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Multimedia in Requirements Elicitation: When to Show, to Speak, to Animate, or to Simulate

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ABSTRACT

Due to the abstract information that is communicated during the process of requirements elicitation, requirements elicitation is considered the most difficult yet critical phase in software development. Cross-functional team members communicate requirements to reach shared understanding of the user's needs. Challenges, such as divergent domain knowledge between the user and the analyst, often inhibit successful communication and lead to misunderstandings. These misunderstandings can lead to project failure.

In the past, a number of techniques such as prompting and scenario-based approaches have been proposed to improve requirements elicitation. Among those techniques is prototyping, which can be used to help users visualize and articulate requirements. Advances in technology have enabled more sophisticated ways of prototyping, moving away from pen and paper based methodologies, towards auditory, visual, animated and interactive simulations. However, the use of such simulations is often costly. Thus, knowing whether the use of simulations using various combinations of media results in value and under what conditions this occurs is imperative.

We propose a study that investigates the impact of animations and simulations in combination with verbal information presented visually and auditorily on requirements elicitation performance through the lens of two theories from the education and learning domain: Dual-Coding Theory and Multimedia Learning Theory.

Employing the principles of Dual-Coding Theory and Multimedia Learning Theory, we hope to illustrate under what circumstances animations and simulations in combination with verbal as well as textual cues prove helpful in increasing communications performance in the early stage of internalization of information requirements.

While Dual Coding Theory is not novel in the context of requirements elicitation, previous studies have focused primarily on comparative analyses between the use of static

and animated images, providing explanations for superior performance for animations in general. However, the effect of animations itself could not be isolated and the impact of simulations, which provide the user with the ability to interact with the prototype, has not been investigated. Furthermore, while investigations in previous research were generally based on the individual level of observation, this study will focus on the dyadic communication between the user and the analyst during the requirement elicitation process.

We hypothesize that in requirements elicitation, simulation accompanied by verbal explanations presented auditorily leads to better performance than simulation accompanied by verbal explanations presented visually (H1). We also propose that in the same context, animation accompanied by verbal explanations presented auditorily leads to better performance than animation accompanied by verbal explanations presented visually (H2). Furthermore, we hypothesize that, when verbal information is presented auditorily, the performance advantage of simulation over animation is less than that when verbal information is presented visually (H3).

To test our hypotheses, an experiment will be conducted that will allow us to directly compare between the treatments while maintaining control over the way the subjects receive the treatments. A 2x2 between-subject experimental design will be used and our treatments are simulation with verbal narration, simulation with written explanation, animation with verbal narration, and animation with written explanation.

To assess performance and distinguish between the user and the analyst, we will incorporate physiological and brain activity measures to assess cognitive load during the experiment, providing us with the ability to detect information/cognitive overload and exactly pinpoint its occurrence, and thus, potentially opening opportunities for future research in the direction of NeuroIS.