Using Digital Technology to Support Reminiscence Therapy (RT) for People With Mild Cognitive Impairment (MCI) and their Caregivers

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MS-HCI Maters Project

Final Presentation

OUR TEAM.

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MS-HCI, Georgia Tech

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INTRO.

The Goal.

This project aims to create **a digital tool to support Reminiscence Therapy (RT)**, a non-pharmacological intervention for people with MCI (PW/MCI), to facilitate self-expression and improve their quality of life.

The Target User.

People with Mild cognitive impairment (MCI).

MCI is the stage between the cognitive decline of normal aging and the more serious decline of dementia.

Problem Space.

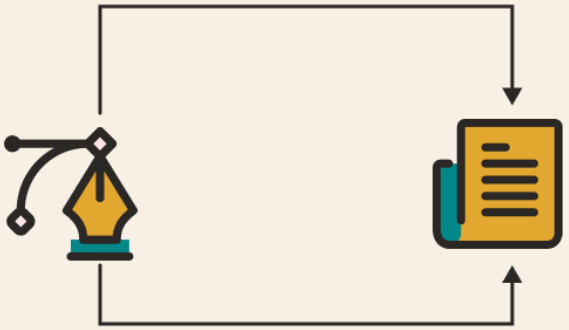
Reminiscence Therapy involves the discussion of memories and experiences with other people using tangible prompts such as photographs to evoke memories and stimulate conversation.

Research proved that Reminiscence Therapy can improve the quality of life and wellness of P/w MCI.

Our Timeline.

Research

Ideation



Prototype **Evaluation**

Jan Feb Mar Apr May Aug Sep Oct Nov Dec

Spring 2022

Fall 2022

Research

Ideation

Prototype

Evaluation

SECONDARY

Literature Review

Competitive Analysis

PRIMARY

Subject Matter Experts Survey

Subject Matter Experts Interview

Workshop

RESEARCH

Literature Review.

Justification

- Literature review enabled us to undersatnd the problem space and target user group

Goal

- To build foundation of knowledge of the RT and MCI

Findings

- Group RT and Individual RT
- **Simple Reminiscence** (unstructured and spontaneous process that focuses on positive memories) and **Life Review** (structured and individualized)
- Common topics and activities for group RT
- RT also offers benefits for family caregivers

RESEARCH

Competitive Analysis.

Justification

- Competitive analysis helped us learn from existing technological intervention for RT, identify gaps and opportunities for innovation.

Goal

- To identify potential opportunities
- To learn from pros and cons of existing systems and gian inspiration

Findings

👍

- Multimedia materials
- Design with constraints (users' acceptance of technology)

👎

- User group: not many solutions targeted toward PW/MCI.
- Caregiver involvement
- Negative Memory

❓

- Personal material vs. generic material
- 1 on 1 vs. group

Name	Technology Use	Content	Stimuli	Does it involve Therapist?	Single Vs Groups	Pros	Cons
MemoryLane	• Ipad • Tangible box with buttons	Archival music or video clips	Image	No	• Single	• Tangible touch button • Easy Interaction	• Need to own specific device for the exercise
Pensieve	• Email	User's services or the impersonal prompts	Text	No	• Single	• User can access to Pensieve at any time and have constant use it for everyday	• Need to build diary data bases
CIRCA	• Laptop	Archival Clips include photo, video and music compiled in multimedia formats	Image, Video,Music	No	• Single	·	·
Networked Reminiscence Therapy	• Phone, laptop, or tablet with videocall function	Voice communication with therapist, archival video and photo	Image, Vocie	Yes	• single	• Participate with therapist	• Can not work with caregiver
Jukebox	• Music player with digital screen	Archival music and relevant images	Image, Music	No	• Group	• Group activity • social exchanges :	• Music and Display have less connection
Pyramid	• Screen with tangible button	Images that influential scene of time and their relevant sounds	Image, Sound	No	• Group	• Social Exchanges • Tangible interaction is easy and playful	• Display is small for group activity
Binoculars	• VR technology	Images topics related to the shown image, which can be used to foster social exchange with the participants.	Image	No	• Single	• Interaction is easily manageable • time-travel metaphor • Beable to finished individuly	• User have problem reaching for control wheel at the first time
Multimedia Biographies	• Computers, TV, Dvd player and remote controls	Personal Photo and videos	Image, Vide	No	• Single	• Use Personal image as stimuli	• Need to build personal database
Food Stamps	• Laptop/Tablet/Phone	Archival game with calculate function	Image, game	No	• Single	• Adding calculation to help MCI user	• Culture limit • Only visual stimuli
Virtual Worlds	• Motion capture system • Digital screen display	reminiscence room, virtual tour and gardening in 3D virtual world	Image	No	• Single	• Use motion capture technology	• User needs to own specific device

RESEARCH

Subject-Matter Experts Survey.

Justification

- The survey allows us to obtain a large amount of information in a relatively short amount of time

Goal

- **To obtain contact information of potential willing interview targets**
- To identify materials that are commonly used by therapists during the RT
- To understand factors that therapists consider when selecting materials
- To identify digital tools they are currently use and gauge their perception of using digital tools to support RT

Procedure

- The survey was made in **Qualtrics**
- Distribution Plan: Facebook groups
- **55** responses in total, **21** valid responses (Therapists with RT experience)

Georgia Tech

Hi there! We are graduate students at Georgia Tech working on a project to develop a reminiscence therapy (RT) tool for seniors with mild cognitive impairment (MCI). The purpose of this survey is to understand therapists' current practice for conducting reminiscence therapy.

If you're a therapist or psychologist with reminiscence therapy experience, we really appreciate your input!

This survey should only take 5 minutes, and your responses are completely anonymous. If you have any comments, questions, or concerns about this survey, Please contact Lily Yang (lyang639@gatech.edu), Anne Chen (achen757@gatech.edu), or Dr. Alfateemy (leila.alfateemy@gatech.edu).

RESEARCH

Subject-Matter Experts Interview

Justification

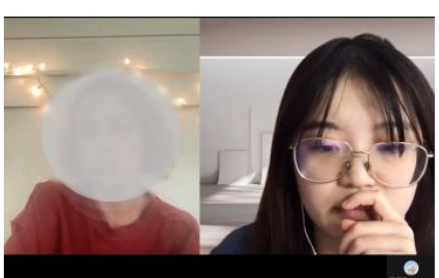
- To get a more in-depth understanding of the current RT process.

Goal

- To understand the current material selection process.
- To gain in-depth knowledge about the current RT process.
- To identify challenges therapists encounter in the current RT process.
- To identify digital tools they currently use and gauge their perception of using digital tools to support RT

Procedure

- Semi-structured Interview
- 45 mins for each session
- **4** therapists with RT experience, **1** psychology professor whose research area is the reminiscence



RESEARCH

Findings from Subject-Matter Experts

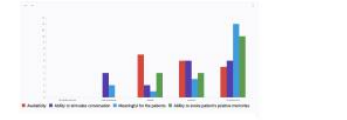
#1: To trigger memories and foster conversations, the chosen material had to consist of positive and personally relevant stimuli

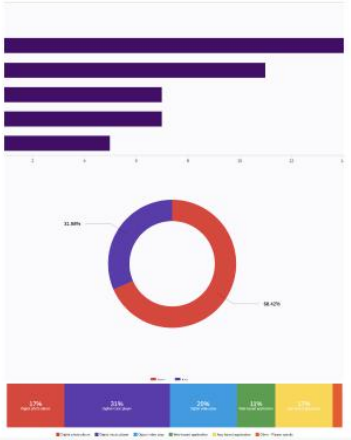
#2: The current RT process primarily relies on conventional medium considering people with MCI's (PW/MCI) acceptance of new technology.

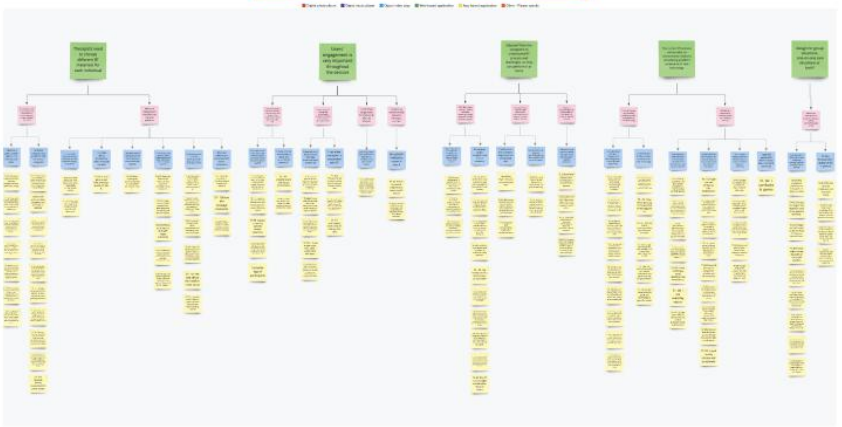
#3: With proper training, it would be meaningful to let caregivers perform RT with PW/MCI.

