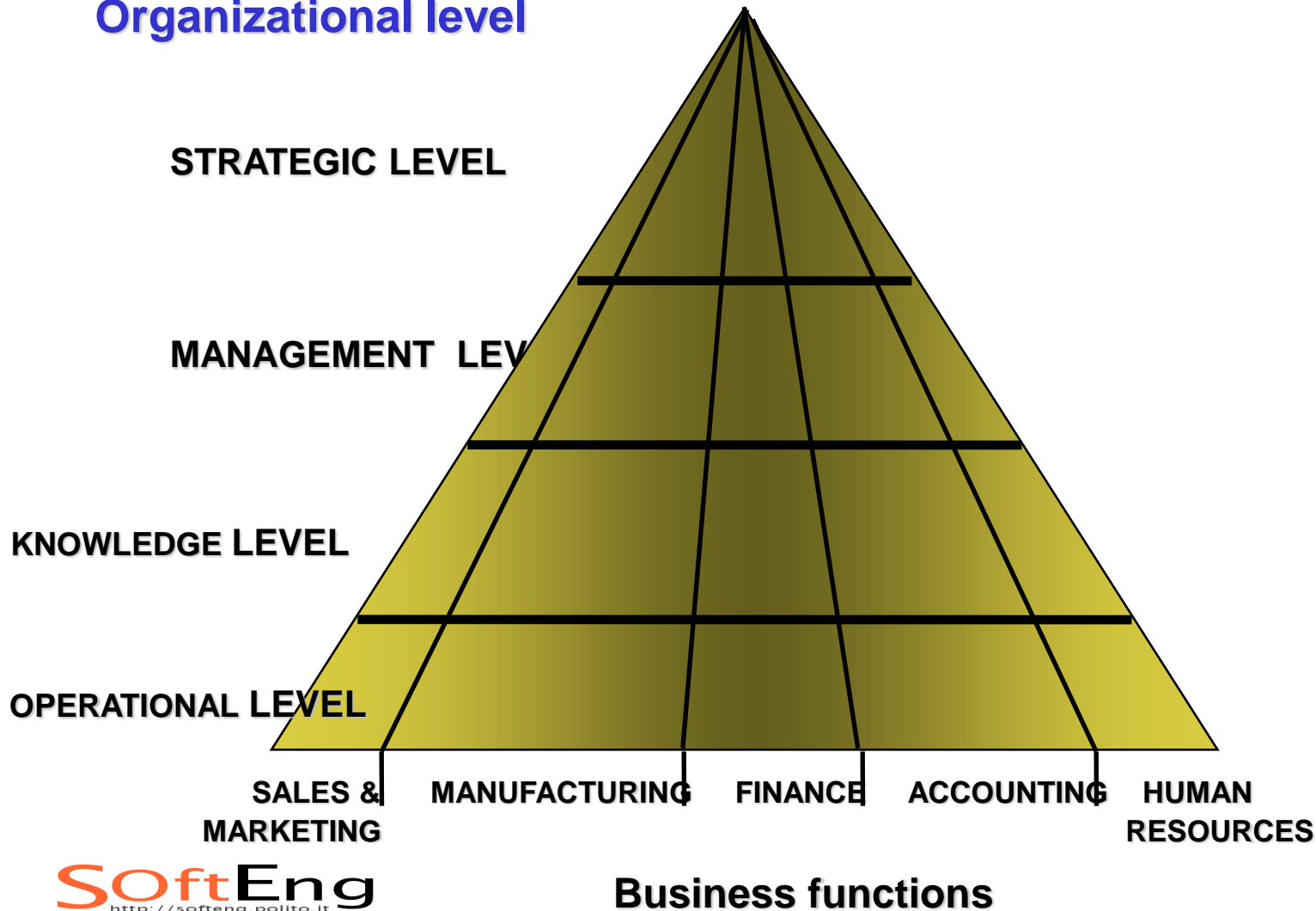


Customer	Request	Activities performed (summary)	Organizations involved (summary)	Output (summary)
Private customer	Book order	Process order, Order-picking, Book-delivery	Frontend, Bookshop, Logistic services	Delivery of books

Anthony's model

Anthony's model (pyramid)

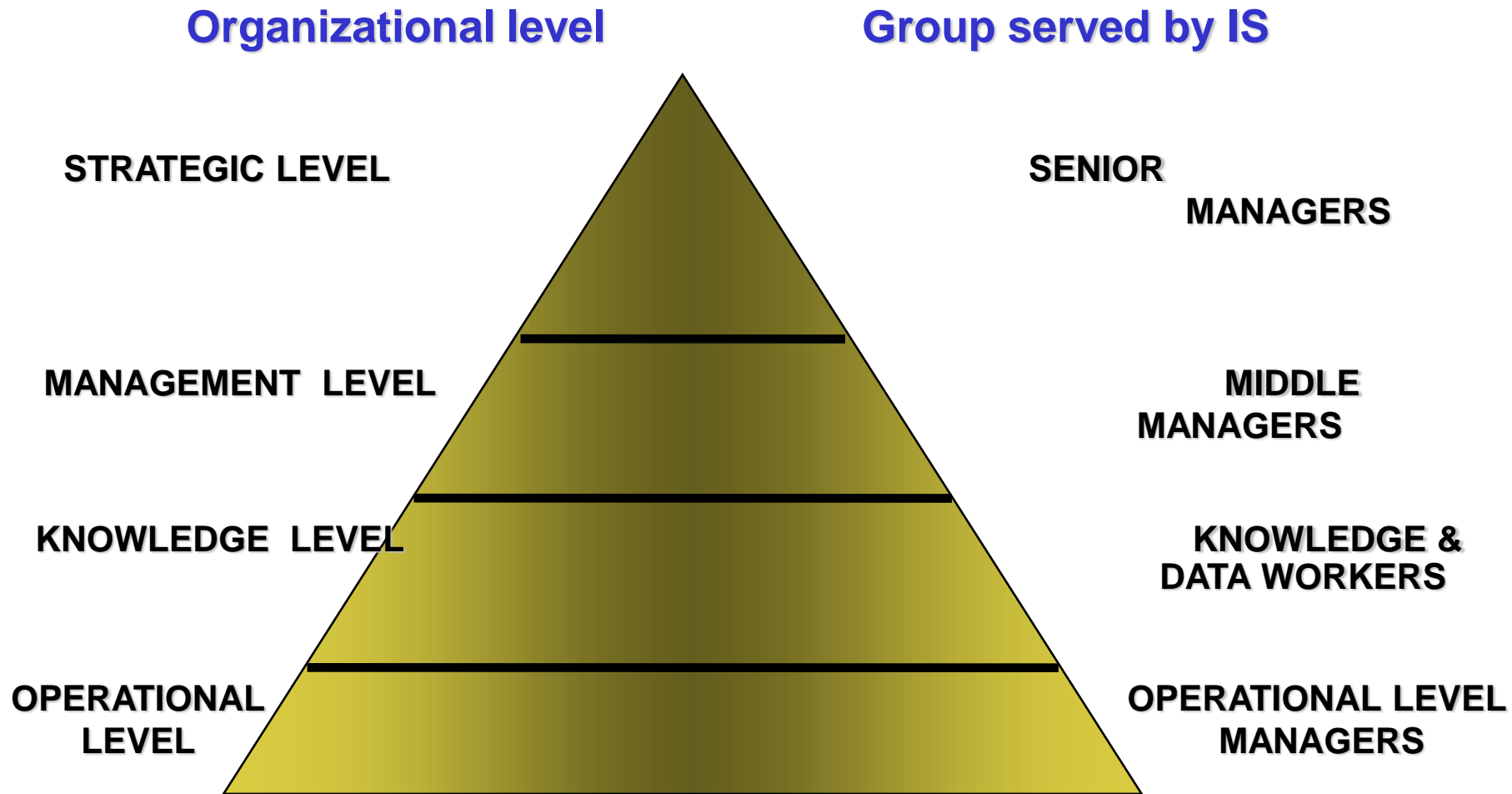
Organizational level



■ Mixes

- ◆ Functional view in terms of business functions
- ◆ Organizational view in terms of hierarchical levels
- ◆ At each intersection different IS functions are needed

Organizational view



Horizontal levels

- Strategic level
 - ♦ Activity: key decisions on future
 - ♦ Time frame: long term future (months, years)
 - ♦ Size: very limited (1–10 people)

Horizontal levels

- Management level
 - ◆ Activity: control and planning of operational level
 - ◆ Time frame: weeks / months, past and near future
 - ◆ Size: limited number of employees
- Operational level
 - ◆ Activity: support to day by day, repetitive activities
 - ◆ Time frame: fine grained, present
 - ◆ Size: majority of employees

Horizontal levels

- Knowledge level
 - ◆ (only for organizations that design their products / services)
 - ◆ (not really a horizontal level, more an organizational unit)
 - ◆ Activity: design new products / services
 - ◆ Time frame: present, future
 - ◆ Size: depends on complexity of product / service

Example of process / levels

- Retail company:
 - ◆ **Strategic** – decide type of offer and products, decide opening / closing of new shops
 - ◆ **Management** – review of sales, monitor employees
 - ◆ **Operational** – implement a sale, replenish products on shelves

Example of process / levels

- City:
 - ◆ **Strategic** – check costs and incomes of social services, definition of new prices, building plans
 - ◆ **Management** – payment control, reminders, monthly comparison of budget vs. actual income
 - ◆ **Operational** – citizen payment accounting, road maintenance, pollution measurement

Example of process/levels

- Bank:
 - ◆ **Strategic** – assess performance of a service, decision to activate a new service
 - ◆ **Management** – review of negative balances, monitor employees and level of services
 - ◆ **Operational** – implement operations on accounts (withdrawals, bank transfers, ..)

