Hochschule Esslingen
University of Applied Sciences

Module “Information Systems (InfoSys)" Information regarding Project

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Learning Objectives

- To apply and train project management techniques and social skills
- To get familiar with the Database System Development Lifecycle (DSDLC) by
  - analysing a given application area
  - collecting and analysing requirements from a “customer”
  - designing a conceptual, logical and physical data model
  - implementing a data model, constraints and business rules
  - designing and implementing a user interface
  - testing the application
- To get familiar with CASE-tools (Innovator, Toad)
- To experience advantages and disadvantages of CASE-tools
- To get experience with rapid prototyping by using MS Access

Project Goal

- The goal of the project is

  „A database application for the planning and reporting of teaching at the IT department of Esslingen University“

- Motivation:
  Each semester somebody has to plan and report about which lecturer is teaching which lecture, lab, ... taking a large number of constraints into account.

Organisational Issues

- Project work in teams of 4-6 students (depending on the total number of students)
- Regular project meetings of the individual groups (to be arranged by group)
- 4 milestone meetings of “supplier” (i.e. you) with “customer” (i.e. lecturer) to enable structured information exchange between supplier and customer
- Estimated effort for supplier: approx. 60 hours of work (per person), i.e. product should be produced within 180-360 working hours.

Project Management

- A team of students (supplier) has to define
  - A team leader (project manager)
  - A sub-project leader for each milestone
- The work may be devided between the team members.
- Each team member has to keep a project manual documenting meetings, progress, next steps, ...
- A time schedule has to be created and updated regularly according to progress and changes in estimation of efforts.

DSDLC Project Steps (1 / 6)

1. Database planning
   a) Tasks:
      i. organise your team
      ii. define project leader and task managers
      iii. estimate effort
   b) Deliverables:
      i. documentation of group structure
      ii. mission statement & mission objectives
      iii. time schedule
2. System definition
   a) Tasks:
      i. describe users of system
      ii. define user views
   b) Deliverables:
      i. user views

DSDLC Project Steps (2/6)

3. Requirements collection and analysis
   a) Tasks:
      i. use fact-finding techniques to identify all necessary requirements
      ii. identify system areas where there are no requirements
      iii. document design decisions regarding those system areas
   b) Deliverables:
      i. list of requirements (structured, sorted, numbered)

DSDLC Project Steps (3 / 6)

4. Database design

a) Tasks:

i. identify entities, attributes and relationships
ii. design conceptual data model on paper (Chen notation)
iii. associate modelling elements to user views
iv. implement conceptual data model in Innovator
v. implement logical data model in Innovator
vi. bring all relations in BCNF (where useful)

b) Deliverables:

i. conceptual data model on paper (Chen notation)
ii. Data catalogue
iii. list of all relevant entities and relationships for each user view
iv. conceptual data model in CASE-tool
v. logical data model
vi. proof that all relations are in BCNF or an explanation why not

DSDLC Project Steps (4/6)

5. DBMS selection
   a) Tasks: none (IBM DB2 has been preselected)
   b) Deliverables: none
6. Application design
   a) Tasks:
      i. database application: define any constraints and business functions you want to implement
      ii. GUI: define functional sequences of windows
      iii. GUI: make sketches of windows for data input and queries
   b) Deliverables: none
7. Prototyping (we will do the implemention directly)
   a) Tasks: none
   b) Deliverables: none

DSDLC Project Steps (5 / 6)

8. Implementation
   a) Tasks:
      i. export DDL from Innovator
      ii. define constraints, triggers, procedures in SQL
      iii. implement GUI with MS Access
      iv. pre-testing with simple data
   b) Deliverables:
      i. all SQL code
      ii. MS Access project
9. Data conversion and loading
   a) Tasks:
      i. convert the provided testing data into SQL statements which insert the data into your tables
   b) Deliverables:
      i. SQL-code for data loading

DSDLC Project Steps (6 / 6)

10. Testing
    a) Tasks:
        i. carry out all defined use cases with various parameters (test cases)
        ii. let the system be tested by the customer (product acceptance test)
    b) Deliverables:
        i. list of positive and failed test cases
        ii. product with required functionality and a minimality of bugs
11. Operational maintenance (out of scope)
    a) Tasks: none
    b) Deliverables: none

Milestone Meetings (1 / 4)

- There are 4 milestone meetings at which the supplier has to present their deliverables to the customer. There is an additional meeting if deliverables were not acceptable previously.