#4: PW/MCI's engagement is very important throughout the session.

#5: Both group therapy and one-on-one care therapy have their benefits.







RESEARCH

Elicitation Workshop

Justification

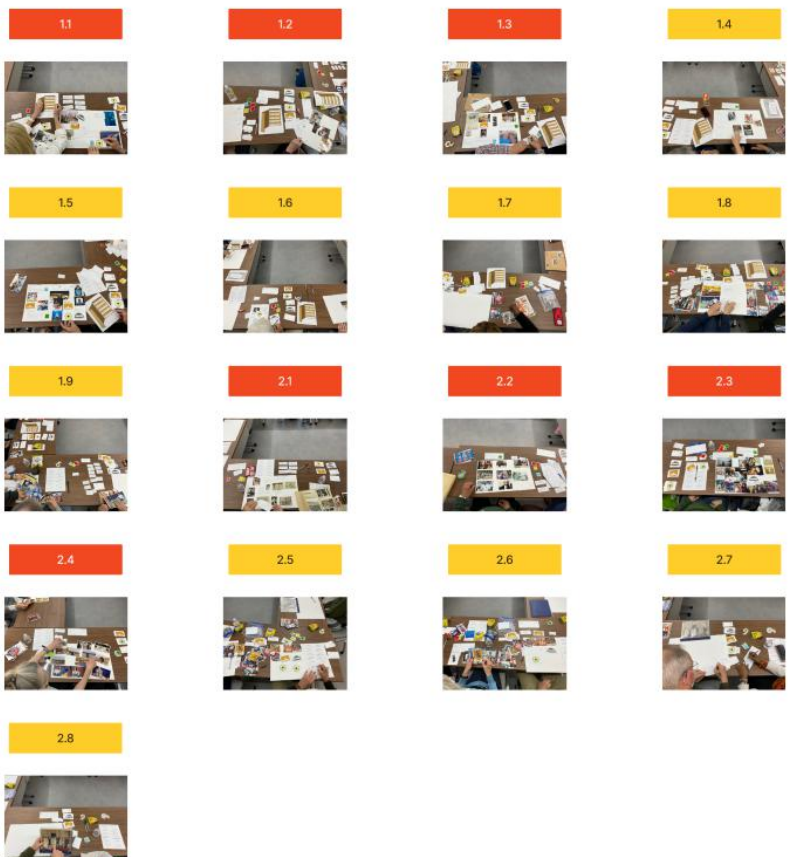
- The **Elicitation Workshop** allows us to understand how PW/MCI remember the past without asking them to describe the entire process. This research method also helped us to observe how MCI patients interact with their caregivers during the process.

Procedure

- Scrapbook reminiscence activity
- Think Tank section with Cognitive Empowerment Program @ Emory University
- **2** sections, **45mins** each section

Goal

- To validate the previous research findings.
- To understand how PW/MCI tell a story?
- To determine what kind of medium can better stimulate PW/MCI memories
- To determine what topics are PW/MCI interested in?
- To understand if PW/MCI want to share their memory to others.



Problem Statement

Traditional RT is **labor-intensive** and **time-consuming** for caregivers and P/W MCI since all the materials must be hand-picked, and it is difficult for P/W MCI to be involved because the session always takes away their **autonomy**.

2.RESEARCH PLAN & **DESIGN REQUIRMENT**

Finding	User Needs	Design Requirement
1. Using their personal memory medium will better stimulate their memory than a generic memory medium.	1. Members need personal stimuli to better recall memories	**1. Design should allow user to input their own material**
2. Members and caregivers tend to select memories from their 20s and 30s.(Validated reminiscence bump)	2. Members need positive memory material, which tends to appear in the 20s-30s.'	**2. Design should assist users in recalling positive memories**
3. The caregiver was over-involved in this process, leading the member to become the observer.	3. Members need to be more engaged in the collaborative process with caregivers	**3. Design should provide users with a fun and meaningful experience**
4. Member and Caregiver spend a long time organizing the materials.	4. Members need a more efficient way to organize their materials.	**4. Design should increase the efficiency of organizing materials**
5. Members will increase negative emotions when they struggle to remember some detail from the photo.	5. Members need some clues to prevent the struggle of recalling details	**5. Design need to avoid asking for nuanced detail about their memory**
6. Members and caregivers are often struggling with technology	6. Member and Caregiver need a design that requires less cognitive and physical load.	**6. Design should facilitate usage by older adults**

Research

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PRIMARY

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Subject-Matter Experts Interview

Workshop

Ideation

Brainstorming Sessions

Storyboarding

Concept Feedback Sessions

Prototype

Evaluation

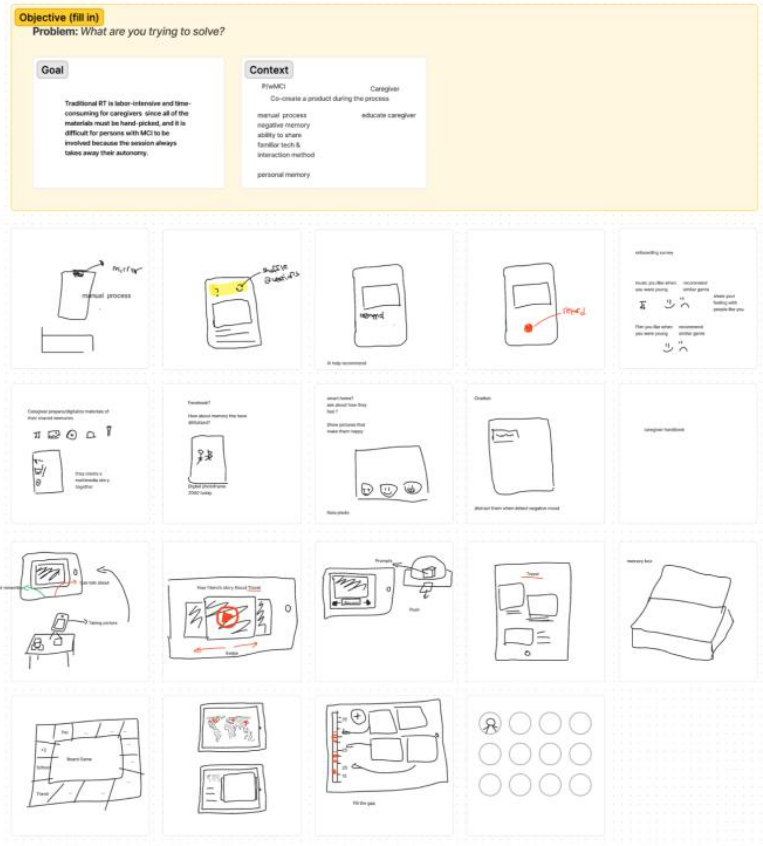
IDEATION

Brainstorming

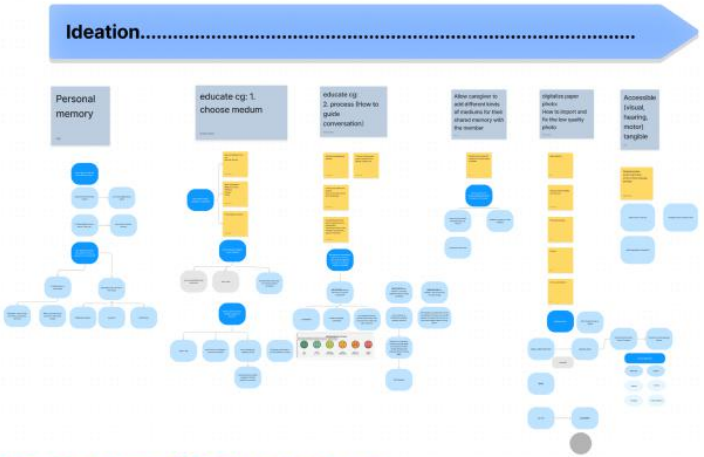
2 2hr Brainstorming Sessions based on the design requirements

Brainstormed **12** ideas and dot voted on the top **4** ideas.

