

# DELIVERING THE HOLISTIC URBAN BEEKEEPING EXPERIENCE



pairing an easy-to-assemble urban beehive with beekeeping tips & education tools and a virtual beekeeping community.

# COLONY COLLAPSE

in the past 50 years the domesticated honey bee population has dropped 50%  
human population has increased by 26% in 25 years



PARASITES

Varroa mites and other mites hurt bees. Bees at their healthiest can take care of the infestation.



STRESS

Demanding honey adds stress, pesticides also adds stress, as well as poor environment.



PESTICIDES

Pesticides, especially in rural areas, are killing bees and destroying hives. Its the main contributor to colony collapse.

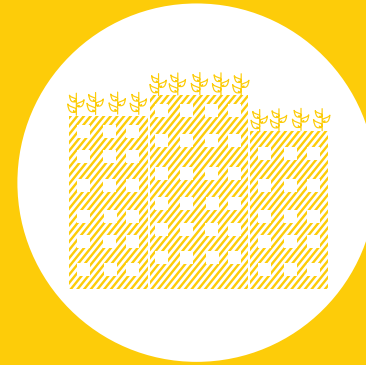


NUTRITION

As crop variety is knocked out, bees are losing their sources of food and nutrition in their rural homes.

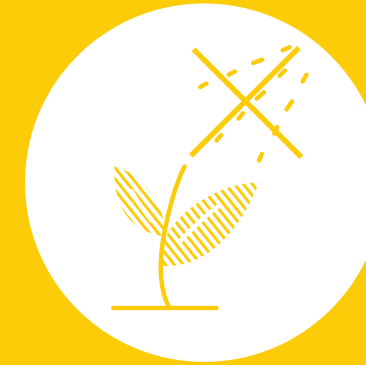
The food system industrializes to meet population growth with pesticides and GMOs, which in affect is large cause to colony collapse, the large drop in honey bee population.

# BEES NEED HEALTHY ENVIRONMENTS



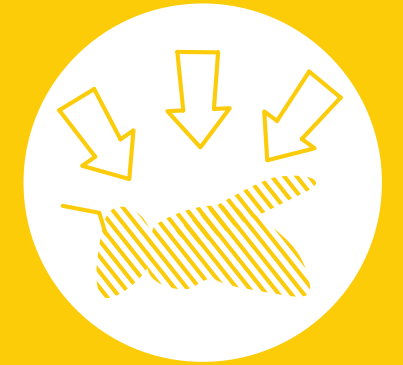
URBAN GARDENS

As urban gardening and farming grows, and food variety in rural areas becomes less, there is much more opportunity for bees to find healthy food sources.



NO PESTICIDES

The intense pesticides used in rural farm fields, isn't used in urban areas, bees won't be killed or become ill from it.



LITTLE STRESS

Hobby beekeeping allows the beekeeper to give more focus and care to each hive. There is also less demand on acquiring honey for sales, so enough honey is left for bees to feed on over winter.

# BEEKEEPERS GAIN BENEFITS AT MULTIPLE LEVELS



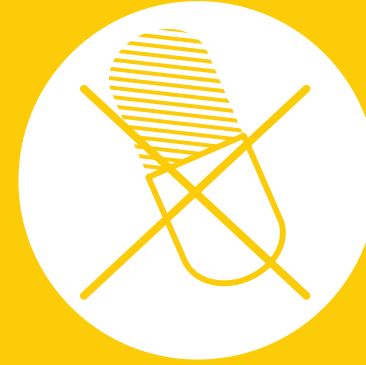
HONEY

Honey has so many health benefits not to mention its a delicious treat, with your own hive you have your own honey and some to share.



POLLINATION

Bees are nature's most efficient pollinators. Having a hive will help your garden succeed to its best ability.



HEALTH

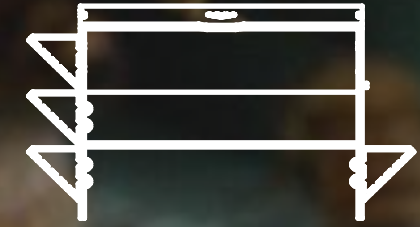
Eating native raw honey can reduce seasonal allergies, it delivers small amounts of allergens, creating immunity. Honey contains a variety of minerals, vitamins, antioxidants, and more. Lastly Beekeeping brings you outside and connected to the environment.

# BEEKEEPING IS OVERWHELMING



Current books and blogs are **overwhelming**, nothing is straight forward, and existing beehives are sold with **no guiding resource**.

OPPORTUNITY



HIVE DESIGNED FOR NON-PROFESSIONAL BEEKEEPERS



WEBSITE FOR GUIDANCE , EDUCATION , AND COMMUNITY BUILDING



## UNDERSTANDING BEEHIVES

The following research was conducted to gain a better understanding of the varieties of beehives and methods of beekeeping. This was done in order to find a direction that would meet design goals.

## WHICH STYLE OF HIVE TO CHOOSE



TOP BAR HIVE



WARRE HIVE



LANGSTROTH HIVE

# WHICH STYLE OF HIVE TO CHOOSE

<p>PROS</p> <ul style="list-style-type: none"> <li>/ Collects most honey because of foundation frames</li> <li>/ Small footprint</li> <li>/ Honey extractors designed for langstroth frames</li> </ul> <p>CONS</p> <ul style="list-style-type: none"> <li>/ Heavy lifting to remove boxes and frames</li> <li>/ Bees build combs on pre-designed foundation, which is larger than typical bee comb, and can contribute to varroa mites and disease</li> <li>/ Designed for honey production</li> </ul>	<p>POTENTIAL DIRECTION</p>  <p>LANGSTROTH HIVE</p>
<p>PROS</p> <ul style="list-style-type: none"> <li>/ Roof and quilting insulates hive and creates more constant temperature</li> <li>/ Bees build natural comb</li> <li>/ Uses foundationless bars and frames for a more natural and healthy comb</li> </ul> <p>CONS</p> <ul style="list-style-type: none"> <li>/ Bees fill comb out in square shape and comb gets stuck to the sides</li> <li>/ Difficult to add boxes because the top ones are heavy</li> <li>/ A lot of</li> </ul>	<p>POTENTIAL DIRECTION</p>  <p>WARRE HIVE</p>
<p>PROS</p> <ul style="list-style-type: none"> <li>/ Uses foundationless bars for a more natural and healthy comb</li> <li>/ ergonomic and easy to lift just one bar at a time, instead of a entire box</li> <li>/ sloped sides makes for easy comb gathering</li> <li>/ Docile to the bees as you place down one bar at a time not a heavy box.</li> </ul> <p>CONS</p> <ul style="list-style-type: none"> <li>/ Can't expand</li> <li>/ Needs more frequent inspection</li> </ul>	<p>HIVE DIRECTION</p>  <p>TOP BAR HIVE</p> <p><small>*A top-bar hive is a single-story frameless beehive in which the comb hangs from removable bars.* - wikipedia</small></p>

# HIVE DIRECTION



TOP BAR HIVE

"A top-bar hive is a single-story frameless beehive in which the comb hangs from removable bars." - wikipedia

# BENCHMARKING

# COMB HIVE MOTIVATIONS

BEE SMART TECH



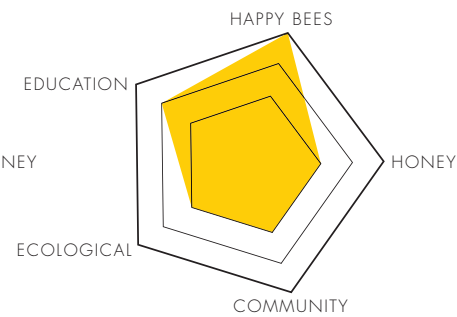
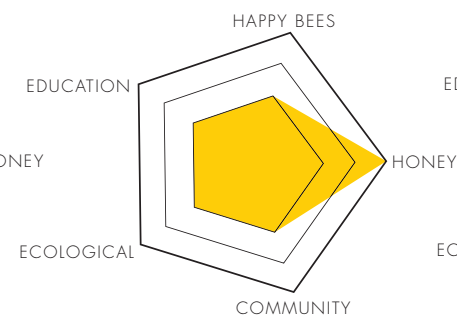
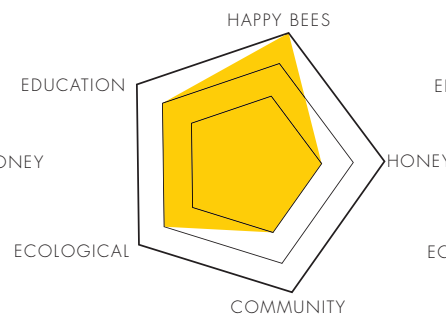
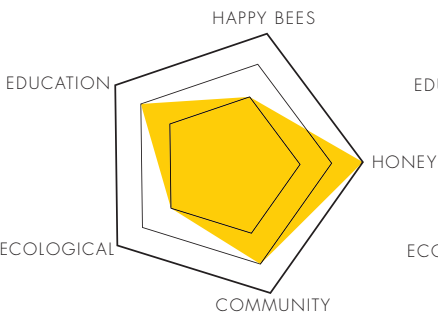
OPEN SOURCE



FLOW HIVE



BEE THINKING



- Uses a sensor to track hive temperature / humidity, honey production, and hive location.
- focuses on sensor and less on improving the actual hive or innovative accessories.

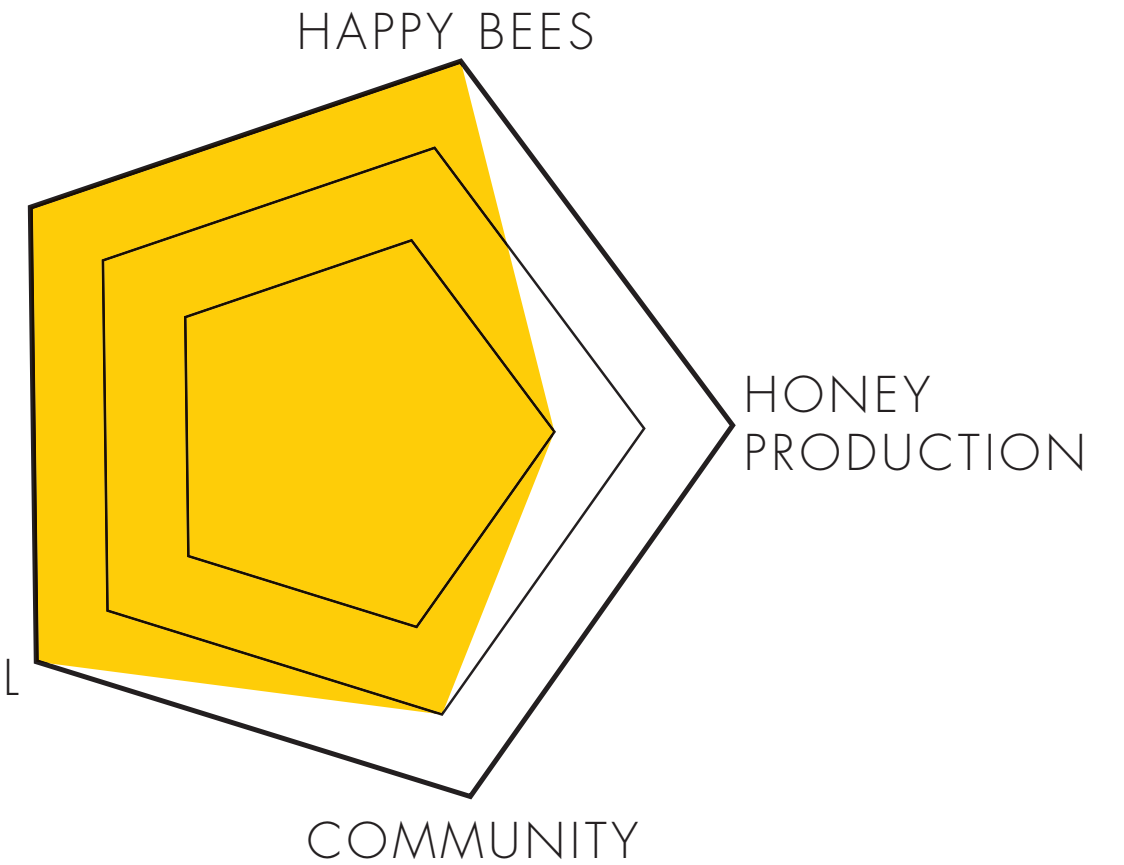
- Open source CNC design with no database to find a place to actually mill design.
- No education on starting up the actual hive.
- Too small, will cause swarming from bees being too cramped.

- Goes against natural bee "living", bees fill in pre-designed comb, which is unhealthy.
- Comb is completely "broken up" for honey to flow out while bees are still inside hive & doesn't recognize preserving honey for bees over winter.

- Extremely expensive shipping.
- Doesn't consider feeding the bees.
- No innovative accessories.

EDUCATION

ECOLOGICAL



**HAPPY BEES** : Creating an environment most natural to the bees, such as enough room and natural comb.

**EDUCATION** : Starting a new hive is overwhelming & discouraging, when buying a hive there should be new beekeeping guidance.

**ECOLOGICAL** : Ecological for bees by creating most natural environment, also hive's affect on environment (wood, shipping, etc.).

**COMMUNITY** : Creating a community but also connecting new beekeepers to existing communities nearby.

**HONEY PRODUCTION** : If you have a healthy and happy hive, honey will be the outcome.

## VISITING HIVES & EXPERTS



**Jordan Whitney**

Past Chicago suburban  
beekeeper  
2 hives 2 years



**Cody Harrison**

Cincinnati urban beekeeper  
1 hive 1 year



**Kyle Gati**

Chicago urban beekeeper  
8 hives 4.5 years



**Liz Tilton**

Cincinnati urban &  
suburban beekeeper  
80 hives > years



**Virginia Russel**

Cincinnati urban/suburban  
beekeeper  
3 hives > years



**Gene Kritsky**

Cincinnati urban/suburban  
beekeeper  
6 hives 20 > years

"Bees are endearing & smart... more people should know that... bees don't want to sting you, they just want to be happy."

"Starting a hive was overwhelming and could have been discouraging if I hadn't found a community of beekeepers to help."

"There's so many different philosophies and everyone has different answers... its confusing... I would have liked one set of rules to start with and then go from there."

"Top bar hives are the best, honey will be an outcome if bees are happy and the hive is self-sustaining."

"Starting your hive and purchasing tools from the sites is hard for a "hobby" beekeeper, the sites and hives are designed for professionals"

"Ventilation is important, looking at different roofs and ways to integrate it will help a hive."





## DESIGN PRINCIPLES

### EDUCATION

Educate beginner beekeepers on the WHY and HOW of beekeeping. With one set of clear instructions, we avoid conflicting advice to simplify and increase confidence.

### COMMUNITY

Bees build a successful hive by working together as a community. COMB hive builds successful beekeepers by connecting them to nearby communities.

In addition to using technology to enable COMB hive beekeepers to connect to each other.

### ACCESSIBILITY TO HOLISTIC EXPERIENCE

COMB Hive uses CNC routing machinery to create the pieces for you to build at home. COMB connects you to local CNC machining locations and is easy to assemble.

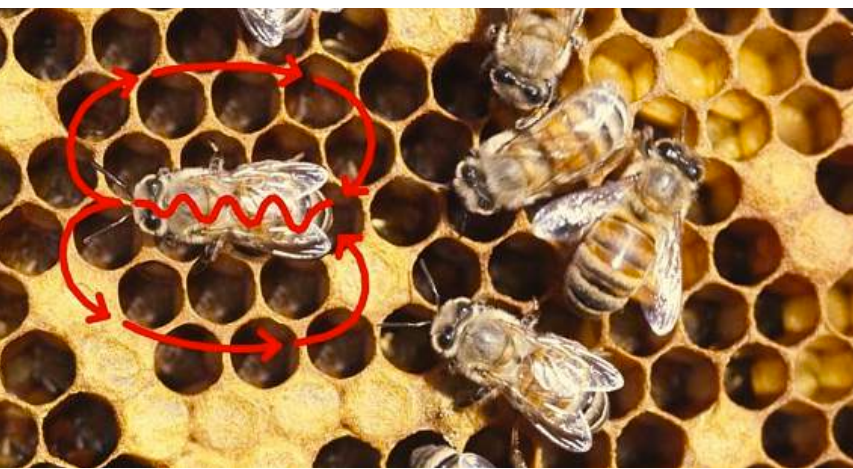


## WHY COMB? COMB IS...

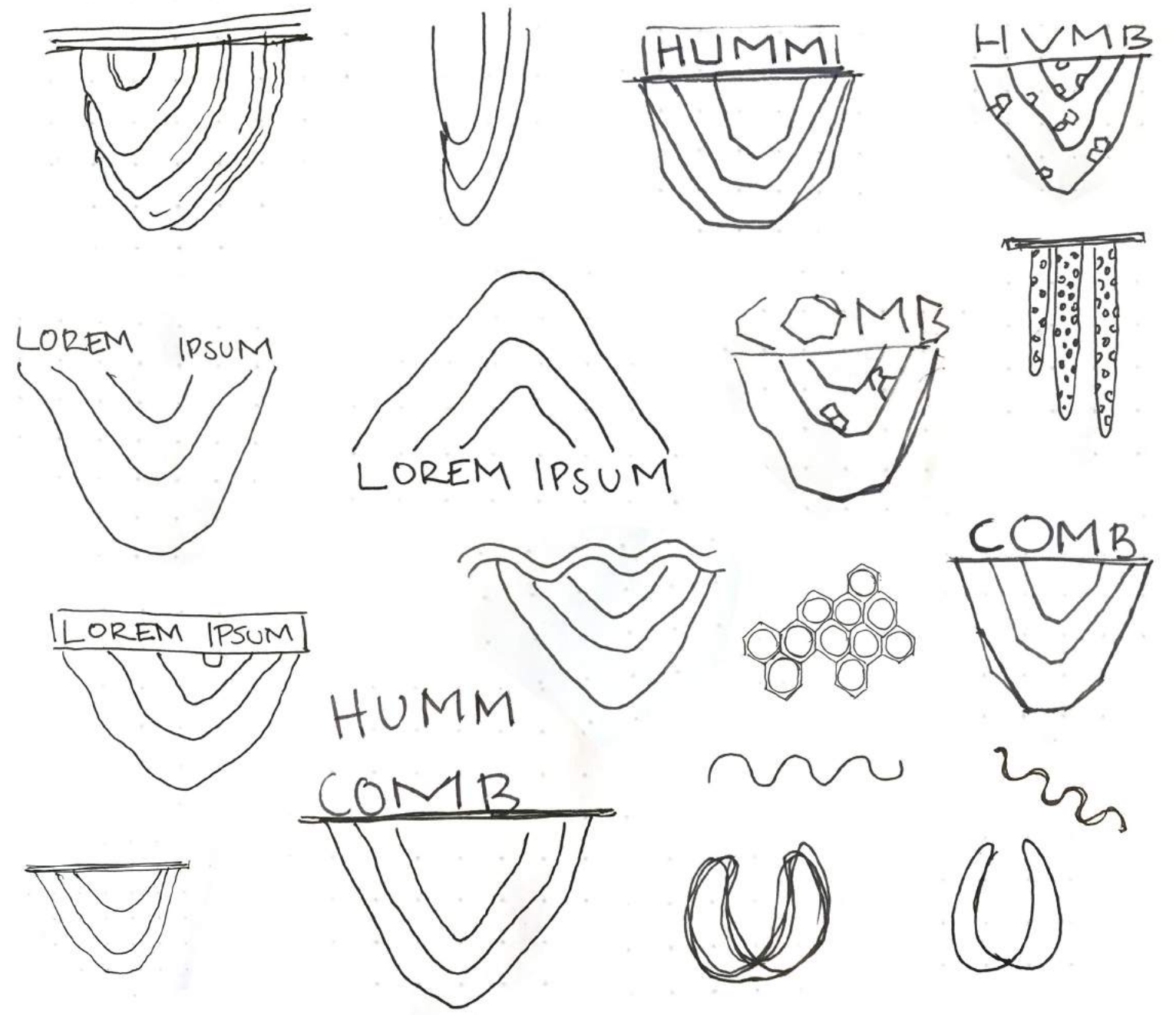
COMB is the building block for bee communities & the foundation for a successful hive.

