

Process Book



Supé


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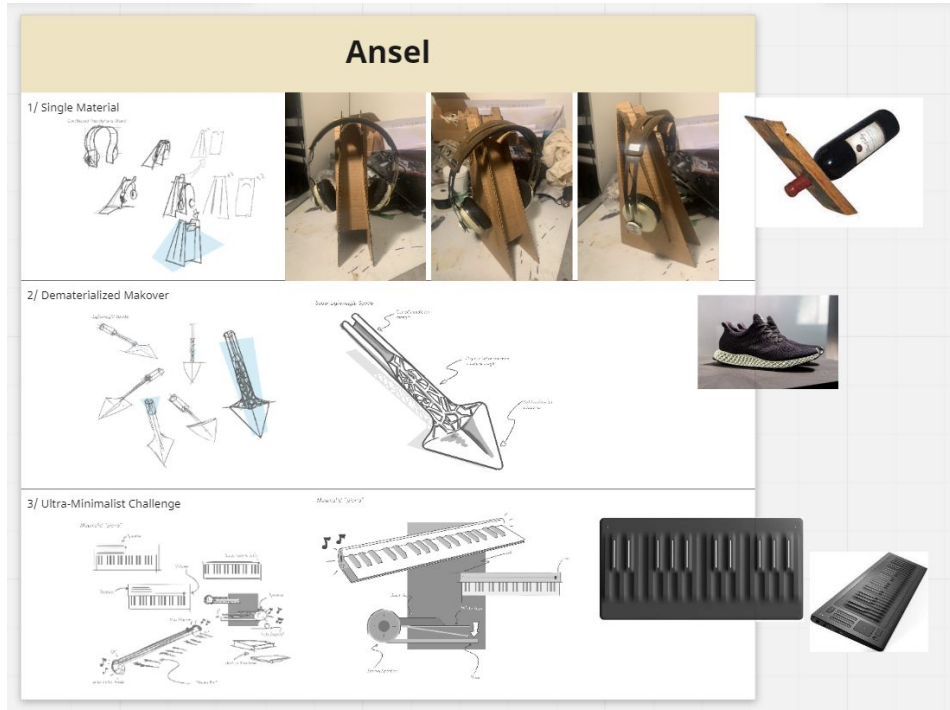
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Final Design and Goal Recap

01

Strategy Assignments

Assignment 1- Dematerialization - Ansel



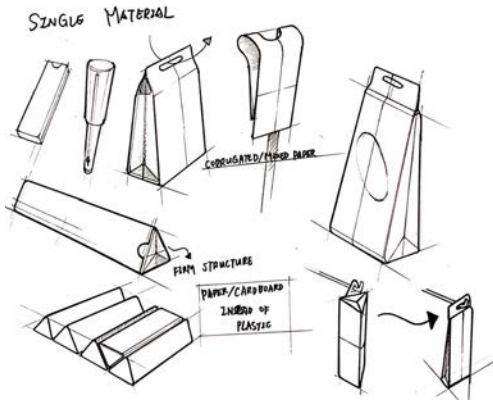
An exploration to see how little material is actually needed. From procedurally generated structures, cantilevered stands using a single material.

Assignment 1- Dematerialization - Lillian

1. Single Material

This idea aims to reimagine the possibilities of designing a single-material packaging for BIC pens. The current package with plastic material sealing the pens/refills onto the back.

My solution is considering that the packaging could be refined with materials like recycled or corrugated paper, and at the same time maintaining the product branding graphic on the paper packaging. This enables biodegradable or reusable materials to be applied.

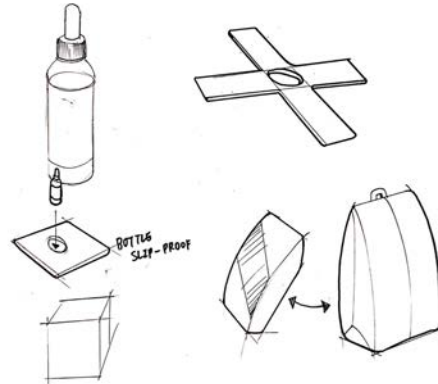


2. Dematerialized Makeover

Current makeup and personal care products like makeup bottles and essential oils are often made with glass or plastic that is hard to degrade, and tends to be over-packaging with some buffer material.

My idea is that we could replace the buffer with a piece of minimal stabilizing piece, or using recycled materials like shredded newspapers and recycled paper.

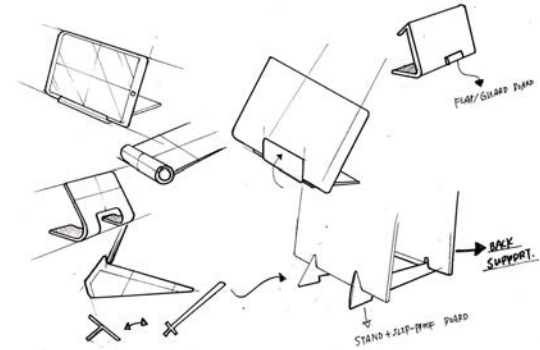
Customers can return or recycle the paper container box as well as the buffer paper to keep pushing the reusing action forward.



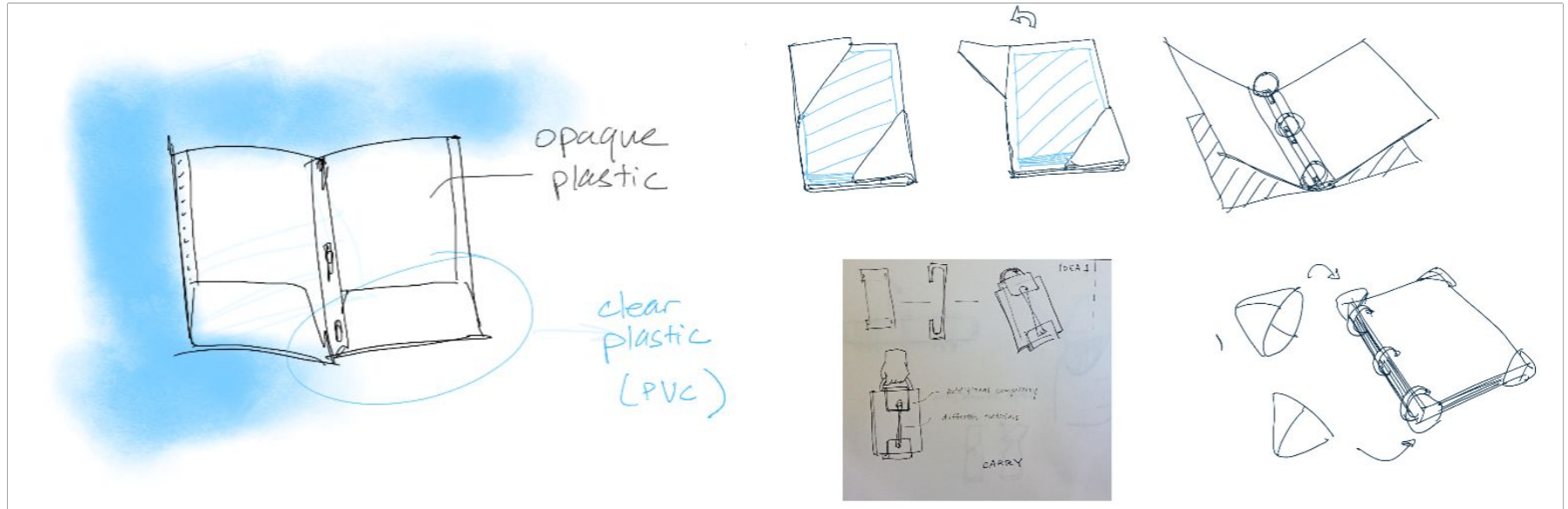
3. Ultra Minimalist Challenge

This solution is looking at iPad and smartphone stands in our daily lives. Current ones are mostly made of firm metals like stainless steel, and is formed with a complicated mechanism.

This challenge involves redesigning with the minimal stands made from cardboard and making a supportive structure.

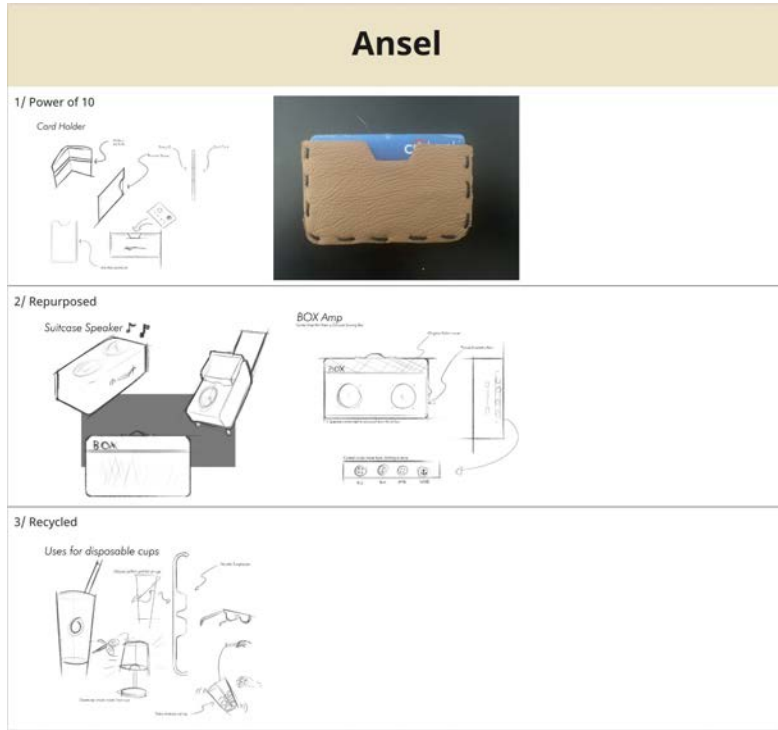


Assignment 1- Dematerialization - Sean (Continued)



3/ Ultra-Minimalist Challenge Plastic Binder

Assignment 2 - Rematerialization - Ansel



Creating products from found materials, repurposed items, or recycling old items into new products.

My personal favourite was using old upholstery leather and twine to fashion a new wallet from scratch. (top)

Assignment 2 - Rematerialization - Lillian

1. Power of 10

I made a bathroom storage box for daily items out of a paper shopping bags.

This aims to solve the problem of tidying all the messy spray cans and bottles that scattered around. It sits well on flat surfaces like back of the toilet where I used to stack these bottles.



3. Recycled

This solution is a reuse of packaging materials from a health supply pack, and a disposable flatware pouch I got from Delta Airlines (2 years ago).

The intent is to discover the possibilities of combining these materials and make a functional **pen bag** that ties well and can be carried around.



Assignment 2 - Rematerialization - Lillian

2. Repurposed

The long cords/wires of earphones have always been a trouble in storage and organizing them. They could easily get tangled in messy knots.

This idea is a progressive exploration process of ways to simplify and optimize earphone organizing.



Stage 1

Starting from broken spring clips that fell off of my clothes hanger, I try to make use of the holes on the clips as placement for the plug.

Shortcomings I found for this stage is that it gets loose easily and is tricky to warp.



Stage 2

Consequently, I keep refining this with new materials found at home—rubber bands, food sealing clips, and two random wooden pieces I got from my roommate's waste materials.



A slot for the plug



Clip part for holding the receivers tight and neat.



