

# Definition and views of Information Systems



- IS – Definition, larger scope
  - ♦ System to store and process information used by organizations
    - Includes paper, people, computers and software
- (CB)IS – Definition, reduced scope
  - ♦ Computer based system to store and process information used by organizations
  - ♦ Also known as CBIS (Computer based IS)



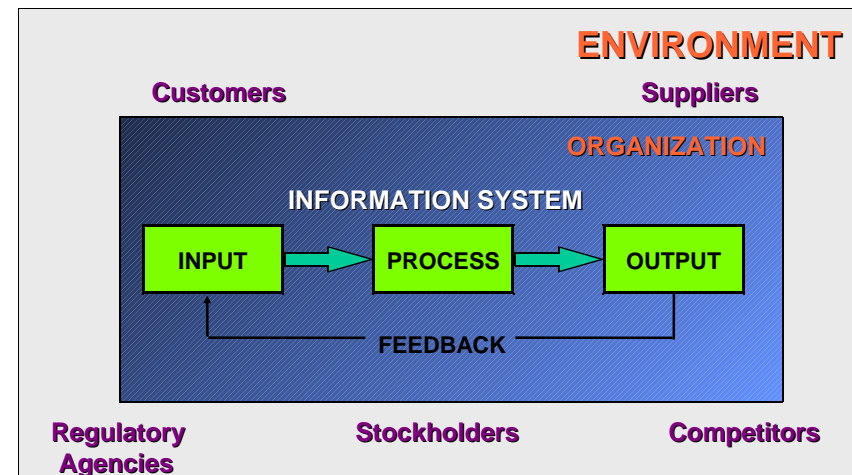
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- IS – Definition, Laudon
- Interrelated components working together to
  - ♦ collect, process, store, and disseminate
- information to support
  - ♦ decision making, coordination, control, analysis, and visualization
- in an organization



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## IS, high level functions



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- **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

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- **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

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## Data vs. information

- **Information**

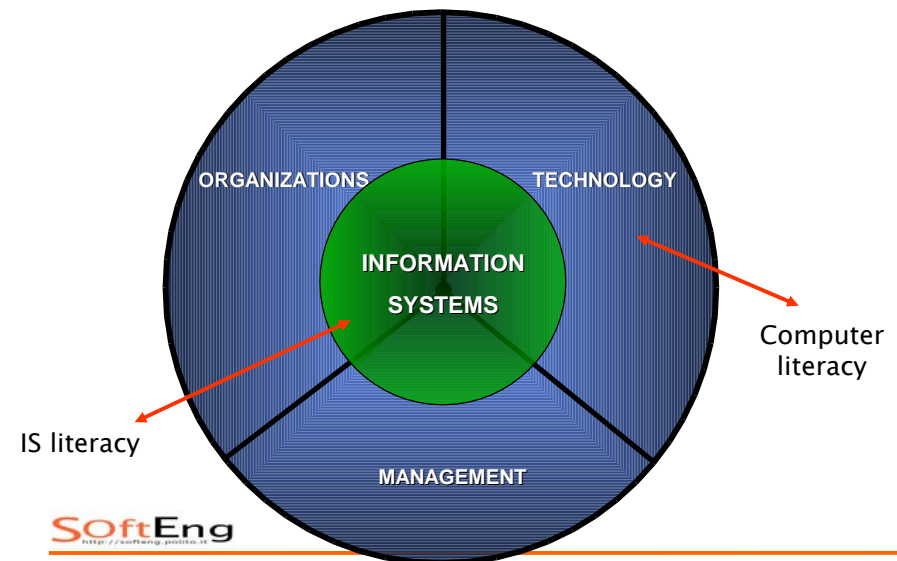
- ♦ Data that have been shaped into a form that is meaningful and useful to human beings in processes such as decision making

- **Data**

- ♦ Streams of raw facts representing events occurring in organizations (e.g. business transactions) or the physical environment before they have been organized and arranged into a form that people can understand and use

