Hi–Yah!

Meal Kit

McKenna Burns
Gabriel Cortez

Our Year in Review

THE SYSTEM

We chose the subject of sustainability because of the immediacy
regarding waste and waste collection. In recent years we have heard that the recycling system is failing. There are reports of American recycling centers only reusing specific materials and China no longer accepting American waste. Recycling is enabling our society to think less about how American society consumes. Since our recycling system is failing it is now the responsibility of the companies to rethink materials, systems, and products. Large problems like this can only be balanced with baby steps. Our project does not address the systemic recycling problem and or the societal problem. Our project is not fully sustainable because it is close to impossible to create a closed loop system using FDA regulated food safe materials. THAT BEING SAID our lunch kit that we lovingly crafted is a hell of a lot more responsible and considerate of material choice. Our kit uses the least amount of plastic as possible (saving cost on shipping and manufacturing)and has functionality far greater than its competitors.

WHAT IS SUSTAINABILITY?

At the beginning of this project we thought we knew what sustainability meant. “It means when something is eco-friendly... right”? Well no... after we sat down with U-Arts professor and permaculture expert Anthony Guido we realized that sustainability has no true definition. It’s typically a buzz word used for retail companies to make it seem like they care about the environment. With that knowledge we had to define sustainability for our specific project. That for us is to use as little plastic as possible.

THE PROCESS

Capstone has pushed us further than ever. When we started this project we didn’t know what sustainability meant, regulations regarding food packaging, or packaging techniques. Our process had a few dead ends which felt crushing at times. However with aid from: our professionals, professors, classmates, Mac Miller and Frank Ocean we chugged through. Multiple times knowledge from experts created insights; turning dead ends into clear paths. Our strength was creating paper prototypes. During that period we could produce multiple prototypes a day. Our weakness was and still is graphics. We are not graphically inclined so creating them took forever. Additionally without a partner this project would not be as fortified. Through countless late nights, tons of iterations and lots of talking/sketching through this project, having someone there to motivate workflow was essential.

Index

AT A GLANCE


USDA ORGANIC
16g of Protein
Organic!
Hi-Yah!
Honest Apple Juice
Honest KiDS
Ham & Cheese
Net Wt. 10.2 oz

An easy to open refrigerated snack package utilizing graphics to educate the origin of food using the least amount of materials as possible.

MEET THE CAST

ANTHONY GUIDO

INDUSTRIAL DESIGNER

Professor at the University of the Arts, permaculture expert and thinker. Tony is good at providing a fully 360 degree view of a subject. He assisted us at the very start of the project; redefining our thoughts on sustainability and the American recycling system. We both enjoyed his words,“Recycling may be the crack to our consumption”. After a chat with Tony we realized the depth of this issue.

DR. RON KANDER

MATERIALS ENGINEER

Associate Provost for Applied Research at Jefferson where he manages the Applied Research activities across the university in order to provide faculty with professional development opportunities and support services to improve overall research productivity. He aided us in the material research side of the project.

MARIBETH KRADEL-WEITZEL

GRAPHIC DESIGNER

Assistant Provost for Academic Affairs and founding Director of the MS Health Communication Design program at Thomas Jefferson University. We went to Maribeth and she helped us with functionality and graphic integration. Maribeth is also a mother of two, so she gave us insights to her as a parent and her children's food preferences. She also gave us insights into the packaging industry.

TIM BROWN

PACKAGING DESIGNER

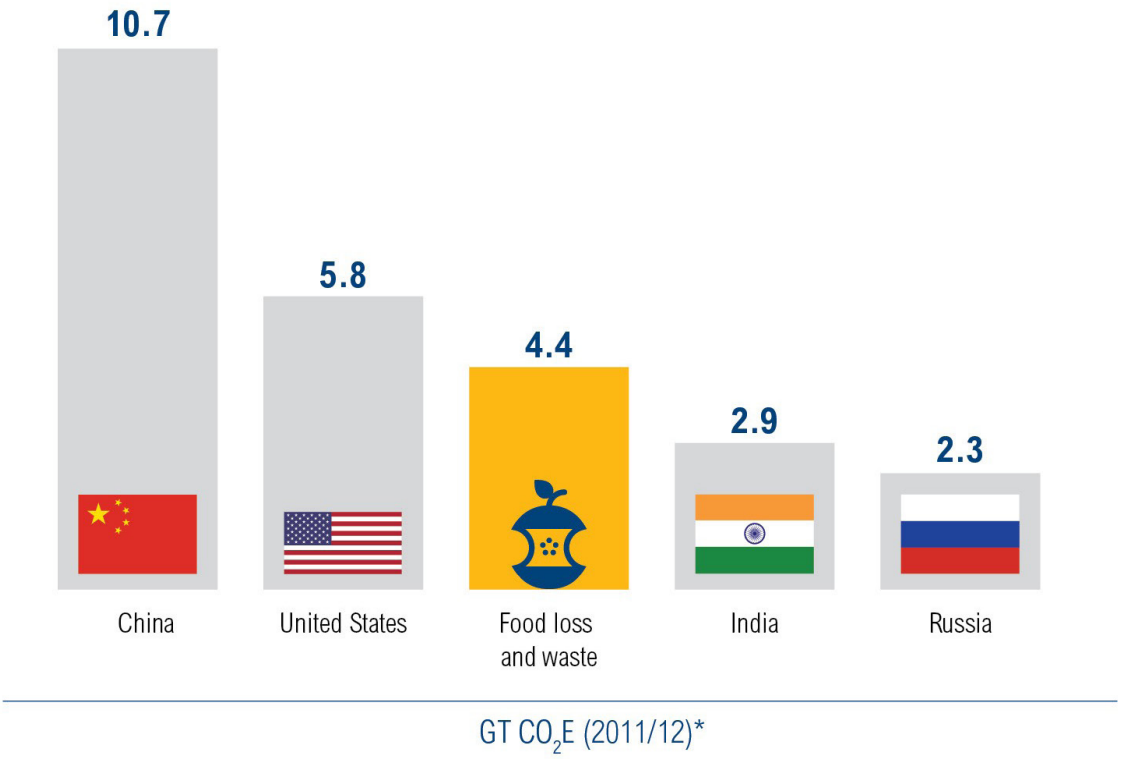
Tim is a packaging designer at Campbells and an alumni of Jefferson University. He has helped us with manufacturing, printing and material information. Tim also gave us insights into user testing techniques and tips. Things to keep in mind when designing packages specifically for children and FDA regulations. He was also able to help us with shipping requirements, shelf space, and how these can effect consumers buying behaviors.

RESEARCH

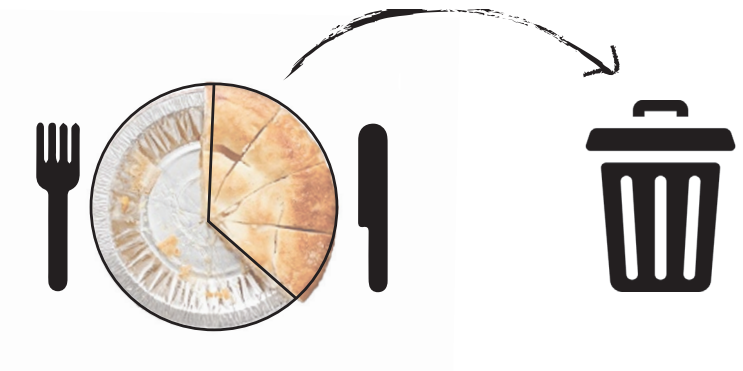
FOOD WASTE

Food waste is one of the most overlooked drivers of climate change. If food waste were a country, it would sit third behind the U.S and China regarding its impact on climate change. Throughout the food production system, from production to consumers, numerous greenhouse gases are emitted.

Greenhouse Gas Emissions



40% of all food produced in the U.S is wasted. In developed countries the majority of this waste occurs post production, in the hands of the consumer due to soilage. Food is not consumed in a timely manner and goes bad, leading people to throw it out. One of the most effective solutions to this problem is packaging. Modern packaging techniques, utilizing mostly plastic, can extend a foods lifespan by weeks or even months.



40% of your pie in the trash

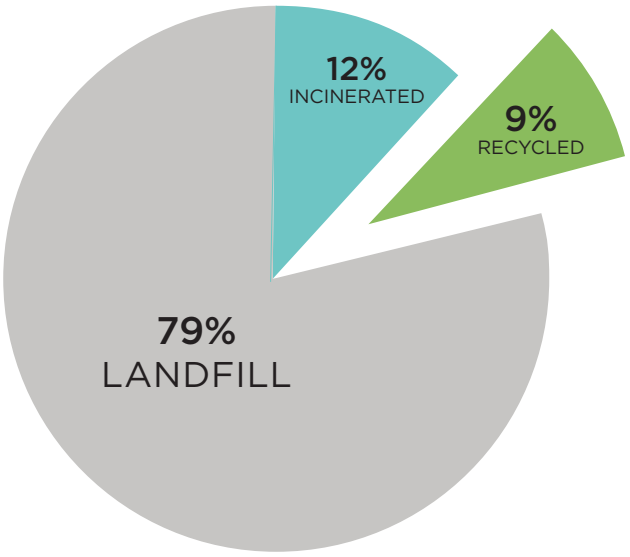
Plastic packaging is the most commonly used method for preventing food waste. This packaging keeps food fresh longer, which allows consumers more time to eat it, and also prevents food from going bad during transportation. New technologies such as 'modified atmospheric packaging insert a certain mix of gases to extend shelf life. Plastic is also the most effective barrier from oxygen, exposure to oxygen is what spoils food.

However, the **waste produced from plastic packaging is cause for concern**. In recent years there has been an increased awareness of climate change and single use plastics have been a topic of debate.

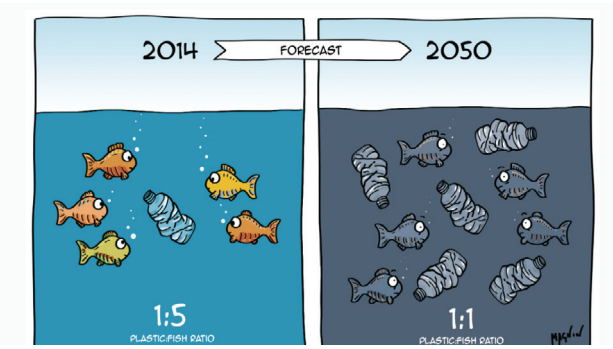
A PLASTIC PLANET

Of the 8.3 billion pounds of plastic that has been produced only 9% of it has been recycled. While 12% of it has been burned, the remaining 79% ends up in landfills or even worse litter in the environment. Behind cigarette butts, **food packaging is the second most common type of packaging found in the environment.**

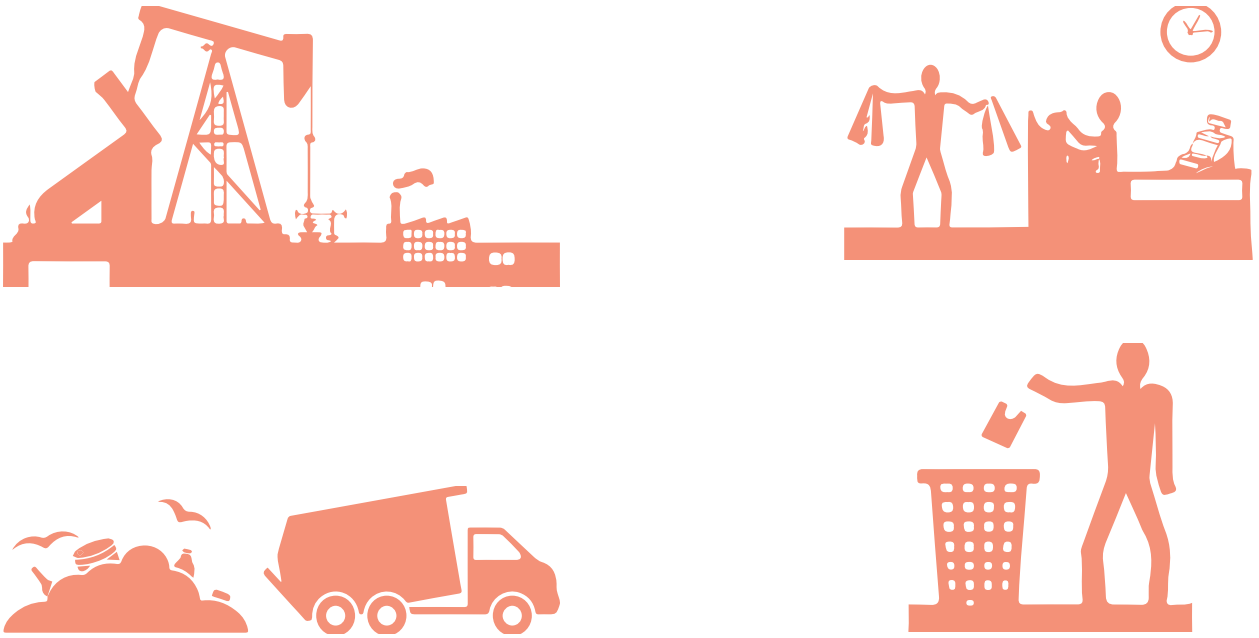
Plastic Waste Management



The world's oceans could contain more plastic than fish by 2050. Over time plastics break down into smaller pieces called micro plastics, which end up in our food and water systems. This problem is not just affecting the environment and other animals, but our health as well. **The plastic that was once used to package our food has found its way into our food.**



From cradel to grave plastic is inefficient and unsustainable. Plastics can be made from a variety of materials but most are made using crude oil. Oil fracking is an extremely disruptive **process that has contaminated drinking water, increased air pollution, triggered earthquakes and caused ecological disasters** such as the Deepwater Horizon oil spill in 2010. The greenhouse gases emitted from plastic production and incineration from now until 2050 would almost be equal to 50 times the annual emissions from all coal power plants in the U.S.



Life Cycle of a Plastic Bag

Single use packaging was a business strategy created by the plastics industry. In the 1950's when plastic was booming, manufacturers had to find a way for consumers to keep buying their products. One of their strategies was producing "non-renewable' packaging, a package that was only meant to be used once then thrown away. What manufacturers did not consider is that all this production produced a lot of trash. Trash that consumers were not accustomed to.

After Vermont passed a law banning throwaway bottles the packaging industry got worried and took action. The top manufacturers teamed up to create the 'Keep America Beautiful' campaign, an advertising effort encouraging people to properly dispose of their trash and not litter. Through this campaign they were able to change the debate of America's garbage problem. **Packaging manufacturers shifted the focus from themselves to the consumers, or 'litterbugs.'** Currently it is still up to consumers to lower their waste output.

A WEEKS WORTH OF WASTE

Zero Waste Life

There is a large movement by individuals to live waste free. **People are drastically changing their habits so to minimize waste consumption.** They replace all items that are not used for very long. For example: instead of getting a expensive late everyday and throwing out the lid and cup; they will make fresh brewed coffee with their own mug. They also will repair or up cycle items when possible prolonging items lives for as long as possible. Living waste free is a great idea but very close to impossible to achieve. Even the more efficient zero waste participants cannot go an entire year completely waste free. The most successful zero waste participants can fit all of their waste into a single glass jar at the end of the year.

Plastic Food Waste Sources

Vending machines are a popular stop in schools, offices and public places. All items are unhealthy and wrapped in plastic. We fell victim to the vending machine during our experiment more than once.

Fast Food chains are a large producer of single use packaging. Everything is wrapped individually regardless of eating in or out and everything is single use.

Airlines produced 5.7 million tons of waste in 2016 alone. All meals and drinks are served in plastic containers, designed only to be used once.

Our Waste Experiment

As an experiment **we collected all of our trash to gauge how much waste we used in a week**. During the week we tried to pack our own lunches, drinks and snacks in reusable lunch boxes and cups. However during the week our trash collection grew and it became painful to watch the pile grow. At the end of the week we compiled all of our trash to see what is was mostly composed of. It contained a lot of paper towels, some packaging from random items we purchase, it mostly contained packaging from food. Packaging from convenient foods like chips, school salads, plastic drink bottles and granola bars. This zero waste experiment was very difficult and taught us that food was the hardest item to minimize waste.

This experiment gave us some insight into where our plastic waste was coming from. These are some of the main sources of plastic waste as well as other sources we found through research and reflection.

Plastic Food Waste Sources

Take out and delivery is becoming more and more popular. All the food to go requires single use packaging that wouldn't have been used otherwise. From cups, containers, sauce packets, and plastic cutlery all this plastic adds up quick.

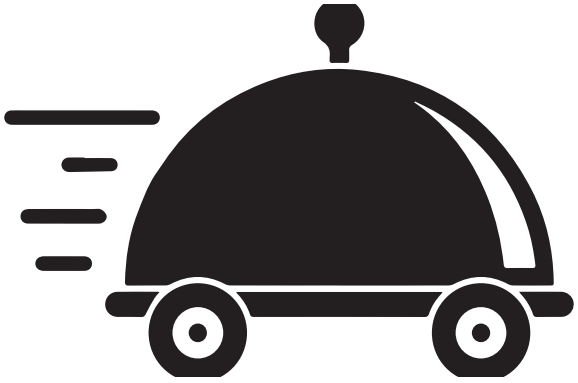
Cafeterias and Cafes are a large contributor of plastic packaging and tableware. Drinks are served in plastic or paper cups. Food is served on a plate destined for the trash, and snacks are packed in various plastic containers.

Grocery stores are overflowing with plastic. It only took one visit to the grocery store to realize supermarkets were one of the worst offenders of plastic packaging. From veggies and meat to cereal and chips it's all wrapped in plastic.

CONVENIENCE CULTURE

Food is available anytime, anywhere. In the U.S. we live in a fast paced society. Our culture encourages speed and efficiency and values work above all else. These customs have found their way into our food culture as well.

Our food system is centered around convenience. Companies like Amazon delivering groceries right to your door, meal-kit services providing all the necessary ingredients for a specific recipe, and take-out and food delivery services like Grubhub and postmates gaining more and more popularity.



24/7 Food Delivery Services

POSTMATES

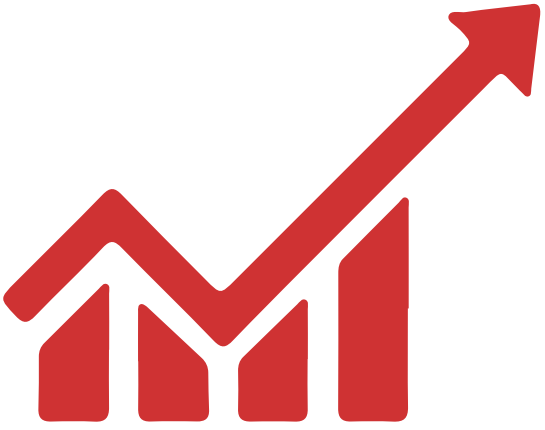
seamless
HOW NEW YORK EATS

goPuff

Uber Eats

GRUBHUB

DOORDASH
delightful delivery



Online Food Delivery Growth

Online food delivery is expected to grow 15% in the next two years. **This change in our food system is also changing our food habits.** Humans form habits from very young ages that continue into adulthood. Children tend to take on the attributions of their parents. This applies to food as well. For example, if a child grows up in a home that prioritizes cooking and views meal time as a social experience, they are likely to carry these habits with them into adulthood. The same can be said for the opposite. Food plays a large role in regional culture. It's a bonding agent for humans. The process of cooking and eating with the ones around you helps strengthen relationships.

Food also ties individuals to the environment around them. When buying produce you learn what food is in season. It also allows for the buyer to choose if they want to buy food locally, investing in the immediate community surrounding them. The ritual of buying your own groceries also allows for the possibilities to stumble upon new items that entice buyers to purchase because of sales.

Food Cultures Around the World

Other countries treat lunchtime as a class. In France, they recognize that **children need to learn what a balanced diet looks like.** They have a chef plan their meals by month to make sure they are getting a variety of food and introducing new recipes. They also eat with real tableware to learn food educate.

In J**apan one elementary student a day serves all of their classmates**. After they serve the food all the students have a dedicated time of lunch to quietly eat without talking. Then a time at lunch dedicated to eating. After all of the children eat their meals they clean up and thank the student who helped serve their meals. This **teaches students the importance of helping others while getting them involved in the meal making process.**

CURRENT SOLUTIONS

Plastic waste is an issue, and our current management solution of **recycling is not working.** As food habits change, companies and individuals are looking for ways to cut down on plastic.

Reusable containers have become a trend over the past decade. Yet 'Reduce' and 'Reuse are the two least talked about "R's" of 'Reduce, Reuse, Recycle. Within the past decade reusable water bottles have become more and more common place, and people are trying to use reusable lunch containers and utensils. In a perfect world everyone would carry their own tableware and takeout containers everywhere they go. Unfortunately we do not and many people see these as inconvenient or often times forget to bring these items with them. They **require behavior change from individuals**, which is hard to create without incentive.

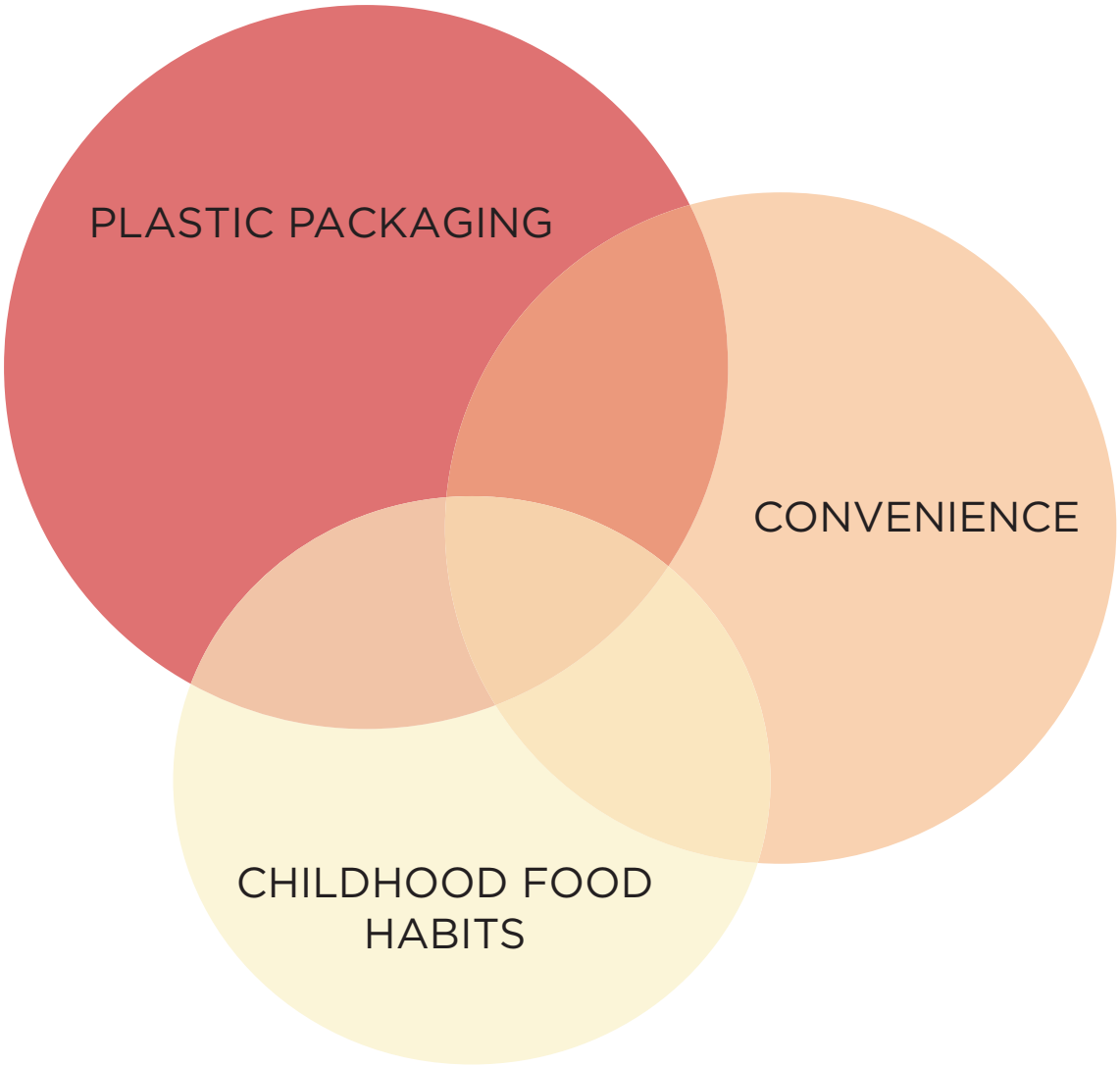
Alternative materials are starting to be used in place of plastic. As takeout and delivery services grow restaurants are starting to use biodegradable and recyclable paper containers. There are a few companies that are trying to make a change in the way they package their foods. There are brands that use recycled plastic for their packaging. Some brands are able to use wax paper wrapping depending on the product. Bioplastics are plastics made from more renewable resources that degrade quicker. These **bio-plastics are not shelf stable** though, since when food touches them they begin to degrade.

