

Alluminate

ITP 326: Product Design and Development

Alejandro Quintero

Juan Carlos Mosqueda

Nicole Martinez

Ryan Untalan

I. Executive Summary

From April-June 2019, our team was asked to establish a problem existing in a particular customer segment and design a solution for that problem. Our group went through a process of consolidating down on specific product areas we were interested in. Afterwards, we started collecting data to help us identify a specific need. The product area we ended up focusing on was electronic protection products. Going into more depth, our team realized that there was a problem with cell phones becoming easily damaged. By the month of May, we consolidated down the physical attributes and design of the product. We did extensive research so that we would be able to get inspiration for our product. Lastly, we created three prototypes that helped us to refine and create a final prototype called Alluminate.

I. Introduction

The report will include the following sections: opportunity identification, mission statement/design brief, identification of customer needs, concept development, industrial design, and prototyping. The output of each step is the input of each subsequent step. It was important for us to follow these steps so that we would be able to keep ourselves organized and create our product in the most systematic way.

A. Opportunity Identification

The team generated 40 needs and filtered through them to identify exceptional opportunities. We began the exercise by reflecting on the daily challenges we face and brainstorming needs. Once we compiled and classified all our ideas, we started a filtering process to determine which opportunities are worth further investing. We used an innovation tournament structure to narrow down to the top ten needs. We then used the Real-Win-Worth-it Framework to narrow down the list to an exceptional few. After further review and discussion, our team decided to create a product in the electronic protection accessory category to address the problem of the screen of devices breaking.

40 Group Needs:

Ryan's Needs

1. Crutches are bulky and hard to store
2. Buckling seat belts can be hard for my grandparents
3. Getting out of bed can be difficult (tired)
4. Transferring laundry is annoying
5. The hands-free device when brushing teeth (disability/ elderly)
6. Neck hurts when working on my laptop in bed
7. Golf clubs can be expensive and use a lot of material
8. Not having access to a microwave and want hot food
9. Hat flies off when running/ biking because too windy (annoying)
10. Waiting for the machine to open up while at a gym

Nicole's Needs

1. Can never fold my clothes efficiently enough
2. Can never tune my string instruments perfectly
3. My earrings always get lost
4. My phone loses its battery too quickly
5. Sleeping through my alarm is frustrating
6. It's sometimes too hot when taking your first sip of coffee or tea
7. Accidentally eating too much is frustrating
8. Getting too hot or too cold at night is annoying
9. Legs get too sore after a long run
10. I occasionally lose too much bow hair on my violin.

Alejandro's Needs

1. Peanut jars don't allow for complete consumption.
2. All white/bright lights are too harsh to some necessary for a room.
3. Clean, Accessible Water is hard to come by sometimes.
4. People traveling in Lower Earth Orbit might experience increased Nausea.
5. Very small things get lost easily
6. Sound can be loud for some people but okay for others.
7. Dirty dishes tend to pile up with no easy way to start to clean them
8. Dirt entering a place of residence is unsanitary.
9. Infants and toddlers grow out of clothing/footwear very quickly.
10. Washers and Dryers take up too much space individually.

Carlos' Needs

1. The sound of making organic juice is annoying
2. More storage space on cars for drinks
3. No to lose my soccer ball every time I play soccer
4. Be able to blend my own smoothies on the go
5. A cell phone screen that won't crack
6. Some people easily get sunburn
7. Clean water anywhere
8. Wake up on time
9. To keep cool drinks in the summertime
10. Know went the BBQ or steak is ready

Classification of the needs:

After completing the review of all the needs, we classified all the needs into four main categories. The categories were as follows: camping/traveling, lighting, home/organization, and others. The process began with the team gathering all information to analyze the needs with common themes. As the team grouped similar themes together the categories list emerged. The list of categories had three major labels and one that was designed as other because the needs did not fall into the similar identified themes.

Camping/ Traveling

- Crutches are bulky and hard to store
- Buckling seat belts can be hard for my grandparents
- Not having access to a microwave and want hot food
- Hat flies off when running/ biking because too windy (annoying)
- know went my BBQ or my steak is ready
- to keep cool my drink in the summertime
- I easily get sunburn
- Be able to blend my own smoothies on the go
- Legs get too sore after a long run

Lighting

- All white/bright lights are too harsh to some eyes but necessary for a well-lit room.

Home/ Organization

- Very small things tend to get lost easier.
- Can never fold my clothes efficiently enough
- My earrings always get lost
- Dirty dishes tend to pile up with no easy way to start to clean them.
- The sound of making organic juice is annoying

Other Categories

- Peanut jars don't allow for complete consumption.
- Clean, Accessible Water is hard to come by sometimes.
- Getting out of bed can be difficult (tired)
- Transferring laundry is annoying
- More storage space on my car for drinks
- wake up on time
- A cell phone screen that won't crack
- No to lose my soccer ball every time I play soccer
- The hands-free device when brushing teeth (disability/ elderly)
- Neck hurts when working on my laptop in bed
- Golf clubs can be expensive and use a lot of material
- Can never tune my string instruments perfectly
- People traveling in Lower Earth Orbit might experience increased Nausea.
- Waiting for the machine to open up while at a gym
- Dirt entering a place of residence is unsanitary.
- My phone loses its battery too quickly
- Infants and toddlers grow out of clothing/footwear very quickly.
- Sleeping through my alarm is frustrating
- Sound can be loud for some people but okay for others.
- It's sometimes too hot when taking your first sip of coffee or tea
- Accidentally eating too much is frustrating
- Getting too hot or too cold at night is annoying
- I occasionally lose too much bow hair on my violin

Classifying needs methodology

The team first came into consensus by using an innovative tournament structure to select the top ten needs. Once the top ten needs were identified, the team proceeded to assigned order of importance 1 being the most important and 10 begin the least important. The order was placed by using the Real-Win-Worth-It Framework, which allowed for each team member to vote and give a numerical value to the needs. Each need then had a number for which the top ten order was determined. Therefore, the team focuses its research on the top need products that were already on the market.

Top Needs:

- Some people easily get sunburn



Figure 1: Baby Jolie 50 SPF Sunscreen for Kids Individually Packed Safe for Babies On The Go)

- Be able to blend my own smoothies on the go



Figure 2: GO-GO BLENDER from Bennett

- Very small things (such as earrings) tend to get lost easier.



Figure 3: LANTWOO 24 Grids Velvet Glass Ring Earrings Jewelry Box Earrings Organiser Storage Holder Display Case

- More storage space on cars for drinks



Figure 4: CUP CASE™ - Multifunctional car storage organizer)

- Screens on electronic devices (phones, laptops) break easily



Figure 5 & 6: China Premium tempered glass and Apple iPad Pro 11 covers on the market

- Dirt entering a place of residence is unsanitary.



Figure 7 & 8: Welcome Entrance Doormat and Shoe Cover Dispenser

- Sleeping through my alarm/ waking up on time/ getting out of bed is frustrating



Figure 9: Capello digital alarm clock

- Getting too hot or too cold at night is annoying



Figure 10: AirComforter Cloud Sheet Accessory, 100% Pure and Soft Cotton

- Hat flies off when running/ biking because too windy (annoying)



Figure 11: Removable and flexible chin cord, universal fit any kind of hat

- The sound of blenders is loud.



Figure 12: Vitamix Quiet One Blender - 2237W - 1.5 qt

Process of selecting top need:

The team used the Real-Win-Worth-It Framework for each need in the top ten list. The group proceeded to use personal and applied common knowledge to determine the number one need. Based on the Real-Win-Worth-It Framework numerical values that were gathered, the team then voted to eliminate 6 needs from the top ten list of needs. Then, the group decided to research deeply on the remaining four needs to determine the top need. Once more research was gathered, the group voted again and agreed to pursue the top need for the design and development of a new product that will satisfy the top identified need.

Selecting Exceptional Opportunities: Real-Win-Worth-it Framework

Real-Win-Worth-it Framework			
Need	Some people get sunburn really easy		
REAL	Is there a real market and a real product?	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES	SUNBLOCKER	
Will the customer buy (perceived risks and benefits, expectations on price and availability)	YES		
Is there a real product concept (line extension vs new to the world)	YES		
Is the product acceptable within the social, legal, and environmental norms?)	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products)?	YES		
Can it be produced at low costs?	YES		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	9/0/0	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, etc.)	MAYBE		
Is the timing right?	YES		
Does it fit our brand?	MAYBE		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	MAYBE		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	NO		
Do we have the management that can win? (experience? Fit with culture? Commitment to this endeavor?)	NO		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	NO		
Total	YES/NO/MAYBE	1/3/3	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	NO		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	YES		
Total	YES/NO/MAYBE	3/1/0	

After completing this RWW, there were 13 Yes votes, 4 No votes, and 3 Maybe votes.

Real-Win-Worth-it Framework			
Need	BLEEN SMOOTHIES ON THE GO		
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES	SMOOTHIES CUP/BLENDER	
Will the customer buy (perceived risks and benefits, expectations on price and availability)	YES		
Is there a real product concept (line extension vs new to the world)	YES		
Is the product acceptable within the social, legal, and environmental norms?)	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products?)	YES		
Can it be produced at low costs?	YES		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	9/0/0	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	MAYBE		
Is the timing right?	YES		
Does it fit our brand?	YES		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	MAYBE		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	YES		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	YES		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	NO		
Total	YES/NO/MAYBE	4/1/2	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	MAYBE		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	YES		
Total	YES/NO/MAYBE	3/0/1	

After completing this RWW, there were 16 Yes votes, 1 No votes, and 3 Maybe votes.

Real-Win-Worth-it Framework			
Need	Screens on electronic devices (phones, laptops) break easily		
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES	Phone/ Laptop owners	
Will the customer buy (perceived risks and benefits, expectations on price and availability)	YES		
Is there a real product concept (line extension vs new to the world)	MAYBE		
Is the product acceptable within the social, legal, and environmental norms?)	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products?)	YES		
Can it be produced at low costs?	MAYBE		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	7/0/2	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	YES		
Is the timing right?	YES		
Does it fit our brand?	MAYBE		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	YES		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	NO		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	MAYBE		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	NO		
Total	YES/NO/MAYBE	3/2/2	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	MAYBE		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	MAYBE		
Total	YES/NO/MAYBE	2/0/2	

After completing this RWW, there were 12 Yes votes, 2 No votes, and 4 Maybe votes.

Real-Win-Worth-it Framework			
Need	Getting too hot or too cold at night is annoying.	YES/NO/MAYBE	NOTES
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES		
Will the customer buy (perceived risks and benefits, expectations on price and availability)	MAYBE		
Is there a real product concept (line extension vs new to the world)	YES		
Is the product acceptable within the social, legal, and environmental norms?)	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products?)	YES		
Can it be produced at low costs?	YES		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	8/0/1	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	YES		
Is the timing right?	MAYBE		
Does it fit our brand?	YES		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	MAYBE		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	YES		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	YES		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	YES		
Total	YES/NO/MAYBE	5/0/2	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	YES		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	YES		
Total	YES/NO/MAYBE	4/0/0	

After completing this RWW, there were 17 Yes votes, 0 No votes, and 3 Maybe votes.

Real-Win-Worth-it Framework			
Need	Hat flies off when running/ biking because too windy (annoying)	YES/NO/MAYBE	NOTES
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES	Runners/ Bikers/ Hat wearers	
Will the customer buy (perceived risks and benefits, expectations on price and availability)	YES		
Is there a real product concept (line extension vs new to the world)	MAYBE		
Is the product acceptable within the social, legal, and environmental norms?)	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products?)	MAYBE		
Can it be produced at low costs?	MAYBE		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	6/0/3	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	YES		
Is the timing right?	YES		
Does it fit our brand?	MAYBE		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	YES		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	MAYBE		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	MAYBE		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	MAYBE		
Total	YES/NO/MAYBE	3/0/4	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	MAYBE		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	MAYBE		
Total	YES/NO/MAYBE	2/0/2	

After completing this RWW, there were 11 Yes votes, 0 No votes, and 9 Maybe votes.

Real-Win-Worth-it Framework			
Need	Dirt entering a place of residence is unsanitary		
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES		
Will the customer buy (perceived risks and benefits, expectations on price and availability)	MAYBE	Can take off shoes or use a door mat	
Is there a real product concept (line extension vs new to the world)	YES		
Is the product acceptable within the social, legal, and environmental norms?	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	YES		
Will our product satisfy the market (is there a relative advantage to other products?)	YES		
Can it be produced at low costs?	YES		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	YES		
Total	YES/NO/MAYBE	8/0/1	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	MAYBE		
Is the timing right?	YES		
Does it fit our brand?	MAYBE		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	YES		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	MAYBE		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	YES		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	MAYBE		
Total	YES/NO/MAYBE	3/0/4	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	YES		
Do we have the resources and the cash to do this?	MAYBE		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	MAYBE		
Total	YES/NO/MAYBE	2/0/2	

After completing this RWW, there were 13 Yes votes, 0 No votes, and 7 Maybe votes.