Final Outcome

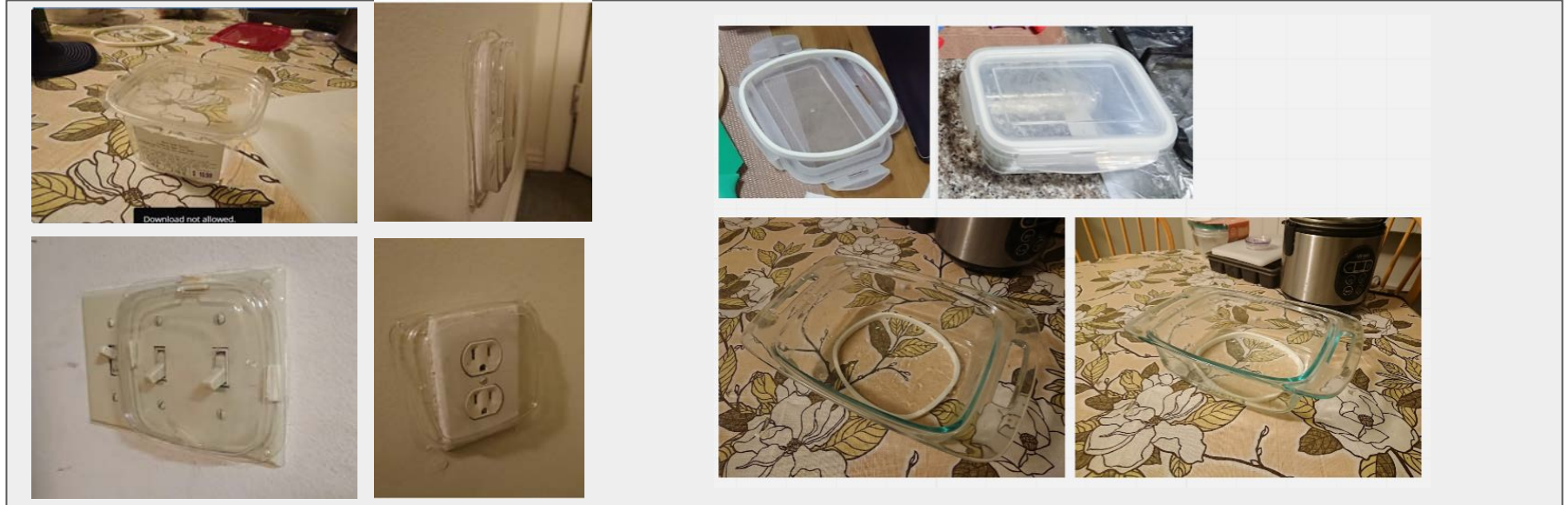
Assignment 2 - Rematerialization - Sean



1/ Power of Ten
Molecular models with a natural source

2/ Repurposed
Reusing a rice-cooker as a headphone sanitization station

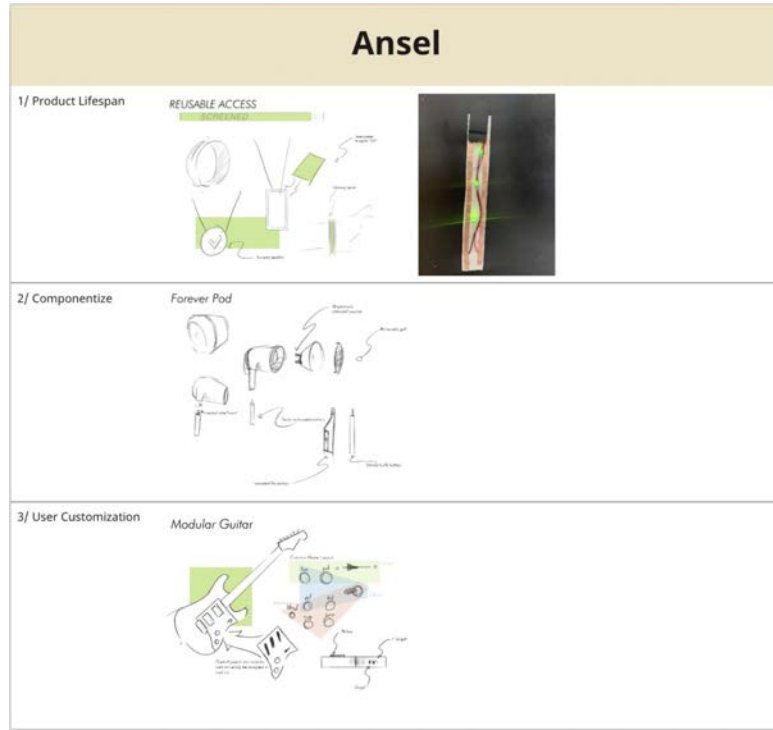
Assignment 2 - Rematerialization - Sean



3/ Recycled
Plastic lid as a cover for outlets / switches

2/ Repurposed (additional)
Reusing a silicone gasket as a placemat

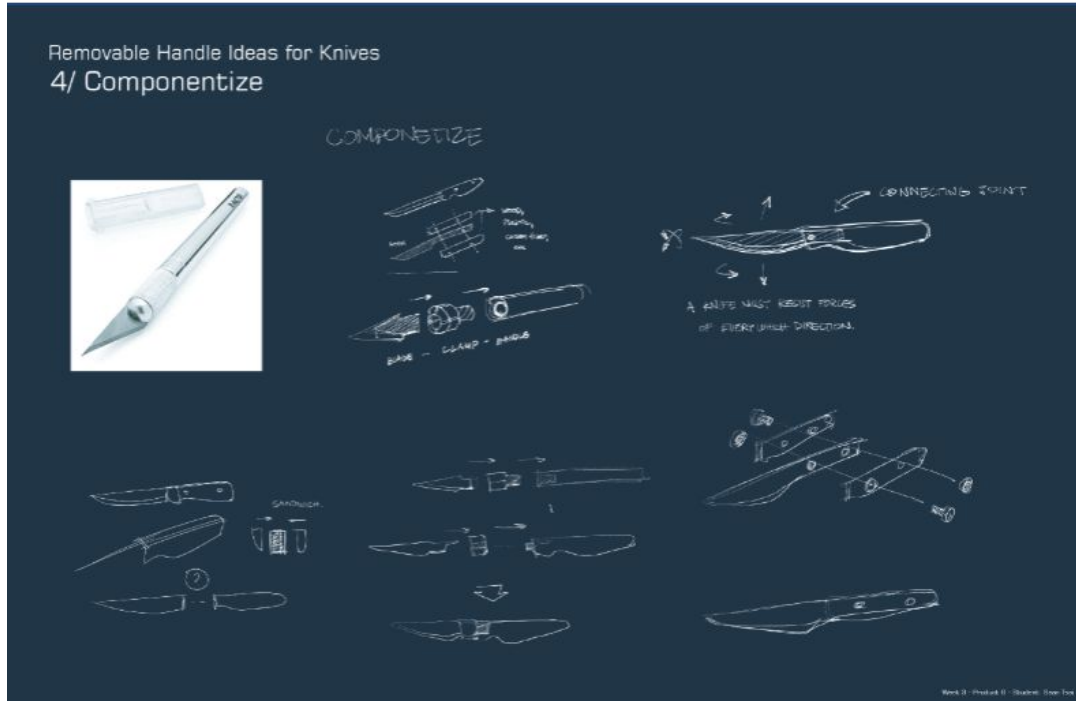
Assignment 3 - Longevity - Ansel



Increasing the longevity of a product is very important for overall sustainability. #1 Tackled the wasteful issue that is the disposable access wristbands at ArtCenter.

By creating a removable and durable product that illuminates, these wristbands could be used for decades which would reduce the amount of paper waste that the school produces.

Assignment 3 - Longevity - Sean



4/ Componentize

Inspired by the X-Acto Blade, this concept aimed to explore the possibility of a larger knife system with replaceable blades.

Assignment 3 - Longevity - Lillian

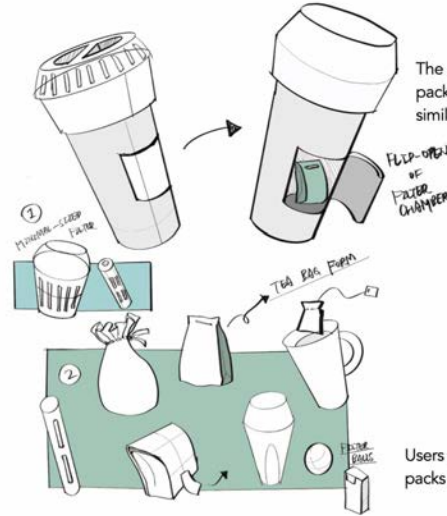
1. Change Product Lifespan

Nowadays many families are using water pitchers with filters that help effectively restricting contaminants in drinking water. The filter parts inside need to be replaced every 2-3 months, and could cause a lot of waste into the landfills.

This redesign intends to keep the plastic filter part as a permanent part, only replacing the carbon filter powders inside which comes as packs.



1. Longer Lifespan for water pitcher's filter



The activated carbon packs having a form similar to paper tea bags.



Users only replace the granular activated carbon (GAC) packs inside the plastic filter unit.

Assignment 3 - Longevity - Lillian

2. MultiFunction-Convertible

As infants and babies grow, some products and furniture pieces can no longer be used. These products end up being left aside unused, but still occupies some space at home.

This toddler chair enables parents to rearrange and reorient the flip boards and pommels. In this way, it could turn into a dining room chair or study room chair as the baby grows up and enter school.



2. Convertible toddler chair

Retractable chair legs enable this toddler chair to be rearranged into a normal-height study room chair after baby grows up.

3. User Customization/Personalization

This solution is a customization to user's needs in outdoor camping. The dining table can be easily converted into a barbecue/grill shelf for foods cooked on campfire.

It allows camping lovers to personalize it according to their specific needs, either use it as a storage table or a substitution of camp stove.

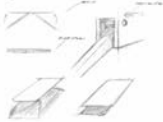


Assignment 4 - Footprints - Ansel

Ansel

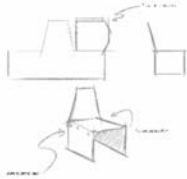
1/ Expand/Collapse

Folding Table



2/ 2D to 3D

Aluminum Monsier



3/ Ship & Store

Iso-Pod



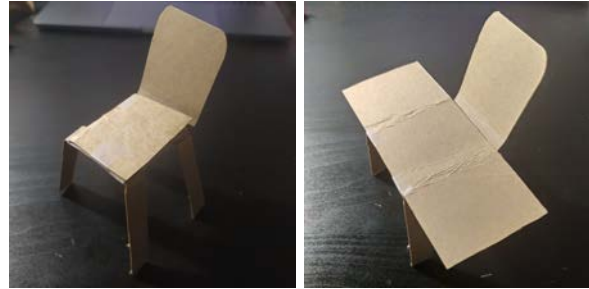
A portable folding tent that beach goers could easily carry like a backpack, then upfold to provide shelter from sun and wind.

Assignment 4 - Footprints- Lillian

1. Expand/Collapse

This concept is a chair design that has the potential to grow bigger in the seat, so it could allow multiple users sitting on it.

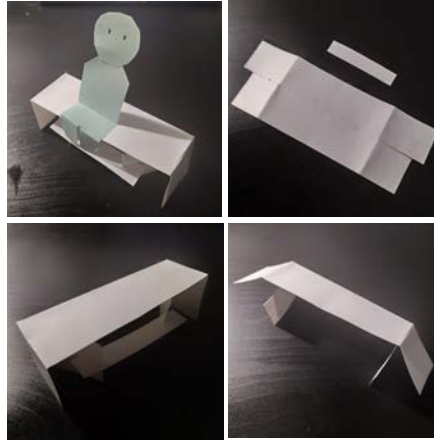
The seating area of the chair can be flipped out and extended from a one-person seat, to a longer and wider area that 2-3 persons may sit on.



2. From 2D to 3D

This design is a transition from 2d to 3d park bench for tourists and users to sit on.

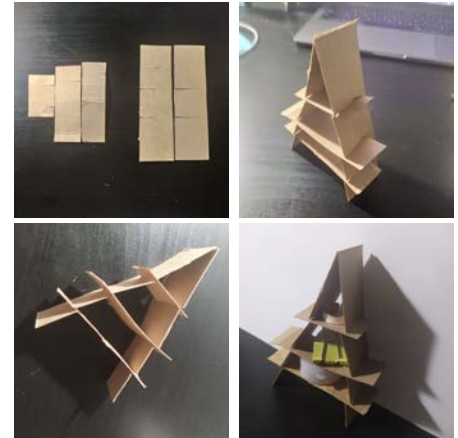
Starting from a pre-cut flat piece, the chair could transform from a flat board to 3 dimensional seating furniture by using slot-cuts, bending and folding of structures.



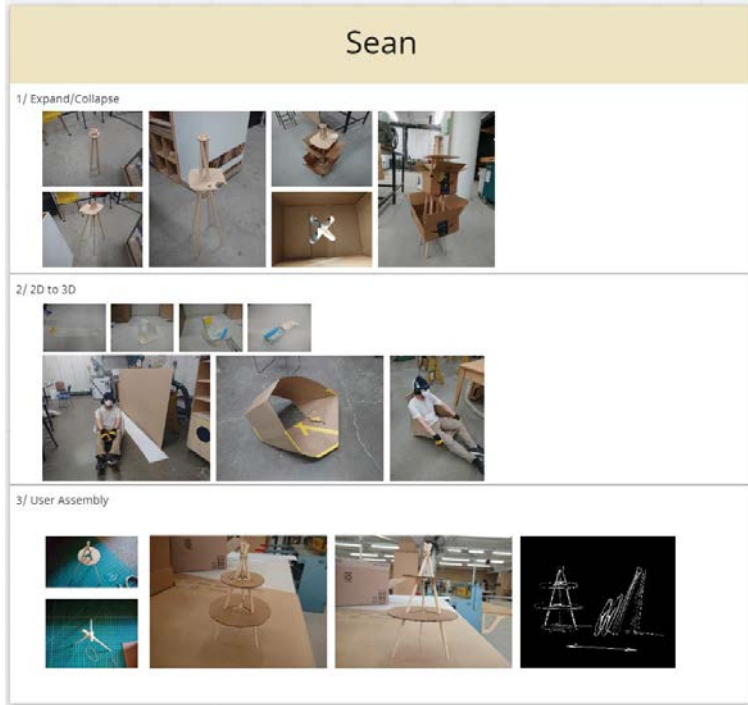
3. User Assembly

This solution is a design that enables user to assemble this bookshelf at home, coming as a flat-pack set before their 1st use.

After they receive it from delivery or pick it up from stores as flat-pack parts, users will be able to easily assemble the shelves and stand boards of this bookshelf by inserting them.



Assignment 4 - Footprints - Sean

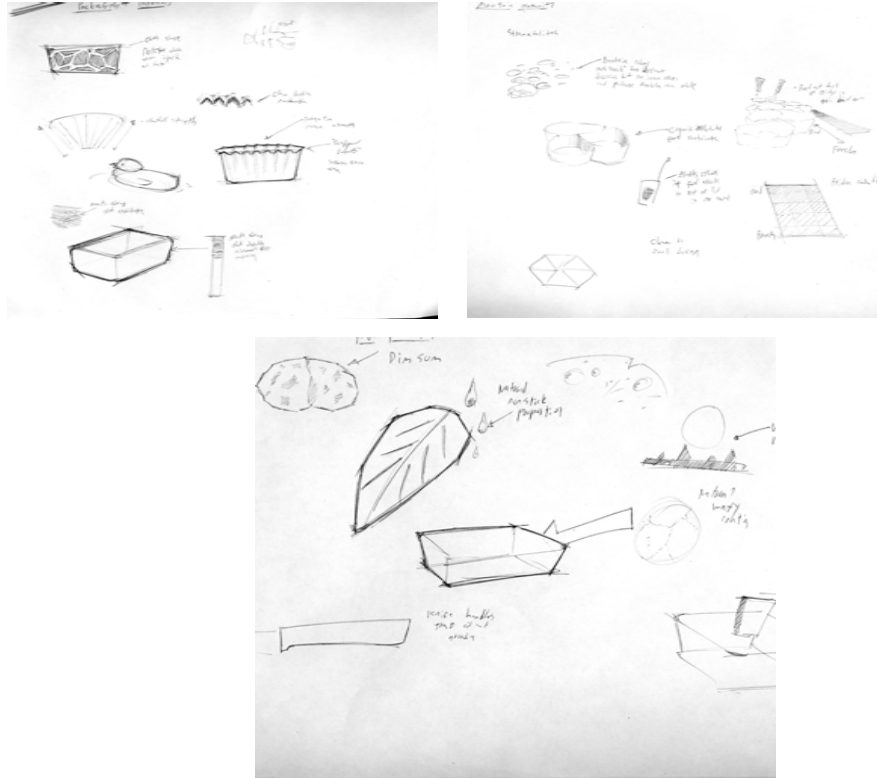


Artist's easel with minimal set-up

Beach chair / Mat with awning

Table / Shelf with multiple levels

Assignment 5 - Biomimicry - Ansel



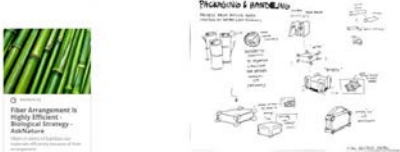
We can learn a lot from nature

By creating a removable and durable product that illuminates, these wristbands could be used for decades which would reduce the amount of paper waste that the school produces.


Assignment 5 - Biomimicry - Sean

Sean


1/ Protect from Physical Harm



2/ Function of your Choice



3/ Maintain Community

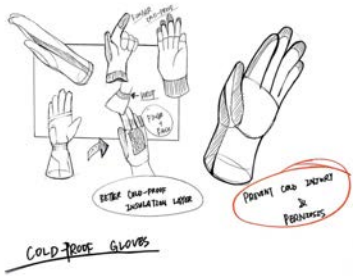


His beautiful Creation

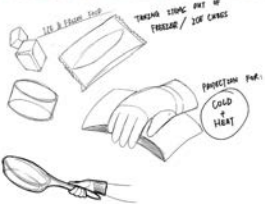
The biomimicry assignment helped us look at the many aspects of good design found in God's Creation.