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## Information systems



## Organizations

- People
  - ♦ Managers, knowledge workers, data workers, production or service workers
- Structure
  - ♦ Organization chart, geography, groups of specialists, products
- Business function
  - ♦ Special task performed in a business organization
- Business process

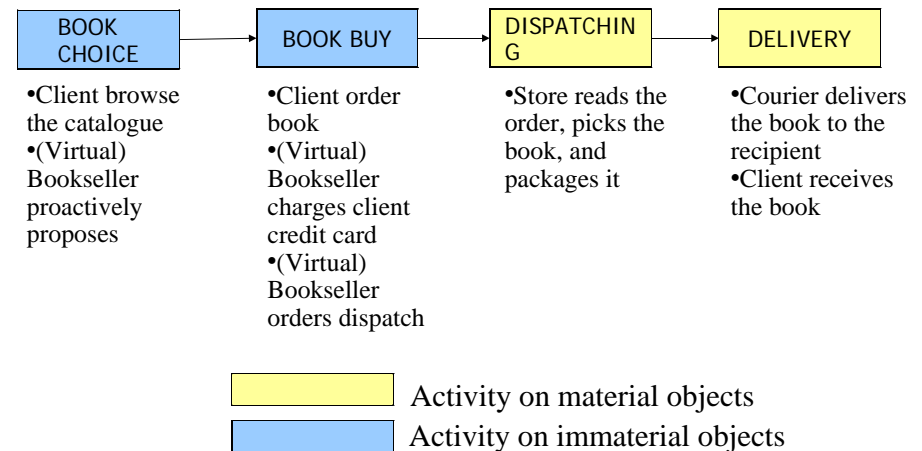
## Major business functions

- Manufacturing
  - Sales & marketing
  - Finance
  - Accounting
  - Human resources
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- Software integrates all facets
    - ♦ Planning, manufacturing, inventory, sales, finance, accounting

## Business process

- The unique ways in which organizations coordinate and organize work activities, information, and knowledge to produce a product or service

## Example business process



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## Views on IS

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## Views on IS

- Computer system view
  - ♦ Application view
  - ♦ Technological view
- Logical view
  - ♦ Process/activity view
  - ♦ Functional view
  - ♦ Data/information view
- Organizational view

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## Application view

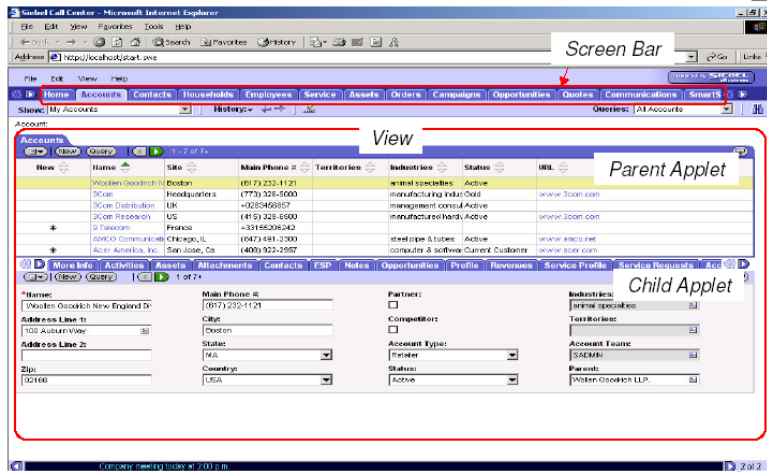
- IS as software at application level, with three layers
  - ♦ Data
  - ♦ Presentation
    - Interaction with end user via GUI (or character based forms)
  - ♦ Business rules
    - Algorithms and rules to process, control and extract data
- ♦ cfr. three tier architecture in technological view