Example of process/levels

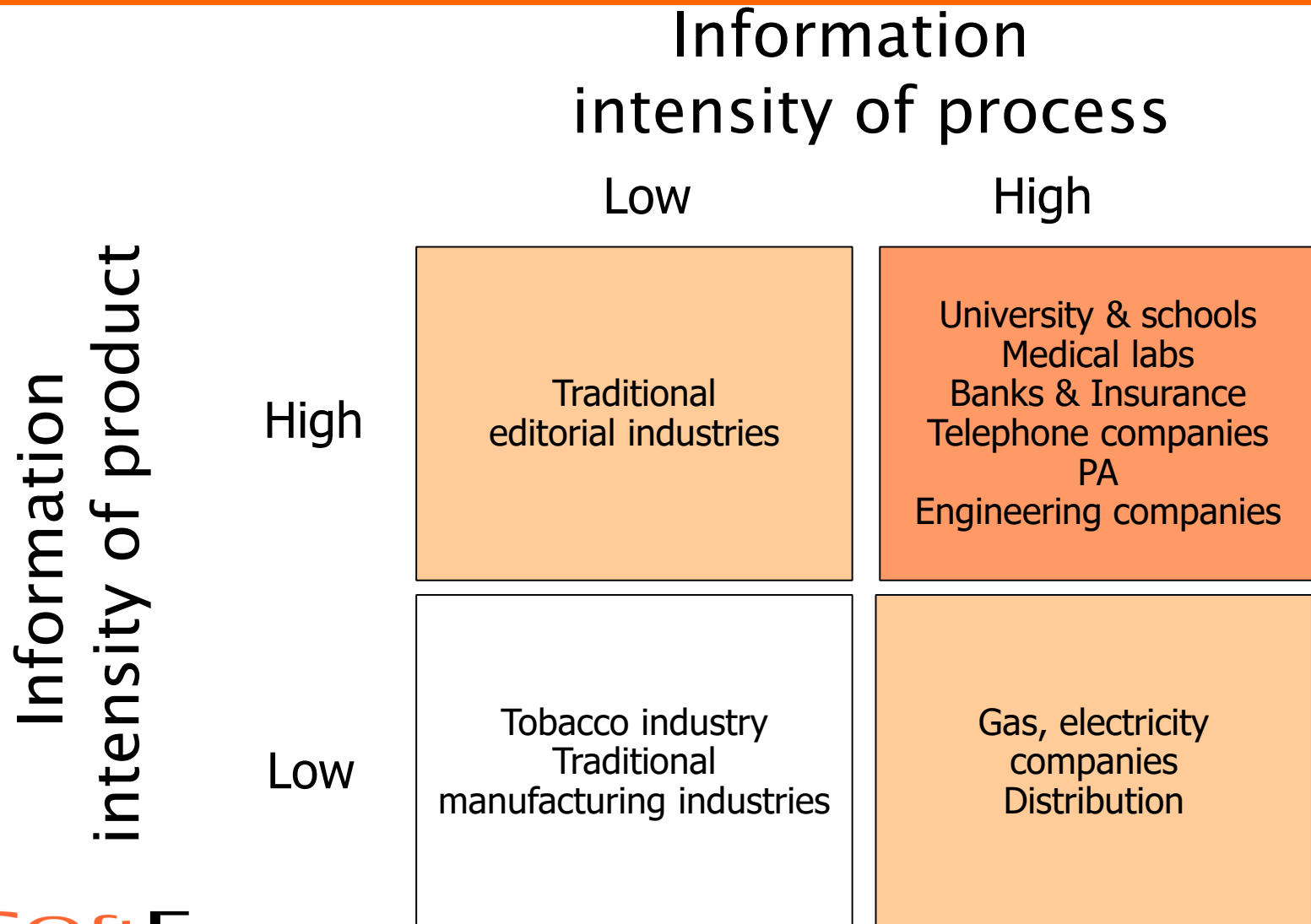
- Water bottling company:
 - ♦ **Strategic** – select most promising market areas
 - ♦ **Management** – check weekly budget vs. actual
 - ♦ **Operational** – recording of orders

Importance of IS

- Importance of IS = $f(\text{IO}, \text{IP})$
 - ◆ IO – Information intensity of product
 - How many bits are needed to describe the product
 - ◆ IP – Information intensity of process
 - How many bits are needed to describe the process

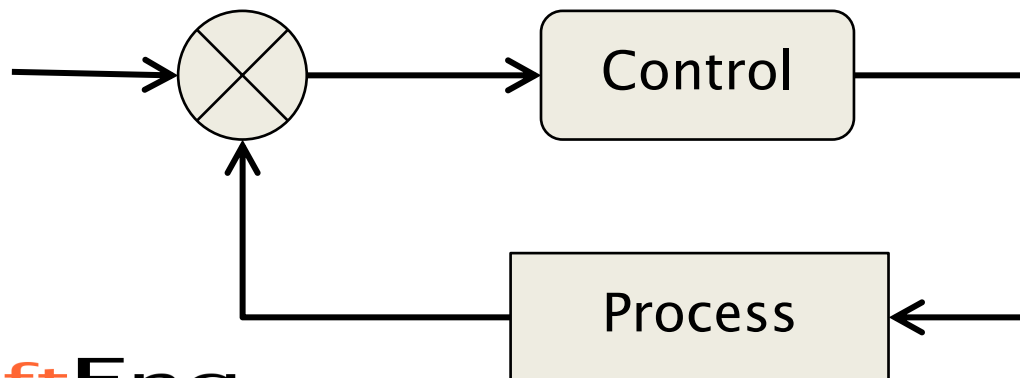
[Porter Millar 1985]

Operational level



Management level

- Supports the management control loop
 - ◆ Goal definition
 - typically economical: budget
 - ◆ Analysis of results
 - ◆ Corrective actions



Budget

- Per expense type

Personnel	50.000
Computers	2.000
Electricity	5.000
Cleaning	1.000
Total	58.000

- Per function

Sales and marketing	10.000
Manufacturing	20.000
Administration	28.000
Total	58.000

Actual vs. budget

	2021 (actual)	2022 (actual)	2023 (budget)
Personnel	46.000	45.000	50.000
Computers	1.000	2.000	2.000
Electricity	2.000	2.000	5.000
Cleaning	1.000	1.000	1.000
Total	50.000	50.000	58.000

Not only on economics

	2021 (actual)	2022 (actual)	2023 (target)
Items produced	6.000	6.200	5.000
Defects per 1000	1	0,9	0,8

Management level

- See later T model

Operational vs. Management

	Operational	Management
Usage	Continuous	Periodic (eg. weekly)
Information	Simple, Current	Aggregate, Historical

Strategic

- Analysis of very large data sets
 - ♦ Customer analysis (profiling)
 - ♦ Product analysis (dependability)
 - ♦ Performance analysis (dashboard)
 - Response time, quality level

Strategic level

- ♦ Volumes of data available for analysis via business intelligence, data warehouse

Sector	Number of usual customers (order of magnitude)	Example of analysis (indexes)
Telephony (eg. EU monopolists)	More than 10 Million	- Profitability
		- Behavior / preferences
Bank (large banks)	More than 1 Million	- Profitability
		- Behavior / preferences
Electricity and gas (European monopoly)	Between 100.000 and 1 Million	- Profitability
		- Behavior / preferences
PA / Finance (Europe)	More than 10 Million	- Sectorial study
		- Segmentation of customer
		- Identify potential
Distribution	Between 100.000 and 1 Million	- Behavior / preferences

Levels and applications

- Strategic
 - ◆ Executive support systems (ESS)
 - ◆ Decision support systems (DSS)
- Management
 - ◆ Management information systems (MIS)
- Knowledge
 - ◆ Knowledge work systems (KWS)
- Operational
 - ◆ Office automation systems (OAS)
 - ◆ Transaction processing systems (TPS)

Levels and applications

TYPES OF SYSTEMS

Executive Support
Systems (ESS)

Strategic-Level Systems

5-year sales trend forecasting	5-year operating plan	5-year budget forecasting	Profit planning	Personnel planning
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Management
Information
Systems (MIS)

Management-Level Systems

Sales management	Inventory control	Annual budgeting	Capital investment analysis	Relocation analysis
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Decision-Support
Systems (DSS)

Sales region analysis	Production scheduling	Cost analysis	Pricing/profitability analysis	Contract cost analysis
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Knowledge Work
Systems (KWS)

Knowledge-Level Systems

Engineering workstations	Graphics workstations	Managerial workstations
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Office
Systems

Word processing	Document imaging	Electronic calendars
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Transaction
Processing
Systems
(TPS)

Operational-Level Systems

	Machine control	Securities trading	Payroll	Compensation
Order tracking	Plant scheduling		Accounts payable	Training & development
Order processing	Material movement control	Cash management	Accounts receivable	Employee record keeping

Sales and
Marketing

Manufacturing

Finance

Accounting

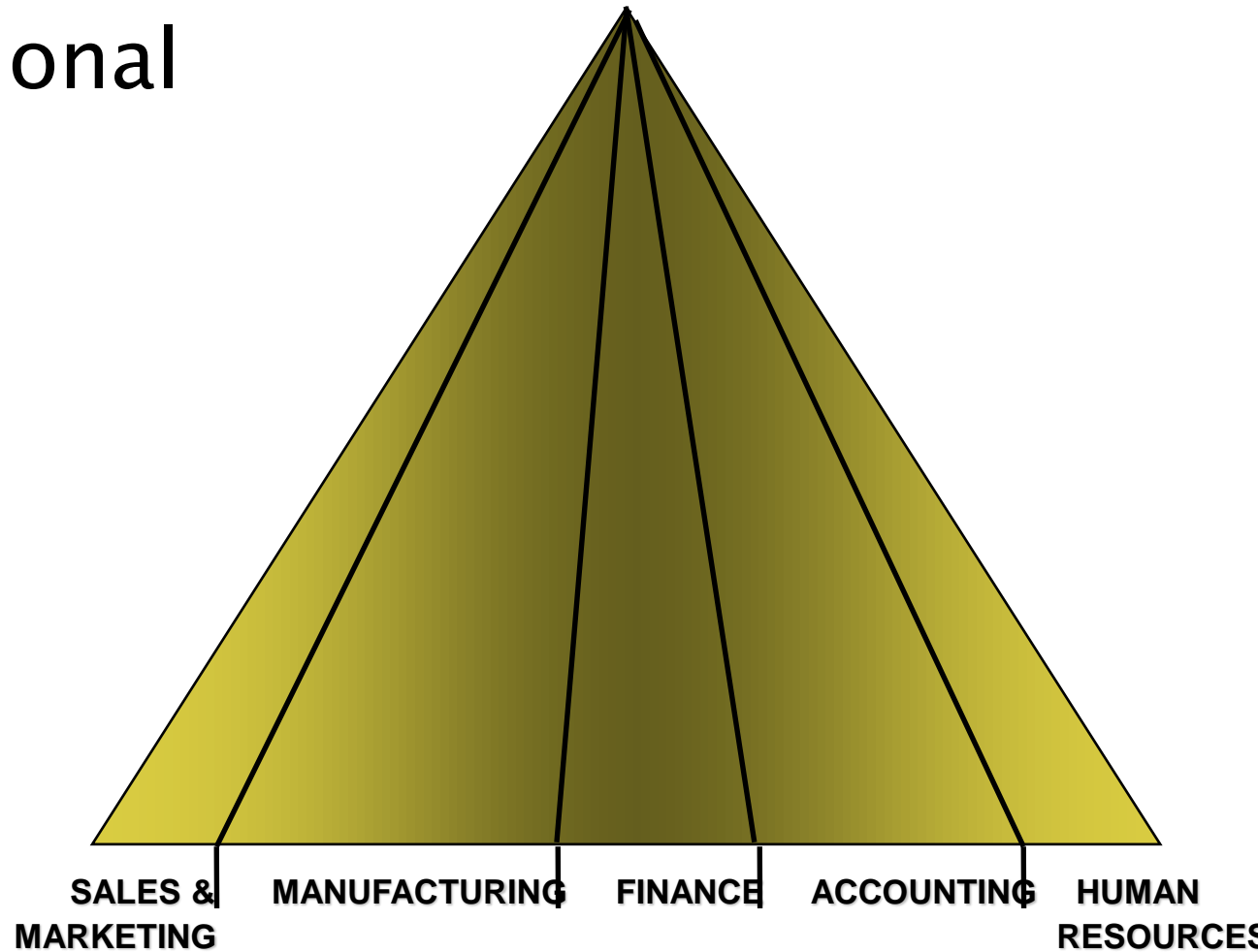
Human
Resources

Characteristics of applications

System	Input	Processing	Output	User
ESS	Aggregate data (external, internal)	simulation	Projections	Senior managers
DSS	Low-volume data (from optimized DBs), analytic models	Simulation, analysis	Special reports, decision analysis	Professionals, staff managers
MIS	Transactions summaries, high- volume data	Routine reports, low-level analysis	Summary and exception reports	Middle managers
KWS	Design spec, knowledge base	Modeling, simulation	Models, graphics	Professionals, technical staff
OAS	Documents, schedules	Document management, scheduling, communication	Documents, schedules, mail	Data workers
TPS	Transactions, events	Sorting, listing, merging	Detailed reports, lists, summaries	Operational managers, supervisors