Assignment 5 - Biomimicry- Lillian

1. Protection Gloves for kitchen purposes



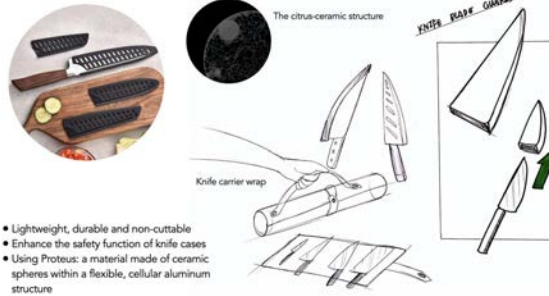
- Thermal insulation
- Protecting hand from physical harm of extreme cold and heat/burning
- Oven/Freezer



- A sugar-based polymer produced by an Alaskan darkling beetle keeps cell contents from freezing in extreme cold temperatures by attaching to the cell membrane.
- Withstand severe climates like coldness in Alaska

2. Knife Blade Protector

- Cutting knives have sharp blades, often guarded by protector cases
- Safety concerns, and better protecting function from sharp cuts that can hurt users
- Proteus from Durham University is a non-cuttable material made of a ceramic spheres within a flexible aluminum structure that interferes with cutting tools. This is a material exploration coming from Mollusk animal shells and grapefruits/citrus family fruit named Proteus.



- Lightweight, durable and non-cuttable
- Enhance the safety function of knife cases
- Using Proteus: a material made of ceramic spheres within a flexible, cellular aluminum structure

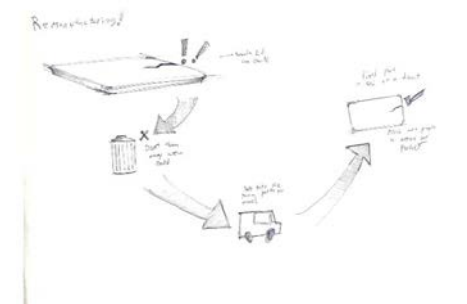
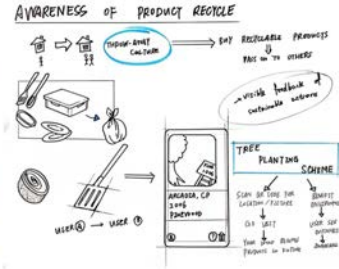
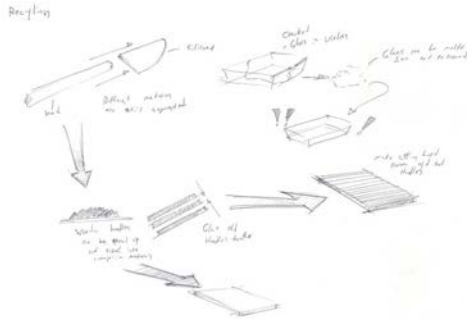
3. Anti-bacterial Spatula

- Many cooking spatula/ladle made from wood are considered better than plastics, yet they do have the problem of longevity.
- Wooden or bamboo spatula needs replacing every 1/2 years because the wood cracks and have crevices, or becomes corrupted with black spots due to bacteria.
- Nanostructure of some spider silk proteins prevents bacterial attachment: stronger, elastic, and fights bacterial with its hydrophobic and densely-packed structure



- Anti-bacterial silk
- Improve the longevity and life span of spatulas, protecting them from germs and bacteria, or even capable to share with others in the long run.

Assignment 6 - Product/Packaging/Service System (PPSS)



1/ Producer Take Back

2/ Design for Behavior Change

3/ Build Community

02

Research Phase

Exploring Potential Topics and Materials



Common Kitchen Materials



Could cleaning be made easier than using paper towels and paper plates?

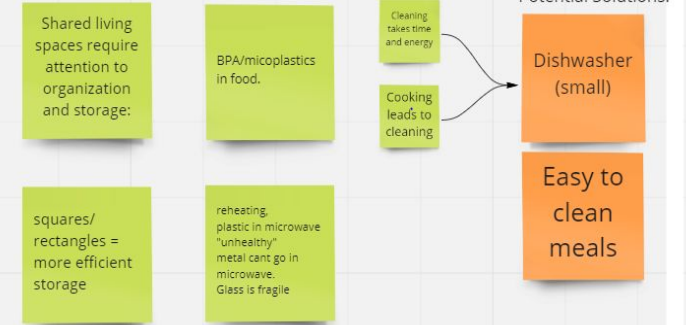
Observation:

Space Concerns:

Material Concerns:

Cleaning Concerns

Potential Solutions:



Doing maps to figure out potential topics, and choice of sustainable material possibilities

Benchmark



Exploration of benchmark items

A Look at Food Prep Utensils used in everyday cooking

Cutting Board

Both are used for the same purpose.

Benefits: Hygiene, Durability

Knives

Benefits: Diverse

A knife set can cover a wider range of food options. The example above is made from stainless steel.

The different matters of cutting is designed within the knife itself. See Santoku vs Chef's knives

Potato Peeler

Benefits: Diverse

A peeler is necessary for certain types of foods: Potatoes, Yamis, Apples, Kiwis.

Can Opener

Benefits: Diverse

Foods are conveniently canned in the supermarket: Chickpeas, Beans, Corn, Peas, Tuna.

Cooking Tools and Utensils in everyday cooking

Spatula/Slotted Turner

Benefits: Diverse

Spatulas work with cookware like fry pans, and has a flat blade part that enables turning, lifting or stirring of foods.

Spatulas are usually metal like steel or aluminum, plastic, nylon, or silicone are also common material choices for not having scratches and heat-resisting.

Heat Resistant to 400 degrees, Steam-Resistant

Mixing Bowl

Benefits: Diverse

Mixing bowls are used for mixing and combining food ingredients, and work with tools like whisks or spoons make and serve foods like salad or baking goods.

Stainless steel: lightweight, and will never shatter

Other mixing bowls: heat-resistant tempered glass or ceramic ones also commonly seen

Ladle

Benefits: Diverse

A ladle is commonly used for liquid foods, and works with cookware like pots.

Ladles and draining spoons have long, ergonomic handle parts for the users to grip tight and safe.

Are featured for being hygienic, non-porous and of durability

Pyrex and Plastic

Benefits: Diverse

Pyrex is very stable with heat and will not melt.

More expensive than plastic

Plastic lid has separate silicon seal for water tightness

Plastic

Benefits: Diverse

Fully plastic container is the affordable option

Concerns over heating food may release toxic chemicals

Cannot withstand stovetop heat

Glass and Metal

Benefits: Diverse

Glass and metal with rubber seal

Most secure, Can be used for long term preservation like canning

Purchasing and analyzing the benchmark items

Lillian - Cooking handheld tools for meal prep

Sean - Preparation and cutting-related items

Ansel - Tupperware and containers for storage purposes

Product Pack-Out



Plastic injection molded together
Metal blade made separation a destructive process



Cheap all-plastics vs. Glass and live hinges
Co-molded seals not replaceable

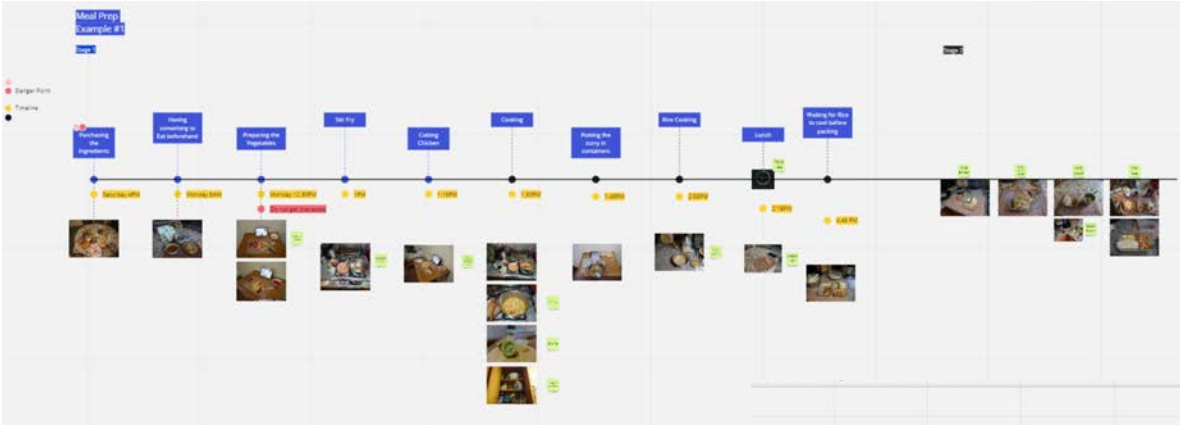


Cookwares can be combined and simplified
Material choice concerns

Personal Pain Points around the Kitchen

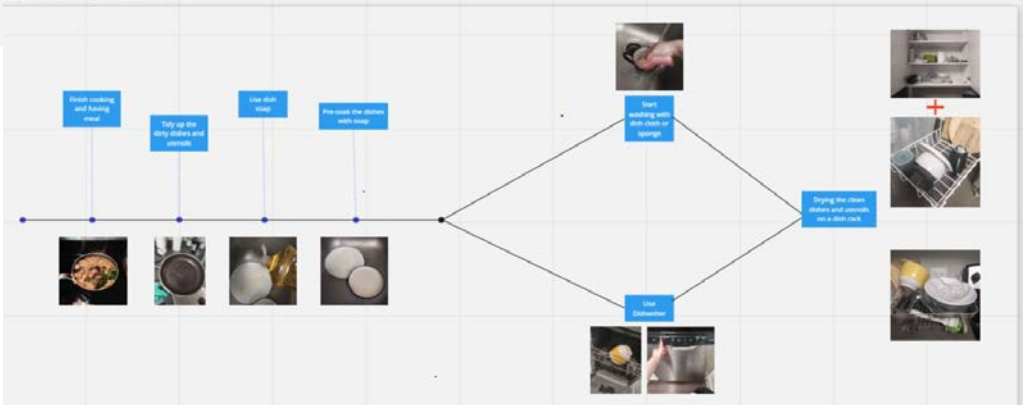


Meal Preparation / Cleaning Timeline

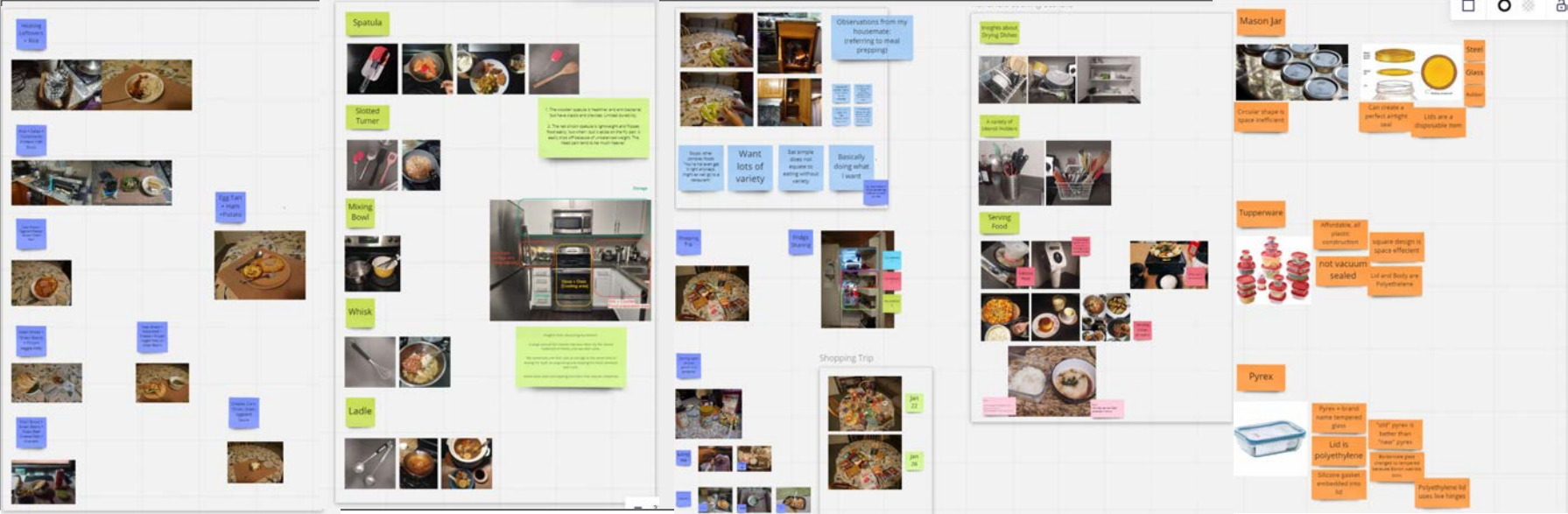


Daily Meal Prep

Cleaning Process



Routines In the kitchen



Quick and Easy meals

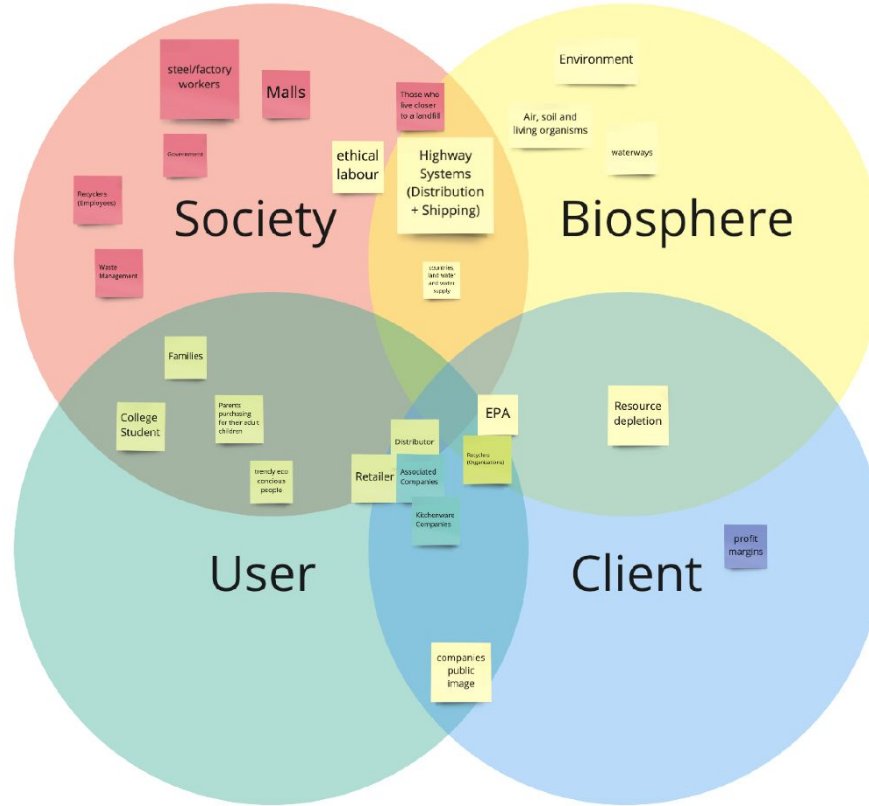
Cooking process + Utensil experiment

Interview notes with housemate

Handheld cooking utensils

Food Container Types & Uses

Stakeholders



Main Interview and Follow-Up

Interview Question List with Zoe

About Cooking in general:

-What got you into cooking?

Learned from her mother, traditional meals, at 15-16 because she moved away from home.

