

# **INTEGRATING A PARTICIPATORY DESIGN APPROACH: DEVELOPING HESTIA WITH MULTIDISCIPLINARY PERSPECTIVES**

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## **ABSTRACT**

Mobile apps are adopted and integrated into practice by service providers working with adults who have disabilities that desire to age-in-place. Service providers are interested in using mobile apps for various reasons including storing reference information, supporting measurements, facilitating reasoning processes, and easing the burden of documentation (Burns & Pickens, 2016). However, app development occurs substantially faster than our vetting processes, compromising app quality and security (Cummings et al., 2013; Shen et al., 2015). Further, many apps available in various marketplaces are not used by anticipated end-users (Dye, 2016) which may be attributed to the lack of consideration of end-user wants and needs (Doebbeling, Chou, Tierney, 2006). We developed a rigorous model for app development that employs multidisciplinary participatory design at multiple levels. We describe our model and processes employed during content and design development of HESTIA, an app to support home assessment and modification practice.

## **INTRODUCTION**

Mobile- and tablet-based technology are integrated into service provision for a range of stakeholders involved in home assessment and modifications practice. App-based technology has the capacity to meet the needs of home evaluators and address the limitations of implementing evidence-based practice in home safety evaluations. However, in-depth consideration of end-user needs is a necessary, but sometimes overlooked step in technology development (Doebbeling et al., 2006). Factors

such as user attitudes, workload, and methods for data input may all be associated with technology acceptance (Lyons et al., 2005). When developing technology-based evaluations, it is essential to focus on the user to improve applicability and acceptance. App-development decisions should integrate user perspectives to support products that meet end-user wants and needs (e.g., Bagozzi, 2007; Holden & Karsh, 2010; Lyons et al., 2005).

Participatory design is an approach where the end-user and stakeholders actively contribute to decision-making throughout app development in order to create products that are applicable and valuable to end-users (Schuler & Namioka, 1993). Our objective is to describe the implementation of our participatory approach in the development of a home safety assessment app called HESTIA.

## **METHODS**

To mitigate our own bias and maintain integrity during app development, we developed and integrated a rigorous model to inform decisions by using objective and subjective data sources, engaging in constant iterative communication between content and design teams, continuously seeking input on user needs, and constantly reflecting on the technology acceptance model (TAM; Bagozzi, 2007). We used a multidisciplinary participatory design approach at several points in time throughout app development (Figure 1).

### Process

First, the Content Team conducted semi-structured interviews with multidisciplinary home evaluators ( $N=20$ ) to support content and feature decisions to create low-fidelity mock-ups and a taxonomy of content, based on qualitative data. The Content Team frequently

interacted with the Advisory Board (comprised of multidisciplinary representative experts from a range of organizations including universities, national organizations, and local community-based organizations for people with disabilities), the Design/Technology Team (comprised of experts in design, technology, and environmental assessment), and the Programming Team (experts in programming and substantial experience in environmental assessment technology development).

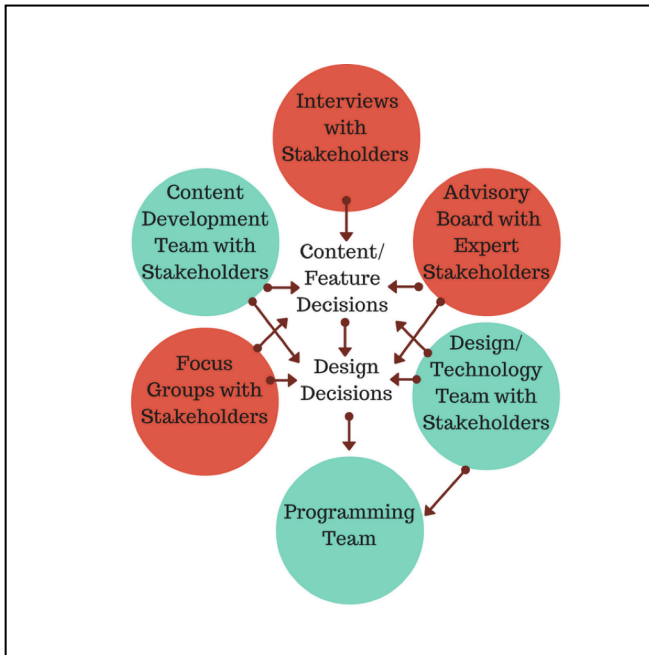


Figure 1: App Development Model Integrating Multi-Level Participatory Design

Using the low-fidelity mock-ups and taxonomy as a starting point, the Design/Technology Team developed high fidelity mock-ups through an iterative decision-making process (Figure 2) between the Design/Technology Team, Content Team, and Advisory Board. The Design/Technology Team and Content Team met two to four times monthly to discuss high fidelity mock-up development and to ensure end-user/stakeholder wants and needs were reflected in design and further content development. All team members and advisory board members convened annually and semi-annually to support decision-making processes. Questions about user wants and needs were

recorded for objective and subjective user interface testing and focus groups.