COMB is the building block for new beekeepers, a foundation of education and confidence.

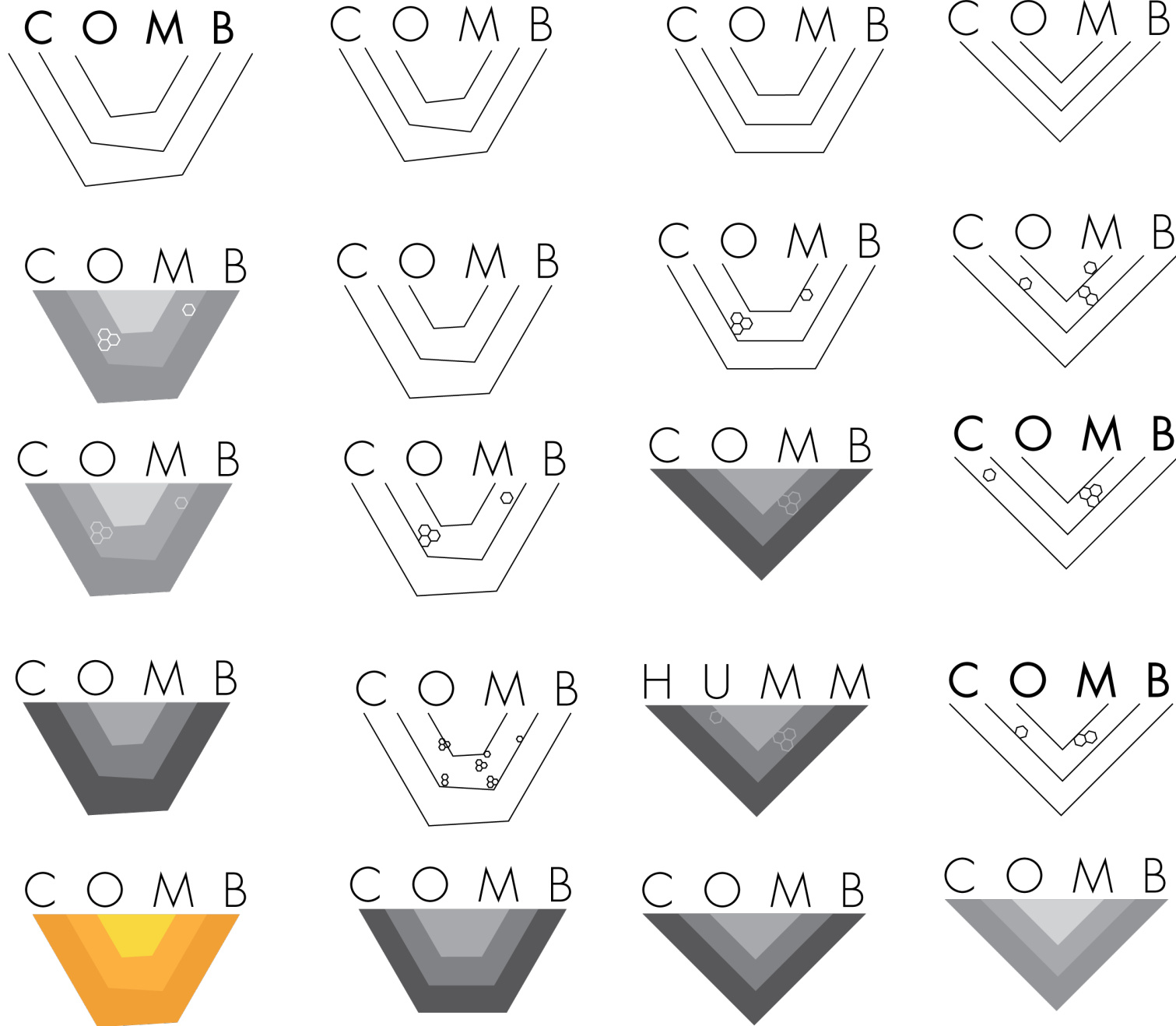
COMB is the community for other COMB beekeepers to connect & share tips, questions, and experiences.



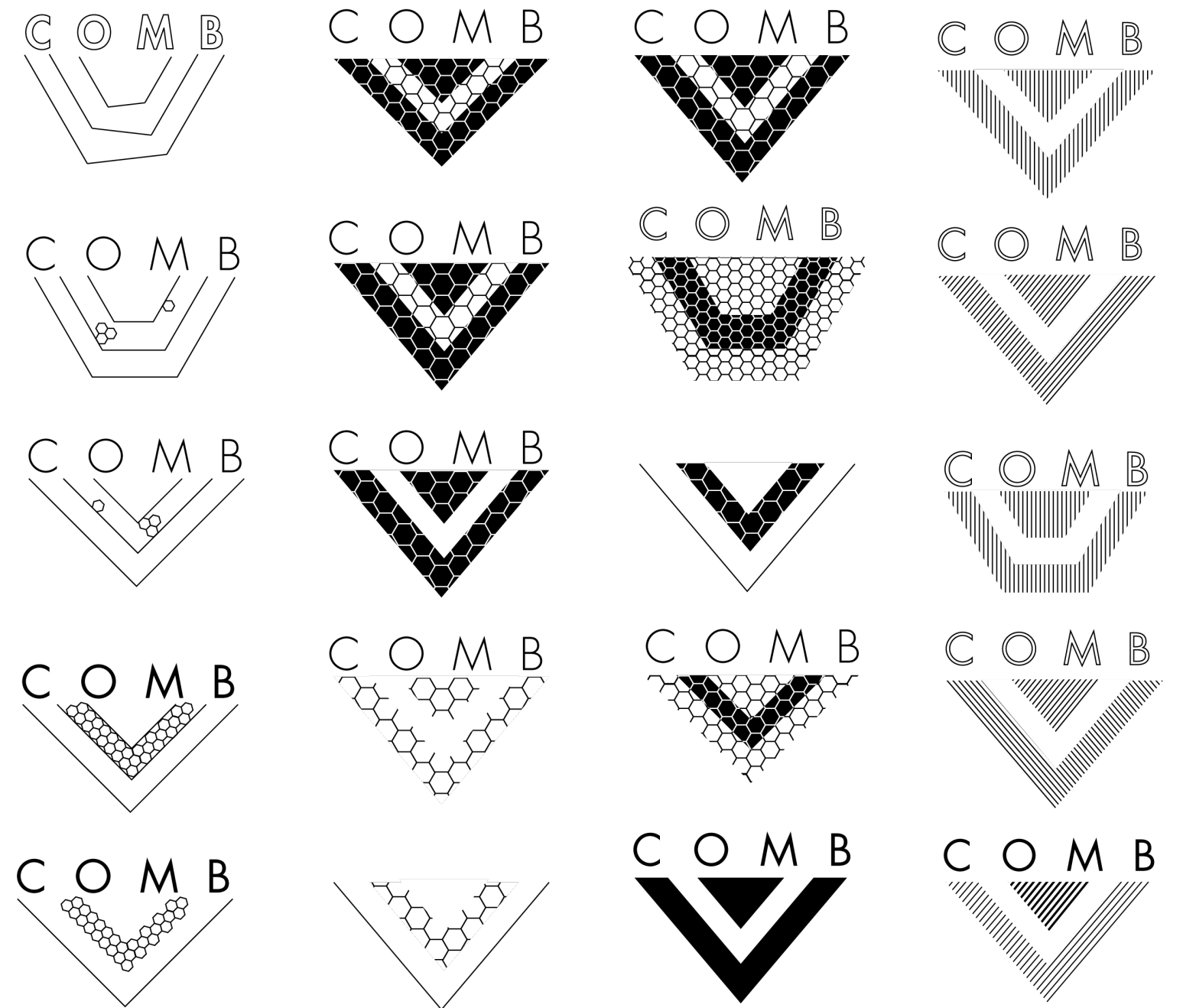
# INITIAL CONCEPTING



BRAND



DEVELOPMENT





## BRAND STATEMENT

COMB HIVE ensures a confident beginning to becoming a beekeeper.

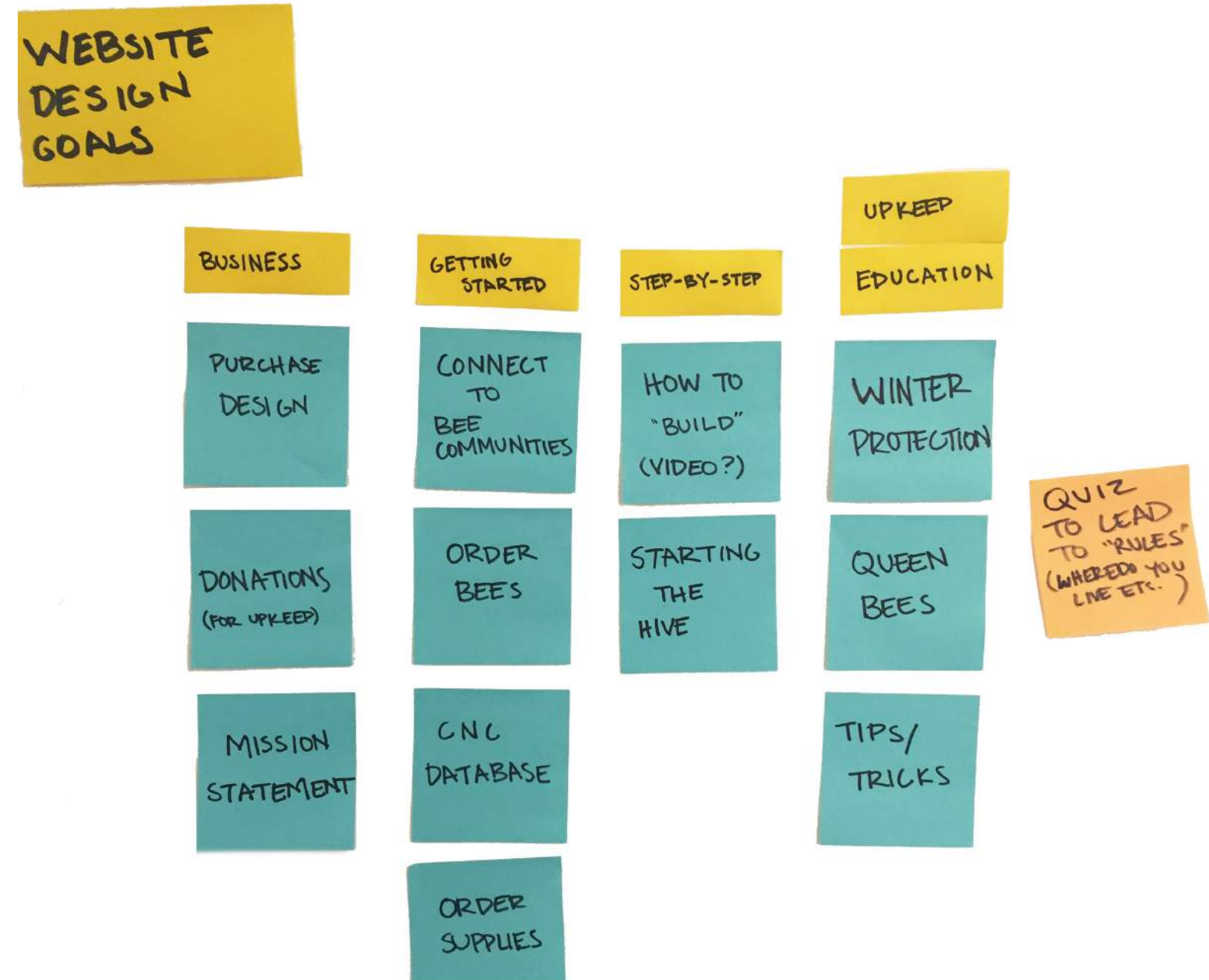
We believe in ensuring a self sustaining hive by providing a natural "free" comb to prevent disease and encourage the natural habits of bees. Happy Bees for a Happy Beekeeper.

COMB stands for the natural comb that the bees build but also stands for the growth in beekeeping in urban areas.

Just as the bees slowly build their comb to create an ecosystem, COMB encourages the growth of beekeeping, one backyard or rooftop at a time. COMB stands for communities and connections it helps create.

## DIGITAL DESIGN TASKS

The website sells COMB HIVE to the potential new beekeeper by introducing its benefits, creating connections to communities, and guiding and encouraging the visitor in beekeeping. The website should introduce beekeeping with excitement and foster confidence.



# USER

WHY COMB HIVE

- MISSION STATEMENT
- INTERVIEWS / VALIDATION
- CNC MILLED DESIGN

WHY BEEKEEPING

- URBAN GARDENING
- HONEY
- HEALTH BENEFITS
- COLONY COLLAPSE
- BENEFITS TO BEES

BUILDING BEEHIVE INSTRUCTIONS

BEEHIVE FEATURES

BEEKEEPING SUPPLIES (w/LINKS)

# TASKS

BEE EDUCATION/ "KNOW YOUR HIVE"

TRACK TOP BARS OF HONEY

BEEKEEPING COMMUNITIES (STATES, CITIES)

PURCHASE HIVE

TIPS & TRICKS

TRACK SUGAR WATER FEEDINGS

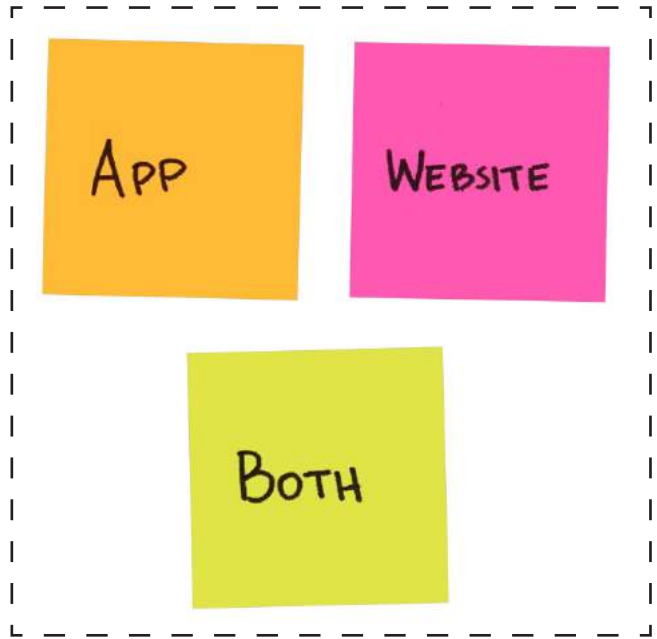
DIGITAL COMMUNITIES

FEEDING BEES

CNC MILLING DATABASE

WINTERING

## KEY



# SITE

## HOME PAGE

COMB BRAND

WHY BEEKEEPING

GETTING STARTED

MISSION STATEMENT

WHY COMB

- Easy to build
- Beginner friendly
- Educational
- Sustainable
- Community

INTERVIEWS/VALIDATION

CNC MILLED DESIGN

URBAN GARDENING

- Counter movement to food industrialization

HONEY

HEALTH BENEFITS

COLONY COLLAPSE

URBAN BENEFITS TO BEES

CONSTRUCTION

- Buy wood
- Mill wood (link)
- "IKEA" Instructions
- Exploded view

FEATURES

- Beekeeping Success
- Bonus

BEEKEEPING SUPPLIES

- Description and links for purchasing

# MAP

CARE

COMMUNITY

TRACKING

KNOW YOUR HIVE

- Simple breakdown to understanding bees and their hive

WINTERING

TIPS & TRICKS

- Basics to taking care of your hive

FEEDING YOUR BEES

BEE COMMUNITIES

- Links by city

CNC - MILLING DATABASE

- Connects you to businesses and shops to mill out beehive design

CONTACT

DIGITAL COMMUNITY

- Connects you to other COMB HIVE users for discussions

TOP BAR PROGRESS

- Multiple Hives

SUGAR WATER FEEDING

EXTERNAL LINK

STORE

BEEHIVE GEOMETRY (\$15)

FELT POCKETS (\$30)

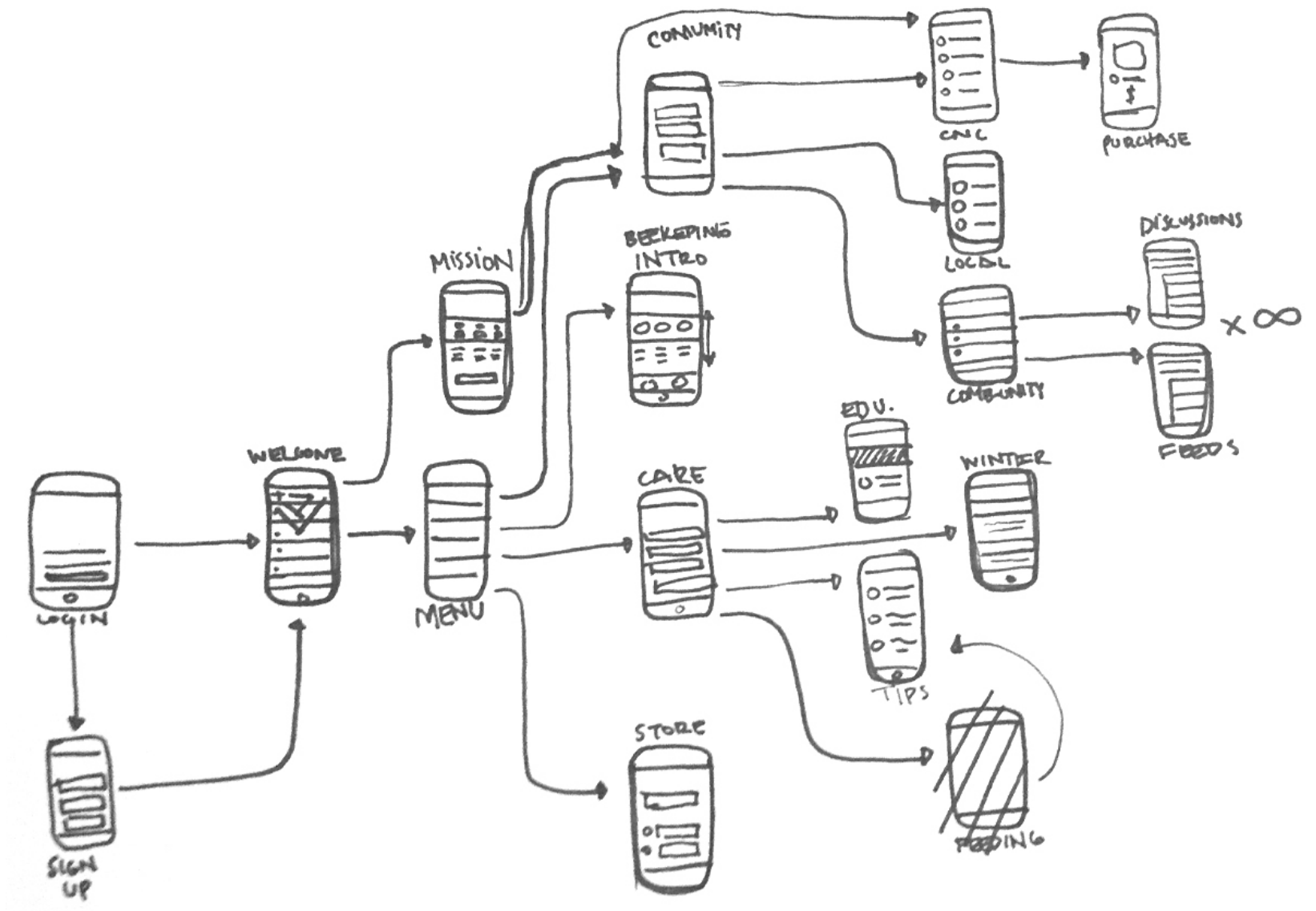
FELT POCKETS PATTERN

DONATIONS



# INFORMATION ARCHITECTURE

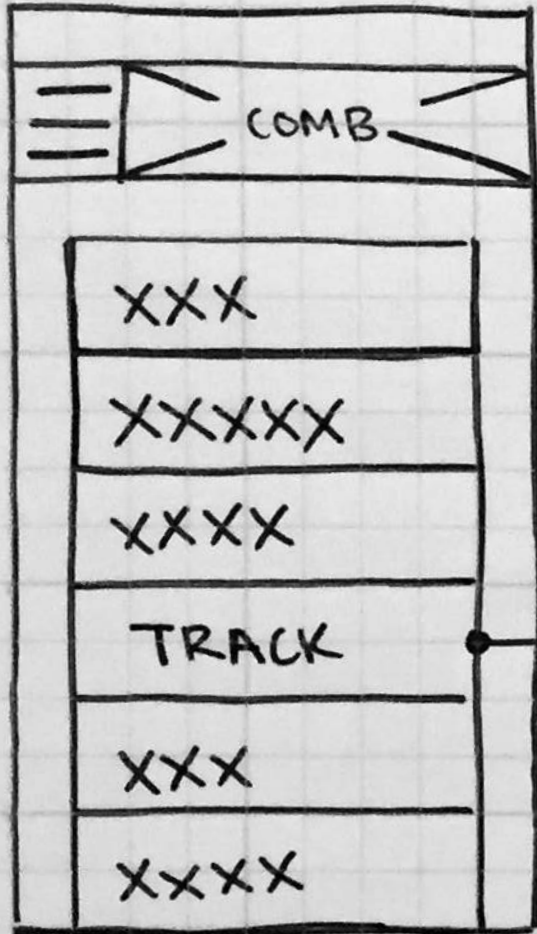
Encompasses the workflow and wireframes to plan how the user navigates through all the information COMB has to share.