Real-Win-Worth-it Framework			
Product	Sleeping through my alarm/waking up on time/getting out of bed is frustrating		
REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	YES		
Can the customer buy (size of the market, customer decision making process)	YES		
Will the customer buy (perceived risks and benefits, expectations on price and availability)	MAYBE		
Is there a real product concept (line extension vs new to the world)	MAYBE		
Is the product acceptable within the social, legal, and environmental norms?	YES		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	MAYBE		
Will our product satisfy the market (is there a relative advantage to other products?)	YES		
Can it be produced at low costs?	MAYBE		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	MAYBE		
Total	YES/NO/MAYBE	4/0/5	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	MAYBE		
Is the timing right?	MAYBE		
Does it fit our brand?	YES		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	MAYBE		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	YES		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	YES		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	YES		
Total	YES/NO/MAYBE	4/0/3	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	MAYBE		
Do we have the resources and the cash to do this?	YES		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	YES		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	YES		
Total	YES/NO/MAYBE	3/0/1	

After completing this RWW, there were 11 Yes votes, 0 No votes, and 9 Maybe votes.

Real-Win-Worth-it Framework

Product More storage space on my car for drinks

REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	Yes		
Can the customer buy (size of the market, customer decision making process)	Yes		
Will the customer buy (perceived risks and benefits, expectations on price and availability)	Yes		
Is there a real product concept (line extension vs new to the world)	Yes		
Is the product acceptable within the social, legal, and environmental norms?)	Yes		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	Yes		
Will our product satisfy the market (is there a relative advantage to other products?)	Maybe		
Can it be produced at low costs?	Yes		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	Yes		
Total	YES/NO/MAYBE	8/0/1	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, pricing)	Maybe		
Is the timing right?	Yes		
Does it fit our brand?	Yes		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	Maybe		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	No		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	Yes		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	Maybe		
Total	YES/NO/MAYBE	3/1/03	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	Yes		
Do we have the resources and the cash to do this?	Maybe		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	Maybe		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	Yes		
Total	YES/NO/MAYBE	2/0/2	

After completing this RWW, there were 13 Yes votes, 1 No votes, and 6 Maybe votes.

Real-Win-Worth-it Framework

Product Very small things (such as earrings) tend to get lost easier.

REAL	Is there a real market and a real product	YES/NO/MAYBE	NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	Maybe		
Can the customer buy (size of the market, customer decision making process)	Yes		
Will the customer buy (perceived risks and benefits, expectations on price and availability)	Maybe		
Is there a real product concept (line extension vs new to the world)	Yes		
Is the product acceptable within the social, legal, and environmental norms?)	Yes		
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	Yes		
Will our product satisfy the market (is there a relative advantage to other products?)	Yes		
Can it be produced at low costs?	Yes		
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	Yes		
Total	YES/NO/MAYBE	7/0/2	
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE	NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, pricing)	Maybe		
Is the timing right?	No		
Does it fit our brand?	Yes		
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	Maybe		
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	No		
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	Maybe		
Do we know the market as well or better than our competitors (customer behavior? Channels?)	Maybe		
Total	YES/NO/MAYBE	1/2/04	
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE	NOTES
Will it make money? (ROI, NPV)	Yes		
Do we have the resources and the cash to do this?	Maybe		
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	Yes		
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	Yes		
Total	YES/NO/MAYBE	3/0/1	

After completing this RWW, there were 11 Yes votes, 2 No votes, and 7 Maybe votes.

Real-Win-Worth-it Framework		
Product	The sound of blenders are loud.	
REAL	Is there a real market and a real product	YES/NO/MAYBE NOTES
Is there a need? (what is the need? How is the need presently satisfied?)	Yes	
Can the customer buy (size of the market, customer decision making process)	Yes	
Will the customer buy (perceived risks and benefits, expectations on price and availability)	Yes	
Is there a real product concept (line extension vs new to the world)	Maybe	
Is the product acceptable within the social, legal, and environmental norms?)	Yes	
Is the concept feasible (can it be made? Is the technology available? Does it satisfy the needs?)	Yes	
Will our product satisfy the market (is there a relative advantage to other products?)	Maybe	
Can it be produced at low costs?	Maybe	
Are the risks perceived by the customer acceptable? What are the barriers to adoption?	Yes	
Total	YES/NO/MAYBE	6/0/3
WIN	Can we win? Can our product or service be competitive? Can we succeed as a company?	YES/NO/MAYBE NOTES
Do we have a competitive advantage? Is it sustainable? (performance, patents, barriers to entry, substitution, price)	Maybe	
Is the timing right?	Yes	
Does it fit our brand?	Yes	
Will we beat our competition? (how much will they improve? Price trajectories? New entrants?)	Maybe	
Do we have superior resources? (engineering, finance, marketing, production? Fit with core competencies?)	No	
Do we have the management that can win? (experience? Fit with culture? Commitment to this product?)	Yes	
Do we know the market as well or better than our competitors (customer behavior? Channels?)	Yes	
Total	YES/NO/MAYBE	4/1/02
WORTH IT	Is it worth doing? Is the return adequate and the risk acceptable?	YES/NO/MAYBE NOTES
Will it make money? (ROI, NPV)	Yes	
Do we have the resources and the cash to do this?	Maybe	
Are the risks acceptable to us? (what could go wrong? Technical risk vs market risk)	Yes	
Does it fit our strategy? (fit with our growth expectation? Impact on brand? Embedded options?)	Yes	
Total	YES/NO/MAYBE	3/0/1

After completing this RWW, there were 13 Yes votes, 1 No votes, and 6 Maybe votes.

Innovation Charter:

Create a protective device in the electronic device category that launches in the Fall through online sales.

Reflection:

After a thorough review and discussion of our “Real-Win-Worth-It” Frameworks, our group has decided to invest our time in developing a product that addresses electronic protection accessories. We are all excited to create something that will become more applicable as the technological age continues to progress.

B. Mission Statement/ Design Debrief

The mission statement is the formal summary of the aims for the product and is the result of the planning phase. There is an in-depth analysis of market goals, opportunities, assumptions, and constraints. The importance lies in the need to develop and plan the future for a product.

Mission Statement:

Product Description	<ul style="list-style-type: none">• A universal product that protects devices such as smartphones, laptops, and tablets
Benefit Proposition	<ul style="list-style-type: none">• Product owners will prevent their devices from breaking and thus saves money, time, and provides peace of mind
Key Business Goals	<ul style="list-style-type: none">• One of our goals is to complete the product's design by June 2019.• We will focus on keeping the product's price at an affordable level, while also keeping the product's quality of high level.
Primary Market	<ul style="list-style-type: none">• Owners of laptops, smartphones, tablets
Secondary Markets	<ul style="list-style-type: none">• Students• Professionals
Assumptions and Constraints	<ul style="list-style-type: none">• New product platform• Universal design
Stakeholders	<ul style="list-style-type: none">• Customer• Design team• Investors• Distributors• Retailers

Table 1: Mission Statement Table

C. Identification of Customer Needs

Our team began identifying customer needs by visualizing the lifecycle of electronic devices. We brainstormed 10-questions that will guide our customer interviews then went out to interview volunteers and collect data. Once we reconvened, we examined our data and created tables that contained the question/prompt, customer statement, and interpreted need. We then established the relative importance of the needs base on customer surveys and organized the needs into a hierarchy.

Use Lifecycles:

Prospective Productive Use Lifecycle, of electronic devices without protection.

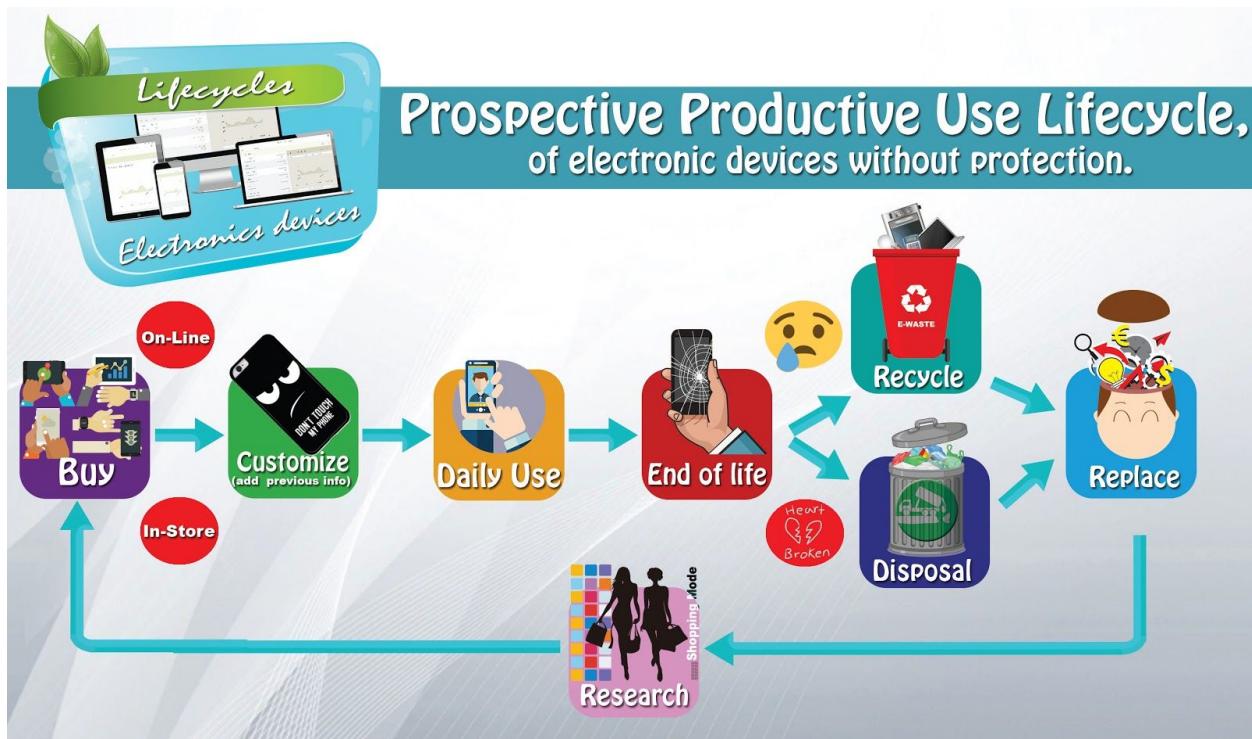


Figure 13: Lifespan of electronic device without protection

Prospective Productive Use Lifecycle, of electronic devices with protection.

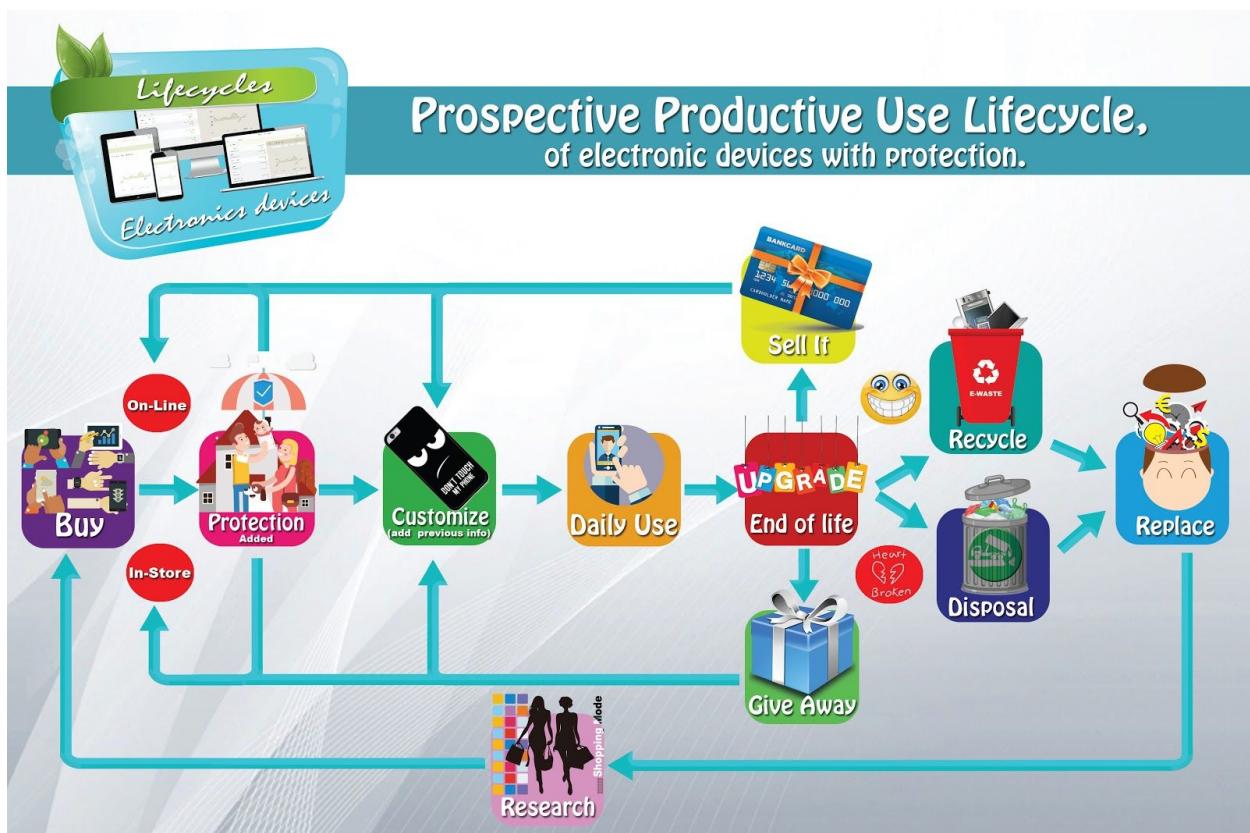


Figure 14: Lifespan of electronic device with protection

Interviewing and Ethnographic Guide

Planning:

This section gives an overview of the interview questions that will be asked, the data collection targets, the specific tasks that will be observed, and the feedback that was received from the interviewees. The team paid attention to searching for explicit and latent needs by conducting interviews.