In high school, living away from home, she started to cook simple foods like fried vegetables for herself.

Since she came to the USA with husband, she started to specialize in Taiwanese and other favorite recipes online to follow and learn from. Cook+ bake, search online or Youtube videos.

What aspects of cooking do you like? (Family meal time, culinary artistry, the good smells?)

Cooking for her family is one of the main inspirations, satisfaction from husband enjoying her food, encouragement

Ingredients of home cooking is safe and healthy, making foods like dumpling from scratch is more original and better taste

What parts of cooking do you find interesting and would like to share with new cooks?

Feeling accomplished making food from scratch. Frozen dumpling meat tastes terrible.

We can choose what ingredients we like and where they are sourced from.

How do you figure out what you should cook for the week?

No exact plans, just try to keep some variety, and purchase enough meat (chicken, beef, pork) for something different. I like to purchase condiments, follow my heart for what I want to cook.

Do you have concerns about non-stick teflon, or ceramic coated pans?

Health concerns over nonstick pans and other cooking tools, found all non stick items and threw them away. Uses stainless steel, and or silicone.

What kitchen tools do you use to heat food most often? (Oven, Air-fryer, etc.)

Use stainless steel pans, spatula: silicone, due to heat resistance

Wooden spatula when using cast iron pot, scrap off the sticken meat: have cracks, buys new ones

Ladle: stainless steel with a wooden handles

How do you deal with food waste? (peels, etc.)

Where do you shop?

Trader Joes, Aldi's.

What tools do you like using for cleaning pots/pans/utensils?

Sponge for dishes - the everyday plates. (From Taiwan) — for pots/pans

菜瓜丝/丝瓜络 (a kind of dried/cuh sponge)

钢丝球 occasionally (iron wool balls)

About Recipes:

What are kitchen essentials (ingredients that you always need to have)

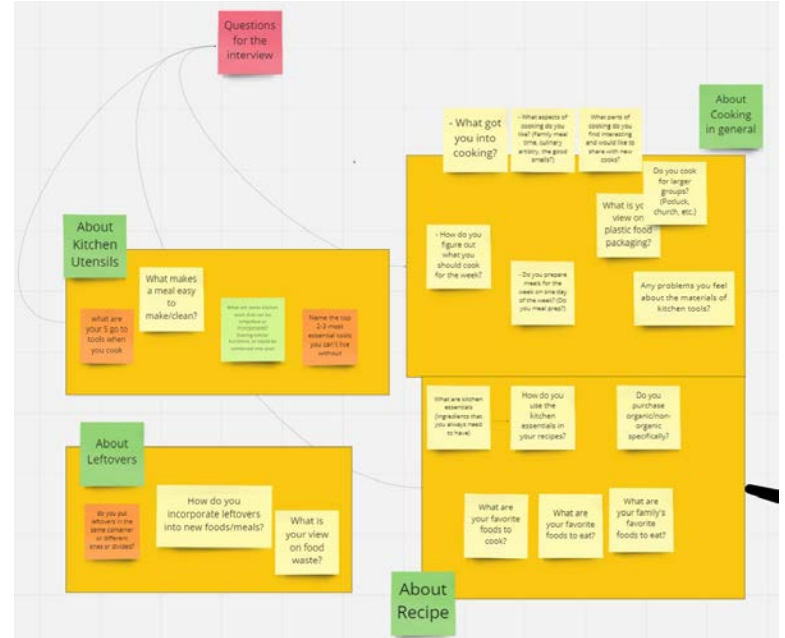
Kutting board, knife, baking sheet, spatula, ladle

Do you purchase organic/non-organic specifically?

Choose organic produce for home cooking, but bananas and avocados it doesn't matter.

What are your favorite foods to cook?

Make bread the most - bread. If I have time, I like to bake. 4 hours to bake.



Start with interview question list, and follow up with detailed questionnaires to more users in the later weeks

User Interview



Name Zoe Yilin Wu (and her family)
Gender Female
Age 30+
Location Minnesota, USA
Occupation Housewife
Formerly a professional cook
and food caterer

Her Kitchen Utensils



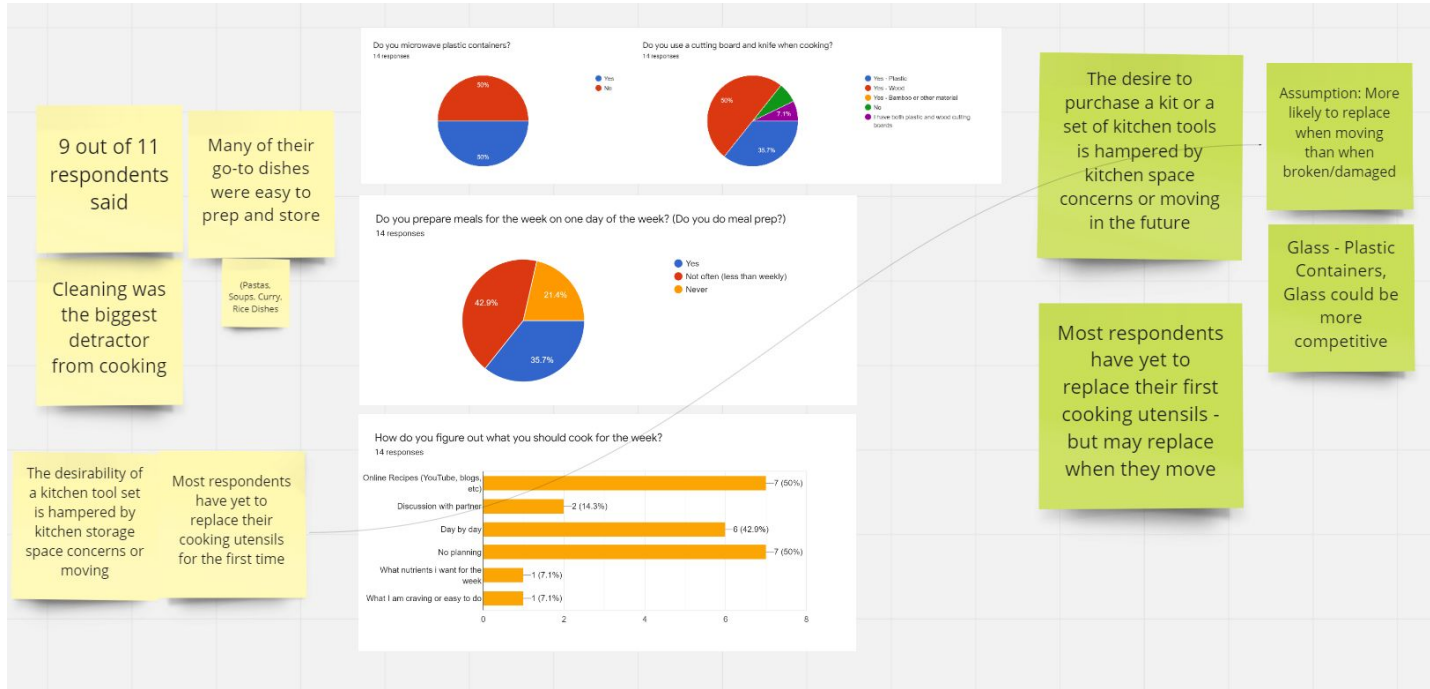
Demographics

Zoe was born in Taiwan
She started cooking at 15-16 when she moved away from home for school
After coming to the U.S. with her husband, she started to specialize in food preparation
Searching online for cooking tutor videos enhanced her interest

Culinary Artistry and Her Inspiration

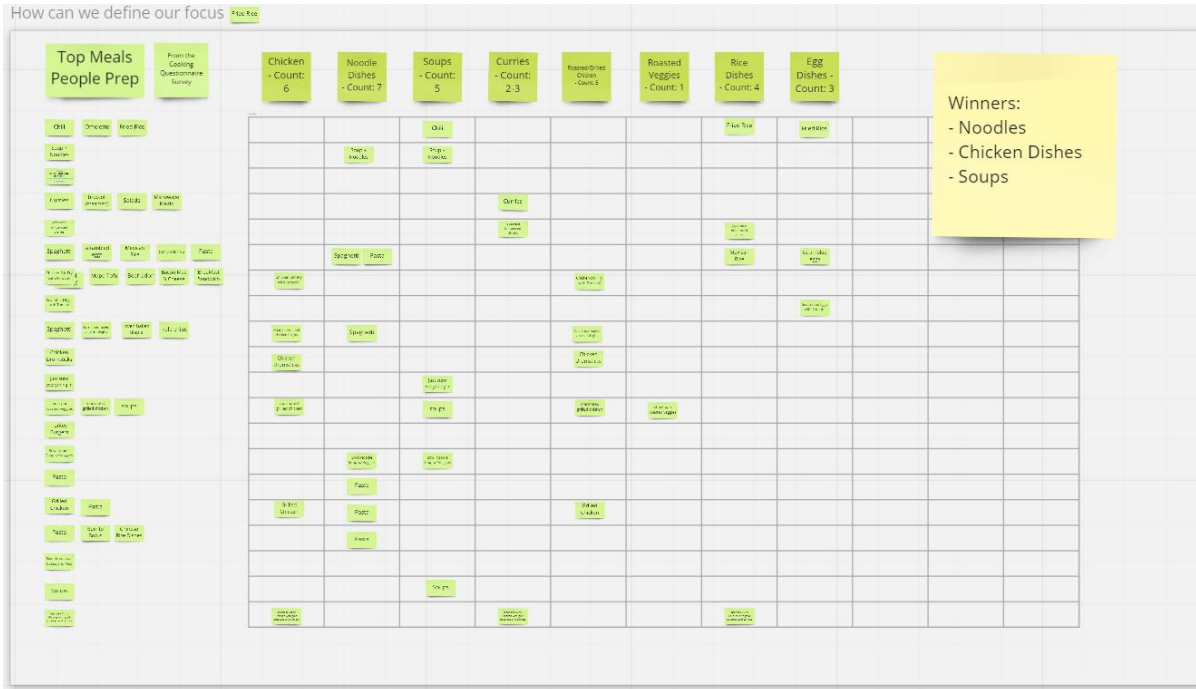
Cooking for her family and the satisfaction from people enjoying her food
Baking for fun and getting healthy ingredients is also vital to her.
Shifting focus from a food catering business to home cooking, she enjoys making cuisines from scratch with better original taste, and the process of culinary artistry in her daily life.

Questionnaire Overview



Doing the questionnaire helped us understand our respondents' (our target audience) concerns and preferences.

Questionnaire Overview



Charting out our respondents' preferences helped guide our design decisions to better focus on their needs. Which in for cooking college students, turns out to be a more efficient noodle, chicken, and soup kit.

Target User

Age Group 18-35

Occupation College age to early working adults

Demographics Lives with roommates

Share a public cooking area

Learning to cook but has limited living expense budgets

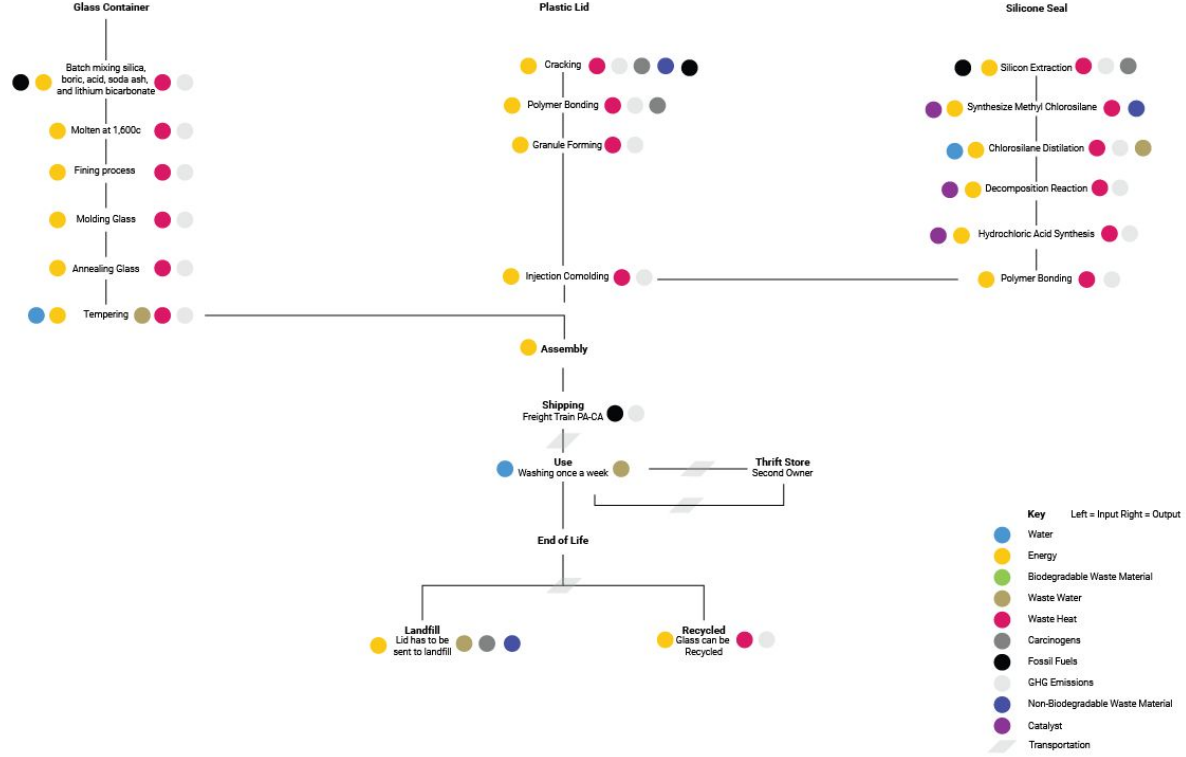


<https://www.unitestudents.com/the-common-room/food-and-drink-cooking-as-a-student-where-to-find-recipes-and-two-quick-go-to-meals>