Meal - Kit services are a current trend that are only on the rise. Throughout our research we saw many variations of this concept, a conveniently packed meal kit that provides all the ingredients and teaches the consumer how to prepare and cook the recipe. We **liked how these companies encouraged at home cooking with real, healthy ingredients.** These two aspects are important to creating a more sustainable food system, but the **amount of packaging they required was far too much** which was disappointing. This **method of food delivery is not efficient.**

Zero Waste grocery stores eliminate all forms of waste from their business. Customers bring their own containers and fill what they need from large storage bins. These are a slow growing trend, but are having difficulty in the U.S. Consumers feel these places are inconvenient having to bring all your own containers. **Food sold at these stores generally requires cooking**, there are no ready to eat meals available. Food shopping at a place like this requires planning, which many people do not do. Once again, **this solution requires behavior change** with no monetary incentive.

KIDS SNACK PACKS

We wanted to choose **a current product that encompassed our key insights of plastic packaging, convenience, and childhood food habits.** Through research we found an **opportunity in the children's snack pack market.**



Market Opportunity

After numerous trips to the supermarket we saw an opportunity in snack packs, specifically childrens. Currently Lunchables dominates this market and has not evolved its product in decades. The majority of this market is filled with snacks that are unhealthy and its branding and messaging are not current. Consumers are looking for an eco-friendly, healthy option.

Plastic Packaging

The classic ‘snack pack’ has not changed since their start. Across the snack pack market there is a variety of food options, but the package is consistent. A plastic tray sealed with a plastic film, contained by a cardboard outer. There has been no evolution of this packaging, and with growing public concern about our environment there needs to be.

Convenience

In an ideal world we would change this culture, and have people eating fresh, local foods at home. We realize this would require an entire overhaul of our current food system, and is highly unlikely. Convenience food is the new norm, and if the market for these products exists they aren’t going anywhere. So we set out to make a better option. Although our product may not be truly sustainable, it is an improvement when compared to the current snack packs on the market.

Childhood Food Habits

When talking with people about habits and our food behaviors we found they generally relate back to our childhood. Realizing this is such an impressionable time we felt redesigning a product for children could potentially have more impact going into the future. By changing the way children eat, what they eat, what they eat out of, and the experience around mealtime has the potential to have a lasting impression in a child's life. It is much harder to have this same impact for adults.

Fun Factor

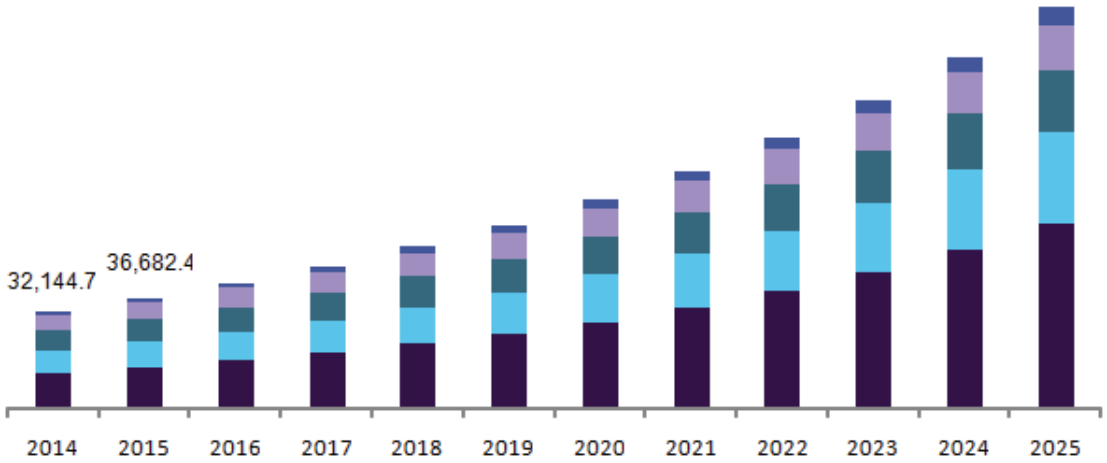
The last reason we choose kids refrigerate lunch meals is because their fun. They have the potential to be made using unique and different forms. The design criteria for children's products include playful engagement, and this is not the same as adult products. Kids products need that wow factor to entice children to want it; that includes: fun graphics, fun forms and games. The playful aspect to this project really awakened the childlike side to us.

MARKET ANALYSIS

GROWING INDUSTRY

Ready-to-eat food is currently the largest segment of the food industry. Due to changing lifestyles and food habits the snack industry is rapidly expanding. In the U.S. the snack food industry generates around 30 billion in annual revenue.

U.S. Healthy Food Market Revenue (USD Million)



HEALTHY OPTIONS

Consumers are opting for multiple smaller, snack sized meals throughout the today compared to full meals. These consumers are also becoming more and more health conscious. The organic snack food industry is expected to triple in size by 2025.

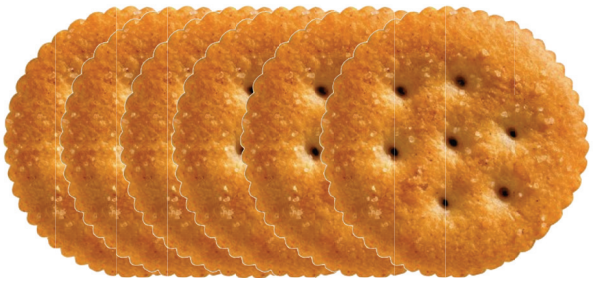
	Lunchables	Armour	Good & Gather
Top Market Competitors			
Common Variation	Pizza Kit	Cheese & Cracker Kit	Cheese & Cracker Kit
Price $	$ 1.35 - $ 3.69	$ 1.35 - $ 3.69	$ 1.35 - $ 3.69
Beverages	Kits with and without juice pouch	Kits with and without juice pouch	No beverage included
Dimension (in) L x W x H	7.5 x 5 x 1.5	7.5 x 5 x 1.5	7.5 x 5 x 1.5
Plastic Net Weight (g)	18 g	18 g	17 g
Net Paperboard Weight (g)	44 g	42 g	20 g

INSIGHTS

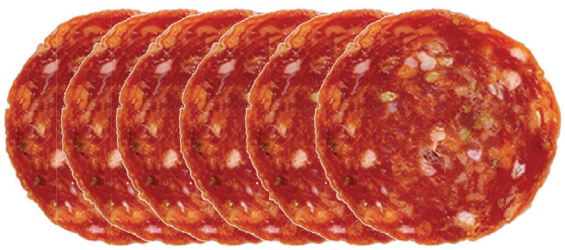
- Most common variations are cheese and crackers and pizza kits
- Largest package is pizza kit
- Amount of plastic is consistent throughout market
- Tray dimensions are the same
- Beverages make overall package larger
- Good & Gather only competitor that offers healthier food options

WHAT IT HOLDS- CRITERIA

We modeled our food based on Targets snack packs, they are just like Lunchables but healthier. All of Target's meal kits are organic, and they use less processed foods. The juice box that we chose is Honest Kids Organic Juice Boxes. Compared to other juice boxes they are medium sized and organic, which adds extra value and fits with the rest of our organic food. This also decides the size of the container we create. The food must fit inside.



6 Crackers 1.25" Diameter



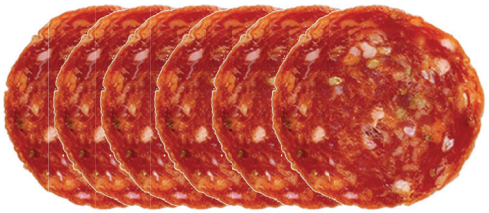
6 Pepperoni 1" Diameter

6 Cheeses 1" Diameter

Fruit Snacks 1 oz

3 Pizza Crusts 3” Diameter

Shredded Cheeses .6 oz



6 Pepperoni 1” Diameter

Pizza Sauce 6 oz

CONSUMERS

Our snack package needs to appeal to children, but also their caretaker since they are the ones who are actually purchasing our product.

The Busy Parent

We found that parents are either pinched for time, or want a simple solution they can buy for the week. They are usually not spending much time making the purchasing decision and want something they know their kids are going to eat.

The Eco - Conscious Parent

Through research we found that many parents tended to stay away from lunch kits not only because they were unhealthy, but also because of the plastic packaging. These parents tend to buy organic foods and snacks and are more likely to pack their child's lunch. There is not a ready to eat lunch kit on the market that meets their needs.

Babysitters & Guardians

Babysitters or other family members watching a child seem to gravitate towards easy, fun meals. They want the child to enjoy their time with them, but also know they are well fed. Getting kids to eat can be difficult especially when they are not your own.

Children (Ages 5-12)

Children these ages have lower dexterity and sometimes struggle with opening packages.
Want something fun to bring to the lunch table
Make fun creations with their meal kits
Unaware of food sources
Still learning about diet
Views school lunch as social currency

Hungry Teen (Ages 12+)

While these types of lunch kits are usually made for children, we are aware of the fact that many teenagers eat them as well. These consumers tend to have more control in what their parents feed them, and also have spending privileg-

Observing Snack Packs

We observed the way children interact with various snack pakcs. We found five problems we can resolve, each one of the observations will inform our design moving forward. Our final design will resolve all of these issues.

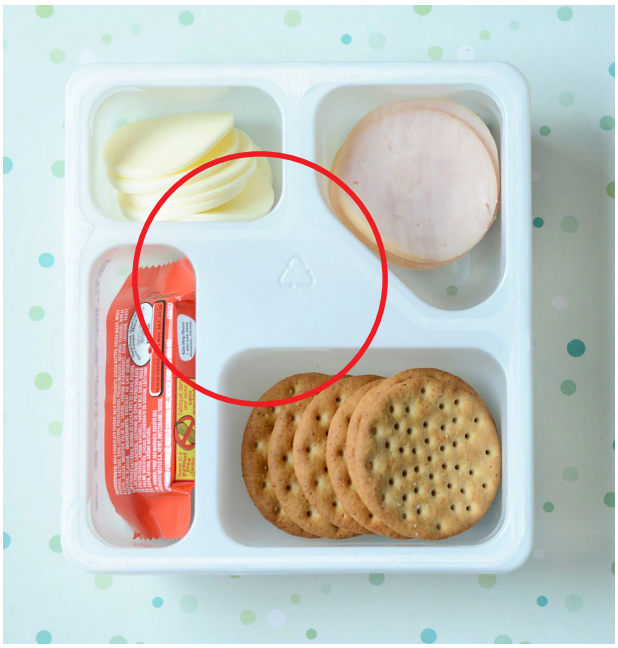
PROBLEM 1

NO PREP AREA

We observed young child with low dexterity try to open the film top on a Lunchable the food almost always explodes everywhere. This is because young children don't have control due to lack of muscles. The explosion causes food go everywhere you don't, even possibly the floor.

PROBLEM 2

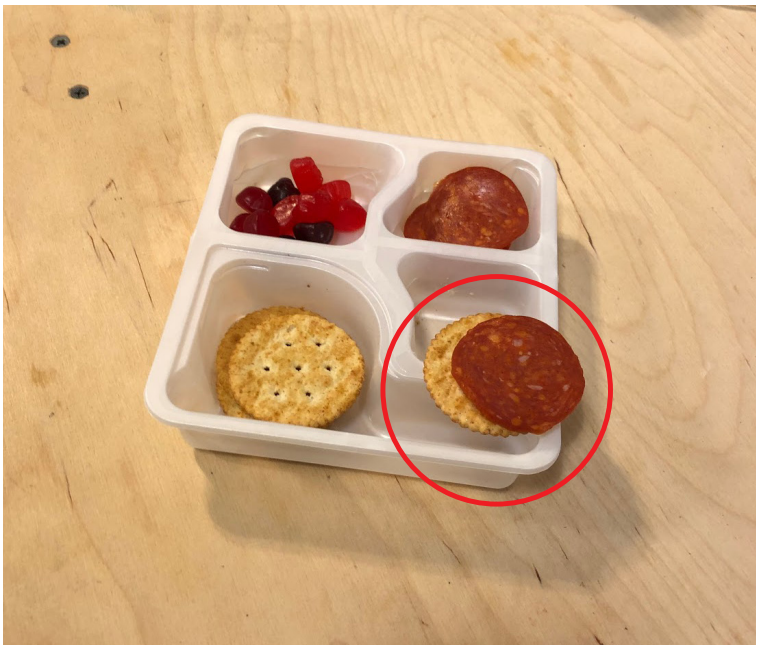
WASTED SPACE



There were large parts of the trays that were not being used. We thought that they did that to make their package look bigger with more food inside. This problem also affects shipping because they are losing space and money when shipping food. It's also possible that they make a few tray shapes for different meals to save cost on tooling for production, however in the long run they are still losing money due to shipping.

PROBLEM 3

NO PREP AREA



There are no place to put food if you wanted to stack it. Sometimes kids will use the edge of the inter container to rest food on top of. This surface is not adequate and sometimes causes food to fall over. It also takes a good amount of dexterity to stack up everything.

PROBLEM 4

PACKAGE HAS NO FURTHER USE TO CONSUMER

Brands like Lunchable had a cardboard box that encased the food packaged on the inside. This exterior would be used once and thrown away immediately. We believe that there is opportunity to improve on the outside container and give it another function.

PROBLEM 5

GRAPHIC IMAGERY

The final observation was the lack of nature. Food is directly related to nature and the current market does not utilize that. Some use characters from pop culture to draw the attention of children. Without some connection nature and food become disconnected. Habits form early, from an early age children should have more of a connection to their food. We believe by adding natural elements we can passively educate children so the associate food with nature.

DESIGN & DEVELOPMENT

FUNCTIONALITY

Easy to open for those with low dexterity (children 5 & up)
Prevent any food explosions and create as sense of independence.

Exterior has another use
We want it to serve another function so it doesn't get thrown away immediately.

Hold as much food as competitors
So that we can compete with the most popular brands and have a satisfying meal.

PRODUCTION

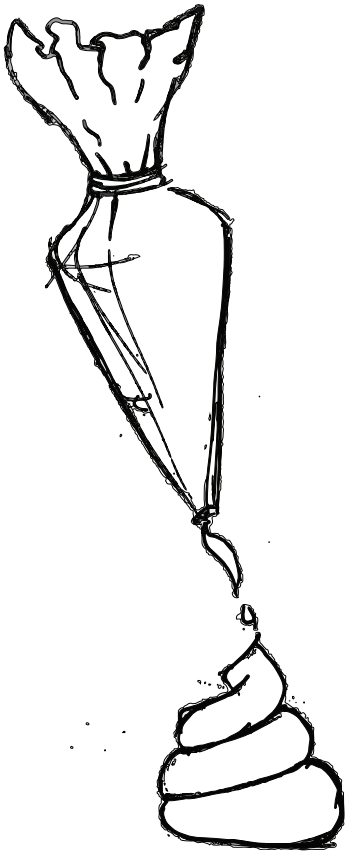
Use only biodegradeable materials
To eliminate any materials that will spend the remainder of their life in a landfill.

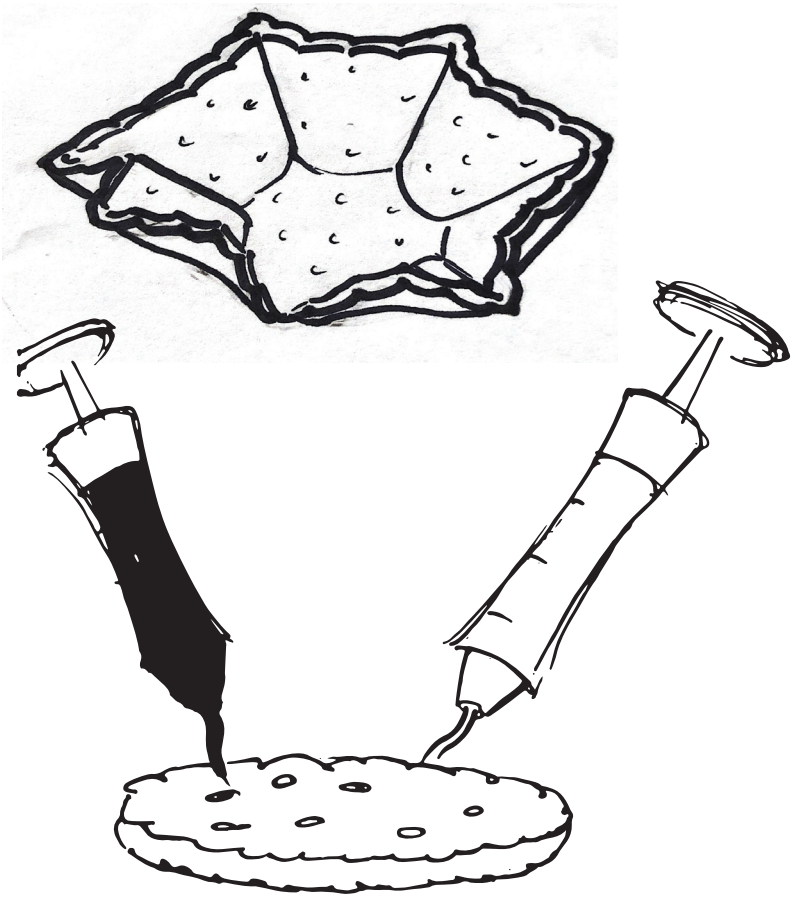
Streamline production
To ensure that are product is as efficient as possible, not to waste any energy or materials.

IDEATION

FIRST CONCEPTS
One of our initial concepts was to **design both the package and the food** inside. We felt that not only the materials were important to the sustainability of the project,but also the food. We wanted to enhance the experience and encourage creativity during mealtime.

Observing how kids struggled with the sauce packet we thought about **different ways to apply sauce to their pizza crusts.** We also thought about how we could do this in a way that would **enhance and support a childs creativity in their meal creations.**





TURNING POINT
After talking with our professors and food scientists, we came to the conclusion that **designing food was out of our realm of expertise.** We are industrial designers, not food designers. So we moved forward with the intention of **designing just the package and not the food.**

REUSABILITY
Moving forward in our discussions we kept asking, **“Is this package going to be something that’s reusable?”**

“Recycling might just be the crack to our consumption.” - Anthony Guido

In our discussion with Anthony, he advised us to **define our version of sustainiblilty,** as there is no true definition. He also pointed us in the direction of a Philadelphia company ‘Simply Jars,’ and suggested we explore areas like space food, hiking & camping food, and also military food rations.

Simply Jars provides fresh and healthy, chef crafted meals in reusable jars using a refrigerated vending machine. Jars can be returned to a collection bin on site.

We applied this concept to existing snack packs with the idea of **customers returning the container the next time they go grocery shopping**. The incentive being either a discounted price or meals donated to children in need.

Consumer buys snack pack. Consumer eats snack pack. Package returned at store.

This concept could also be applied to a **school lunch delivery service**, in which kids lunches would be delivered weekly to the home, and **used containers would be swapped for fresh meals.**

INSIGHT
We quickly realized **mass distributors of ‘snack packs’ would not use this package.** They do not have the existing infrastructure for collecting and sanitizing the containers. We **wanted our package to be used by mass retailers of snack packs**.

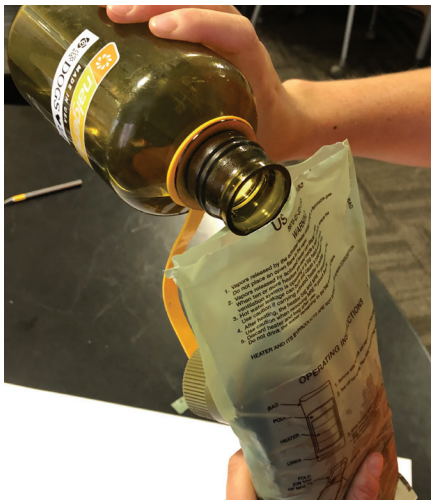
MATERIAL EXPLORATION

MRE DISSECTION

Realizing our package was going to be single use, we still did not want to use plastic so we began **exploring different types of meal delivery.** From **Anthonys advice we started with military food rations (MRE).**

Military Ration (MRE)

MRE Components



Food Heating Bag

ALUMINUM MRE

While looking at MRE openings online we saw that **older MREs used aluminum instead of plastic.** This got us thinking about possibly using aluminum. Further research showed us that **aluminum is one of the most recyclable materials, with the highest recycling rate.** We began looking at products that currently use aluminum packaging.

Aluminum MRE Opening

ALUMINUM PACKAGING OPENINGS

Soda can

Pull Tab

Key Opening

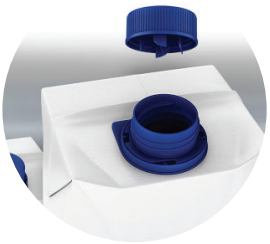
Cut edge

INSIGHTS

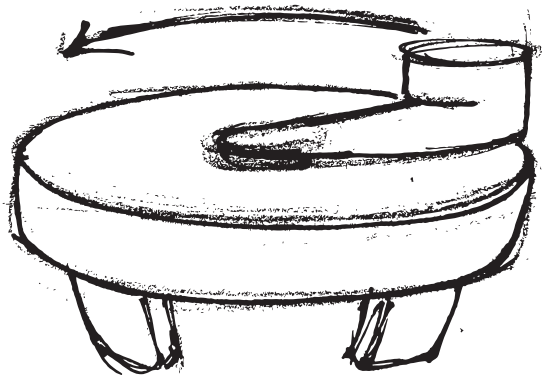
After exploring these ideas we realized **most aluminum packages create sharp edges when open which is not kid friendly. Aluminum can also be very difficult to open because of pull tabs and be limiting to form.**

TETRA PAK RESEARCH

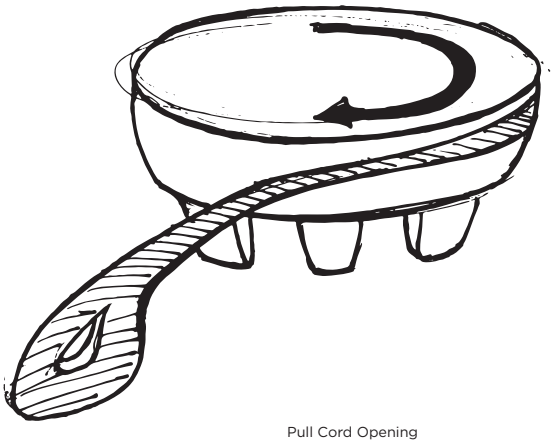
Further research into aluminum packaging brought us to Tetra Pak. A packaging company that uses layers of aluminum, paper, and plastic to package shelf table products. The method they use to break aluminum seals attracted us. As **the cap is turned, teeth attached break the seal.**



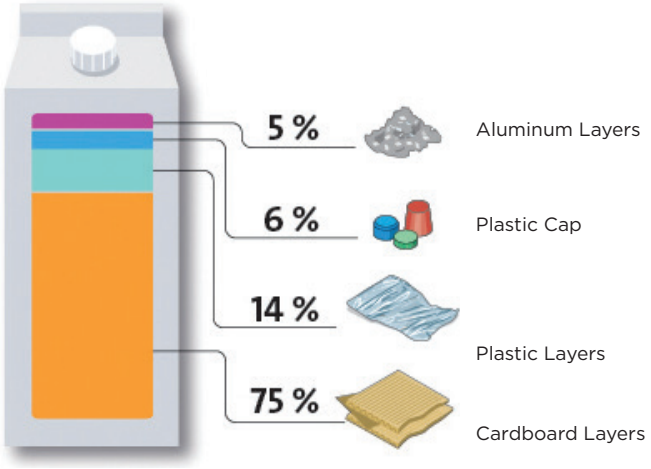
Since children have small and weaker hands, twisting a cap might prove difficult. Possibly **cranking the lid or using a pull chord to unscrew the cap** would be easier.



