

# Team Lets Get Weird

## Part 2: Design Alternatives

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## Problem Space

We re-focused our project on physical activity for our user group. Previously, we were focusing on design for a system to assist in alleviating dementia symptoms in our user population, or an event coordination system for the retirement community. We made a change in our problem space definition because our extended user community at Campbell Stone has a more pressing issue with activity/event attendance than others. Also, we felt that it was unclear whether we could validate our solution for the dementia problem space within the time constraint for the project. Even in the medical field, dementia is not entirely understood, and there is no existing systematical evaluation framework for dementia symptom alleviation. We can only hypothesize that certain memory retention games or activities can help postpone the onset of dementia. Given the uncertainty of our proposed solution for memory issues in our user group, we felt we should switch to a different design problem.

We believe that designing for physical activity was an important issue for our user group to improve the quality of their lives. Elderly people who exercise regularly have fewer health risks than those who are inactive. Physically active elderly are also happier due to the endorphins released from exercising. We feel that designing for physical activity would have the largest impact on our high-level goal to improve the lives of our user population.

## User Profile Update

In order to follow up with our initial user observations and contextual inquiry we visited the Campbell Stone Retirement Home in Sandy Springs, GA.

At Campbell Stone, we spoke with the Wellness Coordinator, Samantha. We posed similar questions to Samantha as we did with the event coordinator of Emeritus Retirement Home, Deborah. During our interview with the wellness coordinator, a secondary user of our intended system, we sought to understand her interest of having a more physically active community. Samantha expressed that having a more physically active community would help keep residents healthy and would act as a preventative measures for common health issues, including arthritis, joint pain, and heart conditions. We also noted other possible problem spaces within the Campbell Stone retirement community. We considered designing for technology education for the residents. We also gained knowledge from Samantha about a possible system she was working on to track the activity of residents using pedometers. Samantha also provided us with a copy of their monthly calendar and invited us to attend events at any time. Similar to other senior homes, Campbell Stone is required to have a certain number of activities each day. We also took notes on the popular games/activities such as Bingo.

We then visited Campbell Stone later in the week to observe the Bingo game with the residents. All our team members even had a chance to proctor the Bingo game, which is called being the "caller". We were able to speak with the residents and used this time as contextual inquiry to understand more about the design space. We asked questions focusing on the physical activeness of the residents as well as events that they enjoyed attending. We found out that many of the residents enjoyed the physical activities that Samantha leads every week. We also learned that the residents enjoy walking outside for exercise. As expected, when it comes to

activities, Bingo is by far the favorite among the residents we spoke with. The residents learn about the available events either by the monthly paper calendar, or fliers slipped under their doors at the beginning of each week. None of the residents named the tv display as an info source for events, although the daily events are posted each day in the lobby. Interestingly, people did not notice there was a TV, or perhaps they need to plan out their days and need info more in advance.

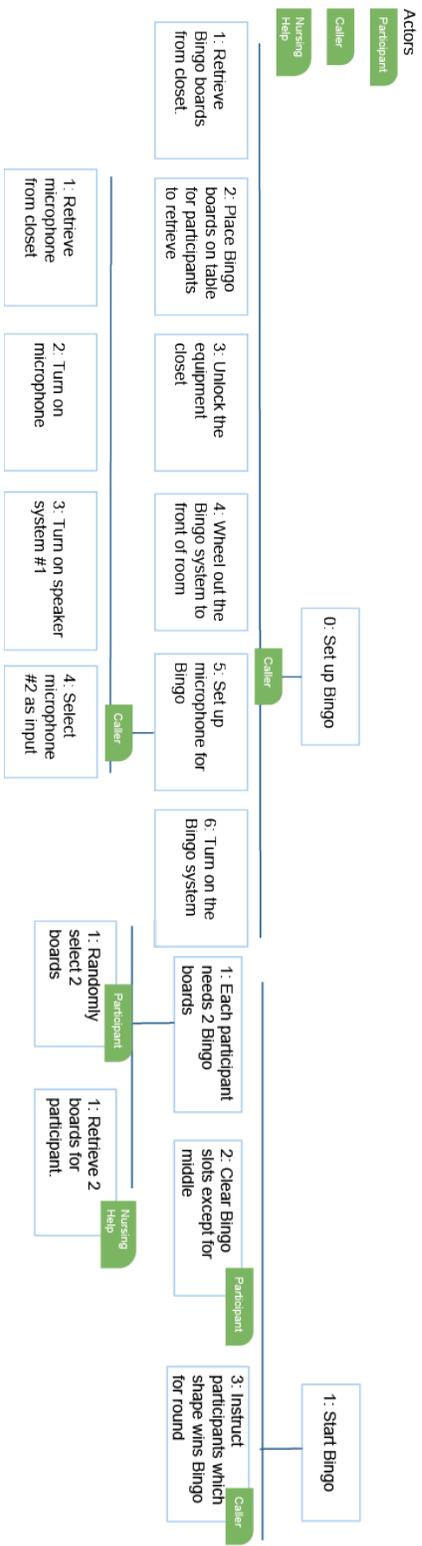
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<b>ROOM KEY</b> (AR) = Activity Room (BR) = Board Room (DC) = Dalrymple Chapel (DR) = Dining Room (Front) = Front Parking Lot						
<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
9:20 Believer's Sunday School (BR) 5:00 Vesper Service (DC)	8:00 Indoor Trackers (Front Desk) 1:30 Zumba Class (AR) 2:00 Foundation Therapy Seminars (DR) 3:00 Chaplains' Bible Study (DC)	9:15 Grocery Shopping 11:00 Catholic Rosary Prayers (DC) 1:00 Recycling (Back Hallway) 1:30 Stretchersize (AR) 2:30 NewsCurrents (DR)	8:00 Indoor Trackers 9:00 Flu Shots (AR) 10:00 Computer Training Classes (AR) 1:00 Veggie Man (Front) 1:30 Strength Builders (AR) 2:00 Crafty Ladies (6th Fl) 3:00 Bingo (DR)	11:45 Cardio Exercise (AR) 2:00 Crafting Scarves with Tami (AR) 2:30 Blood Pressure Checks (DC)	<b>YOM KIPPUR</b> 8:00 Indoor Trackers (Front Desk) 9:15 Grocery Shopping	9:00 Saturday Shopping 1:30 Stretching with Stacie (AR) 2:30 Stretchersize (AR) 5:00 Catholic Mass (DC) 7:00 Movie Theater (DR)
<b>12</b>	<b>COLUMBUS DAY 13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>
9:20 Believer's Sunday School (BR) 5:00 Vesper Service (DC)	8:00 Indoor Trackers (Front Desk) 1:30 Zumba Class (AR) 3:00 Chaplains' Bible Study (DC)	9:15 Grocery Shopping 11:00 Hearing Aid Checks (BR) 1:00 Recycling 1:30 Stretchersize (AR) 2:00 Fire Safety Training (Chapel) <b>DINING ROOM CLOSED FOR DINNER</b>	8:00 Indoor Trackers 9:00 - 10:30 Flu Shots (9th Floor Wellness Rm) 1:00 Veggie Man (Front) 1:30 Strength Builders (AR) 2:00 Afternoon Tea Time (Front Garden) 3:00 Bingo (DR) 7:15 St. Jude's Game Night (DR)	10:30 Art Project with Cheryl (AR) 11:45 Cardio Exercise (AR) 2:00 Resident Council (DR) 2:30 Blood Pressure Checks (DC) 7:00 Evening Concert by Voices of Gwinnett (DR)	8:00 Indoor Trackers (Front Desk) 9:15 Grocery Shopping 11:30 Birthday Luncheon Hosted by Amanda (DR) 2:00 Travelogue on Alaska with Allison (DR)	1:30 Stretching with Stacie (AR) 2:30 Stretchersize (AR) 5:00 Catholic Mass (DC) 7:00 Movie Theater (DR)
<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>
9:20 Believer's Sunday School (BR) 5:00 Vesper Service (DC)	8:00 Indoor Trackers (Front Desk) 1:30 Zumba Class (AR) 2:00 Medicare Talk (DR) 3:00 Chaplains' Bible Study (DC)	9:15 Grocery Shopping 1:00 Recycling (Back Hallway) 2:30 NewsCurrents (DR) 4:45 Residents' Choice Meal (DR)	8:00 Indoor Trackers (Front Desk) 11:00 Communion (9th Fl) 1:00 Veggie Man (Front) 2:00 Crafty Ladies (6th Fl) 2:00 Fire Drill 3:00 Bingo (DR)	11:45 Cardio Exercise (AR) 2:30 Blood Pressure Checks (DC) 3:00 Healthy Cooking Demo (DR)	8:00 Indoor Trackers (Front Desk) 9:15 Grocery Shopping 11:00 Karaoke and Mimosas (9 <sup>th</sup> Floor) 4:00 Shabbat Rituals (DR)	9:00 Saturday Shopping 2:30 Stretchersize (AR) 5:00 Catholic Mass (DC) 7:00 Movie Theater (DR)
<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	
9:20 Believer's Sunday School (BR) 5:00 Vesper Service (DC)	8:00 Indoor Trackers (Front Desk) 1:30 Zumba Class (AR) 2:00 Scrabble with Allison (DR) 3:00 Chaplains' Bible Study (DC)	9:00 MARTA Bus Training (DR) 9:15 Grocery Shopping 11:45 Dining on the Bayou 1:00 Recycling 1:30 Stretchersize (AR) 2:30 NewsCurrents (DR) 4:45 Dining on the Bayou	8:00 Breakfast Club (DR) 8:00 Indoor Trackers (Front Desk) 1:00 Veggie Man (Front) 1:30 Strength Builders (AR) 2:00 Crafty Ladies (6th Fl) 3:00 Bingo (DR)	11:45 Cardio Exercise (AR) 2:30 Blood Pressure Checks (DC)	8:00 Indoor Trackers (Front Desk) 9:15 Grocery Shopping 10:30 Apple Trip 7:00 Halloween Party (DR)	