03

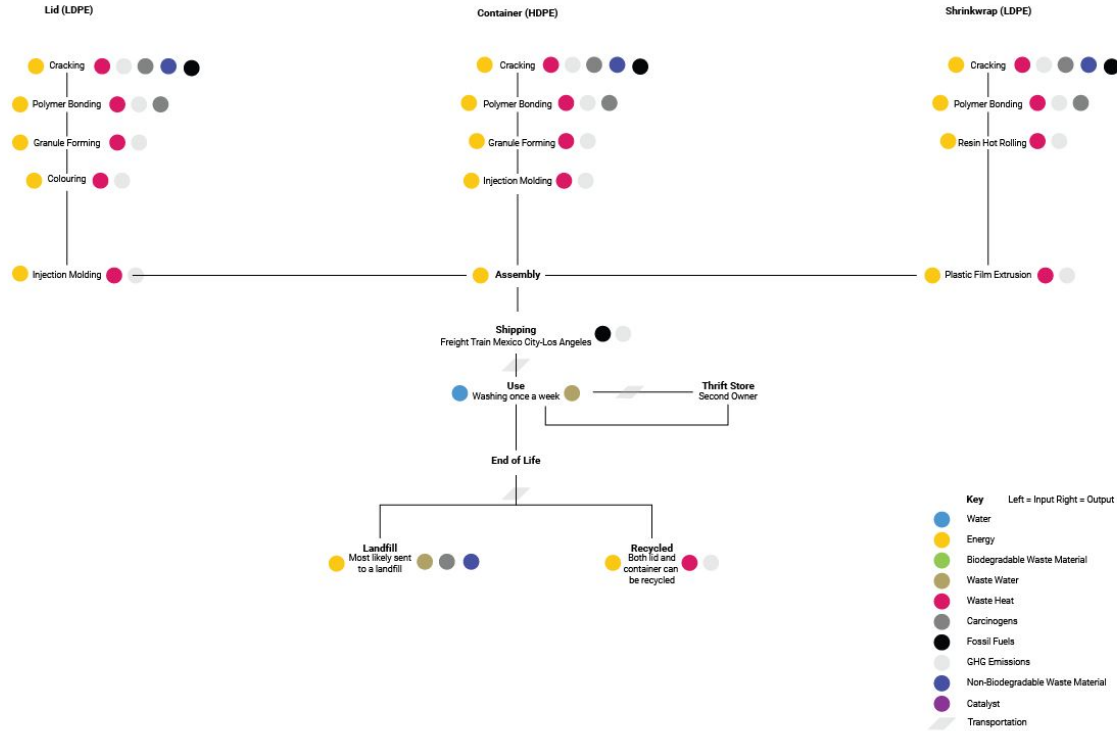
LCA, Process Tree and Okala

Finalized Process Tree of Benchmark-Ansel



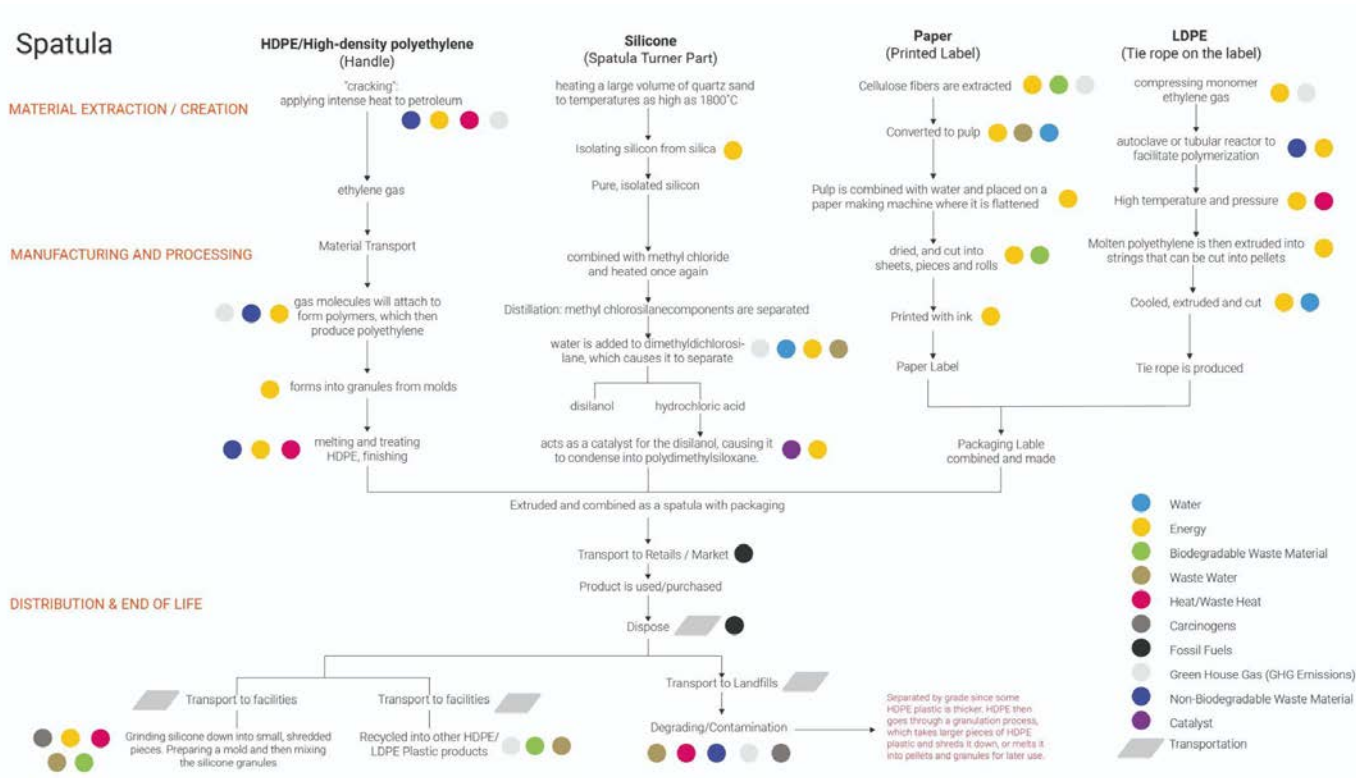
Pyrex Process Tree

Finalized Process Tree of Benchmark-Ansel



Rubbermaid Process Tree.

Finalized Process Tree of Benchmark-Lillian



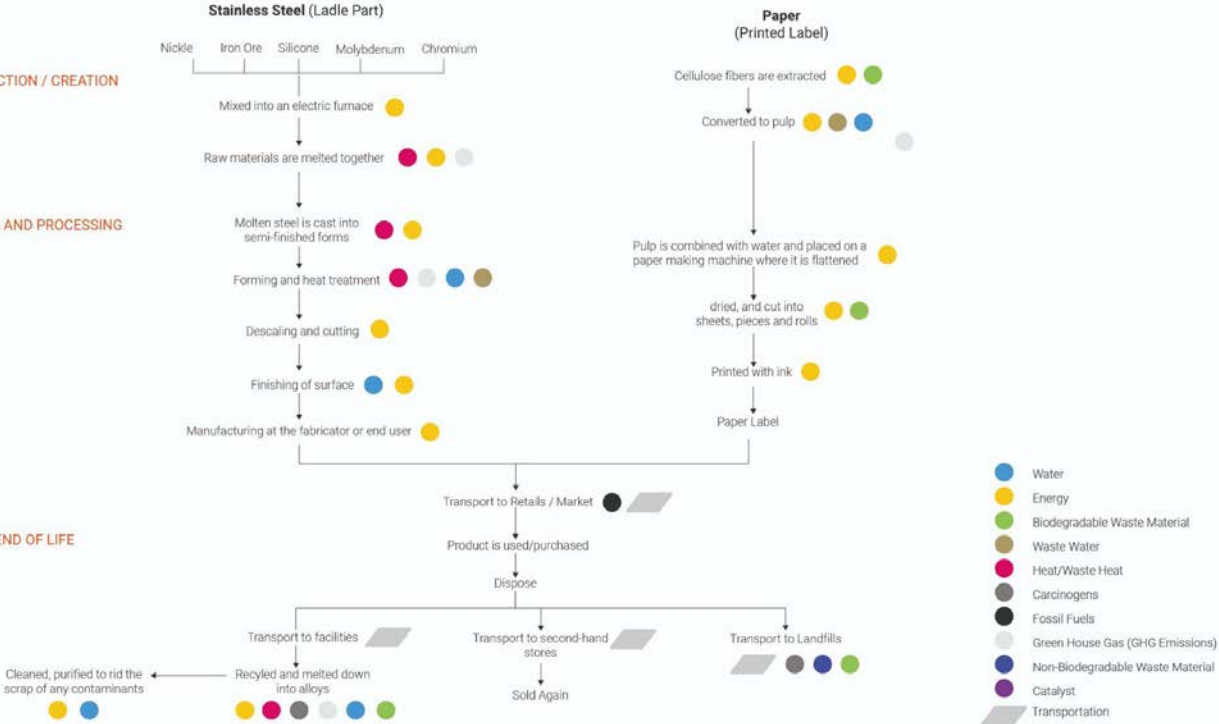
Finalized Process Tree of Benchmark-Lillian

Ladle

MATERIAL EXTRACTION / CREATION

MANUFACTURING AND PROCESSING

DISTRIBUTION & END OF LIFE



Okala Form and Sustainable Minds chart-Lillian

Okala Impact Assessment Form Date: 3/1/2022

Designer: Lillian Lin | Product Lifetime: 3 Years

Product Concept Name: Spatula | System Boundaries: | Functional Units: |

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
Silicone	0.12	Lbs	1.7	Lbs	0.204
HDPE	0.15	Lbs	1.7	Lbs	0.105
LDPE	0.005	Lbs	1.5	Lbs	0.0075
Paper	0.06	Lbs	0.37	Lbs	0.0222
Water	55	Gal	0.0022	Gal	0.121
Dish Soap	0.2625	Lbs	1.1	Lbs	0.28875
Truck, 7.5t-16t	0.1055	Ton-Miles	0.44	Ton-Miles	0.0464
Landfill Polyethylenes	0.155	Lbs	0.30	Lbs	0.0465
Landfill Paper	0.06	Lbs	0.36	Lbs	0.0216

$$\frac{\text{Impacts / Product Lifetime } 0.86295}{\text{Lifetime Hours } 26280} = \text{Impact/Hour } 0.0003283675$$

Total Impact / Lifetime: 0.86295

Okala Impact Assessment Form Date: 3/1/2022

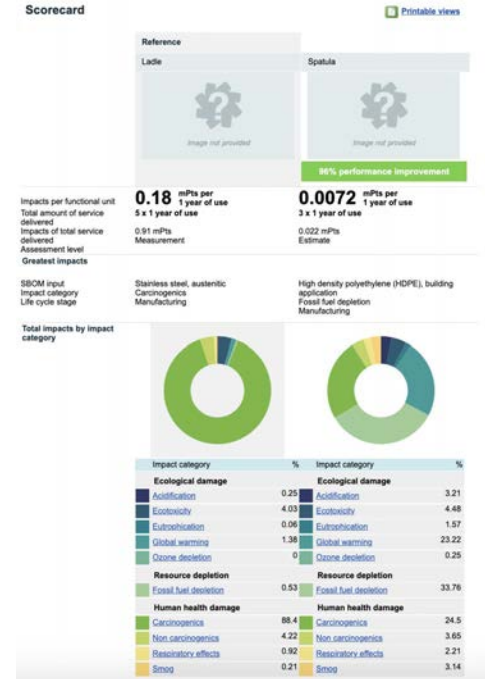
Designer: Lillian Lin | Product Lifetime: 5 Years

Product Concept Name: Stainless steel ladle | System Boundaries: | Functional Units: |

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
Stainless steel	0.34	LBS	3.5	LBS	1.19
Paper packaging label	0.03	LBS	0.37	LBS	0.0111
Water	50	Gal	0.0022	Gal	0.11
Dish Soap	0.256	LBS	1.1	LBS	0.2816
Truck, 7.5-16t	0.1032	Ton-mile	0.44	Ton-mile	0.0454
Landfill Steel	0.34	LBS	2	LBS	0.68
Landfill Paper	0.03	LBS	0.36	LBS	0.0108

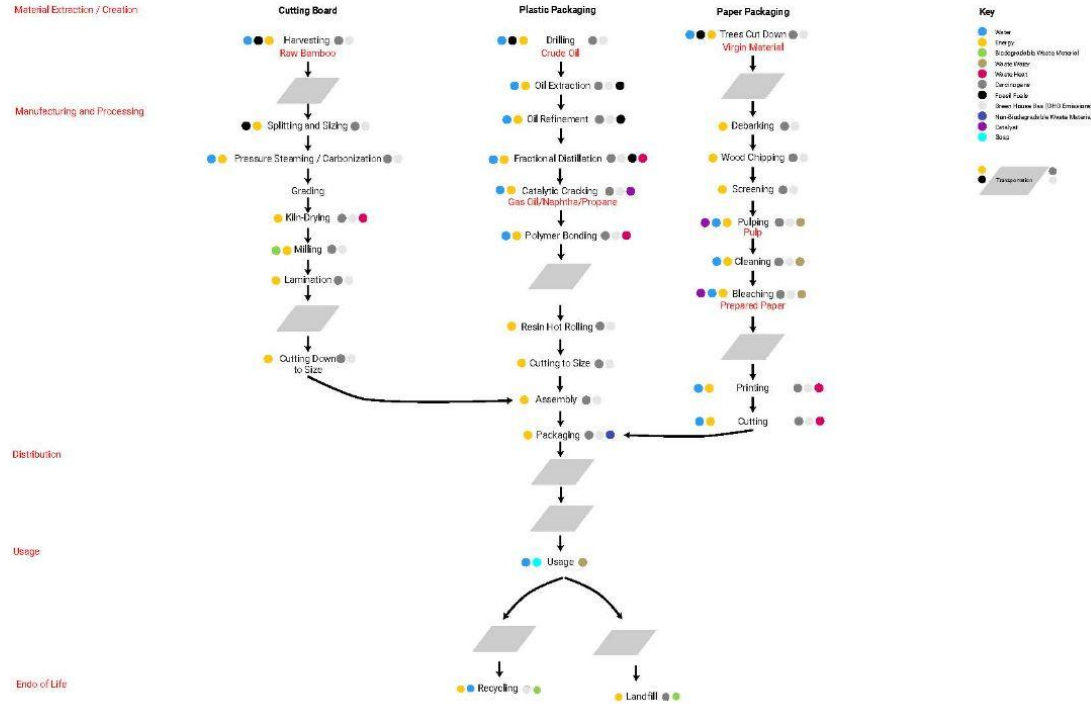
$$\frac{\text{Impacts / Product Lifetime } 2.3289}{\text{Lifetime Hours } 43800} = \text{Impact/Hour } 0.0005317123$$

Total Impact / Lifetime: 2.3289



Finalized Process Tree of Benchmark (Cutting Board)-Sean

Bamboo Cutting Board



Okala Form and Sustainable Minds chart (Cutting Board)-Sean

Okala Impact Assessment Form Date: 02/28/2022

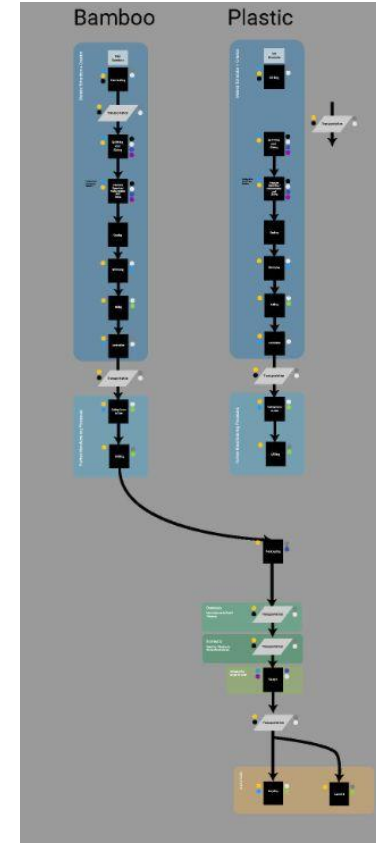
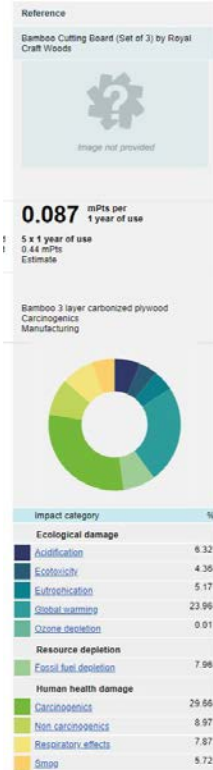
Designer: Sean Tsai Product Lifetime: 5 years