Crank Opening



Pull Cord Opening



To the left shows the layers in tetra pak packaging material. While this may be a good method of opening a package, it would **add even more materials to the package** and need to be used in conjunction with a material like tetra paks. Although tetra pak claims to be a more sustainable option this is actually not the case. **Layered materials are recycled at a low rate like plastic**. Most **recycling centers do not have the capability of separating these materials**, making them non-recyclable and end up going to the land fill.

MOVING FORWARD

Mixed and layered materials are not a sustainable option. The more you mix materials the less sustainable the product becomes.

MATERIAL EXPLORATION

BEESWAX EXPLORATION

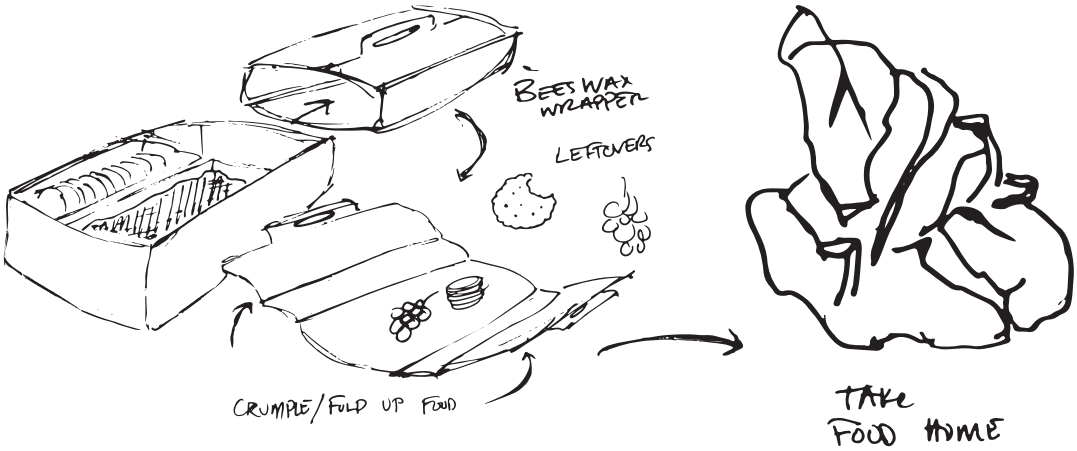
Beeswax wrappings are reusable wrapping papers to store left-over food in. After watching videos we created our own, and **experimented with different ways of varying cloth papers and wax to create a more rigid material.**

Wax being applied to cloth

Wrapping variations and box fold

Layers of wax & cloth gave rigidity

We were able to fold the paper into containers and pouches. We had the idea of packing food in these and children being **able to wrap up their leftovers with the package and bring it home.** They would also be able to use the wrapping at home for further use.



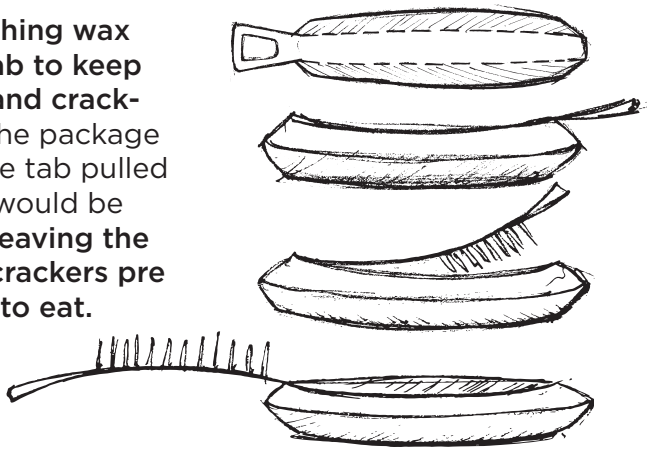
INSIGHT

The manufacturing of this material is still not industrialized and done in small batches. **Using this method to package mass amounts of snack packs is not currently possible.**

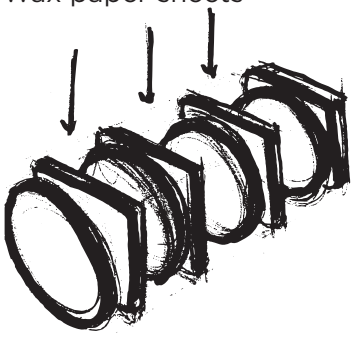
WAX PAPER EXPLORATION

Exploring other types of wax paper packaging we noticed items like cheese and butter were wrapped in simple wax paper. This is due to the requirements. We explored **possible ways of sealing wax paper or folding it.**

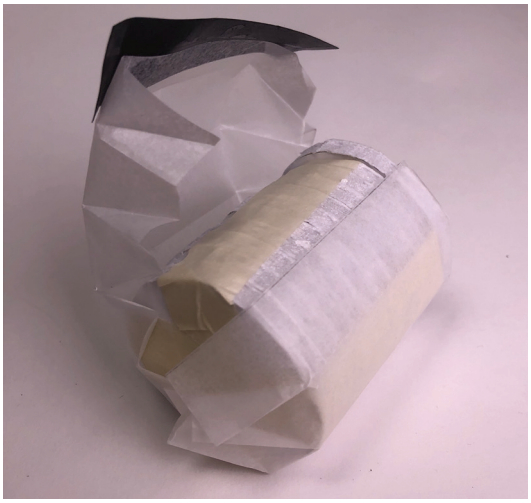
One idea was **attaching wax paper to the pull tab to keep the meat, cheese, and crackers separated**. As the package was opened and the tab pulled up, the wax paper would be pulled up as well. **Leaving the meat, cheese and crackers pre stacked and ready to eat.**

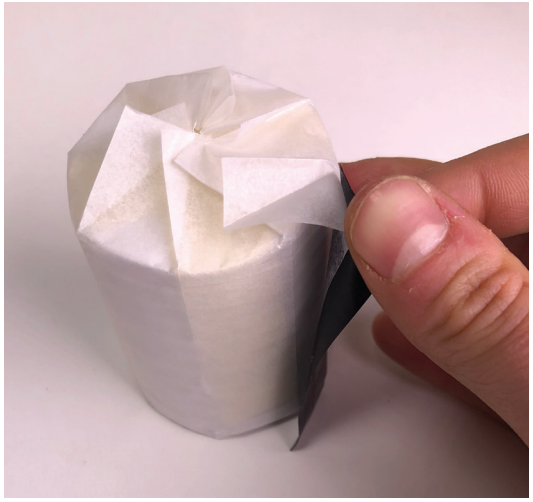


Wax paper sheets



We started checking out books on paper packaging techniques and found Japanese paper packaging. Here we **used paper folding techniques to wrap a stack of crackers with wax paper.**





INSIGHT

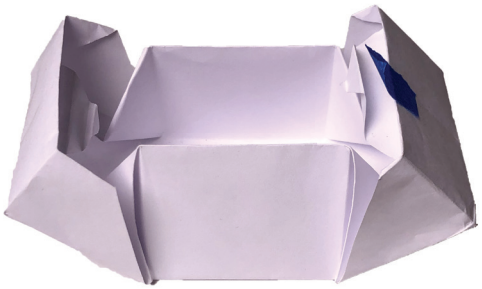
Through online research we found **Japanese paper packaging techniques which lead us to origami, our main area of design and iteration. We found many examples of clever and eco-friendly packaging using origami.**

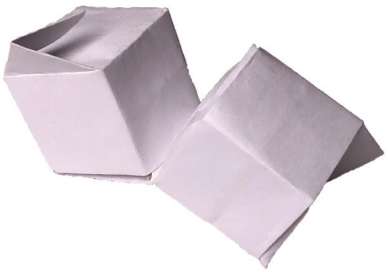
PROTOTYPING: ORIGAMI

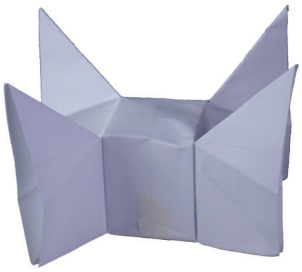
PAPER PROTOTYPES

Origami utilizes paper as its material, which is widely recycled and can biodegrade much faster than plastic. It allowed for easy and quick prototypes, on a single day we could make about 5 or so unique iterations.

We started by following tutorials on simple boxes, and quickly began creating more complex structures. We like how **origami boxes were not traditional packages, which would add a 'wow' factor for kids upon opening.** Different structures would pop off the shelves compared to others.

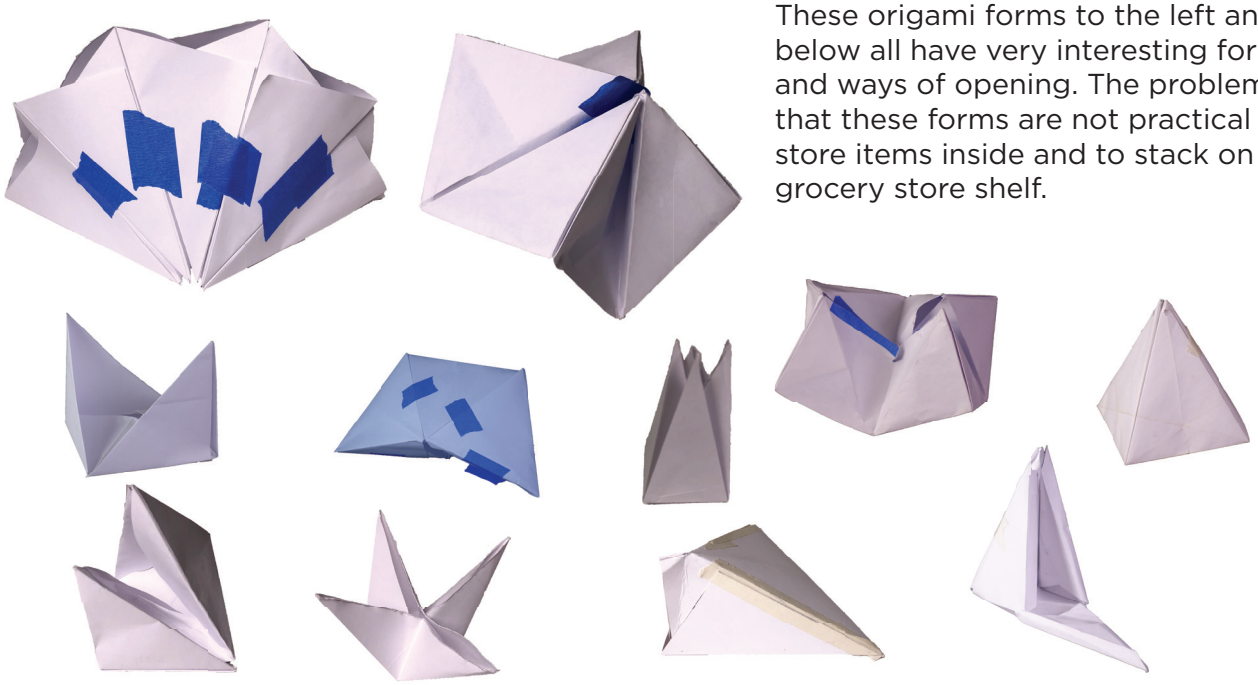






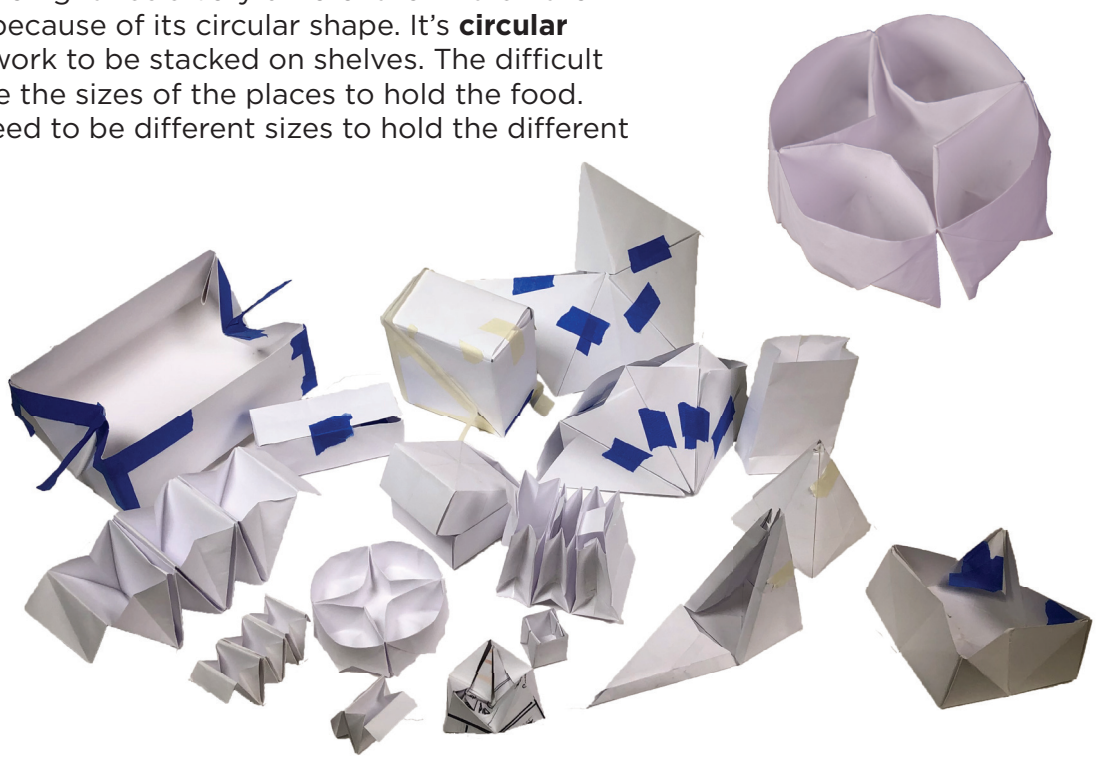
The cube forms were good for shelf storage but very **complicated** to make. The form on the right is a form we particularly liked, it folds **flat** when nothing is in it, and opens wide when objects are inside.

This form was interesting because we thought **it looked like a volcano** so we added a sketch to it to create a theme. This form opens up down the middle and has tabs to grab and open up. The only problem is the shape, its fun but doesn't allow for stacking.



These origami forms to the left and below all have very interesting forms and ways of opening. The problem is that these forms are not practical to store items inside and to stack on a grocery store shelf.

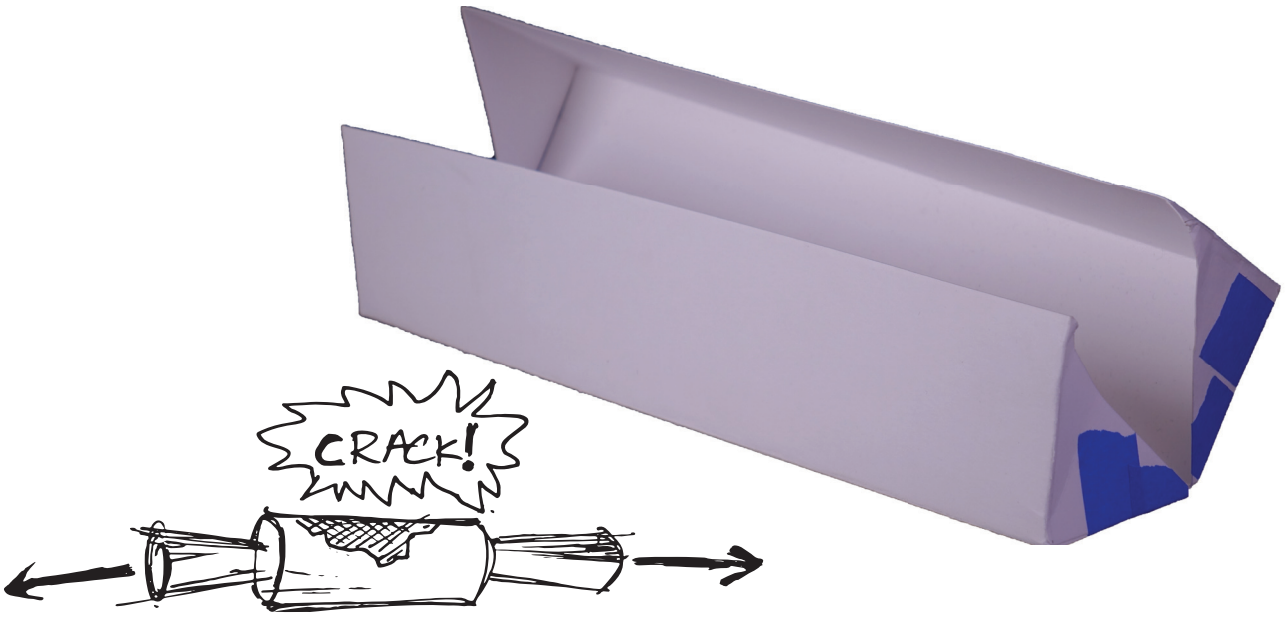
This form to the right has a very different form than the rest of forms because of its circular shape. It's **circular** shape would work to be stacked on shelves. The difficult parts would be the sizes of the places to hold the food. They would need to be different sizes to hold the different sized foods.

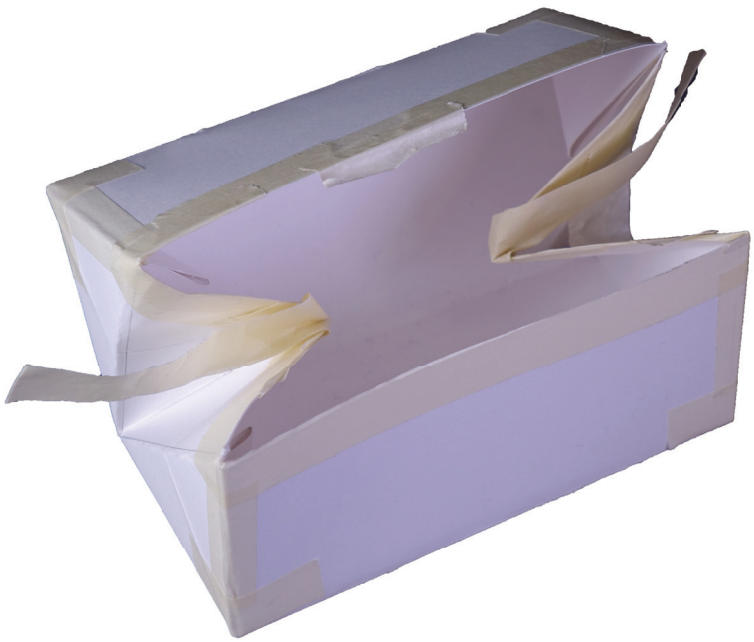


PROTOTYPE 1 & TESTING

CONCEPT 1
After many origami tutorials and hours of folding paper we started to gain an understanding of the different folds and started to iterate.

One of our first iterations was based off an elongated clamshell box. **Looking at how 'crackers' open, we had the idea of pulling the box apart to open it.**





To do this we added tabs attached to the interior of the box. **When the tabs are pulled the tension breaks the seal.**

INSIGHT
Sometimes when pulling apart the tab would break, leaving this opening mechanism useless. The tab would most likely need to be made from string, which would ad another material an process in production. Also pulling the box apart could cause its belongings to explode.

INITIAL TESTING

We decided we needed to get these origami iterations in front of a child to see how they responded and interacted with some of the iterations.

Conor using clamshell as phone.

Understanding how package functions.

OBSERVATIONS

We **observed which structure Conor was drawn to, and if he knew how to open the package without any graphic markings.** Conor played with all of the packages but interacted the most with the basic clam shell, which was surprising because it was the most 'traditional' package. He turned it into a phone, and ran around the house 'eating' his little brother with it.

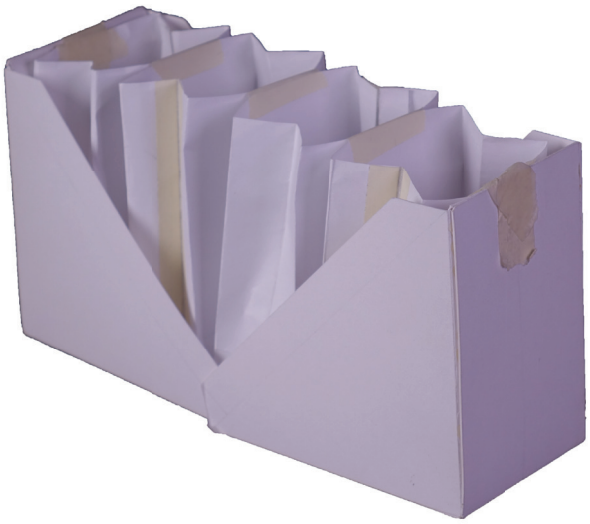
INSIGHT

The more **simple design allowed for more open ended play** with the package, encouraging more creativity. We also realized our **package can create a social interaction**.

PROTOTYPE 2 & TESTING

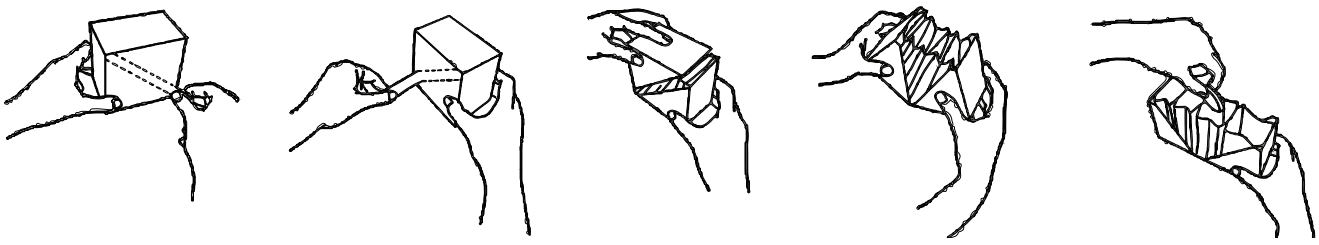
After getting positive feedback about the clam shell iteration, we iterated the design by **combining the clam shell with another origami fold**.

This iteration would make opening the inside packages more seamless, as the exterior is pulled apart the inside packages are pulled apart and the seals are broken. The **exterior would be made of paperboard, and the interior packages would be made of wax paper.**



Prototype 2.

Prototype 2.



FEEDBACK
After a presentation there was **concern over our choice in materials**. Our **knowledge of food safe materials was still lacking** and why certain foods were packaged in wax paper compared to others.

INSIGHT
Before moving forward we needed to nail down our choice of materials and have an understanding of what packaging qualities snack pack food required.

Conor struggling to reach snack.

USER TESTING
After Ron's feedback we tested our second iteration with Conor, sealing the food in small pouches.

OBSERVATIONS
He easily opened the exterior shell and picked the snacks out of each section. We noticed the sections were a bit deep and proved difficult to pick out for small finger. Although he thought the 'accordion' opening feature was cool, there was not nearly as much interaction with the package compared to the first clam shell.

Conor collecting snacks.

INSIGHT
If the interior compartments cannot be used to seal and protect food there is no use for them. They add extra material and do not enhance a childs mealtime experience.

