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## Customer Background

enVista is a global software, consulting, and managed services provider, optimizing and transforming physical and digital commerce for the world's leading manufacturers, distributors, 3PLs/LSPs, and omnichannel retailers.

## Problem Statement / Scope of Work

enVista currently uses a third-party time capture and data collection application for measuring and reporting on labor utilization and productivity. enVista has determined there are opportunities to improve the user experience of the time study application and expand the capabilities of data management to more efficiently support their Labor Management System (LMS) implementations.

Our scope of work over the past two semesters has involved development of a time study application that can be available across multiple platforms and work in online/offline environments all while being seamlessly integrated with enVista's current LMS.

## Requirements

- Ability to create a template on a PC (Excel, CSV, etc.) or directly on a mobile device.
- Ability to edit a template before the study, either directly on the PC or mobile device.
- Ability to edit a template during a study directly on the mobile device without the study ending
- Ability to Add, Edit, and Delete elements.
- Ability to maintain Parent/Child Element relationships.
- Ability to reorder Elements while maintaining all Parent/Child Element relationships.

## Experimentation and Concepts



Figure 1

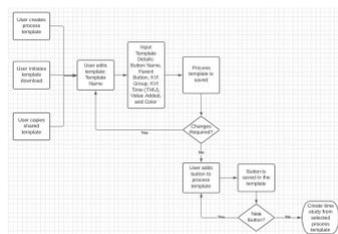


Figure 2



Figure 3

In creating the time study application, the team went through many different variations in developing what we thought was aesthetically pleasing to the user. Figure 1 is the team's first variation of the stopwatch feature that allows the user to start/stop each activity. Figure 3 was our design for a "load project." This tab allows the user to access a list of previously created projects and select which one they want to access.

By creating a functional flow diagram [Figure 2], it allows us to showcase how the application works at a high level.

## Final Design



Figure 4



Figure 5



Figure 6

To write the application, we used software called Flutter. Flutter is an open source framework that allows us to develop the application in a fast, productive, and flexible manner. By creating a stopwatch function [Figure 1], the user will be able to start and stop the activity at any time. With the creation of multi-screen [Figure 2], the user will be able to create multiple pages and navigate through each page. Figure 3 shows each task that can be generated and edited. Within the application, all data will be able to be saved and synced across multiple devices to help store any information that could be used in the future.

## FMEA

Mode	Effect	RPN	Action
Button does not respond to user interaction	Inputted data is not recorded or documented	180	Reduce code complexity, test effectiveness of code within the stopwatch feature, ensure clean and comprehensible code for ease of debugging.
System freezes or crashes	Data is not recorded and user loses access to the system	252	Ensure clean and comprehensible code for ease of debugging, avoid declaring unnecessary variables within code. Break code loops when necessary for proper recording.
Stopwatch runs data on only one activity	Upon pressing a button on the stopwatch, it does not stop itself and keeps running for one activity	48	Number of iterations of code loops are reduced as much as possible to ensure activity switching effectiveness.
User is unable to navigate to the next page	User is stuck on a page or has to restart the app	294	Run & test code for screen connection. Ensure each variable is applied to it's appropriate program (screen).
System has long load time from one screen to another (>1sec)	The app has a long load time and forces the user to wait	100	Break code loops when necessary for screen transfer and reduce code complexity.
All activities are unorganized	User is unable to attach a specific activity to a study and is unable to differentiate between studies.	100	Use volunteers to test and report the usability and functionality of the application.
User is not prompted on where to fill in information	User is unable to create activities or studies	150	Use volunteers to test and report the usability and functionality of the application.

## Testing

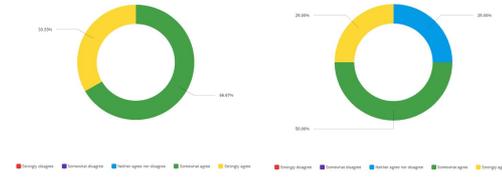


Figure 7

Figure 8

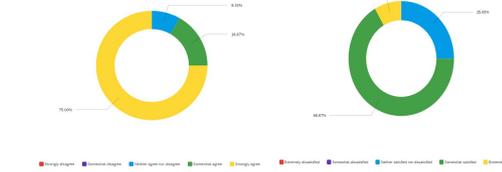


Figure 9

Figure 10