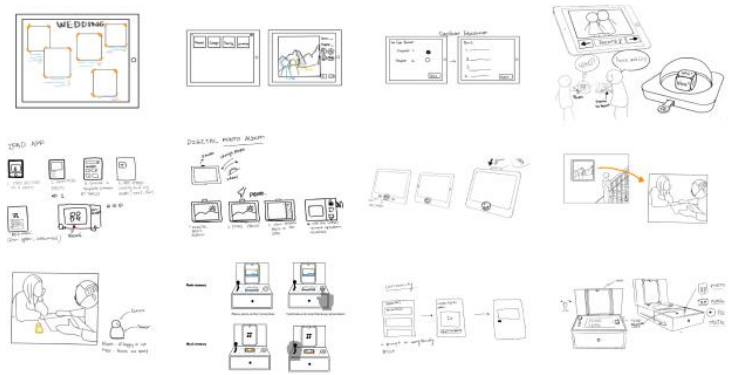
Crazy 8



Brain Writing



Thumbnail Sketches

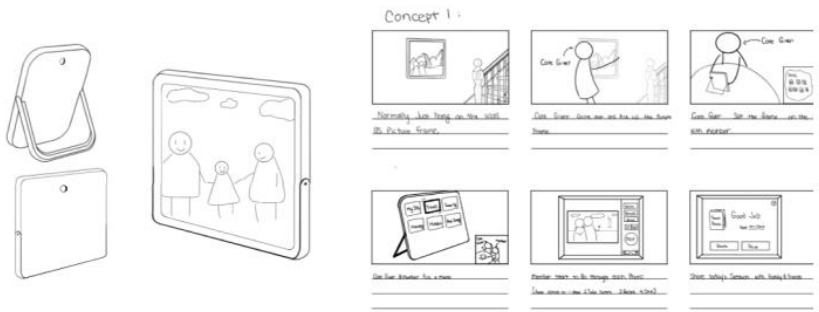


Storyboarding

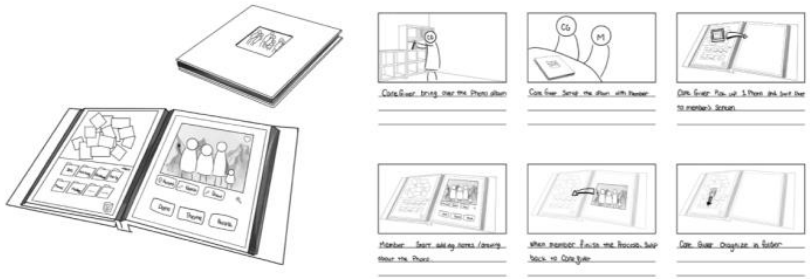
4 Top Concepts

We created sketches and storyboards to communicate our ideas better.

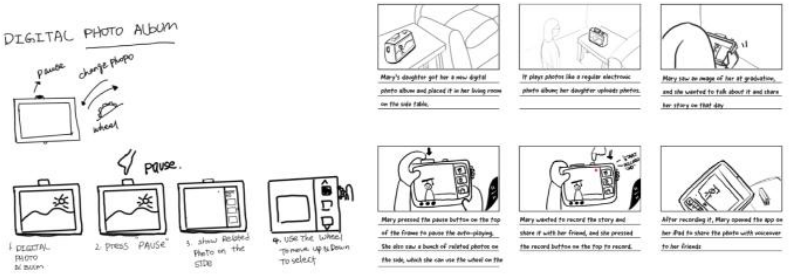
Concept 1



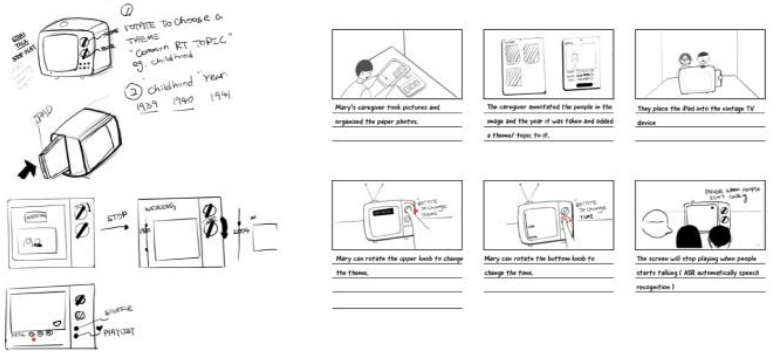
Concept 2



Concept 3



Concept 4



IDEATION

Subject-Matter Experts Feedback Sessions

Participants

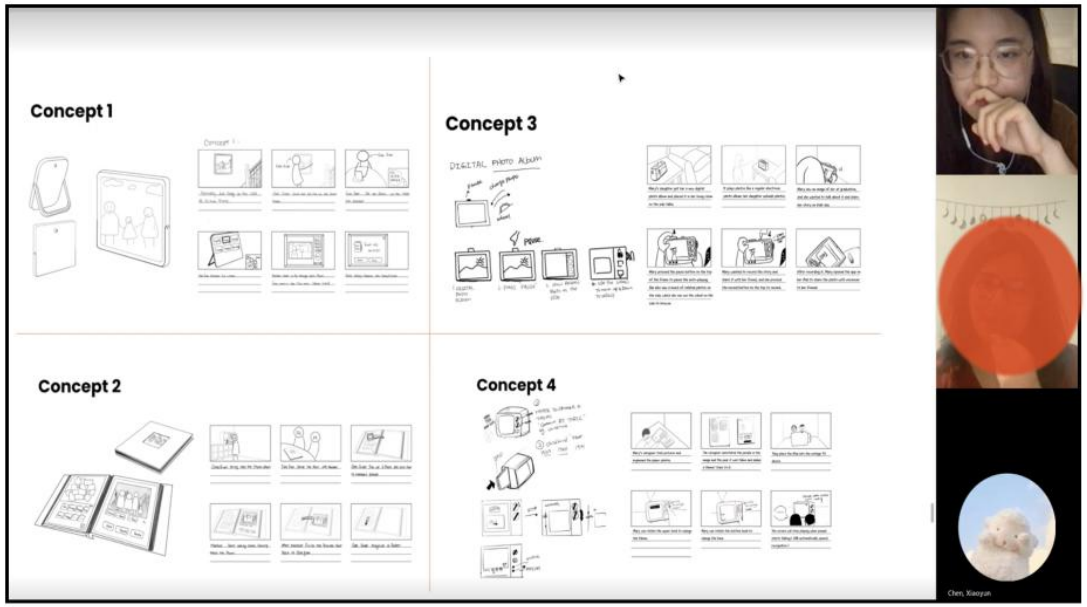
- **Number of participants: 3**
- **Participants Requirement:** Therapists or professors who have experience with conducting RT with Pw/MCI

Protocol

- Present each concept
- Feedback questions after each concept
- Use 10 point rating scale for each concept and rank 4 concepts

Goal

- Help us understand the advantage and disadvantages of each concept from the therapists' perspective.
- Help us narrow down



Sample questions:

- What are your initial thoughts on this concept?
- On a scale of 1 to 10 (1 being not at all, 10 being highly likely), how likely would you be to recommend your client to use this product?

IDEATION

Feedback Session Findings

👍 **Physical Artifact Aspect**

"I like that. It's like a physical artifact that they can have."

👍 **Novel interactive Process**

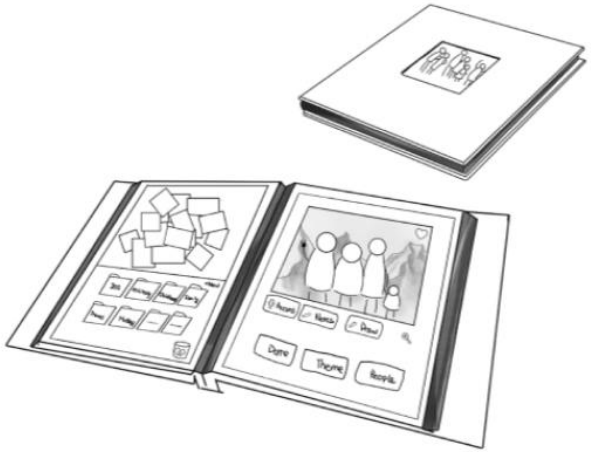
"Most RTs are like to show me a picture and tell me the story This is different where you can reorganize things and talk about why you reorganized it in certain way It's novel and different. "

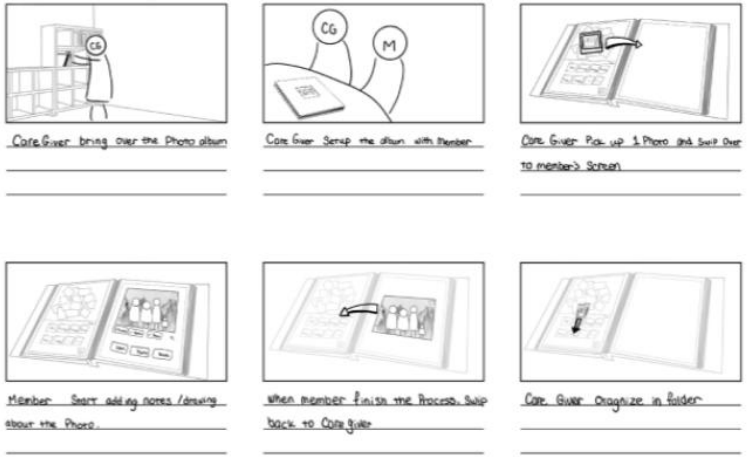
👎 **Interaction might be confusing**

" in terms of like figuring out how to drag and drop photos to rearrange them, I think that would be my only cause of concern"

Concept 2

FIRST PLACE





IDEATION

Feedback Session Findings

👍 **Physical Artifact Aspect**

"definitely like the fact that it's resembling an artifact."