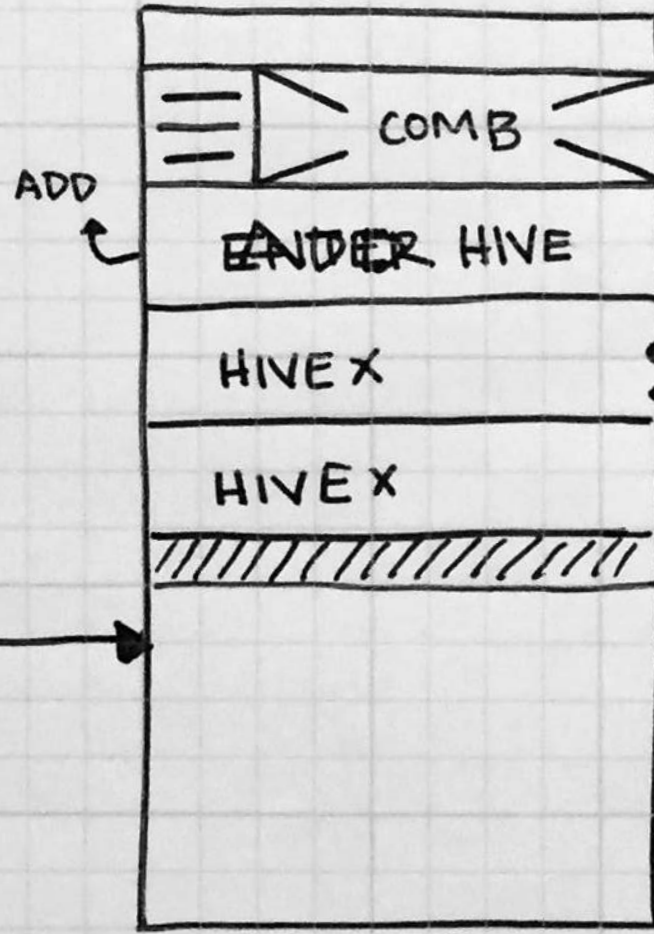
# WIREFRAME

# SKETCHES

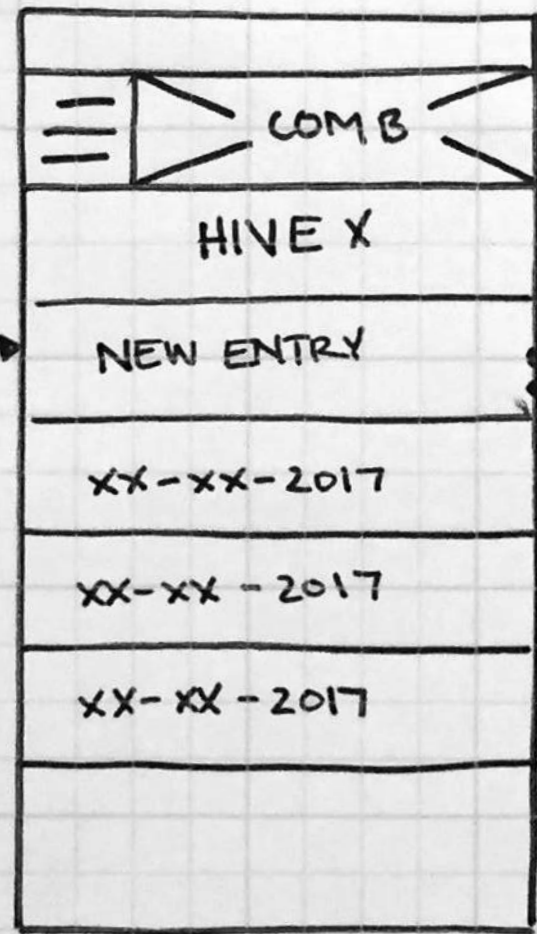
DROP DOWN MENU



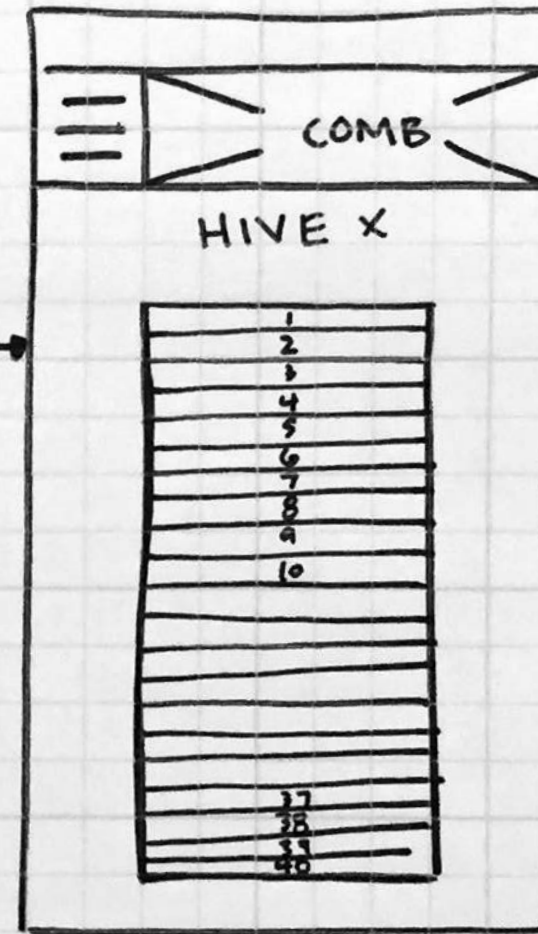
"TRACKING" MENU



"ENTRIES" MENU



HIVE OVER VIEW



TRACK TOPBAR



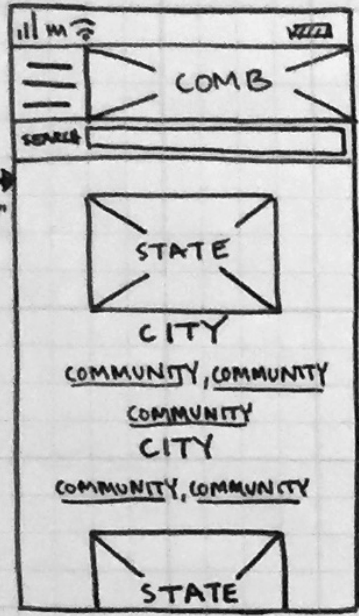
ALSO TRACK SUGAR WATER

BUILD OFF OF PREVIOUS ENTRIES

TOP VIEW OF TOPBAR HIVE

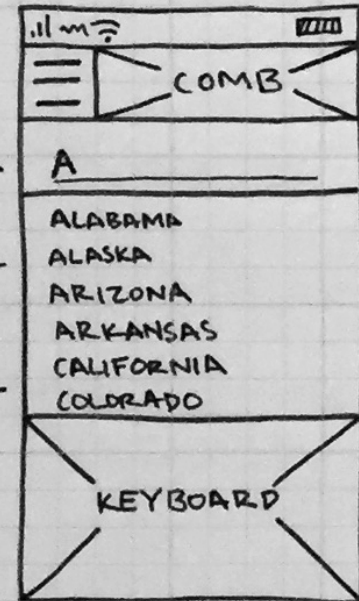
USE FINGER

### APP COMMUNITY BUILDING



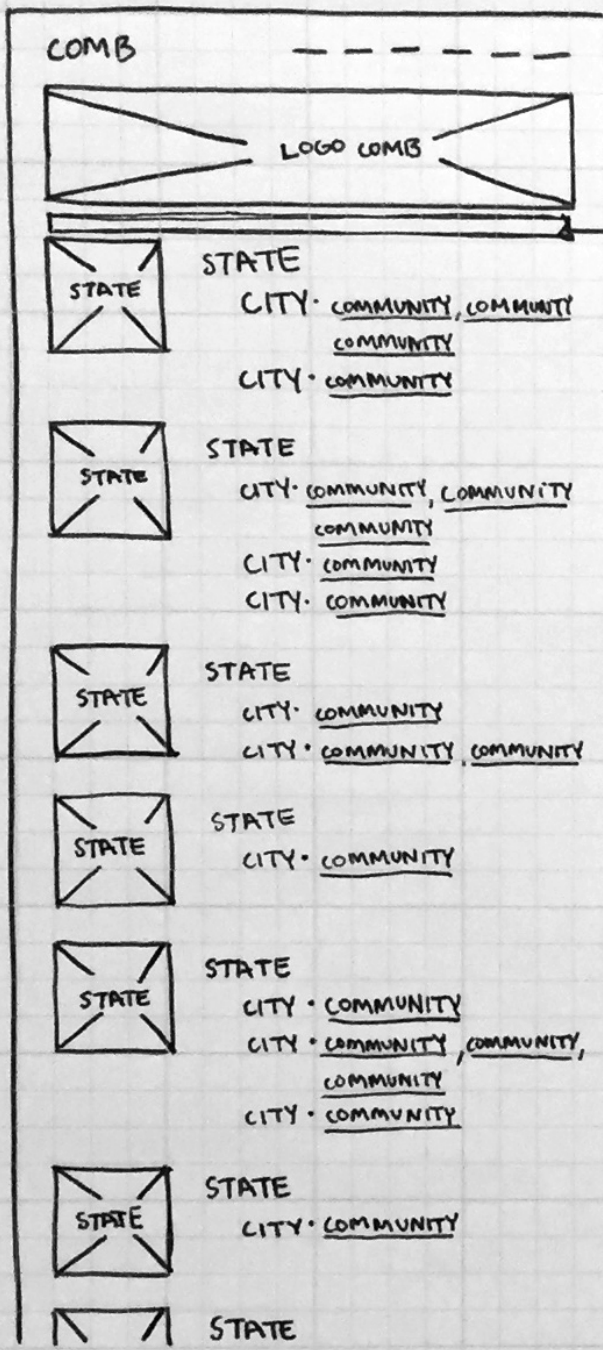
ADD "DATA ENTRY" OPTION

### APP-SEARCH COMMUNITY BUILDING



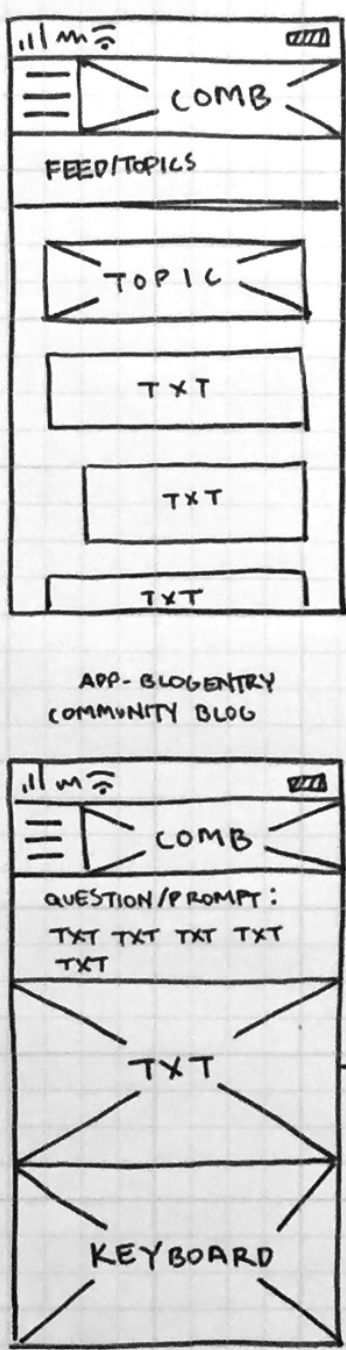
SCROLL OR TYPE

### WEB COMMUNITY BUILDING

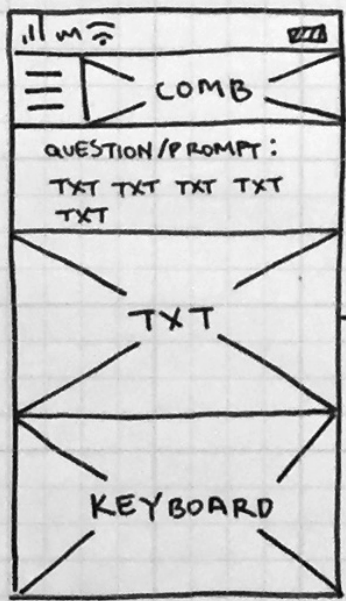


ADD SEARCH BAR

### APP COMMUNITY BLOG

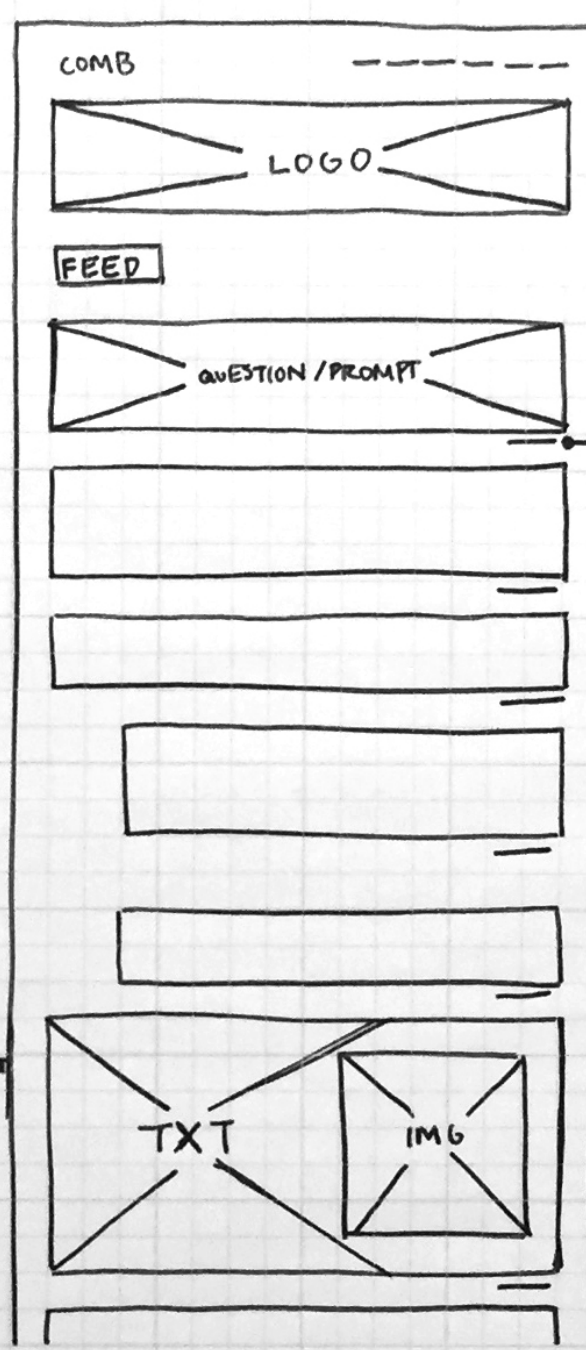


### APP- BLOGENTRY COMMUNITY BLOG



COMMENT

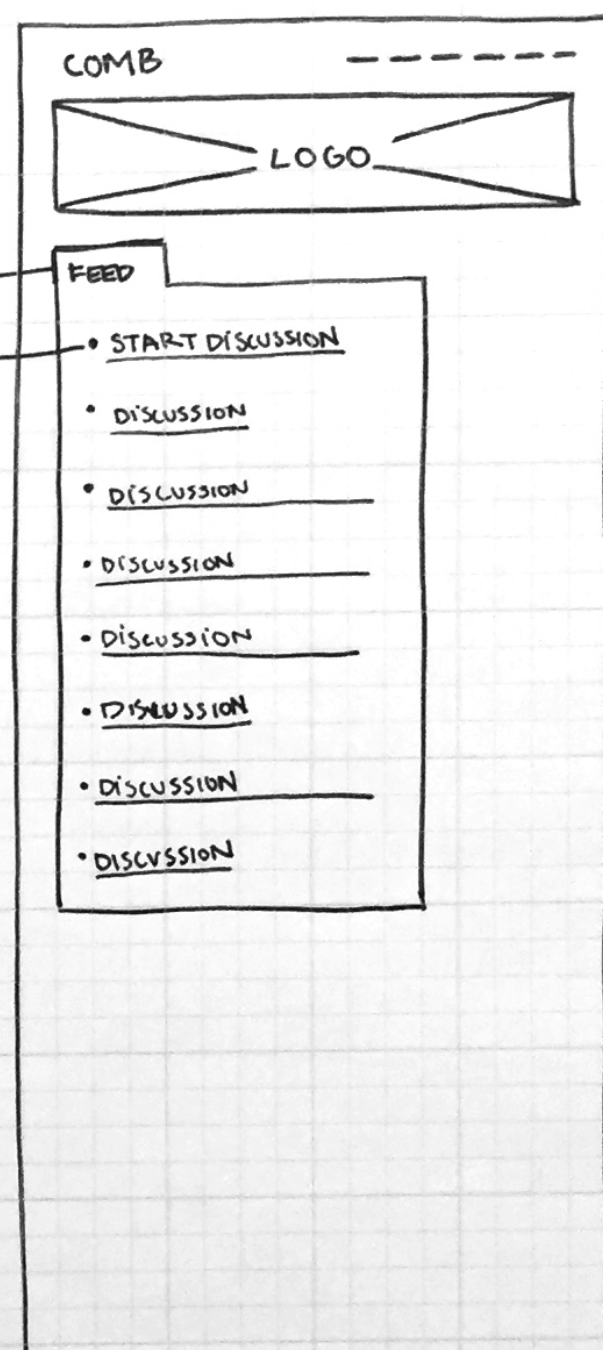
### WEB COMMUNITY BLOG FEED-DISCUSSION



DROP DOWN

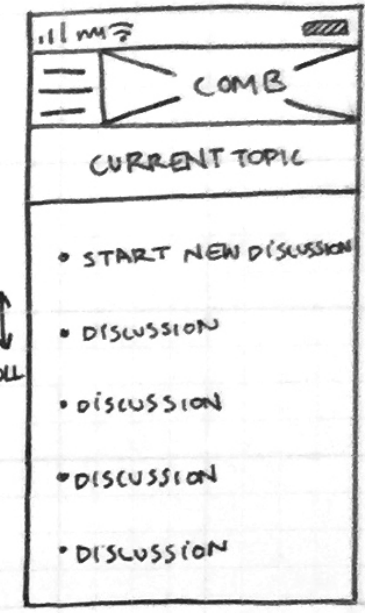
REPLY

### WEB COMMUNITY BLOG LIST/FEED



SCROLL

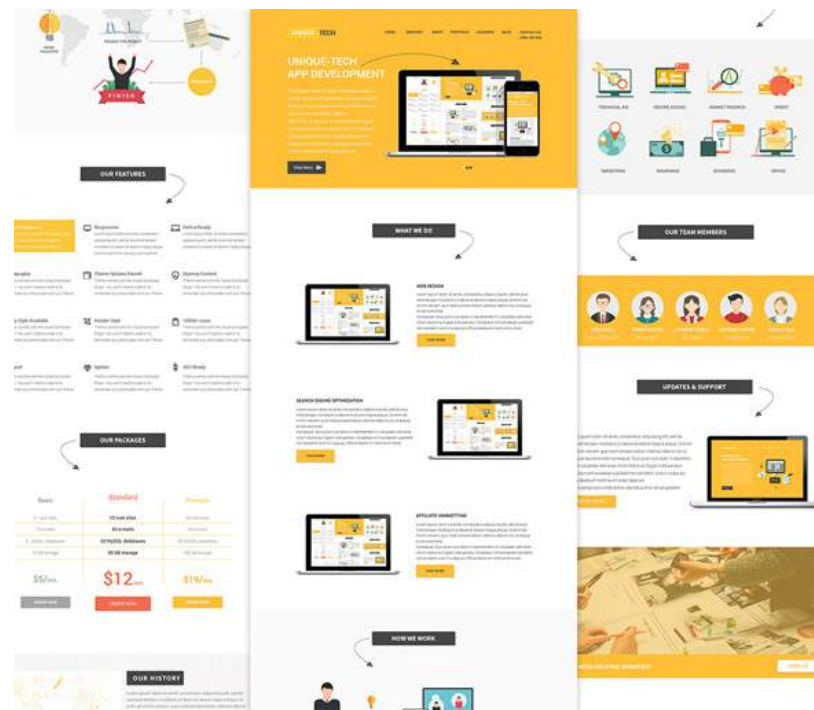
### APP COMMUNITY BLOG FEED



Palette & Icons



Inspiration



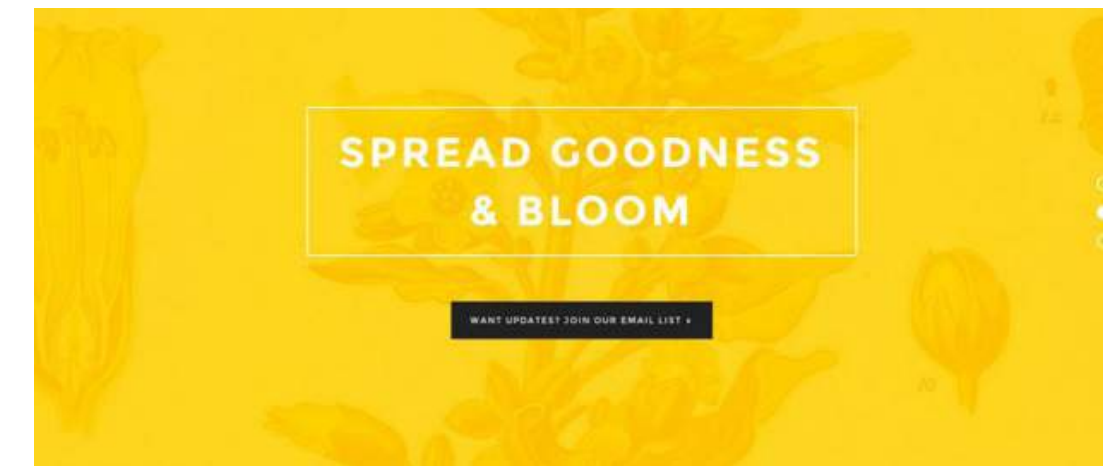
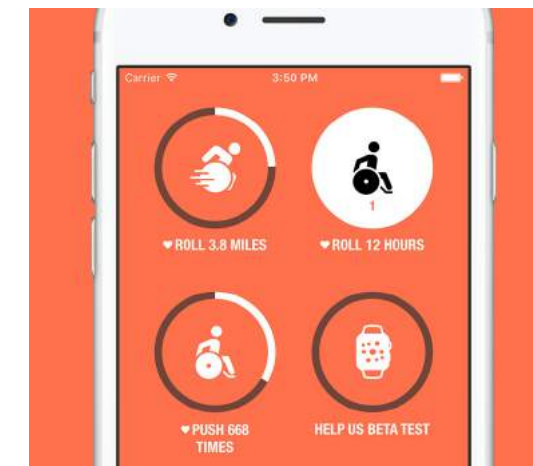
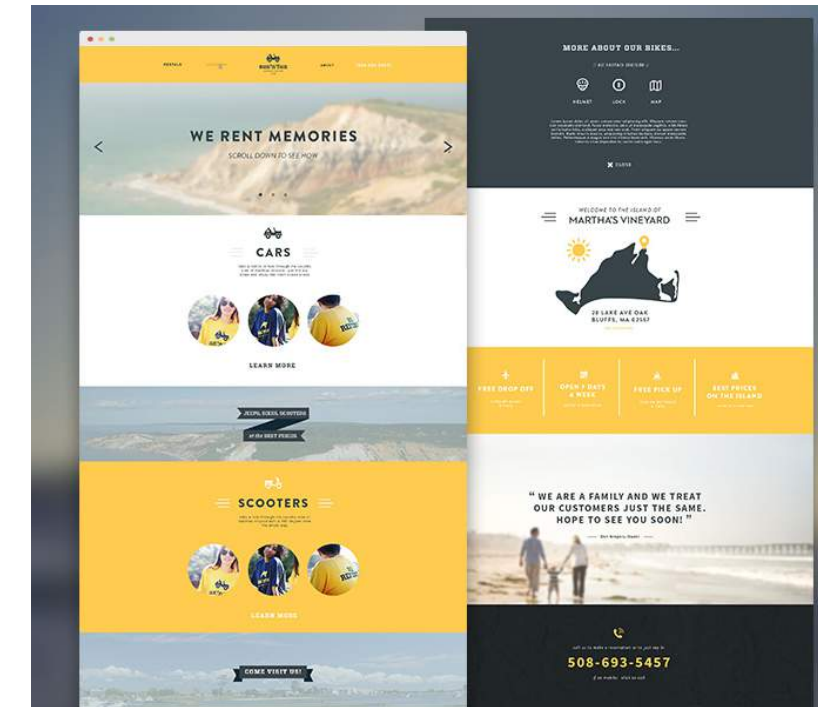
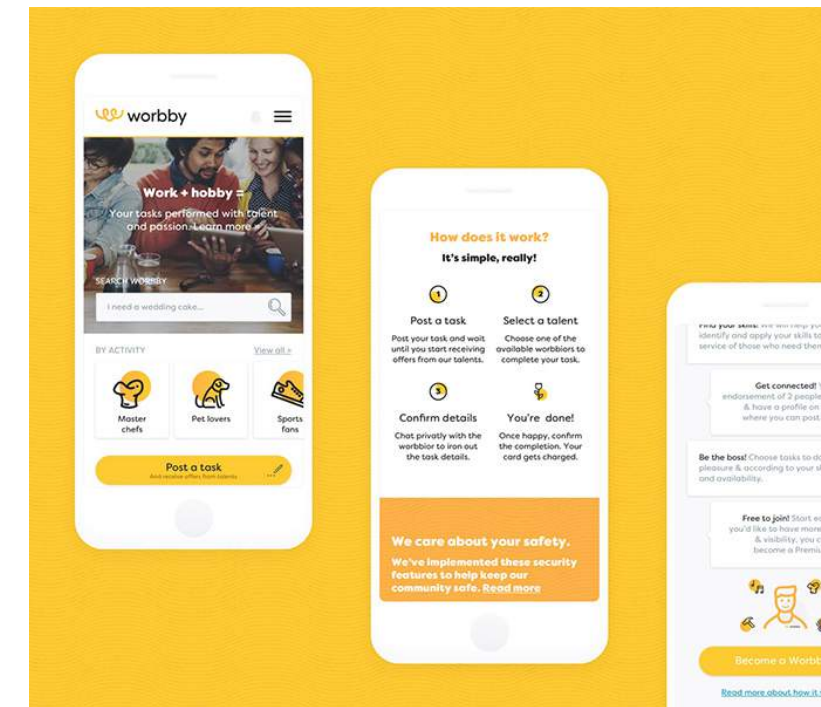
Typography

FUTURA STD BOOK  
CAPSLOCK TITLES

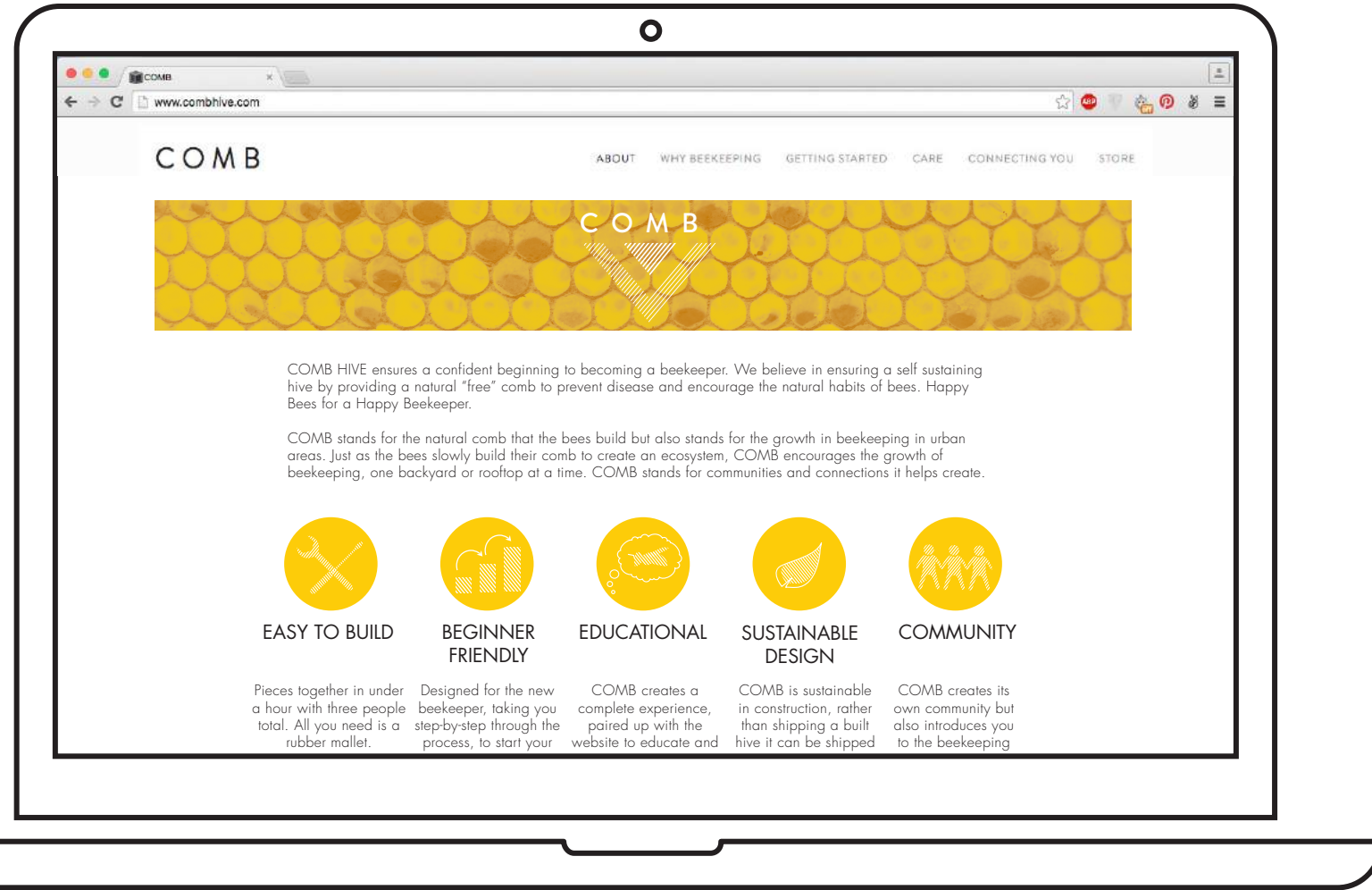
Futura Std Light  
Text Block

FUTURA STD BOOK  
CAPSLOCK TITLES

Futura Std Light  
Text Block



# COMB BRAND



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COMB stands for the natural comb that the bees build but also stands for the growth in beekeeping in urban areas. Just as the bees slowly build their comb to create an ecosystem, COMB encourages the growth of beekeeping, one backyard or rooftop at a time. COMB stands for communities and connections it helps create.

**EASY TO BUILD**

Pieces together in under a hour with three people total. All you need is a rubber mallet.

**BEGINNER FRIENDLY**

Designed for the new beekeeper, taking you step-by-step through the process, to start your hive with confidence.

**EDUCATIONAL**

COMB creates a complete experience, paired up with the website to educate and guide you in caring for your bees.

**SUSTAINABLE DESIGN**

COMB is sustainable in construction, rather than shipping a built hive it can be shipped flat packed or milled in your city. COMB is also designed to be self-sustaining, with natural comb and designed for bee survival.

**COMMUNITY**

COMB creates its own community but also introduces you to the beekeeping communities

**DESIGNED AROUND REAL BEEKEEPERS' EXPERIENCES**

LIZ TILTON

"I am passionate for Top Bar Hives, it allows the bees to build their most natural combs. But for urban beekeeping you need to efficiently feed your bees."

VIRGINIA RUSSEL

"Everything is sold and designed for professional beekeepers. When I began, it was so confusing, I didn't know what was right."

CODY HARRISON

"I started beekeeping because I wanted to learn CNC-milling. But I need I needed more guidance when starting beekeeping."

**CNC MILLED DESIGN**

CNC (Computer Numerical Controlled) Milling is performed through a machining process that uses a rotating cylindrical tool that follows a path designed on the computer.