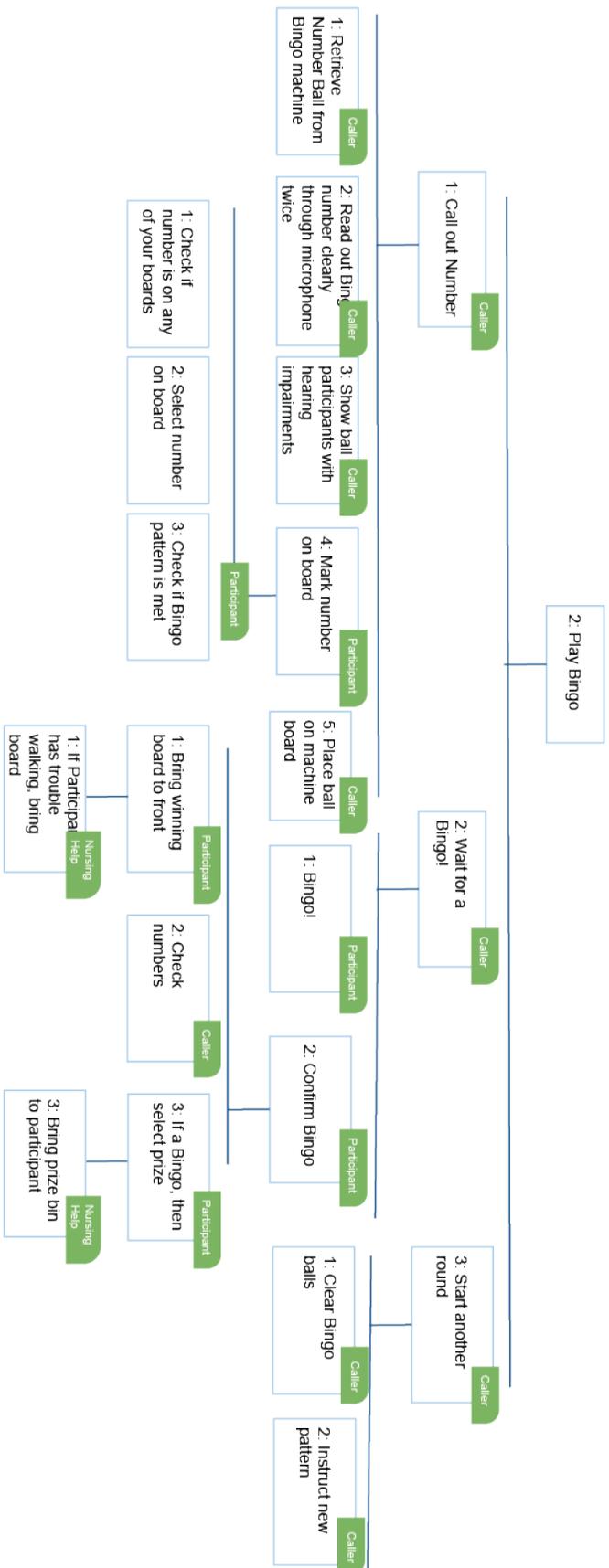
The event calendar for Campbell Stone in October 2014. Every resident is provided a copy of this calendar.

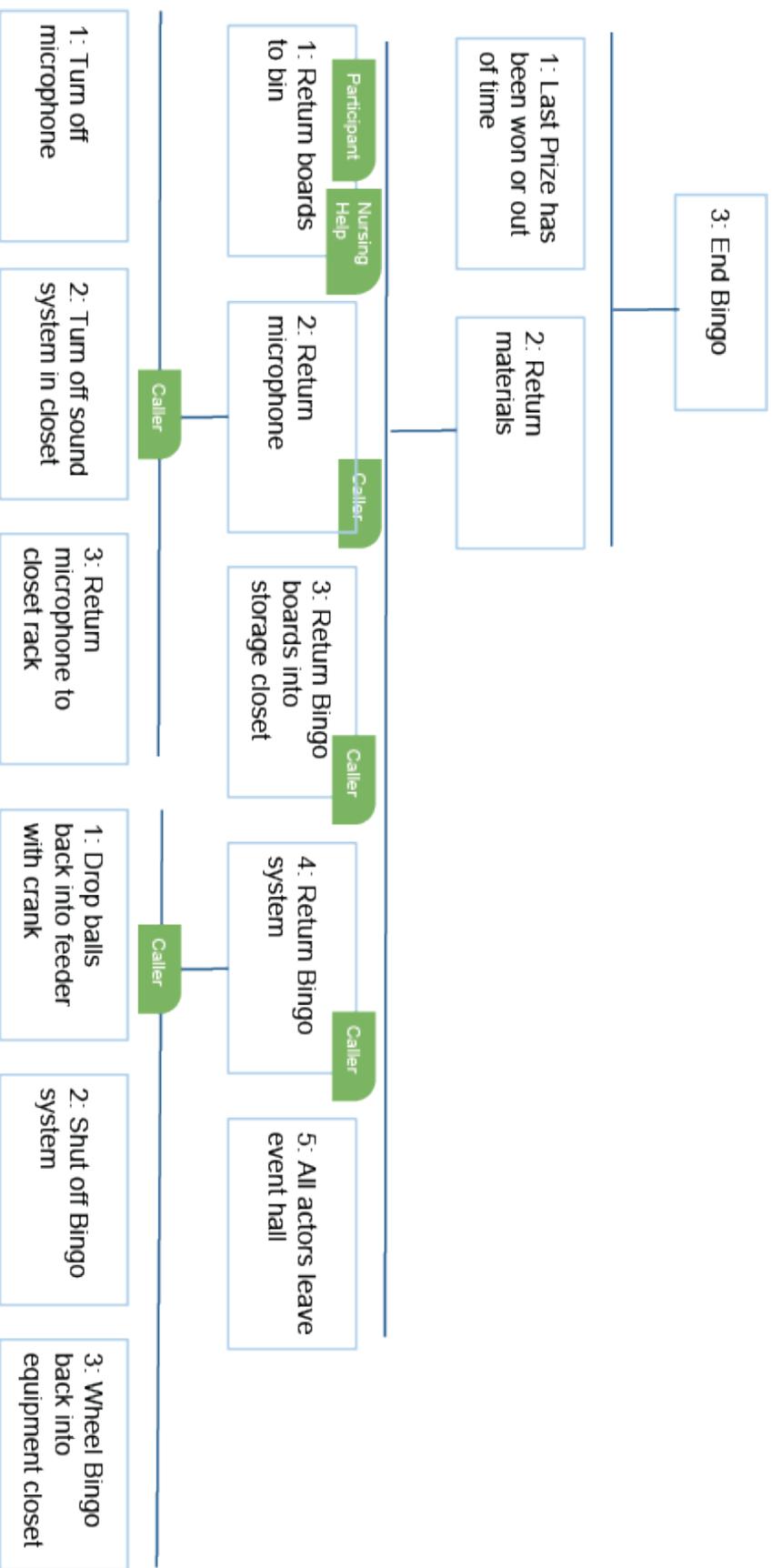


Bingo boards used during the game. Each player uses two unique Bingo boards

# Task Analysis







## Team Formation and 1<sup>st</sup> Team Brainstorming Session

Our first group meeting was on August 24th, 2014 when we conducted our first “Informed Brainstorming” session. According to Dr. Leslie A. DeChurch’s idea on team creativity, we decided to start broad and think divergently, and eventually converge our ideas to several feasible ones. We wrote down two separate lists of potential topics and user groups for the project and tried to make the lists as mutually exclusive and exhaustive as possible. The ideas we came up with during our first brainstorming session were:

User Group	Topic
Children	Education
College Students	Medicine
Faculty	Time Management
Disabled People	Fitness/Staying Active
The Elderly	Social Interaction
Everyone	Transportation
	Crime
	Starting Interest Groups
	Environment
	Volunteering and Event Management

In addition to the group brainstorming, we discussed our skill sets and backgrounds with the group, and set the overall team expectations and goals. We then decided to do individual brainstorming afterwards and delve deeper into the ideas we came up with. In doing so, we could generate some divergent ideas to build upon in upcoming meetings.