👍 **Use interaction the users are familiar with**

"Press a physical button to record.. They may already be comfortable with, so hopefully learning curve is not that high.""

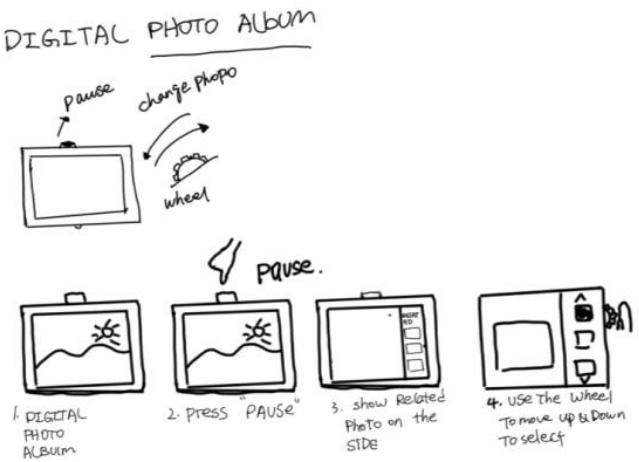
👎 **Too much stumili(related photo)**

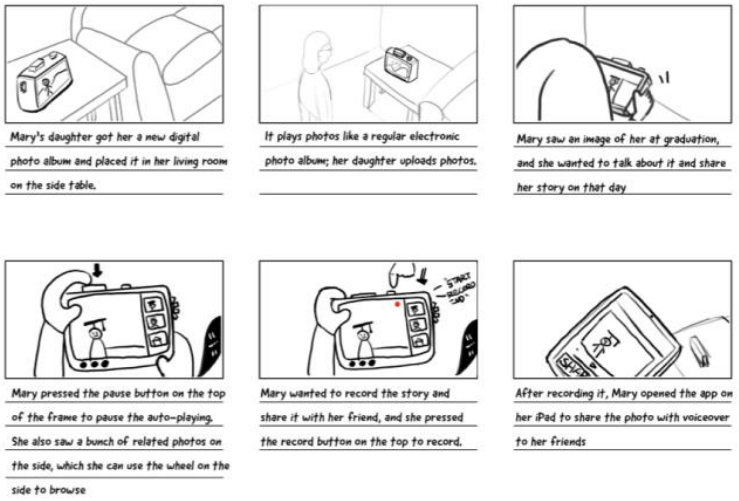
"...looking at related content because it might just become too much stimuli."

👎 **Only fit in the spontaneous scenario**

" How does the aspect fit in the therapy session instead of around (daily aspect) "

Concept 3 2ND PLACE





Mary's daughter got her a new digital photo album and placed it in her living room on the side table.

It plays photos like a regular electronic photo album; her daughter uploads photos.

Mary saw an image of her at graduation, and she wanted to talk about it and share her story on that day

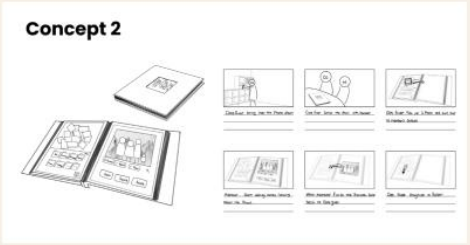
Mary pressed the pause button on the top of the frame to pause the auto-playing. She also saw a bunch of related photos on the side, which she can use the wheel on the side to browse

Mary wanted to record the story and share it with her friend, and she pressed the record button on the top to record.

After recording it, Mary opened the app on her iPad to share the photo with voiceover to her friends

Final Concept

Concept 2

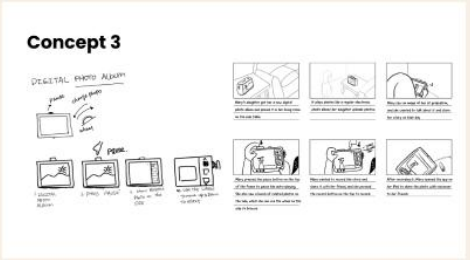


Physical Artifact Aspect

Novel interactive Process

Interaction might be confusing

Concept 3



Physical Artifact Aspect

Use interaction the users are familiar with

Too many stimuli(related photo)

Only fit in the spontaneous scenario

Final Concept

A Digital photo album for PW/MCI to organize and create a life chart(journey) with their caregiver(s)

2 Key Functions

1. **ORGANIZE:** A system allows users to organize their photos in chronological by viewing each photo and adding it to their photo timeline

2. **DISPLAY:** They created a product(artifact) by organizing photos that can be placed in their home.

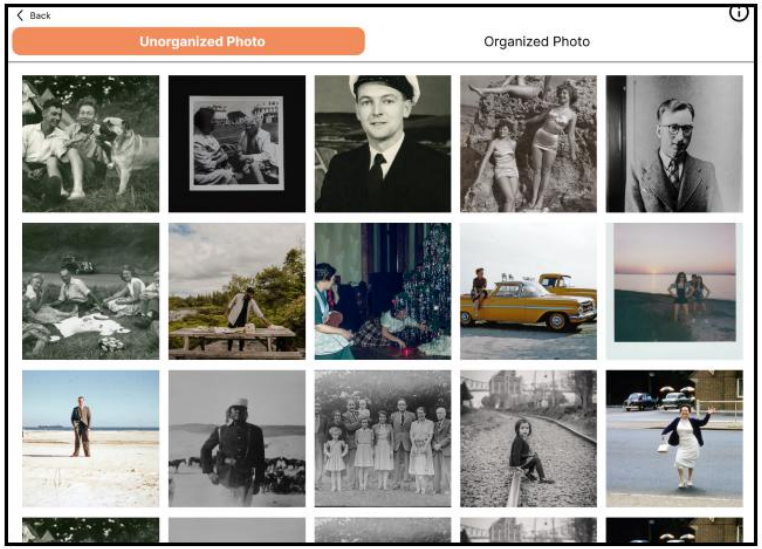
IDEATION

Final Concept

Design Requirements

1. **Design should allow user to input their own material**

Connect to External Photo Account (iCloud, Google Photos, etc.) → Unorganized Photo Folder



Final Concept

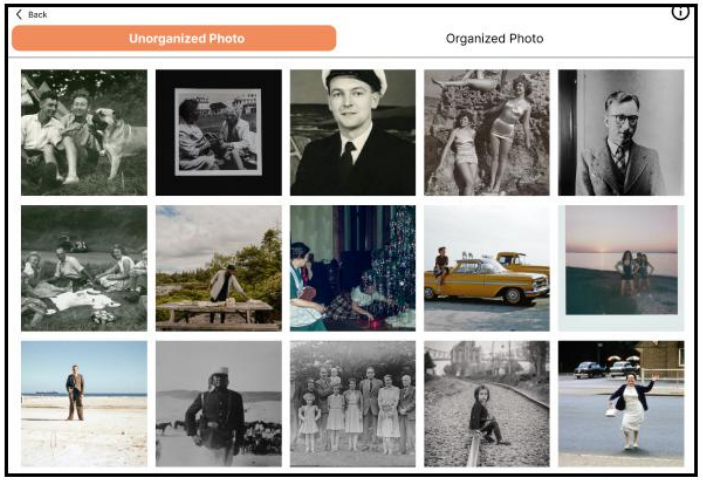
Design Requirements

1. Design should allow user to input their own material

4. Design should increase the efficiency of organizing materials

5. Design need to avoid asking for nuanced detail about their memory

Connect to External Photo Account (iCloud, Google Photos, etc.) → Unorganized Photo Folder → Organize photos by entering the member's estimated age when each photo was taken.