**1. PURCHASE DESIGN**

Purchase computer geometry for just \$15. This geometry can be used again and again to mill as many hives you desire.

**2. MILL HIVE**

Design must be programmed per CNC machine and then milled out of 2 sheets of 3/4" plywood. CNC machining database is available to find a CNC Mill near you.

**3. HIVE "SNAPS" TOGETHER**

Pieces together in under a hour with three people total. All you need is a rubber mallet.

"HOME PAGE" welcomes the user and explains what COMB stands for as a brand and promises its clients.

WHY COMB -

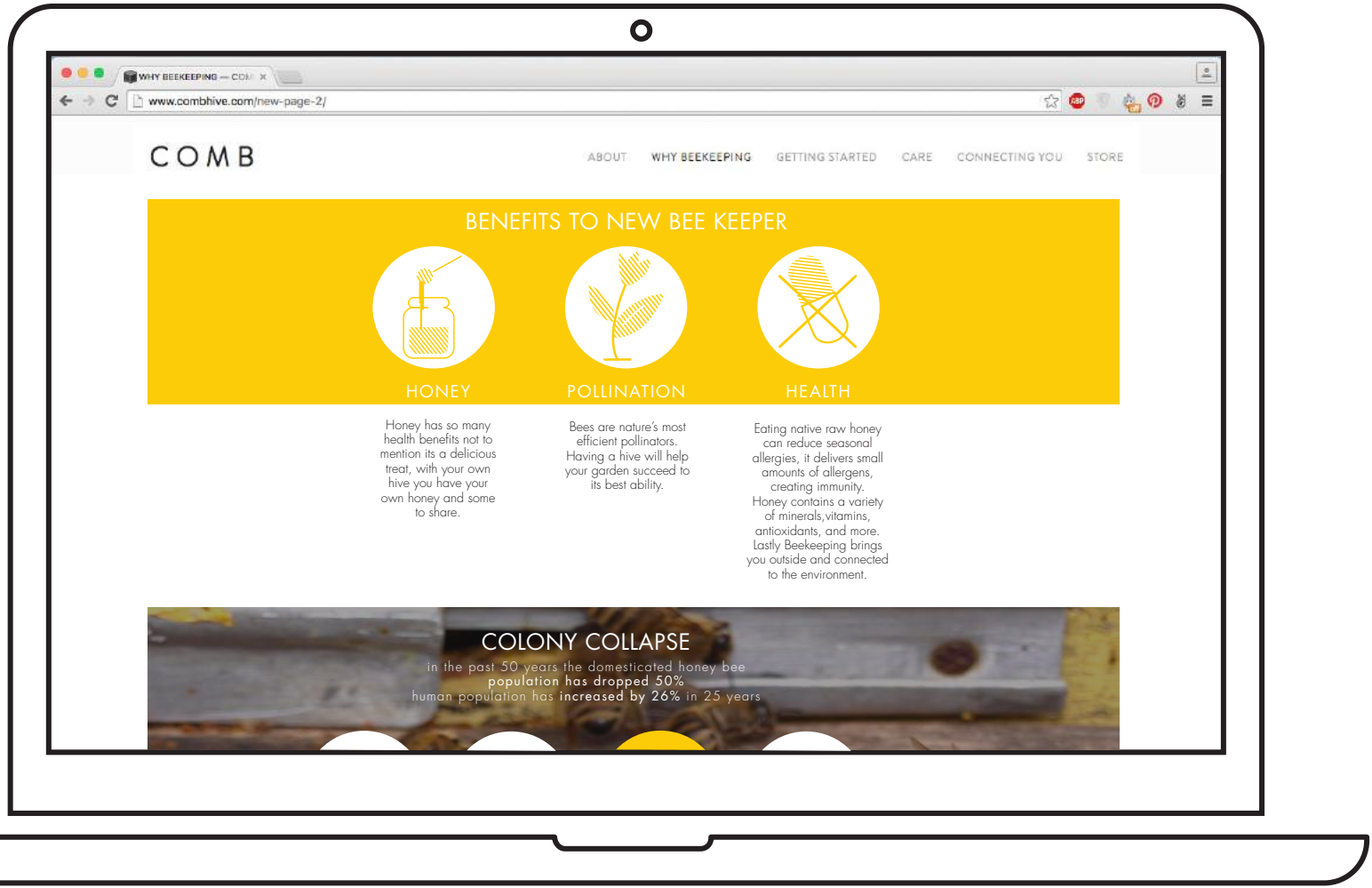
- "EASY TO BUILD"
- "BEGINNER FREINDLY"
- "EDUCATIONAL"
- "SUSTAINABLE DESIGN"
- "COMMUNITY"

DESIGNED AROUND REAL BEEKEEPERS' EXPERIENCES

CNC MILLED DESIGN -

- "1. PURCHASE DESIGN"
- "2. MILL HIVE"
- "3. HIVE 'SNAPS' TOGETHER"

# WHY BEEKEEPING



# WHY BEEKEEPING

**COMB**

**WHY SHOULD YOU BEE-COME A BEEKEEPER**  
There are so many benefits of beekeeping, when you find them out you'll want a hive of your own.

There is an urbanization of the population, and the growth of gardening opens the opportunity for the most efficient form of pollination...  
...BEEKEEPING

**1 IN 3 U.S. HOUSEHOLDS IS NOW GROWING FOOD**  
**17% INCREASE IN URBAN GARDENING**

**BENEFITS TO NEW BEE KEEPER**

- HONEY**  
Honey has so many health benefits not to mention its a delicious treat, with your own hive you have your own honey and some to share.
- POLLINATION**  
Bees are nature's most efficient pollinators. Having a hive will help your garden succeed to its best ability.
- HEALTH**  
Eating native raw honey can reduce seasonal allergies, it delivers small amounts of allergens, creating immunity. Honey contains a variety of minerals, vitamins, antioxidants, and more. Lastly Beekeeping brings you outside and connected to the environment.

**COLONY COLLAPSE**  
in the past 50 years the domesticated honey bee population has dropped 50% human population has increased by 26% in 25 years

- PARASITES**  
Varroa mites and other mites hurt bees. Bees at their healthiest can take care of the infestation.
- STRESS**  
Demanding honey adds stress, pesticides also adds stress, as well as poor environment.
- PESTICIDES**  
Pesticides, especially in rural areas, are killing bees and destroying hives. Its the main contributor to colony collapse.
- NUTRITION**  
As crop variety is knocked out, bees are losing their sources of food and nutrition in their rural homes.

The food system industrializes to meet population growth with pesticides and GMOs, which in affect is large cause to colony collapse, the large drop in honey bee population.

**BENEFITS TO BEES IN URBAN ENVIRONMENTS**

- URBAN GARDENS**  
As urban gardening and farming grows, and food variety in rural areas becomes less, there is much more opportunity for bees to find healthy food sources.
- NO PESTICIDES**  
The intense pesticides used in rural farm fields, isn't used in urban areas, bees won't be killed or become ill from it.
- LITTLE STRESS**  
Hobby beekeeping allows the beekeeper to give more focus and care to each hive. There is also less demand on acquiring honey for sales, so enough honey is left for bees to feed on over winter.

