Precedent-Oriented Approach to Conceptually Experimental Activity in Designing the Software Intensive Systems

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ABSTRACT

The chapter presents a precedent-oriented approach to conceptually experimental activity in collaborative designing the complex systems with software. The efficiency of such work can be essentially increased if a human part of the work will be fulfilled with an orientation on using the precedents’ models reflected the units of an occupational experience. In described case, interactions of any designer with a computer are organized and implemented as interactions between the designer and an “intellectual processor” as a role played by the same designer. Such version of the human-computer activity involves real-time combining “units” of the natural experience with its models. In solving the project task, this combining is brought under conceptual experimenting understood as an automated thought experimenting. The offered approach is evolved till an instrumental system that supports conceptual experimenting as a very useful form of computerized activity based on experiential human-computer interactions.

KEYWORDS

Conceptual Experimenting, Intellectual Processor, Interactions, Software

INTRODUCTION

For over 20 years, in the development of software intensive systems (SISs), extremely low success it is the most critical problem (Chaos, 2013). There were numerous attempts to change the state of affairs in this subject area, but the problem of the successfulness remains. The main reason for such a situation is considered to be the complexity of the essences, with which the developers interact in their professional activity.

In the described case, developers interact with the created SIS, with the process of developing and with the system of instrumental means that can be qualified as the specialized SIS. Moreover, they interact with marked essences in conditions of high intensity. Two intensities have the software
intensive type (created SIS and technologically instrumental SIS). The third intensity is a creative intensity of developers who take into account (usually and additionally) the complexity for future users of the created SIS.

It is necessary to note, that, in any case, the complexity is discovered through interactions between the designer and the computerized essence, and, now, the used interactions cardinaly differ from interactions among people (who use natural interactions). The base of natural interactions is a natural experience that is the greatest “invention” of nature. Therefore, innovations in the human-computer interaction should be aimed at emulating the natural interactions, and such emulation must be built on a coordinated use the natural experience and models of the naturally occupational experience.

In our deep belief, effective human-computer interactions must have an experiential type. This position correlates with the expanding implementation of empirical methods and means to software engineering (Sjoberg, 2007).

The approach to constructing of HCI from an empirical point of view requires defining with a context of interactions, used analogy between the natural experience and its reflection on the computer side, appropriate models of the experience and forms of the access to the natural experience and experience models. In an offered approach, the context is restricted by the use of HCI on solving the project task with using of conceptual experimenting, the natural experience is reflected on a Base of Experience typical units of which are models of precedents (Sosnin, 2014 a), declarative and procedural question-answering are basic forms of the access to the natural experience and units of the experience. The approach is implemented in the instrumentally technological environment WIQA (Working In Questions and Answers) (Sosnin, 2013 a).

BACKGROUND OF THE APPROACH

Experiential Behavior of Designers

By the standard ISO 9004:2009 (Managing for the sustained success of an organization — A quality management approach) (Managing, 2009), the way to the success in an occupational activity is laid on the use of best occupational practices that are coordinated combining in the necessary process. In designing of SISs, particularly useful sources of the best practices are standards CMMI-1.3 (Capability Maturity Model Integrated for Development) (Capability, 2010), P-CMM 2.0 (People Capability Maturity Model) (Curtis, 2009), PMBOK (Project Management Body of Knowledge, Version 5) (PMBOOK, 2015) and the others.

Any of the indicated standards presents a corresponding area of the occupational experience. Any practice of these standards is a unit of the experience presented in the form chosen by the creators of the corresponding standard, and the effectiveness of applying such units essentially depends on their realization in the frame of the technology used by designers.

A useful approach to the implementation of practices and technologies of designing the system with software has been offered in the initiative SEMAT (Software Engineering Methods and Theory). This initiative, declared by the group of well-known researchers and developers in software engineering in 2009 year (Jacobson, 2012), is estimated as one of the promising attempts to change the state of affairs with the successfullness in software engineering and, consequently, in the development of SISs. It is necessary to notice that, in normative documents of SEMAT, a way of working used by a team of designers is marked as a very important essence. There “way-of-working” as a notion is defined as “the tailored set of practices and tools used by the team to guide and support their work.” For this reason, the search of effective ways-of-working are the perspective direction for innovations and can lead to an increase of success in developments of SISs.

Best practices are units of the occupational experience, and, therefore, they better implement in the form of experience models that are combined in the system of such models usually named as the experience base. In our deep belief, models of experience should be implemented with using the
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