The Impact of Network Technology on Information Systems

Systems - People - Organizations

Prof. Dr. Florian Matthes
Software Systems Institute

f.matthes@tu-harburg.de

A Global Information Society: Chances and Challenges

Learning Objectives

- What is an information system?
- What are major trends in IS development?
- What are contributing research disciplines?
Information Systems

Traditional Perspective
An information system supports cooperative activities
- of employees
- in an organization
- based on codified business rules

Examples
- Manage students at the university
- Run a large manufacturing plant

Cooperation over Time
Lifetime of the data determined by the lifetime of the processes to be supported.

Examples
- Register for a course
- Monitor the progress of a customer order

→ Persistence, Recovery
→ Database Technology
Cooperation in Space

People and systems are distributed physically.

- **Employees** within the organization
- **Customers** and **Business Partners** outside of the organization

**Examples**

- Register online for a course
- Coordinate multiple manufacturing sites

→ **Network Technology**

Software Technology

---

Cooperation in Multiple Modalities

Information systems have to adapt to changing human work practice.

**Examples**

- Batch processing of written student applications
- *Drag&Drop* course allocation with E-Mail notification

→ **Computer Supported Cooperative Work (CSCW)**

Network Technology
### CSCW Space / Time Matrix

<table>
<thead>
<tr>
<th>Same Place</th>
<th>Same Time</th>
<th>Different Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Whiteboard</td>
<td>Computer-Assisted Learning</td>
<td>Shared Calendar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Different Place</th>
<th>Video Conference</th>
<th>Internet Web Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chat Room</td>
<td>E-Mail</td>
<td></td>
</tr>
</tbody>
</table>

### A Specific Example: Our Technical University

#### Customers
- Potential students with a Bachelor degree
- Students enrolled for a Master's programme

#### Employees
- Administration
- Lecturers
- Library
- Boarding house, etc.

**Integrated Information and Communication Support**

![Diagram](image)
international academic programmes

- Challenge in Engineering Sciences
- Master's Programmes
  - Materials Science
  - Mechatronics
  - Information and Communication Systems
  - Process Engineering
  - Application
- Bachelor's Programme
  - Application
- Further Information

Challenge in Engineering Sciences

The increasing globalization of markets requires an increasing internationalization of education. The Technical University of Hamburg-Harburg is prepared to accept this challenge by offering an international academic programme in the engineering sciences which consists of an interdisciplinary bachelor's programme and six master's programmes. These academic courses are characterised by the following features:

information and communication systems

- Challenge in Engineering Sciences
- Master's Programmes
  - Materials Science
  - Mechatronics
  - Information and Communication Systems
  - Process Engineering
  - Application
- Bachelor's Programme
  - Application
- Further Information

The programme comprises a set of compulsory and elective courses which address three more specific areas of the subject:

- Software for Information and Communication Systems
  - Parallel algorithms (1st sem.)
  - Parallel processing (1st sem.)
  - Object-oriented analysis & (1st sem.)
Application Form

International Master's Programmes
Technical University of Hamburg Harburg

I apply for the Programme in
Information and Communication Systems
For the winter term of
1999/2000

Personal Data

Title: Mr.
First name: Fustam
Surname: Kalinichenkow
Sex: Male

Current resident address

Postal address (if not identical to current)

Software Architectures

Lecture
Number: 2612.1002
Professor: Florian Matthes
Time: Friday 14:00 - 15:30
Room: S542 R 1992

Background and Motivation

Software developers have often adopted specific architectural patterns for system organization, but, for the most part, informally. This lecture presents the state of the art in software architectures as an engineering discipline. The focus is on practical and proven models, styles and methods presented from an object-oriented perspective.

Goals

The primary objective of this course is to teach students how to approach software systems from an architectural point of view. By the end of the course, students should be able to
A Cooperative Information System

... supports cooperative activities

• of people
• from multiple organizations
• based on negotiated business rules
• in multiple modalities
• over arbitrary distances

Multi-disciplinary research & development

### Exercises and Exam

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Issued</th>
<th>Return until</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pipe and filter architectures</td>
<td>Fri 6/13/98</td>
<td>Fri 6/19/98</td>
<td>P&amp;E architectures</td>
</tr>
<tr>
<td>2</td>
<td>Event-based architectures</td>
<td>Fri 6/13/98</td>
<td>Fri 6/27/98</td>
<td>Event-based architectures</td>
</tr>
<tr>
<td>3</td>
<td>JDBC relational database access</td>
<td>Fri 7/3/98</td>
<td>Fri 7/17/98</td>
<td>JDBC relational database access</td>
</tr>
<tr>
<td>4</td>
<td>Understanding framework programming</td>
<td>Fri 7/10/98</td>
<td>Fri 7/17/98</td>
<td>--</td>
</tr>
</tbody>
</table>

Candidates and Exam Dates

Please have a look at the large number of online material, books and tutorials on Java.

### Recommended Reading

- Mary Shaw, David Garlan: Software architecture, perspectives on an emerging
Success Factors in a Global Information Society

- **Technology:** Networks and Information Systems
- **Organizations:** Change Management and New Alliances
- **People:** Knowledge and Communication Skills