TECNOLOGIES FOR INFORMATION SYSTEMS

INTRODUCTION

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Course info

- Prof. Letizia Tanca
  - Receiving time: watch PoliSelf
    - currently Wednesdays 14:30-16:30, email: tanca@elet.polimi.it
  - tel: 02-2399-3531, fax: 02-2399-3411
  - Personal web site: http://tanca.dei.polimi.it containing:
    - The course page
    - Information on my group's research interests, for students who are interested in projects (PROBLEM ANALYSIS ATELIER - Progetto di Sistemi Pervasivi) and theses

- Esercise sessions: eng. Paolo Garza: garza@elet.polimi.it

COURSE PROGRAMME

THE LECTURES WILL DEAL WITH THE FOLLOWING TOPICS, NOT NECESSARILY IN THIS ORDER

1. Information System Architectures and Heterogeneous-System Integration: structured and non-structured data (10 hrs lectures, 5 hrs exercises)
   - model heterogeneity
   - semantic heterogeneity
   - dynamic data integration
   - meta-models
   - wrappers and mediators
2. Data Analysis (10 hrs lectures, 6 hrs exercises)
   - Data Warehouse Architecture and Design
   - Data Mining and its Applications
3. Time Representation and Management in Information Systems (6 hrs lectures)
   - Time Ontology
   - Temporal Databases
4. Designing Web Applications: a model-.based approach (8 hrs lectures, 5 hrs exercises)
   - data model
   - hypertext model
   - content management model
5. Seminars on advanced topics (for students who are interested in projects or thesis)

CLASS HOURS: 32 lecture hours; 16 exercise session hours

FURTHER INFORMATION

- Prerequisites: Data bases I and Data bases II
- The course is completely offered in English
- The exam IS WRITTEN and consists of design exercises and questions on theoretical topics
- It is possible for the students to develop a project on these topics, under the guidance of the Technologies for Information Systems' teachers, within the course PROBLEM ANALYSIS ATELIER (Progetto di Sistemi Pervasivi)
- Possible follow-up course:

<p style="text-align:center; color:red">PERVASIVE INFORMATION SYSTEMS</p>

SUPPORT MATERIALS

COURSE WEB SITE:

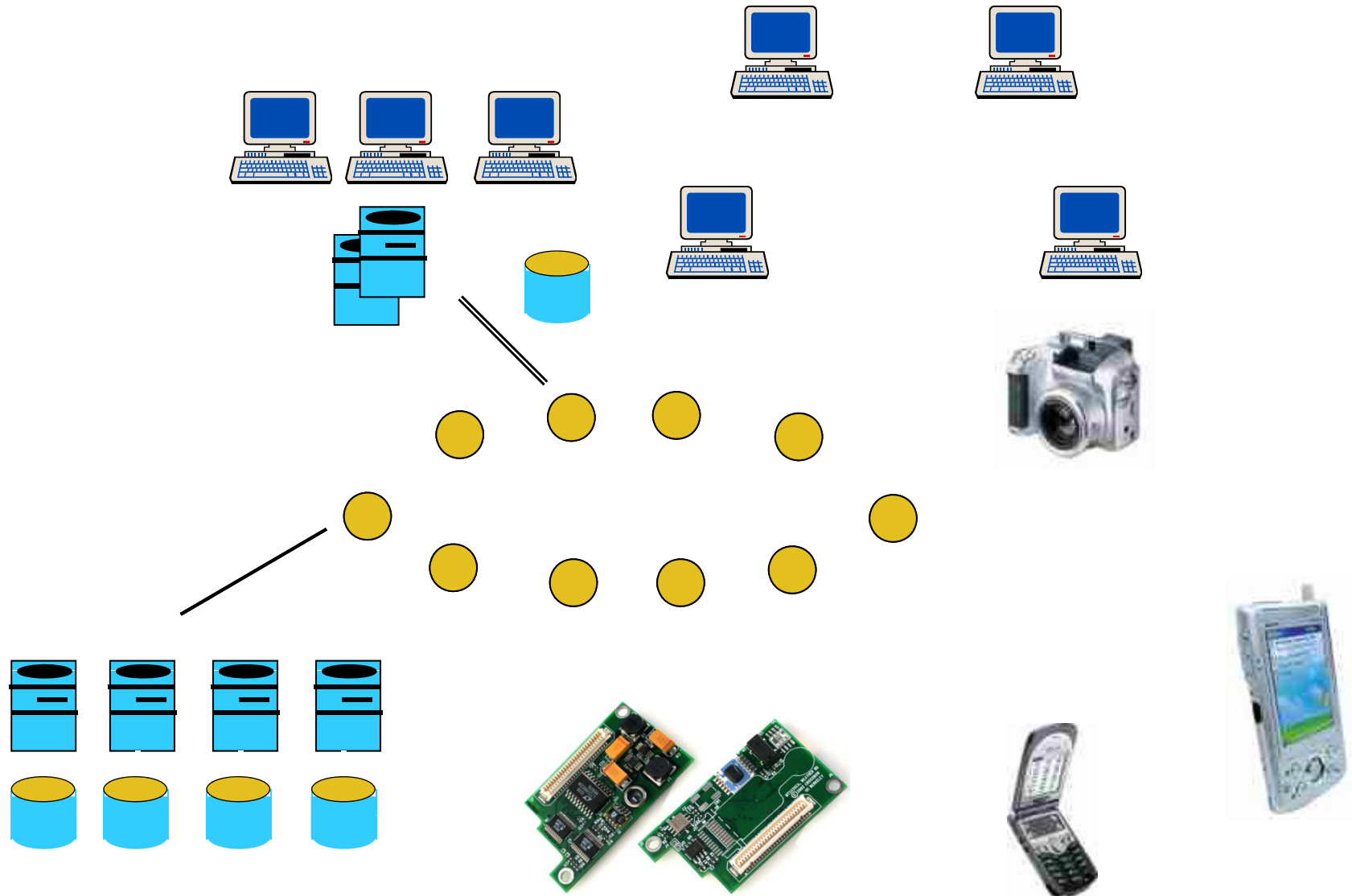http://tanca.dei.polimi.it/index.php?option=com_content&view=category&layout=blog&id=35&Itemid=56