## 2<sup>nd</sup> Team Brainstorming Session

On August 24, 2014, our group held our second group meeting and brainstorming session. Prior to the meeting, we had asked each group member to come up with 3 individual ideas for the

meeting. Based on the potential topics we came up with during the first meeting, we came up with more focused user group and better defined design space, as follow:

User Group Design Details	Design Topic	Possible Domain for Design
<b>Children</b>	Teach STEM/coding/programming languages	Interactive Game
<b>Georgia Tech students</b>	Get students more interactive in different clubs on campus	Interactive Game, Online/Mobile Community
<b>Female aged 40 and up</b>	Health/fitness/dance	Mobile/Online Community
<b>Young people</b>	Get them involved in outdoor activities (cycling, tennis)	Mobile/Online Community
<b>Children</b>	Encourage children to read story book again	Toy, Interactive Game
<b>Children</b>	Encourage children to exercise outdoor	Interactive Game, Toy, Installation

We presented our ideas to the group with narratives we developed for the users. However, we did not feel like we have generated enough novel ideas to address specific problems of unique user groups. We decided to look back and sift through on the lists of ideas, and pick out 3 ideas that have greater potential for the project.

### 3<sup>rd</sup> Team Brainstorming Session

On August 27, 2014, our team held our third group meeting and brainstorming session. We decided to examine the potential ideas with the project requirement to see if we are on the right track. We also looked up the theme for 2015 CHI Student Project Competition, which is “crossing” borders, demographics, technology, physical and digital, and so on. After discussion, we decided to focus on a user group that has been under-represented by and disconnected from modern technology landscape and will greatly benefit from our project. Because we would like to provide the real users with a real piece of technology they can interact with beyond the scope of the classroom, we decided to focus on a user group located in the Atlanta area that we

could have access to throughout the semester. With that goal in mind, we decided to focus on grade school children, elderly residents at senior homes, and single mothers at an Atlanta-based non-profit community support program.

Our goal is to center the design on the particular wants and needs of our user group. We delegated the work to contact on the 3 user groups and gain an idea on their interests to collaborate with us. We got a call back from Emeritus, a senior home located in Sandy Springs and planned to visit the site in the following week.

## 1<sup>st</sup> Site Visit – Emeritus at Sandy Springs

On September 12, we paid our first visit to Emeritus and met with Deborah, the coordinator at assisted living home at Emeritus. After our one-hour meeting with Deborah, we compiled our notes and came to a conclusion on the following potential design problems:

1. Increase social interaction among senior citizens
2. Interactive game to improve their short-term memory
3. Develop a better internal support system to assist staff members and provide autonomy to the residents
4. Increase connection between residents and their families

We obtained a copy of the facility’s event calendar and decided to pay a second site visit in the following week to interact with the residents and observe their existing systems.

## 4<sup>th</sup> Team Meeting and Brainstorming Session

On September 21<sup>st</sup>, we had our fourth team meeting and brainstorming session where we decided to choose one design objective out of the four mentioned above. After discussing the pros, cons, and feasibilities of each design, we decided to focus on the interactive social game that helps alleviate dementia symptoms among the senior residents. Afterwards, we brainstormed on the type of games and interfaces for elderly people. The types of games and interactive systems we generated from the brainstorming session are as follow:

### Different Types of Games the Elderly Might Play:

Taboo	Pictionary	Scrabble
Name that Tune	Lumosity	Memory
Chess	Crosswords	Jigsaw
Signs	Spot the Differences	Poker
Vocab Games	Guess Who	Who Wants to Be A

		Millionaire
Jeopardy	Escape the Room	Clue
Treasure Hunt	Master Mind	Rubik's Cube
Sudoku	Hangman	Where's Waldo
Anagram	Find Objects in Picture	Riddle
Word Search	Jenga	Battleship
Music-Recalling Game		

### Different Types of Interfaces the Elderly Might Interact With:

Lumosity	App/Phone	TV
Game Boards	Personal Computer	Interactive Products
iClicker	Audio/Radio	Pencil/Paper
Raise Hand/Spoken	Notepad	Active Games
Charades	Yell	Pressing Button
Talk	Draw Pictures	Type

Varsha also attended a seminar session by Georgia Tech Aware Home Research Initiative and gained some insights into current research areas involving the elderly. According to Aware Home, The Types of design assisting old age group can put into 3 general categories: 1. Improve daily activity performances; 2. Assist instrumental activities (i.e. grocery shopping); 3. Enhance physical activities.

Unfortunately after P1 submission, our contact at Emeritus stopped responding to us. We got in contact with another senior home named Campbell Stone at Sandy Springs. We visited the site on Monday, September 22<sup>nd</sup> and met with Samantha, the Wellness Coordinator at Campbell Stone.

## 2<sup>nd</sup> Site Visit – Campbell Stone at Sandy Springs

Our visit to Campbell provided us with a new design problem that is different from that of Emeritus. Our contact at Campbell Stone, Samantha, showed us around the facility and introduced us to some residents. We also got the chance to sit in and observe an entire crossword session with the residents. Campbell Stone houses more residents than Emeritus, and the two facilities have similar infrastructure and activities. However, Campbell Stone residents have a larger exposure to technology devices than Emeritus, as shown in the event calendar below. Unlike Emeritus, Campbell Stone staff is more open about inviting us to interact with the residents and participate in their events. Our problem space changed from designing interactive social games for dementia to promoting fitness awareness among the residents.

## 5<sup>th</sup> Team Meeting and Brainstorming Session

Immediately after our visit to Campbell Stone on September 22<sup>nd</sup>, our team met again and conducted our fifth group brainstorming session. We quickly came up with several potential design ideas based on our conversation with Samantha and our observation of the residents:

1. Pedometer/fitness tracker: a system centered around Samantha to keep track of the physical wellness of the residents.
2. Make improvements on the existing computer classes offered to the residents
3. Engage more residents in physical activities and games to improve their physical mobility

We decided to focus on the pedometer and fitness tracker idea and brainstormed to expand more ideas on the topic. During our brainstorming session, we came up with a list of potential physical activities the elderly are capable of performing:

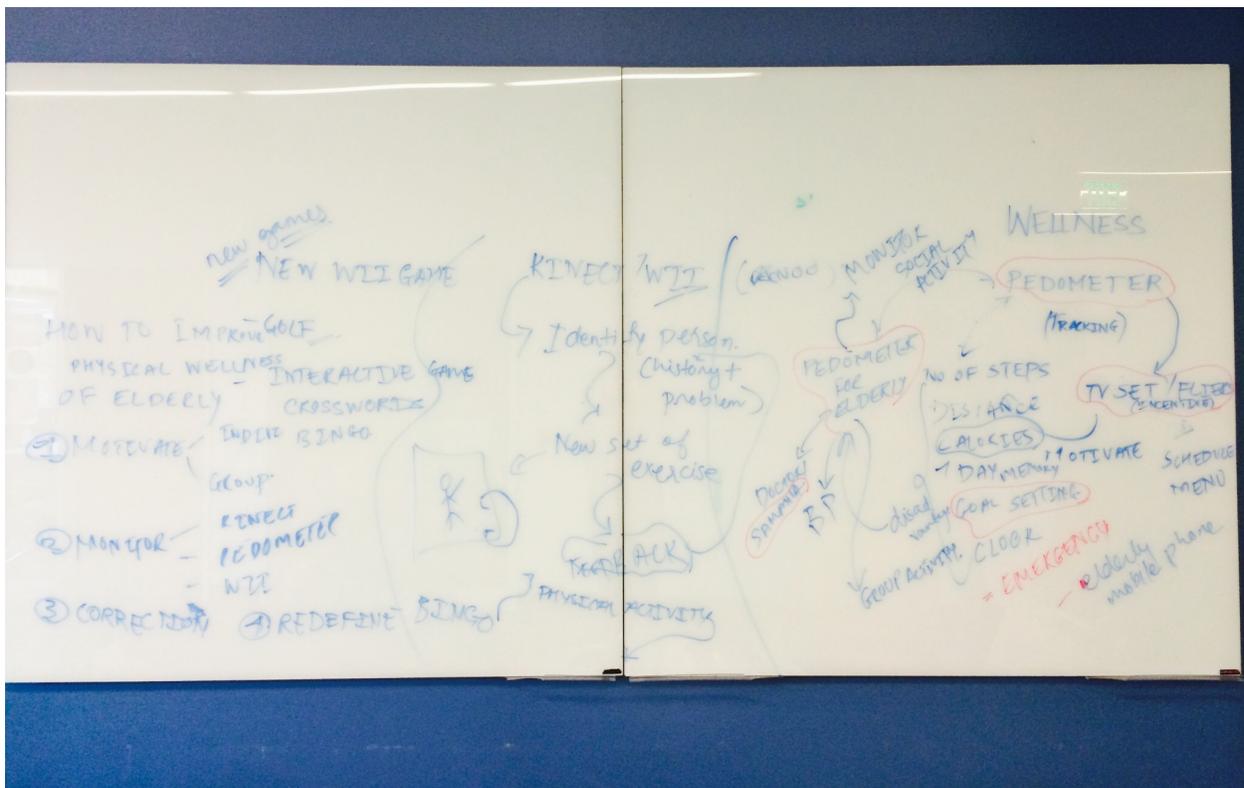
arts & craft	event/football/baseball	meditation	softball
bocce Ball	fishing	morning walk	stairs
baseball games	flying kites	nature walk	stand
bike	gardening	physical therapy	stretch
bird watch	grocery shopping	picnic	swimming
boating	horse shoes	play catch	treasure hunt
building something	jog	play fetch	walk
concert	jump	play sports	walk to lunch
dance	jump rope	run	Wii bowling/tennis

dodgeball	karaoke	shuffle board	yoga
dog walks	laughing	sit down/get up	zumba
elliptical	lift	skip	online shopping

We asked each team member to come up with 3 designs and evaluate how they motivate the elderly and how they buy into it. We decided to do some research on how design motivates the elderly to stay active and planned on visiting Campbell Stone again on September 24.