End user/stakeholders will participate in user interface testing and focus groups to offer input on final design features and functionality. Focus group findings will support another iteration of content and design development. After final content and design decisions have been made for HESTIA, the Design/Technology Team will have frequent and consistent meetings with the Programming Team to ensure the final product will be usable and valuable to end-users. The Content Team will focus on developing app testing protocol and reliability/validity testing.



Figure 2: High Fidelity Mock-Up Designed with Multidisciplinary Stakeholder Input

## RESULTS

Our app development process integrated a multidisciplinary participatory design approach at multiple levels to inform decision-making throughout app development which resulted in the Beta version of the home safety app that matched the needs described in our qualitative

findings. Examples of decisions made throughout our process include:

- All research and development (R&D) teams and Advisory Board prioritized app features for Version 1. App features emerged from qualitative interviews where each participant described home safety assessment app wants and needs.
- Decisions about arrangement of content delivery order entry to support real-world assessment processes emerged from qualitative interviews and were confirmed through Advisory Board and Content Team. This was discussed during regular meetings with Design/ Technology Team.
- Advisory Board made final decisions about landscape versus portrait orientation based on real-world experiences with paper-and-pencil home safety assessments suggesting a more naturalistic transition between clipboard and tablet/iPad (Figure 3).
- Progress bar trackers were discussed between all R&D Teams and Advisory Board and decisions were made for further end-user/stakeholder input as a part of user interface testing and focus groups.

## CONCLUSION

Our rigorous methods and multidisciplinary participatory design approach employed during the development of HESTIA resulted in a Beta-version of the app that aligned with end-user wants and needs. Our model and procedure may support future app-design methodologies. Apps developed with stakeholders and potential end-users may result in apps that best meet user wants and needs.

## ACKNOWLEDGEMENTS

We thank all of the stakeholders who participated in our decision-making processes.

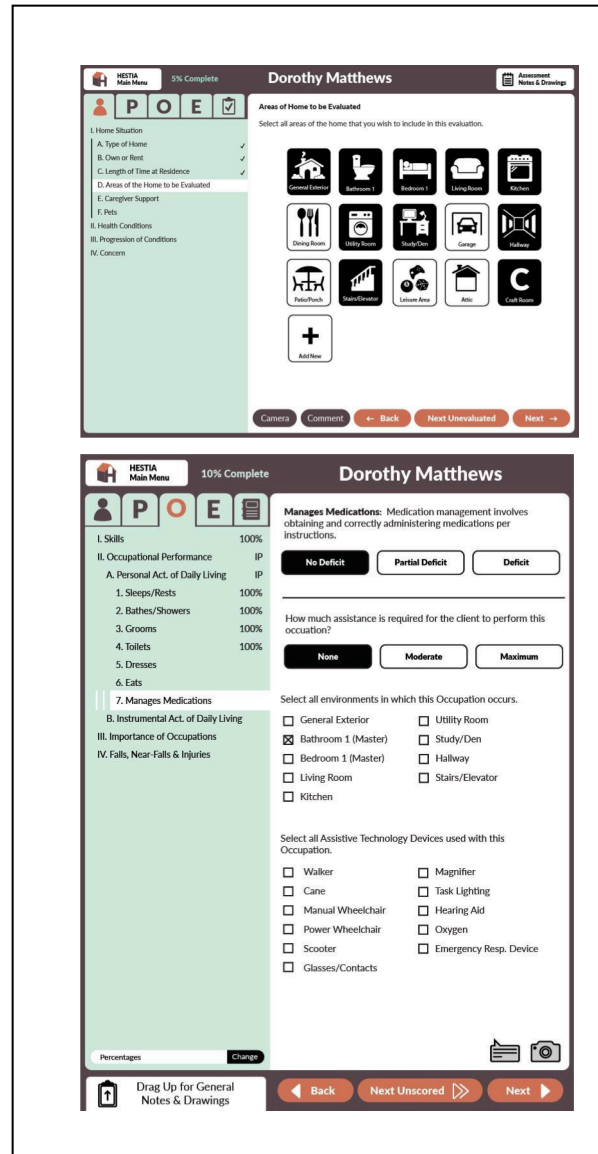


Figure 3: Landscape Versus Portrait Orientation Mock-Ups

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