PRIORITISATION TASK

Q1. Consider the given set of requirements (see Listing 1) for the AIS (Airline Information System):

<table>
<thead>
<tr>
<th>Invoicing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rinv1. AIS should create an invoice for a booking.</td>
<td></td>
</tr>
<tr>
<td>• Rinv2. AIS should send a created invoice to the customer</td>
<td></td>
</tr>
<tr>
<td>• Rinv3. Customer should pay the invoice using AIS</td>
<td></td>
</tr>
<tr>
<td>• Rinv4. AIS should close a paid invoice</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boarding</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rboa1. AIS should create a boarding pass</td>
<td></td>
</tr>
<tr>
<td>• Rboa2. AIS should register a boarded customer</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Booking</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rboo1. AIS should allow the customer to book an available flight</td>
<td></td>
</tr>
<tr>
<td>• Rboo2. Customer should query the airline company for available flights</td>
<td></td>
</tr>
<tr>
<td>• Rboo3. Customer should choose the number of seats on the available flights</td>
<td></td>
</tr>
<tr>
<td>• Rboo4. AIS should book an airline flight based on the booking info</td>
<td></td>
</tr>
</tbody>
</table>

Listing 1: AIS requirements

Answer the following questions:
1. Which given requirements can be prioritized? Explain your answer.
2. Taking into account that cost of requirements implementation is given in Table 1, how these requirements can be prioritised using the AHP (cost/value) approach?

Table 1: Requirements cost

<table>
<thead>
<tr>
<th>Requirement ID</th>
<th>Cost (EUR)</th>
<th>Requirement ID</th>
<th>Cost (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rinv3</td>
<td>20</td>
<td>Rboa2</td>
<td>10</td>
</tr>
<tr>
<td>Rboo4</td>
<td>18</td>
<td>Rinv4</td>
<td>8</td>
</tr>
<tr>
<td>Rboa1</td>
<td>16</td>
<td>Rboo1</td>
<td>6</td>
</tr>
<tr>
<td>Rboo3</td>
<td>14</td>
<td>Rinv1</td>
<td>4</td>
</tr>
<tr>
<td>Rinv2</td>
<td>12</td>
<td>Rboo2</td>
<td>2</td>
</tr>
</tbody>
</table>

REQUIREMENTS TRACEABILITY

Q2. Define traceability model for
• the given traceability graph (see Fig. 1);
• the given traceability matrix (see Fig. 2);
• the given traceability graph (see Fig. 3);
• the requirements given in Fig. 4.
Fig. 1. Traceability graph

Fig. 2: Traceability matrix

Fig. 3: Traceability graph

Fig. 4: Requirements
Q3. Use the traceability model (see Fig. 5) and define traceability relationships given in Listing 1.

Fig. 5: Traceability model

NON-FUNCTIONAL REQUIREMENTS

Q4. For the driver assistance system (see Listing 2) define non-functional requirements regarding system performance, reliability, security, maintainability, and portability. The non-functional requirements must respect criteria for good requirements.

A driver assistance system includes a (sub-) system for avoiding rear-end collisions. This system comprises distance sensors, that permanently check the distance to the vehicle driving ahead in order to avoid an imminent rear-end collision. If the system detects that the distance falls below the safety distance yet is still outside the critical range, an acoustic warning signal sounds. Alternatively, a symbol or message maybe displayed on the driver display in the cockpit of the car. In the driver has not react to the warning after 2 s and the distance between two cars still decreases, the system reduces the speed of the car. If the distance (in meters) falls below one quarter of the driving speed (in km/h) at any time, the system initiates emergency breaking.

Listing 2: A Driver Assistance System

Q5. Correct the following requirements so that they would respect criteria for good requirements:

Q1: It should be easy for novice users to do tasks Q and R.
Q2: Novice users should perform tasks Q and R in a short time.
Q3: Experienced users complete tasks Q, R, and S quicker than novice users
Q4: Recording breakfast shall be easy using keyboard
Q6: Supplier’s hotline shall analyse almost all reports in a short period
Q7: When repairing a defect, a number of related non-repaired defects should be very low
Q8: Every program module must be assessed for maintainability according to organisation’s standards OST-1.12.x. Majority of the modules have to be “High maintainable” (as defined in the standard) and none “poor” (as defined in the standard)
Q9: Development must use regression test allowing full re-testing in a short period
Q10: No method in any object may contain a lot of code lines

GOAL MODELLING
Q6. Meetings are organised by the Meeting initiator, who is using Meeting scheduler system to invite Meeting participants, to set meeting agenda and to find the suitable meeting date. Create a strategic dependency model (using the i* modelling language) to represent the given case. Please separate between
- Social viewpoint, and
- Technical viewpoint

Q7. Refine “Meeting be scheduled” goal to the goal hierarchy (containing at least 4 hierarchy levels and including at least 2 alternative refinements).

SCENARIO MODELLING

Q8. Create use case diagram for the driver assistance system given in Listing 2.

Q9. Select one use case from Fig. 6 and fill in the use case template (see Table 2). Documented scenarios must respect rules of scenario documentation.

Q10. Select one use case from Fig. 6 and UML sequence modelling language to visualize its scenario.