AVAILABLE SUPPORT MATERIALS

- COURSE PROGRAM
- DETAILED LECTURE CALENDAR
- BIBLIOGRAPHICAL REFERENCES
- LECTURE SLIDES
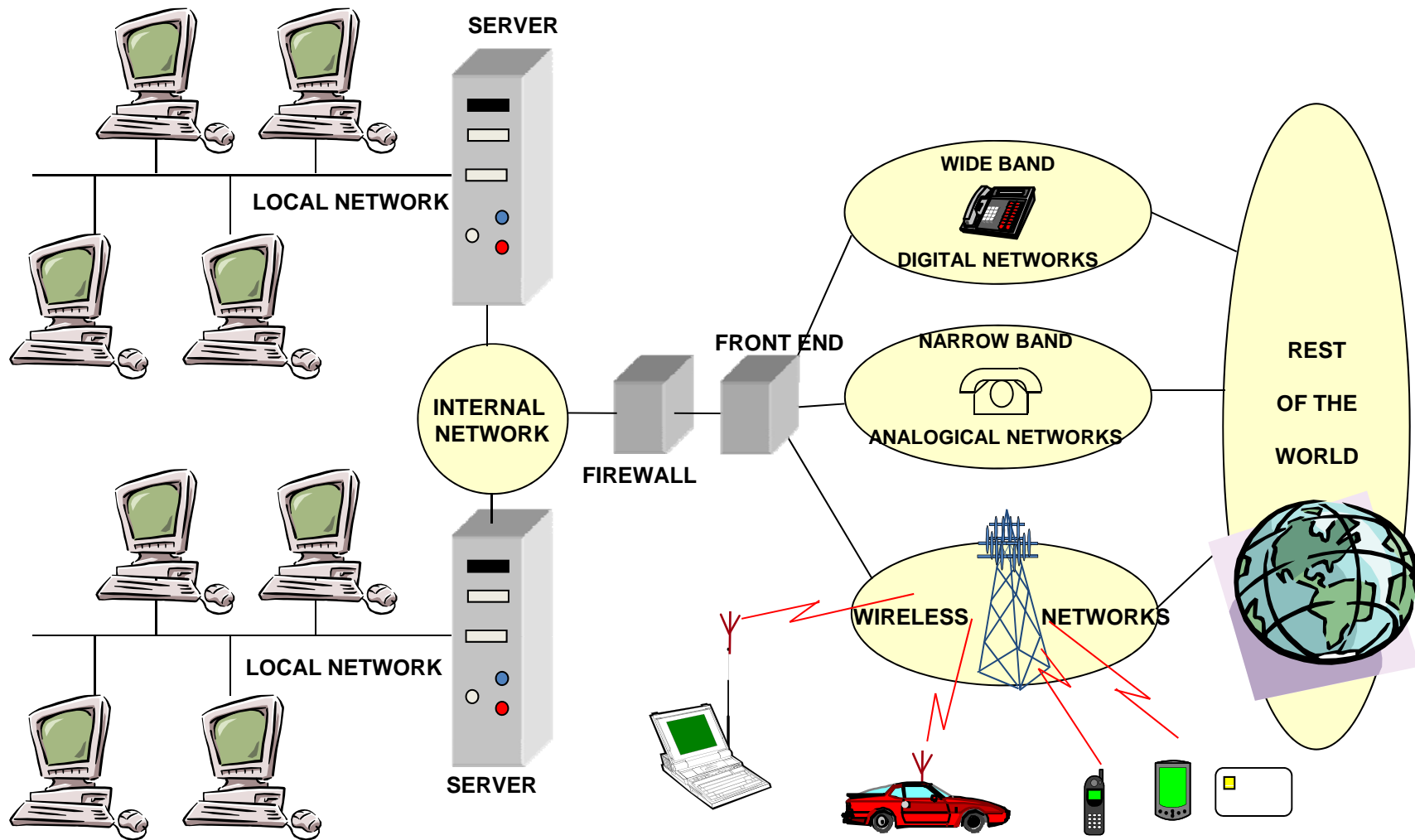- PROJECT SEMINAR SLIDES
- SOME EXERCISES

