

BEMM486J
Design Intelligence

Product Design for Independent Living of
Elderly People:

Airbag Safety Jacket

Group 12

In this Presentation

Here's what we'll cover:

General Causes of injury

Primary reasons For Injury

Products that address similar issue

Our Product Brief

Market Research

Personas & Customer Journey

Variations of Our Product Design

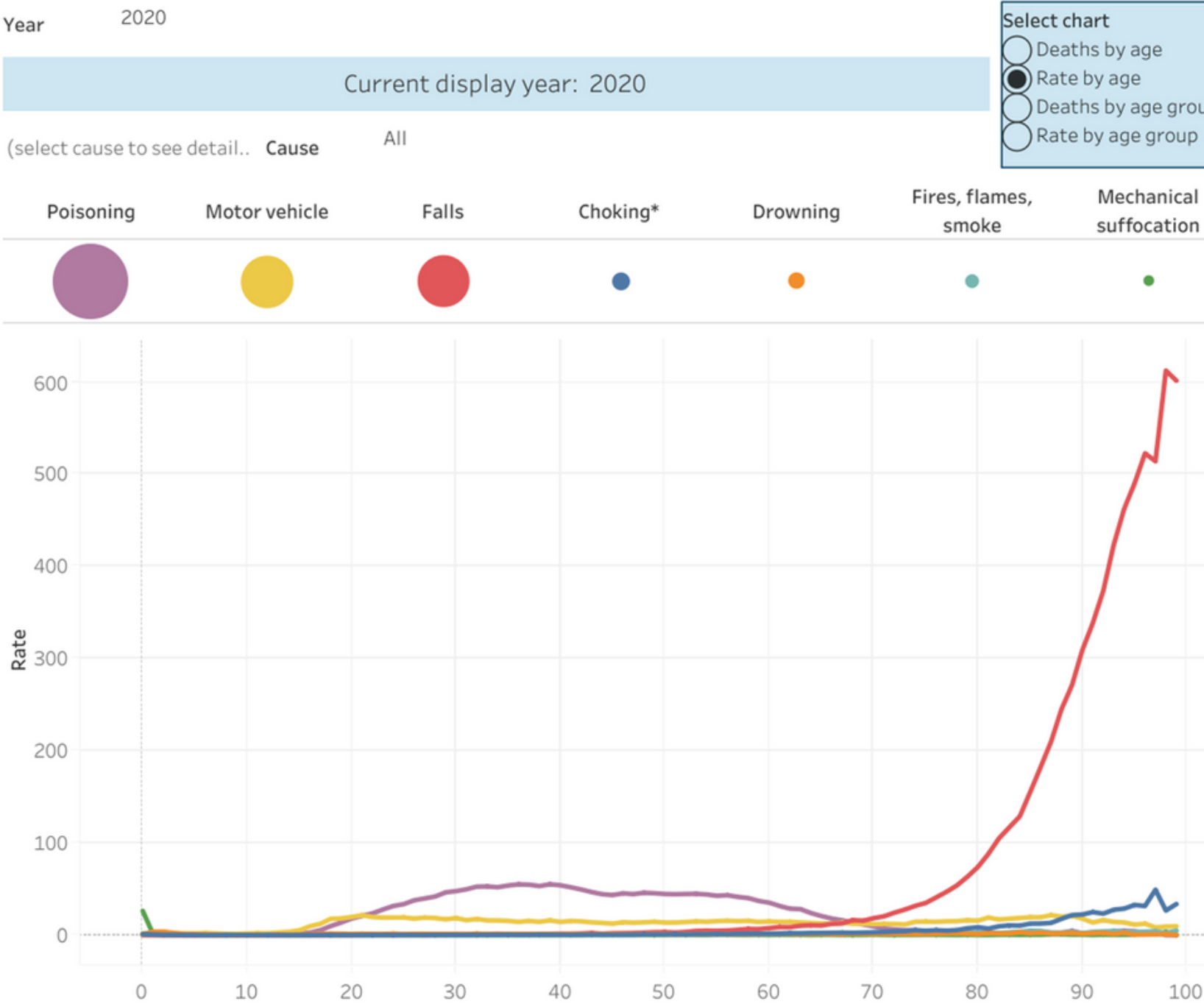
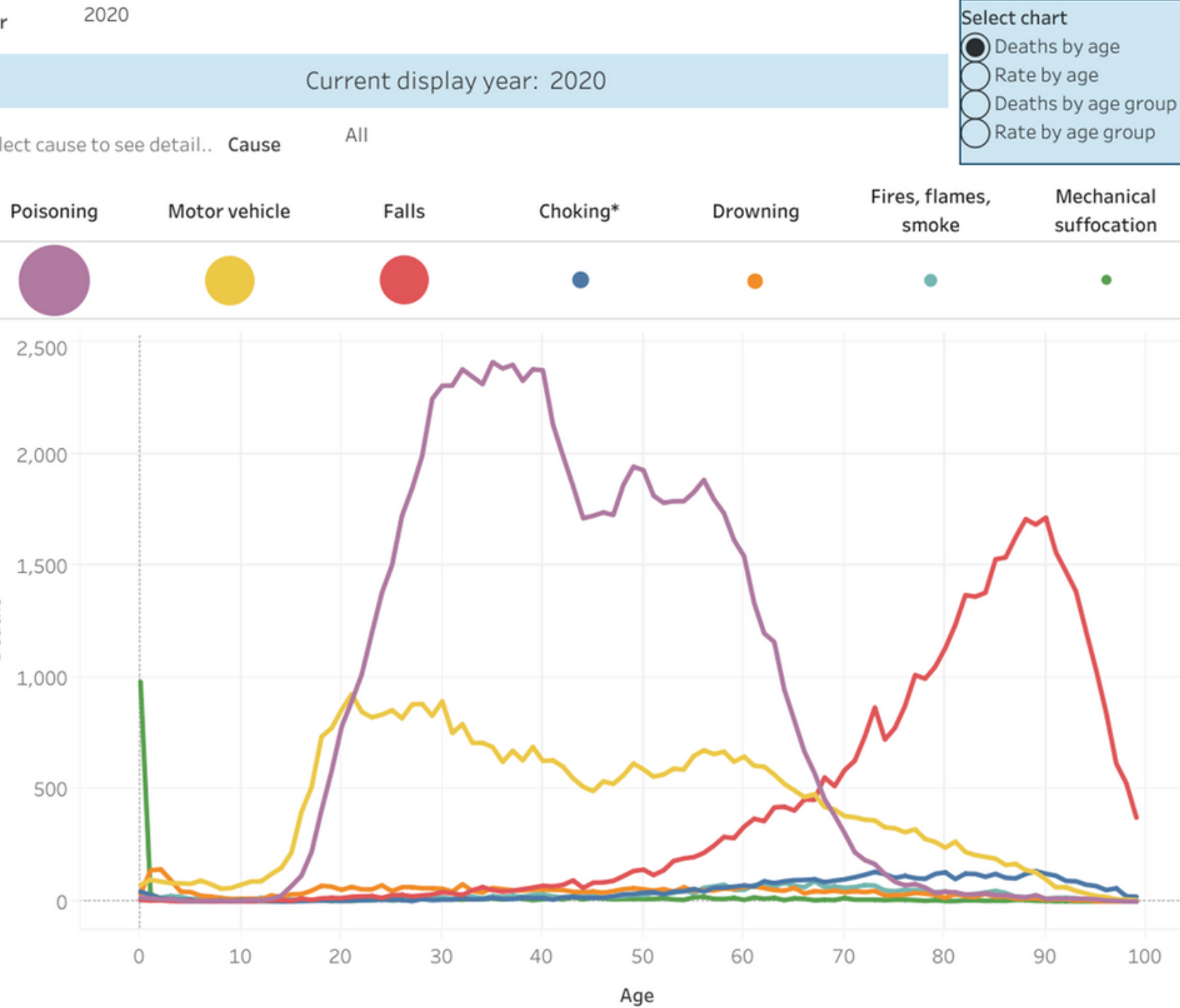
Selection Criteria