Interview Questions:

The interview questions will offer first-hand testimonies from electronic device users. This will give our team insight into specific customer problems they run into and their subsequent needs. Every question of the interview process is not made to sway or lead the customer in any way. The goal is to get the most honest answers within the customer and need's environment.

1. How important is it to keep your electronic device safe? Free of serious damage?
2. When you break an electronic device (phone, tablet, laptop), what problems do you face?
3. How do these problems occur? How do you avoid these problems?
4. What are your next steps after breaking your device?
5. Can you show me how you store your phone, laptop, or tablet?
6. Do you use electronic protection products? If yes, why?
7. What do you like about existing electronic protection products? What do you dislike?
8. What issues do you consider when purchasing an electronic protection product?
9. What improvements would you make to electronic protection products?
10. How important is the reusability of an electronic protection product?

Data Collections Targets:

1. Experienced electronic device users (4+ years or multiple devices)
2. Casual electronic device users
3. New electronic device users
4. Students
5. Friends

Specific Tasks to Observe:

1. Handling of the electronic device
2. Storing of electronic device

Data Collection:

- 2-3 interviews per team member
- Follow questions but also go with the flow and ask questions that spark curiosity.
- Notes
- Video recording

Each of our team members interviewed 3 people each who are experienced and casual electronic device users in order to gather the data we needed. Our interviewees consisted of friends and housemates.

Data Analysis:

After collecting customer data, we created three column tables for each interview which include the following information: question/prompt, customer statement, interpreted need.

Interview Questions

Customer Needs

Interpreted Needs:

John Francis Reyes, 24 years old, Cal Poly alumni, casual electronic device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	It is very important because you wouldn't want to have a damaged product and you would want your device to be safe.	The protection product keeps your device safe.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	At this point, you have a broken device, so a problem that you face is certain components not working. Software wise, you may not be able to access anything.	The protection product keeps your components and software working.
How do these problems occur? How do you avoid these problems?	It could be part of the user's fault because you're always holding onto your device. Most of it is accidental but	The protection product prevents the electronic device from breaking.

	<p>you should be responsible and be careful when you're using the device because anything can happen to it. Luck could also be a part of it. In the end, you are responsible for it.</p>	
What are your next steps after breaking your device?	Try to see if there is a way to fix it without having to spend money. The website, ifixit.com, has protocols as to how to fix a product	The protection product prevents any reason to repair it.
Do you use electronic protection products? If yes, why?	Yes, I have a phone cover for it because I don't want my phone getting scratched.	The protection product prevents the device from getting scratched.
What do you like about existing electronic protection products? What do you dislike?	Sometimes, electronic protection products could be stylish. There are some that are cheap, but also durable. Dislikes are design because some cases are hideous and more expensive.	The protection product is stylish and durable.
What issues do you consider when purchasing an electronic protection product?	Issues could be considering how long the product could last.	The protection product lasts long.
What improvements would you make to electronic protection products?	Make it as durable as it can get. Improve durability and strength.	The protection product is durable and sturdy.
How important is the reusability of an electronic protection product?	Reusability is very important because you don't want to be buying cases all the time.	The protection product can be reused.

Mindy Zhang, 21 years old, Cal Poly student, casual electronic device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Very important because my electronic devices are typically very expensive.	The protection product prevents the electronic device from breaking.

When you break an electronic device (phone, tablet, laptop), what problems do you face?	I lose all my information and it becomes a huge inconvenience. Today, people are very dependent on their electronic devices and when something goes wrong with them, it disrupts their lives in a significant way.	<u>The protection product keeps all the information in the electronic device secure.</u>
How do these problems occur? How do you avoid these problems?	You learn how to maintain your devices. It's like taking care of your health where you make sure your interior and exterior is okay.	<u>The protection product prevents screen cracking.</u>
What are your next steps after breaking your device?	Go to a store to try and get it fixed and if I have a warranty, I'll call the manufacturer and see if I can get a new device and see if I can retrieve all the information that I have lost.	<u>The protection product prevents any reason to repair it.</u>
Do you use electronic protection products? If yes, why?	I do, I have a phone case and it's because my phone is expensive and it's worth spending extra bucks to keep its lifespan longer. I am also clumsy so I need a case.	<u>The protection product serves as an immediate source of protection.</u>
What do you like about existing electronic protection products? What do you dislike?	I like how they do extend my product's lifespan, but I don't like how I need to buy a separate product to have protection. I feel like it needs to be built in and not an extra charge. Not only is it an economic expense, but it is also sad because as an environmentalist, our future is better if we reduce our consumption.	<u>The protection product is built in to the electronic device.</u> Reusability.
What issues do you consider when purchasing an electronic protection product?	As long as it does its job it's fine, and as long as it is affordable. I don't think about	The protection product does its job, is affordable, and has utilization.

	its issues, I just think about its potential utilization.	
What improvements would you make to electronic protection products?	As I mentioned before, I feel like it should just be built in. If I had to make an improvement, I would improve functionality, like how easy it is to put it on and take it off your phone.	The protection product is easy to put on and off your device.
How important is the reusability of an electronic protection product?	Very important because I don't want to buy something and then just toss it away after one use. That is a huge waste of money and it contributes to our waste streams.	The protection product is reusable.

Josh Bosung Kim, 21 years old, Biomedical Engineering Student, Casual electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	I'm more concerned with mechanical failure.	The protection product prevents the electronic device from breaking
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Cost to repair them	The protection product prevents the electronic device from breaking so you don't have to spend money repairing it
How do these problems occur? How do you avoid these problems?	Screen cracking. I use a screen protector and case. And I don't leave it in dangerous places	The protection product prevents screen cracking and the location is known at all times.
What are your next steps after breaking your device?	Find a way to repair or get a new phone	The protection product prevents any reason to repair/ replace
Can you show me how you store your phone, laptop, or tablet?	Usually just keep in my pocket or carry it around or leave it on my desk	The protection product feels comfortable in pockets or to carry

Do you use electronic protection products? If yes, why?	Yes I use a case and used to have a shield but it cracked. For my laptop, I have an electronic warranty. Why? serves as immediate protection if phone drops For laptop, future protection for any long-term problems	Protection product serves as an immediate and long-term source of protection. The protection product is scratch/ crack resistant
What do you like about existing electronic protection products? What do you dislike?	Likes: Screen protectors and aesthetic cases. Dislikes: Cases that make the original design of the phone look not too great Screen protectors breaks too easily	Protection product is sturdy and aesthetic
What issues do you consider when purchasing an electronic protection product?	Cost. It should look nice and be cheap	The protection product is affordable to purchase and has a nice design
What improvements would you make to electronic protection products?	Making it thinner and lighter. Lighter for sure and protects well	Protection product is light and thin.
How important is the reusability of an electronic protection product?	For me, I would prefer that but everyone now doesn't really care about that	Protection product can be reused for multiple devices
Extra question: Do you care about your case having any extra features like charging, card holder, gps stand	Yea, I think it would be cool if my phone has some type of magnet so it could go on a stand in my car and for a gps	Protection product can turn into a GPS stand

Alan Shan, 20 years old, Computer Engineering Student, Experienced electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Pretty important to keep it safe from hacking	Protection product prevents hackers from stealing information
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Not being able to use them for school and to communicate	Protection product prevents the electronic device from breaking

How do these problems occur? How do you avoid these problems?	Broke laptop once due to hitting it hard. Avoid? Be careful with them	Protection product protects the device enough to the point where you can be carefree with it
What are your next steps after breaking your device?	For phone, try to get it fixed somewhere. For laptop, dad took it to repair shop Desktop, faulty part so I sent it back to get a replacement part	Protection product prevents a device from breaking.
Can you show me how you store your phone, laptop, or tablet?	Leave on the desk at home, in pocket when walking, and in backpack during class	Protection product can be stored in multiple areas comfortably
Do you use electronic protection products? If yes, why?	I use a screen protector and case. Laptop in my backpack sleeve. Because I know I'll drop my phone occasionally so you have to keep it safe	Protection product protects screen and the phone itself from breaking <u>Protection product prevents the phone from dropping</u>
What do you like about existing electronic protection products? What do you dislike?	Likes: That they help and are not expensive. Have good reviews Dislikes: Expensive	Protection product is cheap and has good ratings
What issues do you consider when purchasing an electronic protection product?	Everything product is advertised as good but people's reviews are important	<u>Protection product has high ratings and good reviews from multiple people</u>
What improvements would you make to electronic protection products?	I don't know	Protection product feels like it's always been designed like that.
How important is the reusability of an electronic protection product?	The cost is not that significant compared to the phone/laptop so I don't mind paying for a new case	Protection product is cost effective

Brendyn Ikeda, 20 years old, Agricultural Business Student, Casual electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Fairly important. Travel with customer. Tries to buy case and screen protector.	The protection product is light and agile with user.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Replacement. Inconvenient. No insurance most of the time.	The protection product prevents the device from breaking.
How do these problems occur? How do you avoid these problems?	Deep in my pocket. Somewhere at all times. Buy Screen protector and Case for whole phone.	The protection product protects both body and screen of the device.
What are your next steps after breaking your device?	Contacting care provider. Sending to Apple. Try to fix on my own.	The protection product prevents device from breaking and is easy to repair.
Can you show me how you store your phone, laptop, or tablet?	Right hand, Right pocket.	The protection product is able to fit in pockets.
Do you use electronic protection products? If yes, why?	Yes. A screen protector accompanied with case.	The protection product protects screen and body of device.
What do you like about existing electronic protection products? What do you dislike?	Likes: It's durable. It feels good in my hands. Dislikes: Some cases were clunky and took away from having a mobile phone.	The protection product is durable and does not interfere with tasks.
What issues do you consider when purchasing an electronic protection product?	If it will get in the way of my experience with the device.	The protection product is affordable to purchase and has a nice design.
What improvements would you make to electronic protection products?	If it was ultralight and ultra thin that would be clutch.	The protection product is lightweight and adds little extra volume.
How important is the reusability of an electronic protection product?	That would cost less, right? Same case for different size iPhones would be cool.	The protection product is reusable and flexible to many shapes and sizes.

Extra question: Do you care about your case having any extra features like charging, card holder, gps stand	It would be pretty cool if it could stick anywhere. Like a magnet.	<u>The protection product is able to have magnetic qualities.</u>
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Joseph Paulo, 20 years old, Business Administration Student, Casual electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Very Important.	The protection product prevents serious damage to device.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Not being able to communicate with anyone.	The protection product prevents functions of device from being unusable.
How do these problems occur? How do you avoid these problems?	It got wet in the ocean. I threw it a wall once. Sand. Keep my phone on dry land and don't get angry.	The protection product is waterproof and sturdy.
What are your next steps after breaking your device?	Get a new one.	The protection product prevents the device from breaking entirely.
Can you show me how you store your phone, laptop, or tablet?	Right hand, Right pocket.	The protection product allows for easy storage motions.
Do you use electronic protection products? If yes, why?	Yes. Because I drop it a lot.	The protection product prevents damages from dropping.
What do you like about existing electronic protection products? What do you dislike?	Likes: Most of them can be waterproof and shock resistant. Sleek Dislikes: Overpriced for quality.	The protection product is sleek and efficient. The protection product is affordable.
What issues do you consider when purchasing an electronic protection product?	Price. Is expensive one worth it. Cost benefit analysis.	The protection product is worth the price of quality attained.
What improvements would	Stop using plastic packaging.	<u>The protection product is free</u>

you make to electronic protection products?	No plastic in products.	<u>of plastic.</u>
How important is the reusability of an electronic protection product?	I like getting different cases because looking at one over and over gets boring.	<u>The protection product is customizable.</u>
Extra question: Do you care about your case having any extra features like charging, card holder, gps stand	Charging, not bulky and waterproof.	The protection product is able to charge device. The protection product is thin and waterproof.

Rocio Soto, 45 years old, Production Manager, Heavy electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	It is important; I use my electronics for my job.	The protection product prevents the electronic device from breaking.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	The problems that I would face in my company is losing time to communicate, which translates to lots of money.	The protection product performs consistently well.
How do these problems occur? How do you avoid these problems?	Usually water or moisture at the packing machines where I work might spill out onto my electronics.	The protection product is water resistant.
What are your next steps after breaking your device?	The next steps after breaking my device is to call corporate to get it fixed or replaced.	The protection product prevents repair and replacement.
Can you show me how you store your phone, laptop, or tablet?	Of course, I put it in my briefcase that is provided by corporate. I wish they had a female's input when making these cases. Not everyone likes dark colors or bulky things.	The protection product is customized.
Do you use electronic protection products? If yes, why?	Yes, I do use protection products because I have to do it; it is the company's policy.	The protection product prevents the obligation to protect the device.