Consulting this material is a necessary, but not a sufficient condition, for passing the final examination.

Individual study of the suggested bibliography is a must

COMPLEX INFORMATION SYSTEMS
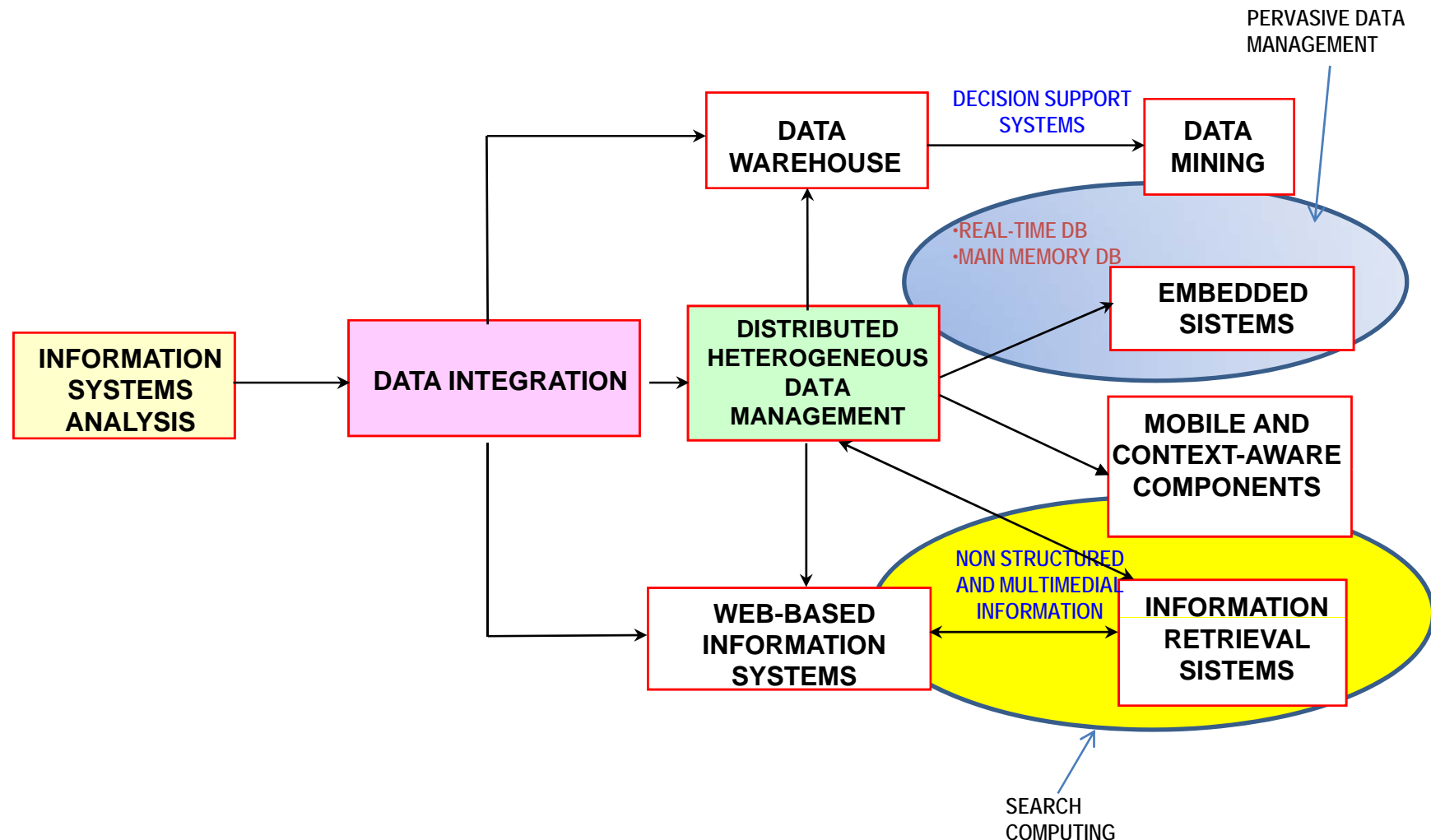
THE ARCHITECTURE OF A MODERN INFORMATION SYSTEM

SERVER

LOCAL NETWORK

INTERNAL NETWORK

FIREWALL

FRONT END

WIDE BAND

DIGITAL NETWORKS

NARROW BAND

ANALOGICAL NETWORKS

WIRELESS NETWORKS

REST OF THE WORLD

LOCAL NETWORK

SERVER

INFORMATION MANAGEMENT TECHNOLOGIES

INFORMATION SYSTEMS ANALYSIS

DATA INTEGRATION

DATA WAREHOUSE

DECISION SUPPORT SYSTEMS

DATA MINING

PERVASIVE DATA MANAGEMENT

DISTRIBUTED HETEROGENEOUS DATA MANAGEMENT

•REAL-TIME DB
•MAIN MEMORY DB

EMBEDDED SISTEMS

MOBILE AND CONTEXT-AWARE COMPONENTS

WEB-BASED INFORMATION SYSTEMS

NON STRUCTURED AND MULTIMEDIAL INFORMATION

INFORMATION RETRIEVAL SISTEMS

SEARCH COMPUTING

THE NEW TECHNOLOGICAL ENVIRONMENT (1)

- **DISTRIBUITED SYSTEMS ON COMPUTER NETWORKS**
  - **EASE OF ACCES, INTEROPERABILITY**

- **MULTIPROCESSOR, PARALLEL SYSTEMS**
  - **PERFORMANCE SCALABILITY**

THE NEW TECHNOLOGICAL ENVIRONMENT (2)

- **NEW TECHNOLOGIES FOR DATA MANAGEMENT**