## 6<sup>th</sup> Team Meeting and Brainstorming Session

The team visited Campbell Stone on September 24 and observed a Bingo session with the residents. On September 27, we had an individual brainstorming session followed by a group meeting where we aimed at finalizing the 3 distinct design alternatives. During the individual brainstorming session, we each came up with a design with our own narrative walkthrough and had the group critique the ideas as a whole. We critiqued all the ideas based on the criteria of implementability, originality, effectiveness, accessibility, low learning curve, low cost, and ease of integration into the existing system.



The first batch of ideas we agreed upon are as follow:

## Idea #1: Using the pedometer to set individual physical goals for the residents

The pedometer will combine motivation, incentives, and goal setting. Pedometers will provide data on calories burned, steps, and distance. Samantha can use the data to motivate the residents. Residents can use the data to track their own physical wellness. Interface design will avoid using statistical graphs, use color schemes for ease of perception

## Idea #2: Redesign a pedometer for the elderly

Currently, Samantha provides the pedometers to those who are willing to participate. Residents can also rent their personal alarm pendants. We propose to combine the pendant and the pedometer.

## Idea #3: Physical Activity Check-in System

The proposed function will be an add-on to Campbell Stone's existing internal system. The new function will inform instructors and participants if the residents are physically able to participate in the activities provided by the facility. It will also inform residents which activities they are capable of participating in.

## Idea #4: Personal fitness tracking

The design will set daily and weekly goals for the residents as a motivation to encourage them to exercise. Similar to Fitbit, the proposed design will meter how close the individuals are to their personally defined fitness goals.

## Idea #5: Customized Workout and Activity Planner

The users will input their goals and past exercise history and have the system generate a personalized fitness plan.

## Idea #6: Kinect Exercise Posture Correction Tracking

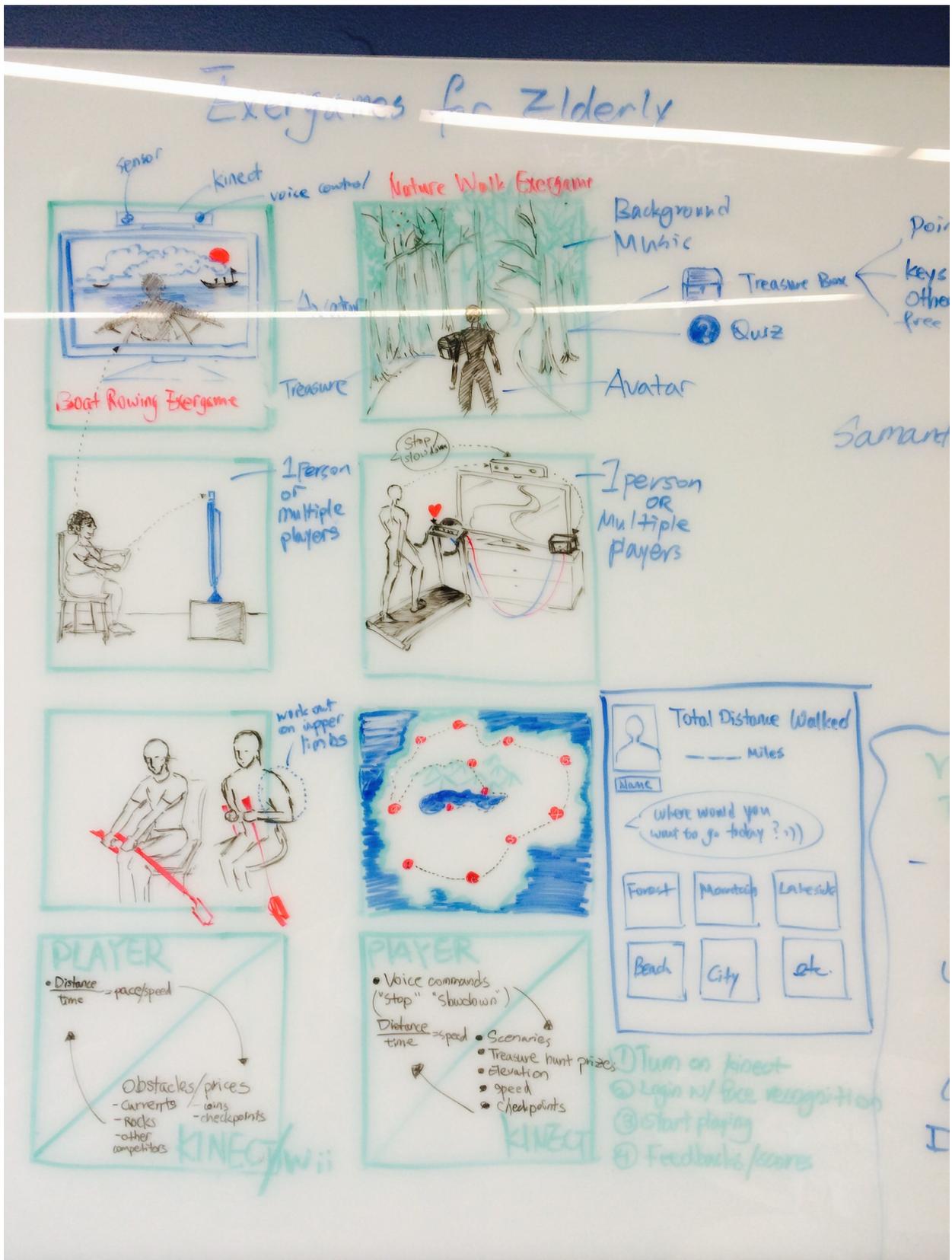
Utilize Kinect to track if the residents are doing current workout moves correctly. Kinect will monitor and provide feedback on the exercises of the residents. This system would also be able to keep track of residents' activity frequency and improvement.

## Idea #7: Redesign Bingo Game

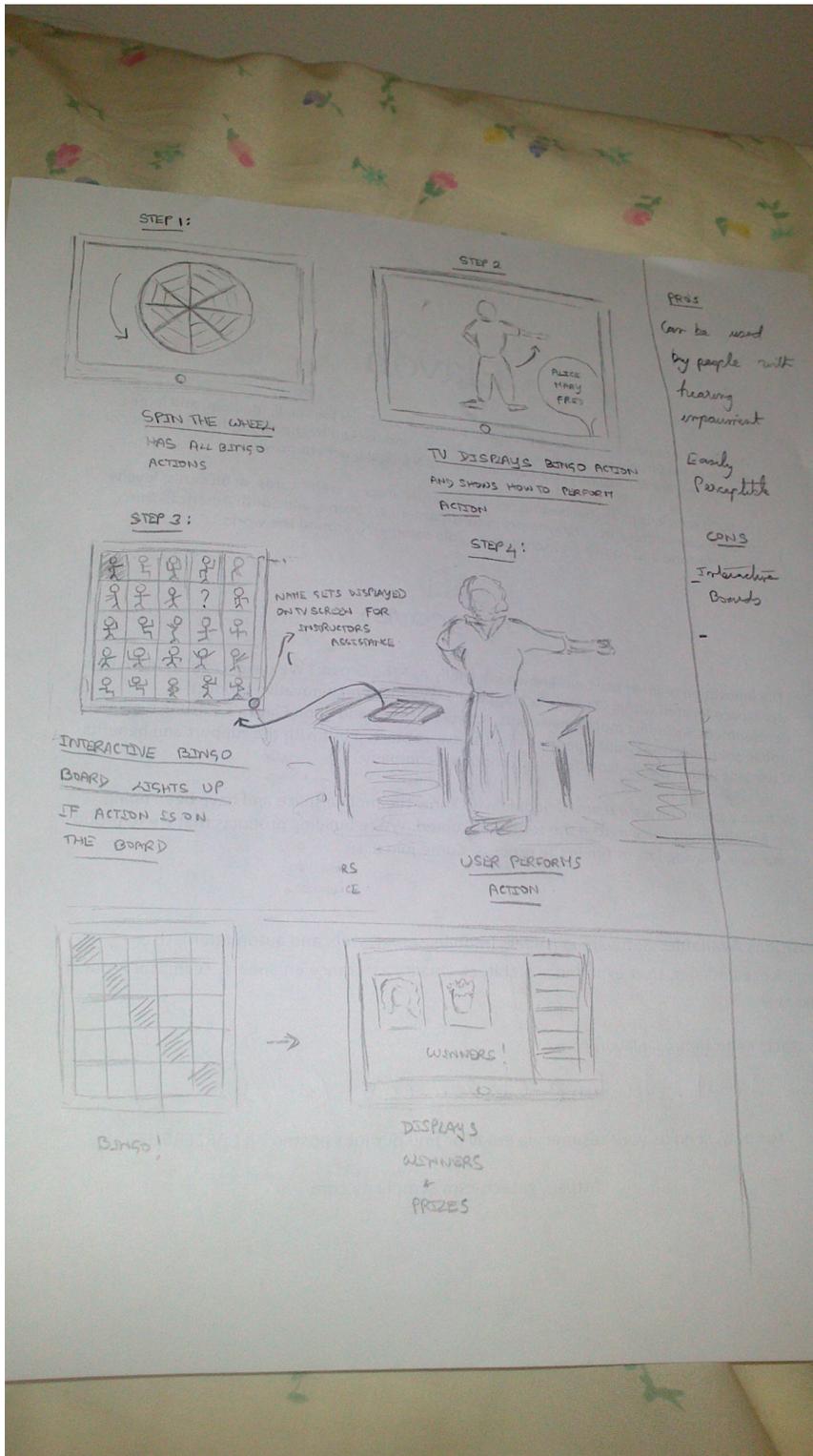
Add physical exercise components to residents' favorite Bingo game.