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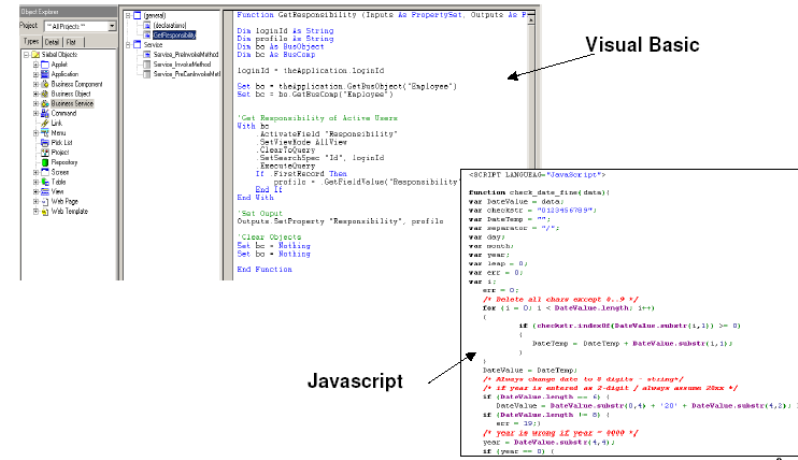
## Example

Presentation layer	Rule layer	Data layer
Show GUI screen "Withdrawal request": Acquire data entered by the customer	IS the required amount between the valid thresholds	Access to data tables and read thresholds
Show a message "Correct/Cancel"; Acquire data from customer	If the request is not valid require to correct or cancel; if then the input is cancel, stop processing, otherwise read the value of the account	Access to data tables and read values
Show a message; Acquire data from client	If the request is greater than the account ask to correct or cancel and re-read the value; if then the choice is to cancel stop processing, otherwise update the account value	Access to data tables and change values

# Ex: presentation, customer data



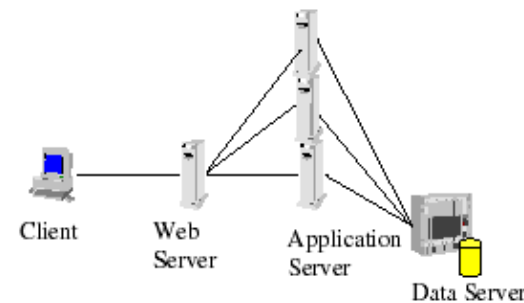
# Ex: business rules



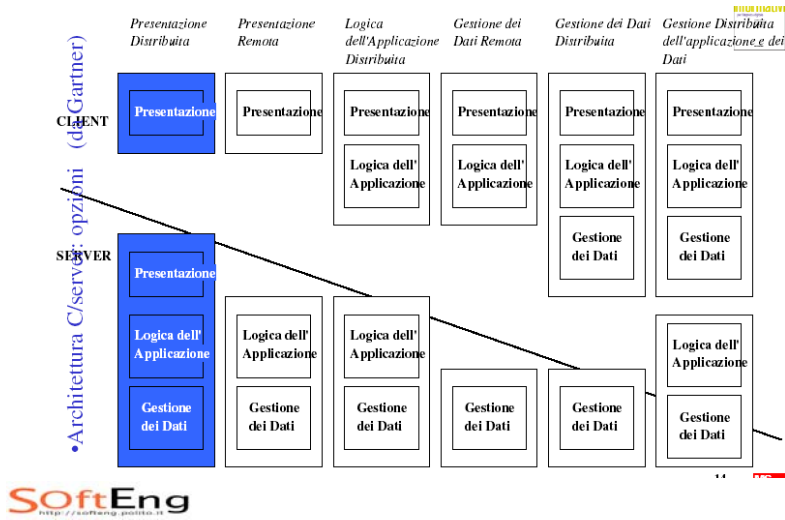
# Technological view

- IS as hardware systems and their connections
- Client server architectures
  - ♦ Two tiers
    - Data + application server;
  - ♦ Three tiers
    - Data server, application server (business rules), presentation server
  - ♦ ...