  - **HOMOGENEOUS DISTRIBUTED DATABASE**
  - **DATA WAREHOUSE**

- **INTERNET CONNECTED SYSTEMS**

  - **WORLD-WIDE-WEB: THE BEST INFORMATION ACCESS INTERFACE**

    - **HETEROGENEOUS INTERCONNECTED SYSTEMS**
    - **MOBILE COMPONENTS**

THE NEW TECHNOLOGICAL ENVIRONMENT (3)

- THE MASSIVE INTERNET WIDESPREADING INFLUENCES INFORMATION SYSTEMS AS TO
    - NO MORE INFORMATION SEARCH AND RETRIEVAL IN A SINGLE DATA BANK, BUT IN EVERY NETWORK NODE

    - INTERNET/WWW ARCHITECTURE USED ALSO FOR INTRA/INTER-COMPANY INFORMATION SYSTEMS
        - INTRANET
                    +
        - EXTRANET
                    =
        - INTERNET

- INTEGRATION NEED AMONG THE WEB TECHNOLOGY AND TRADITIONAL OLTP

THE NEW TECHNOLOGICAL ENVIRONMENT (4)

THREE-TIER ARCHITECTURES

- PRESENTATION
  - BROWSER (Netscape Navigator, Internet Explorer, ecc.)
  - CLIENT

- FUNCTIONAL
  - APPLICATION AND NETWORK MANAGEMENT FUNCTIONS
  - WEB SERVER

- DATA
  - DBMS
  - BACK END

THE NEW TECHNOLOGICAL ENVIRONMENT (5)

- USE OF MOBILE DEVICES

  - TYPE AND POWER OF THE DEVICE (smart cards, cell phones, PDAs, portable PC, …)

  - OPERATING ENVIRONMENT VARIABILITY (proprietary, intranet/internet, …)