We realized some ideas are redundant and can be grouped together. Therefore, after discussion, we came up with the final set of 3 ideas that are described in full details in the next section. We also weighed our decision based on the perceived utility of each idea to improve the physical activeness of the user community. We also individually sketched out the walkthrough of the system.

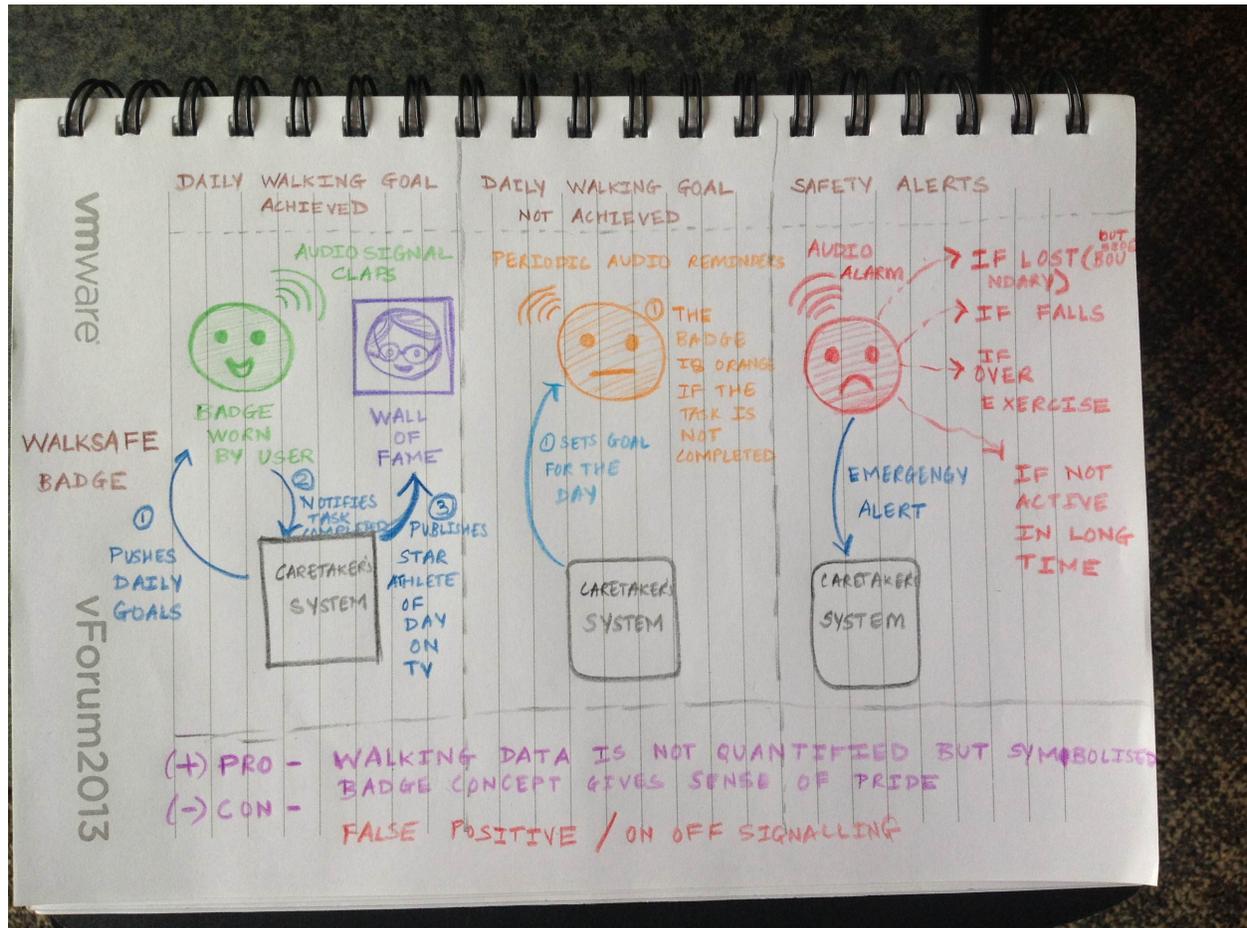
# Idea #1: Kinect Rowing



## Idea #2: Bingo-Go!



### Idea #3: WalkSafe



### Poster Making and Presentation

We started the poster making process right after we had the sketches ready. We wanted to focus on visualizing how the users actually interact with the designs in the activity setting. We sketched out detailed images of how the entire system would look like if implemented. We also wanted to make sure we showed our ideas using graphical displays instead of text explanations. Therefore, we put 3 different storyboards on the final poster.

## TEAM "LET'S GET WEIRD"

LIZA GEORGE  
VARSHA JAGDALE  
BIGING LI  
JOHN THOMPSON

In the United States and also around the world, the 65+ year old demographic is growing as people are living longer. Not only are people living longer, but they are also staying active longer. Our designs will facilitate physical activity within this growing age demographic.

### USER PROFILE

Adults 65+ years old  
Independent Living  
Shared Community

Limited Mobility  
Impaired Vision and Hearing  
Desire to Remain Autonomous

### DESIGN CRITERIA

Facilitate Physical Activities for Users  
Motivate Users to Stay Physically Active  
Provide Intermittent Breaks during Exercise  
Prompt Users through Entire Process  
Allow for Errors and Provide Recoverability  
Prize-Oriented Competition

## WII ROWING

Allow users the ability to participate in fun physical activity from the comfort and convenience of their room

In order for most users to enjoy physical activities they must join others in a group class at the activity center or go outside of the community. Not only could users injure themselves while outside but most residents require a considerable amount of time to get ready. This application brings the activity to them.



### Weaknesses Strengths

- Doesn't require social-interaction
- Keeps users indoor
- Safety
- Ease of use
- Mediated rate of play
- Participate while seated

1 Spin the wheel

2 Bingo Action instruction is displayed on the TV

3 User performs action

4 Winners are displayed on the TV and get prizes

Action lights up if present on users' board  
User presses help button to call instructor

## BINGO-GO!

Build upon a beloved game of the user community by adding a physical component.

Bingo-Go! is an interactive bingo game that has actions instead of numbers. It encourages participants to be active together and have fun by playing a game that they can relate to.

### Weakness Strengths

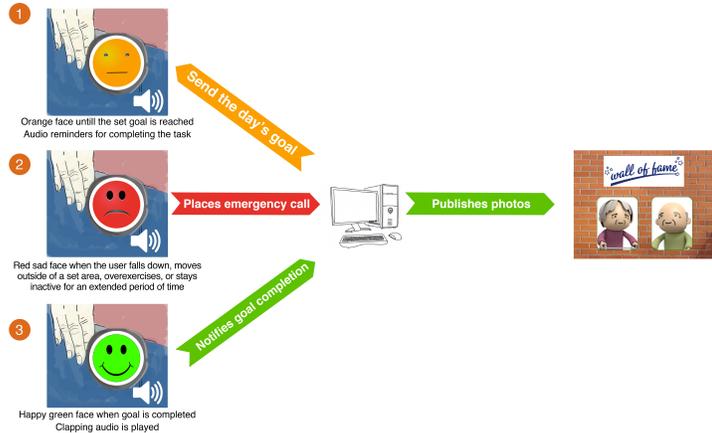
- Might not provoke the same level of interest as Bingo
- Group interactive
- Allow for breaks
- Retain interests
- Prize oriented
- Can be played by people with hearing impairments

## WALK SAFE

A fun device to show others that you exercised and motivate them as well. The device also acts as a safeguard.

Inspired from the fact that the elderly are hardly interested in quantitative data. Therefore we are trying to personify the data. In addition, the device ensures the safety of the user when they are not attended by a caretaker.

- ### Weakness Strengths
- Possibility of false positives
  - Motivates physical activities
  - Ensures safety
  - Requires minimal user input



## Design 1: WalkSafe

### Narrative Walkthrough

WalkSafe is a wearable device that encourages the elderly to walk. The device tracks the user's walking as a pedometer would and also ensures their safety. WalkSafe displays the fitness data, the number of steps and calories burned, using an ambient display. The pedometer also emits auditory signals instead of displaying numerical values.

### How it looks?

1. The WalkSafe device is a round-shaped badge which the elderly can attach to their belt, just like a badge.
2. WalkSafe conveys data by changing the color of the screen, the emoticons, and auditory signals.
3. The different displays are shown as follows

State	Color	Smiley Emoticon	Auditory Signal
Walking goal not reached	Orange	Stoic	Gentle chime
Walking goal reached	Green	Happy	Clapping sound
Emergency	Red	Sad	Alert sound

### What it contains?

The WalkSafe device contains a 3 axis accelerometer to detect the number of steps taken when the user walks, a GPS sensor to detect the user's location, and a motion detection sensor to detect when the user falls down.

### How it works?

1. The user pins the WalkSafe device on their hips like a badge.
2. The caretaker's computer system and the pedometer are connected and send/receive data to/from each other.
3. Everyday, the caretaker sends each resident's daily walking goals to the WalkSafe device.
4. WalkSafe is in "Walking Goal Not Reached" state and will remind the user to finish the goal by playing a gentle chime when the deadline nears.
5. If the daily walking goal is reached, WalkSafe display will turn green and the caretaker's system will be notified about the goal completion.
6. Photos of those who are amongst the first one to complete the goal will get displayed on the 'Wall of Fame' on the TV Screen.

7. If the user encounters any problems while walking, the pedometer will alert the caretaker's system.
8. For safety purposes, the WalkSafe's GPS receiver can be used to find the location of the user if an incident is detected by the motion sensor.
9. The following are the four safety conditions monitored. When WalkSafe detects any of the conditions that indicate that the user is not safe, the device turns red and the caretaker's system is notified.
  - a. While walking if the user walks out of the set boundary area, the caretaker's system is alerted along with the GPS location.
  - b. In case the user has been inactive for a prolonged duration.
  - c. If the user trips and falls accidentally while walking.
  - d. If the user drastically exceeds their daily walking limit and is at risk of exhaustion.

## Scenario

*James, a resident of the Campbell Stone retirement home has been advised by his doctor to walk daily to maintain good health. However, he often forgets to go for a daily walk. James has been lacking motivation to walk for the past months. The days when he goes for walking, he does not keep count of his total distance and often ends up over exercising and exhausting himself, which subsequently affects his exercise routine. Recently James has been forgetting things. When walking alone, James has a hard time remembering directions. He hopes to have an exercise companion who can motivate him to walk and ensure each other's safety as well.*

*Now, James can see his daily goal on the WalkSafe device. Initially the device displays an orange, stoic face emoticon. With the motivation to reach his walking goal, indicated by a green smiley face emoticon, he steps out of his room. He goes out for a walk alone. While walking, he stumbles upon a stone, trips and falls down. The WalkSafe detects that James has fallen and immediately notifies Rose, the caretaker. Through the GPS system, Rose is notified of James' location and reaches there to help James. James is escorted to his room safely afterwards, and everything is fine. The next day, James receives another daily walking goal. He goes out for a walk again. As soon as he reaches the walking goal, the Walksafe turns green, displays a happy smiley face and plays a clapping ovation to congratulate James. Rose notices that James was the first person to reach his walking goal for the day. She then displays his photo on the Wall of Fame. Other residents feel motivated by James and hope to see their photo on the screen one day.*

## Justification

### *Encouraging Walking*

During our discussion with Samantha, the Wellness Coordinator at Campbell Stone, we were told that the elderly usually refrain from exercising, including walking. To encourage the residents to step outside of their rooms, she sometimes offers free lunches as an incentive for those who can walk to lunch. In general, residents' participation level in any social events increases if incentives are offered. The Campbell Stone has a LCD screen to display upcoming events. We came up with a new incentive model by combining the

incentive system and the LCD display. Those who complete the walking goals first get their photos displayed on the “Wall of Fame” or LCD screen.

### *Tracking Fitness*

As the physical trainer, Samantha decides on the type and duration of the exercise for individual resident. She distributed pedometers to residents to keep track of their daily step counts. After observing and talking to the elderly in the context of social activities, we realized that they were not as interested in quantitative data when related to fitness. This contrasts with the younger demographic that smart pedometers are designed for, where people want to know exactly how far they ran, walked, or biked. Also most of them don't have a computer or a mobile phone to synchronize the data. We decided to redesign how the the pedometer is used by the residents and the caretaker. The elderly will be notified whether she has achieved the daily walking goal, and the caretaker receives the entire fitness tracking data to monitor the resident's activity level and set new goals for the resident.

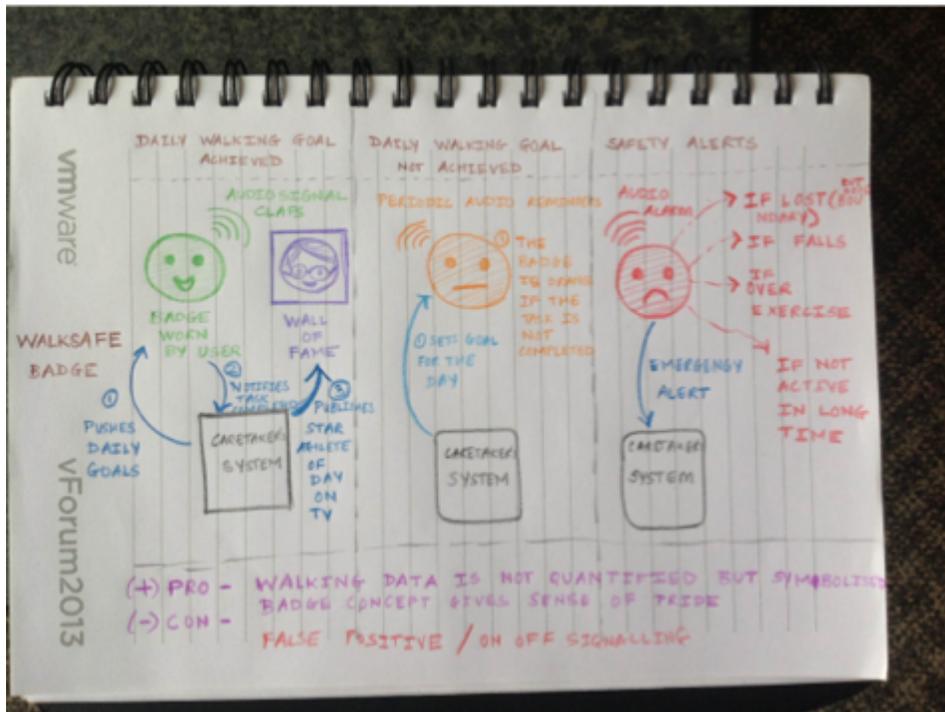
### *Ensuring Safety*

It is really dangerous for the elderly to lose balance, trip, and fall down. Also, as people age, their cognitive capacity and the short term memory decrease. As a result, they find it difficult to remember directions and have a higher chances of getting lost. Oftentimes, the residents do not exercise at all. On the contrary, those who maintain an active lifestyle might end up over-exercising and exhausting themselves. Taking these factors in consideration, we decided to build in a 3 axis accelerometer, GPS receiver and motion sensors. With these sensors WalkSafe can detect the above scenarios and notifies the caretaker accordingly.

### *The badge shaped form factor*

On one of our visits to the Campbell Stone, we noticed that an elderly lady was wearing a badge that showed it was her birthday. She was excited to share with others that it was her birthday and felt happy when she was greeted. Hence we came up with the idea of making a badge-shaped pedometer that could be worn on the hip. Once the residents reach the daily walking goals, they can proudly share their achievement with others by showing their badges.

## Initial Design



A quick pencil and paper mockup drawing during the brainstorming session

## Poster Design

### WALK SAFE

A fun device to show others that you exercised and motivate them as well. The device also acts as a safeguard.

Inspired from the fact that the elderly are hardly interested in quantitative data. Therefore we are trying to personify the data. In addition, the device ensures the safety of the user when they are not attended by a caretaker.

**Weakness**

- Possibility of false positives

**Strengths**

- Motivates physical activities
- Ensures safety
- Requires minimal user input

## Pros

1. The wearable represents the quantitative data in form of visual and auditory signals.
2. The wearable is simple and requires minimum input from the elderly.
3. Safety measures are taken into consideration.
4. The reward system motivates and encourages the users positively.
5. The system does not just keep track of the walking goal completion, but also alerts the users and the caretaker in case the users exceeded their daily permissible walking limits.

## Cons

1. There could be cases of false positives. For example, the wearable might slip out of the hand of the user, triggering the fall detection motion sensor and notifying the caretaker.
2. The device can only be used by those who can walk, excluding part of the population that are wheelchair-bound.
3. The size of the badge might be a design constraint due to the number of sensors required.

## Feedback

During the poster session, we received a lot of positive feedback from the audience. The motivational factor and the safety factor were appreciated overall. From the overall gathered feedback, this design alternative got a novelty rating of 3.27 / 5 and an implementable rating of 4.45 / 5.

### *Positives*

1. A step count device is easy to wear and use.
2. The safety feature is a plus. Current fitness tracking devices in the market such as FitBit or Nike FuelBand do not have this feature.
3. Simplistic design is a pro for the user group.
4. Provides motivation to the elderly to walk.