What do you like about existing electronic protection products? What do you dislike?	I like how my laptop case is functional because it fits my iPad and my cellphone at the same time. I dislike how it is not stylish at all.	The protection product is stylish .
What issues do you consider when purchasing an electronic protection product?	Quality of the product is essential.	The protection product is of high quality .
What improvements would you make to electronic protection products?	Some improvements I would make is to add more color and make it more appealing to the eye.	The protection product has an appealing design .
How important is the reusability of an electronic protection product?	I don't care much about reusability. It's a tool that I use for my job and I don't own it, so it doesn't matter to me.	The protection product has consumers engaged .
Extra question / additional comments that may be relevant.		

Connie Gonzalez, 39 years old, Director, Heavy electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Extremely important; my cell is like another part of my body. I can't let anything happen to my body parts.	The protection product has heavy-duty protection and military grade .
When you break an electronic device (phone, tablet, laptop), what problems do you face?	It is nerve-racking because I face downtime on productivity.	The protection product is reliable .
How do these problems occur? How do you avoid these problems?	Usually, when I am not careful, I drop my electronics. I think I need a reminder or a warning coming out from your protection device that your hand grip is not right or it is coming out of your pocket.	<u>The protection product has a sensor grip</u> .

What are your next steps after breaking your device?	Call my insurance to get it fixed or replaced.	The protection product prevents any need for replacement.
Can you show me how you store your phone, laptop, or tablet?	I put my phone in my back pocket, my laptop in its carry-on case, and my tablet with its protective case inside my briefcase.	The protection product protects a cell phone, laptop, and tablet all at the same time.
Do you use electronic protection products? If yes, why?	Yes, I do. I need my work tools to stay safe just like I told you. My electronics are part of my body. I can't function without these for work and everyday life.	The protection product is durable.
What do you like about existing electronic protection products? What do you dislike?	I dislike the range of pricing. I don't like the false advertising.	The protection product has honest advertising.
What issues do you consider when purchasing an electronic protection product?	I consider how much it costs, what other people say about the product, and how it looks.	The protection product is durable, not very costly, and aesthetically pleasing.
What improvements would you make to electronic protection products?	I would make them more functional. I would like to have my protective gear like my cell phone case to also hold more than a few credit cards, my house keys, etc.	The protection product is a multipurpose device.
How important is the reusability of an electronic protection product?	Reusability is very important for the environment. I think there should be a program where users send back their cell phone or laptop cases and get a discount for a new one. Maybe even get one replaced for a lower cost.	The protection product comes with a program where users send it back and get discounts.
Extra question / additional comments that may be relevant.		

Isabel Ramirez, 55 years old, works in a restaurant, Casual/light electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	Very important. My cellphone is where I have all the contact information of all my family.	The protection product prevents the device from breaking.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Normally, I ask one of my sons to take a look at it and see if we can repair it.	The protection product prevents the need to repair it.
How do these problems occur? How do you avoid these problems?	I always try to keep my cell phone in my purse.	The protection product prevents the screen from cracking.
What are your next steps after breaking your device?	If one of my sons cannot repair the phone, we go to the store and get a new one. I ask the representative of the store to transfer all my contact info.	The protection product prevents any need for replacement.
Can you show me how you store your phone, laptop, or tablet?	Yes, I just drop it in my purse.	The protection product is scratch resistant.
Do you use electronic protection products? If yes, why?	Yes, I have this plastic case that was given to me as a present.	The protection product prevents the device from breaking.
What do you like about existing electronic protection products? What do you dislike?	I really don't know much about protection products. As I said, my son does all that for me. I really do not like that my screen is scratched up and the case is too bulky.	The protection product is not bulky.
What issues do you consider when purchasing an electronic protection product?	The issues I consider is the cost and the time it will take my son to finally help me buy it.	The protection product is affordable and is easy to purchase by a senior citizen.
What improvements would you make to electronic protection products?	I would like the case and the screen scratch protection to both be sold in a package together.	The protection product is a multipack protection gear.

How important is the reusability of an electronic protection product?	Reusability is important because I am on a fixed income.	The protection product is not costly.
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Fabian Quintero, 18 years old, High School Student, Casual electronics device user

Question/ Prompt	Customer Statement	Interpreted Need
How important is it to keep your electronic device safe? Free of serious damage?	A lot. I want to take care of my devices as much as I can to avoid performance issues.	The protection product prevents the device from experiencing a lack of performance.
When you break an electronic device (phone, tablet, laptop), what problems do you face?	Well, going to a shop to fix it is a hassle and getting a brand new one is expensive.	The protection product is convenient. The protection product is affordable.
How do these problems occur? How do you avoid these problems?	If I'm careless with it. It's usually when I leave somewhere where it shouldn't be. I try to keep it off the ground and protected from anything falling.	The protection product prevents the device from breaking or falling.
What are your next steps after breaking your device?	Going to a shop or store to see if I could fix the device or whether I have to replace it.	The protection product prevents the need for replacing the device.
Can you show me how you store your phone, laptop, or tablet?	Phone: Right Hand. Right Pocket. Clutches tightly. Laptop: Places in backpack carefully, slowly.	The protection product is scratch resistant.
Do you use electronic protection products? If yes, why?	Yes I do. Protecting them keeps them in better condition.	The protection product is durable.
What do you like about existing electronic protection products? What do you dislike?	Existing ones are sometimes sleek and simple. But most of them are bulky.	The protection product is lightweight and minimal.
What issues do you consider when purchasing an electronic protection product?	Just price and if the quality is good.	The protection product is affordable and good quality.

What improvements would you make to electronic protection products?	I guess just try to blend them in. If they interfered less with how the device is already that would be cool.	The protection product does not interfere with the use of the device.
How important is the reusability of an electronic protection product?	That would be good honestly. Everything is just a different size all the time.	The protection product is universal.
Extra question / additional comments that may be relevant.		

Needs Hierarchy:

We created a hierarchical list of primary and secondary customer needs for our protection product. The * is used to denote relative importance based on customer interviews and surveys and the ! is used for hidden/latent needs.

***** **The protection product prevents the electronic device from breaking.**

***** The protection product prevents any reason to repair/ replace

** The protection product needs to be water resistant

***** The protection product prevents the device from getting scratched

***** The protection products is sturdy/ long lasting/ durable

* The protection product keeps your components and software working

! The protection product keeps all the information in the electronic device secure.

! The protection product prevents hackers from stealing information

! The protection product prevents the phone from dropping

*** **The protection product feels comfortable in pockets or to carry**

***** The protection product is thin and lightweight

*** The protection product has natural feel to it and fluid design

! The protection product is built in to the electronic device.

***** **The protection product is affordable**

***** **The protection product is aesthetic**

! The protection product is customizable

***** **The protection product is reusable**

! The protection product is free of plastic.

! The protection product's location is known at all times

! The protection product has high ratings and good reviews from multiple people

! The protection product can turn into a GPS stand

! The protection product has a sensor grip

Relative Importance of Needs Based on Customer Surveys

Electronic Device Survey:

We had 37 people take the following survey. Of the 33 people, 45% were female, and 62% were male, between the ages of 18-25.

For each of the following electronic protection devices features, please indicate on a scale of 1 to 5 how important the feature is to you. Please use the following scale:

1. Feature is undesirable. I would not consider a product with this feature.
2. Feature is not important, but I would not mind having it.
3. Feature would be nice to have, but is not necessary.
4. Feature is highly desirable, but I would consider a product without it.
5. Feature is critical. I would not consider a product without this feature.

Also indicate by checking the box to the right if you feel that the feature is unique, exciting, and/or unexpected.

Importance of feature
on a scale of 1 to 5

Check box if feature is unique,
exciting, and/or unexpected.

- | | |
|---|--------------------------|
| _____ The product prevents the
electronic device from breaking | <input type="checkbox"/> |
| _____ The product feels comfortable
in pocket or to carry | <input type="checkbox"/> |
| _____ The product is affordable | <input type="checkbox"/> |
| _____ The product is aesthetic | <input type="checkbox"/> |
| _____ The product is reusable | <input type="checkbox"/> |
| _____ The product is thin and lightweight | <input type="checkbox"/> |
| _____ The product is sturdy/ long lasting/ durable | <input type="checkbox"/> |

- _____ The protection product prevents hackers from stealing information
- _____ The protection product is customizable

Top Product Features:

1. Comfortable
2. Affordable
3. Sturdy/Durable
4. Identity Theft Proof
5. Eco-Friendly

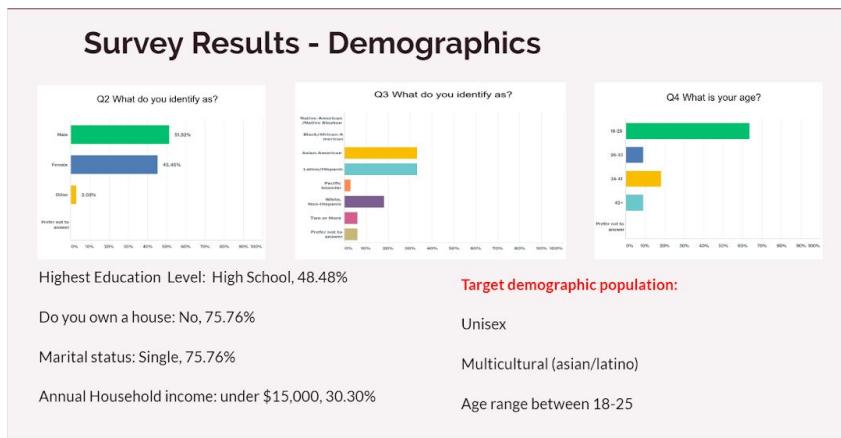


Figure 15: Survey Results - Demographics

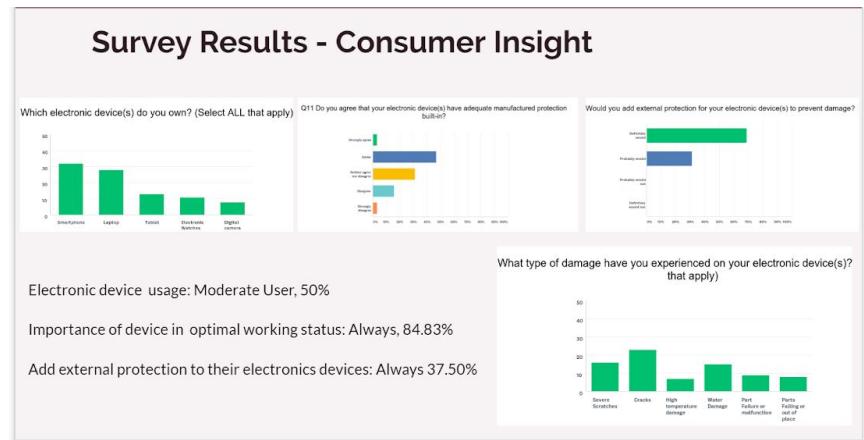


Figure 16: Survey Results - Consumer Insight

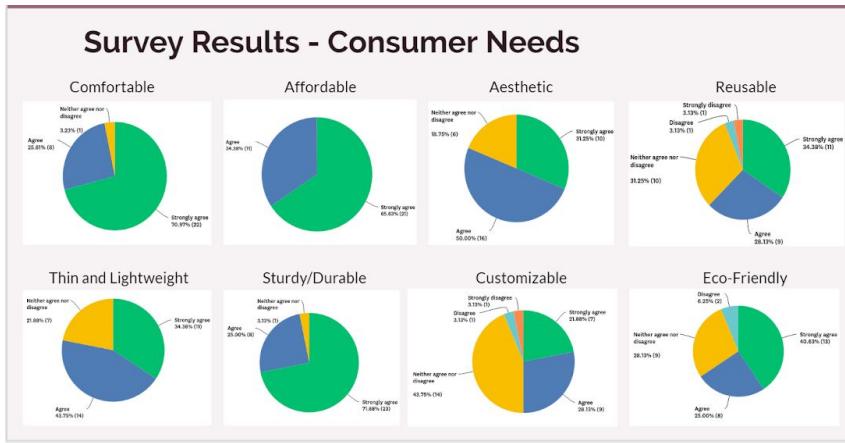
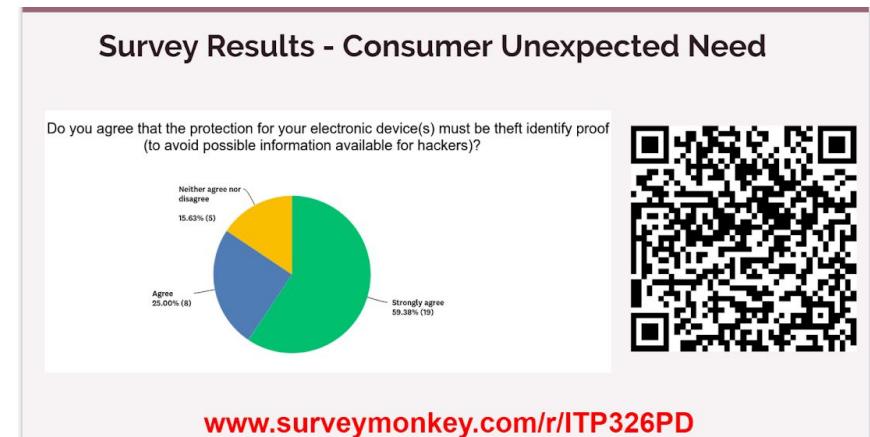


Figure 17: Survey Results - Consumer Needs



Reflection on the Results and the Process:

We interviewed a variety of people so that we would be able to know who our key customers are. Because our target market are electronic device users, we asked users to show us how they handled their devices. Observing potential product users performing tasks of what they currently do with their phones, laptops, and tablets was very useful to us. Hearing their feedback from our survey helped us identify the needs we must satisfy when creating our high quality product. Through customer interviews and collecting survey data, our team was able to discover both critical and latent needs for an electronic protection product device. From the interviews, we identified the five needs our product needs to address: comfortability, affordability, durability, software securitability, and sustainability. We are hoping to incorporate all of the customer's needs into the next stages of product development.