Product Concept Name: Bamboo Cutting Board Set of 3 System Boundaries: Functional Units:

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
M Bamboo	4.62	lbs.	0.007	lbs.	0.0323
L (landfill) wood	4.62	lbs.	0.14	lbs.	0.6468
M (printed packaging) paper	0.056	lbs.	1	lbs.	0.058
M (plastic bag) LLDPE	0.011	lbs.	1.5	lbs.	0.0167
L (landfill) paper	0.058	lbs.	0.36	lbs.	0.0208
L (landfill) pp	0.011	lbs.	0.26	lbs.	0.0028
C liquid dish soap pp	1.14	lbs.	1.1	lbs.	1.254
C water (assumed cold)	97.5	gallons	0.0019	gallons	0.1952
S Part of Guangzhou	16,432 mi	mi	0.053	mi	2.2907
S Part of LA	16,432 mi	mi	0.31	mi	0.0247
S Amazon Fulfillment Center	0.29	ton	4.2	ton	0.1329
S Amazon Fulfillment Center	0.29	ton	4.2	ton	0.1329

KEY:
 L: Landfill
 M: Material
 C: Consumer
 S: Shipping
 * MEASURED without process steps in the manufacturing

Impacts / Product Lifetime = **4.6649**
Impact/Hour = **0.000649 / hour**
LifeTime Hours = **43,830**
Total Impact / Lifetime = **4.6649**



Okala Form and Sustainable Minds chart (Knives)-Sean

Okala Impact Assessment Form Date: 02/26/2022

Designer: Sean Tsai Product Lifetime: 5 Years

Product Concept Name: Custom Knives Set - Green Blade System Boundaries: Functional Units

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
L (HANDLE) Blade Stainless steel	0.206	lbs.	0.51	lbs.	0.104
L (HANDLE) handle Plastic	0.091	lbs.	0.26	lbs.	0.023
L (HANDLE) connector Plastic	0.091	lbs.	0.39	lbs.	0.035
L (HANDLE) reinforced bar	0.142	lbs.	0.39	lbs.	0.055
L (HANDLE) packaging bag Plastic	0.013	lbs.	0.26	lbs.	0.003
L (HANDLE) accessories Paper	0.009	lbs.	0.36	lbs.	0.003
S Packaging material for LA	0.877 lbs. for 1533 units	ton/mi	0.053	ton/mi	0.433
S Packaging material with green (same as blade set)	0.114 m3	m3			
S Part of Los Angeles to Amazon fulfillment center	0.019	ton/mi	0.31	ton/mi	0.004
S Amazon fulfillment center to user (shipping)	0.019	ton/mi	4.2	ton/mi	0.025
1533 in direct route					

KEY: L: Landfill, S: Transport/Shipping

Impacts / Product Lifetime: 5.036^{*} Total Impact / Lifetime: 5.056^{*}

Impact/Hour: 0.00115^{*} Lifetime Hours: 43,830

^{*} only factors in part of Guangzhou (best guess) to user in California for transport impact.

Okala Impact Assessment Form Date: 01/28/2022

Designer: Sean Tsai Product Lifetime: 5 Years

Product Concept Name: Custom Knives Set - Green Blade System Boundaries: Functional Units

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
M (BLADE) Carbon steel	0.282	lbs.	1	lbs.	0.282
M (BLADE) handle P/C *	0.091	lbs.	15	lbs.	1.363 [*]
M (BLADE) connector Polypropylene	0.098	lbs.	1.9	lbs.	0.187
M (BLADE) reinforced bar LDPE	0.013	lbs.	2	lbs.	0.026
M (BLADE) packaging bag Polypropylene	0.142	lbs.	1	lbs.	0.142
M (BLADE) accessories Paper	0.009	lbs.	1.11	lbs.	0.009
M Packaging material for LA PET *	0.091	lbs.	1.8	lbs.	0.163 [*]
M Packaging material with green (same as blade set)	0.013	lbs.	0.9	lbs.	0.011

KEY: M: Material, P: process step, U: usage, T: transport

Impacts / Product Lifetime: Impact/Hour: Total Impact / Lifetime:

^{*} unknown, guess.

Okala Impact Assessment Form Date: 01/28/2022

Designer: Sean Tsai Product Lifetime: 5 Years

Product Concept Name: Custom Knives Set - Green Blade / Santoku System Boundaries: Functional Units

BILL OF MATERIALS	AMOUNT	UNIT X	OKALA FACTOR POINTS	UNIT -	OKALA FACTOR POINTS
M (BLADE) Stainless Steel	0.206	lbs.	1.5	lbs.	2.673
M (HANDLE) Polypropylene	0.091	lbs.	1.9	lbs.	0.173
M (BLADE) connector Polypropylene	0.098	lbs.	1.9	lbs.	0.187
P (HANDLE) Shipping	0.206	lbs.	0.13	lbs.	0.037
P (HANDLE) Injection Molding	0.091	lbs.	0.72	lbs.	0.065
P (BLADE) Shipping	0.048	lbs.	0.72	lbs.	0.034
P (BLADE) Injection Molding	0.215	sq ft.	0.044	sq ft.	0.0094
V (WATER) WATER	157.95	gallon	0.0019	gallon	0.3
U (SOIL) SOIL	0.119	lbs.	1	lbs.	0.119

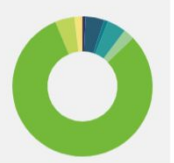
KEY: M: Material, P: process step, U: usage, T: transport

Impacts / Product Lifetime: Impact/Hour: Total Impact / Lifetime:



0.17 mPts per 1 year of use
 1.5 x 1 year of use
 0.85 mPts Estimate

Stainless steel, austenitic
 Carcinogenics
 Manufacturing



Impact category	%
Ecological damage	
Acidification	0.73
Ecotoxicity	4.28
Eutrophication	0.95
Global warming	4.3
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	2.52
Human health damage	
Carcinogenics	80.85
Non carcinogenics	4.49
Respiratory effects	1.32
Smog	0.55

Benchmark product process tree (New)

Category	Renewable	Metal	Plastic(s)		Glass	Packaging (Paper)
Materials	Bamboo	Stainless Steel	HDPE, PP	Silicone	Tempered Glass	Paper Material
Application	Cutting Board	Knife Blades, Ladle	Tupperware, Packaging	Turner Head	Pyrex Container	Instructions, Printed Packaging
Process Steps	Harvesting Splitting Sizing Pressure Steaming / Carbonization Grading Kiln-Drying Millin Lamination	Excavation Processing Shipping Refinement (Electric Arc Furnace) Quenching Tempering Grinding / Polishing Drying Non-Stick Coating Application Oiling	Drilling Oil Extraction Oil Refinement Fractional Distillation Catalytic Cracking Polymer Bonding	Quartz Sand HEating Isolation of Silicon from Silica Methyl Chloride Combina- tion Distillation Water Addition Acid to Catalyst Condensation	Obtaining silica, boric acid, soda ash, lithium bicarbon- ate Batch Mixing Heating Firing Process Glass Molding Annealing Process Tempering	Trees Cut Down Debarking Wood Chipping Screening Pulping Cleaning Bleaching Printing Cutting
Use	Water + Soap	Water + Soap	Water + Soap		Water + Soap	
End of Life	Landfill	Landfill	Landfill		Landfill	Landfill

LCA Score Comparison

Benchmark Kitchen Tools + Paper Towels

Okala Score

5.9075

10 years = 3.8075 (benchmark products) +
2.1 (Paper Towels)

Product Lifetime:

Utensils 4 Years

Tupperware 4 Years

Supre System (Swedish dishcloths included)

Okala Score

2.29

10 years = 2.0722 (benchmark products) +
0.22 (Swedish Dishcloths)

Product Lifetime:

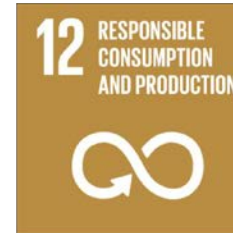
Utensils 8-10 Years

Tupperware 10 Years

UN Sustainability Goals



3. Good Health and Well-Being



12. Responsible Consumption and Production



13. Climate Action

The 3 UN Goals that resonated with our concept most.

Throw-away Culture

- From College Life to Work
- Moving to a new home
- Tend to dispose instead of recycling or reusing items

Heavy Use of Plastics

- Negative environmental impact
- Not Degradable /Recyclable
- Life cycle and end of life

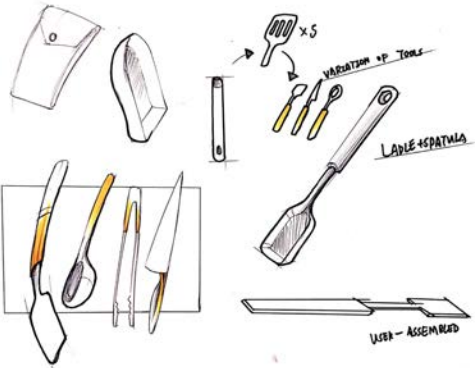
Difficult to Organize

- Starters buy unnecessary Utensils
- Hard to organize / differentiate
- A crowded mess in kitchen

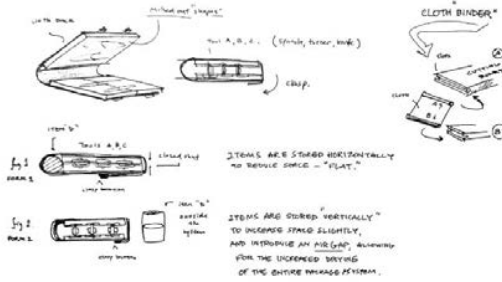
04

Design Ideation

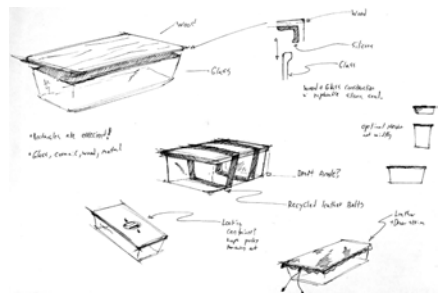
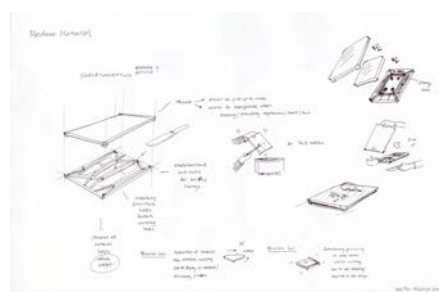
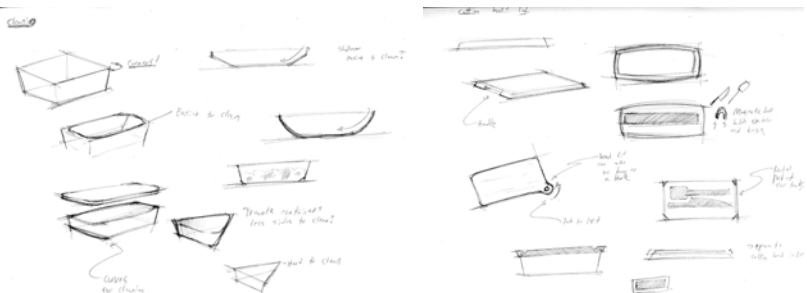
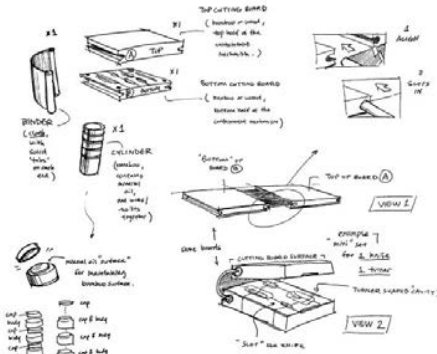
Initial Concept Directions - Integration, Multifunction



INTEGRATION. DRYING-STORAGE-BOARD(?) - UTENSILS, KNIVES, ..

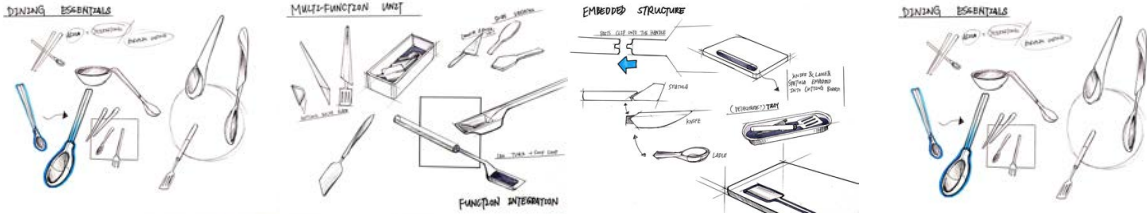


INTEGRATION. DRYING-STORAGE (UTENSILS + KNIVES). BOARD - CONTINUED

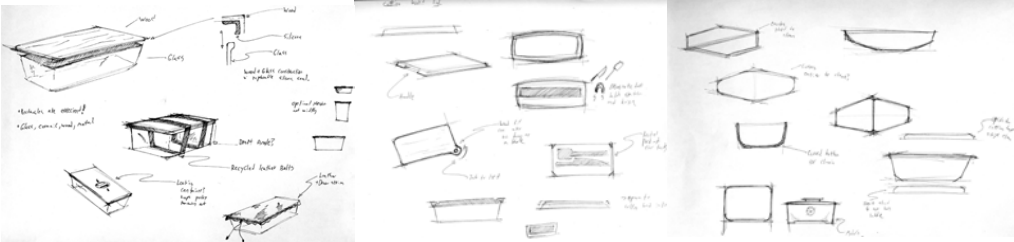


Objects can have multiple features, allowing users to have more product, while cutting down on material on the whole.