Business function view

- Organisational view



Business functions

IS supports business functions

- E.g. Manufacturing function
 - ◆ Fulfill an order
 - ◆ Look at status of order
- E.g. Sale function
 - ◆ Accept an order
 - ◆ Make a bid

Functional taxonomy

- Sales and Marketing
- Manufacturing and Production
- Finance
- Accounting
- Human Resources

Sales and Marketing

- Marketing is concerned with
 - ◆ identifying the customers
 - ◆ determining what they need or want
 - ◆ planning and developing products and services to meet their needs
 - ◆ advertising and promoting these products and services
- Sales is concerned with
 - ◆ contacting customers
 - ◆ selling the products and services
 - ◆ taking orders
 - ◆ following up on sales

Sales & Marketing examples

System	Description	Level
Order processing	Enter, process and track orders	Operational
Market analysis	Identify customers using demographics, markets, trends	Knowledge
Pricing analysis	Determine price for product or service	Management
Sales trend forecasting	Prepare 5-year sales forecast	Strategic

Manufacturing and Production

- Activities deal with
 - ◆ Planning, development, and maintenance of production facilities
 - ◆ The establishment of production goals
 - ◆ The acquisition, storage, and availability of production materials
 - ◆ Scheduling of equipment, facilities, materials, and labor required for finished products
- Integrate and control the production flow

M&P examples

System	Description	Level
Machine control	Control action of machines	Operational
Computer-aided design	Design new product	Knowledge
Production planning	Decide when and how many	Management
Facilities location	Decide where to locate new facilities	Strategic

Finance and Accounting

- Finance function
 - ◆ Managing the financial assets, such as cash, stocks, bonds, and other investments, in order to maximize the return
 - ◆ Borrowing money (issue bonds, ..)
- Accounting function
 - ◆ Maintaining and managing the firm's financial records/receipts, disbursements, payroll, to account for the flow of funds in a firm

Finance and Accounting

System	Description	Level
Account receivable	Track money	Operational
Portfolio analysis	Design portfolio of investments	Knowledge
Budgeting	Prepare short-term budgets	Management
Profit planning	Plan long-term profits	Strategic

Accounting



Accounting

- Very old
 - ◆ Luca Pacioli, 1494, double entry bookkeeping (“partita doppia”)
- General ledger
- Standards and norms available
 - ◆ Standards: IAS/IFRS

Date	Description	Debit	Credit
2 mar 2022	Purchase item #3	50	
2 mar 2022	Purchase item#4	60	
3 mar 2022	Sale item # 5		100
3 mar 2022			
...			
	TOTAL		

Accounting

- Sectional
 - ◆ Towards customers and suppliers
 - ◆ Accounts payable, accounts receivable
- Institutional
 - ◆ Towards stakeholders and law
 - ◆ Balance sheet, public communications, consolidated balance (groups), certifications
- Management accounting
 - ◆ Towards internal structure

Human Resources

- HR function is responsible for
 - ◆ Attracting workforce
 - ◆ Developing workforce
 - ◆ Maintaining workforce
- Human resources information systems support activities such as
 - ◆ Identifying potential employees
 - ◆ Maintaining complete records on employees
 - ◆ Creating programs to develop employees skills

Human Resources

System	Description	Level
Training and development	Track employees training, skills and estimate performance	Operational
Career pathing	Design career paths for employees	Knowledge
Compensation analysis	Monitor fairness in employees wages and benefits	Management
HR planning	Plan long-term labor needs	Strategic

HR

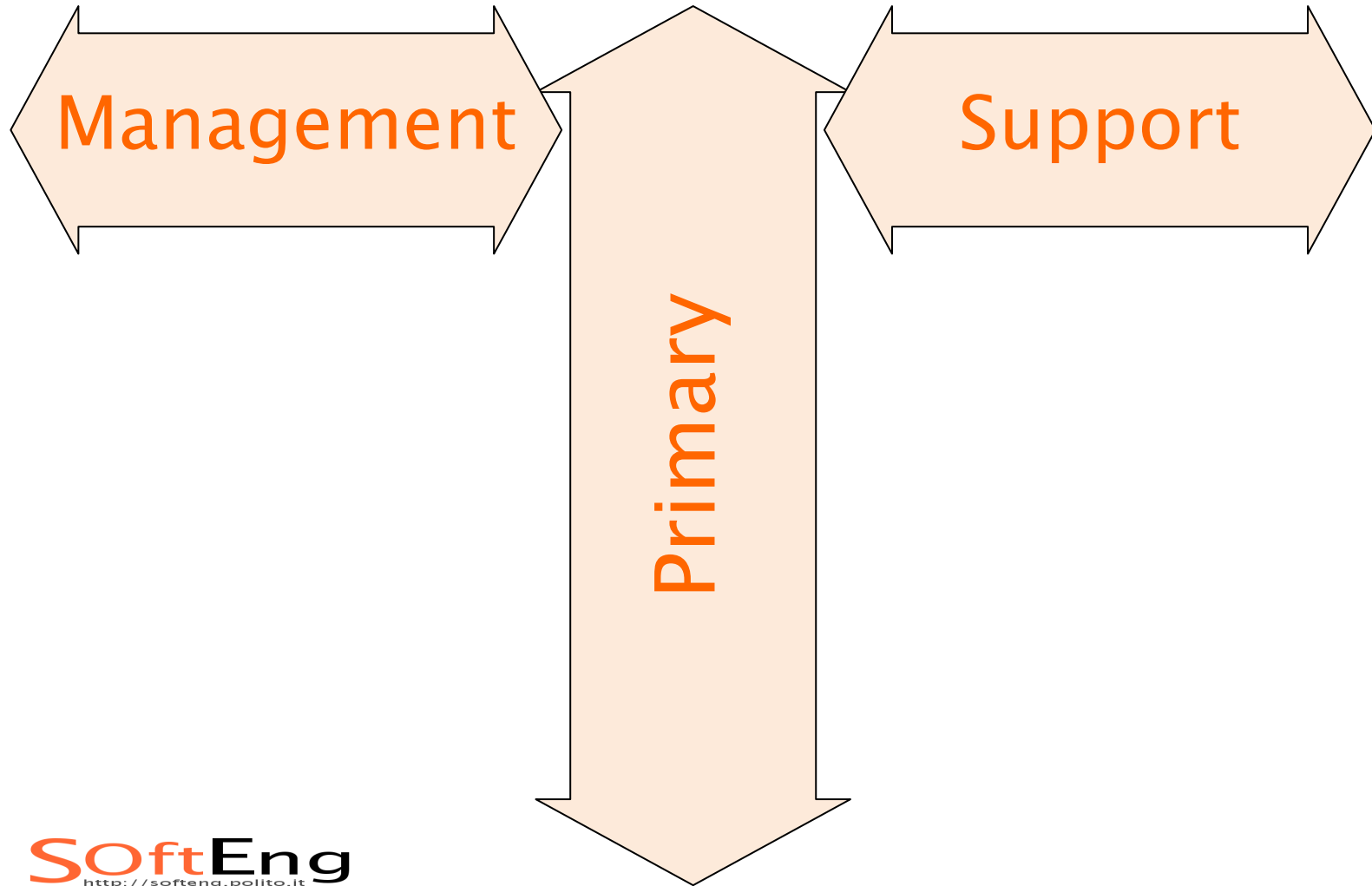
- Planning
 - ◆ Understand what skills are needed
 - Training, hiring
- Relationships
 - ◆ With trade unions
- Administration
 - ◆ Record working (leave, sick) days
 - ◆ Payroll
 - ◆ Pension, health, insurance, taxes

HR

- Management
 - ◆ Search skills
 - ◆ Relationship management
 - ◆ Record skills and history
 - ◆ Training
 - ◆ Evaluation and compensation systems
 - ◆ Outplacement

T Model

T Model



Process families

Managerial processes	Primary Processes	Support Processes
Strategic planning Control Business Intelligence ...	Production and provisioning of products and services	Accounting Resources management (human, investments, estate) Business support: (IT, general services) ...
GOAL: Lead the organization	GOAL: Serve the customers	GOAL: Provide services to the organization and comply with law obligations

Process families

- Support
 - ◆ IT, Human resources, Accounting, Firm infrastructure
- Management
 - ◆ Business intelligence, strategy, management control
- Primary/Operational
 - ◆ Produce service or product

Business domains / sectors

- Manufacturing
- Process industry
- Telecom
- Bank and insurance / Finance
- Retail
- Utilities
- Public administration
- Health
- ...

Vertical vs. Horizontal

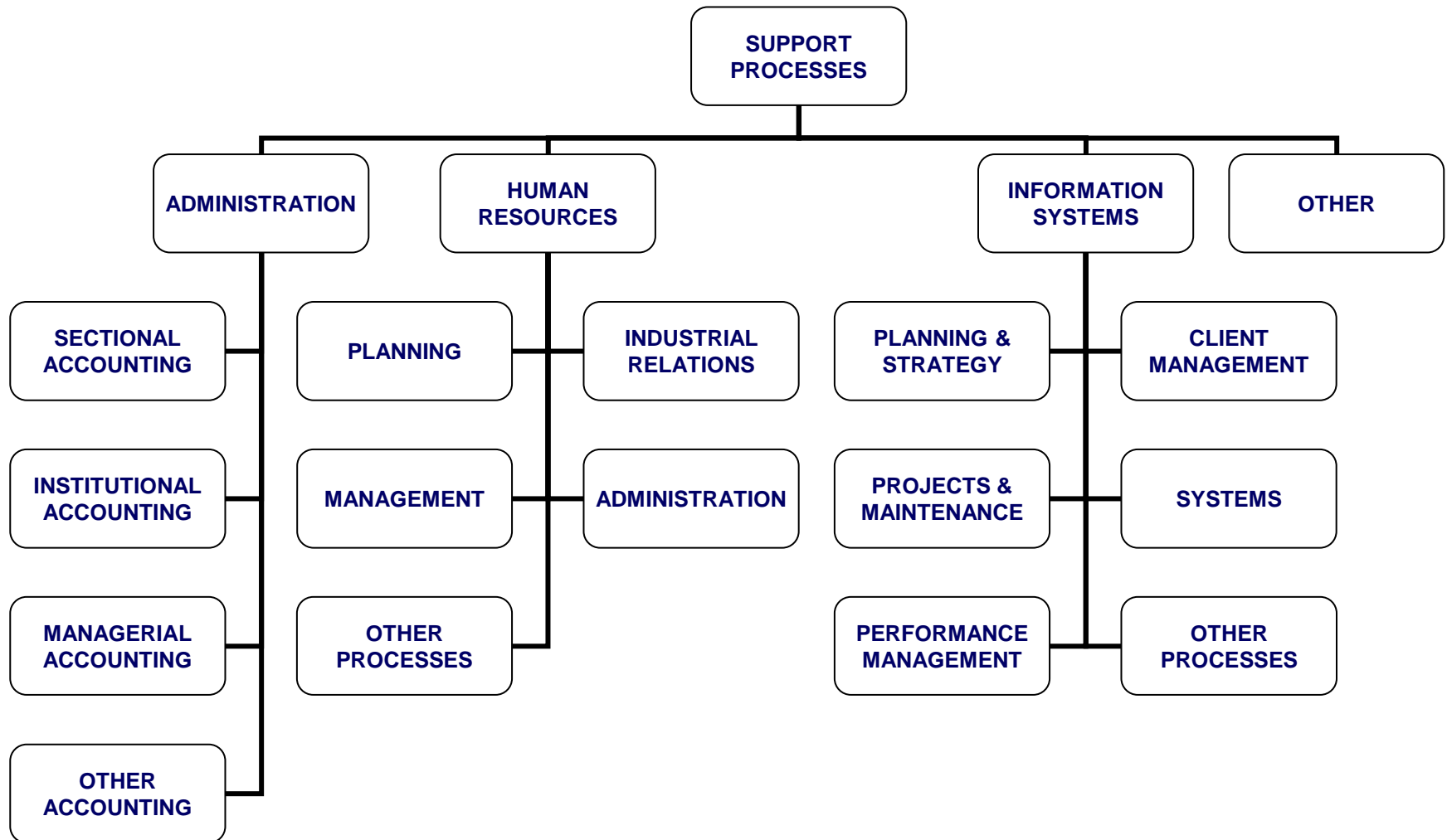
- Vertical = specific to business domain
- Horizontal= not specific