“WHY BEEKEEPING” expresses the importance as well as the benefits of urban beekeeping.

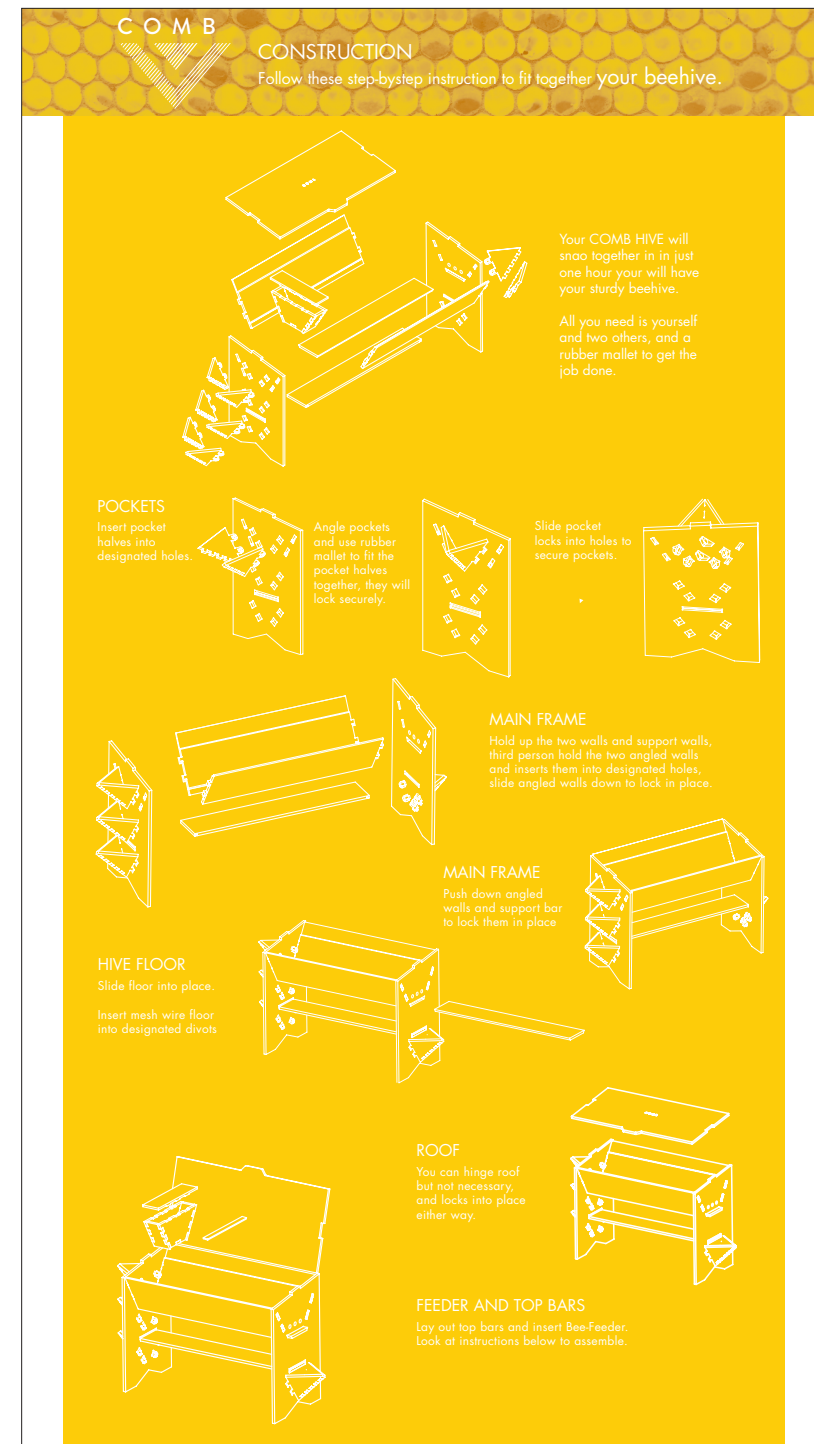
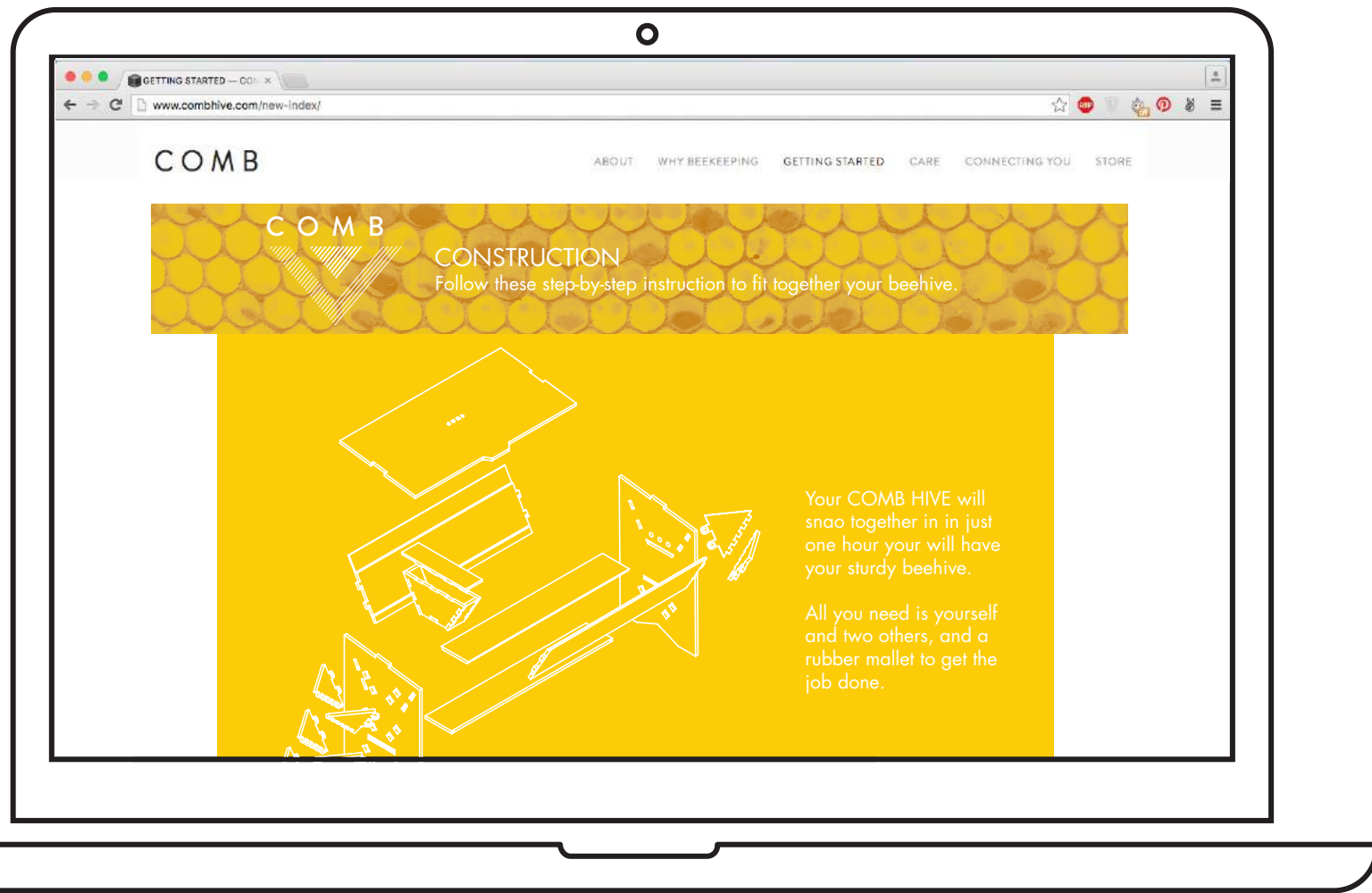
Colony Collapse - bee population has dropped 50% in 50 years as human population grows

BENEFITS TO BEEKEEPER - Honey, Pollination, Health Benefits

BENEFITS TO BEES - Urban Gardens, No Pesticides, No Stress

# GETTING STARTED

## CONSTRUCTION



# GETTING STARTED

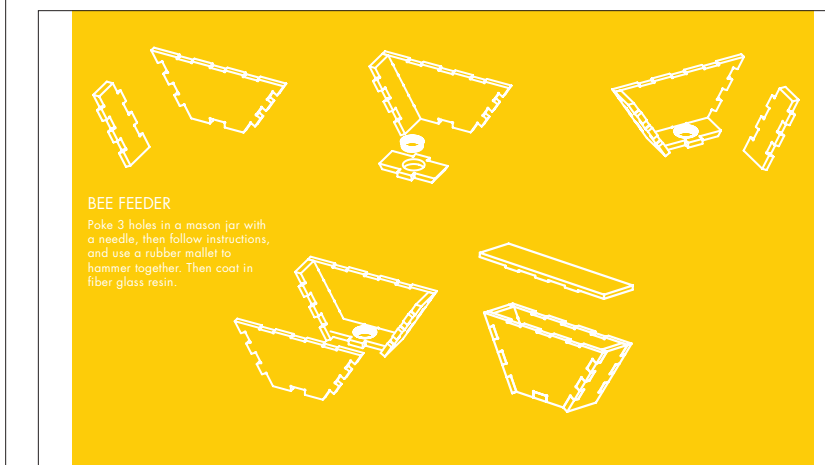
## CONSTRUCTION

“CONSTRUCTION” helps the COMB HIVE purchaser assemble their hive.

**POCKETS** - Pockets insert into side walls first.

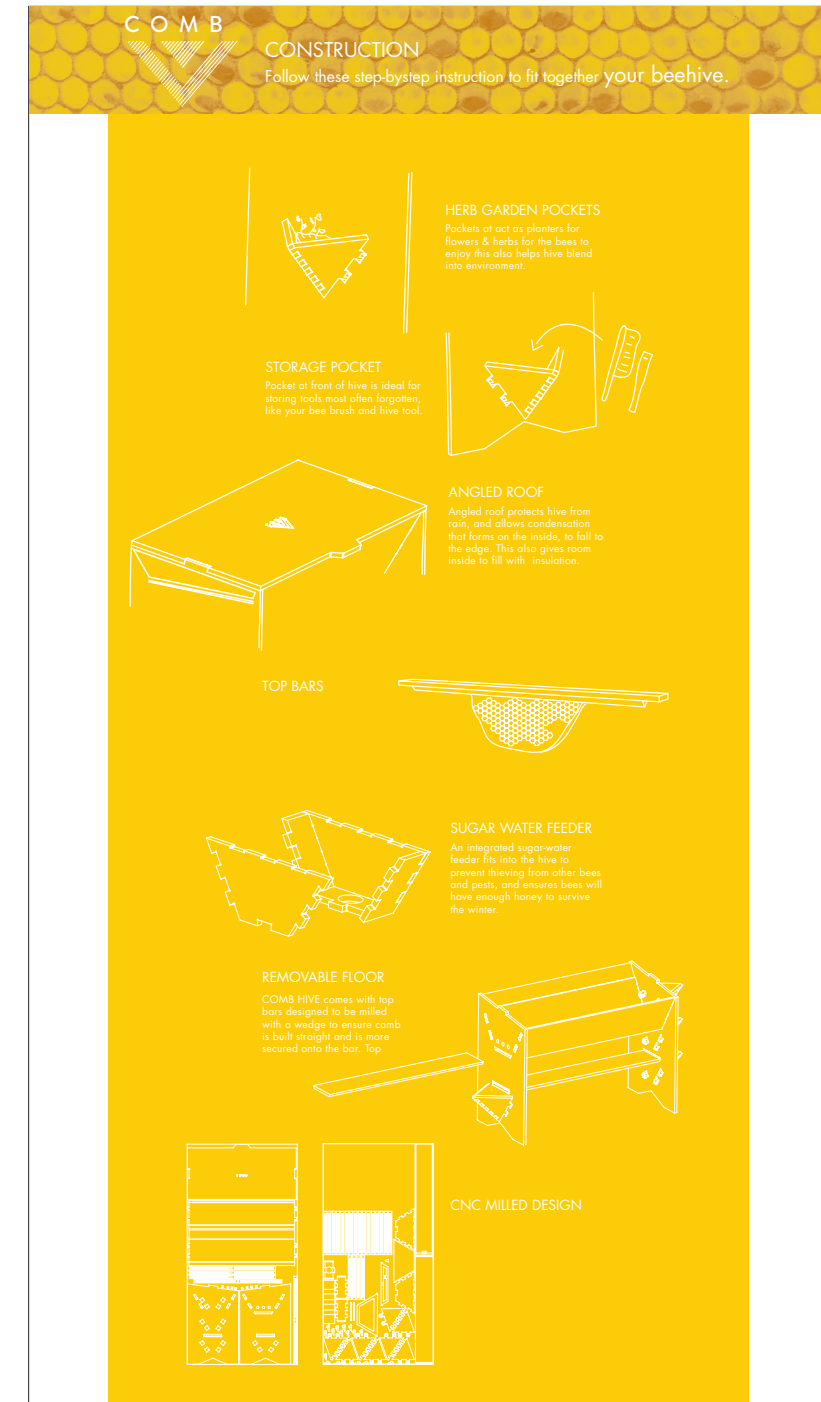
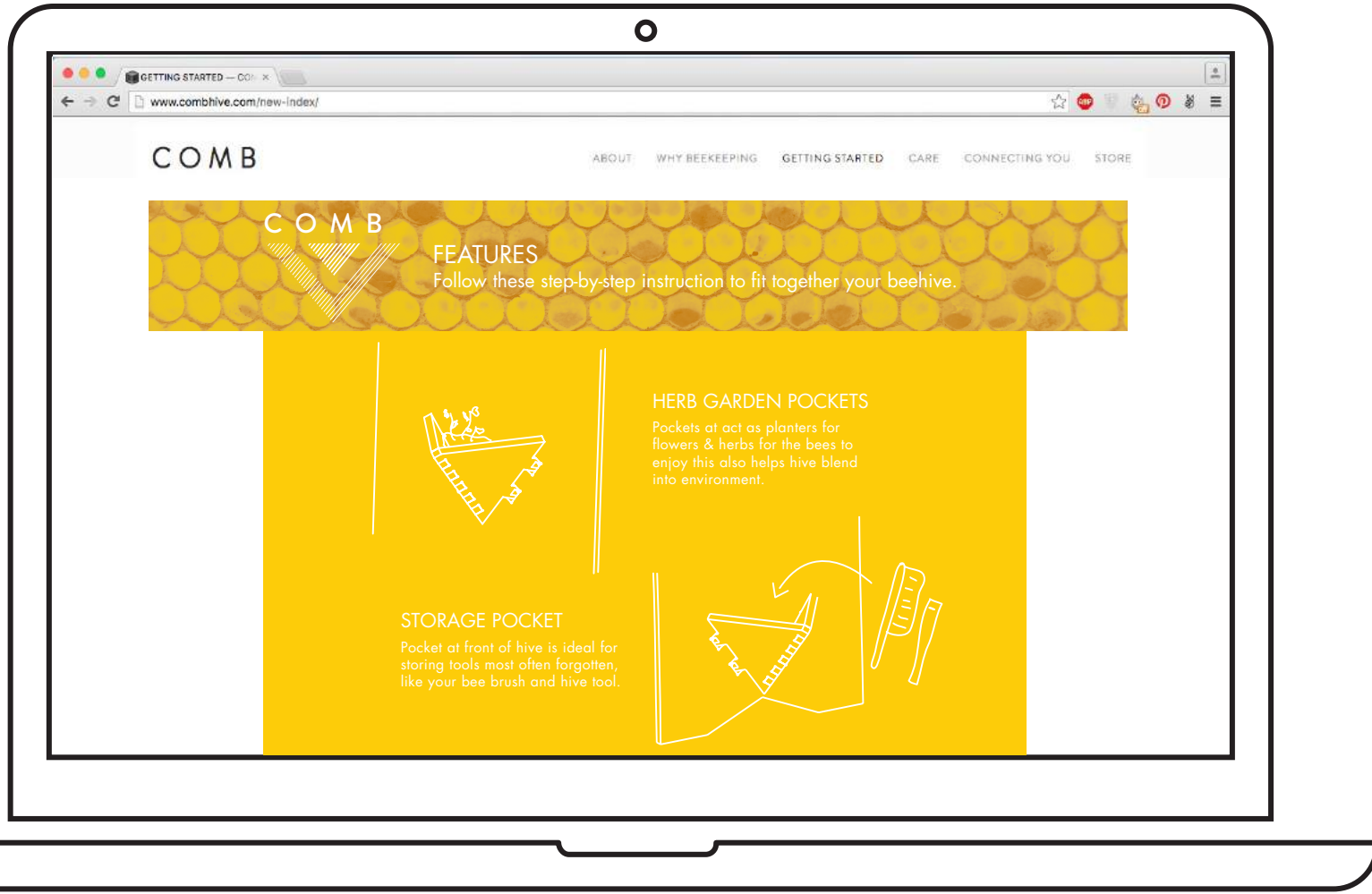
**MAIN FRAME** - Slide angled side walls and support bars into the main walls and push down to lock

**BEE FEEDER** - Insert a mason jar lid with three holes poked into it, to drip the sugar water



# GETTING STARTED

## FEATURES



# GETTING STARTED

## FEATURES

“FEATURES” shows off the benefits and unique qualities of the COMB HIVE

POCKETS - Pockets store tools and plant

ROOF - Roof is angled for weather protection

TOP BARS - Top Bars encourage natural and healthy honey comb

BEE FEEDER - Feeder is integrated to fit in the hive and help bees survive the winter

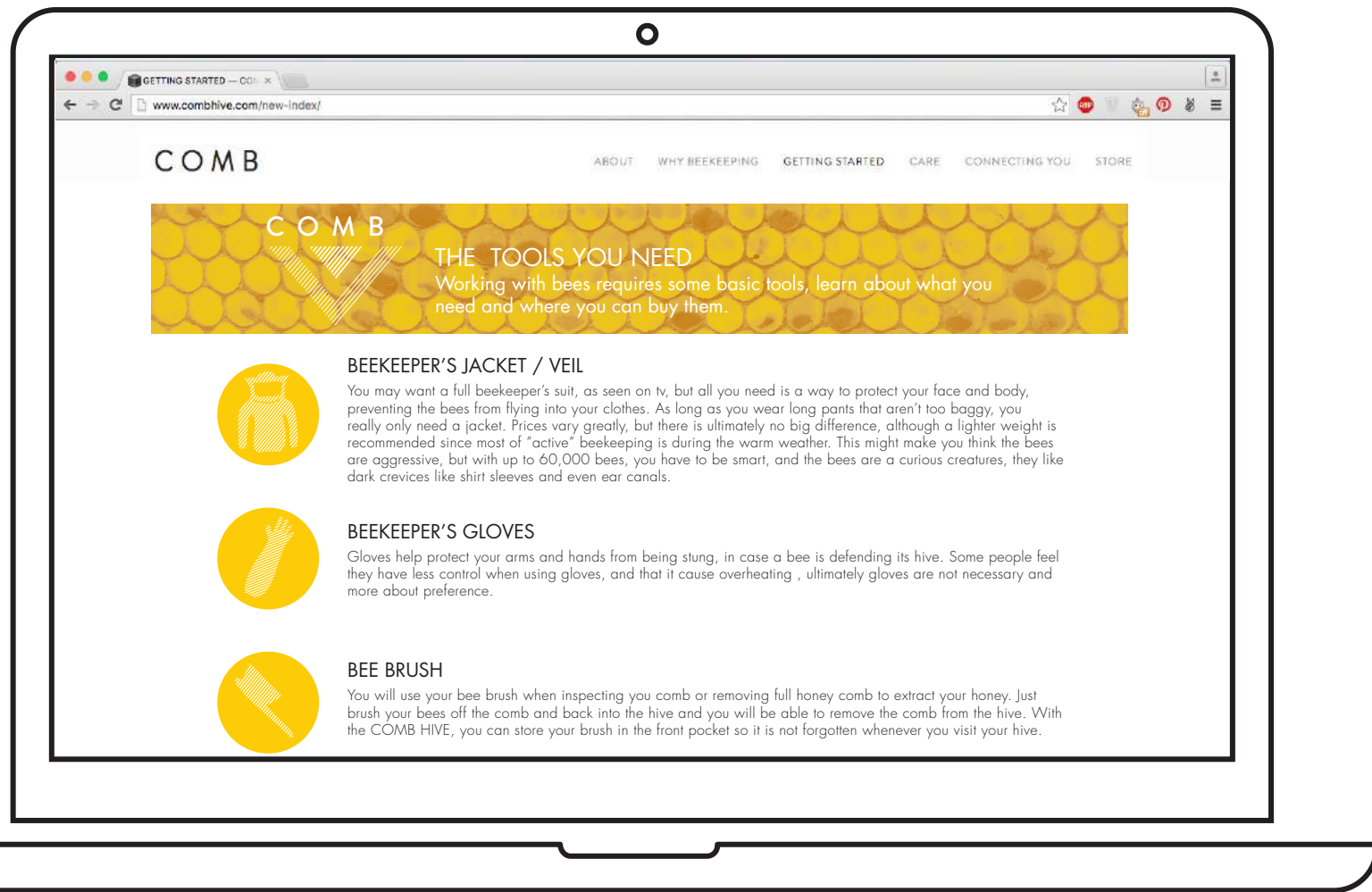
REMOVABLE FLOOR - Floor slides out to allow for ventilation in hot weather

CNC MILLED DESIGN - Designed to be milled out of wood for easy assembly and fabrication



# GETTING STARTED

## BEEKEEPING SUPPLIES



# GETTING STARTED

## BEEKEEPING SUPPLIES



“BEEKEEPING SUPPLIES” educates the new beekeeper on what tools they will need with links on where to buy them.