MOVING FORWARD

"You need to use plastic." - Ron Kander

EXPERT FEEDBACK
Moving forward we needed to know our possible choices of material for our package. During our meeting we discussed bioplastics and what compostable means versus biodegradable. He explained that **these 'greener' types of plastic begin to breakdown after about a week upon contact with food.**

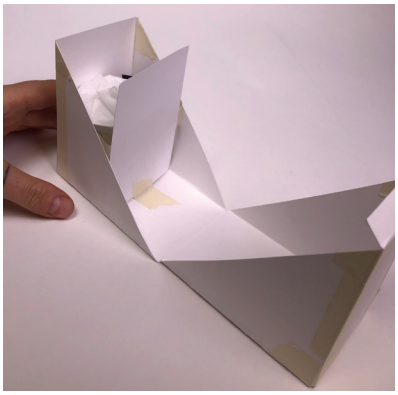
Since snack packs have a shelf life ranging from 1-2 months, there is **no biodegradable or compostable plastic we would be able to use**. Ron told us that **we would should use an existing FDA approved plastic**, especially as a new product on the market.

MOVING FORWARD
This guidance was disappointing, as our goal was not to use plastic. **Ron told us this did not mean our entire package needed to be made of plastic, but rather used to provide a barrier between the food and environment, which can take many different forms**

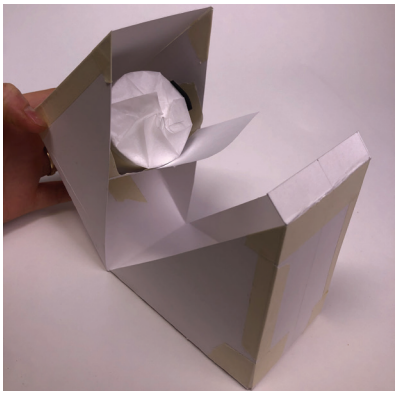
PROTOTYPE 3

CREATING A PREP AREA

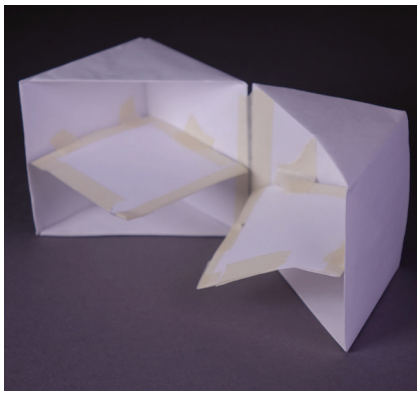
Since our food had to be wrapped in plastic **we wanted to make the exterior the selling point of our package.** Our current clamshell package was meeting most of our criteria. It was already much easier and intuitive to open, smaller, and had a further use to the child as a 'toy'. **Our current model did not provide a prep area for kids to make and eat there food. In this round of iteration we tried solving this.**



Flat surface acts as barriers.

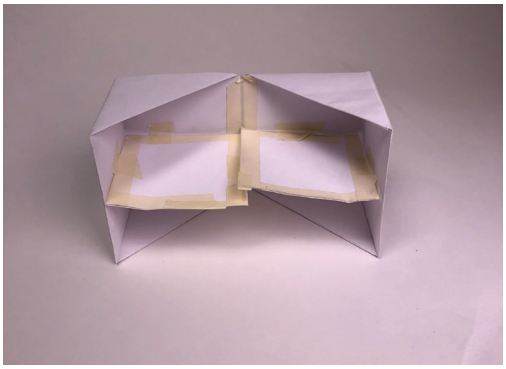


Barrier helps contain food.

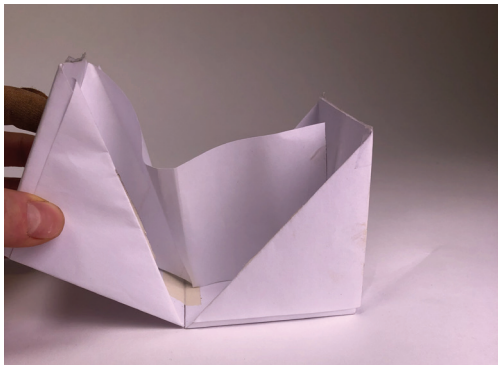


Paper walls could make table.

We began by adding walls inside the package in hopes of creating a type of table. The paper barriers were not strong enough to hold food and did not seem obvious enough to be used as a prep area.



Barrier also acts as table



Barrier Connected

INSIGHT

We needed to create a flat surface that is created as the package is opened so it's obvious for the child to use.

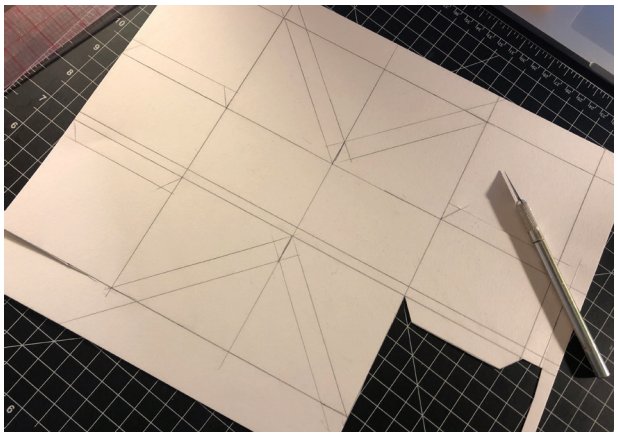
PROTOTYPE 4

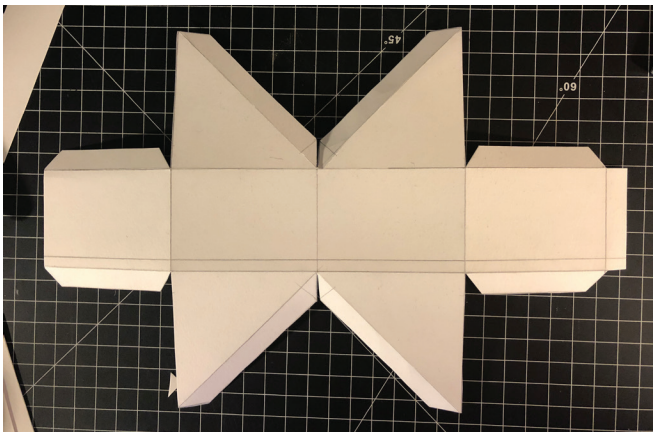
CLAMSHELL EVOLUTION

When creating the clam shell prototype, we tried leaving in the areas we usually cut out to see if the box would still fold. We discovered that the box did still fold, and also made for a surprising opening experience. The ‘wow’ factor we were looking for from the beginning. We had never found this fold in our prior research. The unique value that this origami fold holds is the ability for it to fold from a cube to flat so easily.

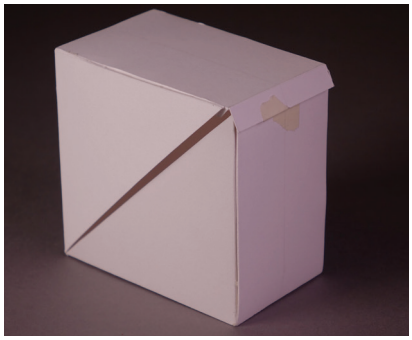
While looking at different youtube videos for new origami folds we came across a tutorial on how to make a tech deck ramp from origami. Combining two tech ramps made for a good technique to make a clamshell box. We started iterating from this.

Origami Tech Deck Ramp


Original cutout pattern



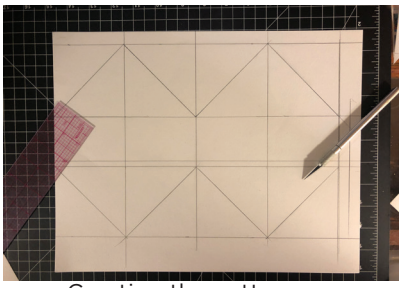
Original cutout pattern


Completed box

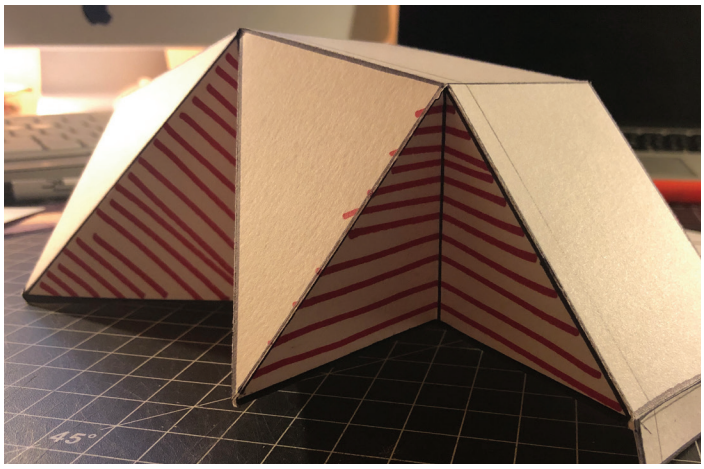
Our first iterations were made using a cutting pattern like the ones above and resulted in a clam shell like so. These cutouts wasted a lot of paper and also required lots of adhesive which we did not like. The clam shell seams would also need to be opened by a diagonal zipper tear. We thought this long tear might be difficult for some children and not open smoothly.

PROTOTYPE 4: ITERATION

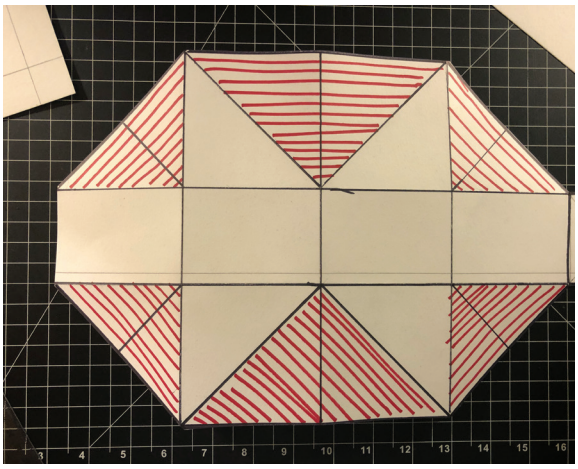
ORIGAMI TECHNIQUES
When looking at out cutout pattern we thought about how we could cut down on the overall amount of seams and adhesives used. From all of our origami iterations we saw how you could make almost any form out of a single rectangular sheet of paper, no cutting or glue involved. We thought about how we could do this with our clamshell form. So we left all the parts we usually would cut out and started to them inward in triangular patterns.



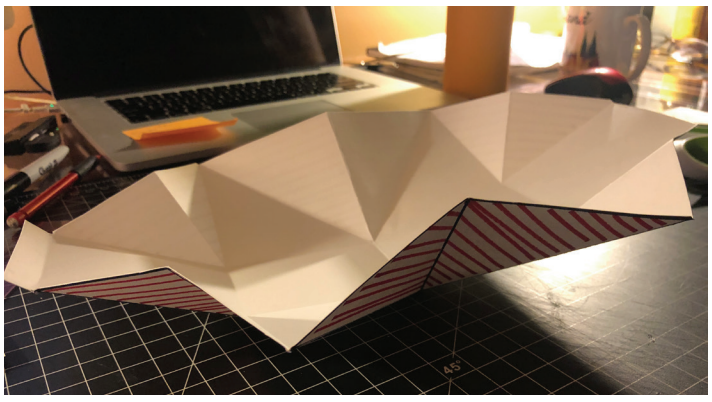
Creating the pattern



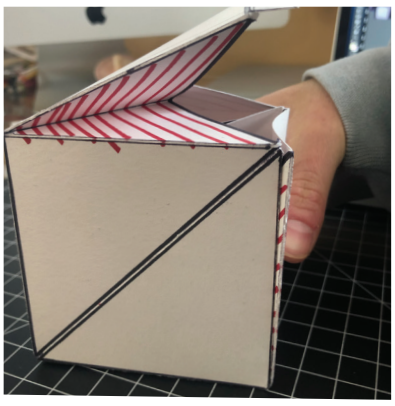
New pattern folded



Pattern with connected webbing



Box unfolded into plate

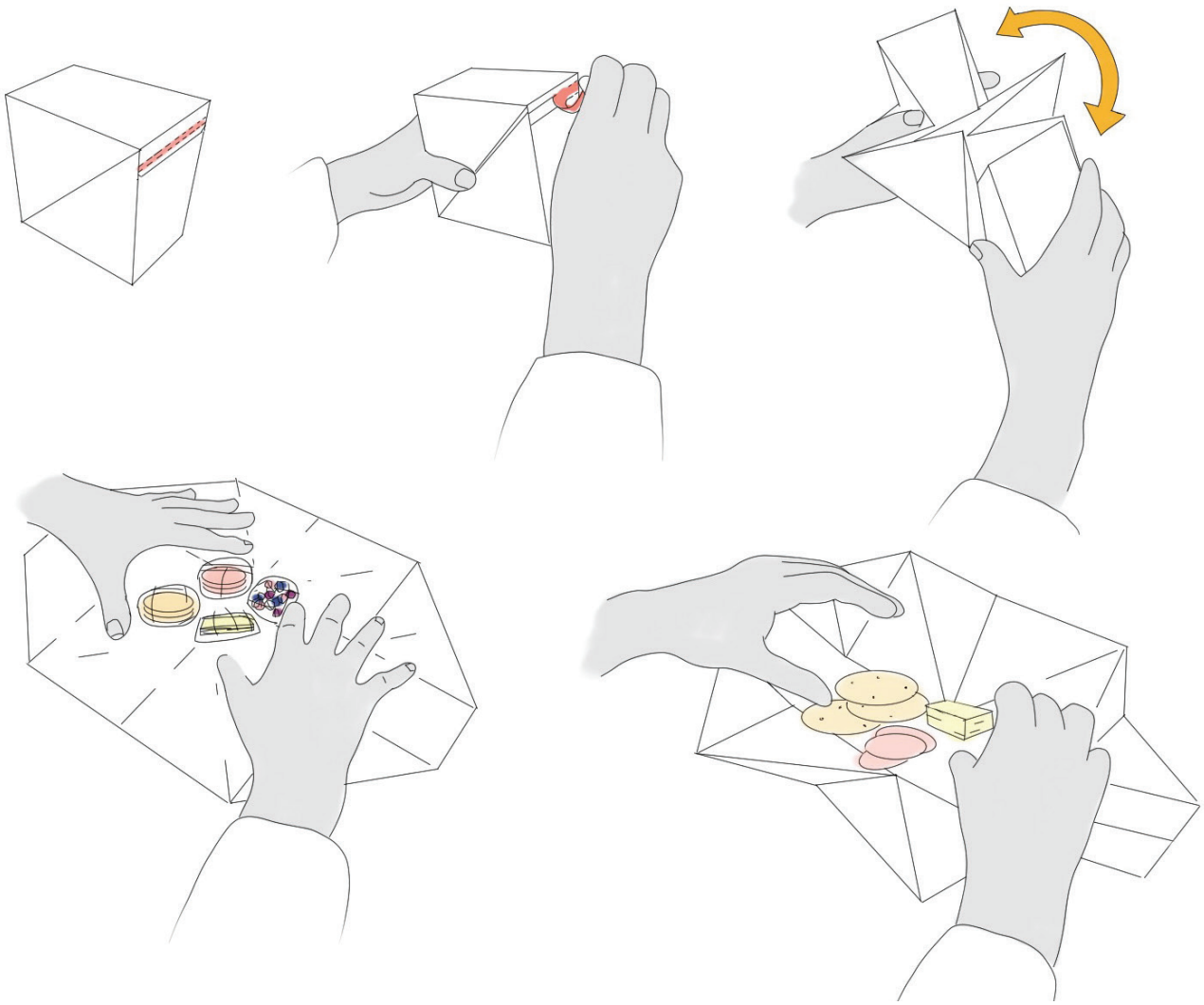


Box folded up

INSIGHT:
This new iteration allows for the box to hold various items then unfold and be used as a plate.

PROTOTYPE 4

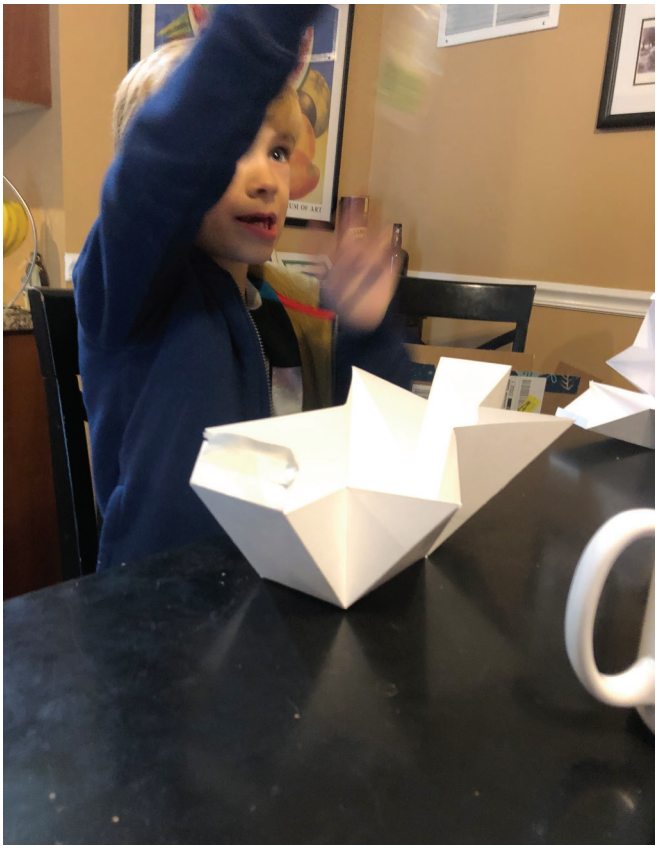
OPENING REFINEMENT
After creating this folding pattern we needed to find a way to seal and open the package. Our first idea was to create a tear tab at the top, and the plate would unfold.



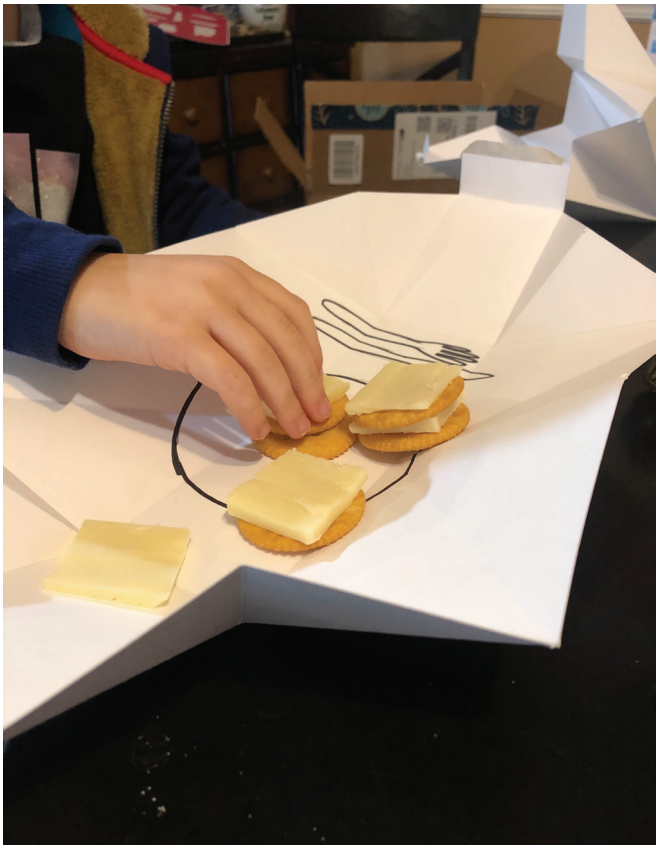
INSIGHT
Intuitive to us may not be intuitive to children. We need to test if kids use it as a plate. Feedback also suggested making it able to close back up again.

PROTOTYPE 4 TESTING

GRAPHIC IMPORTANCE
We tested this exterior shell with Conor again, but this time paid close attention to how he ate his food. We were testing to see if he would use the opened package as a prep area as we intended.



Conor initially playing with food & not utilizing prep area.



Graphics encouraging use of prep area.

Once again he had no trouble opening the package, but when he started to eat his snack he set the box aside and ate on the table. In attempt to change this we quickly grabbed the package and drew a plate with a fork and a knife on it.

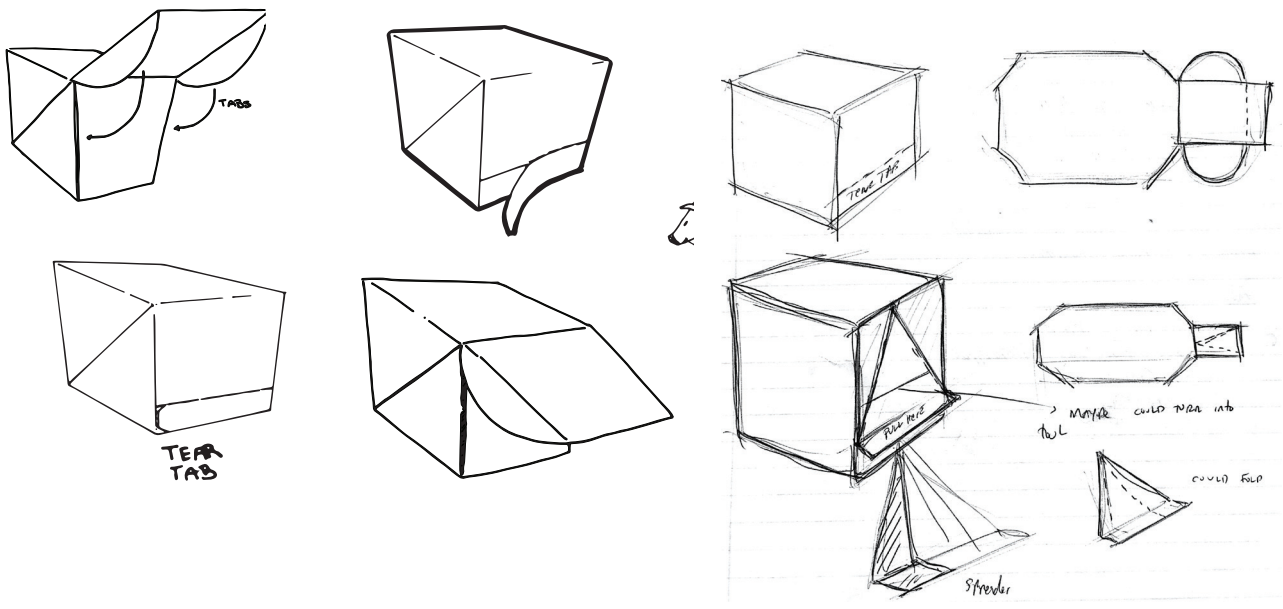
When we put the package back on the table he asked, “Oh it’s a plate?” He then proceeded to put his snacks onto the package and use it as a prep area.

INSIGHT
Graphics can influence the use of the package.

TAMPER ROOF EVIDENCE

OPENING TEAR
During one of our many discussions with Tim we asked what physical requirements does a package need. One of them being tamper proof evidence. **This shows consumers if the package has been opened. This can be in the form of small round stickers or zipper tears.**

Since stickers would add more material, we decided to move forward with a zipper tear. We added another tab to the container with the zipper tear on the bottom. This way kids are able to slide the tab back into the box to close it if they want to bring food home.



INSIGHT
Create a large graphic indicator to signal the consumer where to tear.

INTERIOR DEVELOPMENT

Tim Brown was our main resource while designing the interior of this package. He gave us insights on processes, materials, and the requirements of food packaging.