Process families and v – h

- Support
 - ◆ IT, Human resources, Accounting, Firm infrastructure
 - ◆ (horizontal)
- Managerial
 - ◆ Business intelligence, strategy, management control
 - ◆ (horizontal)
- Primary
 - ◆ Produce service or product
 - ◆ (vertical)

SUPPORT PROCESSES

Support processes



Support processes

- Administration / Accounting
- Human resources
- IT

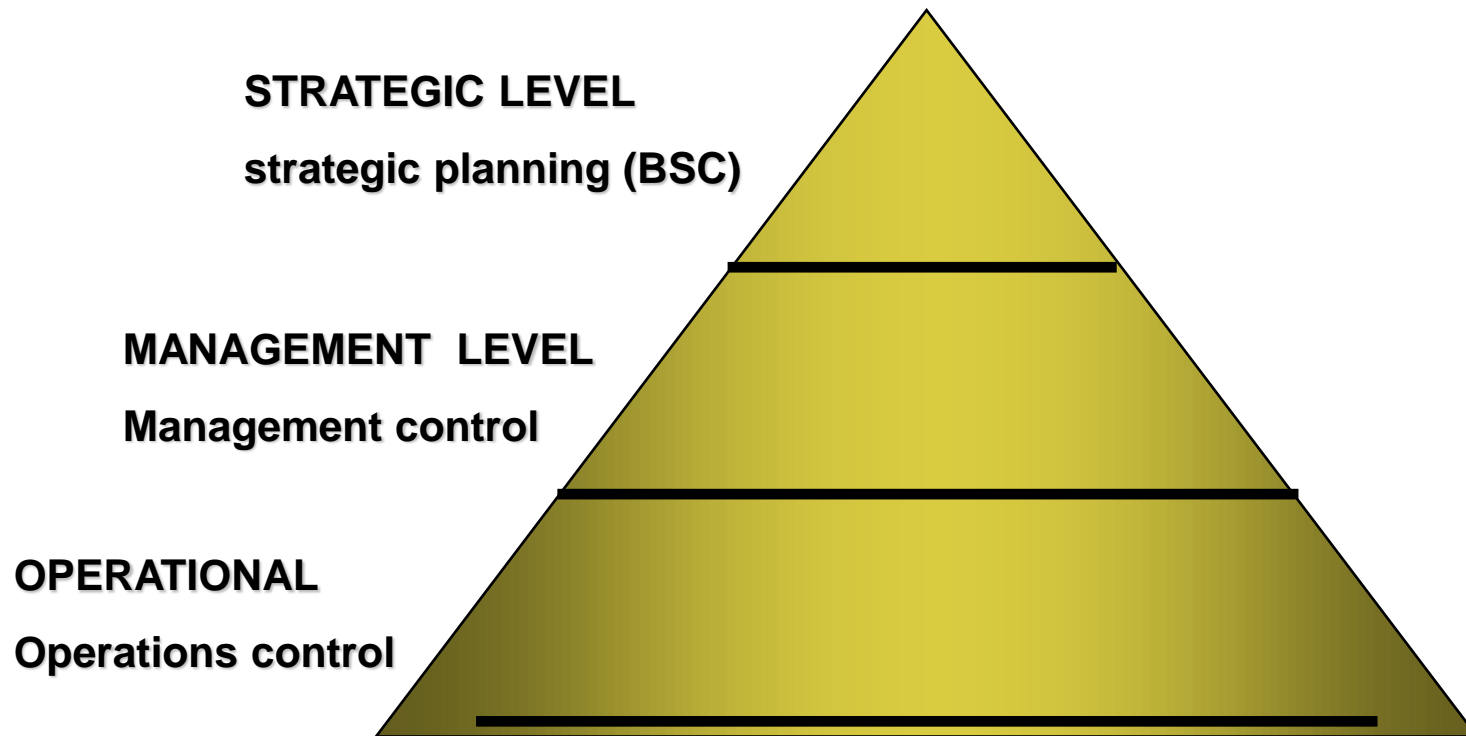
Support processes – IT

- Planning
- Production
- Operation

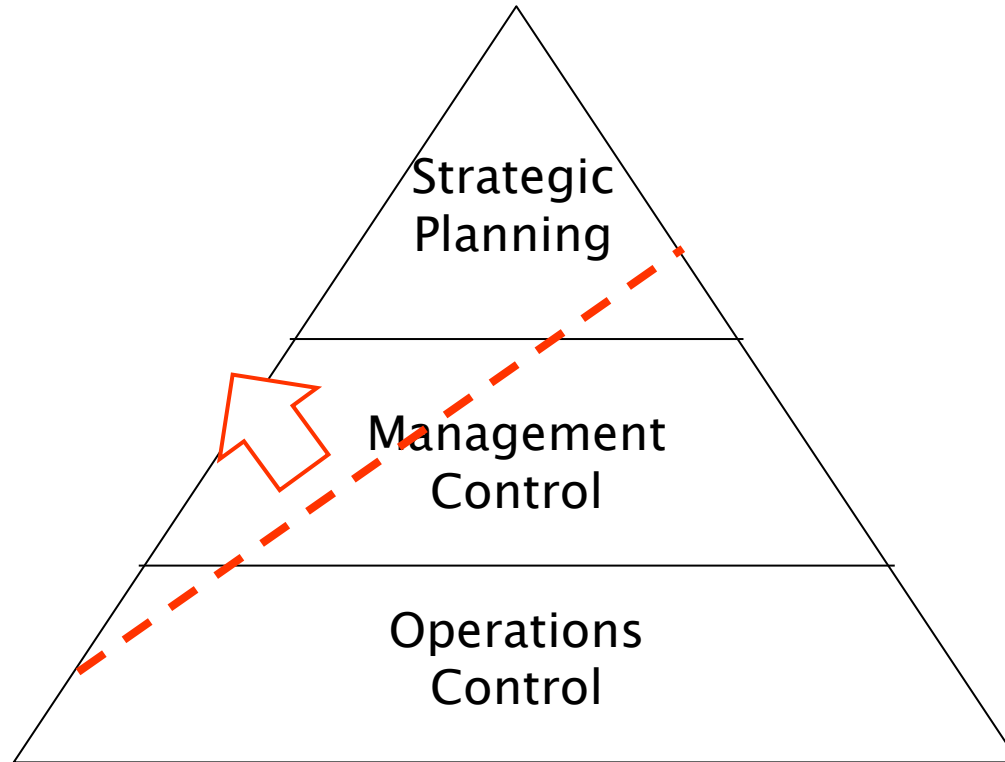
see later COBIT, ITIL

MANAGERIAL PROCESSES

Managerial processes



Managerial processes

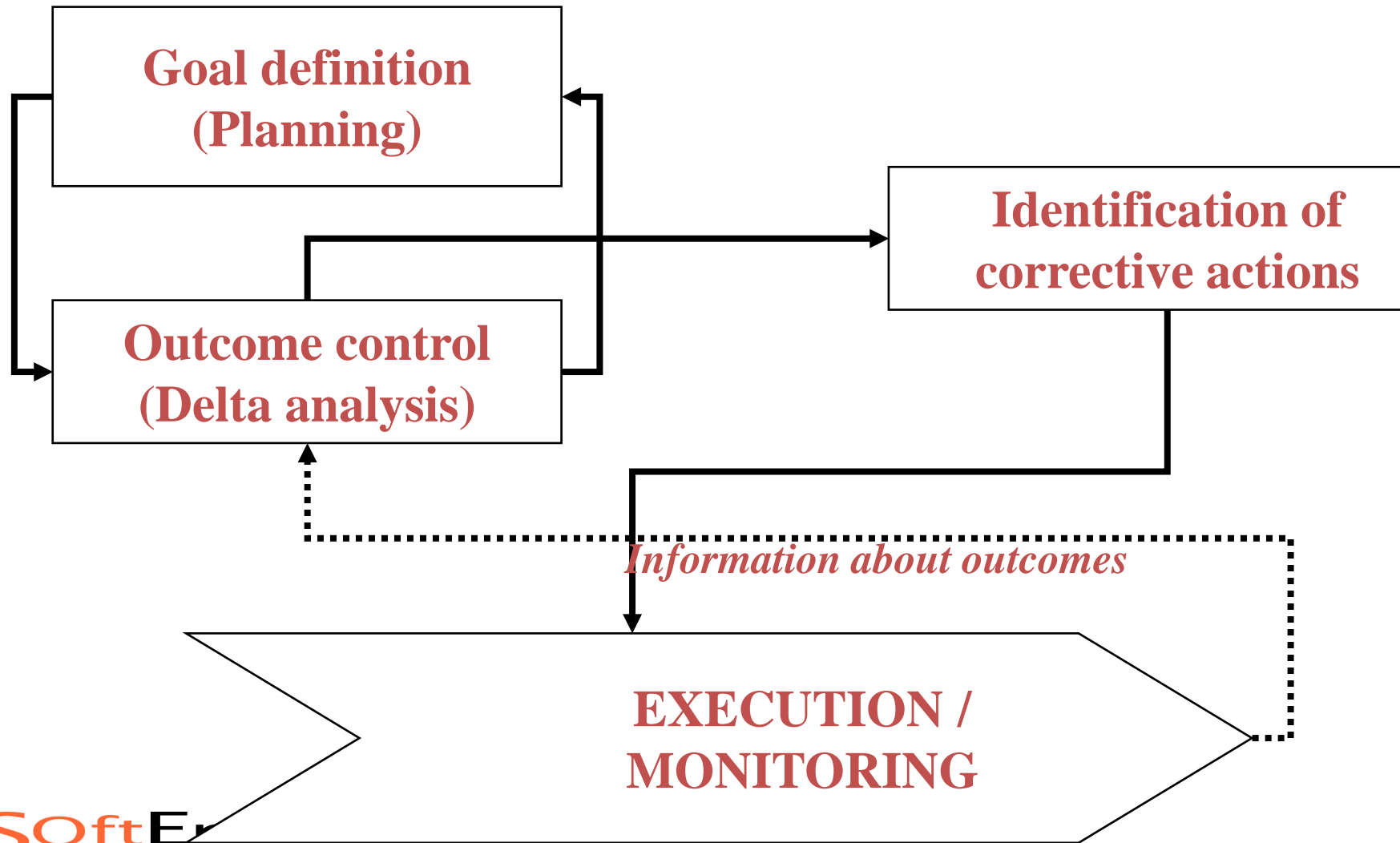


IT has progressively automated managerial processes making large multinational organizations controllable

Strategic planning

- What: strategy (markets, products, ..)
- When: as needed
- Output: strategic plan (projects that implement the strategy)
- Means: BSC
 - ◆ See later: Strategy chapter
 - ◆ See later: KPI, SLA, BSC CSF

Management Control loop



Management Control

- What
 - ◆ Budget (overall, per organizational unit)
 - ◆ Other indicators (sales, market share..)
- ◆ When
 - ◆ Planning (definition of planned budget), annual
 - ◆ Control (actual vs. planned), monthly
- Similar for most domains

-
- budget
 - = financial plan
 - = list of expenses and revenues over a period of time (ex year)
 - ◆ Goal definition
 - Definition of budget
 - ◆ Outcome
 - Actual expenses and revenues
 - ◆ Outcome control
 - Compare budget vs actual, deviations or not?