# Three tiers



# CS - fat to thin client



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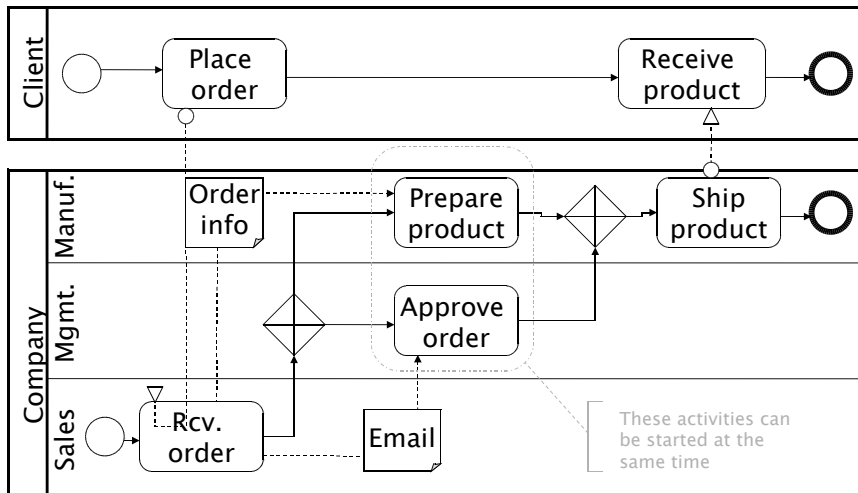
# Logical view

- IS as functions to be offered
  - ♦ Disregarding how implemented
  - ♦ Process view
    - UML activity diagram
    - DFD
  - ♦ Information view
    - UML class diagram
  - ♦ Functional view
    - UML use cases
    - DFD

SoftEng

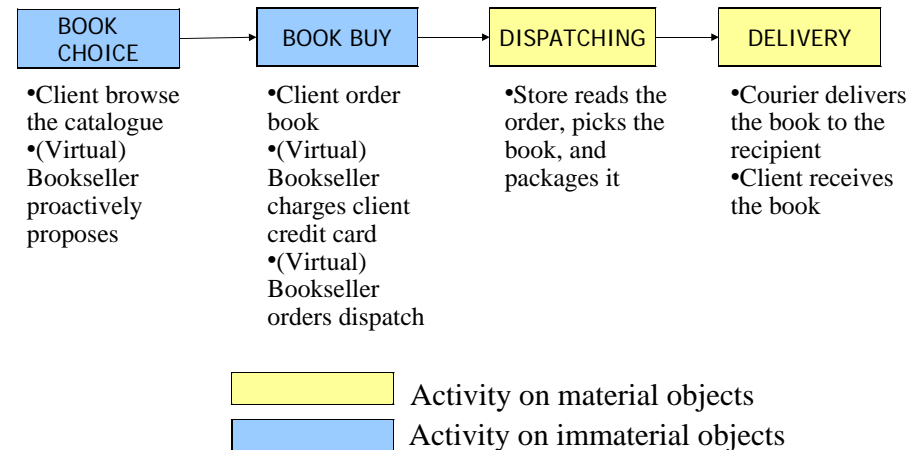
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# Process view



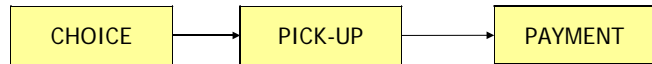
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# Ex: buy book, internet



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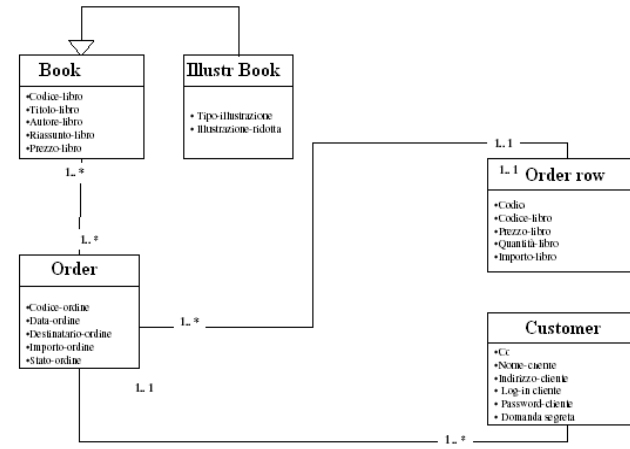
# Ex: buy book, bookstore