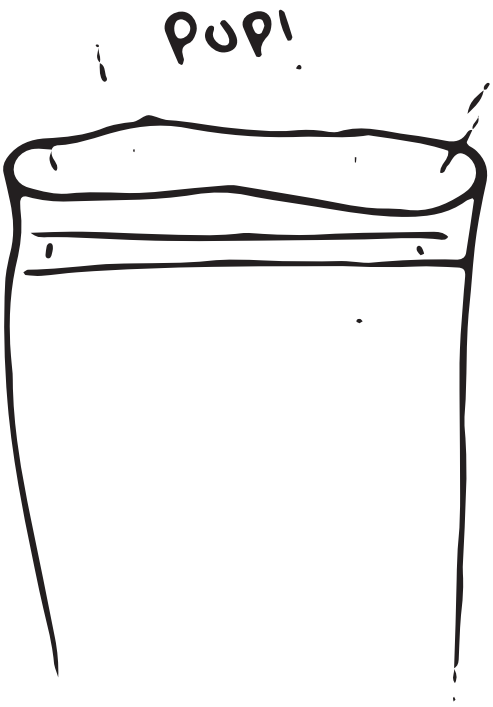
Knowing we had to use plastic for our interior packaging seemed to limit us in terms of design. When discussing our interior packaging with Tim about the requirements and properties the plastic needs to protect the food we realized something. Each food has different packaging requirements.

Crackers don't have the same needs for packaging that meats and dairy do. In a lunch able everything in the tray has to be packaged to meet the requirements for meat and dairy since they are all encased in one tray, meaning more layers in the plastic and less recycling. This is probably why the sauce packet in a pizza lunchable is wrapped separately, because it has different needs than the other items. He suggested if we wrapped everything individually to that food specific needs, we may be able to reduce the amount of protective layers in the plastic possibly making it easier to recycle.

Moving forward our interior development centered around wrapping each food individually to its specific needs.

ACCESS POINT 1

INSPIRATION
We wanted to create a fun and easy way of opening the food packages. **Throughout our explorations of various packages we came across these air filled packaging bags that were fun to pop.**



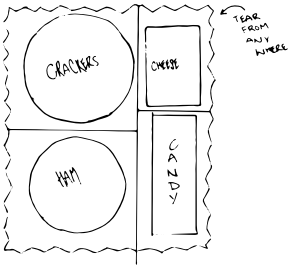
POP TO OPEN
Since our food was going to be wrapped in individual packages we had the idea of **filling the pouches with gases utilized in modified atmospheric packaging. Children would then squeeze and pop the pouches to open them.**

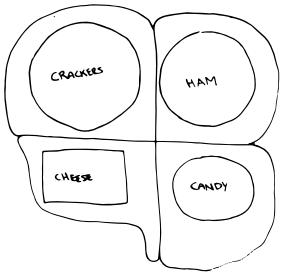
Another idea was to adhere the various packages to the interior of the package, and then **popping them by pushing down onto the package.**

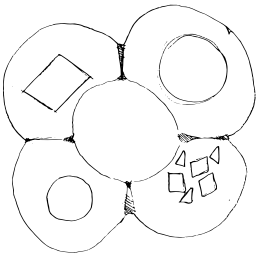
INSIGHT
After talking with parents they didn't think popping noises during lunchtime were a good idea and could cause a distraction. Also **popping the package open would not be a controlled opening** and could explode everywhere.

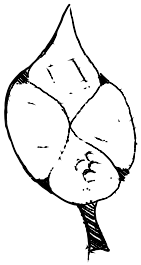
ACCESS POINT 2

ITERATION
We had the idea of creating different shapes with the packaging. These shapes would reflect back to nature and food sources. The package would be opened with an easy peel seal.









PROTOTYPING
We began prototyping different shaped plastic pouches using cut up ziploc bags and a heat sealer. We wrapped up crackers, cookies, and candy as these would not go bad quickly. **Through making these we found that shaping the bags differently did not add much to the package.** Graphics would need to be added to plastic to take it to the next level, which we did not want to do. Graphics on plastic would mean more plastic layers, ink, and processes.

ACCESS POINT 2 TESTING

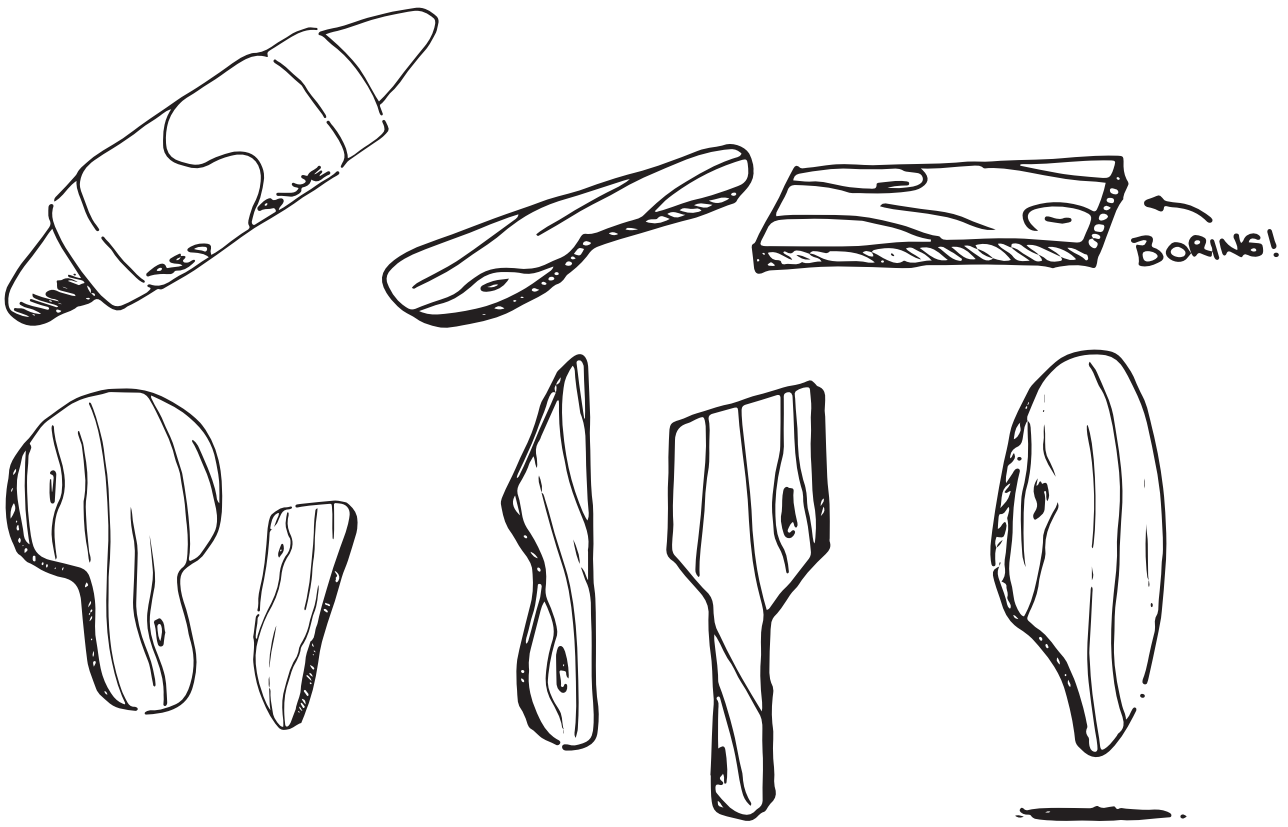
After testing with Conor and getting feedback he informed us the **shape of the pouch did not add anything to his experience. He tore it apart and threw it to the side.**

INSIGHT
Packaging shape has little effect on meal experience. Shaped packaged would cost more in production.

ACCESS POINT 3

ITERATION

To aid in the opening of the pouches we had the idea of incorporating some type of tool that could be used to help open them. We also thought the tool could be used during the making of their meal, such as a small spoon or spreader.



INSIGHT

Adding a tool would add more material to our package, which goes against our criteria of using the least amount of plastic possible.

METHODS OF SEALING

While struggling to determine how our packages would be opened we went back to Tim for more advice. Before talking with us he went to Campbells team in charge of plastic packaging. We **wanted to know what types of seals and opening methods were usually used for kids products**. We learned there were **different types of sealing methods depending on material and food item. Some seals used adhesives and some did not.**

COLD SEALS are used on food items that would melt around heat. An adhesive is applied to both pieces of the material and pressure is applied to seal them together. Things like candy wrappers are cold sealed.

HEAT SEALS are used for the majority of food packaging as they are low cost and require no adhesive. A heated bar is applied to the plastic and welds them together under pressure.

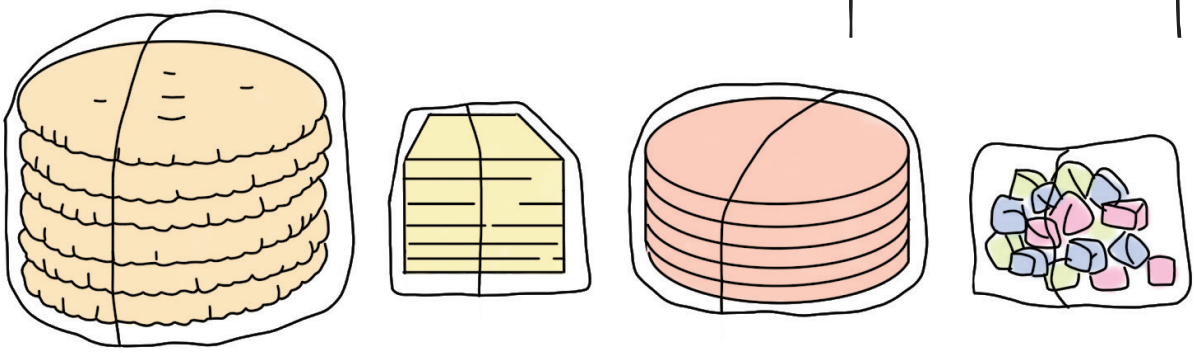
EASY PEEL SEALS use an adhesive on both pieces of plastic, giving users the ability to separate the seal. They are commonly seen on items like cheeses sticks.

TEAR NOTCHES are the most common method used to open a package. They direct the consumer to tear the package at an intentional weak point in the packaging, making it easier to tear. These can be used with heat and cold seals.

PROTOTYPING - INTERIOR

FINAL INTERIOR PROTOTYPES

We moved forward with a heat sealed and flow wrapped food pouch. No extra adhesives would be used in this process.



Food is wrapped in individual bags with tear notches acting as indicators to open.

While testing our prototypes we used snacks that were of comparable size to standard snack pack items. **Everything fit inside of the package** and nothing was loose or moving around. W**e realized the smaller package squeezing everything tight acted extra protection for the food items inside.**

GRAPHIC DEVELOPMENT

We both had very little graphic design experience starting this project. Many meetings with Maribeth helped steer us in the right direction and inspired us. This was the hardest part of the project.

GRAPHIC DEVELOPMENT - RESEARCH

GROCERY TRIPS

We took many trips to various grocery stores and began compiling photos of different types of food packaging. Children's packaging is the most interesting to us because of the creativity. We created compiled photos of packaging into groups.

CREATIVE FOOD GRAPHICS

They **show the food but in a different contex**t; for example the Trader Joe's pretzels are bike tires. This gets **kids imaginations going while also displaying the food.**

CHARACTERS

Most brands that we observed use characters as a face of their brand. Almost always the characters are interacting with the food inside of the box. **Characters are a good way to give a face to the brand to make it memorable.**

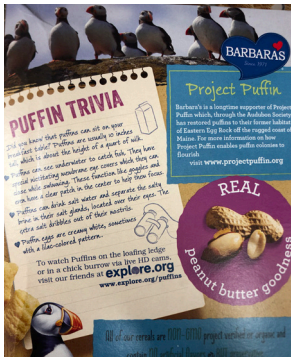
GRAPHIC DEVELOPMENT - RESEARCH

ACTUAL CHILDREN

A lot of **brands utilize real children on their packaging**. We felt these **did not resonate with children. This type of branding seems to be more for the parents than children.**

GAMES

We also found packaging with games printed on them. These are very **interactive and can integrate characters easily**. Most games are printed on cereal boxes because of the size of the box and also the setting where the child is eating.



FUN FOOD

One of our favorites are when brands use their **ingredients as characters or nature**. This both **shows what they are going to eat while giving a face to the brand**. This also gets kids to use their imagination.

DESIGN CRITERIA

After our trips to the grocery stores and looking at all of the packaging we created a base graphic design criteria. From this criteria we could create, experiment and test different graphics.

DISPLAY FOOD INSIDE - For interested customers to know what they are buying. We chose to use photos of the food to show exactly what the food would look like. Sometimes brands will include a plastic window so buyers can see the food inside.

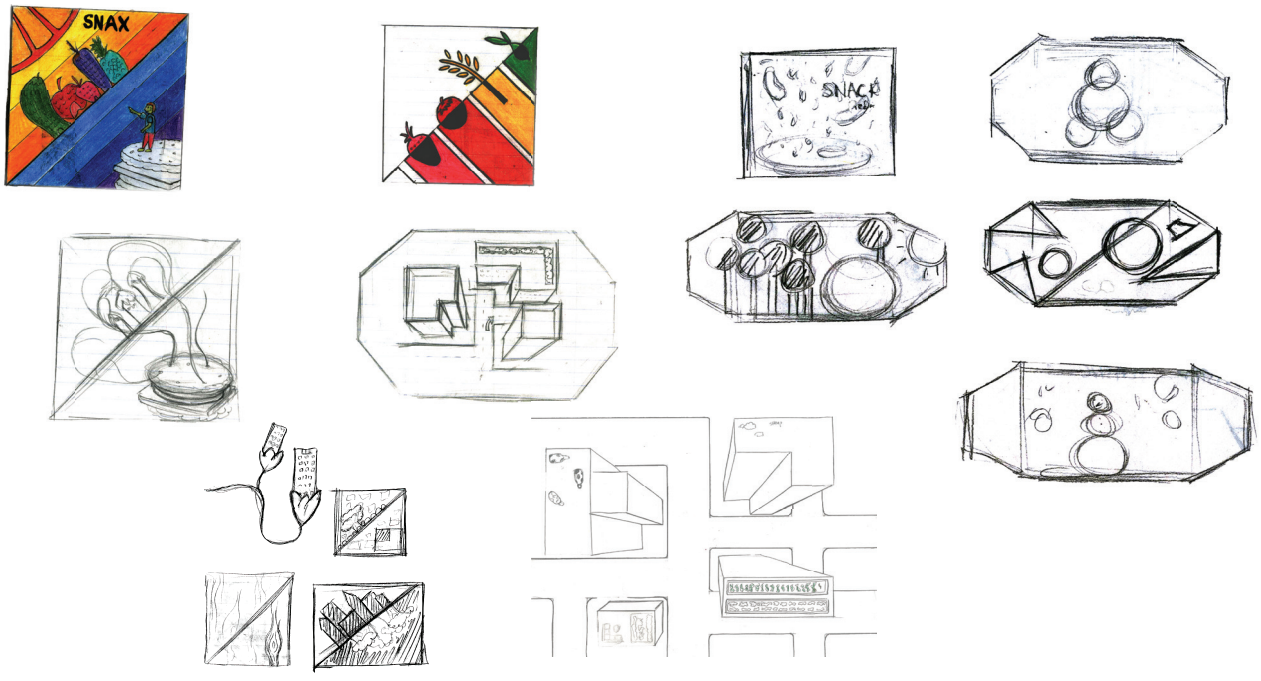
INCORPORATE NATURE - Nature to passively educate children about the relationship between nature and food. Showing where the food comes from could create a connection between the two.

BRANDING - To entice children to want our product. Enjoying the entire experience is necessary for a successful product.

GRAPHIC DEVELOPMENT - PROTOTYPING

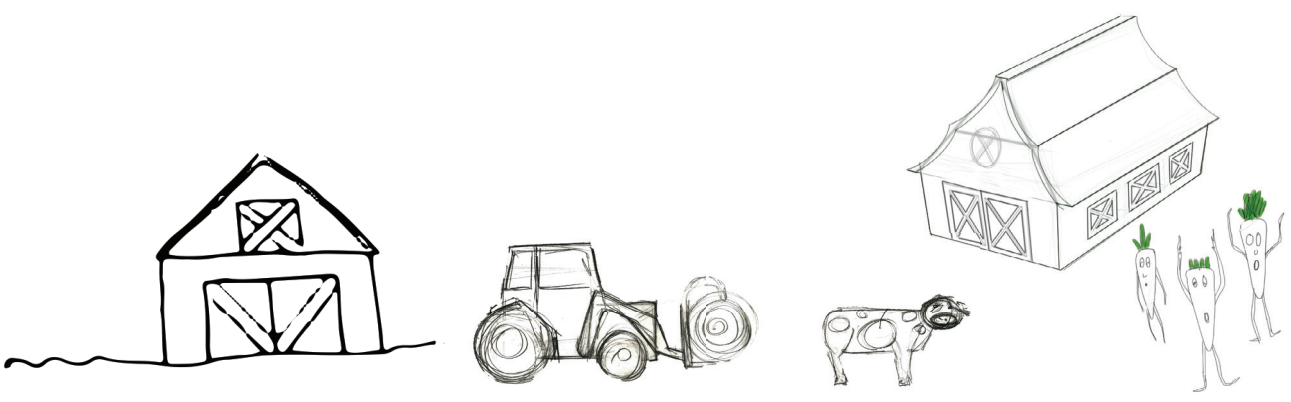
NATURE

Based on our design criteria our we started sketching graphics. Below are some **sketches of vegetables, landscapes, city scapes and some abstract work.** We explored the city scapes based on a comment from Maribeth, she suggested that we could partner with a local urban farm to increase the educational wholistic aspects to this project. We ultimately did not follow through with this because it was unnecessary.



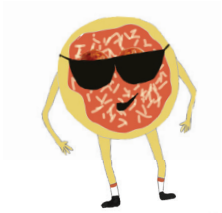
FARMS

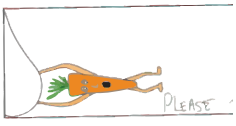
We explored farm themes with the idea of incorporating a game. Possibly matching a food to its source, the food completing the image. **We decided to move in the farm direction because it related directly to our message.**



CHARACTERS

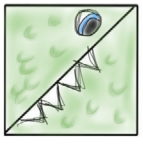
We sketched and **explored characters, some vegetables, animals, and plants**. We liked that they could help **tell the story of food while also being a face for our brand.**

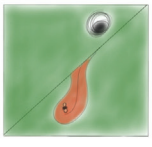


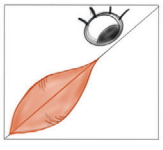


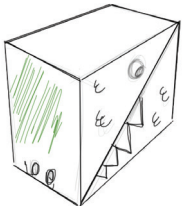
ANIMALS

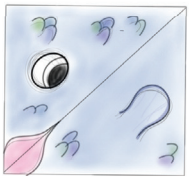
Since our **packaging almost had an anamorphic form we created a few animal inspired graphics. We were encouraged to go in this direction, however it was difficult to have a face on the box while also displaying all of the necessary information.**

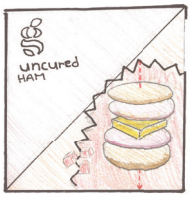








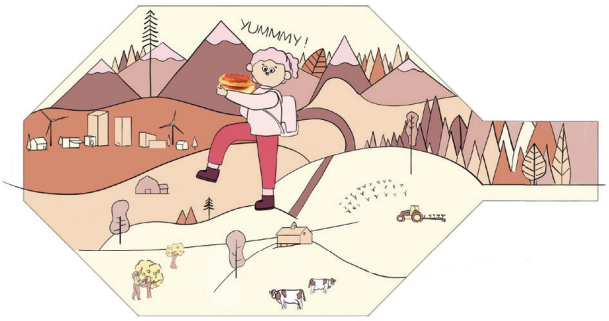


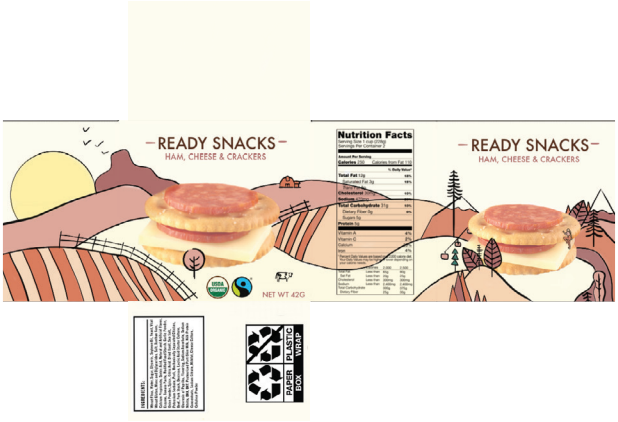


GRAPHIC DEVELOPMENT - PROTOTYPING

FIRST ITERATIONS

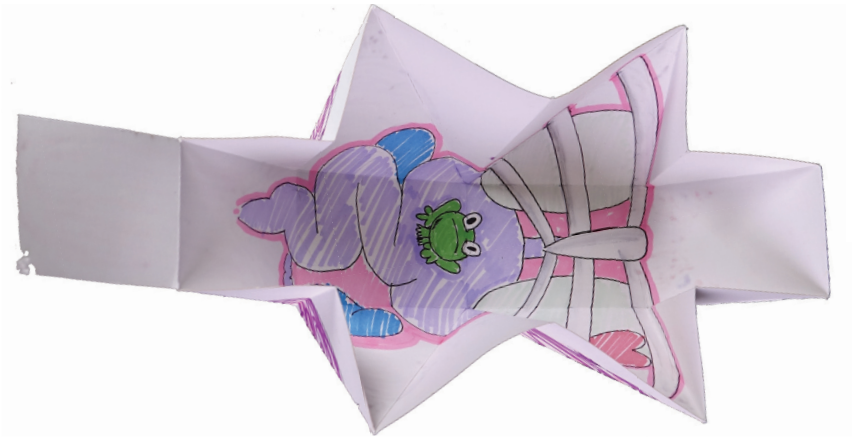
Some of our first graphic iterations we presented received encouraging feedback. We were told to use the diagonal split in our favor, and to make the educational part more bold. We chose the colors based on the ingredients and created a giant girl character to eat the food. In the interior graphic there are all of the origins of the food as education.





ANIMAL ITERATIONS

These are some of the animal iterations that we made. The **animals were drawn like they were balled up and when opened there guts were seen**. We used animals that are fun like a platypus and fox.

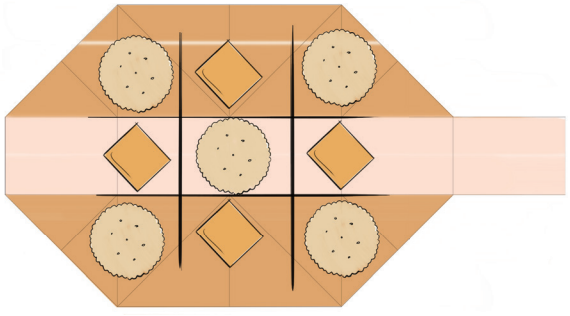


Insides or 'guts' of animal

Platypus

Fox

PTOYOTYPES FOR TESTING
Our professor Mark Havens gave us an opportunity to test our meal kit with a few children so we quickly made a few different graphics to get reactions on multiple ideas at once. We made a few **graphics that had games, abstract graphics, a city scape and a landscape.**



GRAPHIC DEVELOPMENT - USER TEST-

USER TESTING
We tested our lunch kit with nine children from ages 4 - 11 at a homeschool meeting. Our goal in testing was is see how the graphics informed how they interacted with the packaging, the food and eachother. We also wanted to see how they over all liked the our packaging.