Budget

Indexes

Type of values: effective, budget

2nd semester values

Year values

	EFF	BDGT	EFF	BDGT	PROD1	PROD1
Economic balance						
income	2100	2000	4300	4000	1955	2345
acquisitions	720	720	1400	1500	800	600
personnel	850	800	1600	1650	900	700
Margin 1	530	480	1300	850	255	1045
amortizations	200	200	420	420	191	229
other costs	200	225	400	450	182	218
other items	20	20	41	40	19	22
GAIN	110	35	439	-60	-137	576

Timing

Aggregated and derived information

Operational control

- What
 - ◆ Specific operational indicators
 - ◆ (Depends strongly on domain)
 - ◆ (ex, automotive factory: cars produced per day, % defective cars, ..)
- When
 - ◆ Frequent (continuous)
- Very structured for domains with complex products (automotive, aerospace), loosely structured in other domains (engineering)

PRIMARY PROCESSES

Primary by business domain

- Manufacturing companies
- Process industries (chemistry, metallurgy)
- Telecom operators
- Utilities
- Banks/insurances
- Retail
- Public Administration (PA)
- Health

Manufacturing

- Companies designing and producing individual items in large quantities
 - Automotive
 - Home appliances (washing machines ..)
 - ..
- Cfr later Process industry, produce volumes of substances (gas, oil, electricity)

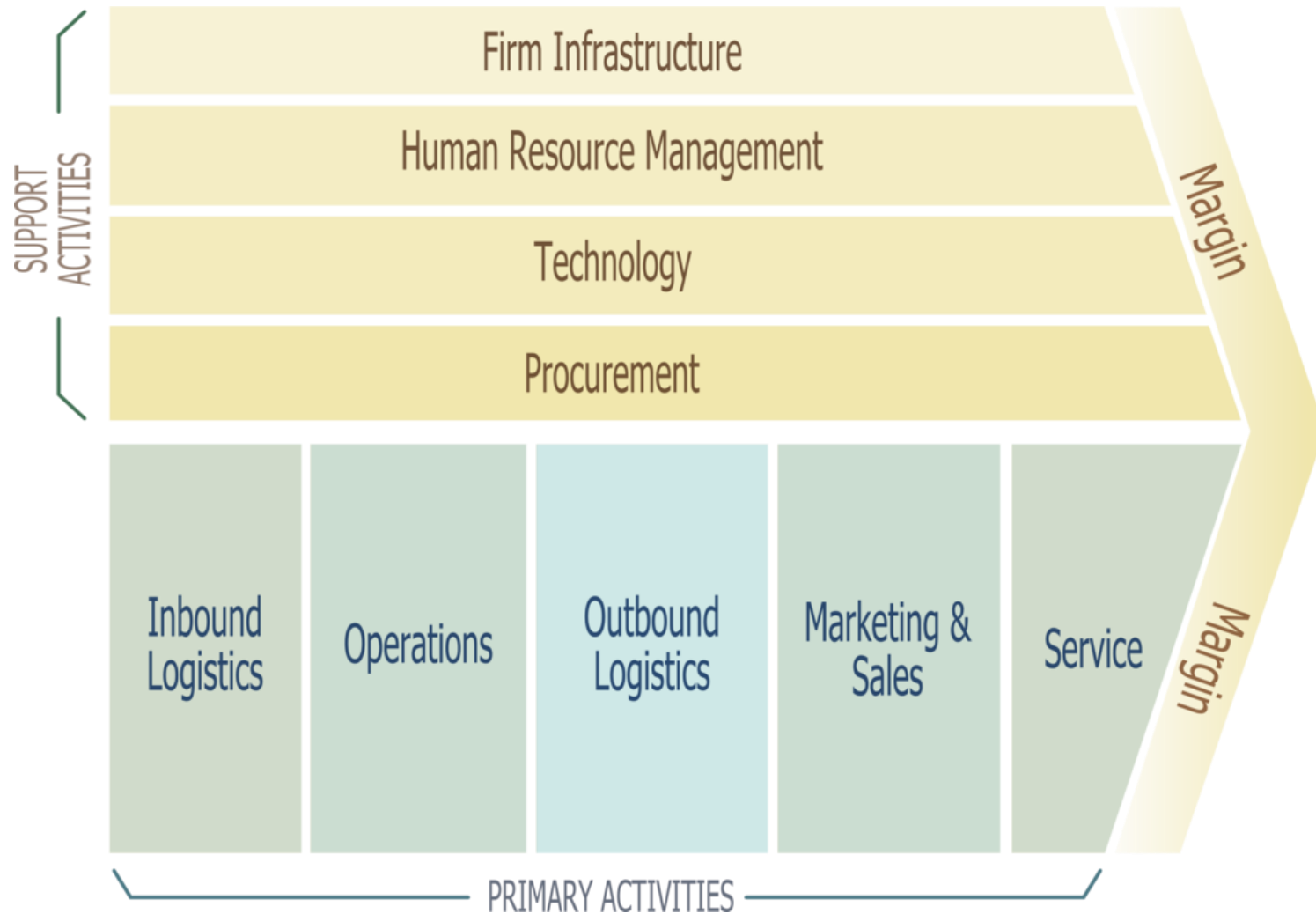
Manufacturing – models

- Value chain
- Planning Execution
- SCOR
- Segmentation by vendors
- Segmentation by integrators
- Open segmentations

Value chain

- [Porter 80, Porter Miller 1985]
- Process view of a company
 - ♦ Cfr. functional + org view in Antony
- Company implements sequence of processes/activities to deliver product/service
 - ♦ Primary/support activities
- Value of product is how much the customer is willing to pay for it
 - ♦ Cost \neq price

Value Chain



Value chain

- Value chain defined for manufacturing companies
- Value chain concept still high level to identify software functions/ applications

Planning / execution model

- Focus on vertical phases (inbound logistics, product design, operations, outbound logistics)
- Detail them (for manufacturing companies) and describe lower level processes

Process types

- Processes and subprocess types
 - ◆ Planning
 - Strategic analysis
 - Planning
 - Year, month, week
 - ◆ Execution
 - Process and product data
 - Order management
 - Material management
 - Physical operations

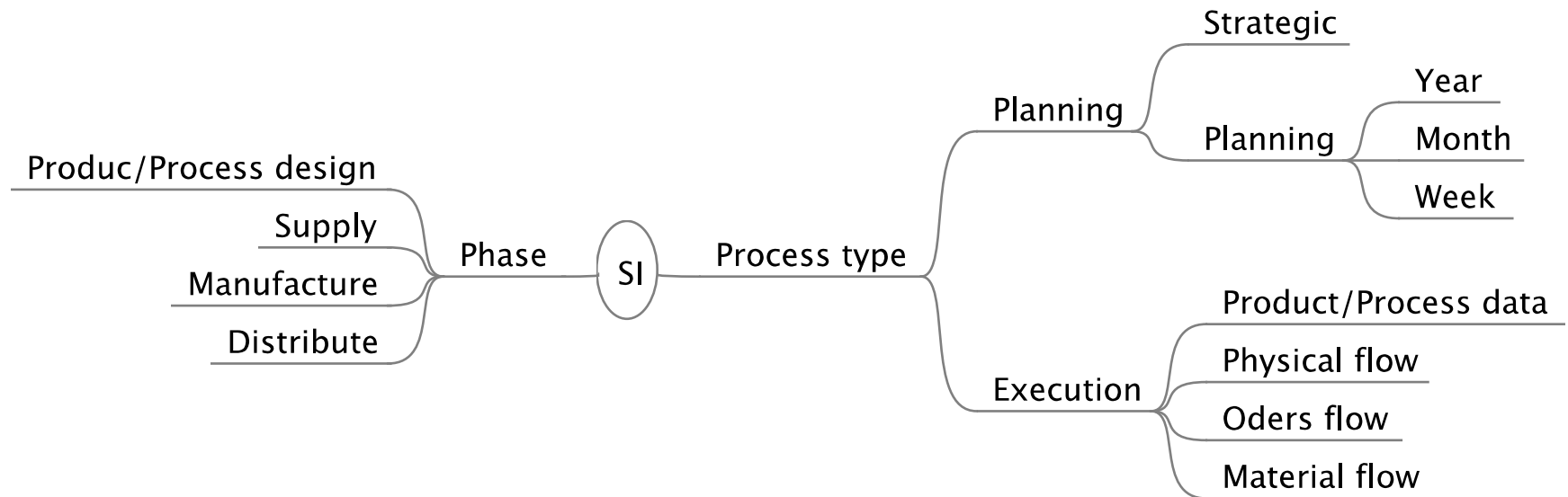
Planning

	Goal	Issues	Horizon
Strategic analysis	Understand Market and technology trends	Complex and heterogenous data	Months years
Plan 1 year	Define requests and needs	Scope: plants	
Plan 1 month		Scope: plants and cells	2 months
Plan 1 week	Define request and needs	Scope: cells	2 weeks

Execution

	Goal	Issues	Scope
Product and process data	Capture know how on product and how to produce it	Complex and heterogenous data	company
Order flow	Define store and process orders from customers. Input to planning.	Large data volumes Order tracing	Intercompany and interfunction
Material flow	Define, store, and process orders to suppliers. Monitor available materials.	Large data volumes Material tracing	Intercompany and interfunction
Physical flow	Monitor all events (materials, assemblies)	Large data volumes Real time	Intercompany and interfunction

Process type vs. Phase



Process type vs phase

Phase/ Process type	Product/p rocess design	Procure	Manufacture	Distribute
Plan				
Execute				