IDEATION

Final Concept

Design Requirements

1. Design should allow user to input their own material

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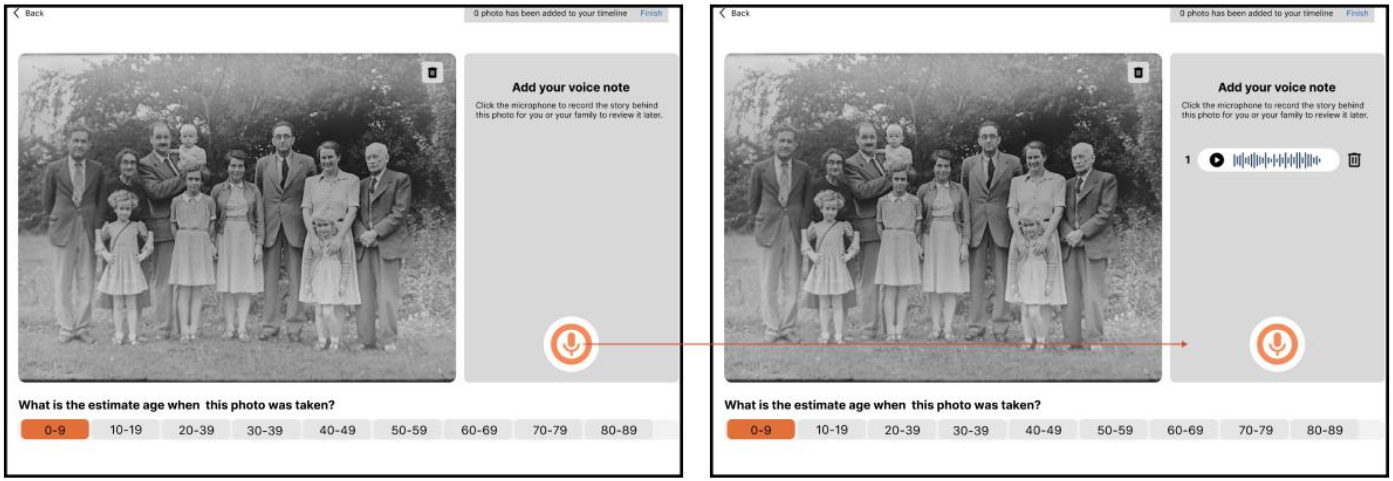
3. Design should provide users with a fun and meaningful experience

Connect to External Photo Account (iCloud, Google Photos, etc.) → Unorganized Photo Folder → Organize photos by entering the member's estimated age when each photo was taken.

Members can also record voice stories in this process.



Final Concept

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1. Design should allow user to input their own material

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3. Design should provide users with a fun and meaningful experience

2. Design should assist users in recalling positive memories

Connect to External Photo Account (iCloud, Google Photos, etc.)

→

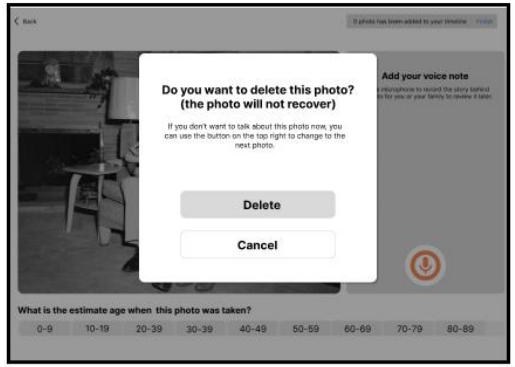
Unorganized Photo Folder

→

Organize photos by entering the member's estimated age when each photo was taken.

Members can also record voice stories in this process.

Members can delete a photo if they don't want to talk about/see it



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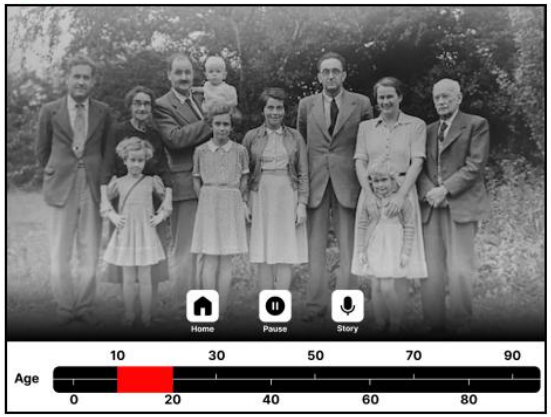


Connect to External Photo Account (iCloud, Google Photos, etc.)

Unorganized Photos Folder

Organize photos by entering the member's estimated age when each photo was taken.

All organized photos will be in the Organized Photos folder.

Members can also record voice stories in this process.

Members can delete a photo if they don't want to talk about/see it

In the display mode, users will be able to play Organized Photos chronologically.

Users can listen to recordings or add new recordings

ORGANIZE

DISPLAY

Final Concept

Design Requirements

1. Design should allow user to input their own material

4. Design should increase the efficiency of organizing materials

5. Design need to avoid asking for nuanced detail about their memory

3. Design should provide users with a fun and meaningful experience

2. Design should assist users in recalling positive memories

6. Design should facilitate usage by older adults

Add physical buttons

Simple task & flow

An instruction that can be referred to at any time

Research

SECONDARY

Literature Review

Competitive Analysis

PRIMARY

Subject-Matter Experts Survey

Subject-Matter Experts Interview

Workshop

Ideation

Brainstorming Sessions

Storyboarding

Concept Feedback Sessions

Prototype

Mid-fi Prototype

Visual Design Guide

Hi-fi Iteration

Evaluation

Mid-fi Heuristic evaluation

Hi-fi Usability testing

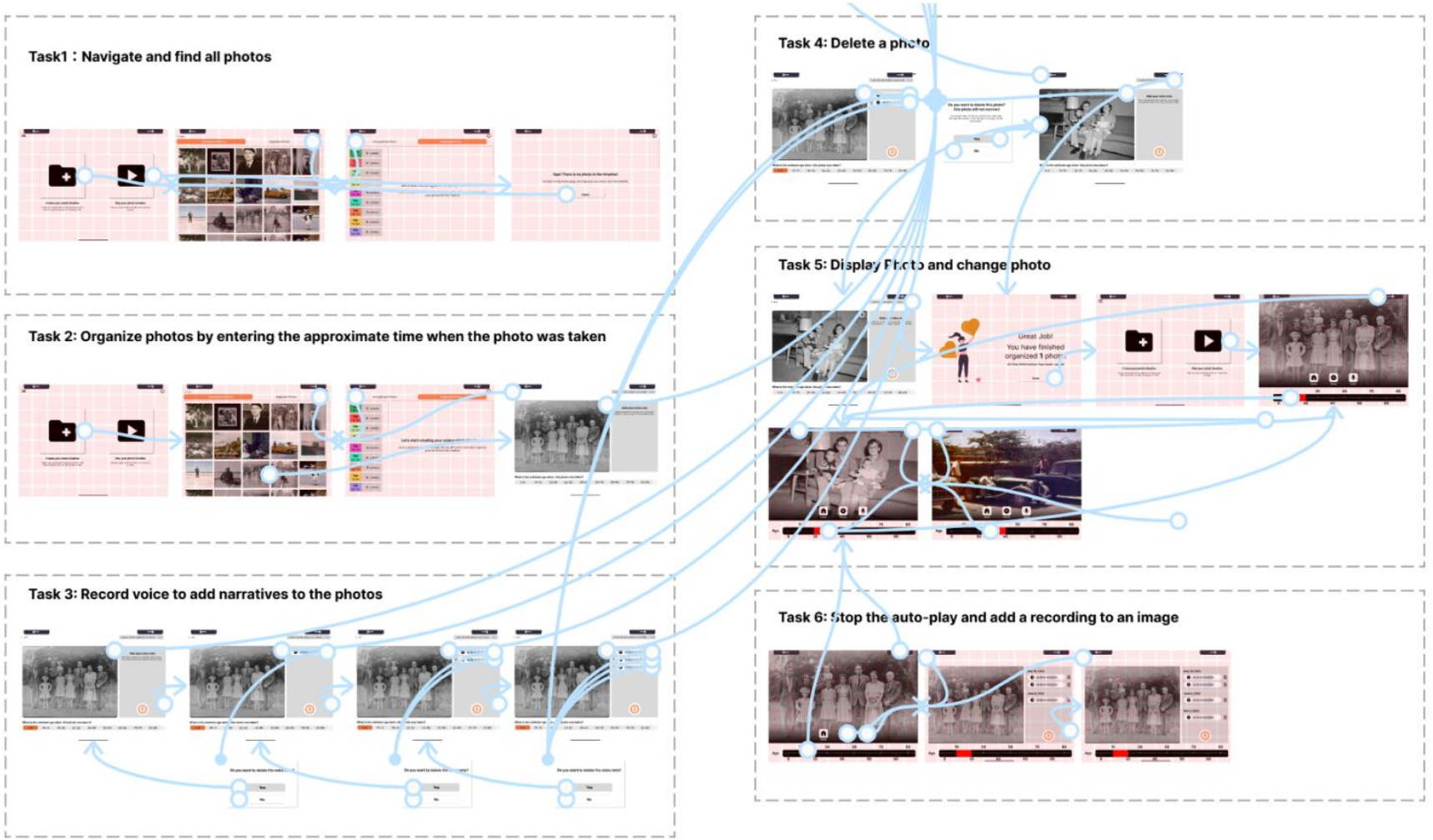
Hi-fi Heuristic evaluation

PROTOTYPE

Mid-fi Prototype

Clickable Mid-fi prototype

After we finalized our key features and frames, we built a clickable prototype to further testing out our idea



EVALUATION

Iteration 1： Heuristic Evaluation

Participants

- Number of participants: 2
- Participants Requirement: UX Experts

Protocol

- 45 mins, in-person sessions
- 6 tasks, think-out loud method
- Each participant was asked to fill out Jakob Nielsen's 10 Usability Heuristics evaluation form at the end of the session.