### *Concerns*

1. There is a possibility that the elderly might experience shame or negative feelings about themselves when they are not able to achieve their daily walking goal and their walk safe badge remains orange.
2. The wearable cannot be used by the elderly who cannot walk.

### *Suggestions*

1. Improving the auditory feedback feature so that it acts as a virtual assistant. Also the users will not be as bored while walking alone because of the virtual assistant.
2. Add gamification to the design to make it more exciting.
3. Ask physical therapists for professional insights on the design

## Design 2: Bingo-Go!

### Narrative Walkthrough

During our brainstorming session we thought of how we can build upon the existing Bingo game to make participants exercise without losing out on the fun elements of the game. One way to do this is to get rid of all the numbers on a typical Bingo board and replace them with exercises moves.

Bingo-Go! Is an interactive game that builds upon the existing game of Bingo. Users need to perform exercises that are on their electronic Bingo board. The game is played as a group activity like the current Bingo game.

### What it Contains?

Bingo-Go! is played using an electronic Bingo Board and a TV monitor that is controlled by a computer application or video game application.

### How it works?

1. Every participant is given an electronic Bingo board with images of different exercises.
2. The game starts when a participant “spins the wheel” displayed on the TV.
3. An exercise is then picked at random depending on where the wheel stops spinning.
4. This exercise is displayed on the TV with instructions on how to perform the exercise.
5. If the exercise displayed on the TV matches with the exercise on the users bingo board, the corresponding cell on the Bingo board lights up.
6. The user then performs the exercise by following the instructions on the TV if he is unsure of how to perform the exercise.
7. Like a regular game of Bingo, the first participant to get a horizontal, vertical, or diagonal row of cells to light up on his board gets a Bingo.
8. If the participant is unsure of how to perform the exercise, he can press a help button on the board, and an instructor will come to his assistance.

### Scenario

*Alice is a resident at Campbell Stone who loves playing Bingo. She goes down to the dining hall everyday to play her regular game of Bingo. She would like to do a little bit of exercise everyday to stay fit but has not gotten into a regular routine. She doesn't feel motivated enough to work out in the gym or go for walks. She mostly stays in her room and takes part in a few activities that she can relate to like Bingo. When Alice hears about the new Bingo-Go! game she is curious to know what the game is about.*

*She picks up her electronic Bingo board and joins her friends. The first action is displayed on the TV. An exercise on Alice's Bingo Board lights up and she starts performing the exercise*

*along with some of her other friends. She feels encouraged to exercise when she sees her friends doing so. The game progresses till Alice gets a Bingo!*

## Justification

### *Building on an existing game*

Our team visited Campbell Stone to interact with the users, understand their needs and observe their daily activities. We found that Bingo is a popular game among this age group. We also took part in the Bingo game that was happening in the dining hall and found that participation and enthusiasm levels were high for this game. Winners of the game got to select prizes at the end of each round.

Building on an existing game can help users relate to a new system. Choosing a game that the users are already enthusiastic about retains a high interest level. The game also allows users who are not familiar with using technology to learn the game easily.

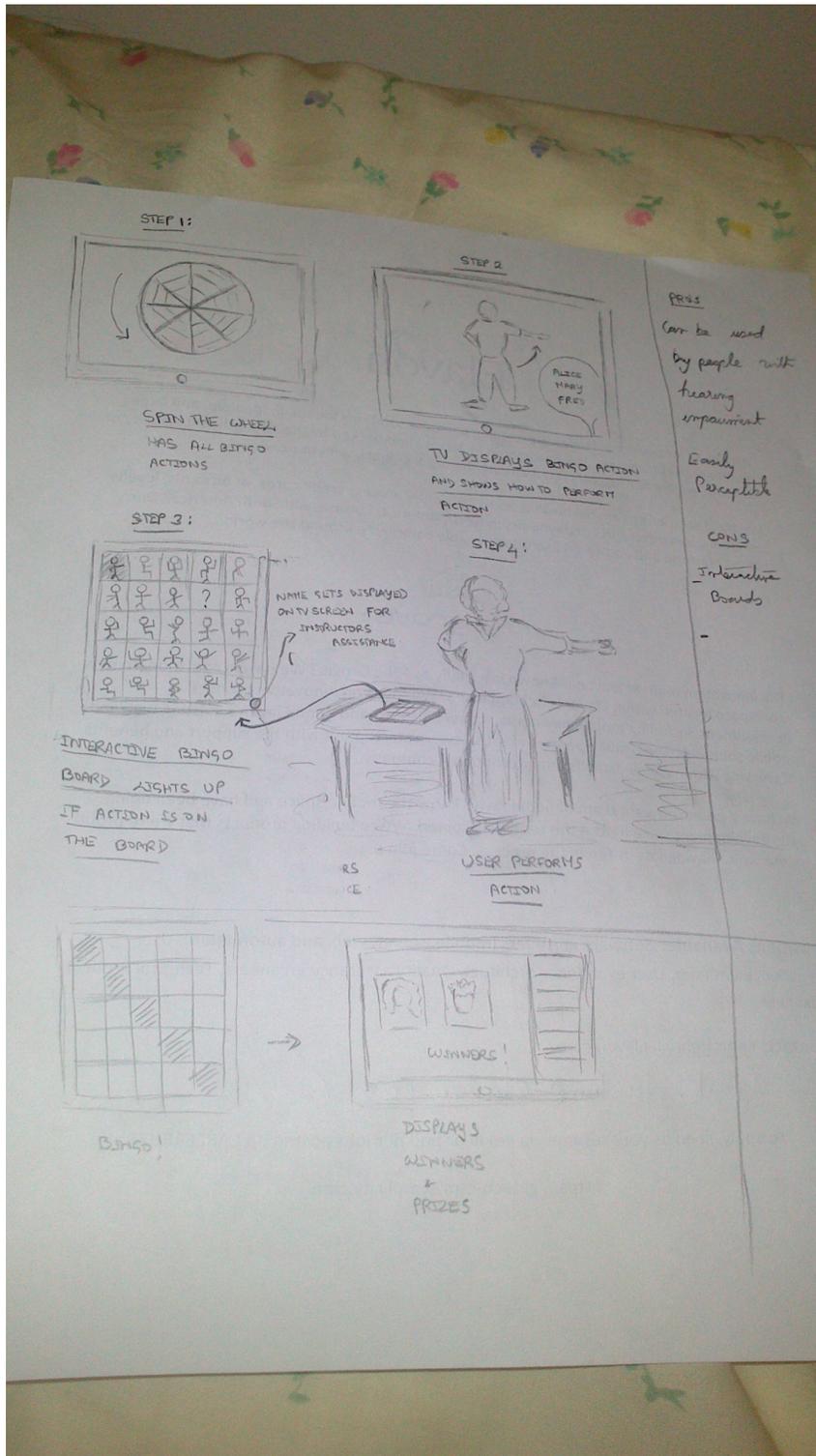
### *Encouraging Fitness*

Bingo-Go! can motivate users to exercise in a manner that doesn't feel like a typical exercise routine. We wanted to keep the fun element in exercises. Users who do not like activities, but prefer fitness might like to play Bingo-Go! The game encourages users to strive to be fit by playing a game that they love.

### *Group Activity*

Since the game is a group activity, watching others participate in the game can motivate users to participate. The users can take part in the game with their circle of friends and enjoy the game together. The game also has a competitive element as winners get prizes. This goal-driven element encourages the users even further to participate.

# Initial Design



A paper and pencil mockup

## Poster Design

**BINGO-GO!**

Build upon a beloved game of the user community by adding a physical component.

Bingo-Go! is an interactive bingo game that has actions instead of numbers. It encourages participants to be active together and have fun by playing a game that they can relate to.

Weakness	Strengths
<ul style="list-style-type: none"><li>• Might not provoke the same level of interest as Bingo</li></ul>	<ul style="list-style-type: none"><li>• Group interactive</li><li>• Allow for breaks</li><li>• Retain interests</li><li>• Prize oriented</li><li>• Can be played by people with hearing impairments</li></ul>

## Pros

1. The game can be played by people with hearing impairments and involves the whole community.
2. The game is played as a group activity, motivating users to play the game with their circle of friends. Watching their friends exercise and be involved in the game can encourage them to do the same
3. Bingo-Go! provides prizes for the winners to encourage participation
4. The game is competitive and winning the game can really get users involved in the game
5. The proposed game builds on the existing Bingo game they are familiar with.
6. Bingo-Go! Uses simple technology that users can easily interact with, allowing users who are not familiar with using technology to participate in the game.

## Cons

1. The game might not provoke the same level of interest as the original Bingo game.
2. People with limited mobility might not be able to take part in all the exercises.

## Feedback

General feedback about the game was that the game could be easily implemented as a HCI project. The novelty rating for we got is 3.45 and implementable rating is 4.36. Some of the other feedback we received about this game was as follows

### *Suggestions*

1. Exploring use of different technology apart from the television and electronic Bingo Boards.
2. Incorporating different levels of difficulty in the game.
3. Defining the exercises and gestures that the users will perform in details.