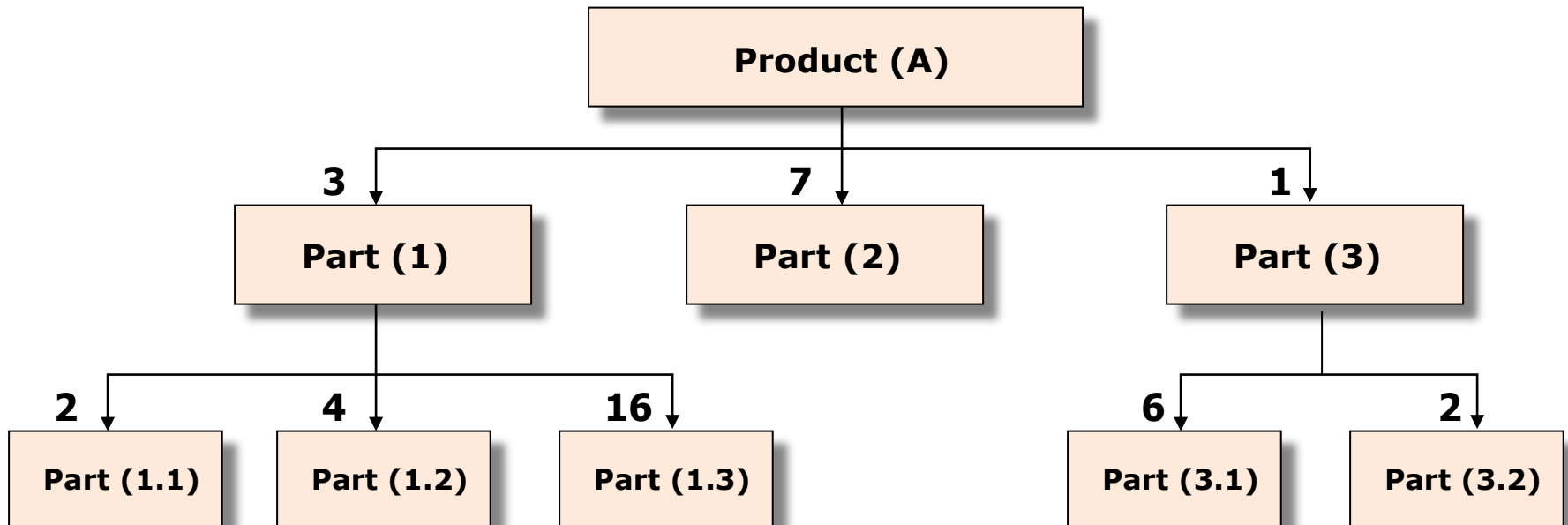
Process type vs phase: AP

	Product/process design	Supply	Manufacture	Distribute
Strategic plan	Technology and market overview	Survey suppliers	--	Market studies. Customer studies
Plan – 1 year	Plan new products/plants	Plan purchases	Plan production	Sales forecast and sales plan
Plan – 1 month	Plan/assign design tasks	Plan and assign purchases	Plan production – plant	Plan distribution
Plan – 1 week	Plan/assign design tasks	Plan purchases. Expedite late supplies	Plan production – cells	Plan / assign distribution tasks
Process product data	List of parts: specifications, designs	List of suppliers. Bill of materials	List of plants, machines, working cycles	List of customers. Catalogue of products
Physical flow	Store and distribute designs, specs		Move parts and assemblies. Monitor state of production.	Manage and ship products. Manage inventories
Orders flow		Send orders to suppliers	Send orders to production	Receive orders
Material flow		Test and store received parts		

Product and process data

- PLM tools: product lifecycle management
 - ◆ Storage, retrieval, processing
 - ◆ Change management
- Bill of Materials (BOM)
 - ◆ For each end product, list of parts
 - What supplies are needed for product Y?
 - What is cost of supplies?
 - What categories of supplies are needed for product Y?
 - What parts are common between X and Y?
- Production cycle
 - ◆ For each end or intermediate product, list of manufacturing / assembly operations

Ex. BoM



Common acronyms and functions

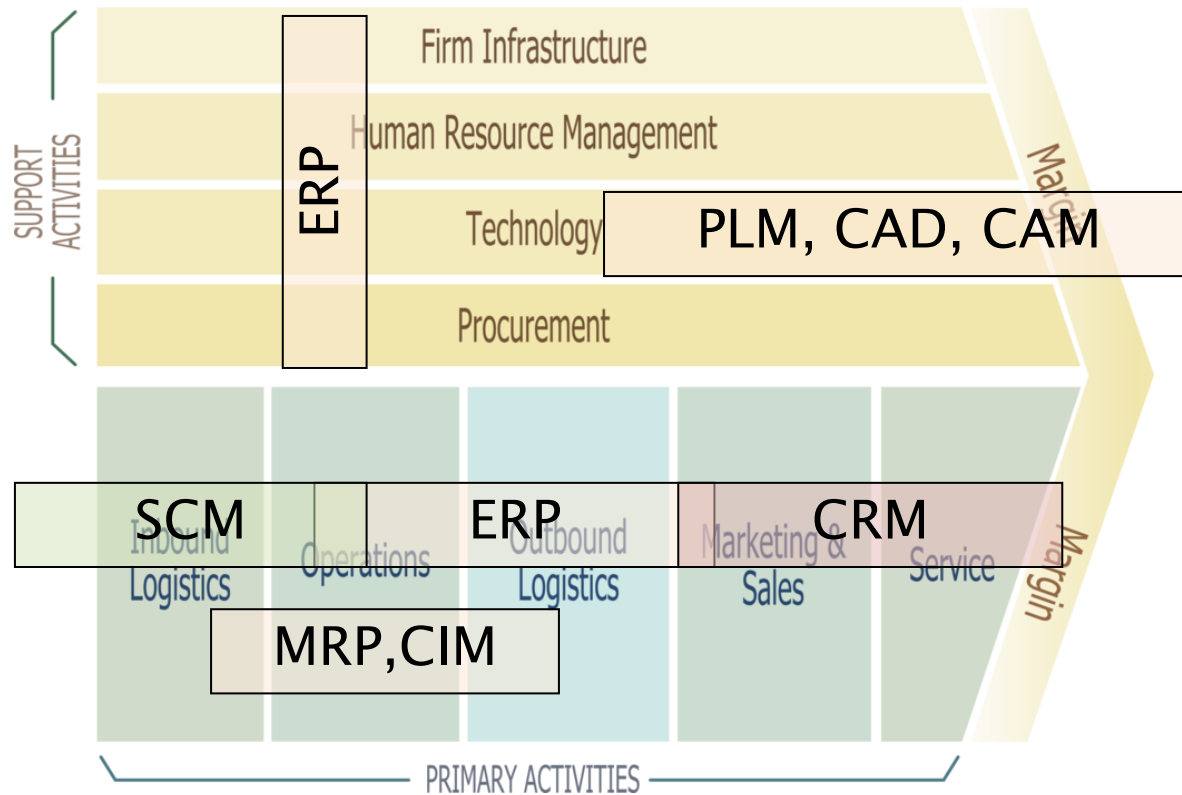
- CAD CAM systems
 - ◆ Product design
- PLM (Product Lifecycle Management)
 - ◆ Store and process designs
- Planning (Manufacturing Resource Planning)
 - ◆ From product data (BOM) and customer orders, define orders for suppliers
- Execution (CIM)
 - ◆ From product data (production cycle) control manufacturing

CIM

- Computer Integrated Manufacturing
- Planning and execution specific to manufacturing phase

Level	Function	Technologies
Machine	Execute physical process	PLC (Prog. Logic Controller) base on microprocessors
Cell	Coordination of flows among machines/resources (sequencing, integration, resource sharing)	Microprocessor supervised by PCs or ad-hoc computers
Area	Executive planning of area Physical movement of materials	Local networks with medium sized servers
Plant	Production planning	Local networks with plant servers
Company	Raw material procurement Inter-plant systems	Company-wide network and servers

IS and manufacturing



SCOR

- Supply Chain Operation Reference
- www.supply-chain.org
 - ♦ 750 members
- Extension/variation of Plan/Execution for manufacturing industries

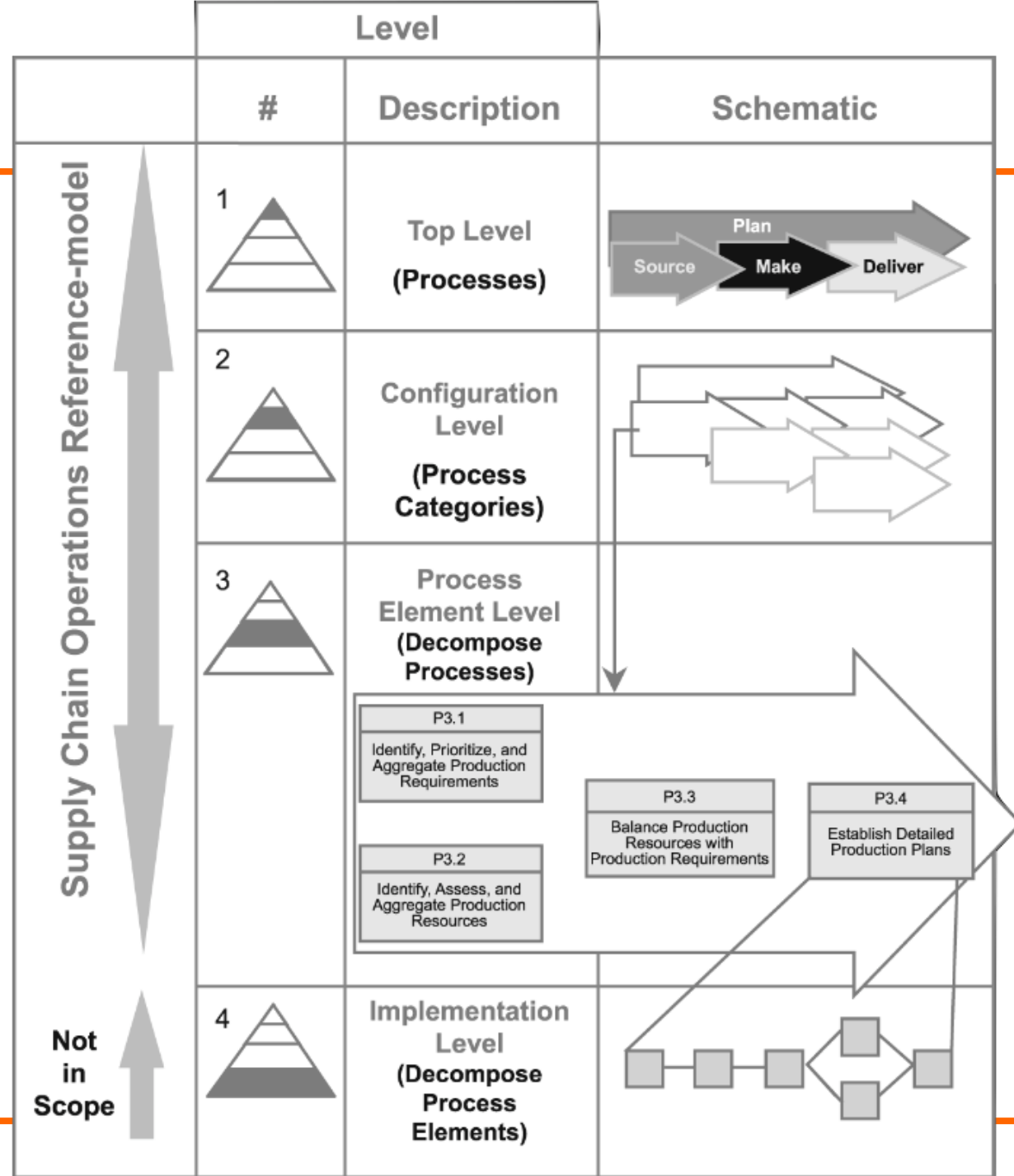
SCOR – processes

- Plan
- Execute
 - ♦ Source: supplies
 - ♦ Make: production
 - ♦ Deliver: shipping and distribution
 - ♦ Return: defective products or supplies
- Enable
 - ♦ Preparation storage and processing of information for Plan and Execute

SCOR – levels

- Three levels
 - ◆ Top level (plan, source etc)
 - ◆ Configuration level
 - High level processes are configured to company. Ex: Make –> make to order vs make to inventory vs make to design
 - ◆ Process element
 - Low level processes