- CHOICE**
  - Customer looks into bookstore shelves
  - Bookseller helps the customer
- PICK-UP**
  - Customer (or bookseller) takes the book from shelf
- PAYMENT**
  - Bookseller packages the book and accepts payment

Activity on material objects  
 Activity on immaterial objects

# Information view

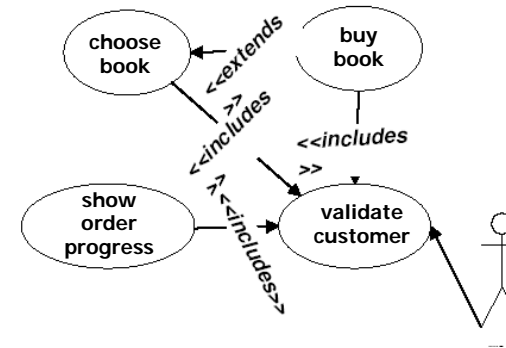


# Information view

## Types of Information

IS type	Anagraphical data	Dynamic data	Indexes
Warehouse management	<ul style="list-style-type: none"> <li>• Materials</li> <li>• Locations</li> </ul>	<ul style="list-style-type: none"> <li>• Storage</li> <li>• Turnover</li> </ul>	<ul style="list-style-type: none"> <li>• Turnover</li> <li>• Storage</li> </ul>
Bank account	<ul style="list-style-type: none"> <li>• Customers</li> <li>• Accounts</li> </ul>	<ul style="list-style-type: none"> <li>• Account balance</li> <li>• Account turnover</li> </ul>	<ul style="list-style-type: none"> <li>• Turnover</li> <li>• Customer balance</li> </ul>
Gas accounting	<ul style="list-style-type: none"> <li>• Customers</li> <li>• Price table</li> </ul>	<ul style="list-style-type: none"> <li>• Consume</li> <li>• Payment balance</li> </ul>	<ul style="list-style-type: none"> <li>• Consume stats</li> <li>• Customers</li> </ul>
Customer order processing	<ul style="list-style-type: none"> <li>• Products</li> <li>• Customers</li> <li>• Price table</li> </ul>	<ul style="list-style-type: none"> <li>• Orders</li> <li>• Product store</li> </ul>	<ul style="list-style-type: none"> <li>• Customer prefs</li> <li>• Customers</li> </ul>
Public services	<ul style="list-style-type: none"> <li>• Citizens</li> <li>• Certificates</li> <li>• Price tables</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate requests</li> </ul>	<ul style="list-style-type: none"> <li>• Service</li> <li>• Citizens</li> </ul>

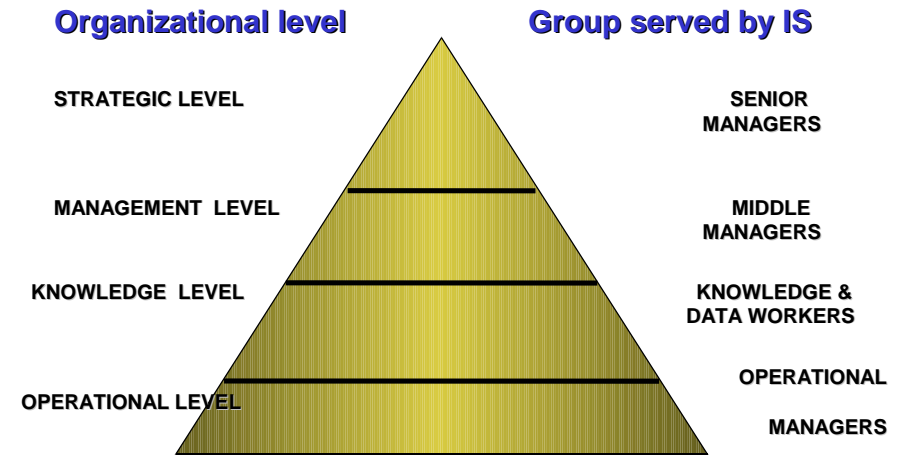
# Functional view



## Organizational view

- IS as service offered to organizational level (and group) of organization

## Organizational view



## Example of process/levels

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

## Example of process/levels

- Bank:
  - ♦ **Operational** – management of accounts
  - ♦ **Management** – review of negative balances
  - ♦ **Strategic** – assess performance of a service, decision to activate a new service