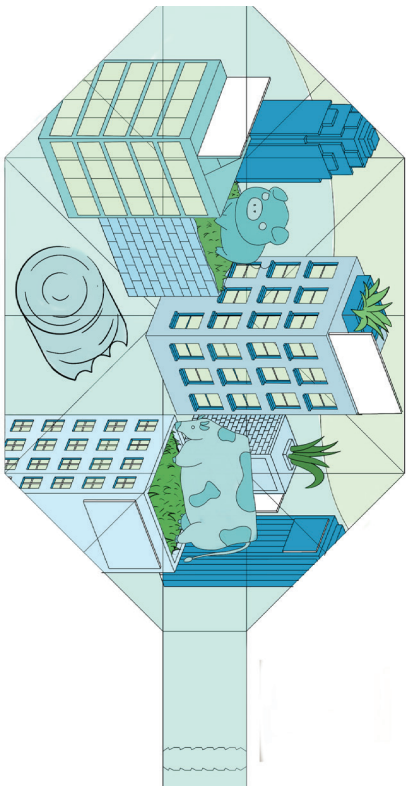
When asking the group which graphics they liked best, **they each preferred the graphic on their given package.** This was interesting, and **made us consider how important graphics really are to children.** When a**sked about the games on the packaging, they said they liked them but no one played any of them.**

Our testing group had **no issues opening the pack**. Some used the packaging as a plate and some didn't. After eating their snack they all began to play with the packaging in various ways. Most **played with them like hungry hippos and some put them on their heads like a hat.**

INSIGHT
- form of our packaging sparked creativity with children
- did not play any of the graphic games
- no trouble openingeasy to open
- we needed to get more of them to use it as a plate
- some children realized the sustainable aspect of the packaging

GRAHIC DEVELOPMENT - ITERATION

ITERATION
After we tested our meal kit we created another graphic similar to the city scapes. This graphic had all of the origins of the food inside. All of the **food origins were the same size as the food included in the pack so they kids would use it as a game**. We also used the o**pposite color pallet as lunchables to stand out from them.**



Graphic Iteration

Graphic Iteration Prototypes

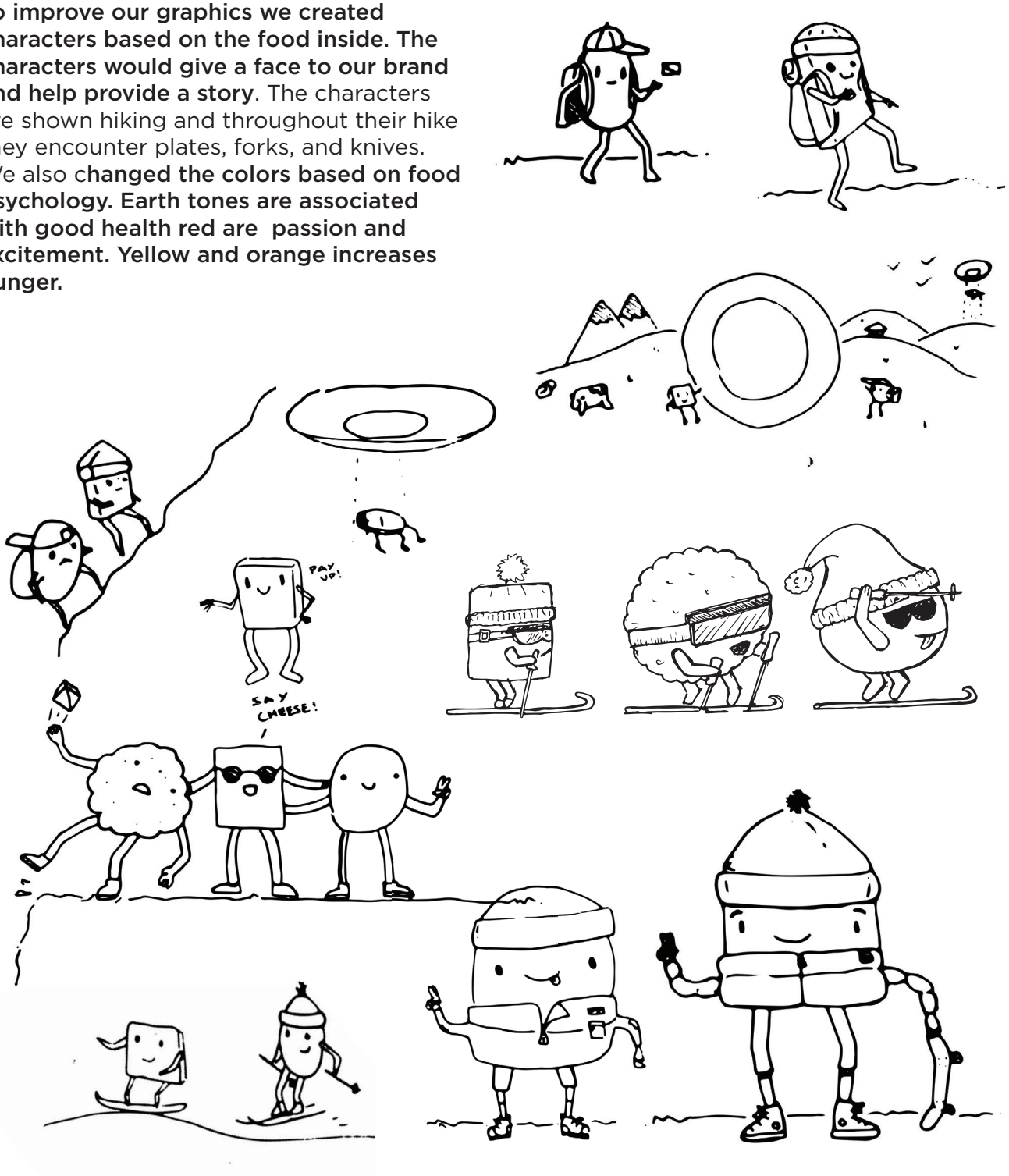
FEEDBACK
We presented this to a group of experts and our classmates and got feed back that we should change a lot. The colors were ugly and **we learned that blue makes food look unappetizing; and the graphics were not compelling.** There was **no face to our brand and we lost the nature element**. Finally it **did not encourage children to use it as a plate.**

INSIGHT
Following our feedback we realized we needed to do research on graphic psychology. Our message was disconnected from our graphics and needed a cohesive theme.

FINAL GRAPHICS

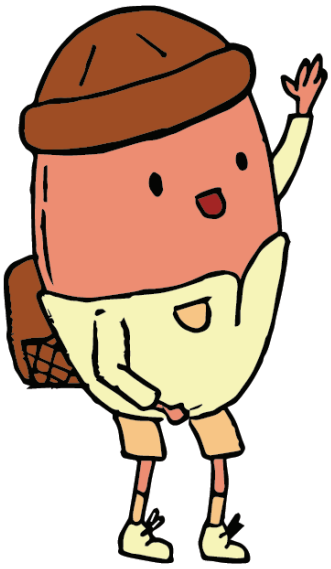
CREATING CHARACTERS

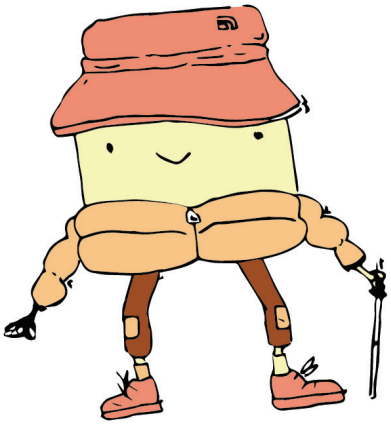
To improve our graphics we created characters based on the food inside. The characters would give a face to our brand and help provide a story. The characters are shown hiking and throughout their hike they encounter plates, forks, and knives. We also c**hanged the colors based on food psychology. Earth tones are associated with good health red are passion and excitement. Yellow and orange increases hunger.**

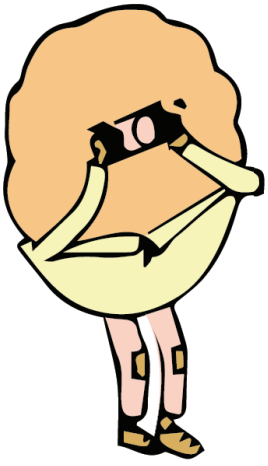


HI - YAH! THEME

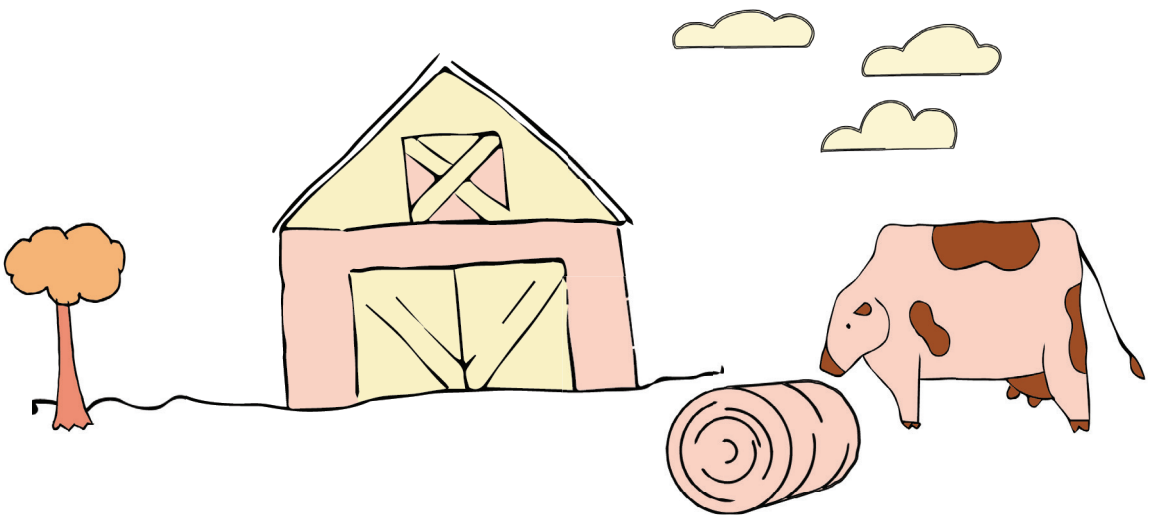
These are the illustrations we chose to bring into the final. The **characters have a hiking theme can will be interacting with the natural environment around them.** To the left is the cheese person with a hiking stick. Below is the cracker person who is taking a picture of friends. To the right of the cracker is the pepperoni person who is waving to friends. We wanted them to be fun and playful.





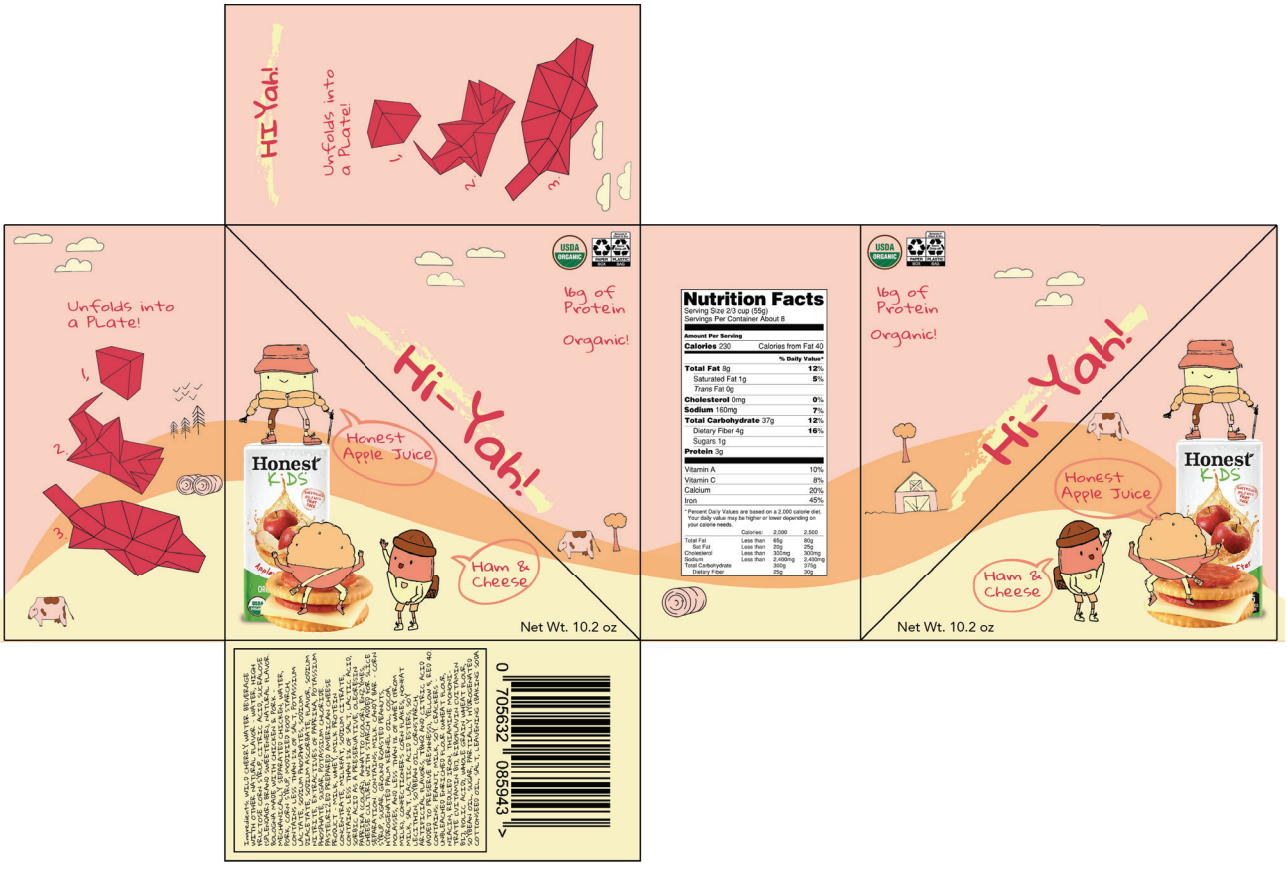


To give context to the food characters world and make it more immersive we created objects to put in it. The **most important objects are the cow, tree, hay bale and barn**. **These are all the sources of the ingredients of the food inside so that we could passively educate the children of where their food comes from.**



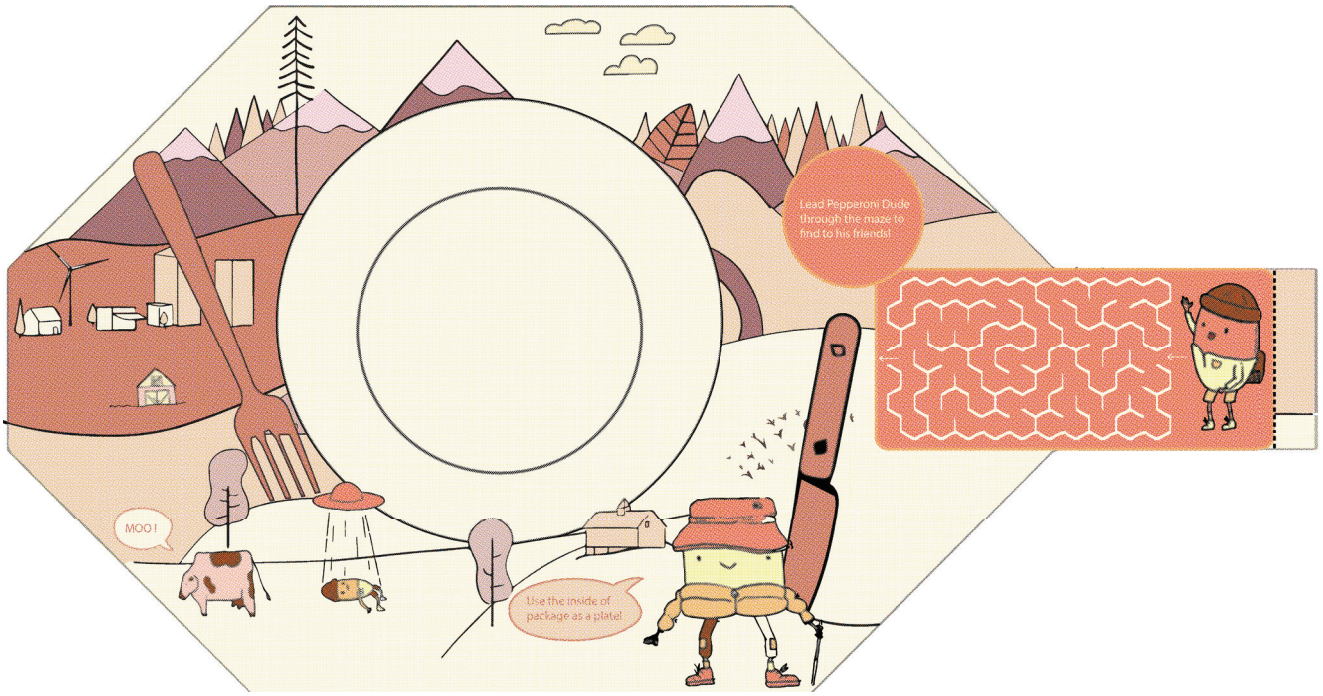
FINAL GRAPHICS

EXTERIOR GRAPHIC



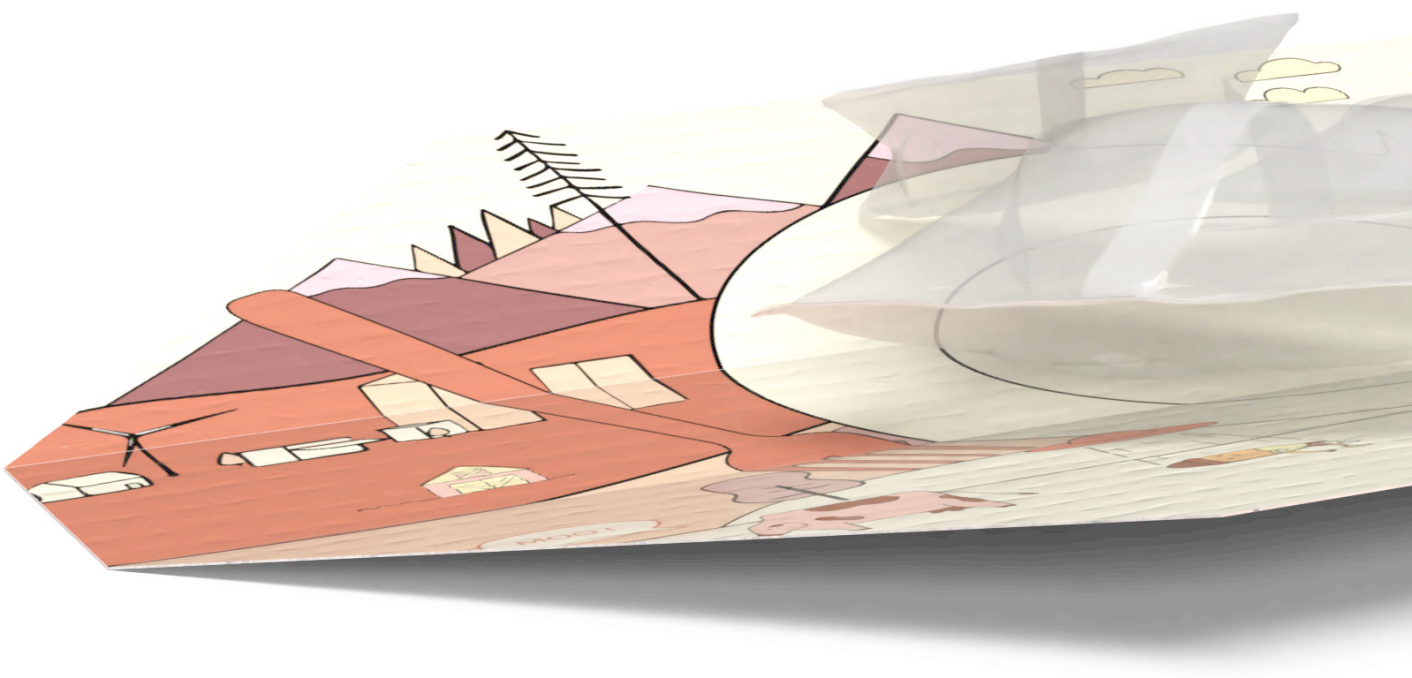
The exterior graphics depict the food characters hiking through nature, taking pictures on a large snack. We have a illustration depicting how the package open to show the uniquness of our snack pack, and the plate functionality.

INTERIOR GRAPHIC

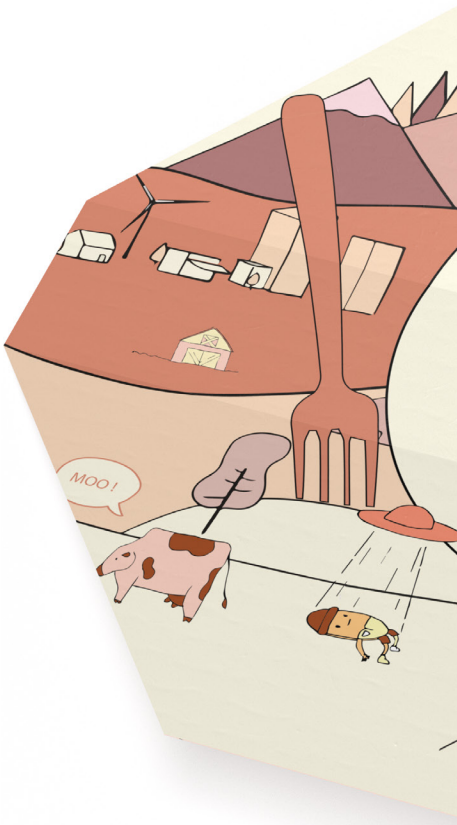


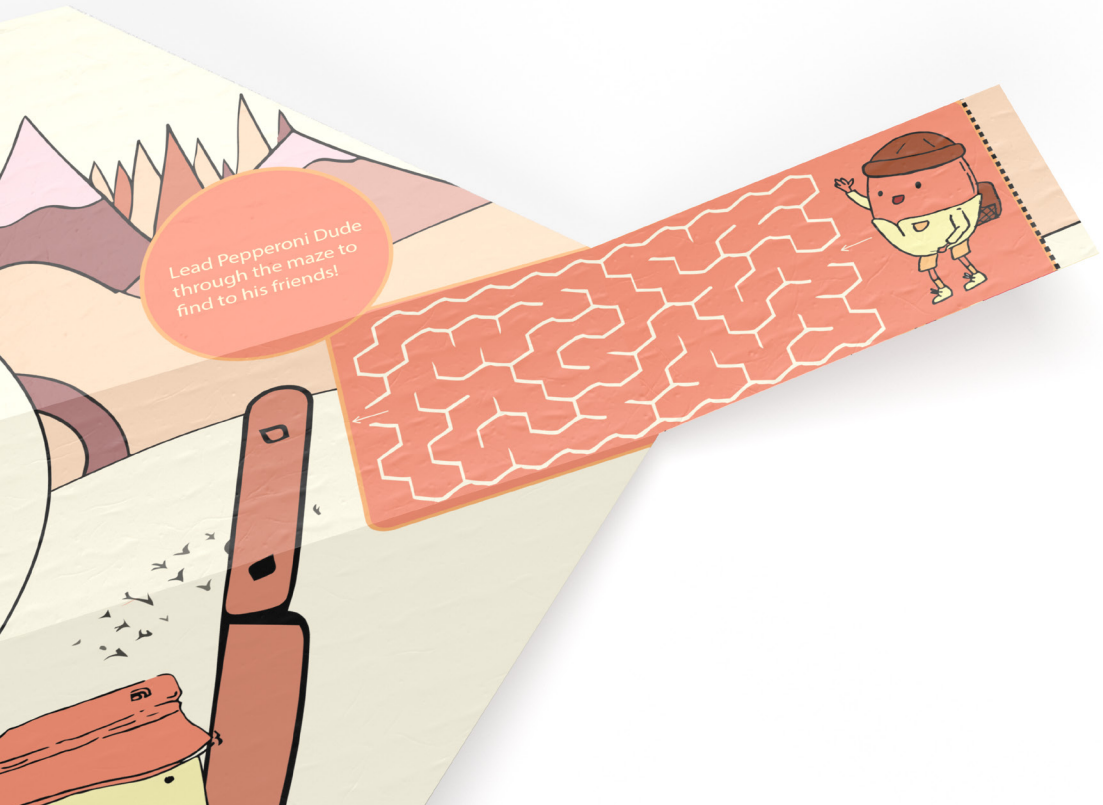
We included a plate fork and knife to encourage kids to use it as a plate. We also included a maze for increased play. We also used a printing method called color halftones to cut down on printing costs because when printed in full color on both sides costs rise by 30%. We also have where the food comes from to passively educate.