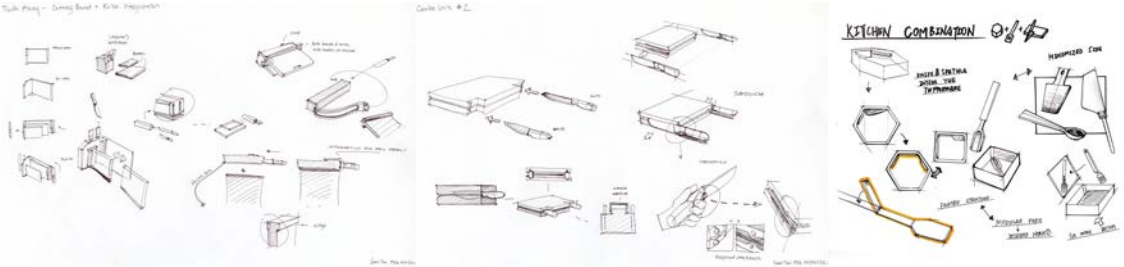
Early Ideation Summary



Modular systems, allowing larger tools to fit in smaller boxes



Hexagon boxes and multiple built in uses for lids



Packaging and creating a "kit"

Inspiration of Biomimicry

Chameleon's Tongue

This Robotic Hand Is Inspired By A Chameleon's Tongue

Chameleons Launch "Ballistic" Tongues - Biological Strategy - AskNature

Glue inspired by Oysters

Adhesive Is Both Strong and Flexible - Biological Strategy - AskNature

Lobster Concrete

Durable 3D Printed Concrete Inspired by Lobster Shells - Innovation - AskNature

Helical Pattern for Toughness

Helical Wound Fibres Increase Toughness - Biological Strategy - AskNature

Spiral Fibers Strengthen Tree Trunk - Biological Strategy - AskNature

Chimpanzees train the next generation simply by sharing tools.

Sharing Tools Passes on Knowledge - Biological Strategy - AskNature

Fibers in stems of bamboo use materials efficiently because of their arrangement

Fiber Arrangement is Highly Efficient - Biological Strategy - AskNature

Social

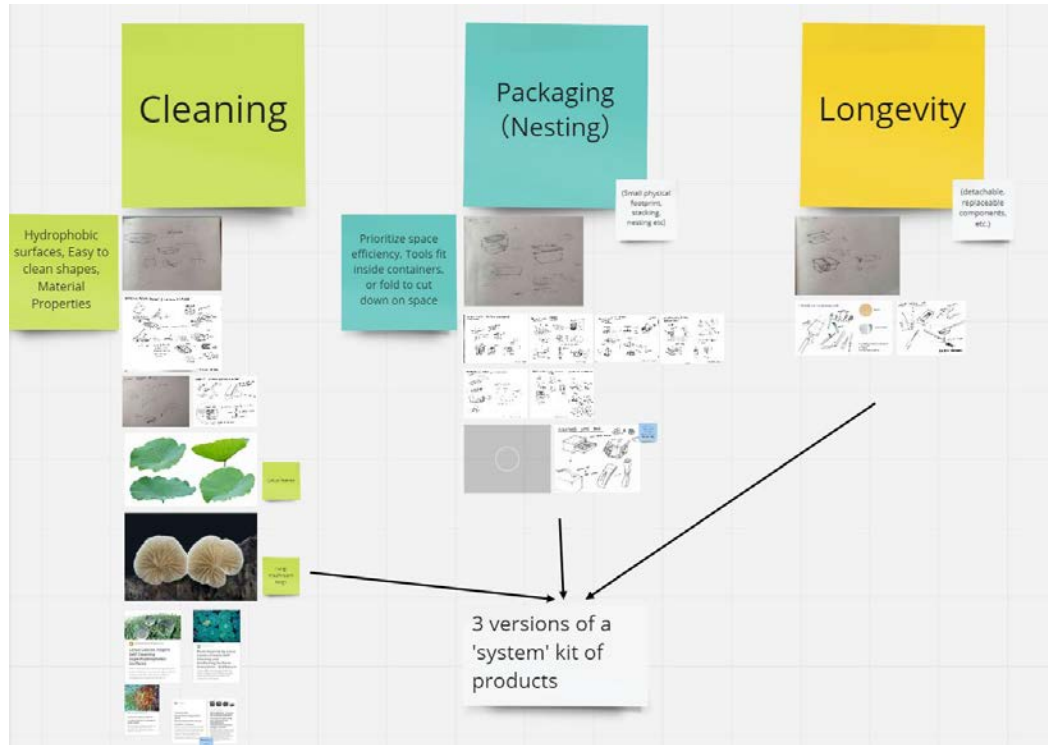
Protection

Material

Pollution / Impact on Nature

Anti-Bacterial

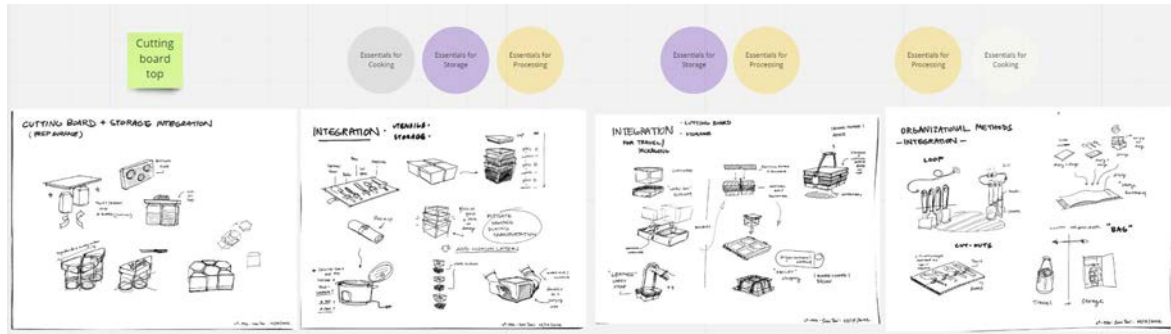
Categorization of Directions



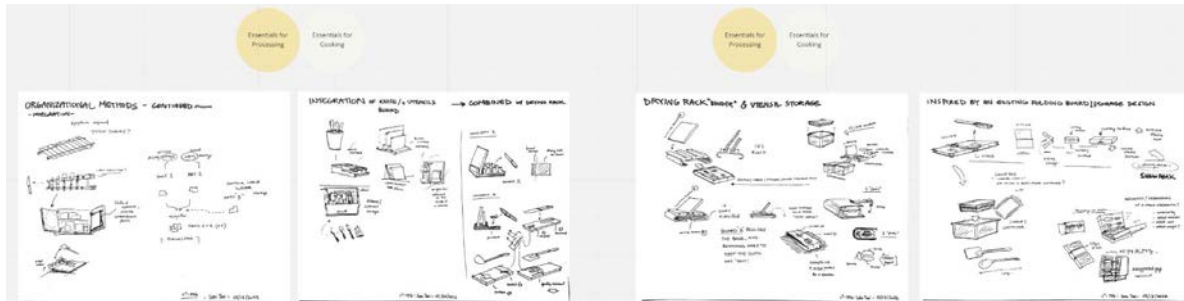
Putting it all together

This is a grouping of our concepts based upon what sorts of bio-inspired inspirations were used.

Refining necessities of a "Starter's Kit"



How to best create a dedicated "kit of parts" and how that should be packaged.



Finding the "necessary" cooking tools for the college cook

Simplifying for better cooking experience

Version 1: Hexagon/Bee hive

Hexagon design language, optimizes heating in a microwave, and tiles well

Form, texture and material-wise:
Hydrophobic surfaces, Easy to clean shapes, Material Properties

Key

- Essentials for Consumption (Cup)
- Essentials for Processing (Mixer)
- Essentials for Cooking (Pot)
- Essentials for Washing (Sink)
- Essentials for Storage (Jar)
- Essentials for Heating (Kettle)

Utensils in this kit

- Essentials for Cooking (Cup)
- Essentials for Storage (Jar)
- Essentials for Processing (Mixer)

INTEGRATION. DRYING-STORAGE-BOARD(?)
- UTENSILS, KNIVES, ..

ITEMS ARE STORED HORIZONTALLY NO BEVILE SPACE - "FLAT."

ITEMS ARE STORED VERTICALLY TO INCREASE SPACE SLIGHTLY, AND INTRODUCE AN AIR GAP, ALLOWING FOR THE INCREASED DRYING OF THE ENTIRE PHRASE SYSTEM.

CLOTH BINDER

INTEGRATION. DRYING-STORAGE (UTENSILS + KNIVES). BOARD - continued

VIEW 1

VIEW 2

THINNER SHAPED UTILITY

"Sheet" the material

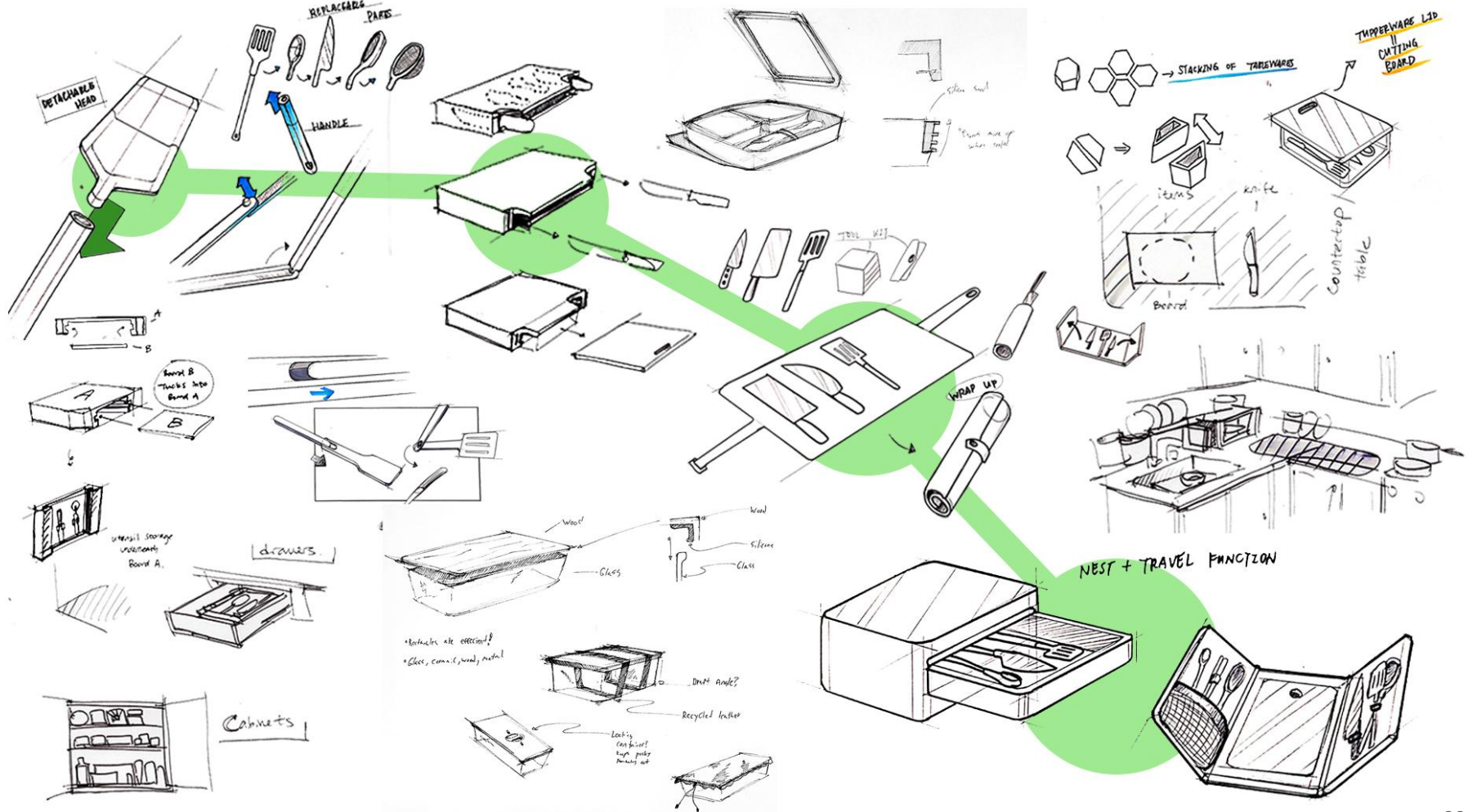
Version 2: Modular + Compact

Most space efficient, provides the minimum but necessary tools for college students

Integrated and simplified for the most demanded functions

Using as little material as possible, cutting down on shipping, packaging and cost.

Integrating multiple tools into an efficiently packaged kit that can be easily repacked and transported.



05

Mockup and Prototype Testing

Early Mock-ups Ideation



Using a knife with a "vertical grip" handle; designed for those with arthritis in the wrist. Found it to be difficult to store, alright to use.



Using cans placed underneath the cutting surface to simulate a taller cutting board profile.



Making a cutting board with additional elevation mock-up



Making containers more customizable with dividers

Tool Integration and Multifunctional Trials



Exploring cutting tools and gesture



Mock-up integrated tool's practicality



Stacking and nesting

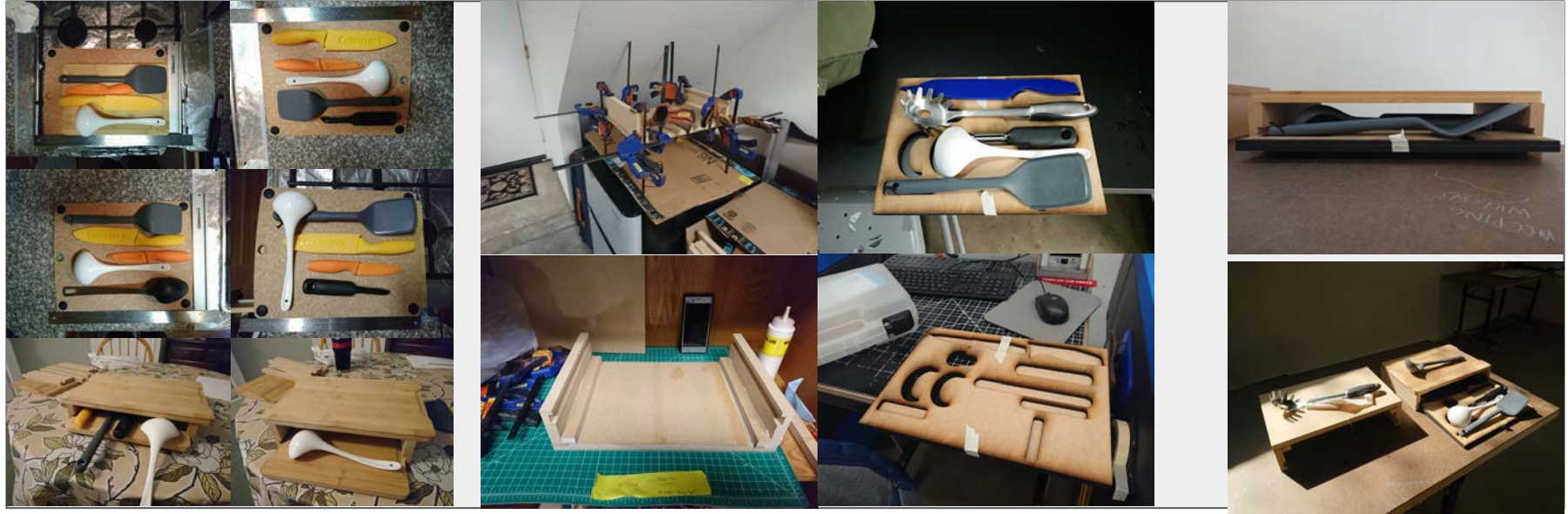
Prototyping the final version

Prototyping the cooking utensils to test out functions and measurement of size

CNC Milling and Wood Staining the Tools



Layout Exploration (Slide out Drawer Board Prototype)