D. Concept Development

The concept development process begins with a set of customer needs. Based on our previous exercise, our product concepts would address our finalized list of needs which include comfortability, affordability, durability, software securitability, and sustainability. Our team engaged in a 5-step method process to generate a variety of different products. The 5-step concept generation method includes clarifying the problem, external search, internal search, systematic exploration, and reflection on the solutions and the process. We decided to focus in on the phone and discover solutions to protecting it. Through this approach, our team has 10 product concepts to select from for further development.

Mission Statement:

Product Description	<ul style="list-style-type: none">• A universal product that protects devices such as smartphones, laptops, and tablets
Benefit Proposition	<ul style="list-style-type: none">• Product owners will prevent their devices from breaking and thus saves money, time, and provides peace of mind
Key Business Goals	<ul style="list-style-type: none">• One of our goals is to complete the product's design by June 2019.• We will focus on keeping the product's price at an affordable level, while also keeping the product's quality of high level.
Primary Market	<ul style="list-style-type: none">• Owners of laptops, smartphones, tablets
Secondary Markets	<ul style="list-style-type: none">• Students• Professionals
Assumptions and Constraints	<ul style="list-style-type: none">• New product platform• Universal design
Stakeholders	<ul style="list-style-type: none">• Customer• Design team• Investors• Distributors• Retailers

Table 2: Mission Statement Table

5-Step Concept Generation Method:

We started with our problem, which is an unprotected electronic device, and built ideas from there. From this, we started breaking down the main problems by function and user action, researching existing products, and brainstorming our own products whether they were feasible or not.

1. Problem Analysis:

The first step of the concept generation method is to clarify and define our problem. We engaged in problem decomposition to focus on critical sub-problems.

A) Problem Decomposition By Key Functions (Functional):

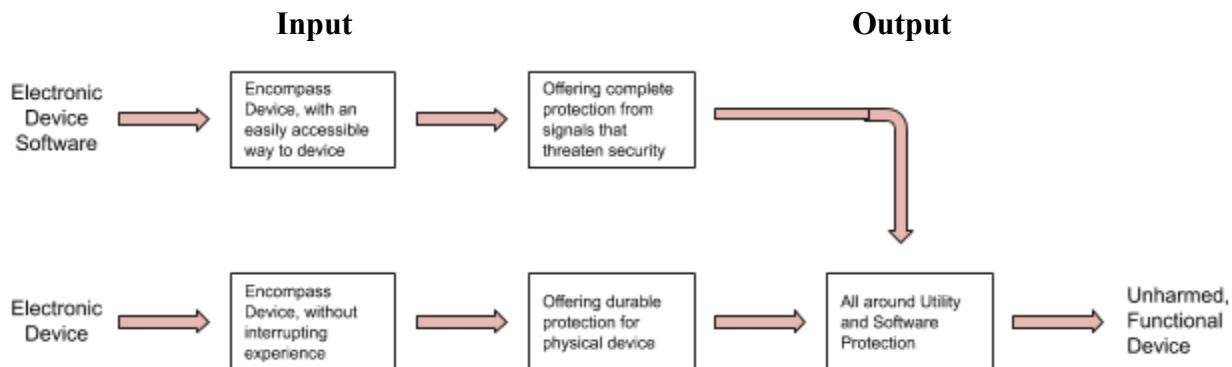


Figure 19: Problem Decomposition by Key Functions Diagram

B) Problem Decomposition By Key User Actions (Tasks)

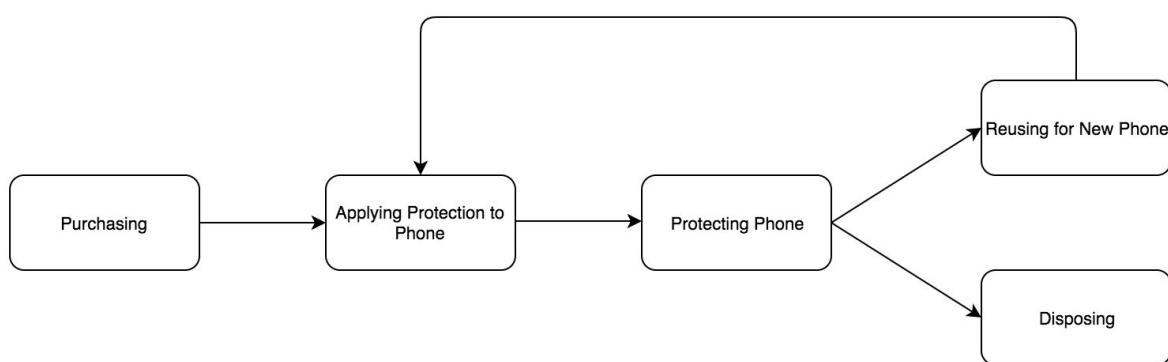


Figure 20: Problem Decomposition by Key User Actions

C) Problem Decomposition By Key Customer Needs (Need):

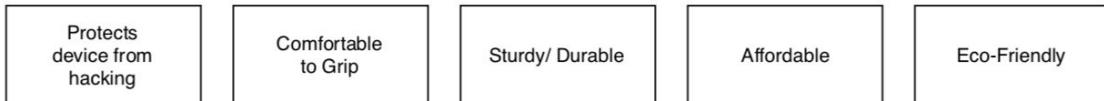


Figure 21: Problem Decomposition by Key Customer Needs

2. External Search:

We did extensive research so that we would be able to get inspiration for our product. Being able to identify existing products and potential competitors became very useful to us. Because of this knowledge, we could either build off of their product and fix an aspect of it to make it better, or use an aspect of it in our product. Not only that, we researched patents in order to not violate existing product feature ideas.

Existing and Inspiration Products:

During this section, our team explores a variety of different products that serve as inspiration for our concept development process. The products that inspired us were found online and in movies.

ART ELECTS Carbon Fiber Phone case for S9 Plus: Sturdy Durable Case, a soft 3D-grip touch, Snap-on, Scratch Resistant Back Cover



Figure 22: Carbon Fiber Phone Case

Galaxy Popsocket: Makes expanding phone grips and mounts. Use them for holding your phone, propping, cord management, and is aesthetically pleasing. The Popsocket can help prevent phones from breaking by providing users with a secure grip so their phone doesn't fall.



Figure 23: Galaxy Popsocket

PHOOZY Apollo XL Insulated Phone Pouch Apollo Silver: can be taken on extreme adventures with its thermal capsule; flotation capability keeps it visible in the water; penetration layer provides insulation and extra protection.



Figure 24: Insulated Phone Pouch

Pela Case: Eco-friendly, durable, compostable, sustainable, soft, and flexible case.



Figure 25: Eco-friendly Pela Case

Smartphone Wallet: custom adhesive cell phone wallet; flexible soft silicone; capable of holding 2-3 cards; easy access scooped front pocket; custom business logo imprinting



Figure 26: Smartphone wallet attachment

GoDark Faraday Bags: stops hacking and location tracking of your cell phone and tablet



Figure 27: GoDark Faraday Bag

Iron Man 2 transparent phone:



Figure 28: Transparent phone from Iron Man 2

3. Internal Search:

Our internal search consisted of brainstorming product concepts on our own as well as in a group. We had a group discussion to find the problem and frame the solutions. Afterwards, we followed the seven brainstorming rules which includes the following: stay focused on the topic, be visual (use sketches and prototypes), welcome wild ideas, go for quantity, build on other's ideas, defer judgment on ideas, and one conversation at a time. Using the IDEO cards to brainstorm helped us generate more inspiration as well.

1. Identity theft protective case: protects phone from being hacked by its Faraday cover and is also able to store credit cards and IDs.
 - a. Analogies: like a safe
 - b. I wish and I wonder statements: I wish we could prevent our phones from being hacked completely. I wonder how that would work.
 - c. Use related stimuli: GoDark Faraday bags

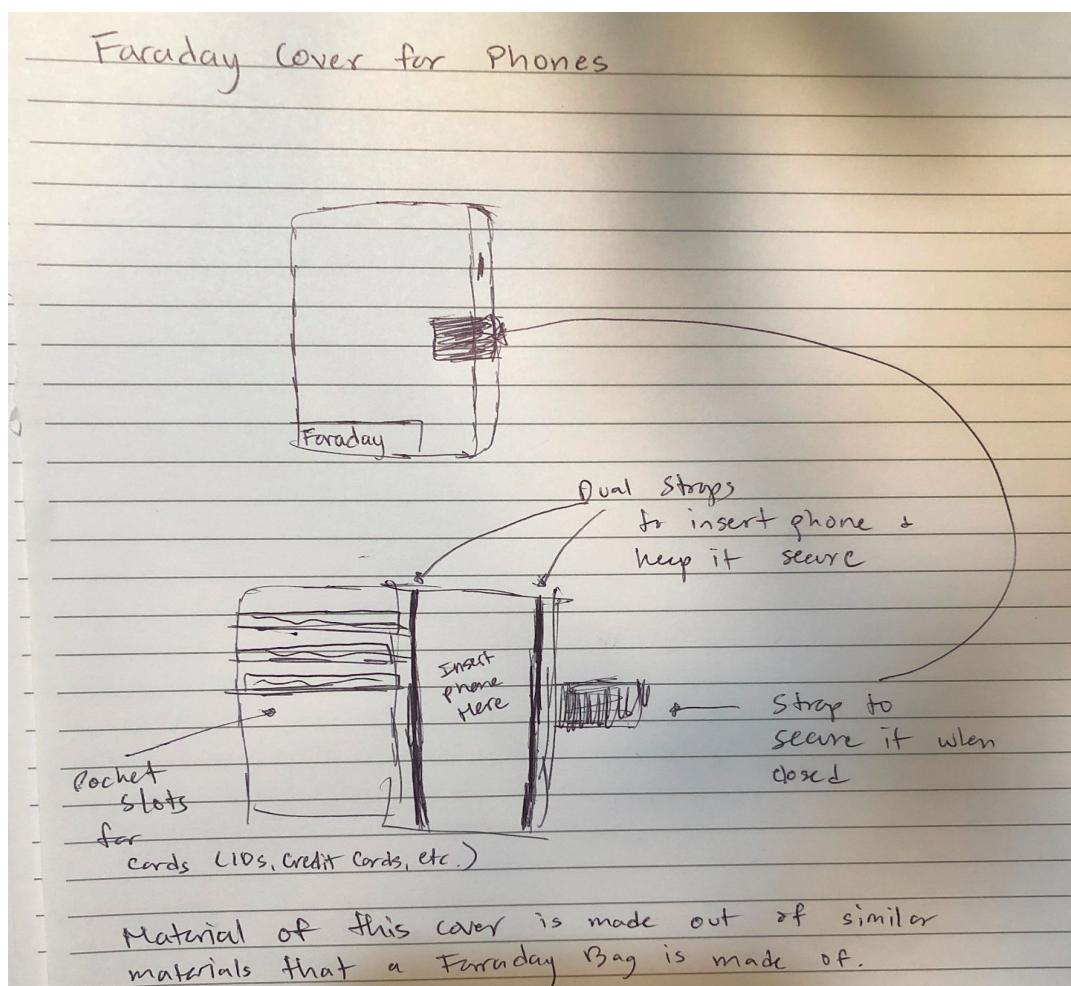


Figure 29: Faraday Cover Phone Case

2. Carbon Fiber x Aluminum Case: inside rubber edges for shock absorption; aluminum interior case for software security; carbon fiber exterior for a smooth, lightweight, and durable finish.