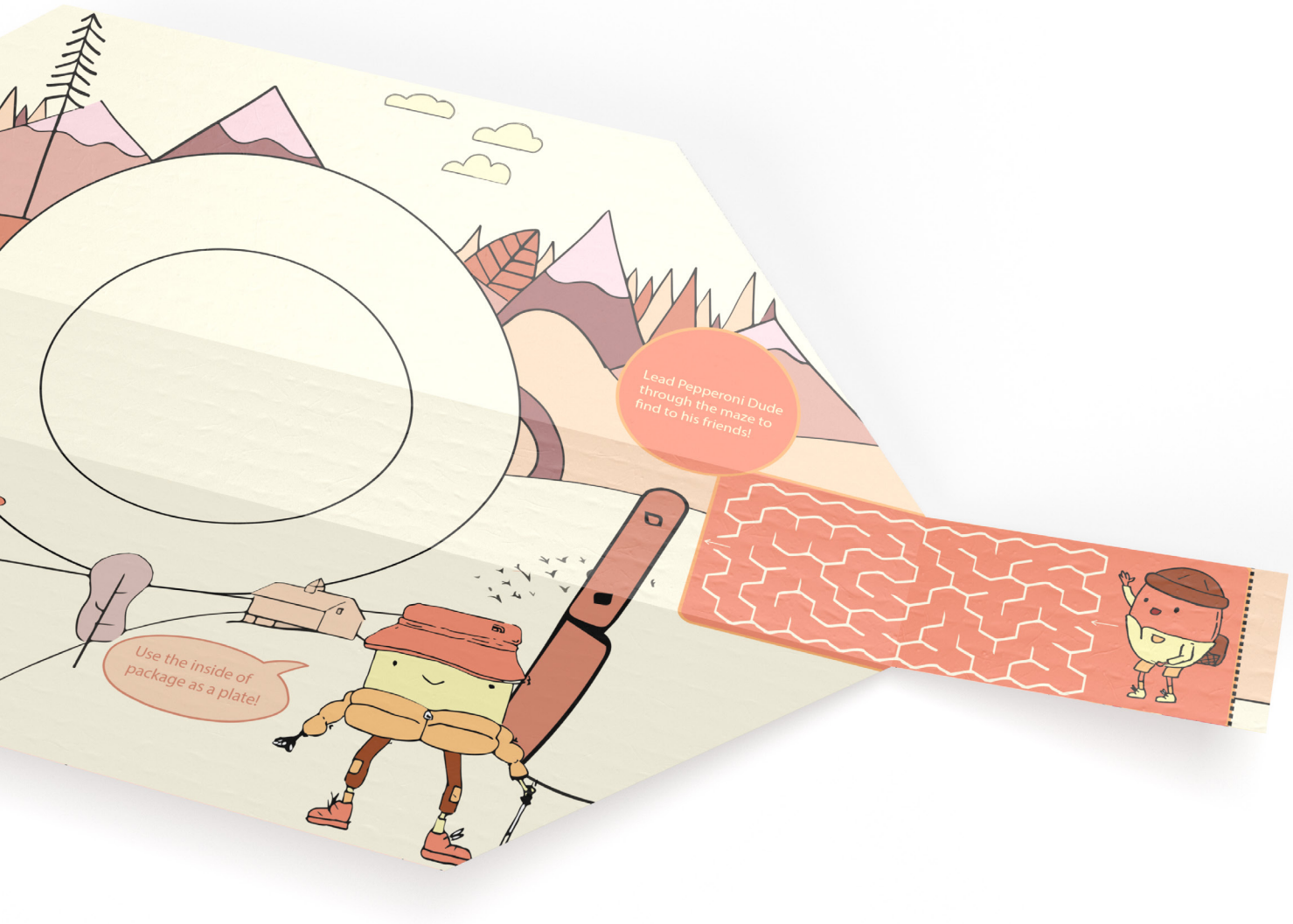

Honest
KiDS
SWEETENED ONLY WITH FRUIT JUICE
ORGANIC JUICE DRINK
FROM CONCENTRATE
6 FL OZ (177mL)
35 CALORIES PER BOX
USDA ORGANIC
PAPER BOX
PLASTIC BAG
Nutrition Facts
16g of Protein
Organic!
Hi-Yah!
Honest Apple Juice
Ham & Cheese
Net Wt. 10.2 oz




Honest
KIDS
SWEETENED ONLY WITH FRUIT JUICE
Appley Ever After
ORGANIC JUICE DRINK
FROM CONCENTRATE
USDA ORGANIC
6 FL OZ (177mL)
35 CALORIES PER BOX


MOO!


Lead Pepperoni Dude through the maze to find to his friends!


Use the inside of package as a plate!
Lead Pepperoni Dude through the maze to find to his friends!

ECO - AUDIT

WASTE COMPARISON

LUNCHABLE WITH BEVERAGE

14 g
Plastic

33 g
Paperboard

HI-YAH! WITH BEVERAGE

4 g
Plastic

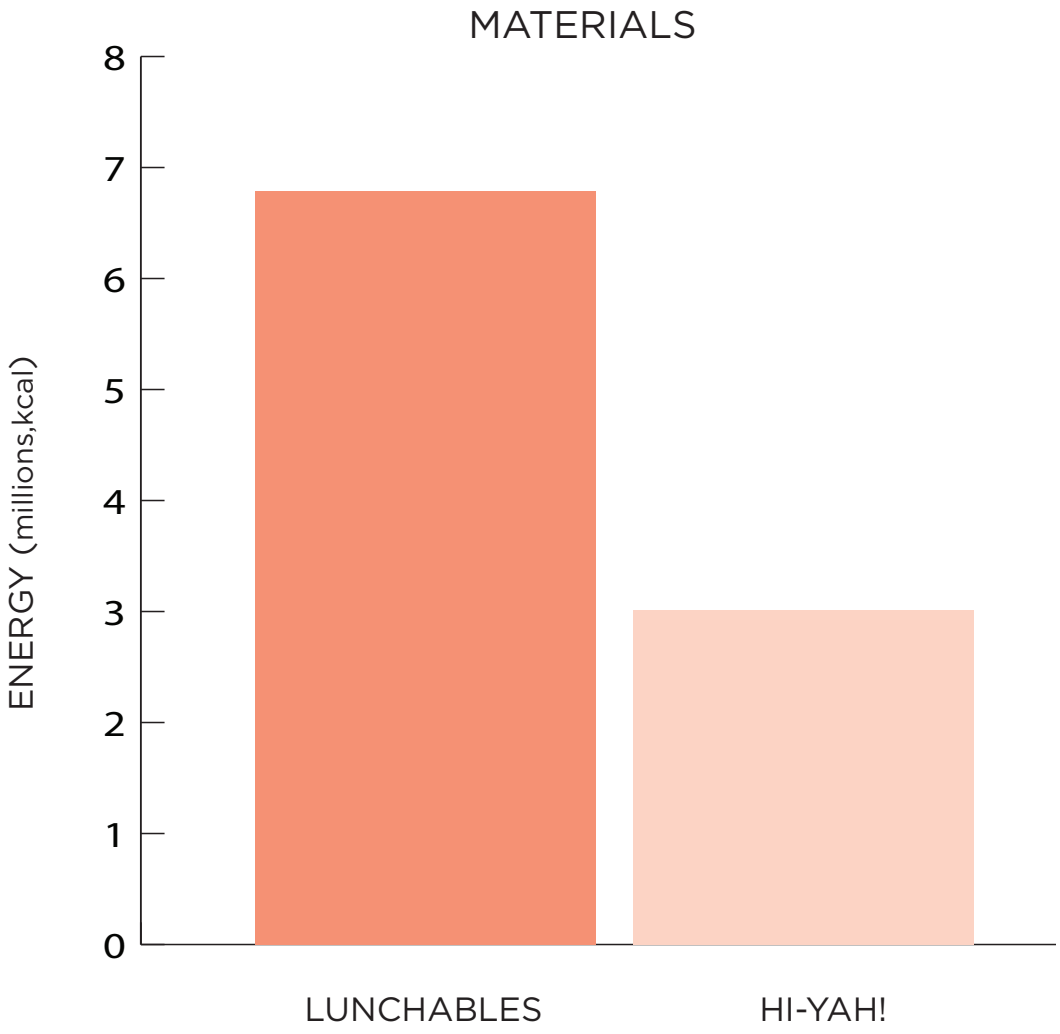
27 g
Paperboard

Hi-Yah! →

10 g Less Plastic

6 g Less Paperboard

ECO - AUDIT



LESS WASTE
We ran an eco audit to evaluate the energy and CO2 footprint of our materials. From this you can see that **our package uses almost less than half energy to produce our materials compared with competitors.**

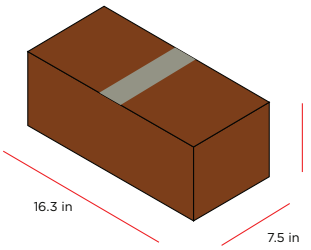
Even though we still had to use plastic our package uses far less material and has a much smaller CO2 footprint.

SHIPPING & DISTRIBUTION

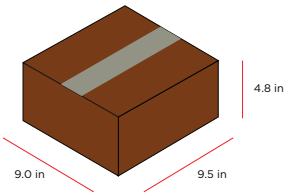
SHIPPING CONSIDERATIONS

When considering the stainability of our product we considered shipping as well. A large amount of energy goes into distributing product. When manufacturers are designing a product or it package they consider the amount of space it takes up. When a product wastes space, manufacturers are shipping air, and shipping air is expensive and inefficient.

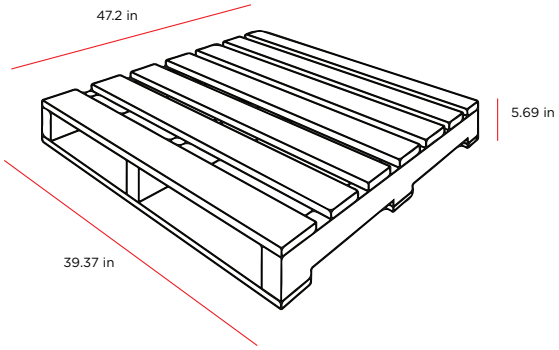
Since our package is much smaller than all of our competitors we compared our shipping efficiency to a Lunchables shipment. We ran Hi-Yahs case size and Lunchables case size in shipping software to find the most ef-



Lunchable Case



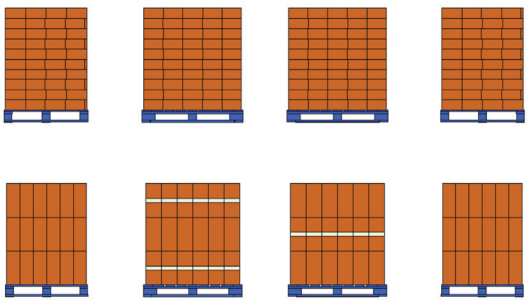
Hi - Yah Case



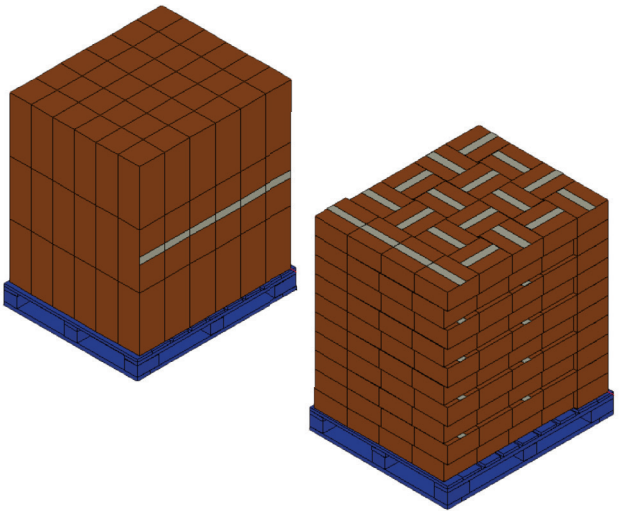
Standard Pallet

We did this using the **standard pallet size which is 47.2 in x 39.37 in x 5.69 in**, with a **maximum height if 56 in** when stacked and an **under hang of 0.5 in.**

We also took into account how many pallets fit in a trailer in a standard shipment. **26 standard pallets fit on a trailer, this will gave us even greater insight into our efficiency.**



Pallet stack views



Pallet stack layer variations

SHIPPING EFFICIENCY COMPARISON

LUNCHABLES
8 - COUNT CASE

108
Cases per pallet

864
Meals per Pallet

2,808
Cases per Trailer

22,464
Meals per Trailer

HI-YAH!
8 - COUNT CASE

200
Cases per pallet

1600
Meals per Pallet

5,200
Cases per Trailer

41,600
Meals per Trailer

Hi-Yah! →

2,392 more cases per shipment

19,136 more meals per shipment

SHIPPING & DISTRIBUTION

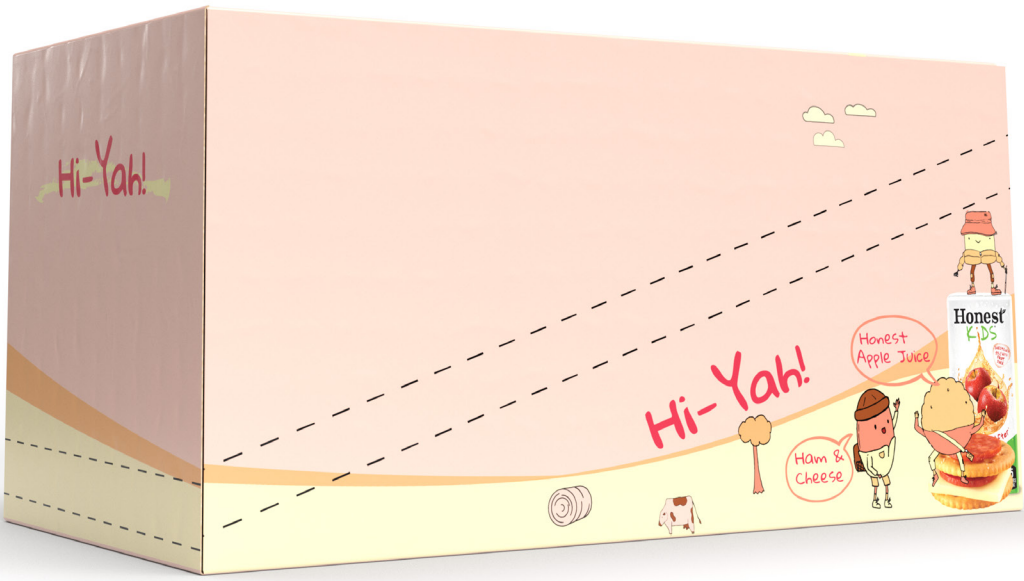
SHIPPING CASE

The Hi-Yah! will be shipped to stores in 8 count shipping cases. This is a standard case count for the industrial, comparable to Lunchables who also ships 8 count cases.

DISPLAY CASE

Each shipping case will have two display cases. A display case holds four Hi-Yahs. This gives us **more control over product presentation in store**. It is also preferred by retailers as they are easier to stock. The **top of the display case easily tears off, leaving the bottom half to act as a display depending on retail store setting.**

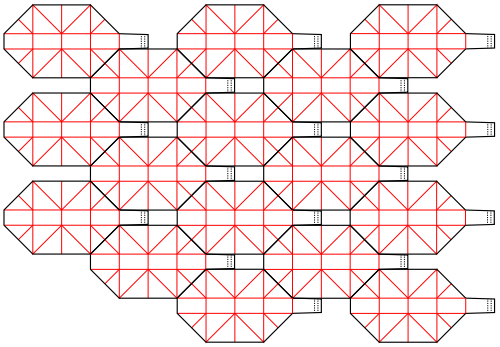
DISPLAY CASE



Top of case torn off

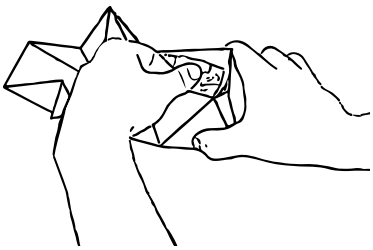
MANUFACTURING

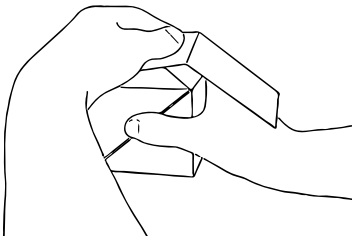
EXTERIOR

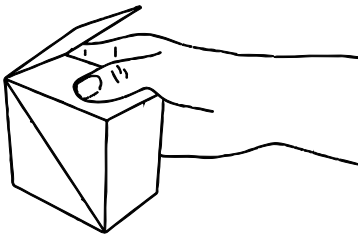


PRINTING & CUTTING PROCESS
- 100% recycled paperboard
- Die cut and scored
- Color print on both sides
- Interior graphic uses a gradient to cut down on costs and ink
- heat activated adhesive applied for sealing

PACKAGED BY HAND
Under guidance from Tim we determined the **food would need to be packed by hand into our package**. Automating this process with a mold would be far too expensive for a new packing technique. Once proven successful a mold can be made.

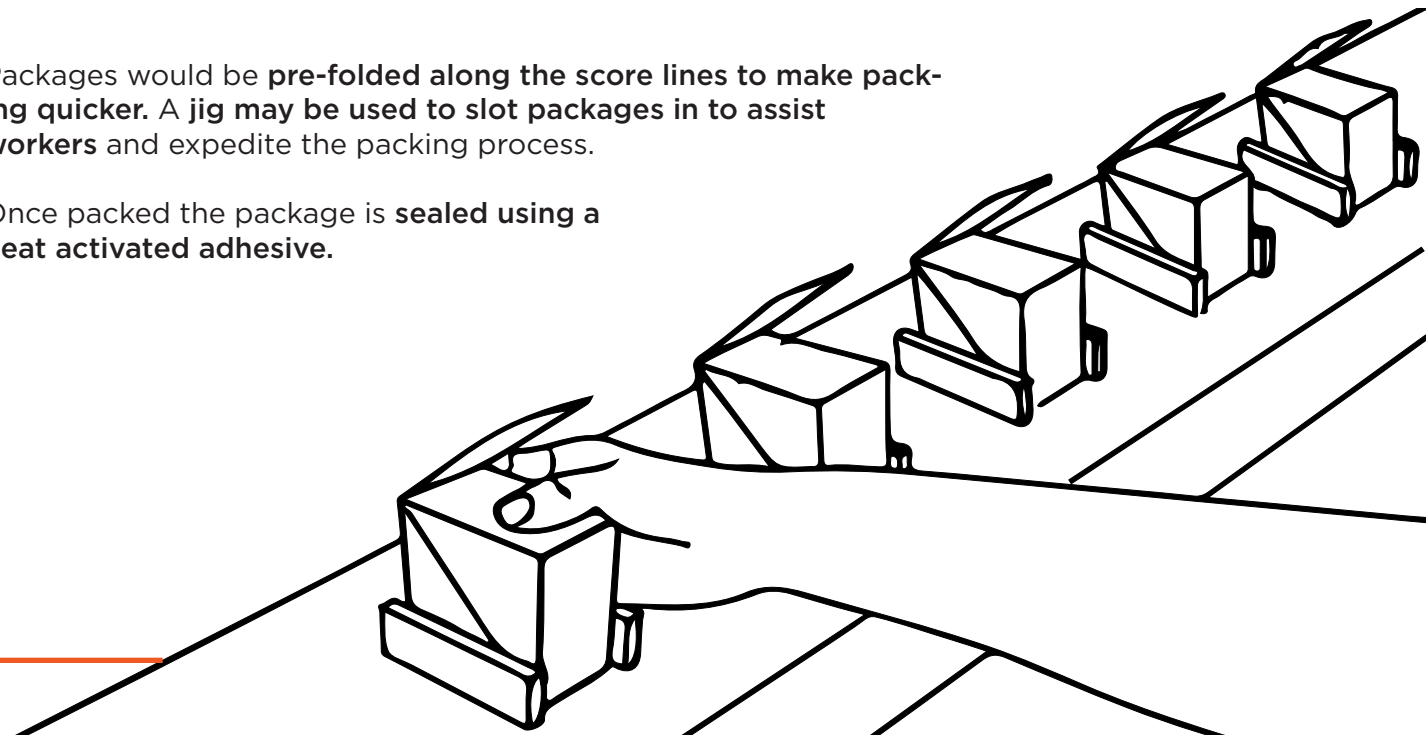






Packages would be **pre-folded along the score lines to make packing quicker.** A **jig may be used to slot packages in to assist workers** and expedite the packing process.

Once packed the package is **sealed using a heat activated adhesive.**

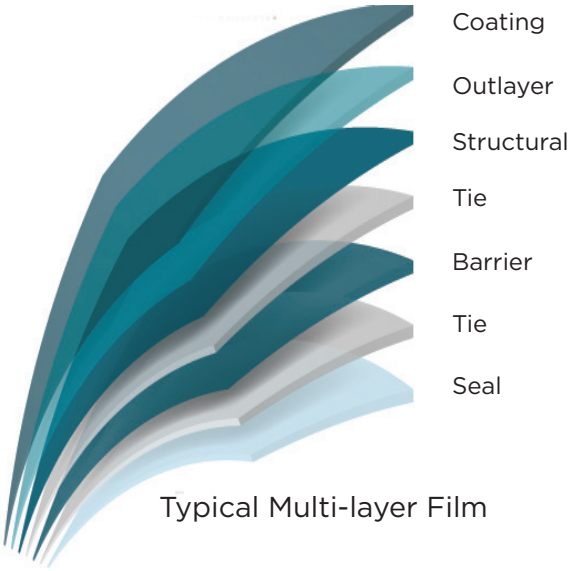


INTERIOR

FOOD POUCHES

Our food pouches are low density polyethylene (LDPE) flexible packaging. This **reduces the overall amount of plastic used, and reduces weight which lowers transportation weight and costs.**

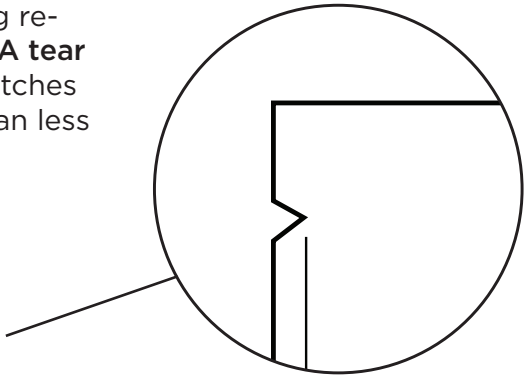
Since our snack pack is refrigerated the food **does not require as much protection to stay shelf stable.** This means that there does not need to be as many protective layers in the plastic, increasing its chances of being recycled.



Typical Multi-layer Film

EASY TEAR POUCHES

Package is heat sealed and flow wrapped. Heat sealing requires no use of adhesive, which is why we chose this. **A tear notch is the access point to the food pouches.** Tear notches do not require any adhesives as well. No adhesives mean less material, processes, and energy put into our package.