  - ACCURATE AND COHERENT SPATIO/TEMPORAL PERCEPTION OF SERVICE STATE AND QUALITY (QoS)

  - MULTICANALITY

THE NEW APPLICATION ENVIRONMENT (1)

INTERNET COMMERCIAL APPLICATIONS
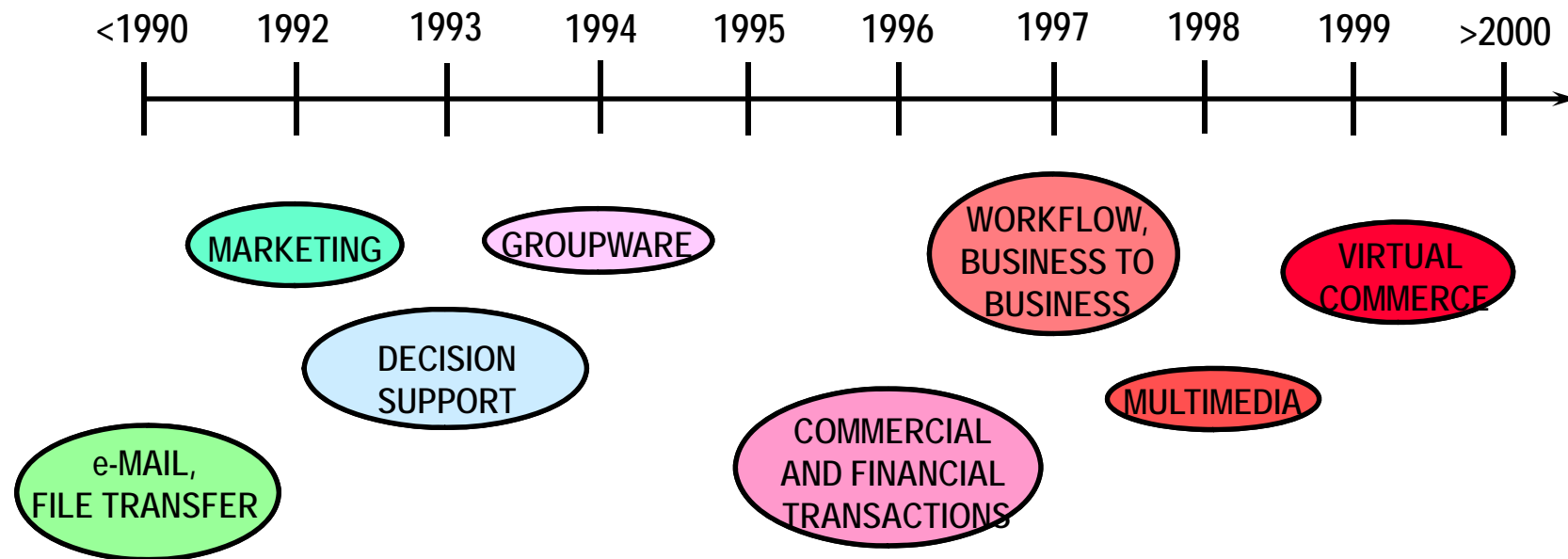
THE NEW APPLICATION ENVIRONMENT (2)

- A VERY LARGE NUMBER OF LARGE DATA SOURCES

- GENERALLY HIGHLY VARIABLE AND VOLATILE DATA (ES. WEB)

- HIGHLY HETEROGENEOUS DATA SOURCES

- DIFFERENT DATA STRUCTURING LEVELS
    - DATABASES WITH DIFFERENT UDERLYING MODELS (RELATIONAL, OBJECT ORIENTED, LEGACY...)
    - SEMI-STRUCTURED DATA (XML, HTML, OTHER TAGGING SYSTEMS...)
    - NON-STRUCTURED DATA (TEXT, IMAGE, SOUND, ETC...)

- DIFFERENT TERMINOLOGIES AND CONTEXTS

THE NEW APPLICATION ENVIRONMENT (3)

- **PERSONALIZATION AND CONTEXT AWARENESS**

  THE SYSTEM CAPABILITY OF IDENTIFYING AN ENVIRONMENTAL SITUATION AND TO ADAPT TO IT IN ORDER TO BE APPLICATION-EFFECTIVE
  - POSITION
  - TIME
  - INTEREST TOPICS
  - PROFILE VARIABLES
  - SOCIAL VARIABLES
  - NOISE LEVEL
  - PRIVACY CONSTRAINTS
  - ………………………

DATA INTEGRATION

Combining data coming from different data sources, providing the user with a unified vision of the data