- a. Analogies: like Captain America's shield
- b. I wish and I wonder statements: I wonder if the material in this product will completely protect the phone.
- c. Use related stimuli: ART ELECTS Carbon Fiber Phone case for S9 Plus

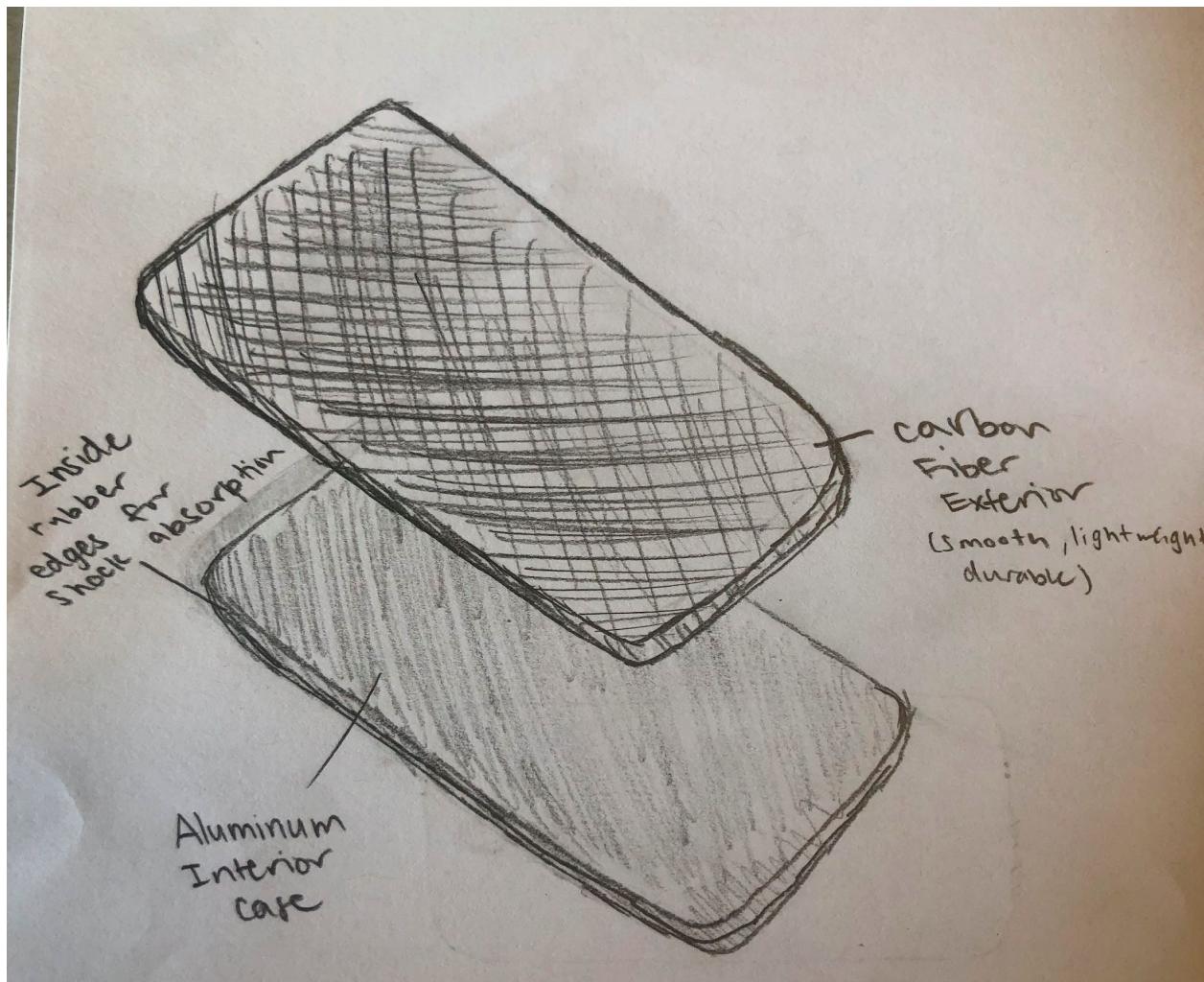


Figure 30: Carbon Fiber x Aluminum Case

3. Universal Case: Protection case that can fit a multitude of devices. Will be able to conform to the shape of any specific electronic device.

- a. Analogies: like a glove that can fit everyone; like a plastic.
- b. I wish and I wonder statements: I wonder if I could use the same case for every phone I buy.
- c. Use related stimuli: *Iron Man 2* transparent phone

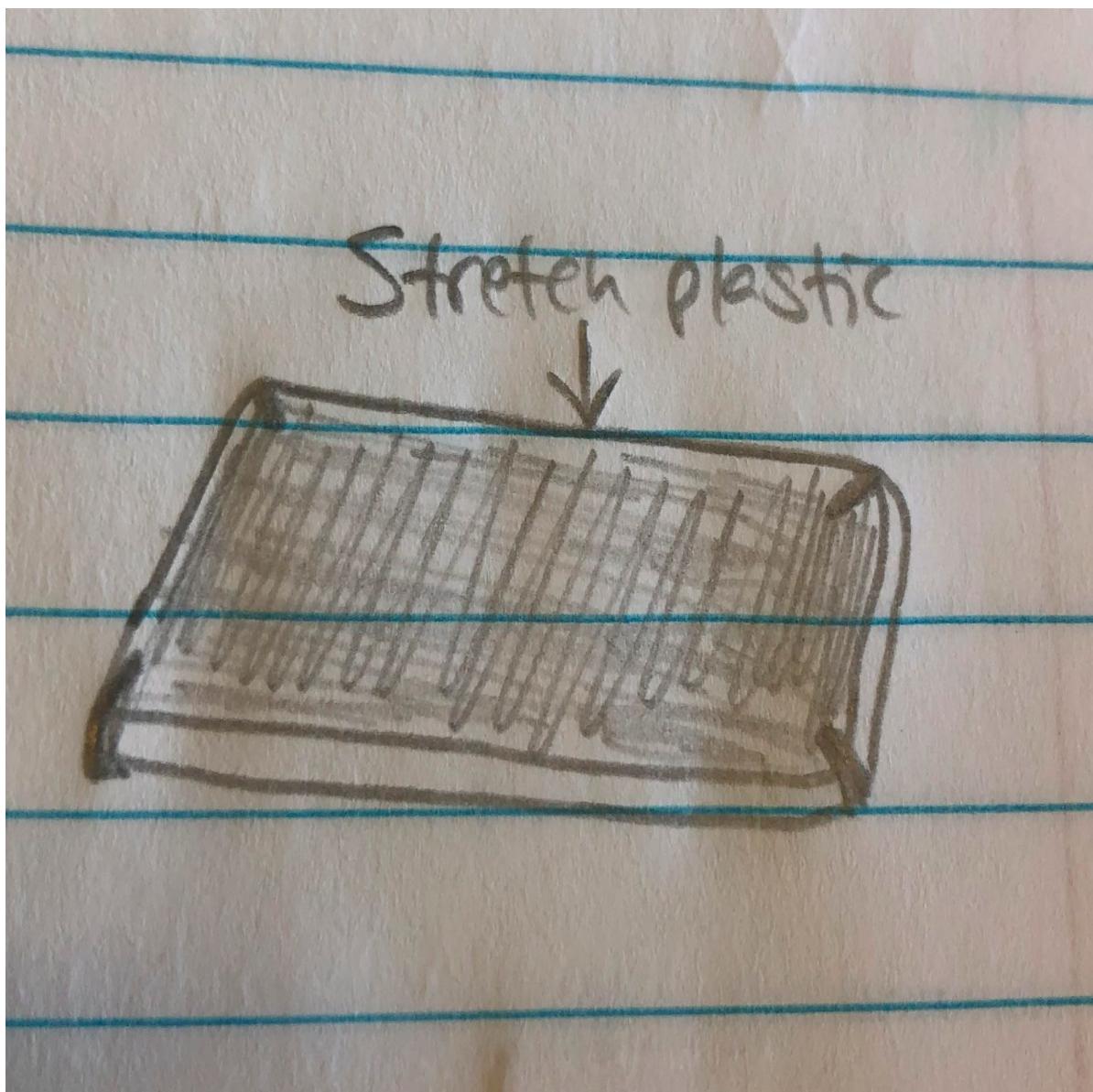


Figure 31: Stretchy Universal Case

4. Chainlink Case: Protection product that is able to expand to the size of many different devices, while offering the software protection that comes from aluminum.

- a. Analogies: like a fence; like chains.
- b. I wish and I wonder statements: I wonder if I could use the same case for every phone I buy, as well as protect my cellular device from being hacked. Likewise, I wish the aluminum won't break once it expands.
- c. Use related stimuli: Fence protection

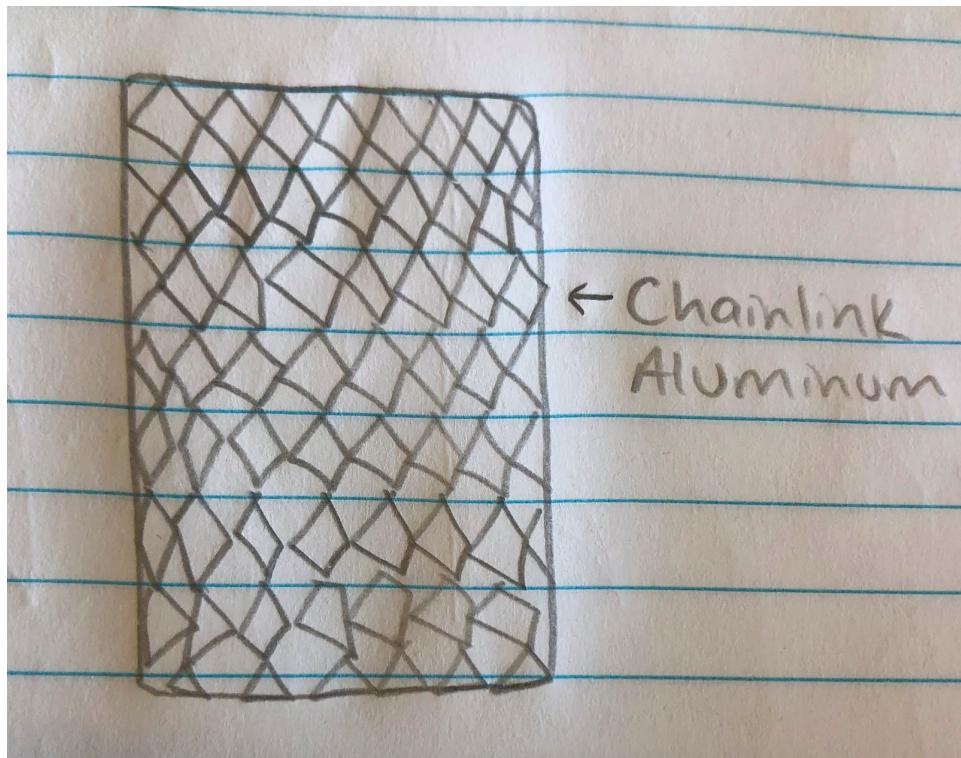


Figure 32: Aluminum Chainlink Case

5. Tarantula 360° Protection: Case that is able to latch onto the sides of electronic devices, making itself able to fit many sizes.

- a. Analogies: like a spider; how mountain spider curls up and protects itself.
- b. I wish and I wonder statements: I wonder if the material for this product will be durable enough. I wish it wouldn't break.
- c. Use related stimuli: Galaxy Popsocket

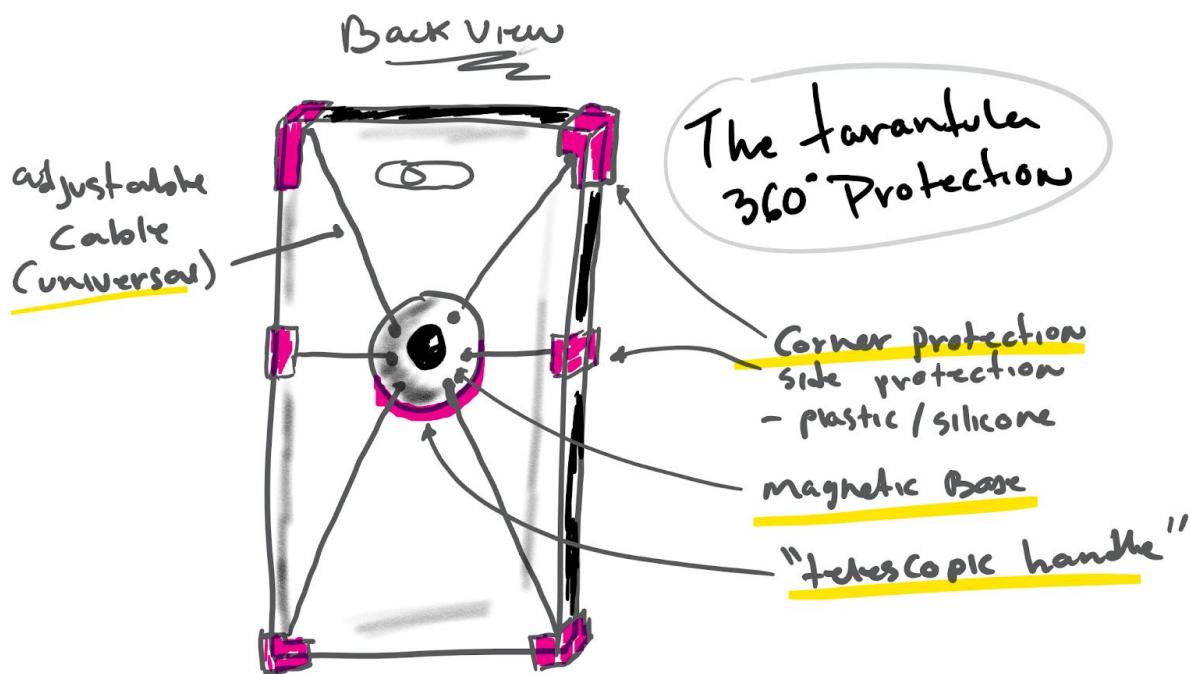


Figure 33: Tarantula 360° Protection

6. Origami Case: Protection product that has a flat pinwheel design on the back of a hard cover.

The pinwheel can be folded into a grip

- a. Analogies: like an origami
- b. I wish and I wonder statements: I wonder if popsockets will be able to lie completely flat.
- c. Use related stimuli: Galaxy Popsocket