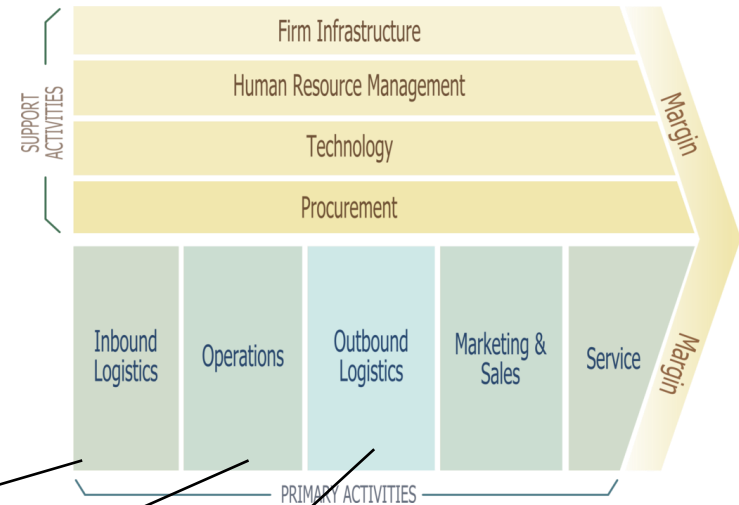
SCOR



Process industries

- Two high level primary processes
 - ◆ Production
 - ◆ Maintenance of plant

Process industries



- Inbound logistics:
 - Raw material supply
 - Spare parts and maintenance material procurement, supply
- Operations
 - Plant supervision + process control
 - Machinery maintenance
- Outbound logistics
 - Product distribution and sale

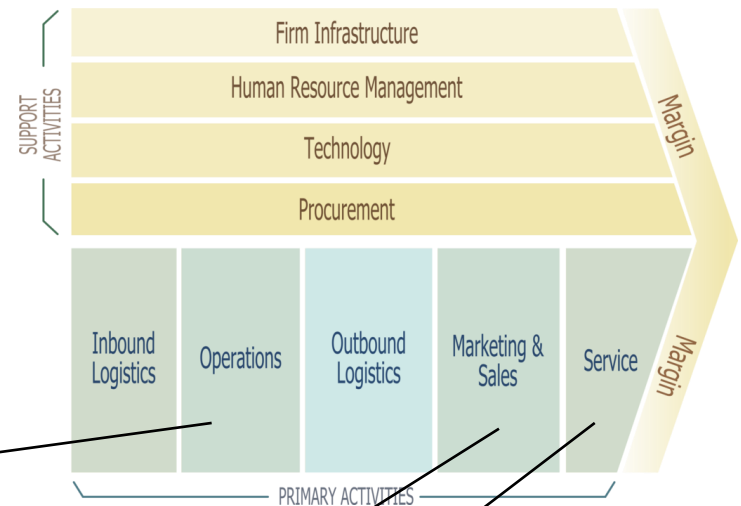
Issues

- Simple supply processes
 - ◆ Few raw substances (oil, coke) vs. thousands parts (manufacturing)
- Simple (absent) product design processes
 - ◆ recipes
- Importance of maintenance of facilities
- Importance of process control
 - ◆ Safety, strategic products, environment
 - ◆ Iso iec 61508, 61511
- Importance of coordination of multi-plant productions

Telecom operators

- Three high level primary processes
 - ◆ Network management
 - ◆ Service management
 - ◆ Workforce management

Telco operators

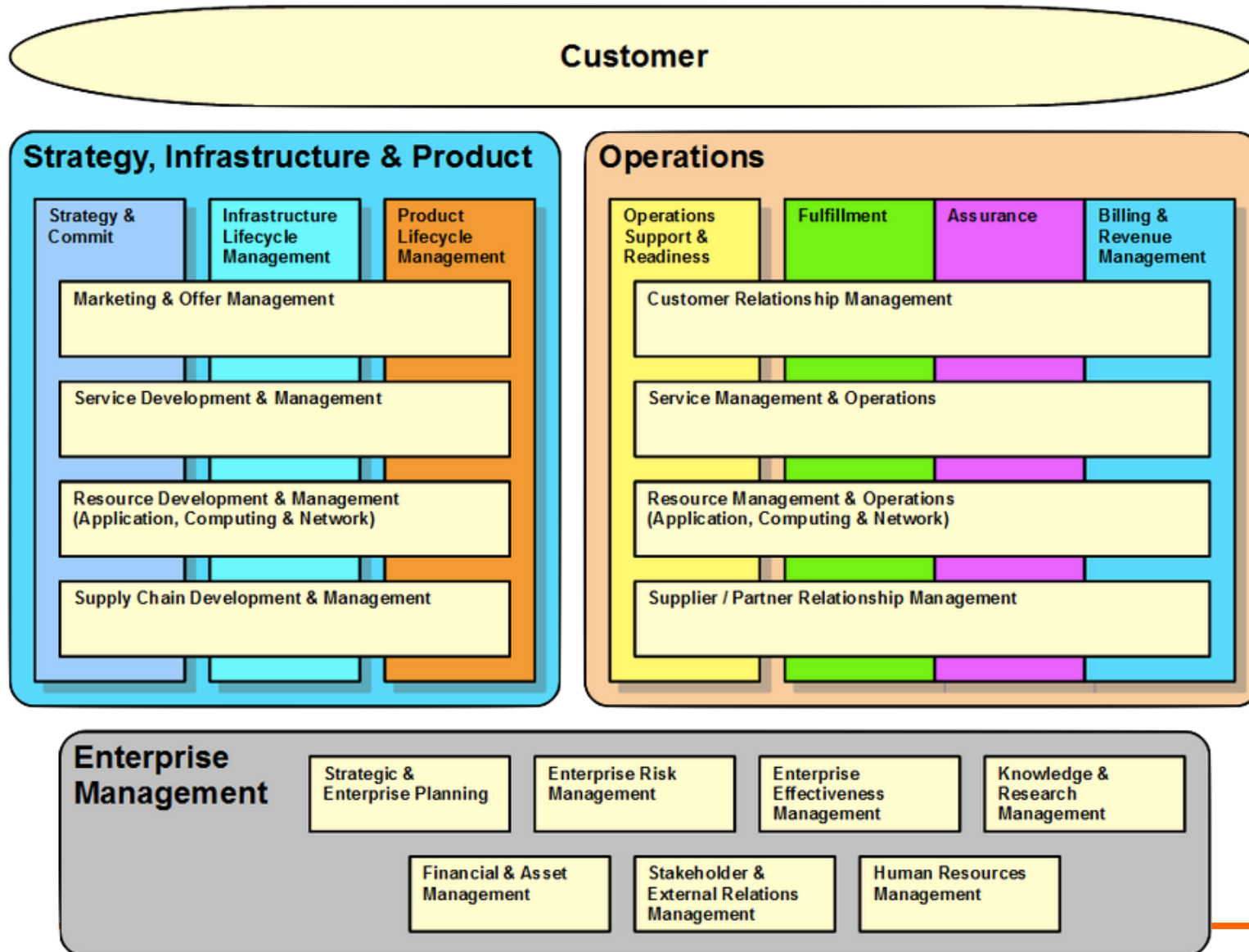


- Operations
 - Network: Plan network, design network, maintain network
 - Service: Service design, activation and delivery
 - Workforce: plan execute jobs, procure, store spare parts, manage technical documentation
- Marketing and sales
 - Marketing and sales, per customer type (business, retail)
 - Billing
- After sale service
 - Complaints, technical support


Issues

- Two customer/product categories
 - ♦ Retail (individual, SME), business
 - Business customers: VPN, dedicated lines, ..
- Strict link between process (network management) and product
 - ♦ Call data records for billing
 - ♦ See prepaid cards, real time billing
- Blurred distinction sales / after sales
 - Continuous interaction with customer
- Key role of IT
 - ♦ All is digital and digitally enabled: ICT
- Innovation in product and process
 - ♦ Billing modes and new products (prepaid cards)

eTom framework



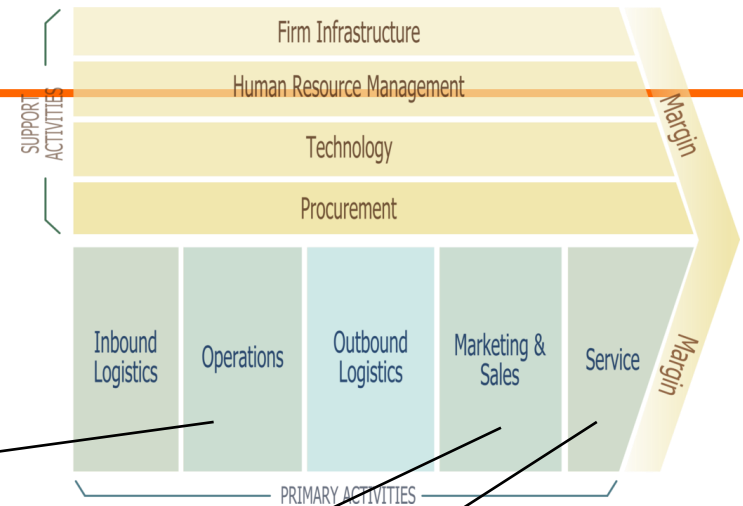
Utilities

- Supply of natural resources / energy
 - ♦ electrical energy, natural gas, water
- Three roles
 - ♦ Production of resource (a process industry)
 - Ex: Enel Power
 - ♦ Trading of resource 
 - Ex: Sorgenia, Enel distribuzione
 - ♦ Network (usually state owned)
 - Ex: TERNA

Utilities

- Three processes
 - ◆ service management (trading role)
 - Buy /sell resource, design and market service offers, bill
 - ◆ Network management (network role)
 - Core network
 - Last mile and meters
 - ◆ Workforce management (network role)
- Similar to telco, but core network is NOT managed by resellers

Utilities



- Operations
 - Service: Service activation and delivery
 - Network/workforce: meter and lines management
- Marketing and sales
 - Marketing and sales, per customer type (business, retail)
 - Billing
- After sale service
 - Complaints, technical support

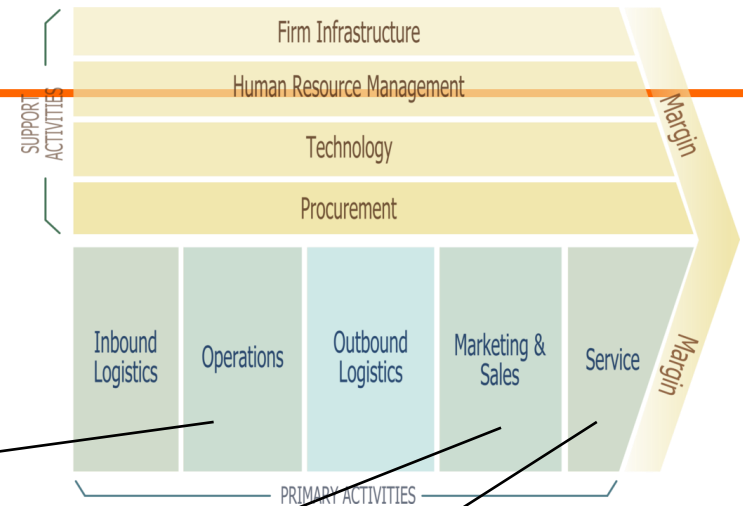
Issues

- Little innovation of product
- Some innovation of process
 - ♦ ENEL: Digital meter connected via electric lines
 - ♦ Solar production, smart grids, many producers model
- Process control (network monitoring and control)
- Little customer turnover
- Two customer classes
 - ♦ Retail, business

Banks – insurances

- One main process
 - ◆ Service management
- Service can be
 - ◆ Banks: account management, investment management, lending (mortgages, loans)
 - ◆ Insurance: vehicles, life, pension plan, health plans