Design Decision

General causes of injury:

- Poisoning
- Motor Vehicle
- Falls
- Choking
- Drowning
- Fire, Flames and Smoke
- Mechanical Suffocation

Data on injury related deaths by age





1

1 in 3 adults over 65
and half of people
over 80 have at least
one fall a year



2

Fall is the leading
cause of death
and major injuries
in people over 65

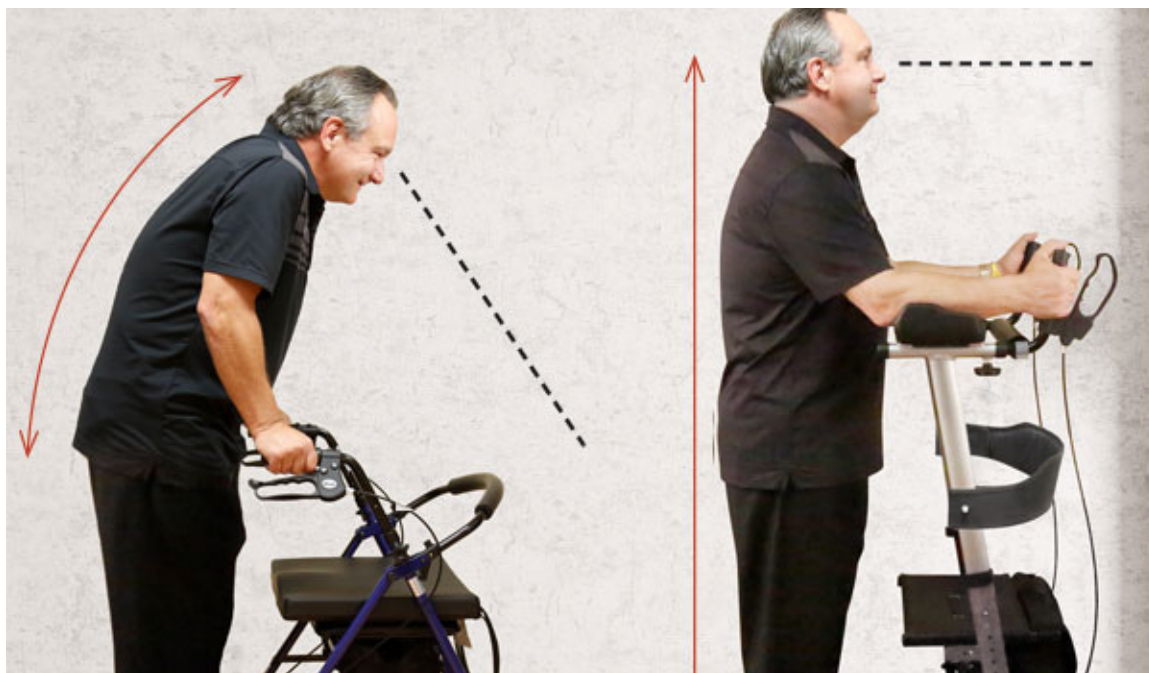
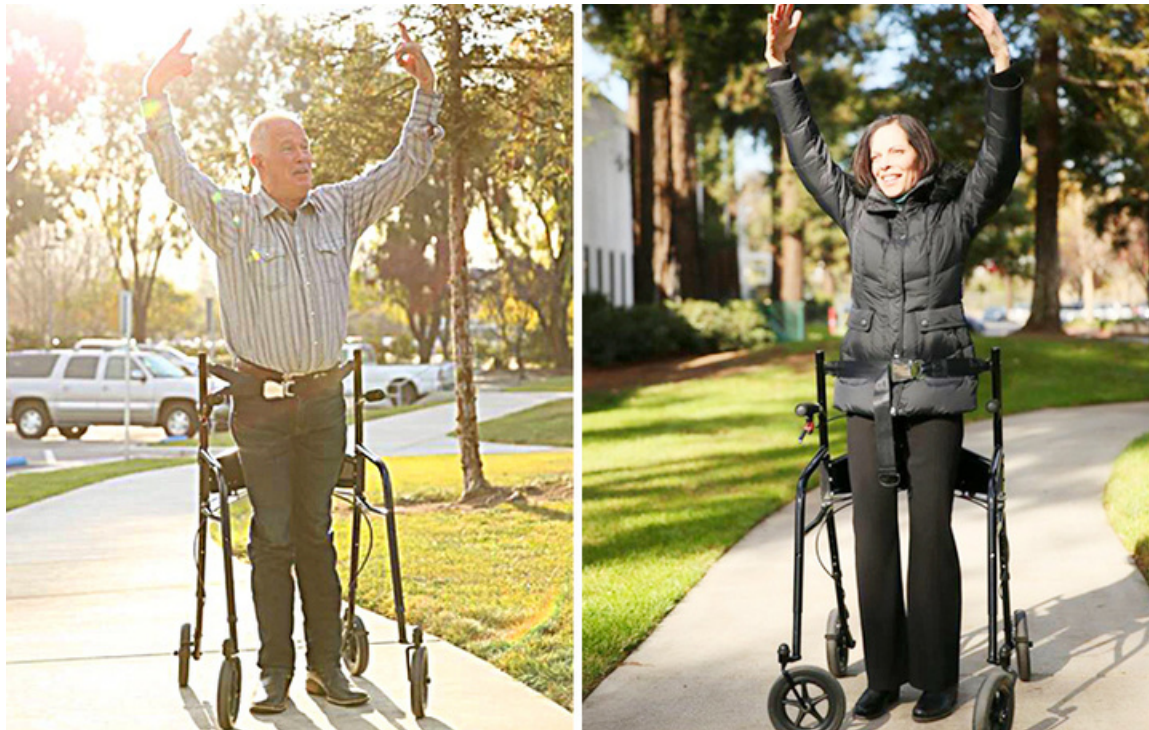


3

Causes – muscle
weakness, poor
balance, vision loss,
osteoporosis, long
term health condition
like heart disease,
dementia, low blood
pressure

Product market for Independent mobility

Smart mobility walkers



Anti-slip walking stick



Anti-fall vests



Safety helmet



Product Brief

Overview - We have decided to design a fall-protection **Airbag Safety Jacket** with technology integration and safety features to ensure no injury on falling; and to support independent living by providing a product which addresses the mobility issues faced by elderly people while walking.

General features:

- Wearable Airbags
- Full coverage from head to toes
- Lightweight
- Easy-to-carry
- Padded from innerside for comfort
- Best quality with affordable pricing
- Available in all size variants

Technological features:

- Smart Microchip
- Battery
- AI algorithms for fall detection
- Accelerometer
- Posture sensor
- Application interface
- Alert reminders

Market Research

- To understand the user requirements and specifications, a survey was conducted on 100 older adults who are potential product users.
- Key attributes considered for the survey are listed alongside.
- These attributes are rated on a likert scale ratings from 1-7.
- 1 being least important and 7 being most important.

