Structure of the Lecture

Unit 1: Introduction
Unit 2: Central Processing Units
Unit 3: Storage and Data Structures
Unit 4: Input and Output Devices
Unit 5: Software
Unit 6: Networks, Data Interchange, and the Internet
Unit 7: Design, Development, Deployment, and Operations of Information Systems
Unit 8: Office Applications
Unit 9: Enterprise Applications
Unit 10: Supply Chain Applications and E-Business
Unit 11: Management Information Systems
Unit 12: Exam Review
Assignment from Last Week

• WI1, pp. 771-835; IBIS, pp. 197-222
• Review the slides

WI1 = Hansen/Neumann: Wirtschaftsinformatik 1; WI2 = Hansen/Neumann: Wirtschaftsinformatik 2; IBIS = Wigand et al: Introduction to Business Information Systems.

Link to the Previous Unit

• Last Unit:
  – Why is it beneficial to integrate business processes not only inside a single enterprise, but also with respect to suppliers and customers?
  – What is Supply Chain Management and E-Business, and what are the technical approaches for the realization of these two visions?

• Today:
  – How are the information needs of the various levels of management different from those at the transactional level?
  – What types of software and techniques are used for supporting managerial decision making?
Structure of the Unit

• Overview and Examples
• Query and Reporting Systems
• Management Support Systems
• Executive Information Systems
• Data Storage and Processing

Information Needs of the Management

• Top Management: Strategic decisions
  – High impact
  – High degree of uncertainty
  – Medium to long-term
• Middle Management: Implementing strategy
• Operational Management: Recurring decision-making on similar issues
Example: Sausage Factory

- **Task:** A sausage factory must decide about one week in advance how many fresh sausages will be sold the upcoming Saturday
- **Problem:** The actual sales will depend on a complex blend of variables
  - Weather
  - Public holidays
  - Sports events

Example: Routing in Transport Business

- **Traveling Salesman Problem (TSP):**
  
  *If a salesman starts at a given city, which one is the shortest roundtrip through a set of cities, given that the distance from any city to any other one is known*

- **Extensions**
  - Capacity constraints
  - etc.
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Query and Reporting Systems

- **Query**: Specification of a question to be sent to a database
- **Report**: Selection and presentation of a set of interesting facts, often periodically

(Cf. Hansen/Neumann; Gluchowski et al.)
Periodic Reports

- Pre-defined, highly structured types of reports that are generated automatically at regular intervals.

- Examples:
  - Sales overview
  - Financial

Exception Reports

- Reports that are generated automatically if certain parameters exceed pre-defined upper or lower limits

Customer Credit Line Exceeded!

Customer: Peter Miller
Approved Credit: $ 5,000
Current Balance: $ -5,350
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Management Support Systems

- Decision Support Systems
- Analytical Information Systems
Decision Support Systems (DSS)

- Supports domain experts in decision-making in complex scenarios
  - Many relevant variables
  - High degree of uncertainty

Key Performance Indicators (KPI)

- Single values or ratios that carry a lot of information on the state of business affairs.
- Examples:
  - Total sales per day
  - Defective parts ratio
  - Turnover per staff member
- SMART Guidelines
  - Specific
  - Measurable
  - Achievable
  - Result-oriented
  - Time-based
- Benchmarking: Comparing your own performance with other companies that run similar processes
Forecasting

- Predicting a future state or variable based on
  - experience,
  - data from the past, or
  - simulation.
- Examples:
  - **Sales forecast**: How many sausages will be sold next Saturday?
  - **Price forecast**: How much will a barrel of oil cost in 10 months?
  - **Quality forecast**: How many defective parts will we have to handle if we sell 1000 computers this week?

Simulation

- Analysing complex systems by computing the system behavior for selected input variables
Example: Tool Path Optimization (1)

Simple ordering of hole coordinates by X- and Y-axis.

80% shorter -> ~ 80% production time saved


Example: Tool Path Optimization (2)
Example: Retail Shelf Management

• How should the available shelf space be used, considering profit margins, consumer interest, etc.?


Example: Yield Management for Airlines

• At what price should you offer an available seat?
• Influenced by
  – General demand
  – Special events at target destination
  – Alternative travel connections
  – Etc.
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Executive Information Systems

- Support systems for top-level management
- Query and report system, sometimes plus lightweight DSS
- Focus on „general business environment“ and KPIs
  - Financial state of the enterprise
  - Economic climate
  - Raw materials
  - Quality, capacities, pending orders

Screenshot (C) http://www.accurasoft.com/
Balanced Scorecard

- **Idea:** Method for measuring whether the activities of an enterprise are meeting its strategic objectives

- **Set of Key Performance Indicators (KPIs) for**
  - Financials
  - Customer Relations
  - Internal Process Performance
  - Learning and Growth


http://www.heppnetz.de/teaching/gwi/

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Data Warehouse

- **Idea:** Data from various transaction systems should be continuously copied to a persistent store

- **Motivation:**
  - Data changes, some types of analysis require comparison with previous states
  - Consolidated perspective
  - Analyzing the data should not delay operations

* ETL = Extraction, Transformation, and Loading

Data Mining

- Using statistical methods for spotting significant (i.e., surprising) patterns in data
- Can point to relevant and unknown information
On-Line Analytical Processing (OLAP)

- Ability to answer queries from various perspectives on large data warehouses
- Multi-dimensional databases
- Slicing, dicing, drill-down

Assignment for Next Week

- Review materials for units 1 – 11
Thank you!

The slides and additional materials will be available at

http://www.heppnetz.de/teaching/gwi/