# Example of process/levels

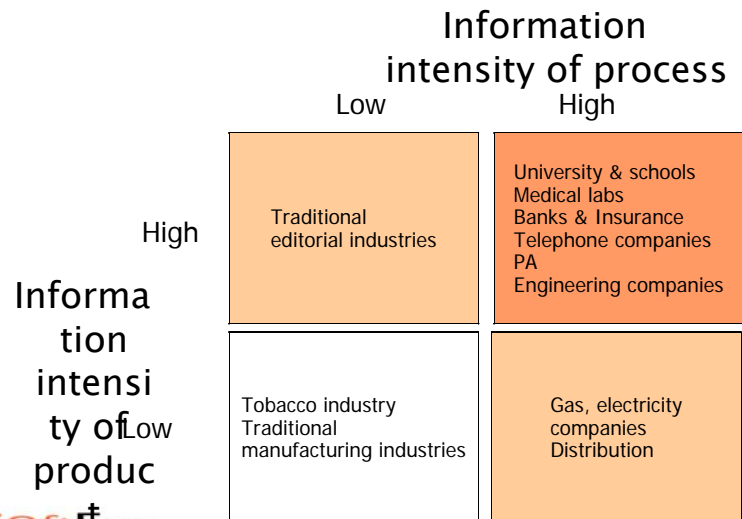
- Company:
  - ♦ **Operational** - recording of orders
  - ♦ **Management** - check weekly budget vs. actual
  - ♦ **Strategic** - select most promising market areas

# Operational level

- Importance of IS = f (IO, IP)
  - ♦ IO - Information intensity of product
  - ♦ IP - Information intensity of process

[Porter Millar 1985]

# Operational level



# Management level

Management IS: Information for control

Type of values: effective, budget

Indexes	2 <sup>nd</sup> 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
<b>Margin 1</b>	<b>530</b>	<b>480</b>	<b>1300</b>	<b>850</b>	<b>255</b>	<b>1045</b>
amortizations	200	200	420	420	191	229
other costs	200	225	400	450	182	218
other items	20	20	41	40	19	22
<b>GAIN</b>	<b>110</b>	<b>35</b>	<b>439</b>	<b>-60</b>	<b>-137</b>	<b>576</b>