**BEEKEEPER'S JACKET / VEIL** - You need to protect yourself, even though bees don't want to sting you, there's a chance they could fly into your shirt and accidentally sting you.

**BEEKEEPER'S GLOVES** - Some people like to wear gloves to protect their hands when dealing with the hive.

**BEE BRUSH** - A brush is used to brush bees off the honeycomb when inspecting or collecting honeycomb.

**HIVE TOOL** - Helps lift top bars and scrape propolis.

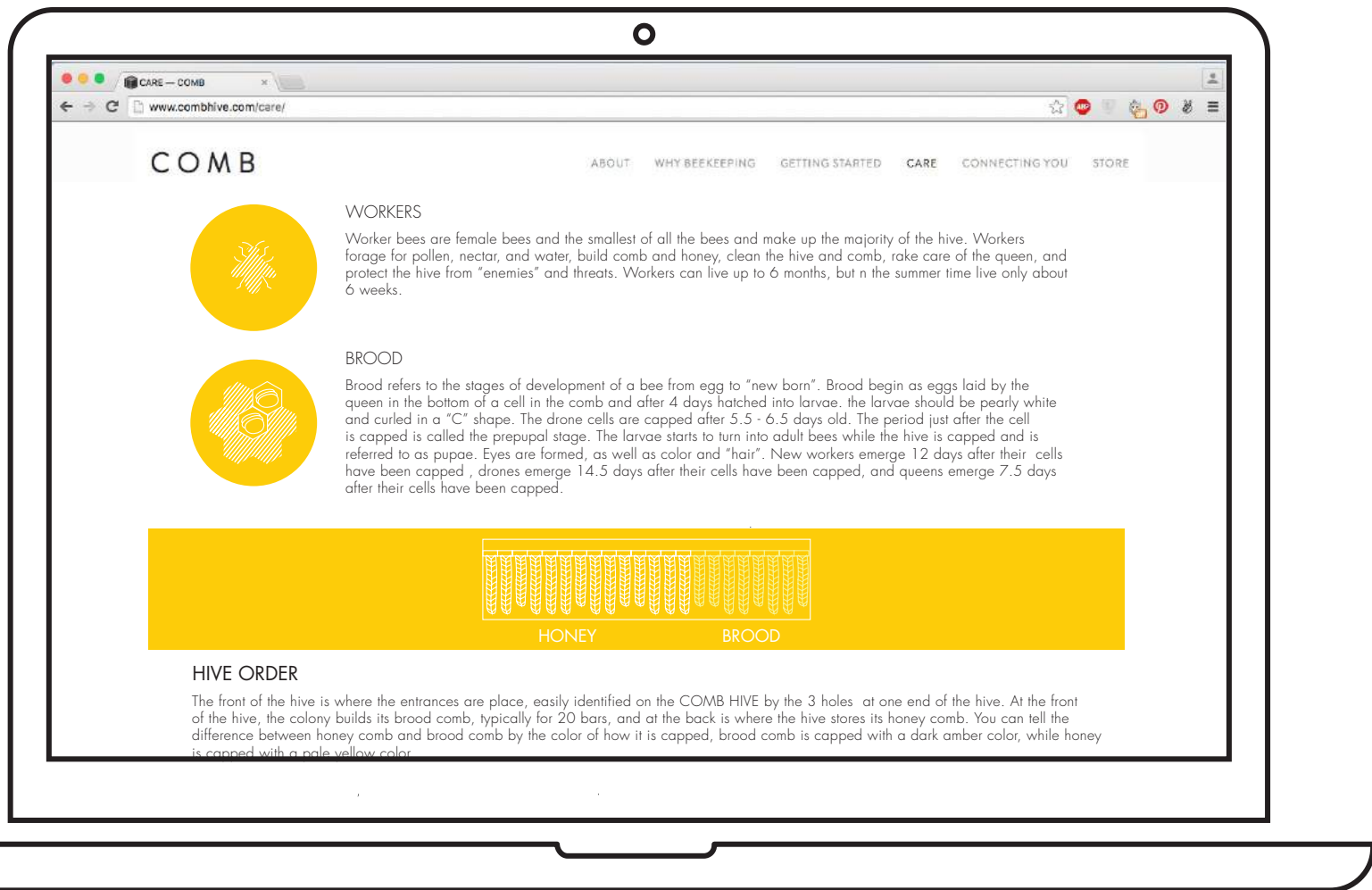
**BEE HIVE SMOKER** - Smoke the hive to relax the bees before inspection.

**STARTER KITS** - You can buy some tools together.

**POLLEN PATTIES** - Bees need extra nourishment when first introduced to the hive, pollen patties have protein and are good to have when starting a hive.

# CARE

## KNOW YOUR HIVE



# CARE

## KNOW YOUR HIVE

**COMB** GET TO KNOW YOUR HIVE  
With so much buzzing and no name tags, it's hard to know who is in your hive, here is a broken down understanding of what's going on inside your hive

**BEEES**

**QUEEN**  
The Queen is the ruler of the hive, as the name would suggest. She is the only member of the colony to lay fertilized eggs and is responsible for the growth and success/strength of the hive. The queen is capable of producing up to 1,500 eggs a day and in fact mates early in life and ends up storing millions of sperm within her body. Queens will cease laying eggs in early October and will not produce again until early next Spring. Queen bees are able to live up to 5 years, but normally only live 2-3 years. Remember to purchase a Queen Bee that is marked, when ordering your bees so you know who she is, but you can also recognize her by her extra large body, especially during egg-laying season.

**DRONES**  
Drones are the male bees of the hive, and are the largest heads within the entire colony. Their function in life is to fertilize the Queen to keep the colony growing. Drones become sexually mature, a week after emerging from their cells, and die immediately after mating, though it might take time until they actually mate with the queen.

**WORKERS**  
Worker bees are female bees and the smallest of all the bees and make up the majority of the hive. Workers forage for pollen, nectar, and water, build comb and honey, clean the hive and comb, take care of the queen, and protect the hive from "enemies" and threats. Workers can live up to 6 months, but in the summer time live only about 6 weeks.

**BROOD**  
Brood refers to the stages of development of a bee from egg to "new born". Brood begins as eggs laid by the queen in the bottom of a cell in the comb and after 4 days hatched into larvae. The larvae should be pearly white and curled in a "C" shape. The drone cells are capped after 5.5 - 6.5 days old. The period just after the cell is capped is called the prepupal stage. The larvae starts to turn into adult bees while the hive is capped and is referred to as pupae. Eyes are formed, as well as color and "hair". New workers emerge 12 days after their cells have been capped, drones emerge 14.5 days after their cells have been capped, and queens emerge 7.5 days after their cells have been capped.

**HONEY** **BROOD**

**HIVE ORDER**  
The front of the hive is where the entrances are placed, easily identified on the COMB HIVE by the 3 holes at one end of the hive. At the front of the hive, the colony builds its brood comb, typically for 20 bars, and at the back is where the hive stores its honey comb. You can tell the difference between honey comb and brood comb by the color of how it is capped, brood comb is capped with a dark amber color, while honey is capped with a pale yellow color.

**PROPOLIS**  
You will start seeing a red or brown resin around the hive, between the bars and sealing any cracks in your hive, that is propolis. It's extremely strong and sticky and is often referred to as "bee glue", which is why you will need a tool to lift your top bars... they will get stuck down and attached to other bars with propolis. There are many benefits and uses of propolis if you decide to harvest it.

**ROUND DANCE** **WAGGLE DANCE**

**BEE DANCES**  
Worker bees "dance" to communicate to each other, which is just one of the amazing social behaviors of bees.

There is the Round dance for if there is a food source 25-100 meters away from the hive or closer. The round dance doesn't point the bees in any direction of the food source, but bees watching the round dance can smell the flower left over on the bee.

There is the Waggle Dance for food sources over 100 meters away. The waggle dance includes information of the direction of the food source as well as the energy it will take to get there. For example a bee may dance 8-9 "rounds" in 15 seconds to indicate a food source 200 meters away, whereas 4-5 "rounds" is for a food source 1000 meters away. The bee indicates the direction of the food by the way she faces during the portion of the dance when she waggles.

Bees can fly up to seven miles for their food sources, but after four miles of travel distance, often bees get lost or too weak to return to the hive and die.

**SWARMING**  
Swarming takes place when the queen bee leaves the colony with a large group of worker bees, about 60%. There are three main reasons for swarming: **congestion** - there are too many bees in the hive and no cells for the queen to lay eggs in, **heat** - when the hive is overheating, bees will not want to stay inside the hive and may swarm away, **old queen** - an older queen's pheromone production reduces with age, the bees sense a lack of queen pheromone in their food exchange and the swarming impulse is triggered. You will notice brood cells that look like peanuts where new queen bees eggs have been laid and all other brood cells have been capped, at this point you should contact your beekeeping community for a new queen bee and guidance in preventing the swarm from leaving the hive.

"KNOW YOUR HIVE" educates the new beekeeper on what goes on inside the hive and more about bees and how they work as a colony

**BEEES** - There are three different types of bees in a colony, the Queen, the Drones, and the Worker bees. There is also the brood, the larvae before they become bees.

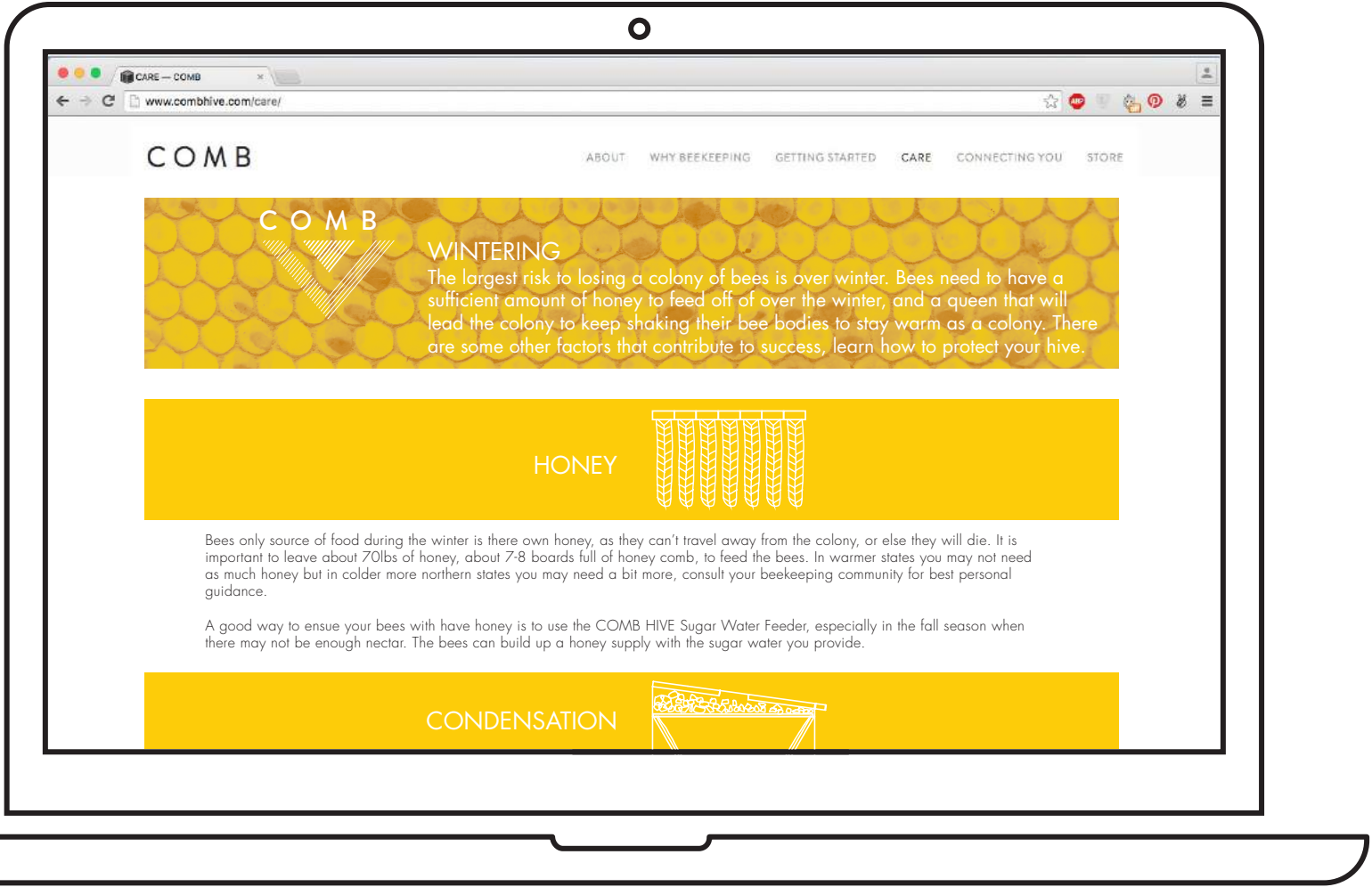
**HIVE ORDER** - At the front of the hive lives the Queen, where she plants the eggs in comb (brood), and in the back the bees make and store the honey.

**BEE DANCES** - Bees communicate through "dancing".

**SWARMING** - Bees will swarm and fly away from the hive if the hive is too small, if it is too hot, or if the queen is too old.

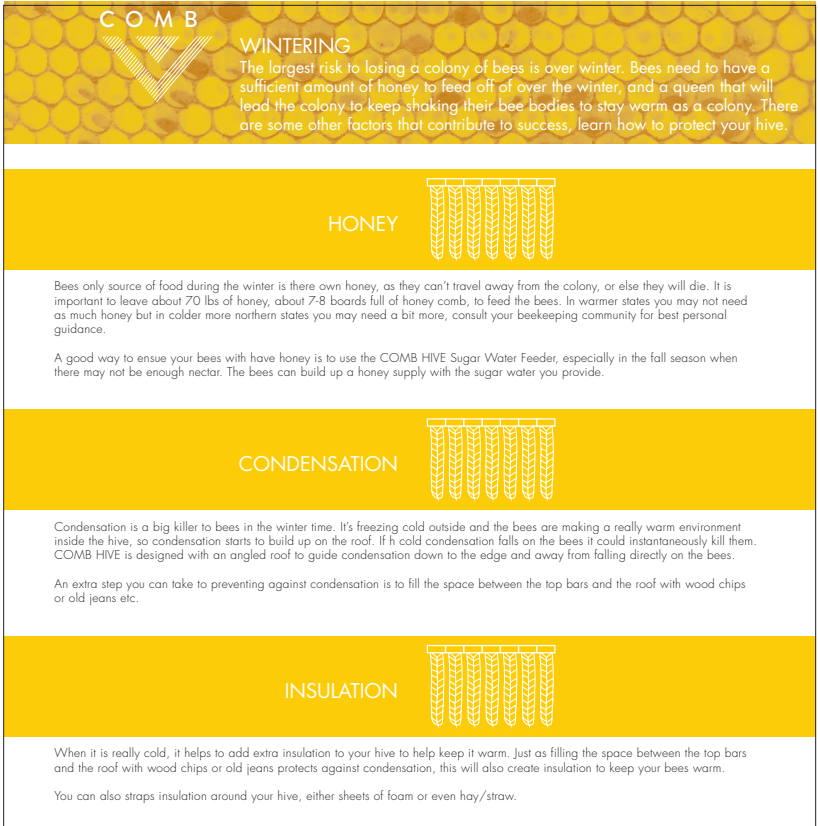
CARE

WINTERING



CARE

WINTERING



“WINTERING” educates the new beekeeper on how to take care of your bees over winter, as that us the time most likely for colonies to die..

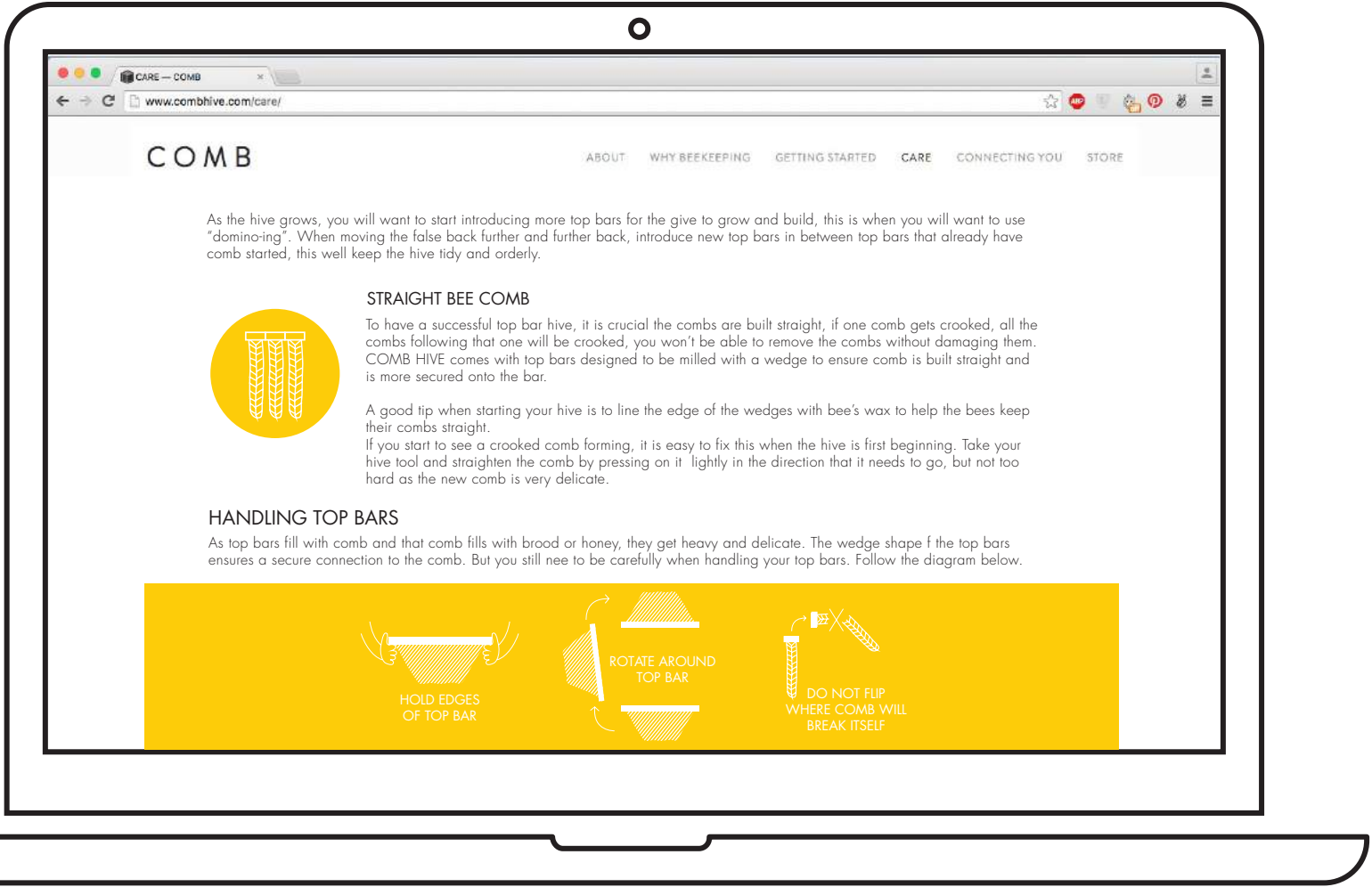
HONEY - Bees need to eat over winter, and that is what honey is for, don't harvest all of the honey so they have enough stock to survive winter.