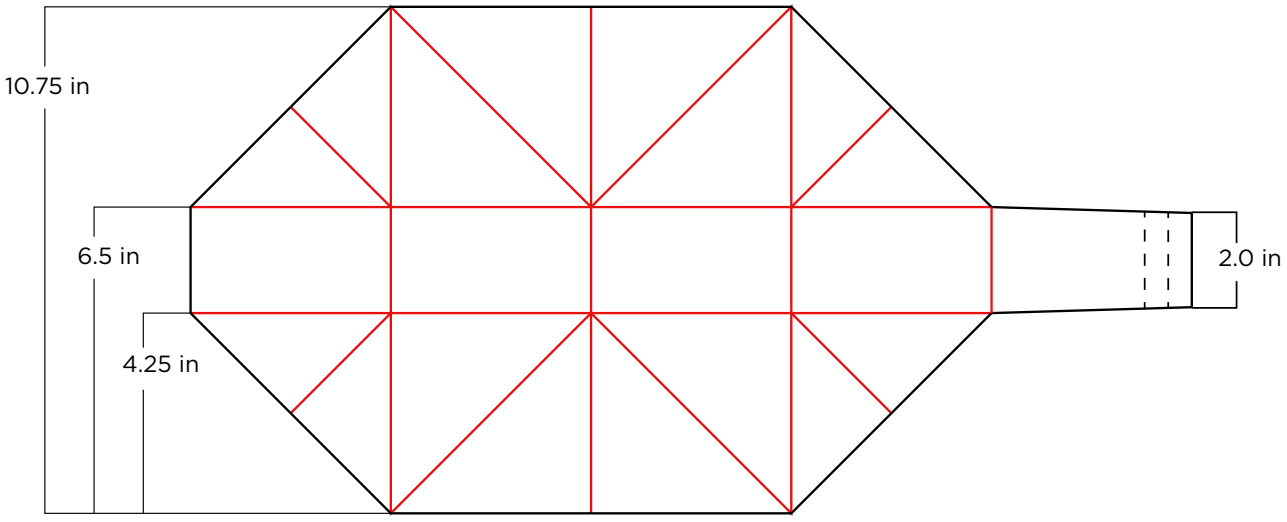


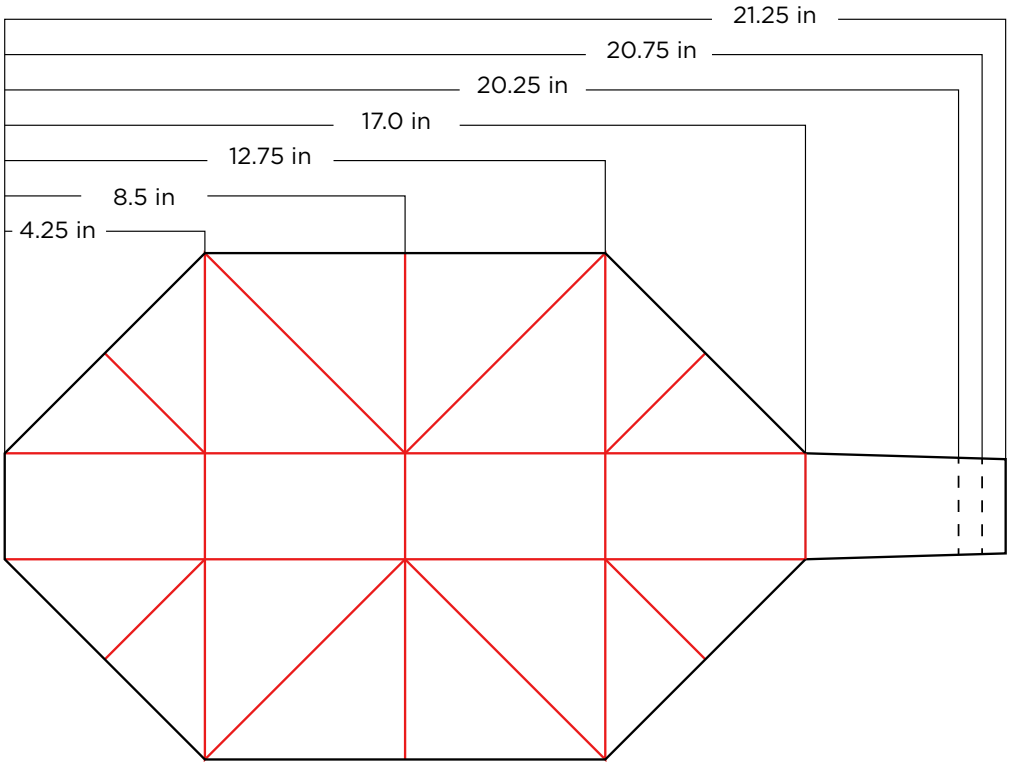
Tear Notch

Food Pouches

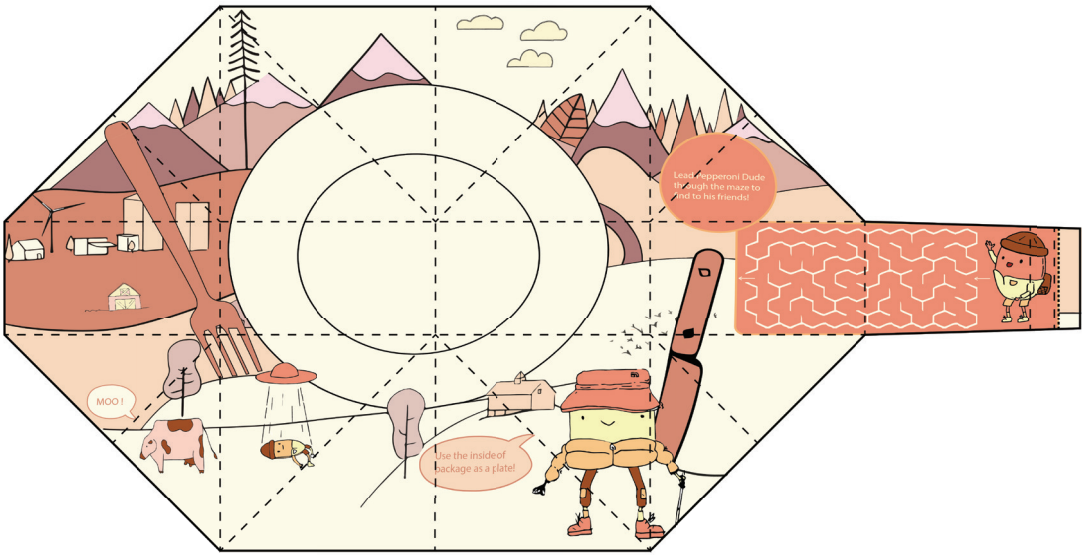
PACKAGE TECH PACK

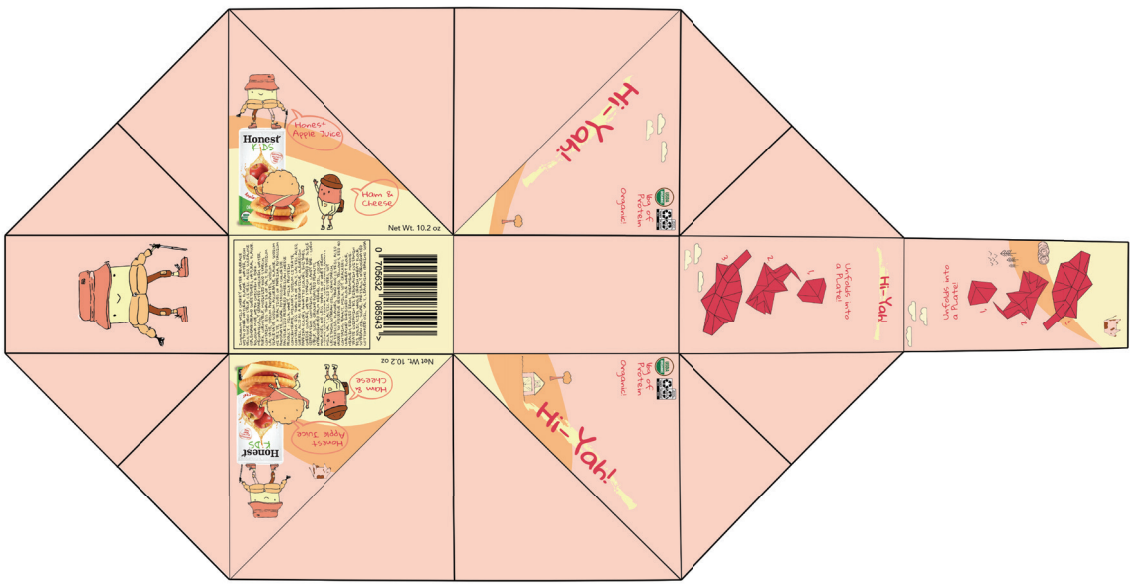
PACKAGE ORTHOGRAPHICS





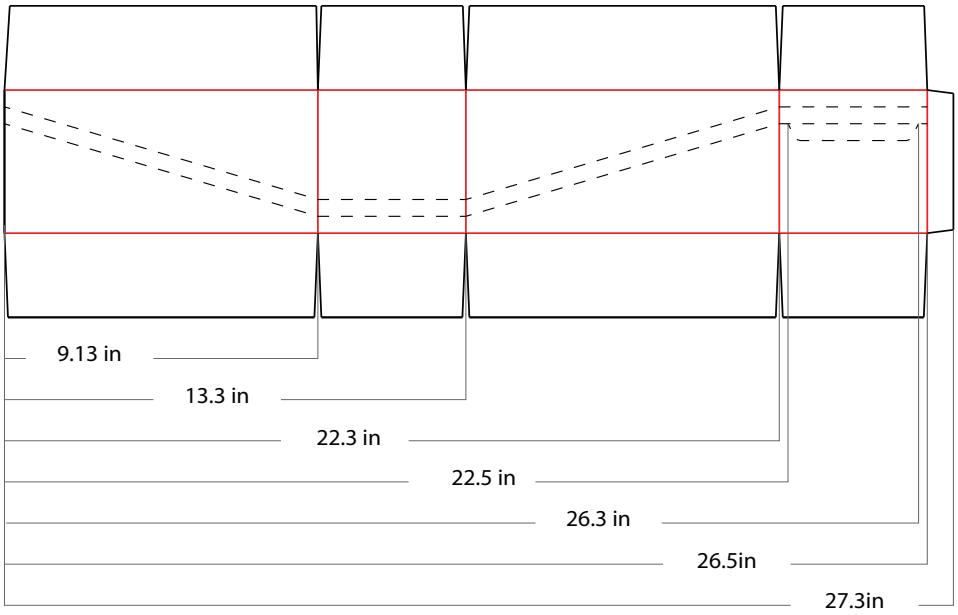
PACKAGE GRAPHICS

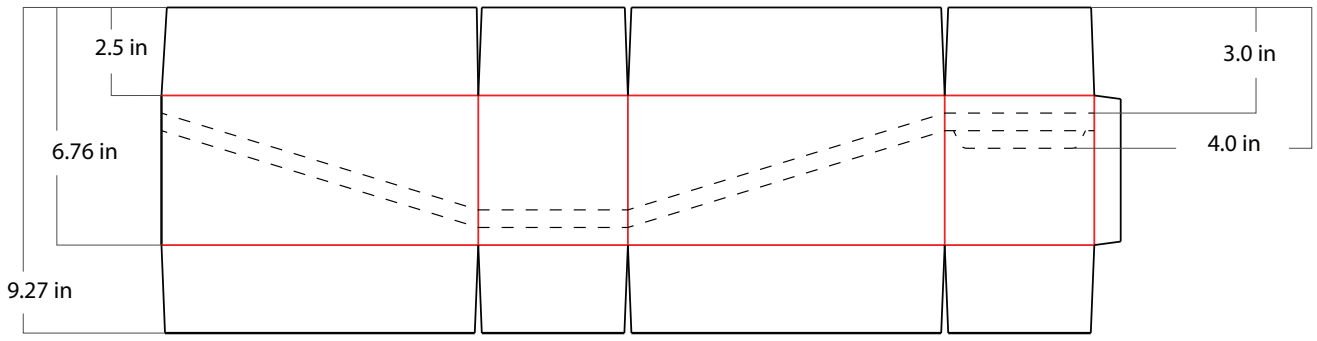


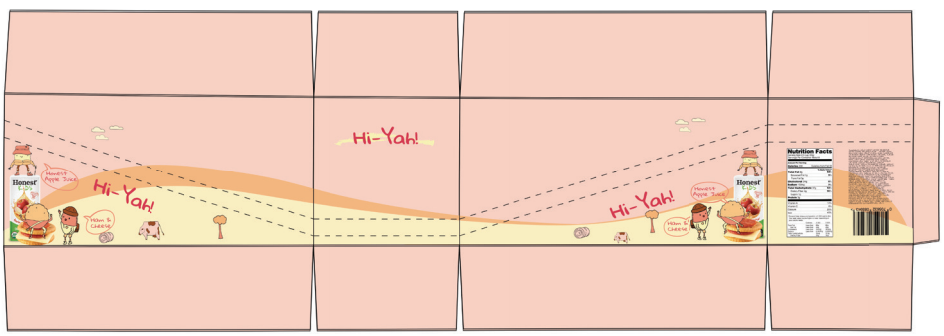


SHIPPING TECH PACKS

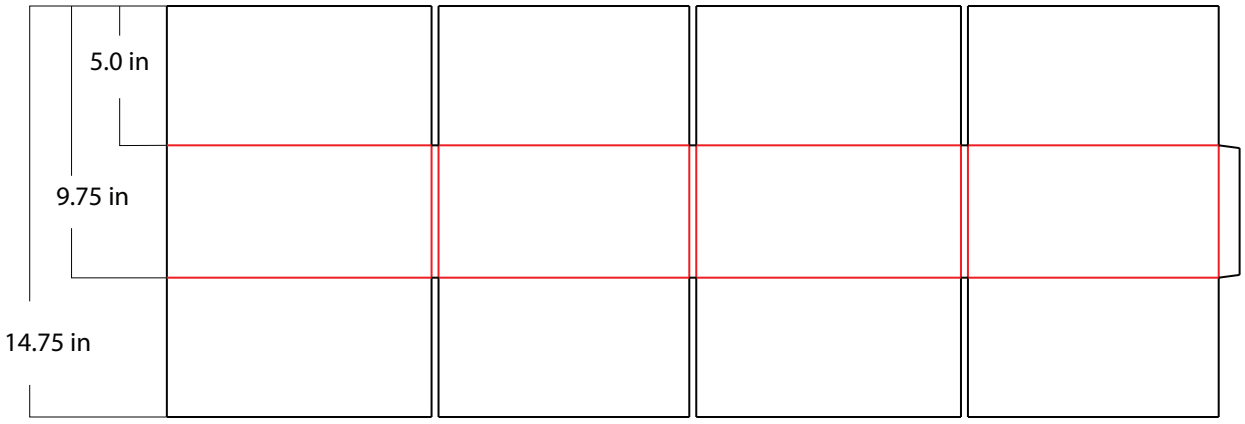
DISPLAY CASE TECH PACK

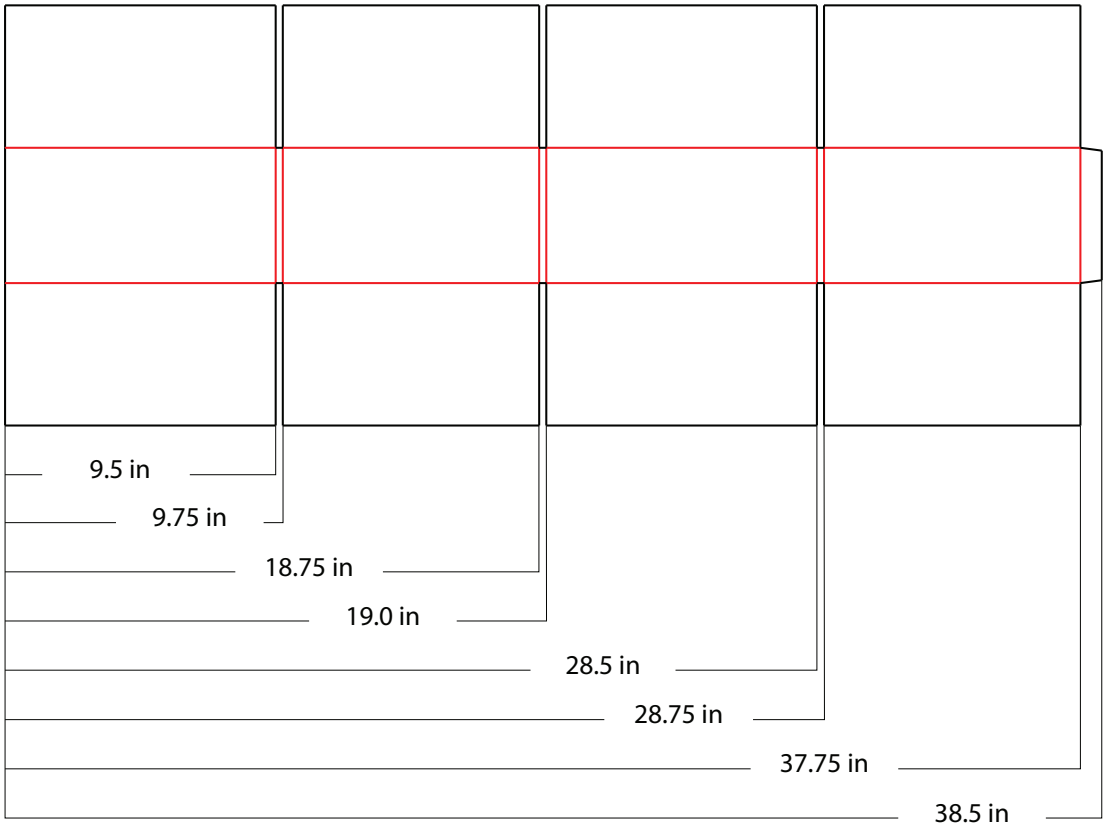






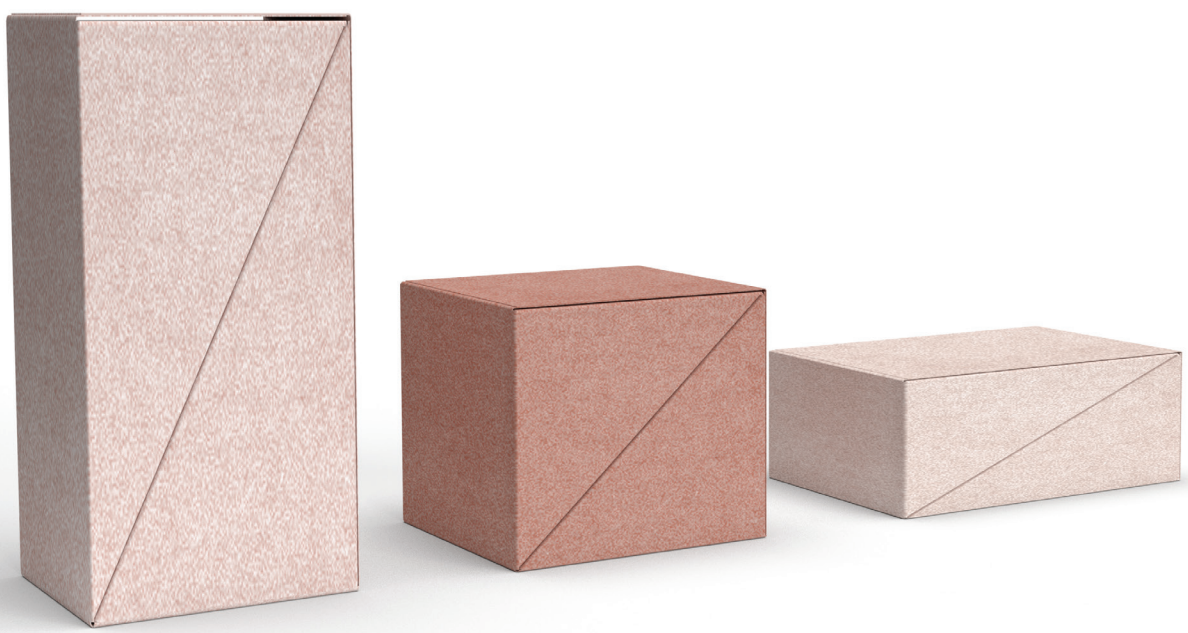
SHIPPING CASE TECH PACK



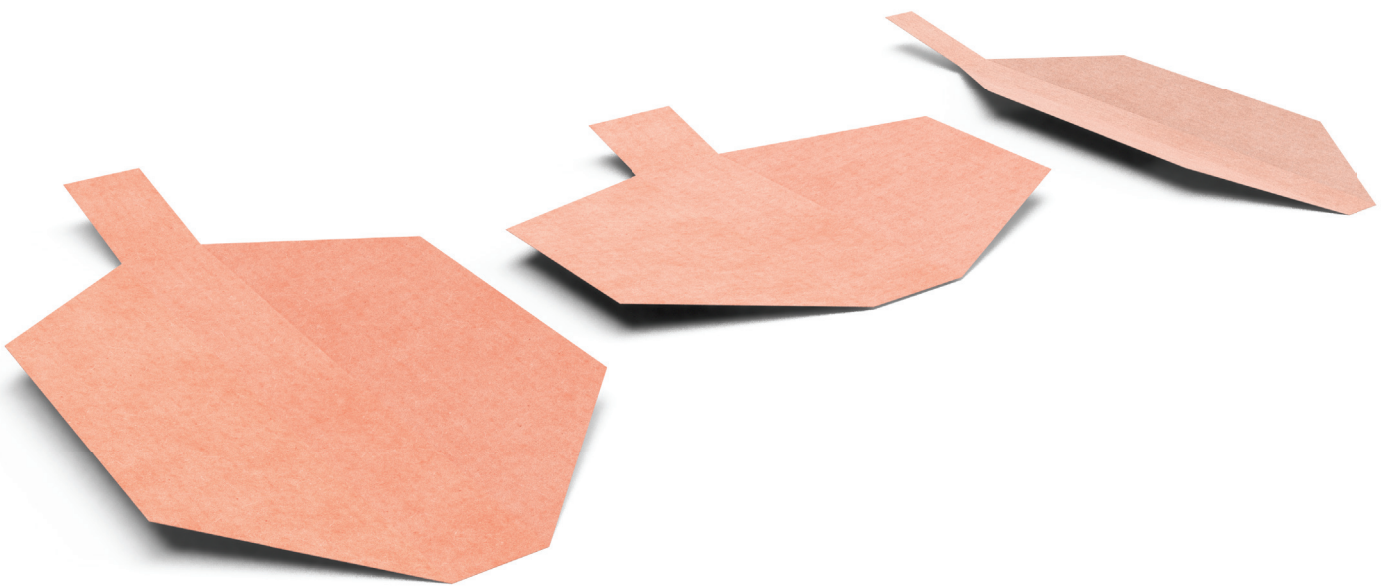


A PACKAGING PROTOCOL

A PACKAGE FOR ALL
This packaging pattern and manufacturing process can be applied to a variety of products. The folding pattern not only works for square containers, but containers of all sizes.



A PACKAGE FOR ALL
The plate can be used for instructional graphics of the product, provide a higher end feel, and enhance the consumers over all experience.




USDA ORGANIC
PAPER BOX
PLASTIC BAG
16g of Protein
Organic!
Hi-Yah!
Honest Apple Juice
Ham & Cheese
Net Wt. 10.2 oz
Honest KIDS
SWEETENED ONLY WITH FRUIT JUICE
USDA ORGANIC


Hi-Yah!
Honest Apple Juice
Ham & Cheese
Net Wt. 10.2 oz
Honest KIDS
Unfolds into a Plate!
USDA ORGANIC
16g of Protein
Organic!

THANK YOU!

Thanks to everyone who was involved in this project. Big thanks to our network of professionals: Tony Guido for giving us the context that our project lived in. Thanks to MariBeth for helping us with graphics and giving us consumer insights. Thanks to Ron Kander for directing our materials research and good luck to him with his hemp research. Thanks to Tim Brown for helping us with manufacturing. To all of the experts that didn't make it into the book thanks. We also want to thank our professors Todd Kramer and Mark Havens for encouraging us and assisting our project. We want to give a huge thanks to all of the industrial design students that encouraged and supported us throughout this project, you guys being there for all of the late nights was priceless. We miss you guys and love ya!