### *Concerns*

1. People with limited mobility might not be able to engage. Also, we should consider providing alternative options for people who can't do the exercise.
2. Personalization of the game for different users.

## Design 3: Kinect Rowing

### Narrative Walkthrough

Kinect rowing exercises the users' upper body in a interactive rowing game on the Kinect console at their own experience level and pace. It encourages users to stay fit through a fun activity that is accessible to all users. The game can be played with single players or multi players. Users can unlock different difficulty levels as the game progresses. They can also compete with each other while playing the game.

### What it contains?

Kinect Rowing system involves a Kinect console and a television.

### How it works?

1. Kinect detects the user either in a wheelchair or seated in front of the TV.
3. The game interface shows the avatars sitting in a boat.
4. The game signals the rower to start when ready.
5. To make the boat move forward the user needs to move his hands to mimic the gestures of rowing an actual boat.
6. The user's actual speed is detected by Kinect. The software calibrates through a feedback loop and returns game parameters according to the user's pace.
7. If the action is done correctly, the boat moves forward, and the game starts.
8. The user steers away from obstacles and rapids in the way. If the rower is more physically capable of putting in more energy in rowing, he will get more obstacles and rapids from the game in return. If the rower wants to take a break or pause the game, he can simply tell Kinect to stop or slow down his rowing gestures. Kinect will sense that the rower has slowed down, and will slow down the pace of the overall game, producing less obstacles and rapids.
9. The game is over when the user reaches the finish line or whenever he tells Kinect to stop via voice command.
10. The user can collect treasure and bonuses on the way.
11. Finishing one level will unlocks the next level.

## Scenario

*Bob is a resident at Campbell Stone. He spends his time talking to his friends and watching TV. Bob used to be a table tennis player but has been in a wheelchair for the past 5 years. He often thinks about how active he used to be in his youth and wishes he could still participate in physical activities. However, most of the fitness activities provided by the senior home are not catered to people in wheelchairs. He also does not feel he has the energy to go outside the community and search for activities that he can take part in. He hears about Kinect rowing and decides to give it a shot. He then calls up some of his friends to join him. When they start playing the game, Bob realizes that he is not at a disadvantage because he is in a wheelchair. He competes with his friends as they try to get the highest score. At the end of the gaming session Bob feels energized after a fun workout with his friends.*

## Justification

We visited Campbell Stone to speak to the users and to get an idea of the existing technology. Currently, some residents will play tennis and bowling on a Wii console. During our brainstorming session, our initial idea was to come up with a game for users with limited mobility that can also be played by the rest of the community. We came up with the idea of an “exergame” through affordable motion-based gaming console such as Wii and Kinect.

### *Convenient*

In order for most users to enjoy physical activities, they must join class at the activity center or go outside the community. Not only might users injure themselves, it also requires considerable amount of time to get ready. The whole process of getting ready and getting to a physical therapy class takes up a great deal of energy for elderly people. Wii rowing brings the activity to them and can be played at the convenience of the user.

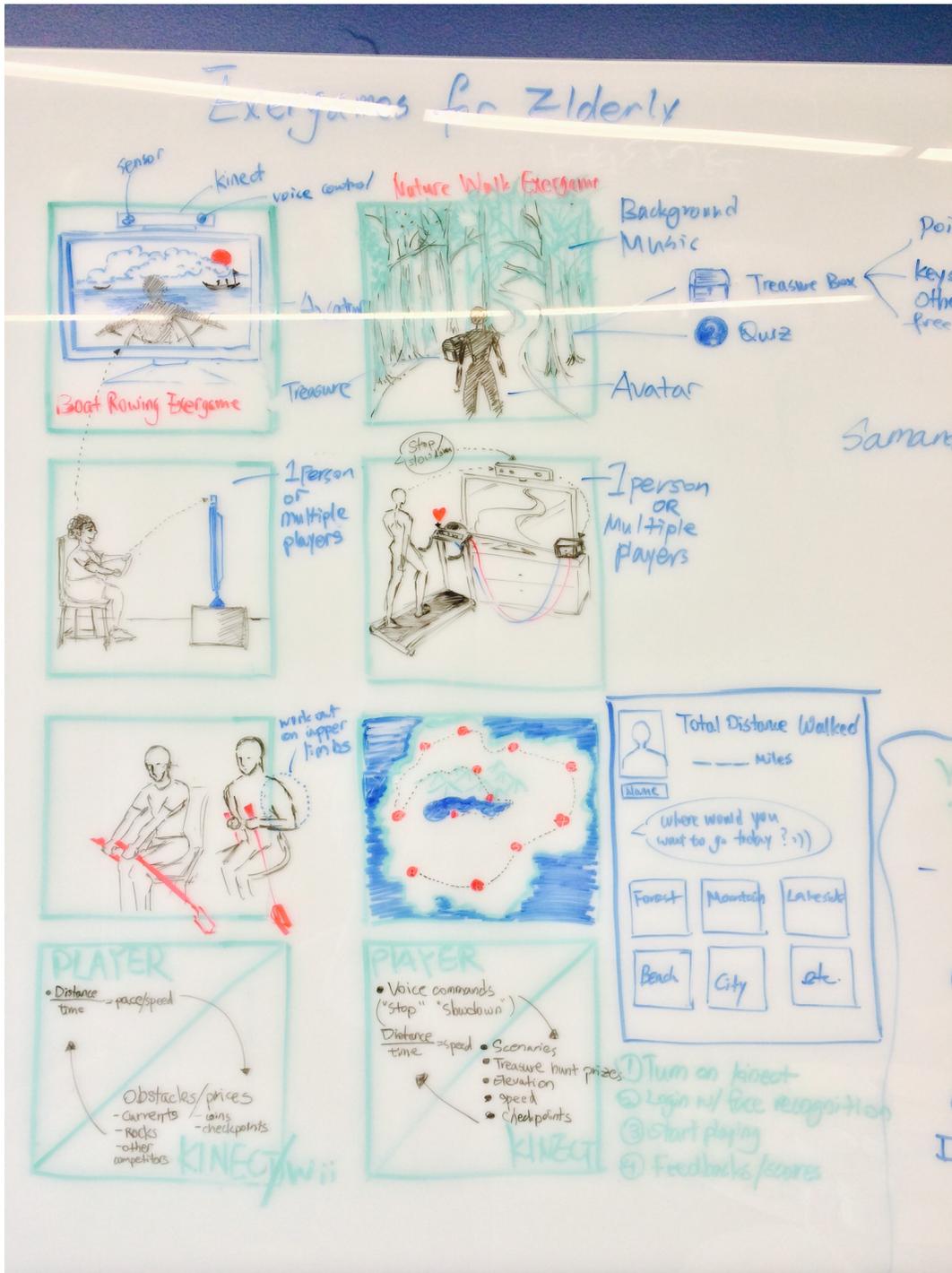
### *Accessible*

Fitness games usually tend to focus on users who have a high level of mobility. When we visited Campbell stone, we saw a considerable number of users using either walkers or wheelchairs. For our targeted user group, an interactive game is accessible to people both wheelchair-bound and have better different levels of mobility.

### *Safe*

Users might injure themselves if they exercise too much. Fitness activities sometimes emphasizes on proper postures and requires higher level of fitness than that of the elderly group. Kinect rowing does not require a great deal of physical exertion since users can play the game while sitting. Kinect rowing also does not require any heavy-lifting or increased aerobic strain, as users are simply enacting a rowing motion with their arms.

# Initial Design



## Poster design

### WII ROWING

Allow users the ability to participate in fun physical activity from the comfort and convenience of their room

In order for most users to enjoy physical activities they must join others in a group class at the activity center or go outside of the community. Not only could users injure themselves while outside but most residents require a considerable amount of time to get ready. This application brings the activity to them.

**Weaknesses**

- Doesn't require social-interaction
- Keeps users indoor

**Strengths**

- Safety
- Ease of use
- Mediated rate of play
- Participate while seated

## Pros

1. Safe to play
2. Easy to use
3. Has a mediated rate of play
4. Participate while being seated

## Cons

1. Doesn't require social-interaction
2. Keeps the users indoors
3. Restricted the users to a single gaming console

## Feedback

During the poster session, this idea got an overall positive response. The idea that the game was made especially for the people with limited mobility was appreciated. It received the novelty rating of 3.18 and a implementable rating of 3.36. The following are the concerns stated and suggestions received from our peers.

## Positives

1. People with limited physical mobility can engage in games.
2. The multiplayer game fosters social interaction.
3. "Cool" concept

## Concerns

1. There is a possibility that the game might turn to be physically challenging for the people in a wheelchair. They might fall out of the wheelchair.
2. Potential audience might be deterred from participation because the game requires one single game console.

3. The game cannot be played by people who cannot move their upper bodies.
4. There are similar games for motion-based gaming consoles (Disneyland Kinect Rowing).

## Suggestions

1. Breadth: Variation in the games can be introduced to support other forms of exercises.
2. Depth: Various difficulty levels could be introduced depending upon the motor skills which would keep the user engaged for a prolonged duration.
3. In addition to showing just the number points gained at the end of the game, a different type of reward system, such as actual small prizes can be introduced.
4. User group can be more well defined i.e. users on wheelchair or users who can walk.