CONDENSATION - Condensation builds when the bees produce heat inside and it is freezing outside, if it falls and falls on the bees, it will kill them.

INSULATION - COMB HIVE comes with opportunity to add insulation for over winter.

# CARE

## TIPS & TRICKS



# COMB

## TIPS & TRICKS TO BEE-ING A BEEKEEPER

There's no right way to bee keep, with 2 beekeepers, there will be three opinions, but its good to start with one guiding set of rules and to grow and evolve as you become a confident beekeeper. These tips and tricks will help get you started into the world of beekeeping with confidence.



**WATER SOURCE**  
Bees need water to make their wax and comb, and just to drink in general, like any living creature, especially in the heat of the summer. When bees find a water source they stick with it so it is important to designate a water source for them early so they do not disturb your neighbors by using their pools or bee baths.  
Bees look for a water source about 20 - 30 ft away, too close to their hive and they will feel it will have been contaminated from their own waste excrements.  
A big concern is that bees can't swim and can easily drown! Whatever you use (a bucket, bird bath, or small pond), make sure it is filled with either rocks for a lot of landing space or filled with mulch which will float on the top and act as a landing pad.



**LOCATION - ROOF, BACKYARD, OR GARDEN**  
When starting a beehive, a big decision is where you will put it...  
**ROOF** - If you have access to a rooftop, that is a great place to keep your beehive, especially if there is a garden up there as well, your garden will be extra successful and you can reap the benefits of a healthy garden and a healthy hive with lots of honey. Just remember wind is extra intense so high up so place your hive near an existing wall boundary to protect against and break the wind.  
**BACKYARD** - If you have a backyard, you are ready for a hive, keep growing your garden with flowers and fruits and vegetables. Just consider your neighbors and talk to them before starting a hive. A helpful way to keep your hive in a backyard is placing it near a fence or tall wall, this will cause the bees flight path to be higher up and less likely to bother your neighbors, they might not even realize you have a hive, other than their flowers and gardens having great success.  
**GARDEN** - If you don't have access to a roof or backyard, don't give up on having a beehive, there are so many urban garden's popping up all over your city, they would love to reap the benefits of your bees, while you reap the benefits of your honey. Contact your local beekeeping community (possibly listed on this site), to find out about potential locations to start your hive.



**VENTILATION**  
Bees create a lot of heat flying around inside their hive, especially in summer time when it is already so hot. When the hive is overheating, bees will not want to stay inside the hive and may swarm away.  
COMB HIVE has a removable floor board to increase ventilation and cool down a hive in the summer time, and a crack at the back of the roof for more air flow. Just install some #8 mesh wire in the designated slots in the bottom of the hive (listed in HIVE ADD-ONS), and during the warm seasons, remove your floor and ventilate your hive.



**DIVIDER BOARDS & DOMINOING**  
COMB HIVE comes with a divider board (sometimes referred to as false backs or follower boards), which looks like a top bar but then continues down to create a false-back to your top bar hive. When starting a hive you will want to place the divide board where the tenth bar would be. This focuses the bees in a smaller area so they can focus on building up there hive from one end to the other, and building the hive in a tidy and orderly fashion.  
As the hive grows, you will want to start introducing more top bars for the give to grow and build, this is when you will want to use "domino-ing". When moving the false back further and further back, introduce new top bars in between top bars that already have comb started, this will keep the hive tidy and orderly.



**STRAIGHT BEE COMB**  
To have a successful top bar hive, it is crucial the combs are built straight, if one comb gets crooked, all the combs following that one will be crooked, you won't be able to remove the combs without damaging them.  
COMB HIVE comes with top bars designed to be milled with a wedge to ensure comb is built straight and is more secured onto the bar.  
A good tip when starting your hive is to line the edge of the wedges with bee's wax to help the bees keep their combs straight.  
If you start to see a crooked comb forming, it is easy to fix this when the hive is first beginning. Take your hive tool and straighten the comb by pressing on it lightly in the direction that it needs to go, but not too hard as the new comb is very delicate.

**HANDLING TOP BARS**  
As top bars fill with comb and that comb fills with brood or honey, they get heavy and delicate. The wedge shape f the top bars ensures a secure connection to the comb. But you still nee to be carefull when handling your top bars. Follow the diagram below.



# CARE

## TIPS & TRICKS

"TIPS & TRICKS" educates the new beekeeper by sharing the basics to caring for your bees.

**WATER SOURCE** - Most people don't know that bees need water like any animal, learn how and where you should place a water source for your hive.

**LOCATION** - You can place your hive on a rooftop, or in a backyard or garden.

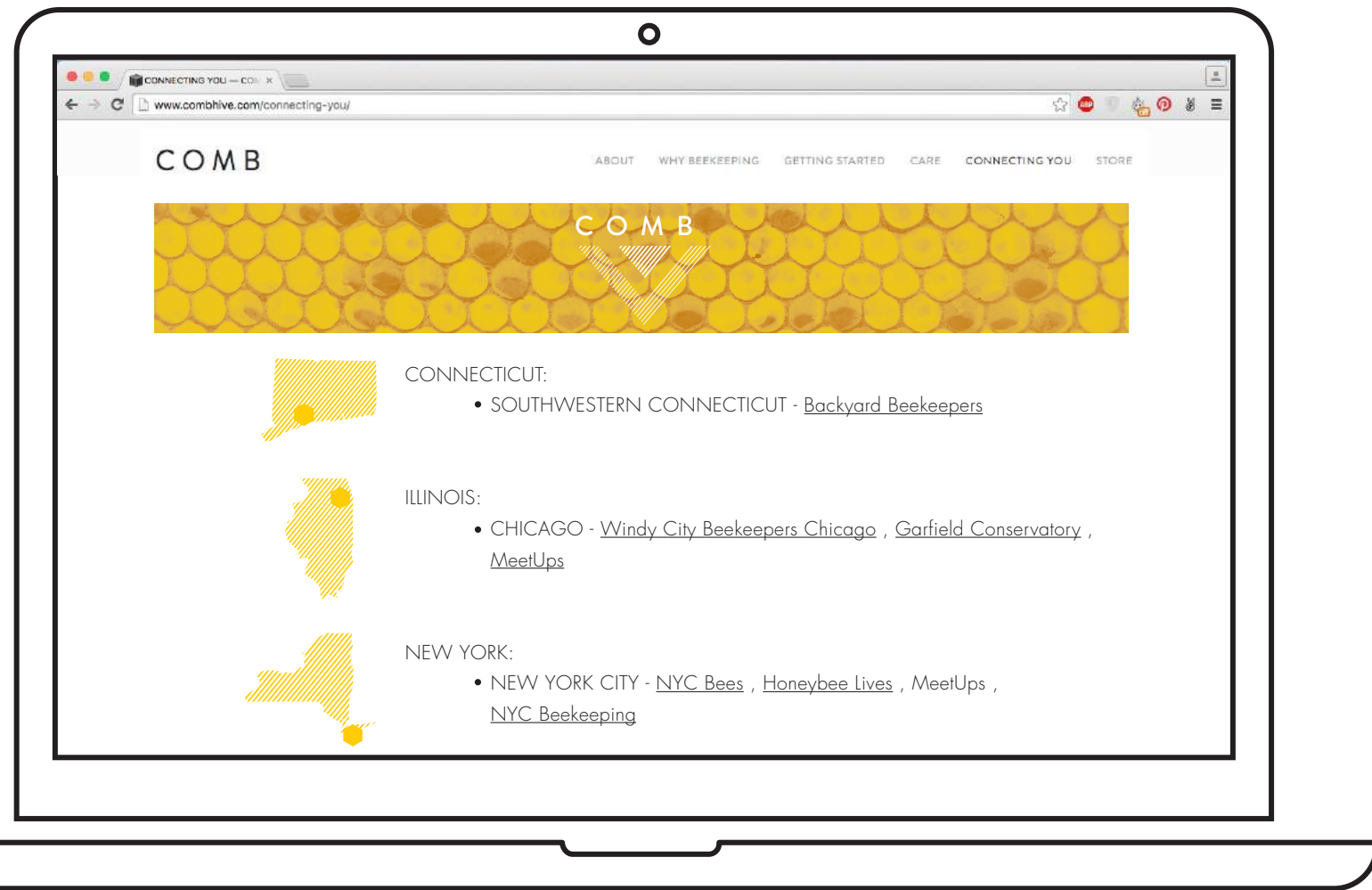
**VENTILATION** - Bees need ventilation, and COMB HIVE has a removable floor board for that reason.

**DIVIDER BOARDS** - When starting a hive you need a smaller space, COMB comes with a divider board to make the hive smaller initially

**STRAIGHT BEE COMB** - Honeycomb needs to be built straight or the whole hive will be damaged.

**HANDLING TOP BARS** - Top Bars are delicate when filled with heavy honeycomb, and must be handled with care.

## COMMUNITY



## COMMUNITY

“CONNECTIONS” is about forging bonds between the new customer, communities, manufacturers, as well as COMB itself...

COMMUNITIES - Database connects you to beekeeping communities near

CNC MILLING - Database connects the new beekeeper to shops and facilities that can mill out the purchased COMB HIVE design.

CONTACT - Questions and comments are welcome by all, and additions to the “communities” and “cnc milling” databases are appreciated as well.



C O M B

A graphic element consisting of three sets of parallel lines forming a downward-pointing triangle. The lines are white and set against a yellow background.

# CURRENT METHODS TO IMPROVE

## ROOF / PROTECTION

Roofs, need to protect from weather, while still allowing for ventilation, and a way to stay "locked" down in bad weather.



## WINTERING

It's important to add insulation and protect from condensation to help bees survive the winter, as well as a good stock of honey.

## FEEDING

Current ways to feed either allow "thieving" (other bee colonies steal food resources), allow for bees to drown, or take up precious space for combs.



## STORAGE

Currently you need "storage for storage" so that all tools are not forgotten. How can storage be more efficient so tools are easily accessible.

## HIVE TOOLS

- 1 - HIVE SMOKER - relaxes bees for easier inspection
- 2 - HIVE TOOL - cuts /scrapes propolis and lifts up bars to inspect hive
- 3 - BEE BRUSH - brushes bees off of comb for easy inspection
- 4 - UNCAPPING FORK - pokes through capped comb to release honey









## DESIGN GOALS

### AESTHETICS / ENVIRONMENT

- Interesting aesthetic that suits environment (garden / yard)

### INTEGRATED FEEDING SYSTEM

- Solve the issue not being able to efficiently feed bees in a top-bar hive, which is crucial for urban bees (not enough nectar in Autumn)

### EASY ASSEMBLY / ACCESS

- Create an easy sales tactic to make the hive easily available to others, as well as easily constructible. (avoid expensive and un-environmental shipping)

### WEATHER PROTECTION

- Integrate solutions that will protect bees from rain, condensation, cold weather, and over-heating

## CNC MILLED DESIGN

### EASY ASSEMBLY / ACCESS

- Create an easy sales tactic to make the hive easily available to others, as well as easily constructible. (avoid expensive and un-environmental shipping)

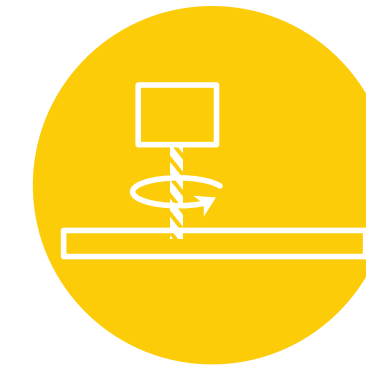


CNC (Computer Numerical Controlled) Milling is performed through a machining process that uses cylindrical tool that follows a path designed on the computer



#### 1. PURCHASE DESIGN

Purchase computer geometry for just \$15. This geometry can be used again and again to mill as many hives you desire.



#### 2. MILL HIVE

Design is programmed per CNC machine and milled out of 2 sheets of 3/4" plywood. CNC machining database helps find a CNC Mill near you.

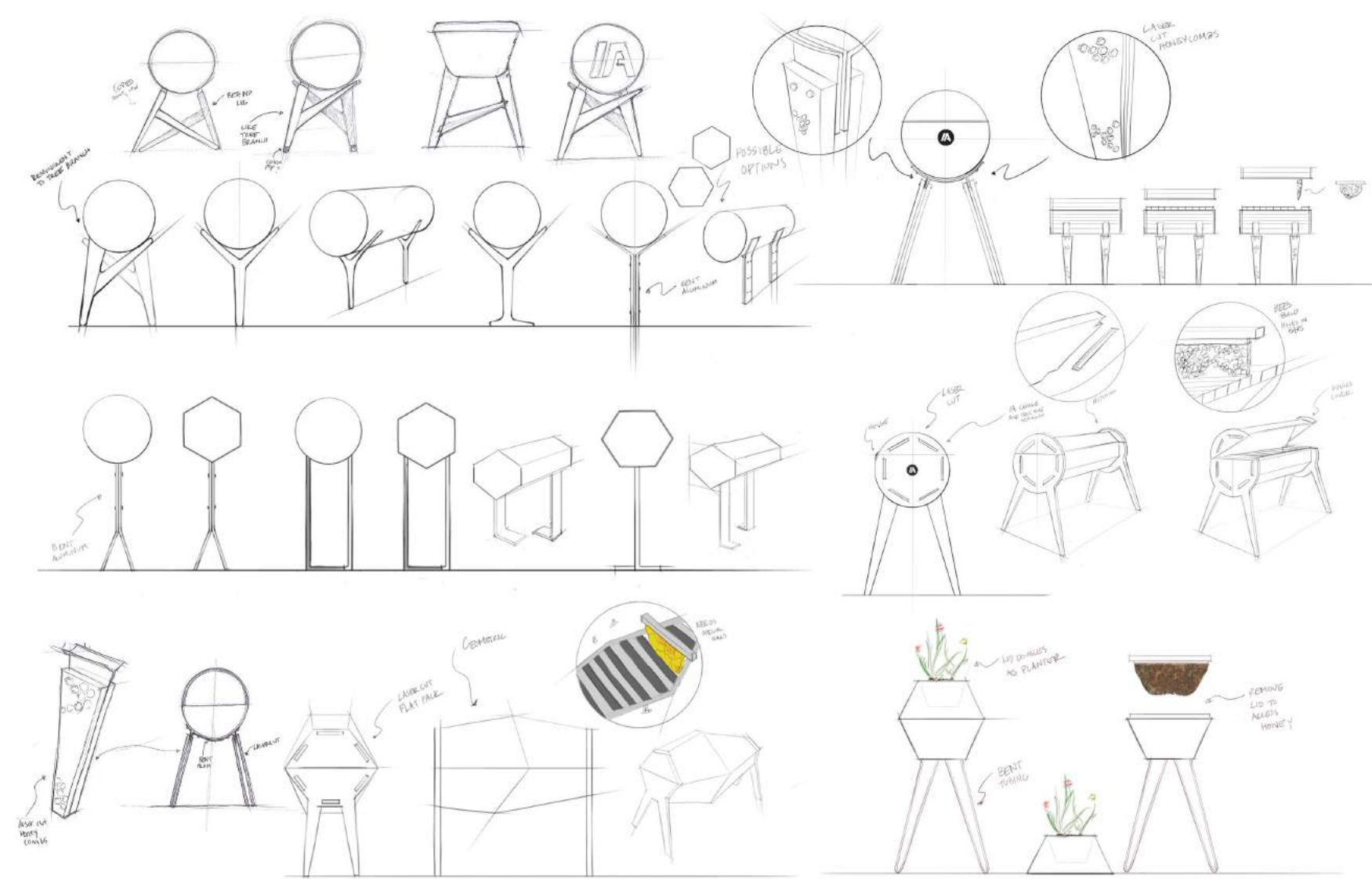


#### 3. HIVE "SNAPS" TOGETHER

Pieces together in under a hour with three people total. All you need is a rubber mallet.



# CONCEPT DEVELOPMENT

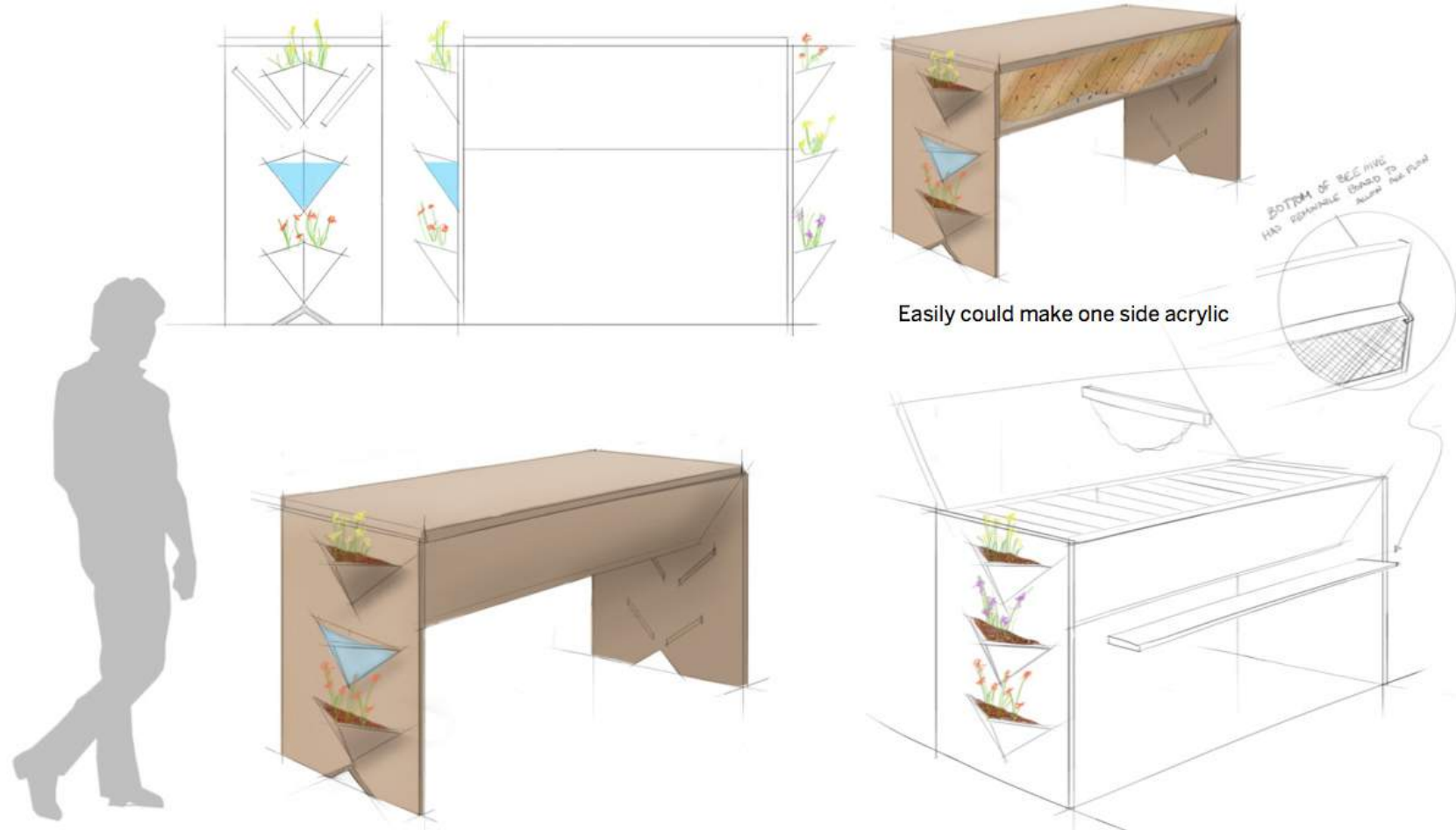


# FURTHER DEVELOPMENT





# DESIGN DIRECTION



# VARIATIONS ON DIRECTION



## PROS

-interesting aesthetic, utilizes "plank" walls for storage and plants

## AREAS TO IMPROVE

- can't use acrylic "window" for heat and health of bees, need feeder, angled roof, and thoughts for "wintering" hive

# PROTOTYPE TESTING

Tested different components of the hive, checking for errors and successes in design: which way (from previous concepts) to feed bees (integrated drip feeder chosen), aesthetic preference of pockets (3 and 1), roof (decided to add hinges and handle).

