OORT Vertical Reading

July 2016

Reading 1: Scenarios/Requirements Description versus Sequence Diagrams. Adapted from Travassos et al. *Reading techniques for OO design inspections* (2002).

Objective: To verify that the functionality described by the functional requirements of the scenarios are captured appropriately in the sequence diagrams, through a pertinent combination of objects and messages working together to capture these functionality. Also consider the existence of constraints for the scenario analyzed and whether these are reflected in the diagrams.

Inputs:

1. A set of scenarios that contain functional requirements describing required functionality and constraints for the scope scoped.

2. One or more sequence diagrams that describe the objects of a system and the services / features it provides. There may be multiple sequence diagrams for a given functional requirement as long as a functional requirement describes multiple system functionality. The correct set of sequence diagrams for a functional requirement should be selected using the document *Scenarios*, which contains semantic knowledge about the system. Finding the correct set of sequence diagrams without traceability information or knowledge about the system will be difficult.

Step I: Read the description of requirements to understand the functionality described.

Inputs: Set of Scenarios Containing Functional Requirements (FR).

Outputs: Candidate functions and / or services (marked in green in the FRs); Sequence of actions to be performed, numbered; Restrictions and conditions for the services / features (marked in yellow in FRs).

A) Read through each scenario thoroughly to understand the features it describes.

B) Find the verbs, or descriptions of actions, that are candidates for service - expected behaviors of the system. Underline the verbs or stock descriptions with a green pen.

C) Identify whether there is an order / sequence in the description of features or services provided by the system. If so, sequentially number the actions that make up the features and / or services.

D) Look for descriptions of restrictions or conditions on the nouns and verbs that you identified in the previous two steps. For example, ask if there are explicit restrictions or limitations on how actions are performed (check for loops or conditions). Try to see if defined quantities have been specified in any part of the requirement. Underline these conditions and restrictions with a yellow pen.

Step II: Identify and inspect the related sequence diagrams to identify if the corresponding functionality is precisely described, if the behaviors are represented in the correct order, and the constraints are properly represented.

Inputs: Scenario with set of Functional Requirements (RF), with marked functionality, services and restrictions and ordered behaviors; Sequence Diagram (SD). **Outputs**: Services / features provided by the system (marked in SD green); Numbered sequence of actions that make up the services and / or functionality (if applicable); Restrictions and conditions for services (marked in yellow in SD).

A) Identify the services and / or features described by the sequence diagrams. To do this, you need to examine the information exchanged between the objects and classes in the sequence diagrams (the horizontal arrows). If the information exchanged is very detailed, at the message level, you need to abstract several messages together to understand the services or features they provide. Underline the identified services and number them (in the order they occur in the diagram) with a green pen.

B) Identify the conditions that allow the activation of actions. Check restrictions and / or conditions in yellow. Usually, in SDs, conditions or constraints appear in the combined fragments (alt, opt, loop), which have guard conditions for sending or not sending messages.

Step III: Review the description of the functional requirements to make sure that all services, features, and constraints have been captured appropriately by the scenario sequence diagram.

Inputs: Scenarios with a set of Functional Requirements (RF), with marked services, functionality and restrictions and the sequence of actions that must be performed, numbered; Sequence Diagram (SD), with services, conditions and restrictions marked, as well as the numbered sequence of actions that make up the services and / or functionality. **Outputs**: Discrepancy form.

A) Look for feature descriptions in requirements that have been omitted from the project. i) For each action description underlined in green in the functional requirements, try to find a associated behavior or combination of behaviors in the sequence diagram, which is also marked as green. Use syntactic tips (i.e. behavior name that is similar or synonymous to an action description) to assist you in the search, but make sure that the semantic meaning of the function in the requirements and high-level design is the same. For each green marking in the requirements, there must be a green matching in the sequence diagram as well. When not found, then the information was omitted from the project. Indicate this on the discrepancy reporting form. ii) For each underlined constraint of yellow, perform the same procedure as the previous item.

B) Look for descriptions of features in requirements that have been misrepresented in the project. i) In this case, the behavior was found in the diagram, but is described with a semantic meaning different from that found in the functional requirements. When found, it means that there was an incorrect fact in the project. Indicate this on the discrepancy reporting form. ii) Do this for all features (underlined in green) or constraints (underlined in yellow) found with this feature.

C) Look for feature descriptions in requirements that are inaccurate in the project. i) This can cause a document user to misinterpret or misunderstand the meaning of the concept. When found, there was an ambiguity in the project. This applies, for example, to the order in which services appear in the sequence diagram. See if the numbering indicated in the FR corresponds to the numbering found in the SD. Indicate this on the discrepancy reporting form. ii) Do this for all features (underlined in green) or constraints (underlined in yellow) found with this feature.

OBS. A service is defined here as part of the functionality, that is, a feature is made up of several services. Restrictions are conditions that must be fulfilled for a service or functionality to occur.