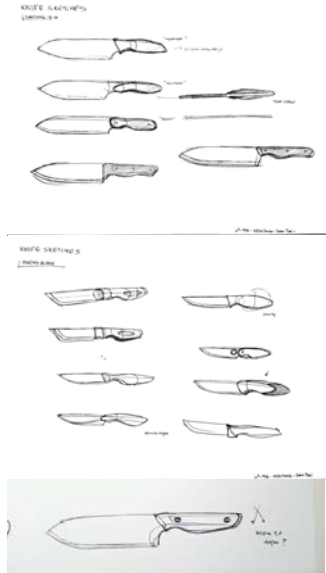


Exploring heights + layout

Construction

Mock-Up

Knives Form Development



Sketching exploration

Having the many flat iterations be tested, before adding volume

Adding volume helped guide decision making in CAD

Full scale Rough Prototype



Paper Prototyping

Checking fitment

In the kitchen



Utensil Pouch Sewing

Easy washing for college students

Knife and safety protection

Organizing system for convenience

Sewing



Sewing Test



Sewing the "band"

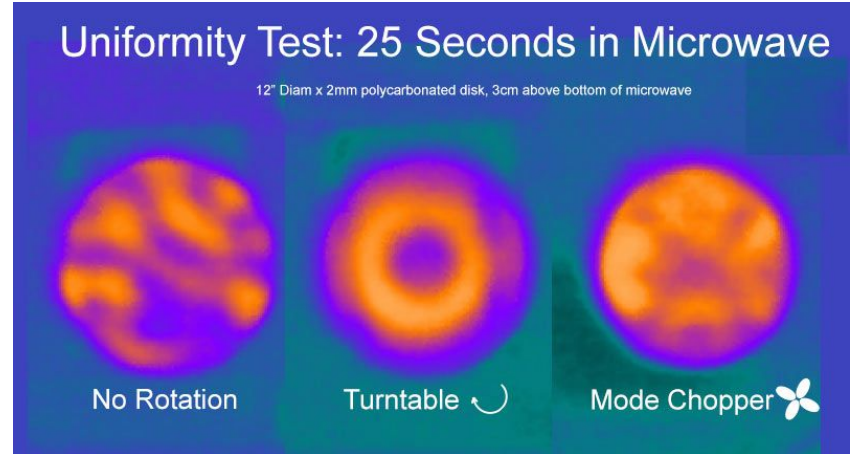


Measure twice, cut once.

Experiments

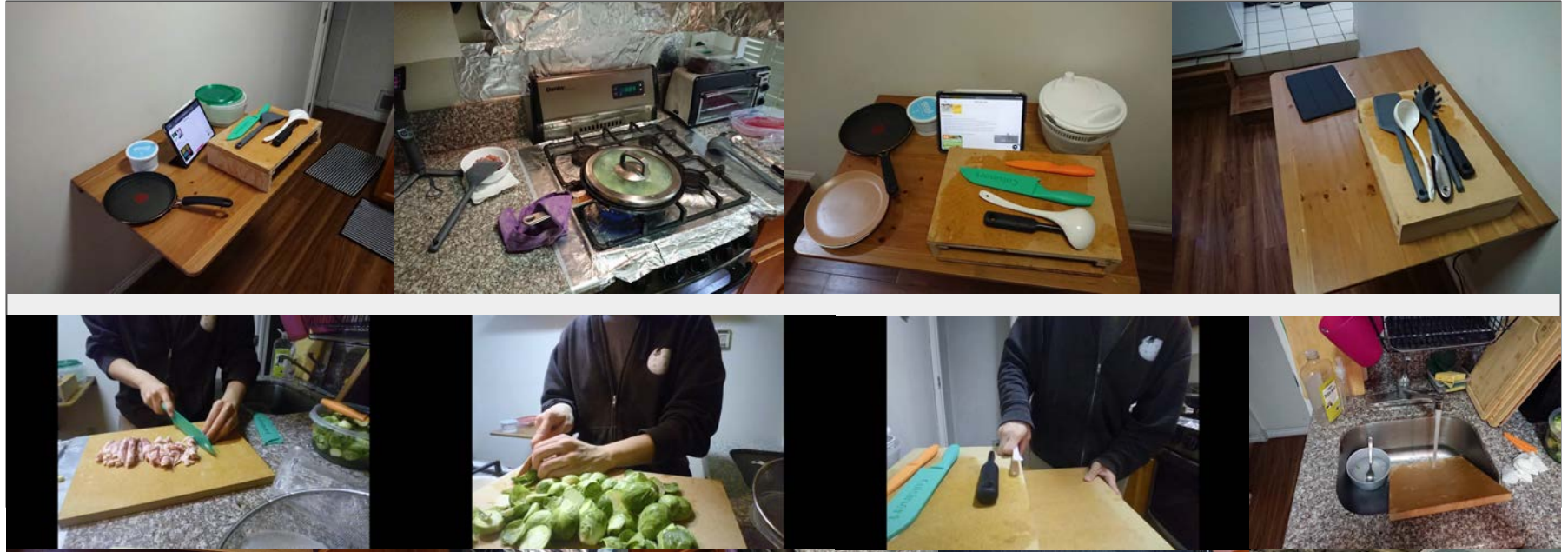


Chopping on the lid - found to be a bit unstable



Microwaving experiment

Kitchen Experimentations - Cutting Board Drawer Mock-up testing



Testing by making brussel sprouts with bacon

Kitchen Experimentations - Cutting Board Drawer Mock-up testing



Pros:

- Convenient location of tools for (this) recipe
- Raised cutting surface made for a easy transition into bowls/plates off from the board

Cons:

- Awkward to move without handles on the sides
- The need for space to use the kit
- Not having everything; still needed a meat thermometer, etc.
- The weight; this was heavy to move about
- Difficult to store upright;
- (More) difficult to wash due to awkward size + shape
- Tolerance of drawer slide was critical to the ease of use

Bacon grease and MDF. Mmm

Kitchen Experimentations - Supé Mock-up testing



In these experiment of making chicken meatballs with Thai curry sauce, I found both strengths and weakness to the system

Kitchen Experimentations - Supé Mock-up testing



Pros:

- Convenient location of tools for (this) recipe
- Sizing and number of containers was just right for double portions of the recipe

Cons:

- Awkward to move without handles on the sides
- Prototype cloth material of the wrap was too thin for the knives; blade tip frequently became stuck on the cloth - which the canvas material resolved
- The need to wrap, unwrap when I needed access to a tool
- The need for space to use the kit
- Not having everything; still needed a meat thermometer, etc.

This was fun to do.

06

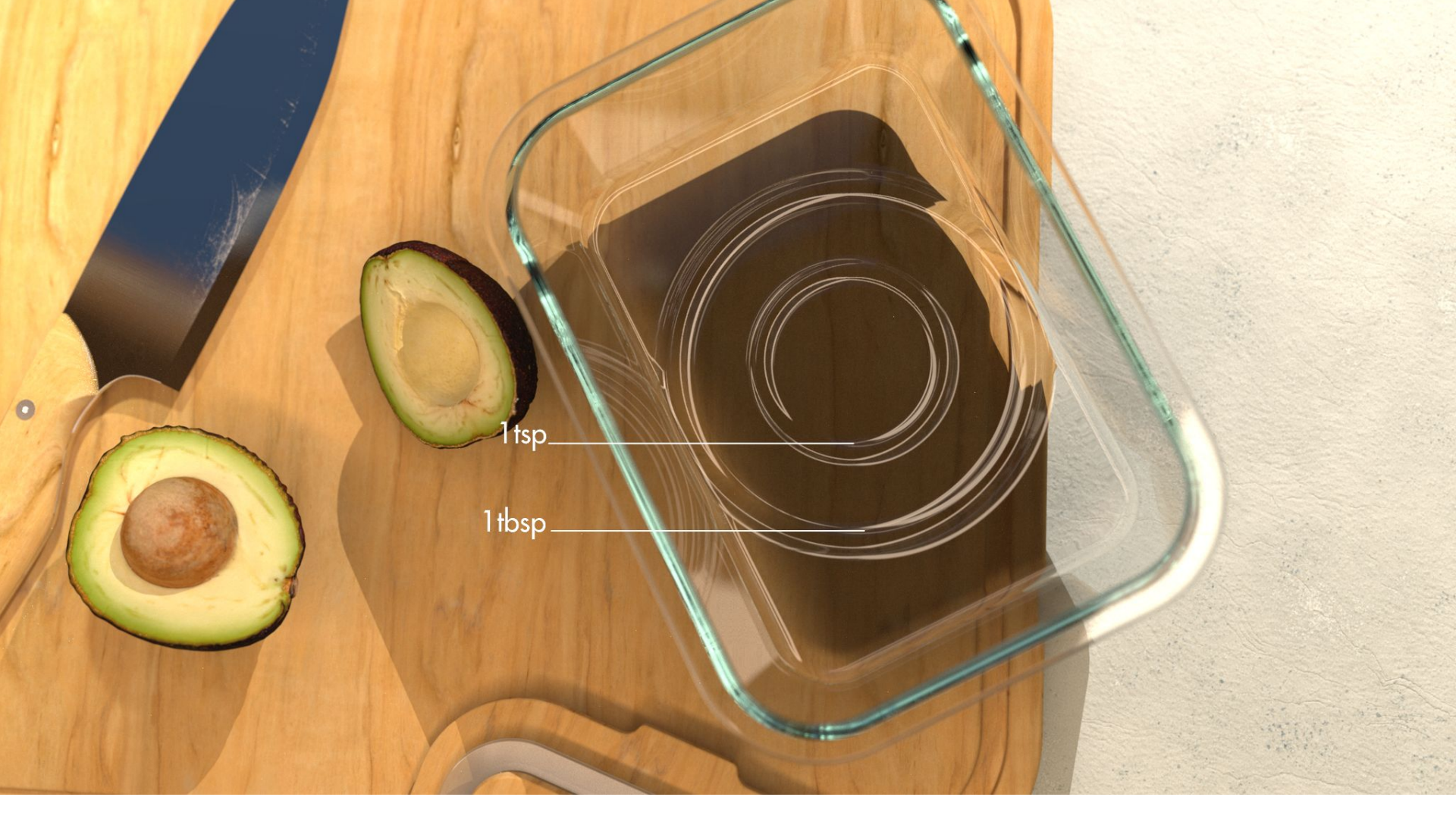
Design Refinement /Finalize

Final Renderings



Finalized "Supe" Design





1 tsp

1 tbsp

Santoku



Pairing Knife



Spatula



Ladle



Container



Lid

Storage Tray



Cutting Board



Gasket



Products in the Kit



Ladle



Spatula



Cutting Board

Products in the Kit



Knives



Food Storage



Cooking Tools Pouch
& Dishcloth

Durability and Interchangeability

Long-lasting utensils, all the essential functions that make cooking easier.

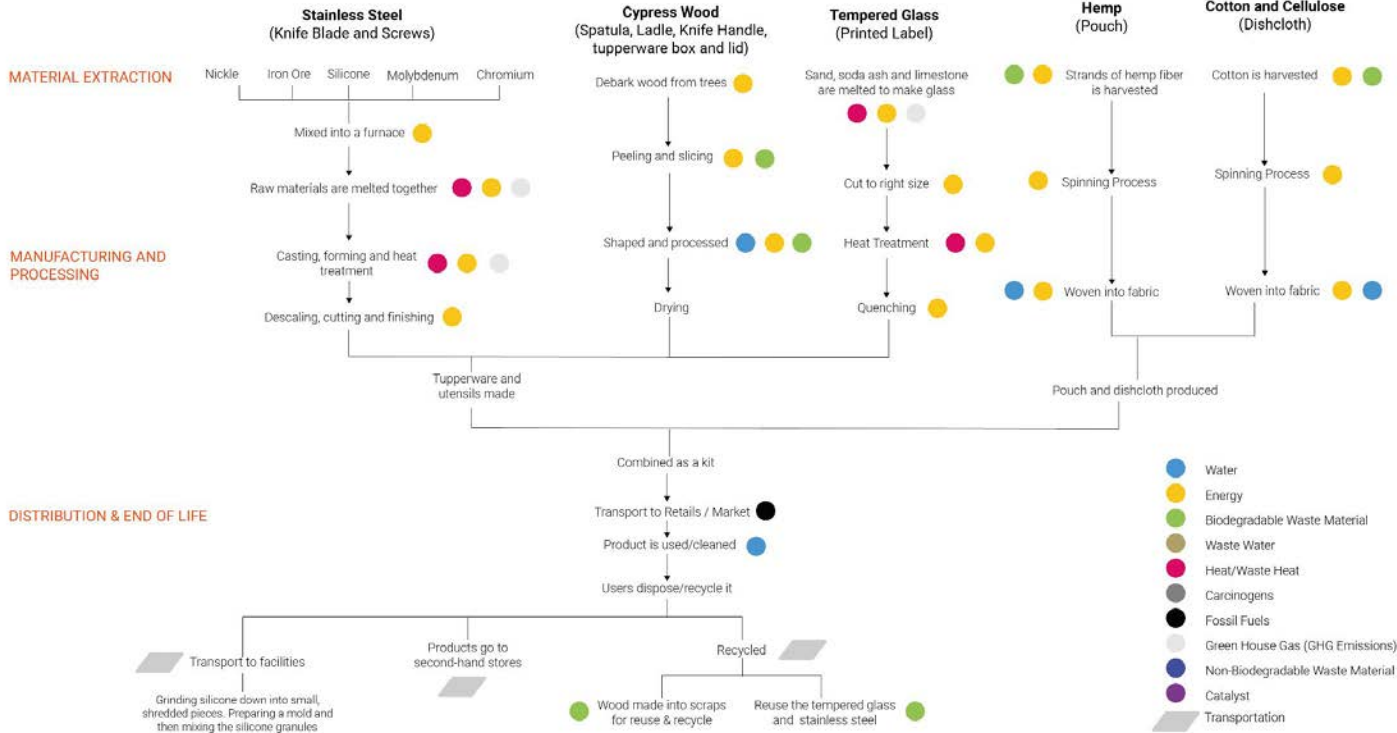


Repair broken components

Users can personalize products

Increases Lifespan

Redesign Process Tree



Goals and Recap

Design Goals

Remove as much plastics as possible

A starter kit for the college cook

Reduce environmental impact



Achieved

Zero packaging & waste, recyclable parts

Keeping the essential tools

Integrated functions

Products with longer life span

End of life: degradable and sustainable

Ergonomic forms, compact kit

Thank you!

Special Thanks To: Heidrun Mumper-Drumm
Jonathan Abarbanel



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