

# **Human-Centered System Architecture: A Framework for Interpreting and Applying User Needs**

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**Abstract**

In the early stages of product development it is crucial to understand users in order to create products that reflect their needs, desires, limitations and capabilities. This paper introduces a user-centered approach for interpreting user needs into actionable knowledge for product design. The proposed framework consists of multiple inter-related knowledge sets for representing the user's mental models in relation to: product structure and function, users' procedures and context-of-use. Structure and function pertains to the product's behavior and attributes; procedures refers to the tasks users engage in during product interaction; and context of use refers to the wide range of influences by which product performance can potentially be affected. The models are interpreted using an event script, an image representation, and a set of influences that allow developers to envision cause and effect, and thereby specify performance specifications. A case study illustrates the framework and how this methodology can be applied.

For access to the full paper, please contact the corresponding author at [galvao@id.iit.edu](mailto:galvao@id.iit.edu)