Fig. 6. Functions of financial module

Table 2: Use case template
Q11. Refine requirement "If a glass break detector attached to the entrance door detects that the entrance door has been damaged, the system shall enter the alarm state and inform the security company" (see Fig. 7) to
- Data model using UML class diagrams
- Behavioral model using UML state diagrams
- Functional model using UML sequence diagrams

Your models must be consistent.

Elicit (and write down) at least four requirements and define traceability relationships between the models and the elicited requirements.

Fig. 7. Requirement and its modelling perspectives
Q12. From the given glossary create system perspective models using UML class diagrams, sequence diagrams and state diagrams. Your models must be consistent. Elicit (and write down) at least four requirements and define traceability relationships between the models and the elicited requirements.

Table 3: System glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google assistant</td>
<td>Artificial intelligence based virtual assistant developed by Google</td>
</tr>
<tr>
<td>Skill/System</td>
<td>An application which provides a separate feature for Google Assistant</td>
</tr>
<tr>
<td>PLANy</td>
<td>A skill for the Google Assistant integrated with different Google products, which allows the users to manage and track their time</td>
</tr>
<tr>
<td>User</td>
<td>A person which interact with the PLANy</td>
</tr>
<tr>
<td>Adventure</td>
<td>An event/meeting in Google Calendar which have purpose, time, date, location and list of invited people</td>
</tr>
<tr>
<td>Notification</td>
<td>Push alert related to different adventures</td>
</tr>
<tr>
<td>Contact</td>
<td>Contact of the user in Google account</td>
</tr>
<tr>
<td>Template</td>
<td>A pattern for invitation message</td>
</tr>
</tbody>
</table>
Multiple choice

A question might have several correct answers. Answer is answered correctly, if all correct answers are marked.

1. How are systems that are useful in the context of some human activities supported by the software, which is run on some hardware, called?
   - Computer systems
   - Information systems
   - Software-intensive systems
   - Software systems

2. Which software system development lifecycle is primarily used to understand the requirements for the user interface, to examine feasibility of a proposed design approach and/or to explore system performance issues?
   - Prototyping
   - Spiral model
   - V model
   - Agile model

3. What are things in the application domain that are true or not when we ever build the proposed systems?
   - Requirements
   - Specification
   - Domain properties
   - Assumptions and expectations

4. What is the part of the system environment relevant for defining, understanding and interpreting the system requirements?
   - System boundary
   - Requirement engineering
   - Requirements specification
   - System context

5. How are aspects which concern the operational or technical environment where the system is deployed, called?
   - Subject facet
   - Usage facet
   - Development facet
   - IT facet
6. Which requirements engineering activity does help to achieve progress in the content dimension by detailing information about existing requirements?

- Requirements validation
- Requirements elicitation
- Requirements management
- Requirements specification

7. Which requirements artefacts do specify requirements at the required level of detail, the desired properties and features of the system to be developed?

- Solution-oriented requirements
- Goals
- Scenarios
- Domain properties

8. Is elicitation difficult because of the existing bias?

- Yes
- No
- Yes, and also because of the thin spread of knowledge and tacit knowledge
- No, it is difficult because of the thin spread of knowledge and tacit knowledge

9. What are the major stakeholder interests?

- Financial interests
- Observational interests
- Development interests
- Usage interests

10. Which elicitation techniques are used for summarization and feedback, i.e., to conclude on a set of the requirements, to discuss the results of the information gathering, etc.

- Meetings
- Interviews
- Groups elicitation techniques
- Joint/rapid application development

11. What concerns should be included to requirement specification (document)?

- Functionality
- Performance
- Attributes
- Design constraints imposed on and implementation
12. Which criterion of good requirements does *often* require quantification?
   - External observability
   - Understandability
   - Cohesiveness
   - Testability

13. Why is it important to resolve requirements conflicts?
   - For the acceptance of the system by stakeholders
   - For the successful (i.e., timely, within the budget, and etc.) completion of the project
   - For the interdependence and clarity
   - For the complete specification of the requirements

14. Which requirements negotiation activity might include decision (by authority) making?
   - Conflict identification
   - Conflict analysis
   - Conflict resolution
   - Conflict documentation

15. What type of conflict does exist if stakeholders are wrongly or incompletely informed about the requirements?
   - Values conflict
   - Data conflict
   - Interest conflict
   - Analysis conflict

16. During which activities requirements inconsistencies can be found?
   - Requirements elicitation
   - Requirements documentation
   - Requirements management
   - Requirements validation

17. To which activity does phrase “to build right system” refer?
   - System development
   - Validation
   - Verification
   - Requirements engineering

18. What should be validated during requirements engineering?
19. During which activity does requirement engineer establish requirements traceability, prioritise requirements, and manage changes of requirements artefacts?

- Requirements representation
- Requirements validation
- Requirements management
- Requirements documentation

20. How is the development of cost effective solutions to practical problems through the application of scientific knowledge, called?

- Live-cycle
- Building
- Engineering
- Application

21. What are the major goals of requirements management?

- Identifying and eliciting requirements
- Managing requirements artefacts
- Observing system context
- Managing requirements activities

22. Ability to describe and follow the life of requirements in both forward and backward directions is called

- Requirements elicitation
- Requirements traceability
- Requirements specification
- Requirements prioritization