Protocol analysis of teamwork in conceptual design

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INTRODUCTION

Teams are the core building blocks of modern product development companies. Understanding teamwork is important for both researchers and practitioners responsible for the formation of teams and allocation of project resources. Thus, the number of studies aiming at understanding how designers work in teams is continuously increasing.

To identify regularities in the phenomena of teamwork design, it must be observed at high levels of granularity and abstraction. Presented research is focused on recognizing the such patterns in team behaviour and correlating them to the team structure and context.

METHODS

Of all the varied range of methods for fine-grain investigation of design activity, protocol analysis has been regarded as the most suitable to reveal the cognitive activity of designers. Hence, the presented research is designed in the form of a protocol study.

Methodologically the study follows five steps: identification of available data (video recordings), development of a coding scheme, segmentation and coding of data, analysis of captured protocols, and discussion of the results.

Two teams performing idea-generation in conceptual design phase were recorded. The coding scheme was developed to reflect elementary design operations of analysis, synthesis and evaluation (ASE) and the alternation of the problem-solution related discussion. The video recordings were segmented and coded with design operations.

PRELIMINARY RESULTS

The distribution of segmented codes showed that Team 1 spent more time formulating and analysing problems while Team 2 spent more time generating, analysing and evaluating solutions. Both teams spent most of the discussion to synthesise and analyse, with evaluation being rarely performed. Additionally, transitions between the coded segments show that for the Team 1 78% and Team 2 60% of transitions followed three directions: synthesis to synthesis, synthesis to analysis and analysis to synthesis. In the problem and solution space the most dominant transitions for Team 1 were the cycles of problem formulation related discussion, while Team 2 had cycles of solution generation and analysis.

DISSCUSSION

Protocol analysis of both teams revealed patterns of analysis, synthesis and evaluation in the problem and solution space. Proportions of design operation correspond to what has been reported for the brainstorming-driven idea-generation sessions in other studies. Both teams show dominant alternation of synthesis and analysis which is typical for idea-generation sessions. Such cycles are repeated until the current aspect of design entity evolves to a satisfactory level or the topic changes to another design entity aspect. Furthermore, as brainstorming method is perceived as a tool of creative design, the alternation of problem and solution related discussion supports the co-evolutionary models of designing.

ACKNOWLEDGMENTS

The abstract reports on work funded by the Croatian Science Foundation MInMED project (www.minmed.org).

KEYWORDS

design process, conceptual design, protocol analysis, teamwork, human behaviour in design