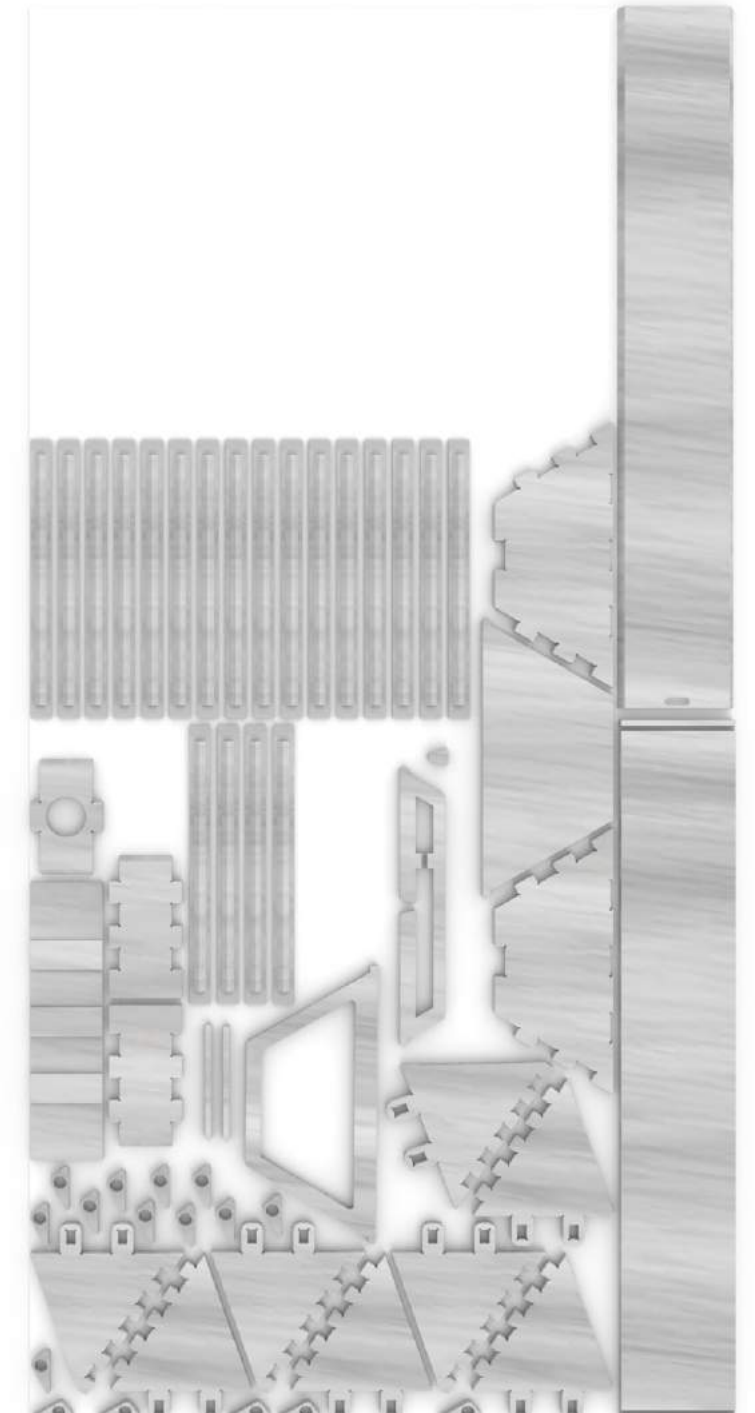
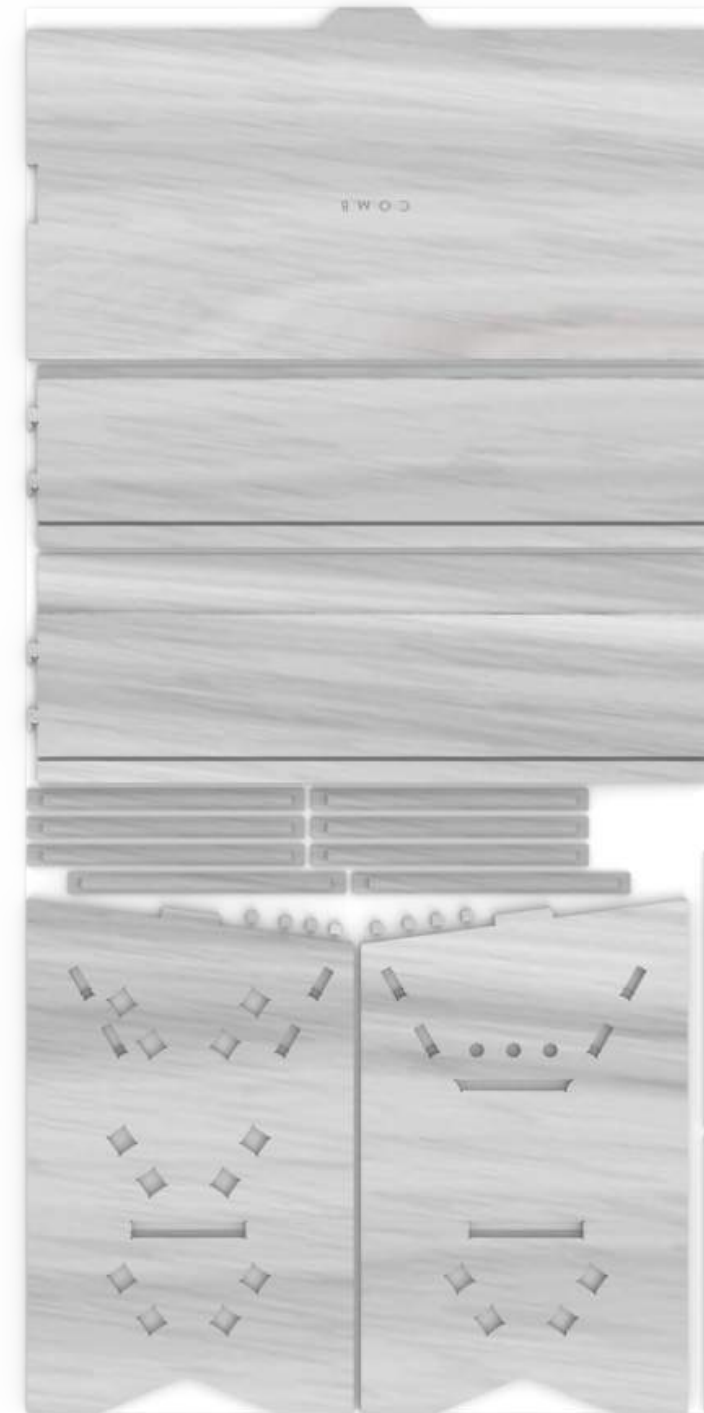


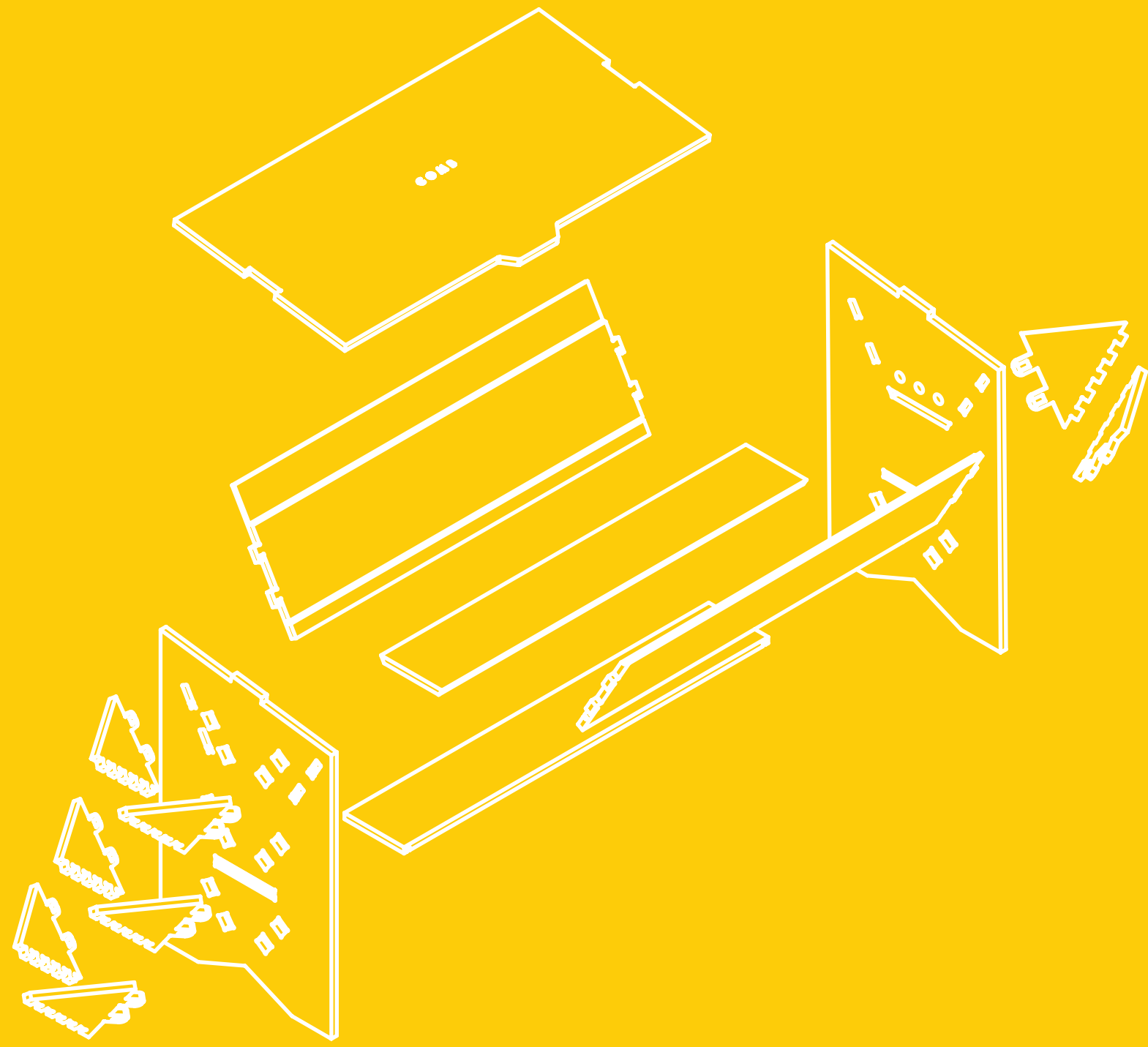


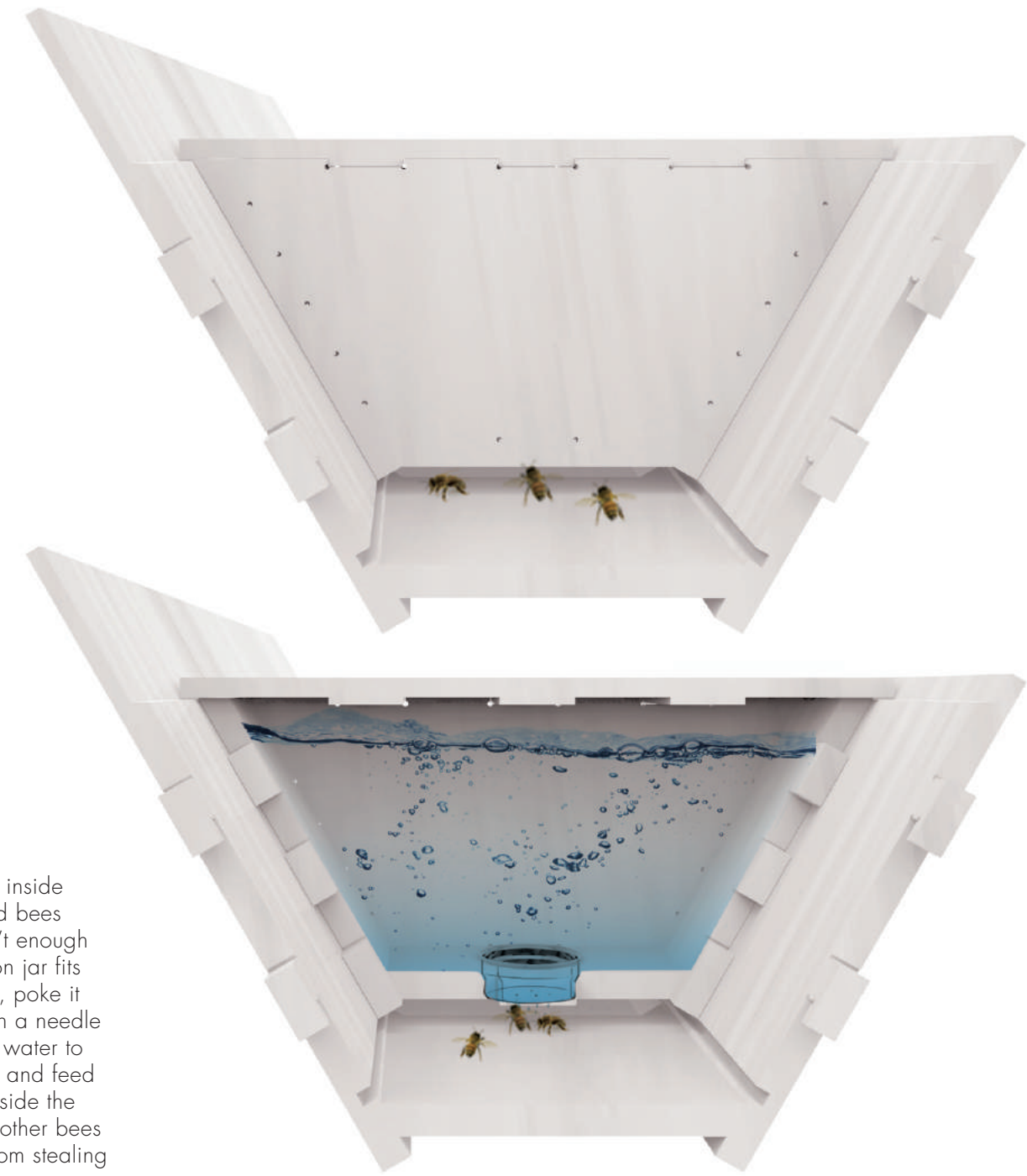
## CNC MILL LAYOUT

Just 2 sheets of 3/4" (.71inch) CARB 2 (emission/formaldehyde free) plywood is needed to make the COMB HIVE.

COMB HIVE was designed on two sheets of plywood to incorporate all of the features of COMB HIVE. The design prevents swarming (minimum of 40" interior length), incorporates aesthetic and functional "pockets", includes all top bars, includes sugar water feeder, and is built at an ergonomic height that also prevents rodents from entering the hive.

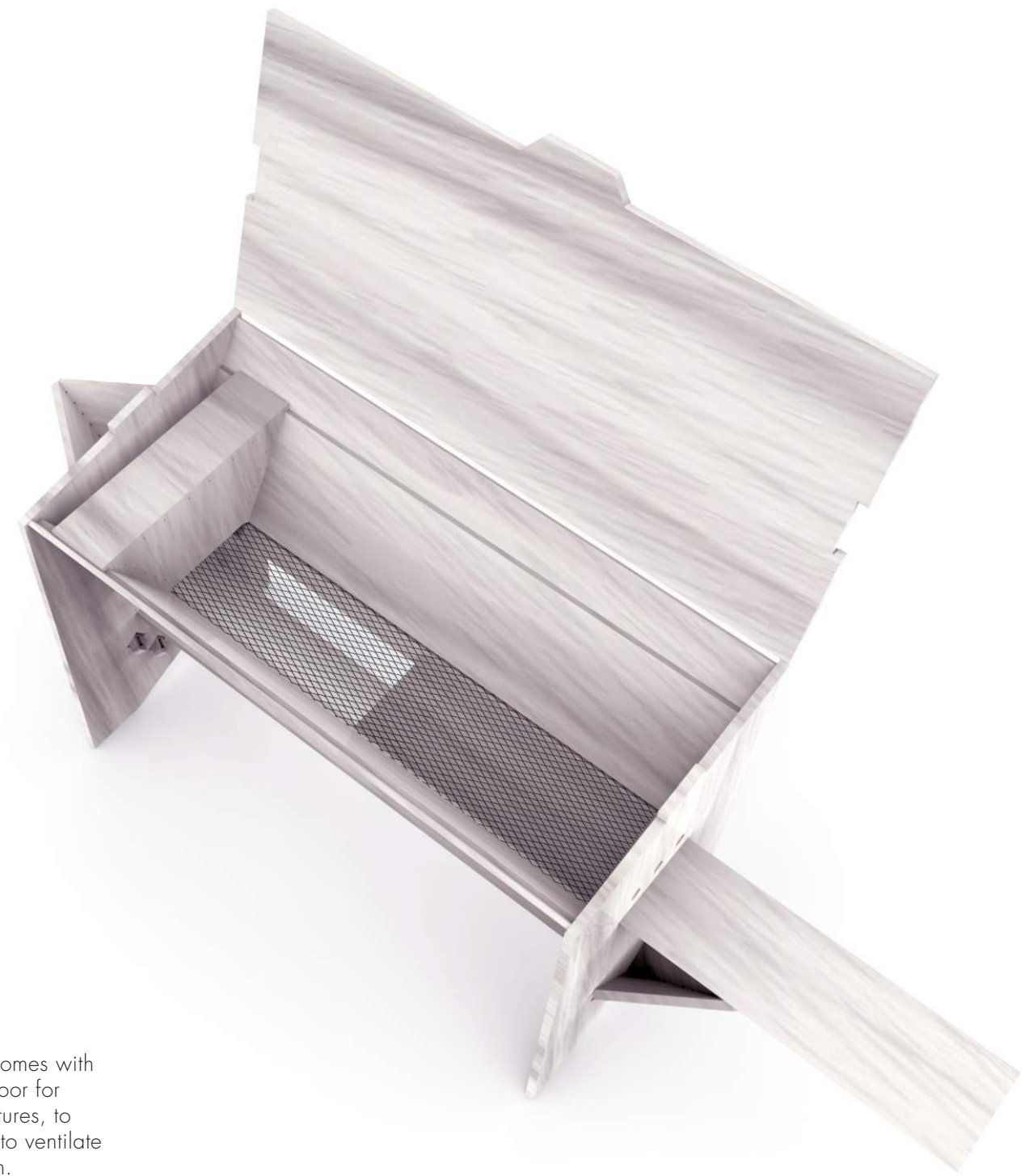






Bee-feeder, fits inside the hive to feed bees when there isn't enough nectar. A mason jar fits inside the hole, poke it three times with a needle to allow sugar water to drip out slowly and feed bees. Fitting inside the hives prevents other bees and animals from stealing their sugar water.





COMB HIVE comes with a removable floor for warm temperatures, to allow the hive to ventilate and cool down.



## I WOULD LIKE TO THANK...

All the beekeepers who shared their knowledge and feedback and lit my passion for bees.

My past employers who have greatly influenced me in design and in life.

UCID16, these past 5 years would not have been the same, and I won't forget the happy and painful memories.

My sisters and brother-in-laws, who always support me and think of me when they see something related to the design world.

Last but not least my parents who have helped me more than anyone else, supported me and have been my biggest fans, I love you.

C O M B