Banks insurances



- Operations
 - Service: Service activation and delivery
- Marketing and sales
 - Marketing and sales, per customer type (business, retail)
- After sale service
 - Complaints, support

Issues – banks

- Customer segmentation
 - ◆ Business, individuals and SMEs, private banking
- Products
 - ◆ Accounts
 - ◆ Financial services (loan, mortgages)
 - ◆ Financial services (investments)
- Data replication
 - ◆ Often customer data replicated among units (ex accounts and financial)

Issues – insurances

- Products
 - ◆ Life, vehicles, buildings
 - Replication of customer data
- IS
 - ◆ IS for local agency vs. IS in main site

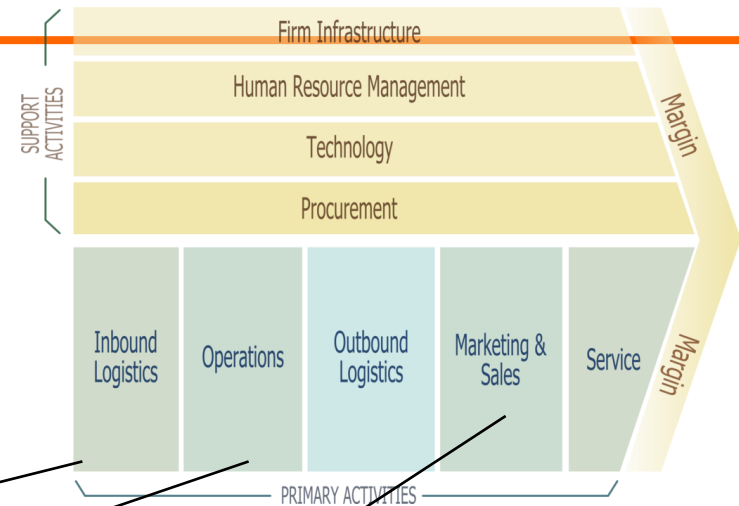
Retail

- Two main process
 - ◆ Procurement and inbound logistics
 - ◆ Store(s) management

Retail

- Management
 - ◆ Offers strategies, acquisitions, supplier selection, contracts
- Logistics (regional centers)
 - ◆ Receive from suppliers, sort
- Point of sale (large number)
 - ◆ Shelf resupply, goods preparation, sale

Retail



- Inbound logistics:
 - Products supply, procurement
- Operations
 - Stores management, supervision, control
- Marketing and sales
 - Billing
 - Campaign management, advertising

Issues

- Large number of stores (point of sales), suppliers, customers
- Regional warehouses (logistics)
- Perishable goods (food)
- Simple processes, big volumes, small margins

Issues for all service domains

- ◆ Banks, Insurances
- ◆ Telco operators, utilities
- ◆ Retail
- Large number of customers, frequent interactions
- Multichannel interaction
 - ◆ Web, mobile, desk, call center
- Strong competition, need to understand the customer
 - ◆ CRM, BI

Health

- Several very different needs and several interconnected actors
 - ♦ Patient
 - ♦ Care centers, private and public
 - Hospitals
 - Analysis labs (imaging and samples)
 - Doctors and medical practices
 - ♦ Private and public entities paying services
 - National health system
 - Private Insurances

■ Patient

◆ Medical data for patient

- EPR Electronic Patient Record
- Patient characteristics, history of treatments, analysis results, drugs taken..

■ Care center

◆ Logistics, scheduling

- Patients
- Drugs
- Doctors / nurses
- Medical equipment

◆ Administration

- Payments, reimbursements, communications
- maintenance

◆ Medical Data

- Results of treatments, analyses

-
- Entities paying services
 - ◆ Aka insurance / service company

-
- Medical devices
 - ◆ Embedded systems
 - ◆ Source of medical data

- Key standards: HL7

- ◆ www.hl7.org

- Standard for patient description
 - Standard for treatment descriptions

Public administration

- Several different entities, interacting w citizens and companies
 - ◆ Local, regional, national entities involved in same or different processes
 - ◆ Transport
 - Public infrastructure management
 - Roads, bridges, tunnels
 - Traffic lights, control systems
 - Registry of vehicles, ships, planes
 - Registry of driving licenses

-
- ◆ Land and estates
 - Registry of land and estates (cadaster)
 - Building monitoring and license issues
 - ◆ Tax
 - Collection, monitoring
 - ◆ Health (see above, for the public part)

♦ Security

- Police
- Army
- Fire departments
- Identity management
 - Registry of citizens, ID issue

♦ Agriculture, rivers, forests

- Issues

- ◆ Monopoly of services

- No competition, less innovation

- ◆ Variety of roles and entities

- Data exchange, data standardization

Public administration











- Management processes often absent
- Support processes more automated
- Primary processes
 - ◆ Services to citizens and companies
 - ◆ Political processes at different levels
 - Design, discuss, approve, promulgate laws
 - ◆ Lack of reference frameworks
 - ◆ See AGID (Italy)

-
- Basic horizontal services (Italy)
 - ◆ SPID (digital identity)
 - ◆ PagoPA (electronic payments)
 - ◆ IOApp (interaction with PA on smartphone)
 - ◆ PEC (certified email delivery)
 - ◆ (digital signature service)
 - ◆ (public cloud)

Segmentations by vendors

- Categories of processes and related supporting IT modules
- Developed by IT vendors

Segmentation (Sap, automotive)

Sustainable Product Innovation 4 Solutions 	Manufacturing and Logistics <u>3 Solutions</u> 	Responsive Supply Networks 5 Solutions 	Marketing, Sales and Aftermarket 4 Solutions 	Smart Mobility and Transportation 2 Solutions 
Human Resources 4 Solutions 	Finance 6 Solutions 	Procurement 9 Solutions 		
Analytics 3 Solutions 	Application Platform and Infrastructure 4 Solutions 	Database and Data Management 4 Solutions 	IT Management 2 Solutions 	Security Software 2 Solutions 
IoT Business and Technology Services 3 Solutions 				

Sustainable Product Innovation	Manufacturing and Logistics	Responsive Supply Networks	Marketing, Sales and Aftermarket	Smart Mobility and Transportation
Project and Portfolio Management	Operational Procurement and Inbound Logistics for Direct Material	Sales, Inventory, and Operations Planning	In-the-Moment Marketing	Mobility as a Service
Compliant Product Lifecycle Management	Responsive Manufacturing	Demand Management and Insights	Empowering Sales to Sell More	Intelligent Transportation Systems
Asset Management	Outbound Logistics	Transportation Management	Omnichannel Commerce	
Environment, Health, and Safety		Warehouse Management	Customer Service Excellence	
		Logistics Networks		

Human Resources	Finance	Procurement
Core Human Resources and Payroll	Financial Planning and Analysis	Sourcing and Contract Management
Talent Management	Accounting and Financial Close	Operational Procurement
Time and Attendance Management	Finance Operations	Supplier Management
Human Capital Analytics	Treasury Management	Inventory and Basic Warehouse Management
	Enterprise, Risk, and Compliance	External Workforce Management
	Cybersecurity and Data Protection	Services Procurement
		Invoice and Payables Management

Segmentations by vendors

Automotive-Supplier - (Edition 2004)

Enterprise Management	Strategic Enterprise Management		Management Accounting	Financial Accounting	Corporate Governance	Financial Supply Chain Management		Business Analytics
Marketing, Sales & Services	Marketing	Sales	Transportation Planning & Delivery			Service	Warranty	Analytics
Product Lifecycle Management	Define Strategy & Concept		Verification of Concept	Prototyping Phase	Preproduction Phase	Product Data Management		Lifecycle Support
Supply Chain Management and Procurement	Operational Procurement		Supplier Relationship Management		Inbound Logistic	Billing	Vendor Performance	Event Management
Manufacturing (Make to Order to Stock)	Supply Planning	Manufacturing Execution		Supply to Line	Inventory Management	Quality Management		Event Management
Order Management	OEM Relationship Management (ORM)			Sales Planning	Sales Execution		Billing and Receipt Settlement	
Service	Demand Planning & Forecasting		Supply Network Planning		Sales & Delivery	Manufacturing	Procurement	Lifecycle Logistics
Business Support	Employee Life-Cycle & Transaction Management		Procurement	Financial Supply Chain Management		Fixed Asset Management		Environment, Health & Safety

Segmentation, car rental

	Marketing and Customer Management	Products	Rentals Management	Rental Fleet Logistics	Business Administration
Plan	Customer Segmentation	Rental Product Strategy	Location and Channel Strategy	Fleet Strategy	Corporate / LOB Strategy
	Customer Relationship Strategy	Product Development/ Design	Location Design and Layout	Fleet Planning	Financial Management and Planning
	Marketing Strategy and Planning		Channel Design and Layout	OEM Relationship Planning	Real Estate Planning
Manage	Customer Behavior Modeling	Promotions Management	Channel and Location Profitability	OEM Performance Management	Alliance Management
	Market and Competitor Research	Pricing Management	Location Operations Management	Inbound Logistics	Business Performance Reporting
	Segmentation Management		Reservations Management		Legal and Regulatory Compliance
	Call Center		Workforce Management		Real Estate and Construction Management
					Risk Management
	Campaign Management				Stock Ledger
Execute	Customer Service	Purchasing/ Sourcing	Rentals and Reservations	Location Operations	HR Administration / Payroll
	Preferred Member Management	Demand Forecasting	Time and Attendance	Fleet Servicing	Corporate Audit
	Customer Communications			Fleet Management	Corporate Accounting (GL, AP, A/R, Treasury, etc.)
	Mass Marketing and Advertising				Indirect Procurement
	Target Marketing				PR and Investor Relations
					IT Systems and Operations

Segmentation, waste management

Enterprise Management	Strategic Enterprise Management	Business Analytics		Business Intelligence & Decision Support		Accounting		Alignment
Customer Relationship Management	Marketing			Sales			Service	
Waste Logistics	Container Management	Fleet Management	Labor Management	Disposal Facilities	Waste Classification	Legal Permissions & Approvals	Traceability & Legal Reporting	
Waste Services	Industrial & Commercial Waste	Municipalities & Residential Waste		Cleaning & Winter Maintenance		Loose & Bulk Waste		Other Services
Waste Processes	Order Creation	Resource & Capacity Planning		Order Output		Confirmation: Weighing & Completion		Interfaces to External Systems
Revenue Management	Billing		Guarantor Billing		Third Party Billing		Invoicing	Receivables Management
Business Support	Human Resources Operations Sourcing & Deployment	Procurement	Financial Supply Chain Management	Treasury Corporate Finance Management	Fixed Asset Management	Real Estate	Industrial Hygiene & Safety	Occupational Health

Segmentation by vendor

- Previous examples by SAP
- Similar available by Oracle, ..
- Of course
 - ♦ Non neutral
 - ♦ Non standard
 - ♦ Non interoperable

Segmentation by integrators

- Accenture, HP, IBM, PriceWaterhouse..
- Private non disclosed know how of the companies
- Often matching the ones of vendors

Open segmentations

- Efforts to define open, public segmentations
 - ♦ Business process management initiative – EU
 - www.bpmi.org
 - ♦ Open process handbook initiative – US
 - www.mit.edu

Summary

- High level models classify business processes using different criteria
 - ◆ Business functions and organization levels
 - ◆ Support, management, primary
 - ◆ Business domain
 - ◆ Segmentations by domain
- Business processes are not described in detail
- However these models are important to provide a holistic view, to drive analysis and design of ISs