- M1 (after “Requirement collection and analysis”):

1. documentation of group structure
2. mission statement & mission objectives
3. time schedule
4. user views (use cases)
5. list of requirements (structured, sorted, numbered)

Milestone Meetings (2 / 4)

- M2 (during “Database design”):

1. conceptual data model on paper (Chen notation)
2. data catalogue
3. list of all relevant entities and relationships for each user view

- M3 (after “Database design”):

1. conceptual data model in CASE-tool
2. logical data model
3. proof that all relations are in BCNF or explanation why not

Milestone Meetings (3 / 4)

- M4 (after “Testing”):

1. all SQL code
2. MS Access project
3. SQL-code for data loading
4. list of successful and failed test cases

- MF (if product acceptance failed in M4)

1. See M4

Milestone Meetings (4/4)

- Milestone meetings will take place in the database lab (room F1.410) at the large computer screen.
- A separate time schedule will be provided for the meetings.
- All documents and presentations must be accessible from the computer with the large screen. Alternatively, you can connect your computer to the large screen.

- **Rehearse your presentation and technical set-up with the large screen. The presentation time is limited.**

Main Requirements

1. Strict application of the Database System Development Lifecycle to ensure efficiency of development and to avoid data redundancy.
2. Strict separation of database, database application and GUI
3. All data, constraints and business rules are stored in the database (application).
4. The GUI provides means for data access and input only.
5. Implementation of the following business processes.

Main Requirements – Business Process „Lecture Planning“

6. The examination regulations define which modules have to be offered. Note that not all lectures are defined in the examination regulations (e.g. Wahlfach X, elective X).
7. Modules can consist out of various elements (lectures, labs, projects, …) having a certain number of weekly semester hours (SWS).
8. Each module element is taught by professors and/or external lecturers (Lehrbeauftragte).
9. A semester group may be split into various teaching groups (e.g. IT3A, IT3B) and sub-groups (e.g. lab groups 1 and 2 of IT3A).
10. Two groups may share the same lecture (e.g. SWT, SWM share Databases 2) having different names for the groups.

Main Requirements – Business Process „Lecture Planning“

11. A lecturer cannot be professor and external lecturer at the same time. However, an external lecturer can become a professor and a professor can become an external lecturer after reaching his pension age.
12. An external lecturer is associated to a specific department (Fakultät).
13. A module element has a certain number of SWS assigned in the examination regulations. The number of hours in the time schedule and the number of SWS as work-load of the lecturer might be different to those, e.g. DB2 Project: Student SWS = 2, Lecturer SWS = 1, hours in time schedule = 0.

Main Requirements – Business Process „Work Load Documentation“

14. Professors have to work a certain amount of SWS each semester. The work can be teaching or assigned tasks (dean, running a lab room, research, …).
15. Currently each full time professor has to work 18 SWS on average (required work load = Deputat). The assigned number of SWS per semester might be higher or lower but not below 9 SWS.
16. Professors might work part-time, be ill for a longer time or be on sabbatical, i.e. the deputat is reduced.
17. External lecturers do not have a required work load and cannot take other assigned tasks.
18. The application has to document the work load of each professor over the years.

Main Requirements – Business Process „Report Generation“

The application must be able to generate a number of reports:

19. List of each task of each professor for a selected semester also giving the total work load balance (Stundenkontostand – accumulated real work load versus required work load (Deputat))
20. List of module elements offered in a selected academic half year for a selected degree (Studiengang)
21. List of external lecturers, their SWS for a selected academic half year and their addresses

Main Requirements – Business Process „Report Generation“

22. List of services provided, i.e. list of module elements taught by IT professors for a different department (name of module element, name of the lecturer, SWS, department which the service is provided for)
23. List of services used, i.e. list of module elements taught to IT students by a lecturer of another department (name of module element, name of the lecturer, SWS, department which the service is provided by)

Main Requirements

24. The GUI, to be designed with MS Access, serves the only purpose to insert, update, access and delete data.
25. The GUI must not implement any data constraints.
26. The data model, constraints and business logic in the database must be designed to forbid any inconsistent data.
27. The data model has to be implemented with the modelling tool Innovator.

Main Requirments

28. Each modelling element (entity, role, constraint) has to have a description defining the meaning of the entity precisely to avoid misunderstandings.

    Example: Possible definitions for entity „Semester“

    1. „Identification of a specific academic half year, e.g. winter semester 2012/13.“
    2. „Identification of a generic academic half year and all its modules according to the examination regulations, e.g. 6th semester of Softwaretechnik (SWT6).“
    3. „Group of students having to take the same lectures as stipulated in the examination regulations (e.g. student group SWB6).“

29. The language of the application (data model, GUI) is German.

Optional Main Requirements

- The students who are fiddling their thumbs out of boredom are invited to extend their application with the following requirements:

30. Business process „schedule planning“: The application can be used to plan the time and room to be reserved for a module element.
31. Business process „schedule reporting“: For a given week, a schedule for a room or a group of students is presented.

