Chapter 10

Question–Answer Approach to Human–Computer Interaction in Collaborative Designing

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ABSTRACT

The chapter presents a question-answer approach to the programming of Human-Computer Interactions (HCI) during collaborative development of software intensive systems. Efficiency of the general work can be essentially increased if the human part of the work is informed by precedents and executed with a special kind of pseudo-program by “intellectual processors.” The role of any processor of such type is fulfilled by a designer. The suggested approach was investigated and evolved until an instrumental system providing the pseudo-code programming of intellectual processors combined with computer processors. Interactions between processors are based on question-answer reasoning. Pseudo-code programs and their corresponding instrumental means can be combined easily with traditional HCI.

INTRODUCTION

One of problematic kinds of a human-computer activity is a collective creating of Software Intensive Systems (SISs) in any of which the software plays an essential role in the system functionality, cost, development risk, and development time (Software, 2006). A very low degree of success (about 35%) in the activity of such type indicates that the problem of failures is connected with an absence of very important means accessible to both developers and users of the SIS.

From the general point of view, the unsuccessfulness of the SIS development is being discovered via users interactions with the SIS that essentially differ from reactions expected by users. Similar events indicate that corresponding units of the programmed behavior have not been tested by developers or were being understood incorrectly. Usually any definite unit of the behavior has not been tested when this unit was not qualified by developer as an essential case.
Therefore, the developers of SISs need the effective means for adequate defining of the essential behavior units, their modeling for achieving the necessary understanding and also for testing the units in appropriate conditions of designing and using. First of all, the essential units are to be distinguished and such actions can be fulfilled experimentally by interacting with the developing system in real time of designing. Let us notice that interactions used in experiments with the chosen behavior unit can play for this unit the integrative and others helpful roles.

On a deep belief of the author, the named behavioral units are to be distinguished, defined, modeled, understood, coded, and tested as precedents. “Precedents are actions or decisions that have already happened in the past and which can be referred to and justified as an example that can be followed when the similar situation arises” (Precedent, 2011, p. 1).

The precedent form of a human activity was “created” by nature in an evolution of a phenomenon named “conditioned reflex.” It is possible to consider, that any precedent appears as a result of the corresponding “experiment” executed by a person or a group of people. Creating of the precedent and its reusing in appropriate conditions which should be preliminary tested are based on human interactions with an environment of the precedent existence. Such interactions are impossible without the usage of the natural language and the activity of consciousness. Any human has a rich experience of such interactions and this experience should be inherited for the creation of means which support the human-computer interaction in the collaborative designing.

All that was told above can be used for formulating the following assertion: the degree of success in collaborative designing can be significantly increased due to the use of new more effective means of HCI which are oriented on behavioral units of the precedent type. Below this assertion is analyzed and evolved until the system of instrumental means, which provide the implementation of question-answer approach (QA-approach) to HCI.

The approach is aimed at increasing the intellectuality of HCI. We can mark the following features of such approach:

- Using the models of precedents for the presentation of appropriate kinds of activity units of developers and users;
- Using the question-answer reasoning (QA-reasoning) and their models in HCI for the rational connection of human and computer actions in their collaborative activity for hierarchical representing the tasks and also for their modeling, analyzing and programming;
- Using the QA-reasoning for pseudo-programming of the human “processor” (intellectual processor or briefly I-processor), which is executing the human actions, similarly the program works being executed by the computer processor (K-processor);
- Combining the offered means of interactions with traditional means of HCI;
- Using the knowledge base for keeping a number of metrics of usability (in the form of precedents) for the access to them for their embedding into the designing process.

**BACKGROUND OF QA-APPROACH**

**Question-Answer Reasoning**

The choice of the QA-approach to HCI is explained that consciousness has a dialog nature the existence and process of which are being opened via the usage of the natural language. Dialog processes in consciousness support an intellectual formation of any precedent model as a certain sample of an activity. Moreover the dialog is a rational form for working with the reaction part of this model and with the conditional choice of the appropri-
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