Assignment 5

Modeling in RE

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I. Task

Individual Tasks

- Read the mandatory items in the reading list
- Prepare two questions about each paper to ask your classmates. These questions can, for example, be about aspects of the paper that are not clear to you, or about your classmate's opinion on interesting aspects.
- Be prepared to give a short summary of each paper in class. This summary should address the following questions:
    - What is the main message of the paper?
    - What are the expected benefits of the proposed method or the paper in general?
    - What are weaknesses of the paper in your opinion?
- Be prepared to answer the questions given below in class

Group Tasks

- Prepare a 15 minutes presentation (5-10 slides) on the theme assigned to your course group and choose two persons from your group to present it.
    - At the beginning of your presentation, relate your topic to the session's topic (as represented by the mandatory reading)
    - Browse/read additional papers and/or web pages where necessary.
- Specify the problem given in the case study below in ADORA (section 5). The focus of the model shall be on the handheld device. Where necessary, ask the tourist guide expert for advice or make and document assumptions. For creating the models, you have the choice between using the ADORA tool (section 6), any general-purpose drawing tool, or paper-and-pencil.
Hints: Start with a type scenario that specifies how a tourist interacts with the tourist guide system. Model the components that are needed to provide the functionality of the tourist guide system. Model the data and the behavior of the components with objects and states. Tourist guide and ADORA expert: Anne Koziolek

II. Reading List

Mandatory reading

[Ludewig 2003] explains the role of models in Software Engineering, while [Machado 2005] discusses various techniques for modeling requirements. [Glinz 2002] provides an overview on ADORA.

Theme-specific reading

[Seybold 2005], [Reinhard 2008]: Modeling Systems with ADORA

[Chung 2000], [Gross 2001]: Modeling Non-Functional Requirements Using Soft Goals
[Lindland 1994], [Moody 2003]: Quality of Models. Optionally, [Moody 2005] could be interesting for a broader introduction, more recent conclusions, and future research directions.

III.   Questions

- How are models used in Requirements Engineering?
- What are the differences between modeling and specifying?
- What is a "good" specification process?
- What are the basic principles of ADORA?
- What are the main differences between ADORA and UML?

IV.   Themes for Presentation

Themes will be assigned by the assistant who tutors this course; your group can apply for a theme.

A.   Modeling Systems with ADORA

Present an overview of the key features of the ADORA modeling language. How are these features supported by the tool? What are the challenges related to the implementation of this tool? What is the purpose of simulating scenarios? To what degree does such a simulation require formal requirements specification?

B.   Modeling Non-Functional Requirements Using Soft Goals

What are soft goals? How are they related to quality requirements? How can NFRs guide the application of patterns during the design of a system?

C.   Quality of Models

What are the three components of semiotics? How can they be used to evaluate the quality of models? Is such an evaluation effective?

V.   Case Study

Assume you are working for a company who wants to develop and market a location-and context-sensitive tourist guide system [Davies 2001]. The tourist guide consists of an electronic hand-held device that offers the following facilities to the visitors. The rough requirements are as follows.

For the initialization of the tourist guide a set of preferences and interests is entered by the tourist to generate and propose interesting suggestions for tours of the city and cultural events to visit.

Having initialized the device, the user can choose from the following functions of the tourist guide:

a)   City Information: Retrieve information about the city, including information about the current location. The retrieved information depends on the preferences, interests and position of the user.
b)   Surprise: The device suggests randomly an activity for the tourist. The activity is chosen according to a, c, d, e.
c)   City Tours: Provide route guidance to help visitors move between locations on the tour. The route is chosen according to the position of the preferences, the interests and the position of the user.
d)   Walking Route: The device suggests a walking route. The route is determined according to the preferences, interests and the position of the system.
e)   Cultural Event: The device suggests a cultural event or museum to visit. The suggestion is chosen according to the preferences, interests and position of the user.
f)   Access Services: Access external services, such as hotel and theatre and ticket reservations.

The handheld device locates its position by using a GPS receiver. The position needs to be updated every 20 seconds.

VI.   ADORA Editor

The ADORA editor is a prototype that can be freely downloaded[1]. The tool requires Eclipse and Java 2 (JDK 1.5). Please note that the simulation features described in [Seybold 2005] are not implemented in the current version of the tool.

References

Chung, L., B. Nixon, E. Yu, J. Mylopoulos (2000). The NFR Framework in Action. In Chung, L., B. Nixon, E. Yu, J. Mylopoulos: *Non-Functional Requirements in Software Engineering*. Kluwer Academic Publishers. 15-45.

Davies, N. K. Cheverst, K. Mitchell, and A. Efrat (2001). Using and Determining Location in a Context-Sensitive Tour Guide. *IEEE Computer* **34**, 8. 35-41.

Glinz, M., S. Berner, S. Joos (2002). Object-oriented modeling with ADORA. *Information Systems* **27**, 6. 425-444.

Gross, D., E. Yu (2001). From Non-Functional Requirements to Design through Patterns. *Requirements Engineering* **6**, 1 (Feb. 2001). 18-36.

Lindland, O., G. Sindre, A. Solvberg (1994). Understanding Quality in Conceptual Modeling. *IEEE Software* **11**, 2 (Mar. 1994). 42-49.

Ludewig, J. (2003). Models in Software Engineering – an Introduction. *Software and Systems Modeling* **2**, 1 (Mar. 2003). 5-14.

Machado, R., I. Ramos, J. Fernandes (2005). Specification of Requirements Models. In Aurum, A., C. Wohlin. *Engineering and Managing Software Requirements*. Springer. 47-68.

Moody, D., G. Sindre, T. Brasethvik, A. Solvberg (2003). Evaluating the Quality of Information Models: Empirical Testing of a Conceptual Model Quality Framework. *25th International Conference on Software Engineering (ICSE'03)*. Portland, Oregon, USA. 295-305.

Moody, D. (2005). Theoretical and practical issues in evaluating the quality of conceptual models: current state and future directions. *Data Knowledge Engineering* **55**, 3, (Dec. 2005). 243-276.

Reinhard, T., S. Meier, R. Stoiber, C. Cramer, M. Glinz (2008) Tool Support for the Navigation in Graphical Models. *30th International Conference on Software Engineering (ICSE'08)*, Leipzig, Germany.

Seybold, C., Meier, S. (2005). Simulation-based Validation and Defect Localization for Evolving, Semi-Formal Requirements Models. *12th Asia-Pacific Software Engineering Conference (APSEC 2005)*, Taipei, Taiwan. 408-420

[1] http://www.ifi.uzh.ch/rerg/research/adora/tool.html