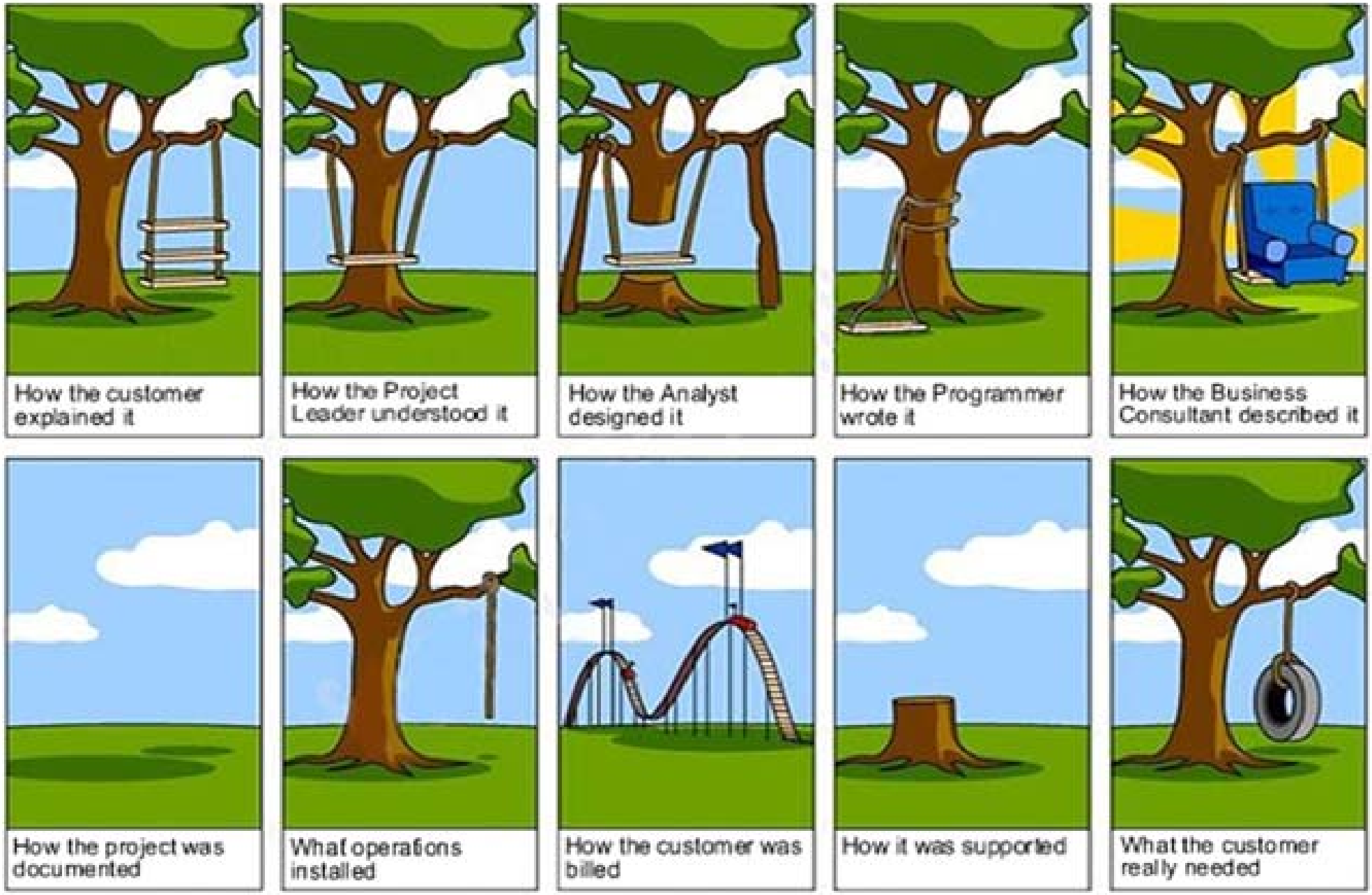
Available Information

The following documents providing useful information are available in Moodle.

- Examination regulations (WKB, SWB, TIB)
- List of all module elements for SS11 (POG)
- Time schedules
- Example reports
- Test data
- HOWTO Innovator
- HOWTO MS Access

For other detailed information you have to contact the customer (i.e. the lecturer).

What we do not want to have …



STRONG ADVISE !!!

- The requirements in these slides are not sufficient to build a useful application.
- Therefore, use the fact-finding techniques to find all requirements so that the customer (i.e. the grading lecturer) gets what he needs and not what you think he described.

Grading the Project Results

- The customer (i.e. the lecturer) will carry out a product acceptance test at the Milestone Meeting 4.
- The first test of the acceptance test is a complete deletion and reload of the database application.
- If the acceptance test should fail there is a second and final chance at the Finale Milestone Meeting.
- After a positive acceptance test the supplier (i.e. you) has to provide a ZIP-file with all deliverables. In addition to the acceptance test in the presence of the supplier, the customer will carry out more tests in private and review the deliverables.

Grading the Project Results

- The acceptance test will evaluate whether the application is functional and functions correctly and efficiently.
- The review of the deliverables evaluates whether the documentation is complete, of sufficient quality and consistent with the implementation.
- Attendance of the meetings is mandatory.
- You have passed the project if
  - **the product is ready for productive operation**
  - **you participated in the meetings**
  - **there is proof that you contributed to the product**