Timing

Aggregated and derived information

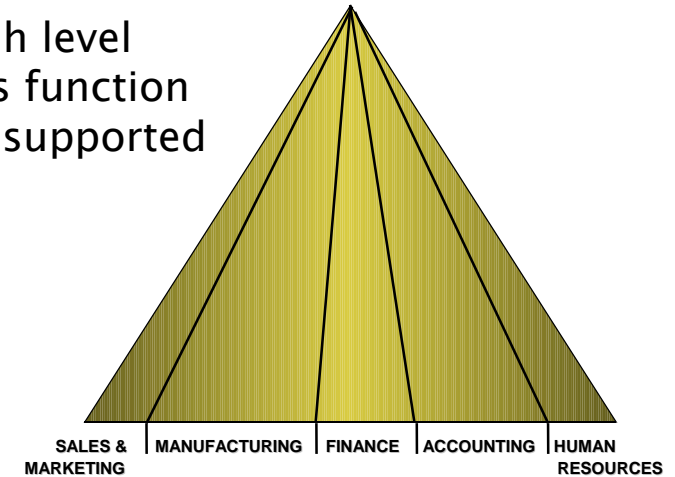
# Strategic level

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

Sector	Number of usual customers (order of magnitude)	Example of analysis (indexes)
Telephony (ex European monopolists)	More than 10 Milion	<ul style="list-style-type: none"> <li>• Profitability</li> <li>• Behavior / preferences</li> </ul>
Bank (large banks)	More than 1 Milion	<ul style="list-style-type: none"> <li>• Profitability</li> <li>• Behavior / preferences</li> </ul>
Electricity and gas (European monopoly)	Between 100.000 and 1 Milion	<ul style="list-style-type: none"> <li>• Profitability</li> <li>• Behavior / preferences</li> </ul>
PA / Finance (Europe)	More than 10 Milion	<ul style="list-style-type: none"> <li>• Sectorial study</li> <li>• Segmentation of customer</li> <li>• Identify potential</li> </ul>
Distribution	Between 100.000 and 1 Milion	<ul style="list-style-type: none"> <li>• Behavior / preferences</li> </ul>

# Business function view

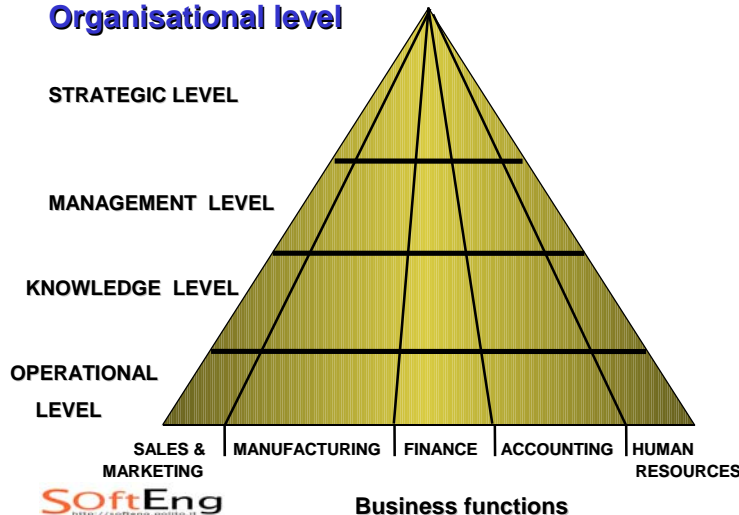
- IS as high level business function offered/supported



Business functions

# Anthony's pyramid

## Organisational level



Business functions

# Wrap-up session

- Definition of information systems
  - ♦ Represent an organizational and management solution based on IT
  - ♦ Transform raw data into useful information
  - ♦ Collect, store, and disseminate information from an organization's environment and internal operations to
  - ♦ Support organizational functions, communication, coordination, control, analysis, and decision making

## Wrap-up session

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- Role of information systems
  - ♦ Provide tools for conducting trade and managing businesses on a global scale
  - ♦ Are the foundation of new knowledge-based products and services
  - ♦ Make it possible for businesses to adopt flatter, more flexible, more decentralized structures

## Wrap-up session

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- Benefits of IS
  - ♦ More efficiency and effectiveness
  - ♦ Support to externalization of activities/processes
  - ♦ Support to delegation and decentralization
  - ♦ Reduction of control and coordination costs
  - ♦ Higher control width and lower hierarchical depth
  - ♦ Reduction of administrative jobs
  - ♦ Supports teamwork

## Wrap-up session

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- Challenges of information systems
  - ♦ Understanding the system requirements of a **global** business environment
  - ♦ Designing systems and IT infrastructure that people can control, understand, and **use** (support to the organization's goals)
  - ♦ Determining the business **value** of information systems

## Why learning IS?

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- Most organization need information system to survive and prosper
- Information system knowledge is essential for managers
  - ♦ IS directly affect how managers decide, plan, and manage their employees
  - ♦ Responsibility for systems cannot be delegated to technical decision makers

# Why learning IS?

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- Most organization need information system to survive and prosper
- Information system knowledge is essential for IS designers
  - ♦ Understand system requirements of global business environment
  - ♦ Create information architecture that supports organization's goals
  - ♦ Design competitive & efficient systems