Comfort

Reusability

Protection

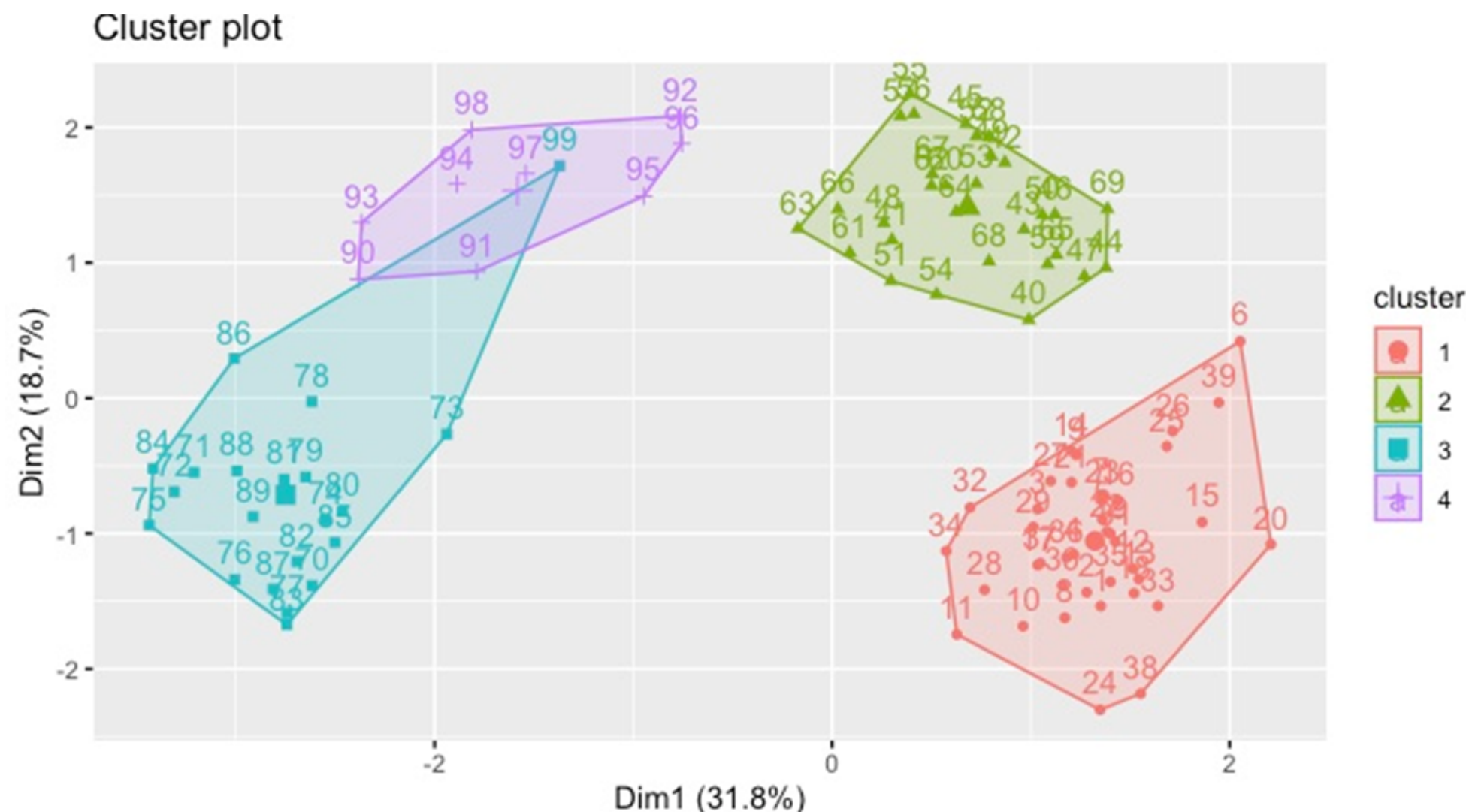
Style

User friendly

Age

Cluster Analysis of the survey data

Performed Hierarchical cluster analysis on the collected data using R and identified 4 significant clusters based on the user attribute ratings provided:



Cluster 3
21.2%

Cluster 4
9.1%

Cluster 1
39.4%

Cluster 2
30.3%

Cluster Analysis: Average ratings

Cluster	Comfort	Reusabilty	Protection	Style	Userfreindly	Male	Income	Age
1	1.77	6.36	6.38	2.05	2.21	0.49	4.28	82
2	6.54	2.27	6.50	2.27	2.04	0.5	4.74	82
3	2.19	2.05	1.81	6.62	6.29	0.48	4.10	83
4	6.34	2.34	1.89	6.34	1.78	0.00	4.00	86
Overall	3.71	3.84	5.04	3.47	2.98	0.45	4.35	83

User experience

Based on the average trends we got from the Cluster Analysis, we defined the four identified clusters as:

- Cluster 1 - Protection + Reusability
- Cluster 2 - Protection + Comfort
- Cluster 3 - Style + Userfriendly
- Cluster 4 - Comfort + Style

Next, we created 4 user personas and their corresponding user journey maps, each representing one cluster.

Protection and Reusability – Imbalance due to hard of hearing



George Washington

George Washington

George and his wife, Sara reside in South London. He is 72 years old and came to the United Kingdom from Egypt in 1964. George worked as a construction worker in Manchester before travelling to London, where he was involved in a tragic accident that caused him to lose hearing in his left ear. As a result, he has balance issues and is unable to support his entire body weight, which is why George walks with a cane for assistance. His son Adam lives 5 kilometres away with his wife Eve and two daughters, Susan and Samantha. Adam pays frequent visits to George and assists him with his daily requirements. Apart from Adam, George also has housekeeping and a nurse who helps him move and do everyday work.

Description

Age: 72
Gender: Male
Living: with wife

Technology Competency

Competency: Fair



Devices Used

- Ipad
 - Smartphone
 - Laptop
- To watch make phone calls, watch movies and surf through social media.

Personality

Cheerful, Knowledgeable, outgoing, confident and up for new adventures.

Activities

- Going out for coffee.
- Gardening.
- Making food.
- Playing bingo with his friends in the park.

Goals

- Wants to be independent.
- wants to keep his good health.
- doesn't want to be a burden on his children.

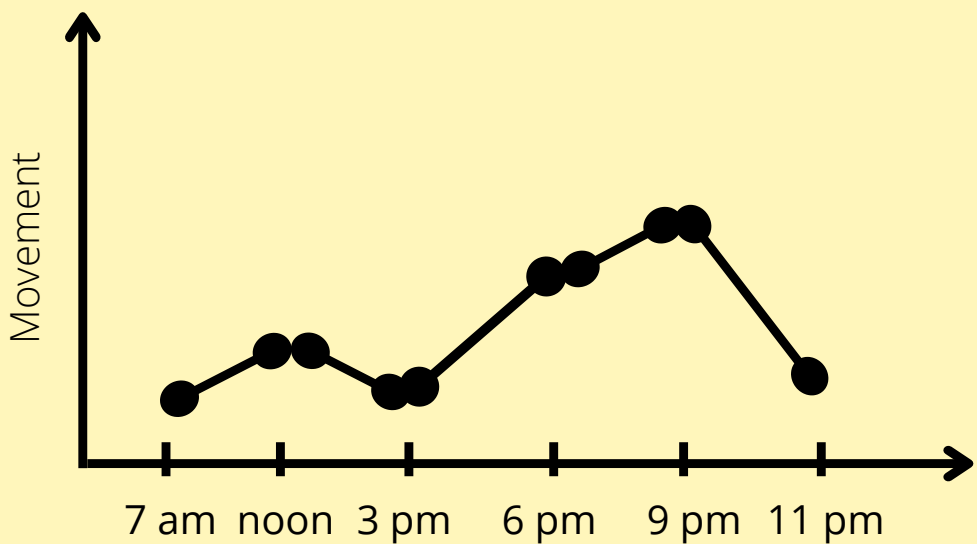
Challenges

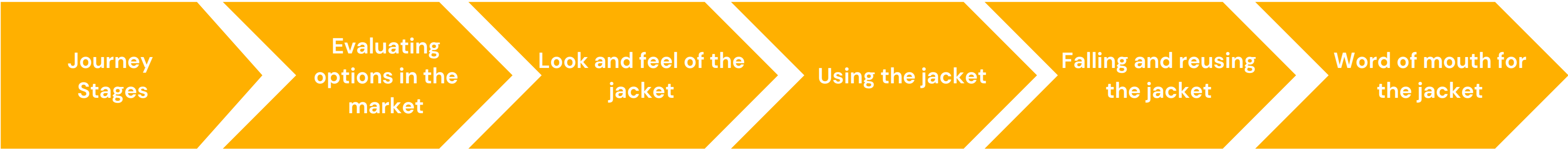
- Hard of hearing.
- worsening health conditions.
- fear of injury, health and safety.

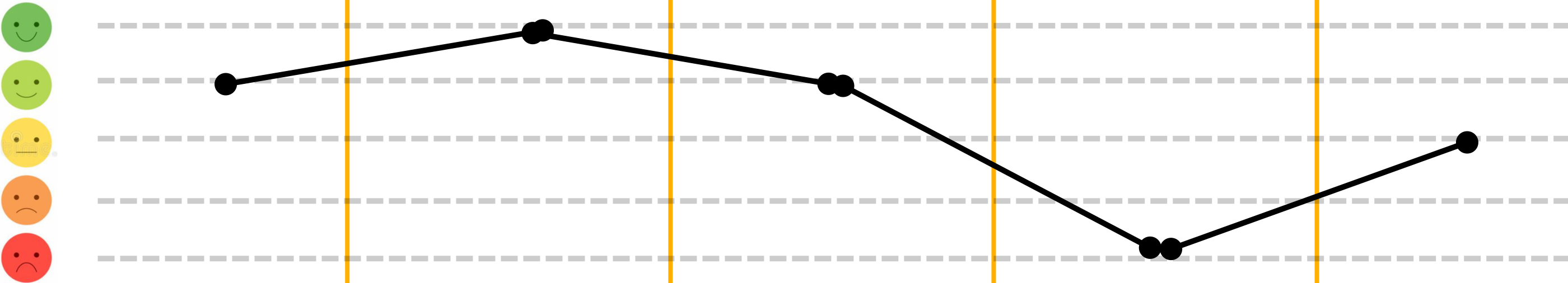
Health Conditions

- Hard of hearing.
- Walking imbalance.
- Cataract (to be operated on soon)
- Obesity
- Arthritis
- Diabetes
- Hypertension

Active hours





Customer Activities	Watches facebook videos from health related group pages	Trying the jacket	Purchasing the jacket from store / online delivery of the jacket	Wearing the jacket	Sharing the experience
Customer Needs	Consider ease of use	Checking the color and comfort of the jacket	Start using the jacket on a daily basis	Testing the jacket and refilling the CO2 Cartridge	Informs others about this product
Touchpoints	Facebook, youtube and word of mouth.	Physical store and distribution center	Wearing the jacket at home and while going out	...	Evening catch up with friends
Experience					
Technology Systems	Smartphone	Accelerometer response and smart reminder	Accelerometer response and smart reminder	Accelerometer response and smart reminder	Whatsapp group chats & Facebook group chats

Protection and Comfort – Mental instability due to past experiences



Helley Smith

Helley Smith

Helley, 69, is a retired businesswoman who lives in Adelaide with his husband Peter, 76, who is a retired bank manager. They have two children: Suzi and Adam, both staying away from them. Suzi is doing a corporate job in London and visits her parents twice a year whereas Adam is running a startup in Canberra. Helley developed fear of falling and getting injured two years ago when she slipped on a wet floor and ended up with a fracture on her right arm. Though the fracture was completely recovered but her fear hadn't. She will enter the septuagenarian club next year and still she is not able to eliminate her fear, due to which she is avoiding going alone outside the house without her husband. But as Peter is also aeging, she cant completely rely on him and is in search of a comfort-oriented safety product, wearing which she can go for a walk fearlessly without her husband.

Description

Age: 69
Gender: Female
Status: Married

Personality

Mental-health conscious, jolly, kind-hearted, loves to explore, accommodating

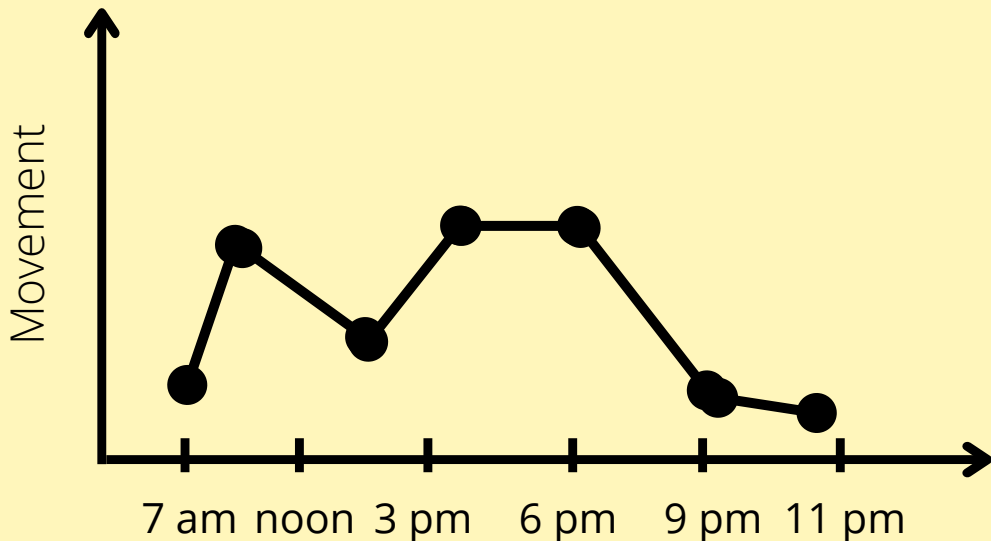
Health Conditions

- Hypermetropia
- Ptophobia
- Basophobia
- Low BP
- High stress

Activities

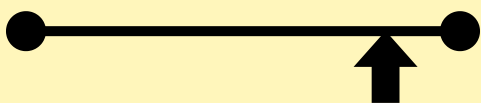
- Reading books
- Daily evening walk
- Doing yoga and meditation

Active hours



Technology Competency

Competency: Fairly good



Goals

- Remove all the mental fears of injury
- Achieve a good BMI as per her age
- Start living an independent life

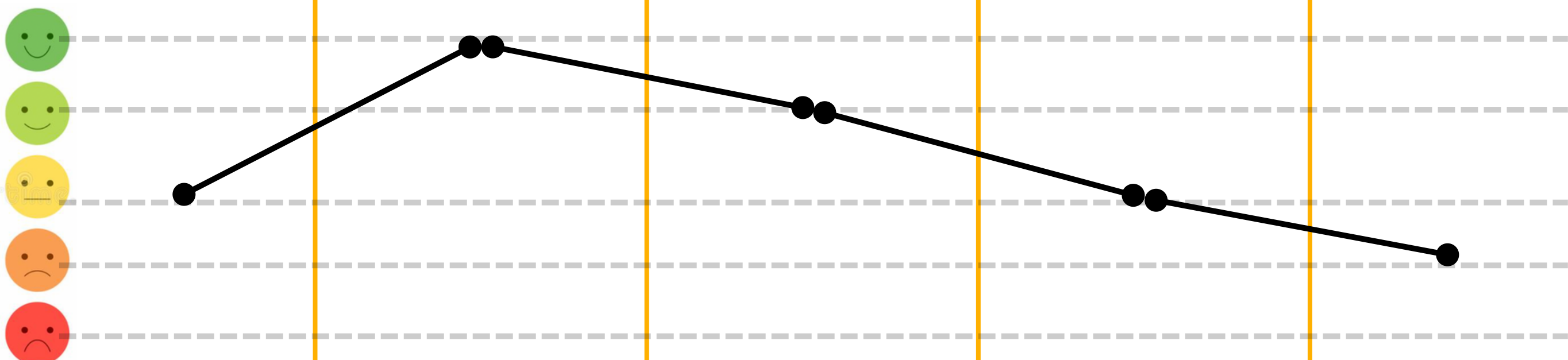
Devices Used

- Smartphone
 - Smartwatch
- To get regular physical and mental fitness tips.

Challenges

- Low success in achieving mental stability
- Fear of falling, getting injured/ getting fractured



Customer Activities	sees ads on television and online platforms	testing the specs by dummy falling	movement in the house	goes for a walk alone	commenting about the experience
Customer Needs	to find a safety jacket	to be lightweight, comfortable and easy to wear	to prevent the user from any serious injury after falling	to provide same protection as offered during the trial	to post reviews about this jacket
Touchpoints	online platforms, social media	physical stores, at home	wearing jacket in home	wearing jacket outdoors	Product review section on website
Experience					
Technology Systems	online retailing portal	Accelerometer response and smart reminder	Accelerometer response and smart reminder	Accelerometer response and smart reminder	online retailing portal

Style and User friendly – Mobility products For life of dignity



Benjamin Buford

Benjamin Buford

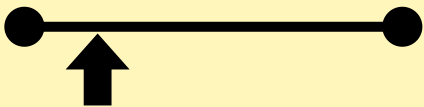
Benjamin served as an army Lieutenant during the Vietnam War in the 1970s, during a military operation Benjamin lost one of his legs and was awarded the purple heart medal for his contribution and retired from the service. After coming back to the USA Benjamin worked as an instructor for a security firm and retired at an age of 60 from the company. Benjamin has 1 son who is married and lives in the UK with his family thus Benjamin is currently living in an old age home for war veterans. Benjamin is a self-sufficient man and takes immense pride in living a life of dignity despite being physically handicapped. He has a very stable financial situation and is keen on using products that assist him in overcoming his mobility issues.

Description

Age: 76
Gender: Male
Status: Widower

Technology Competency

Competency: Low



Devices Used

- **Fitness tracker**
 - **Smartphone**
- Uses a smartphone for YouTube and a fitness tracker to keep track of step count and heart rate monitoring.

Personality

Self-reliant, influencer, confident and social

Activities

- Discussing war stories
- Politics
- Guest speakers at various security firm conference
- Walking to the riverside

Goals

- Ease of use with a gentle learning curve for product usage
- A product that can resonate with his social status among peers
- Ensure his safety when trying new prosthetics

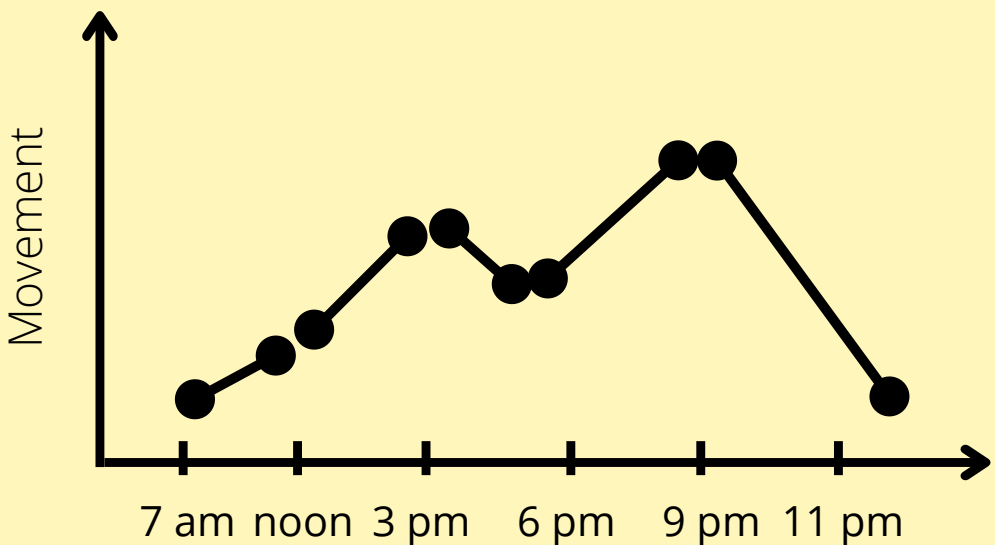
Challenges

- Weight of safety product
- Aesthetic of the product
- Injury while climbing stairs due to room being on first floor

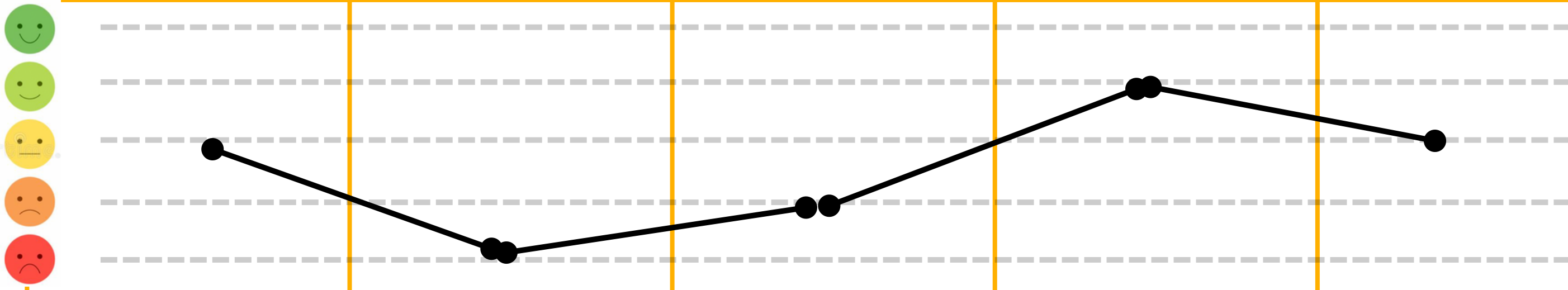
Health Conditions

- Amputated right leg
- Diabetes
- Weakness
- Post-traumatic stress disorder
- Mood disorders

Active hours





Customer Activities	Check fall safety equipments in magazine	Trying the jacket	Purchasing the jacket from store / online delivery of the jacket	Wearing the jacket	Sharing the experience
Customer Needs	Consider ease of use	Checking the color and comfort of the jacket	Start using the jacket on a daily basis	Testing the jacket and refilling the CO2 Cartridge	Informs others about this product
Touchpoints	Magazine, YouTube and live demonstration	Physical store and distribution center	Wearing the jacket in home and while travelling	...	Evening catch up with friends
Experience					
Technology Systems	Youtube	Accelerometer response and smart reminder	Accelerometer response and smart reminder	Accelerometer response and smart reminder	

Comfort and Style – Losing mobility due to osteoporosis



Lilian Bishop

Lilian Bishop

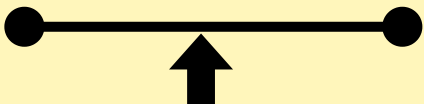
Lilian Bishop is an 78 year old author who lives in London with her husband and a personal carer. She is the author 2 best selling books and has a very good financial situation. She had a very active life overall – taking walks and going for run regularly during her adult life. She is very creative and still enjoys a walk in the nature. However, she is suffering from osteoporosis due to which her mobility has decreased a lot. She had fallen couple of times last few months while in the park. She is a determined person, doesn't want to be bed-ridden because of her health situation and believes that mobility will improve her health. So she is looking for wearables which will ensure her safety during her walks.

Description

Age: 78
Gender: Female
Status: Married

Technology Competency

Competency: Average



Devices Used

- Laptop
- Tablet
- Smartphone

Personality

Creative, Enjoys outdoors, Determined

Activities

- Writing
- Enjoys taking walks in parks
- Spends time on her computer, smartphone

Goals

- Looking for a wearable/device that will ensure her safety even when falling while taking walks outside
- Device/wearable should be comfortable enough as she has weak and fragile bones in the whole body
- Device/wearable should be flexible enough to wear easily as her body is getting stiffer

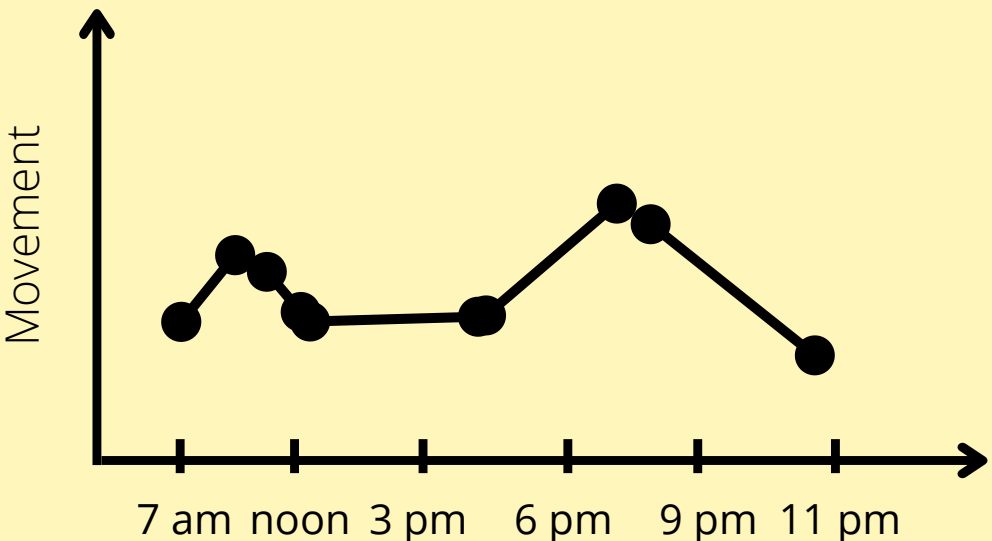
Challenges

- Comfortable (soft) and Flexible to wear
- Full body protection
- Protect from injury even when falling while walking

Health Conditions

- Early stage of osteoporosis
- Fragile bones
- Weak spine
- Slight stiff body

Active hours



Based on the cluster analysis, personas and their user journey, 4 product concepts are generated

Protection + Reusability

Safety is highest in priority with fall and flat surface detection algorithm. Has sustainability features like readjusted airbags and disposable CO2

Protection + Comfort

Apart from protection features it has comfort features like an ergonomic design and soft cushioning

Style + User friendly

Focused on color, design, material, ease of use of the jacket and connectivity

Comfort + Style

Focused more on stylish options and comfort features such as ergonomic design and soft cushioning

Concept Selection by Pugh method

		Protection + Reusability		Protection + Comfort		Style + User Friendly		Comfort + Style	
Selection Criteria	Weight	Avg. Rating	Weighted Avg.	Avg. Rating	Weighted Avg.	Avg. Rating	Weighted Avg.	Avg. Rating	Weighted Avg.
Protection	50%	6.38	3.19	6.5	3.25	1.81	0.905	1.89	0.945
Reusability	25%	6.36	1.59	2.27	0.5675	2.05	0.5125	2.34	0.585
Comfort	25%	1.77	0.4425	6.54	1.635	2.19	0.5475	6.34	1.585
Size of the cluster	7	39.40%	2.758	30.30%	2.121	21.20%	1.484	9.10%	0.637
Total Score		7.9805		7.5735		3.449		3.752	
Rank		1		2		4		3	
Decision		Develop		Discard		Discard		Discard	

Design Decision

- Protection + Reusability accounts for 40% of the sample population.
- This variant of jacket prioritizes safety features: instant fall detection, flat surface detection, non-flammable, and spine injury prevention, with additional cushioning on the neck and back.
- This variant has sustainability features: airbags that can be simply readjusted back into the jacket by the user. Disposable CO2 cartridges that can easily be placed back into the jacket for re-inflation during falls.
- This sample demographic is intended for clients who are concerned about falling. Customers who have fallen or have a loved one they wish to safeguard from falling in the future might be just a few of the numerous reasons for purchasing this version of the jacket.



References

1. Deaths by Age and Cause - Data Details - Injury Facts. (2022, January 11). Injury Facts; injuryfacts.nsc.org. <https://injuryfacts.nsc.org/all-injuries/deaths-by-demographics/deaths-by-age/data-details/>
2. Avoiding Injuries as You Age | Johns Hopkins Medicine. (2022, January 1). Avoiding Injuries as You Age | Johns Hopkins Medicine; www.hopkinsmedicine.org.
<https://www.hopkinsmedicine.org/health/wellness-and-prevention/avoiding-injuries-as-you-age#:~:text=As%20we%20age%2C%20it's%20normal,death%20in%20people%20over%2065>
3. Falls. (2021, April 26). Falls; www.who.int. <https://www.who.int/news-room/fact-sheets/detail/falls>