Goal

- To uncover usability issues before we start building a hi-fi prototype.

Sample questions:

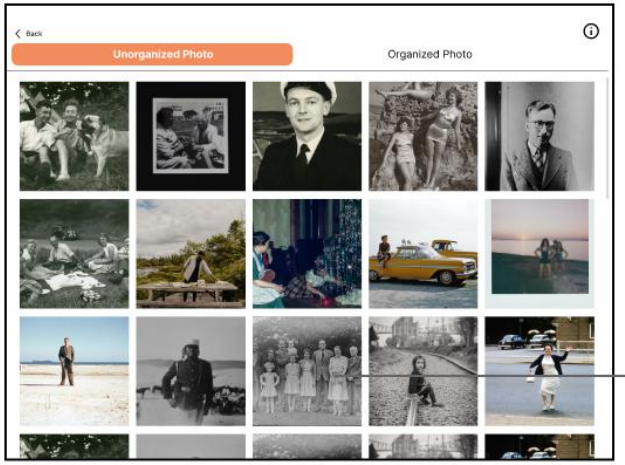
- How was your experience navigating to find all your photos?
- [Ask if a step was incorrect] What motivated you to click [interaction A] instead of [interaction B]?

EVALUATION

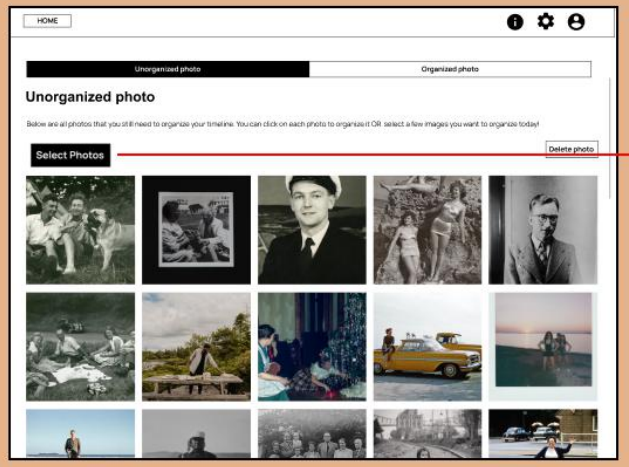
Revising Our Design

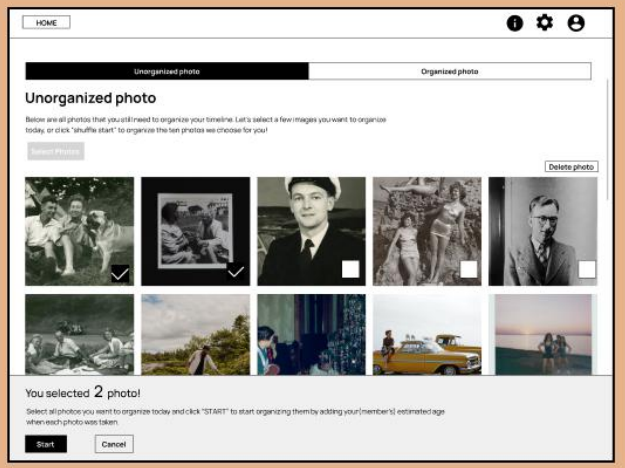
Main change#1:
how to start organizing photos

Before



After



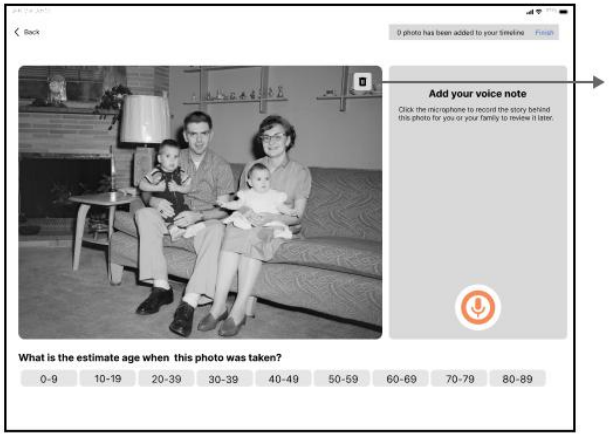


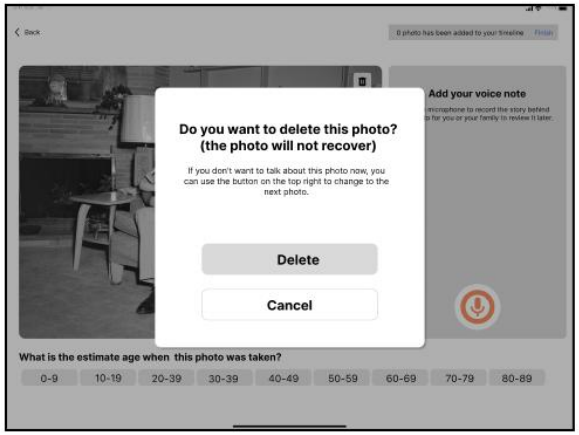
EVALUATION

Revising Our Design

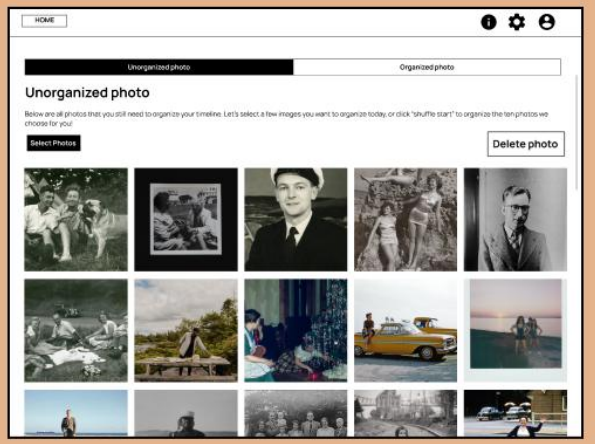
Main change#2: how to delete photos from the device