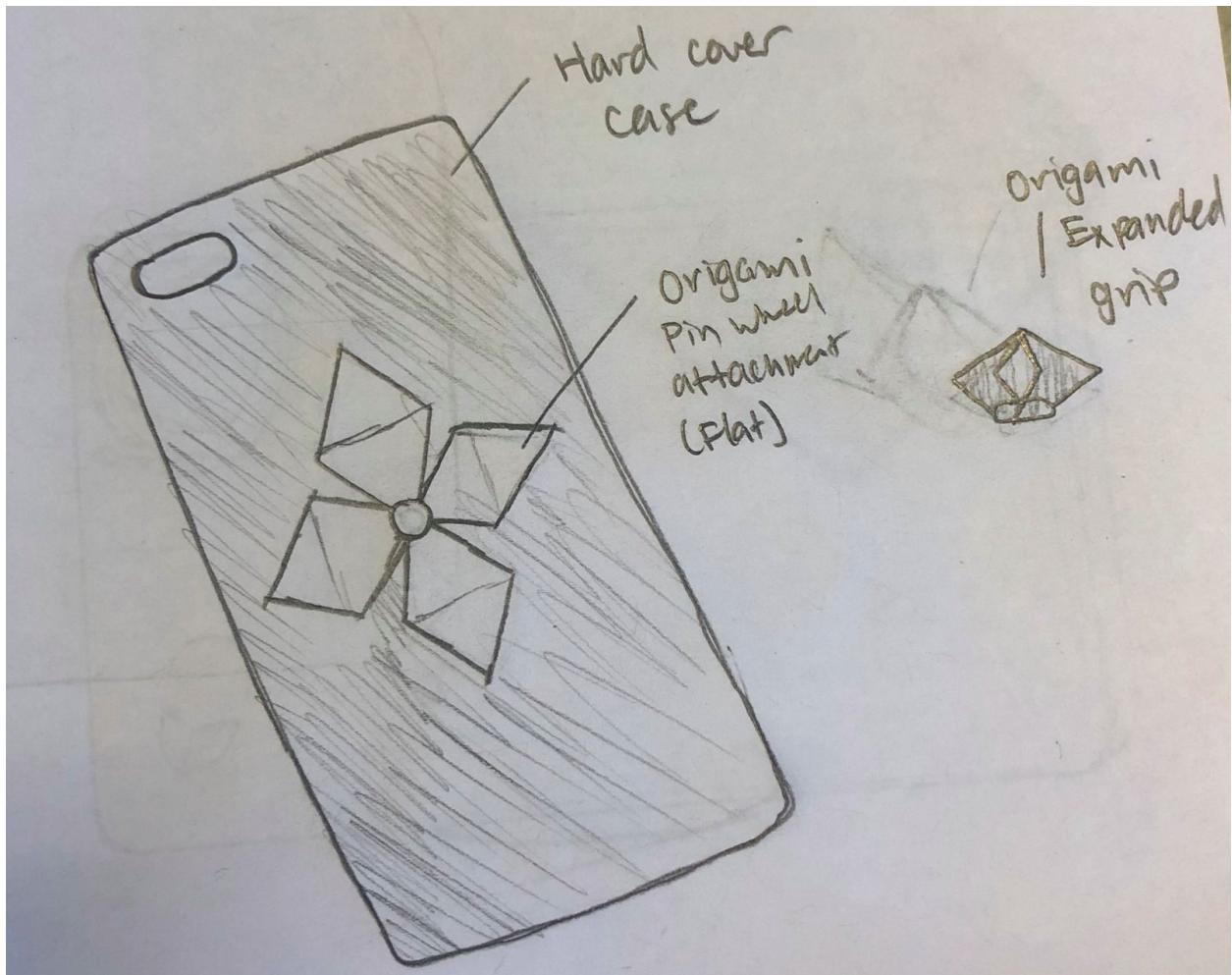


Figure 34: Pinwheel Origami Case

4. Systematic Exploration:

Our team used the concept classification tree as well as the concept combination table to organize and synthesize our ideas.

Concept Classification Tree

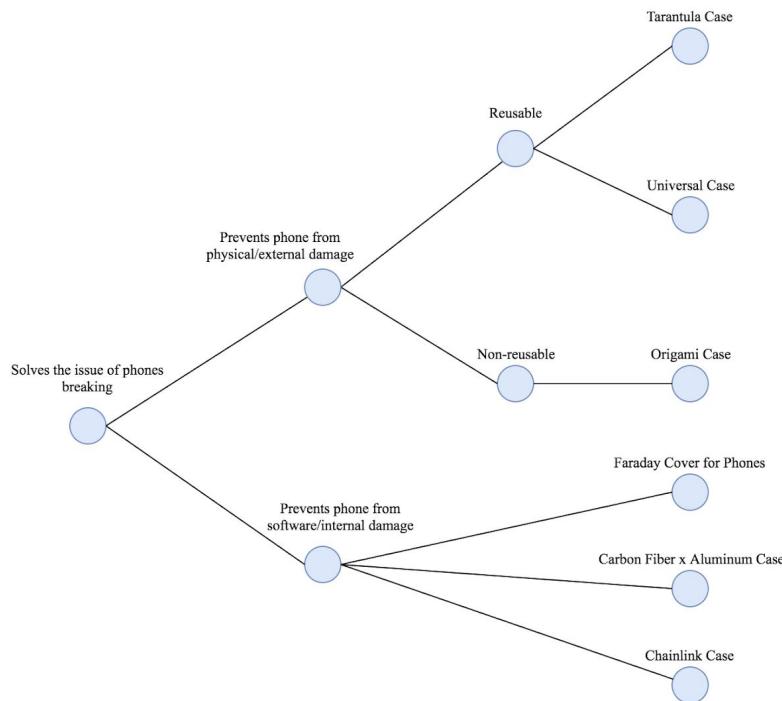


Figure 35: Concept Classification Tree

Concept Combination Table of Electronic Device Protection		
Requirements	Responsive Design	Prevention of Damages
Comfortable	Physical/ Hardware	Drop Height Physics
Affordable		Water/Relative Humidity
Sturdy/Durable	Material	Heat/cold
Identity Theft Proof	Software/Program	Sustainability
Eco-Friendly		Cyber Attack

Table 3: Concept Combination Table of Electronic Device Protection

5. Reflection on the Solutions and the Process

The process of creating solutions to our needs started out tough. With 5 needs, we needed to narrow down our priorities for our product to at least 2. Towards the middle of our solution generation process we started to focus our attention software protection. This latent need became a key quality in our concept sketches as we included some other needs such as universality of the product and durable design. Making a latent need such as anti-hacking a key approach proved to be a challenge. As we created our sketches we found a few ways to incorporate the different needs. Our first sketch is like a wallet-phone case that has a aluminum shield for the extra software protection. This allows for anti-hacking material to be present with the allowance of wifi and cellular signals. Our second concept is a more durable version including carbon fiber and aluminum. The third and fourth sketches saw the melding of universality and software protection. Our fifth sketch ditches the idea of an anti-hack case and gears towards a sturdy and lightweight needs. Our final sketch focuses on a smooth and lightweight surface case with a foldable grip. We then took our concepts and organized them into a concept classification tree and concept combination table.

E. Industrial Design

Product Architecture:

Our product will be comprised of 4 parts total:

1. Interior hard shell
2. Waxed Cotton Exterior
3. Aluminum cover
4. Waxed Cotton Sleeves

Design Language:

Our product will have a professional look, since we want it to appeal to a wide audience. Our audience includes professionals in the workforce, students, new cellular device users, casual cellular device users, as well as experienced cellular device users. Professionals would want to have a more sleek design, whereas new cellular device users would prefer a simple design. So in general, we want to create a sleek and simple design that protects our users mobile device internally and externally. Additionally, we plan to offer our product in a range of colors in order to accommodate people with different preferences for a cellular protection product.

Ergonomics and usability:

Our product will take into account several ergonomic design features to ensure that our customers have the optimal interaction and usability with their mobile devices. One part of our product that reflects ergonomic considerations is the grip. We want to prevent mobile devices from falling out of our customers hand and so we want to create a product that fits well in people's hands. Another ergonomic consideration is keeping the device lightweight. Most people carry their phones with them at all times and so creating a lightweight protection product will satisfy a highly valued customer need. The smoothness of the product is also an ergonomic consideration. Since most people store their phones in their pocket, having a smooth surface will allow people to take out and store their phones with ease. Overall, we want to create a product that allows for efficient use of the mobile device it's protecting.

Sustainability:

In order to make our product environmentally friendly, we are planning on using aluminum as the main material of our product. We were inspired by the GoDark Faraday Bags where it stops hacking and location tracking of your cell phone, just as how aluminum can stop hacking and location tracking on a cellular device as well.

Manufacturability:

The product will be fabricated through different processes. The first layer of protective material will be made of optically clear polycarbonate (PC) and flexible thermoplastic polyurethane (TPU) material, so the case fits right over the buttons for easy use, and tailored to fit the device. The second layer of protection will be made of aluminum. The aluminum will be heat sealed into the first layer. The aluminum layer will also encompass the entirety of the device. The third layer of the product will be made of waxed cotton that masks the aluminum and will include slots for cards on the inside portion of the case.

Intellectual property:

A patent gives people the right to stop others from copying, manufacturing, selling, or importing inventions without permission. In this case, our team strongly believes that we will need a team of professionals to patent our product before the manufacturing process. Therefore, our team has decided to hire the Invents Company, LLC that will take care of patenting Alluminate. The patent application filing fee for a basic utility patent is \$330, in addition to a \$540 utility patent search fee, \$220 examination fee, and patent maintenance fees of \$980 after three years.

Final Product Concept:

Ideally, we would want our product to be designed the way that it is shown in the SolidWorks renderings below. The drawings below show how our product would look in the closed position, as well as the different components and materials that would go into manufacturing the product.