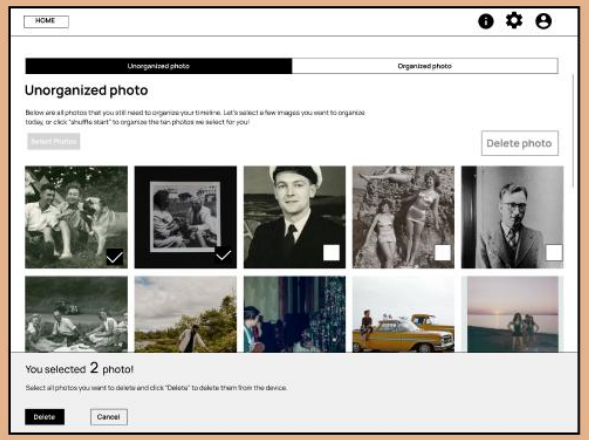
Before





After



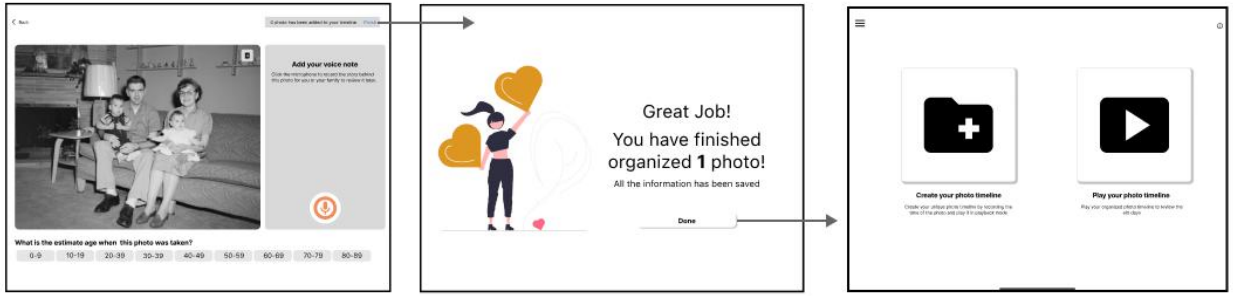


EVALUATION

Revising Our Design

Main change#3: After organizing a few photos

Before



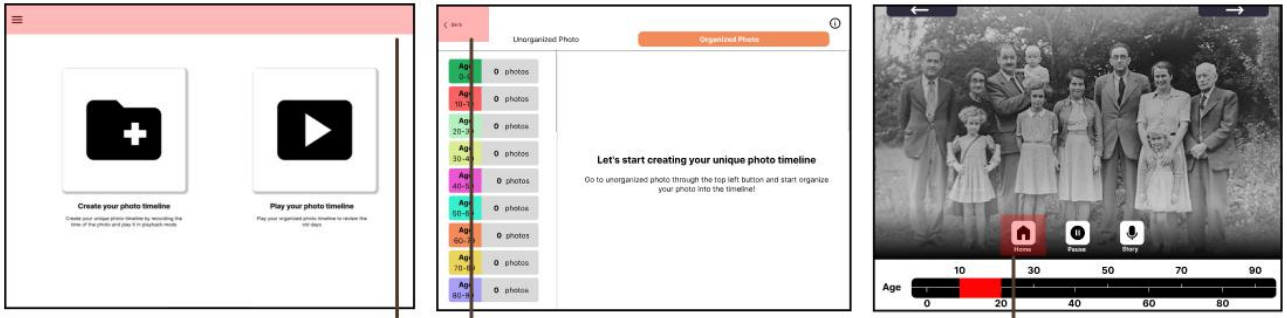
After

EVALUATION

Revising Our Design

UI Change #1:
Consistent nav bar in all pages

Before



After

EVALUATION

Revising Our Design

UI Change #2: Make all buttons look like buttons for this population

Before

After

PROTOTYPE

Visual Design Guidelines

LOGO

Memory ine

TYPOGRAPHY (easy for the elderly to read)

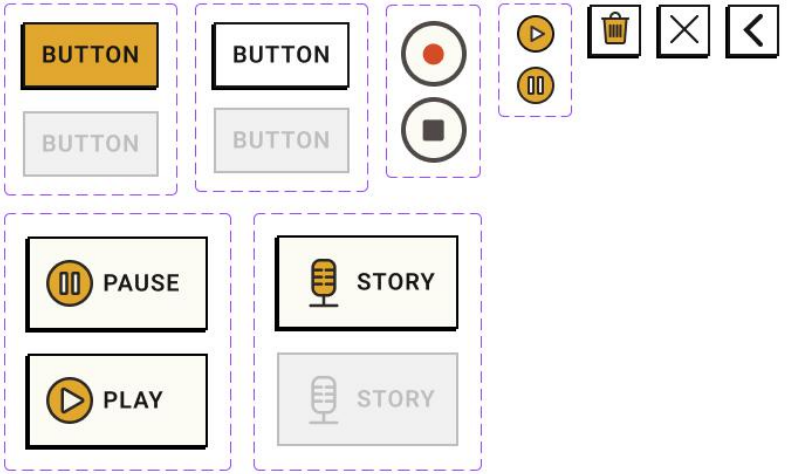
Roboto Bold 72	**Header 1**
Roboto Bold 48	**Header 2**
Roboto Bold 32	**Header 3**
Roboto Regular 32	Subtitle
Roboto Regular 20 - 145%	Body
Roboto Bold 20	**BUTTON**
Roboto Regular 18	Caption

COLORS (70s Retro Stripes Color Palette)

PRIMARY	#503D2E	CTAs Focused, Active Status
SECONDARY	#E2A72E	Links Popups, icons
TERTIARY	#F9F7E9	Background
SUCCESS	#048789	Success
FAILURE	#F9F7E9	Failure/error
TEXT	#181615	Test

ICONS

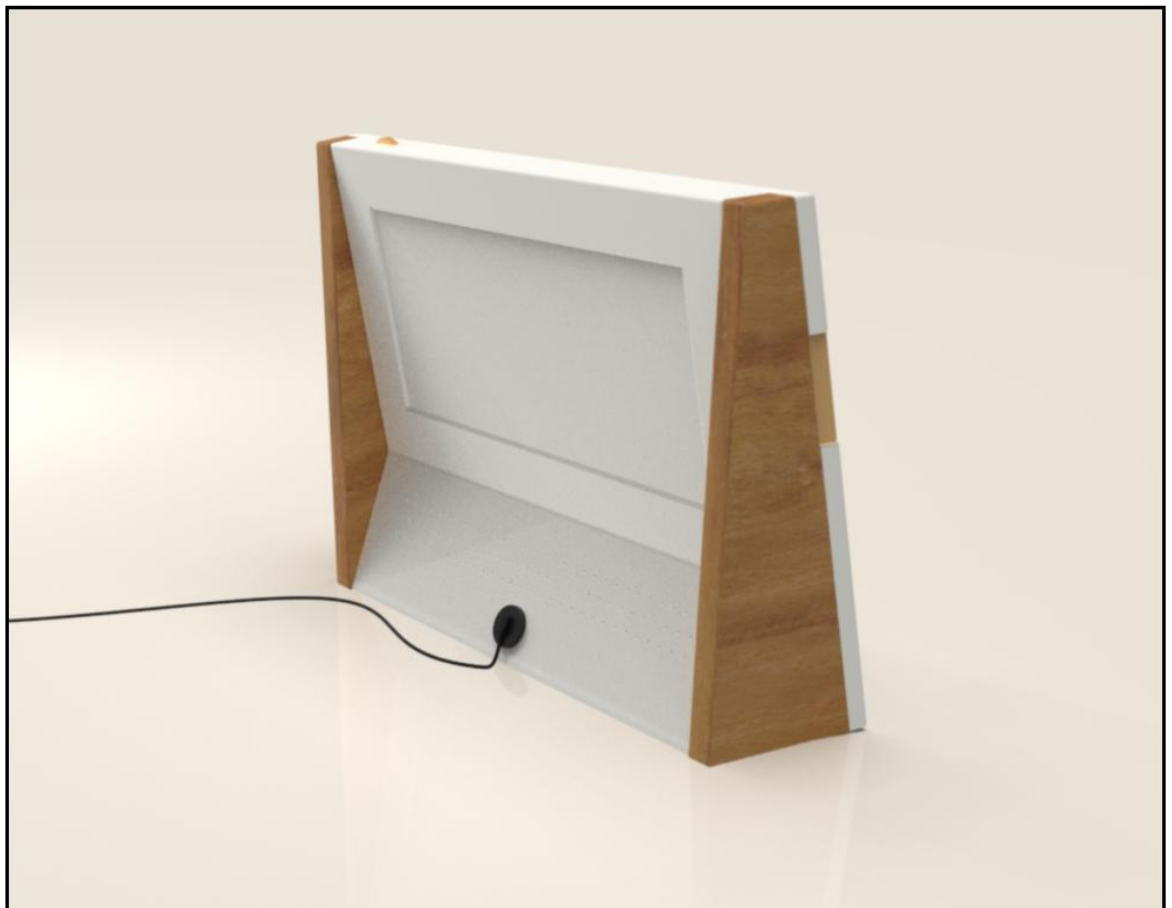
BUTTONS

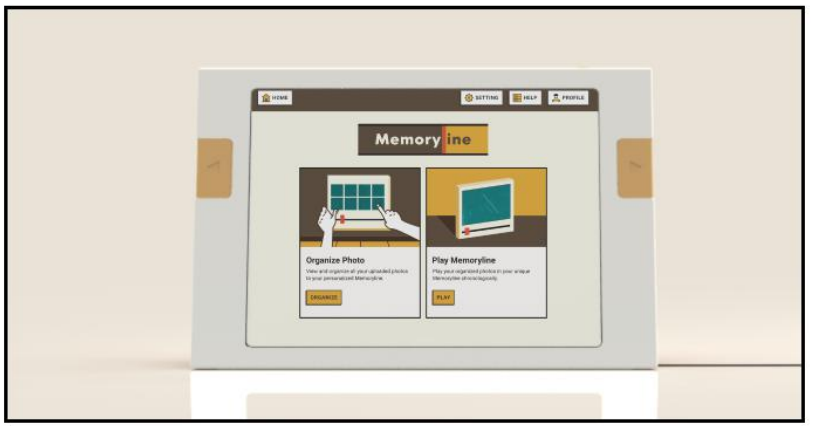


ILLUSTRATIONS

PROTOTYPE

Physical Product Design





PROTOTYPE

Iteration 2

EVALUATION

Testing Plan for Iteration 2

Usability test with target users

Participants

- Number of participants: 5 pairs
- Participants Requirement: 65 yrs or older, CEP Members with their Caregivers

Protocol

- Task-based, think-aloud testing sessions
- Import users' photos for testing
- Questions regards usability after each task
- Usability & Satisfactory Survey at the end of each session

Goal

- To understand users' mental modal when using the system
- To gauge the usability of the system

UX Expert Heuristic Evaluation

Participants

- Number of participants: 5
- Participants Requirement: UX experts with experience working with PW/MCI

Protocol

- Task-based, think aloud testing sessions
- Each participant was asked to fill out the Jakob's 10 Usability Heuristics Survey at the end of the session.

Goal

- Discount evaluation: As an alternative for us to test the usability when we can't recruit real users

EVALUATION

Usability Testing Plan Pivot

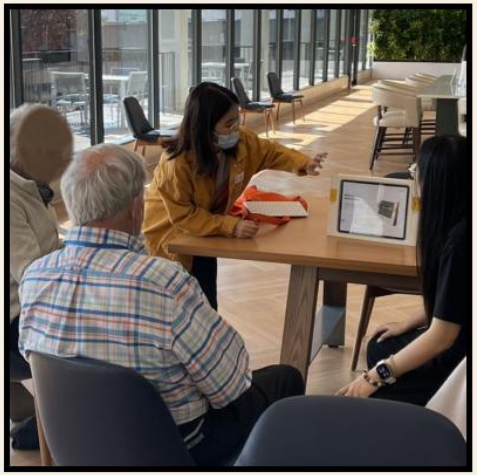
5 Usability test sessions with target users

Why did we adjust the plan ?

- Time commitment
- Concern for privacy
- Don’t interested in the photo-related product

2 usability testing sessions with target users (1 done, 1 scheduled today)

1 Feedback sessions with target users (with 3 pairs of users(member + care partner) and one member)



EVALUATION

Findings From Users

What users like about the design:

- Photo as medium
- Categorizing photo chronologically
- "Voice recording is much better than typing."
- **From observation:** members looked excited when they saw a photo of them

> *“Photo is So important; it brings a lot of things you can't remember. ”*

> *"The better thing about this is it puts it in chronological order. Instead of asking questions, the photo makes the narrative."*

> *"Voice recording is much better than typing."*

EVALUATION

Findings From Users

Suggestions we received:

- Clear and in-detailed instruction
- Want a Frame design that fits in their home decor
- Detailed description on each feature

> *"Use paper instruction diagrams and pictures of how to that can slide into the back or something out because I have to refer back to things." ”*

> *"I would like a nice frame if that will display at home." "*

> *“Today, technology applications come to us without any written description, which means you have to be savvy."*

EVALUATION

Testing Plan for Iteration 2

Usability test with target users

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- Number of participants: 5 pairs
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Goal

- **Discount evaluation:** As an alternative for us to test the usability when we can't recruit real users

EVALUATION

Heuristic Evaluation Findings

2/5 experts mentioned that we should use our interface instead of illustrations for onboarding screens.

> *"I don't know what I expect to see when I finish reading all the onboarding screens."*

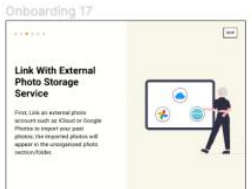
4/5 experts pointed out that we should let the users know how to refer back to the onboarding screen and where to find HELP.

> *"Use current help for onboarding, guide them through steps, and let them know where to find it again."*

Onboarding 15

Onboarding 16

Onboarding 17



Onboarding 18

Onboarding 19

Onboarding 20

Onboarding 21

EVALUATION

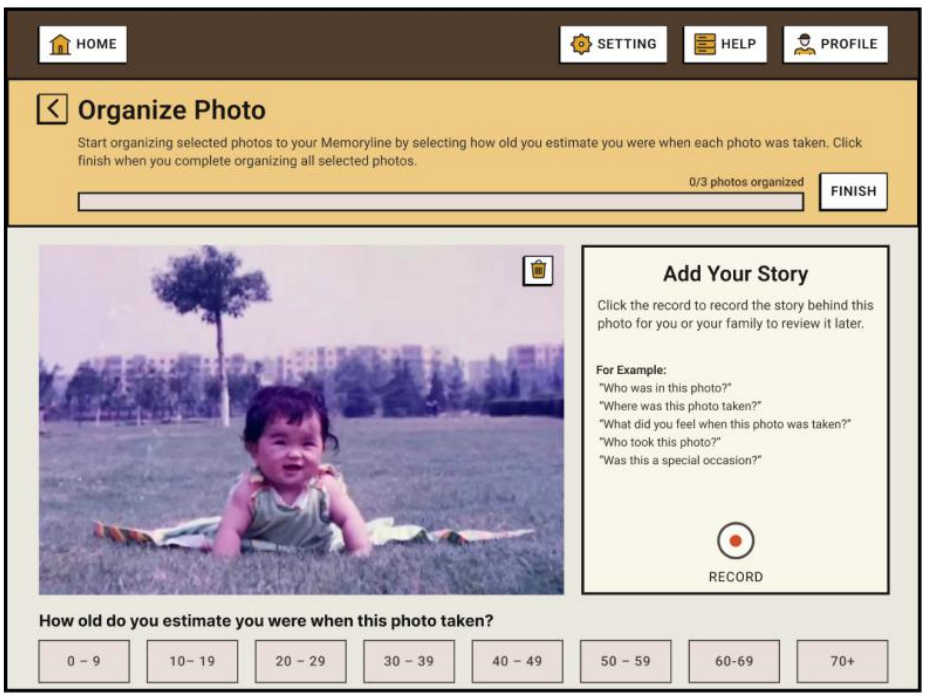
Heuristic Evaluation Findings

4/5 experts said they felt a bit overwhelmed when they first landed on this page

> *"It's hard for me to figure out where to start on this page. Record story or select age?"*

3/5 experts didn't know whether the recording was mandatory or not

> *" Can I move to next image without recording a voice story? "*

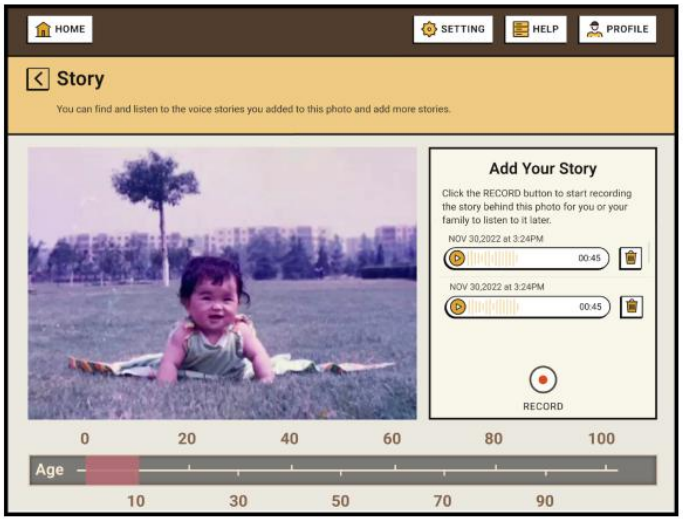


EVALUATION

Heuristic Evaluation Findings

2/5 experts felt the icon for the story looks like mute.

> I thought that icon was for muting the audio."



4/5 experts said they did not expect to see a new page after they click the STORY button in the display mode.

> *"It's weird to see a completely different screen when clicking STORY. I expected to see a side panel or something like that."*

Summary

Papers

Subject-Matter Experts

CEP members & care partners

Research Methods

Design Iterations

Evaluation Phases

CONCLUSION

Reflections

learnings from our year-long Masters project

We learned how to conduct user studies, communicate, and empathize with this population (Older adults with MCI in the CEP).
(Shout-out to our advisor and staff at CEP for their support.)

Designing for simplicity- it's challenging, but we did a great job.

Time management when working with this population. We should have planned more time for IRB and recruitment.

CONCLUSION

What's Next?

If we have more time, we will...

Conduct usability testing sessions with more members

Iterate our design based on current findings

- Make the onboarding and instruction more robust
- Simplify the hierarchy of some pages by changing them to structured steps
- Try to provide members with some hints or prompts when they are recording.
- Change the design of the story page for the display mode.

THANK YOU!