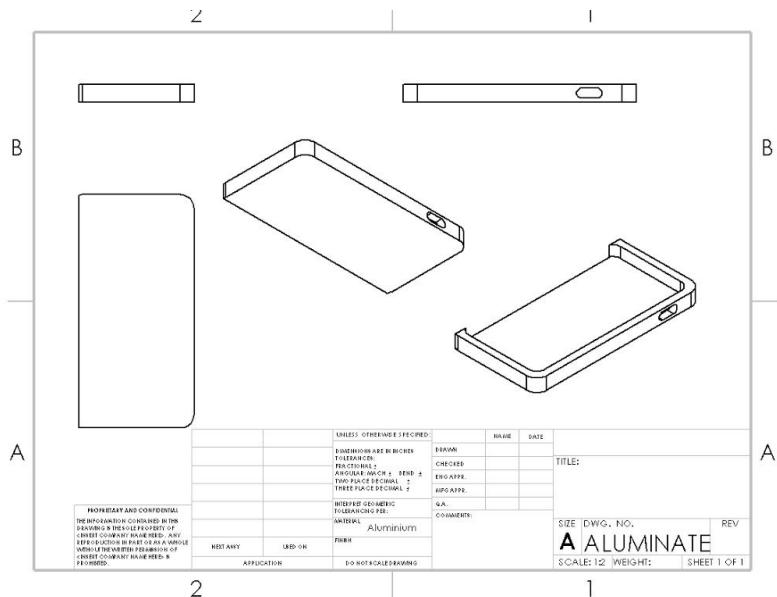


Figure 36: Solidworks drawing of the Faraday Case Prototype 3.0 - Lower part

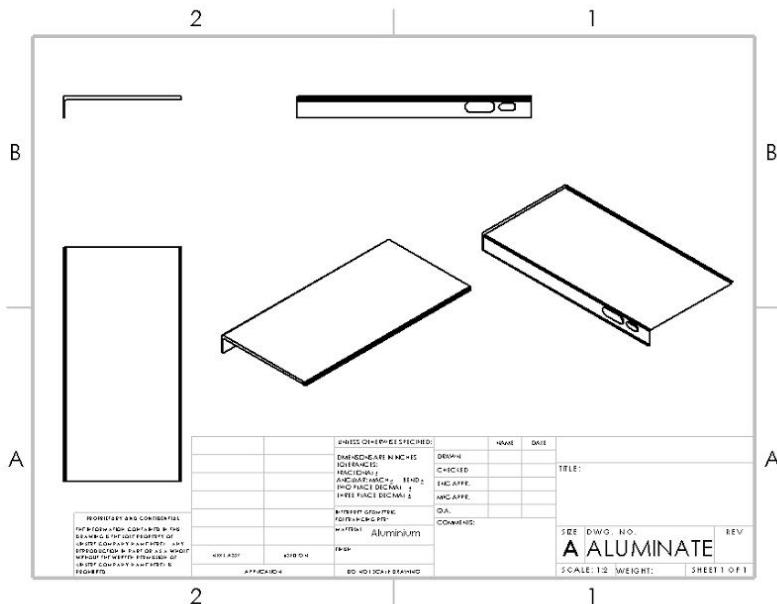


Figure 37: Solidworks drawing of the Faraday Case Prototype 3.0 - Upper part

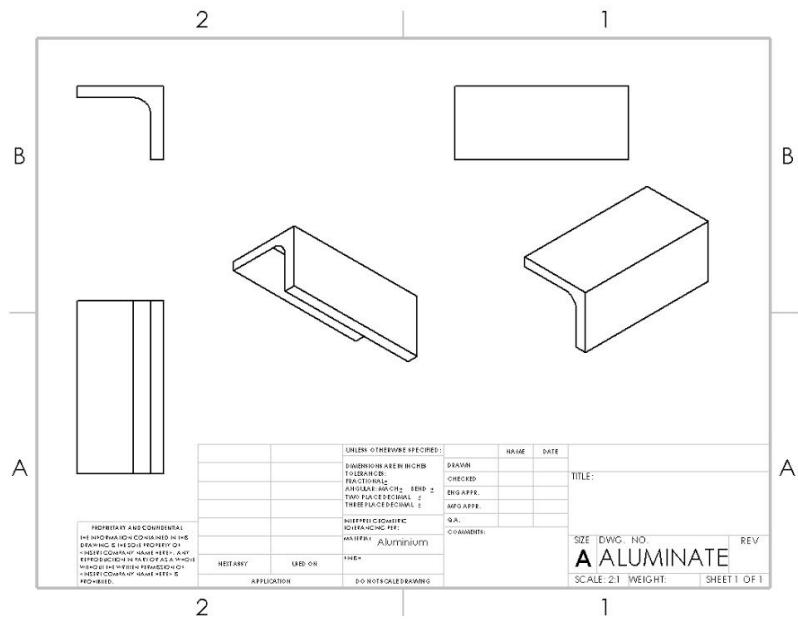


Figure 38: Solidworks drawing of the Faraday Case Prototype 3.0 - Locking mechanism

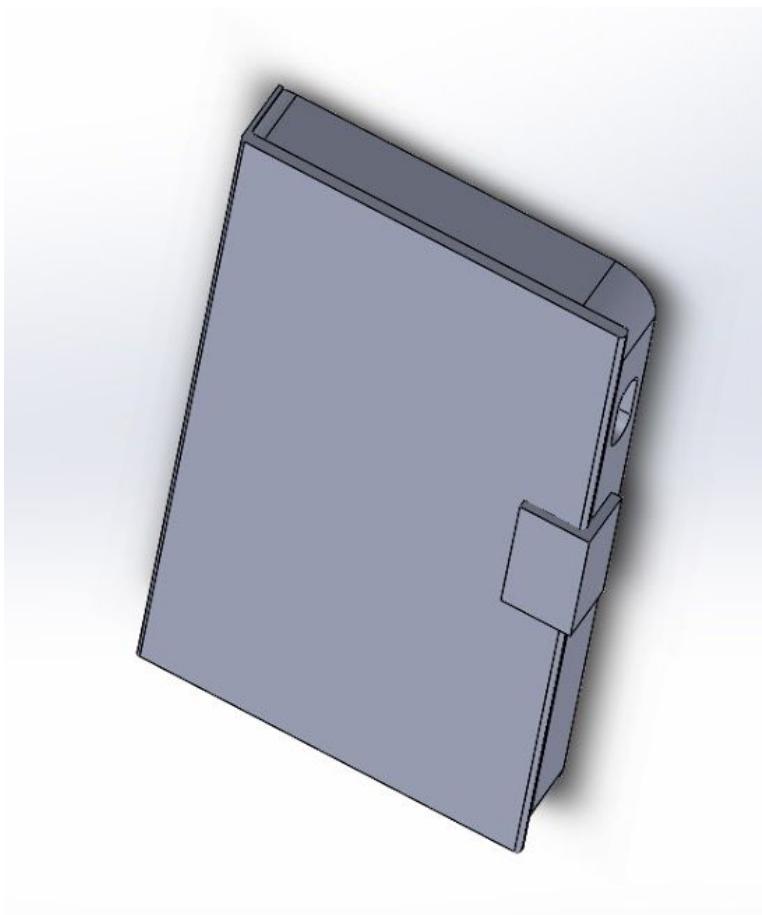


Figure 39: Solidworks Assembly of the Faraday Case Prototype 3.0

F. Prototyping

With product concepts in mind, our team engaged in prototyping to turn concepts into physical representations. We had access to several different types of tools and materials and as a result, we created four different prototypes that address our customer needs. The following pictures are our team's prototypes:

Prototype 1: Origami Grip

This first prototype focuses on how to prevent a phone from falling out of someone's hand, and thus preventing the phone from breaking. The origami grip taught us that we want to create a product that is lightweight and provides a sufficient grip.

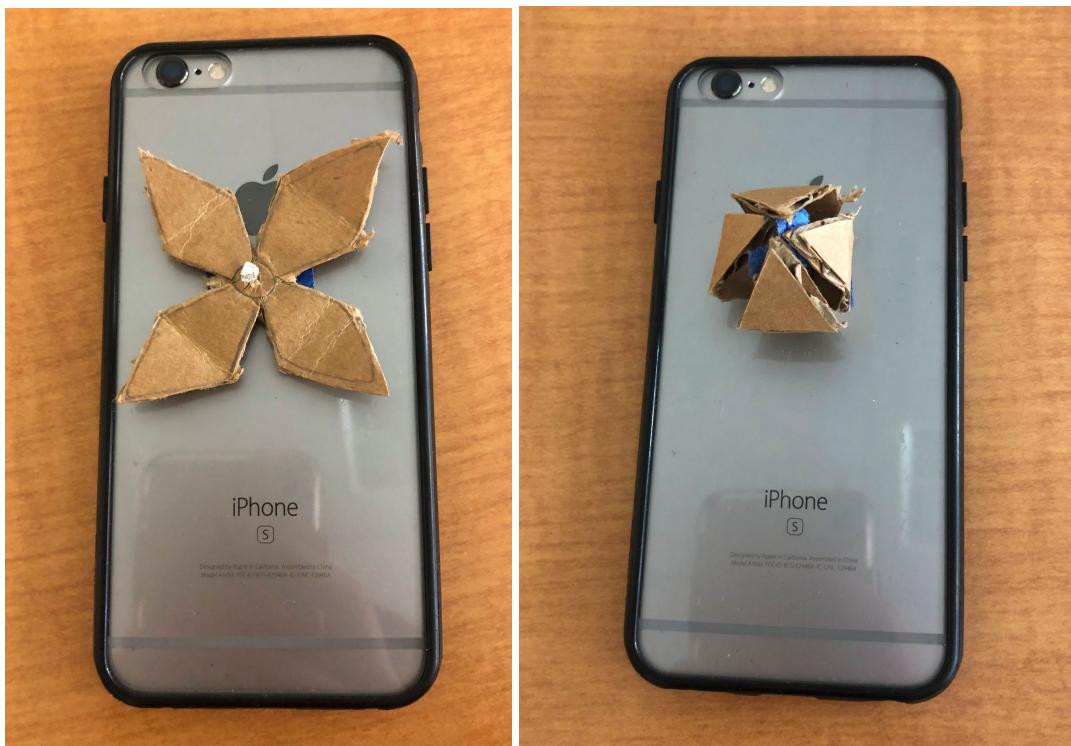


Figure 36-37: Origami grip prototype

Prototype 2: The Tarantula Case

This second prototype incorporates a grip and emphasizes the need for a lightweight case by using minimal material to provide protection. The Tarantula Case uses wires that extend from the base grip that can attach to the corners and edges of a phone for protection. Also, because the wires are adjustable, it can be used for multiple mobile devices. This product taught us the value of having a product that not only prevents the phone from falling but also provides sufficient protection if it does fall.

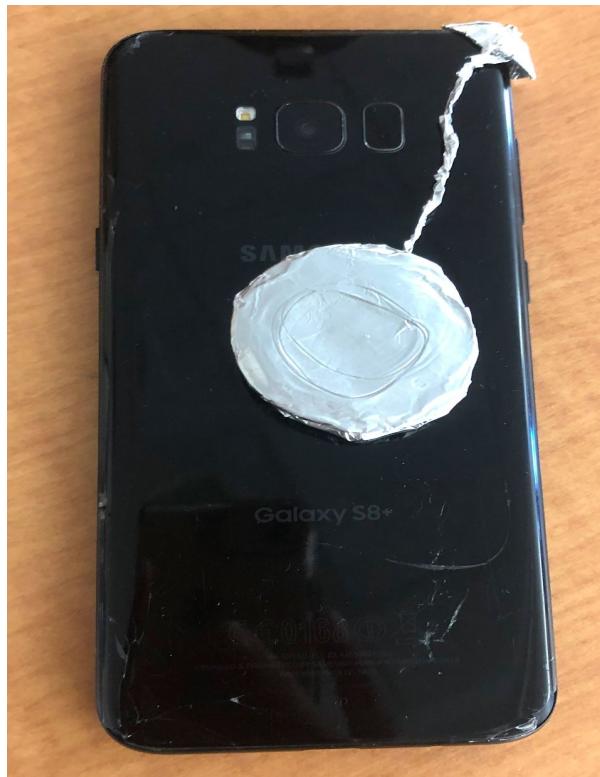


Figure 38: Tarantula Case Prototype

Prototype 3: “Take-Form” Case

This prototype was made to convey the idea of a case that is able to adjust to various phone sizes, and more ambitiously, tablet and laptop sizes.. The product would be made of a stretching material that is able to be manipulated to protect different electronic devices. The “Take-Form” Case taught us that we want to create a product that is sustainable, reusable and universal.



Figure 39-40: Universal Case Prototype

Prototype 4A: The Faraday Case

The faraday case was created to address both the physical protection and the internal software of mobile devices. By creating an aluminum case that surrounds the phone, hackers will be unable to access any data on the mobile device. Also, the case will have a sturdy base and soft exterior and this will provide sufficient protection for the phone inside. From this prototype, we learned that our team wants to continue with developing the idea of providing both external and internal phone protection.



Figure 41-42: Faraday Case Prototype 1.0

Prototype 4B: The Faraday Case 2.0

The faraday case 2.0 adds additional features such as sleeves for credit cards and a latch that will keep the case closed. So not only will the case act as a phone protector but also keeps your cards organized and safe.



Figure 43-44: Faraday Case Prototype 2.0

Final Prototype

For our final prototype, we decided to improve Prototype 4B: Faraday Case Prototype 2.0. We decided to improve it by 3D Printing our model. Like Prototype 4B, our final prototype adds additional features such as sleeves for credit cards and a latch that will keep the case closed. Not only will the case act as a phone protector but also keeps cards organized and safe. And lastly, by creating an aluminum case that surrounds the phone, hackers will be unable to access any data on the mobile device.



Figure 45 : Final product of Faraday Case Prototype 3.0

III. Conclusion

Our mission statement was to address the need for an electronic protection device. Our product successfully did so in a unique way. We were very satisfied with the size, aesthetic, and functionality of Alluminate. The five needs we found through our interviews were met through our product as it is comfortable, affordable, durable, eco-friendly, and provides software securitability. There is nothing currently in the market that is like it. The professional look of our product is perfect for the customer because we are targeting professionals in the workforce, students, new cellular device users, casual cellular device users, as well as experienced cellular device users. We are very proud of our prototype because it incorporates all of the different factors and has an appealing aesthetic.

References

References for External Search Images:

ART ELECTS Carbon Fiber Phone case for S9 Plus:

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Galaxy Popsocket:

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PHOOZY Apollo XL Insulated Phone Pouch Apollo Silver:

<https://www.rei.com/product/160839/phoozy-apollo-xl-insulated-phone-pouch>

Pela Case:

<https://pelacase.com/>

Smart Phone Wallet:

<https://www.amazon.com/Back-Pocket-Silicone-SmartPhone-Wallet/dp/B00JAJDB76>

GoDark Faraday Bags:

https://godarkbags.com/?gclid=Cj0KCQjwocPnBRDFARIIsAJJcf96unAcPERGgWgHUp62L7nWpmv59MBB_O5jyg9gr-B8rM35Qv1WApUwaAmkREALw_wcB

Iron Man 2 Transparent Phone:

https://www.google.com/search?q=Iron+Man+2+Transparent+Phone&rlz=1C5CHFA_enUS773US773&source=lnms&tbo=isch&sa=X&ved=0ahUKEwihv43xpsbiAhVRLX0KHdK_Dq8Q_AUIECgB&biw=1440&bih=789#imgrc=Y-kBMiZXYBElnM: