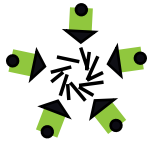


mobile living:





Project Definition:



> We began by looking at disaster relief. We were drawn to the **feeling of community** that develops during and after a disaster.



> In 2005 **125 million** were affected by a natural disaster.
<www.habitat.org/local/>



Project Definition:



➤ From looking into disaster relief units, we decided to create a space for **volunteers rebuilding permanent housing** as well as the **community** affected by the disaster.



➤ **Habitat for Humanity** is an organization that embodies the ideals of community and volunteering. From speaking to several people, we learned that many **people were discouraged from volunteering** because of cost issues. 75% of Habitat for Humanity volunteers travel away from home to help and thus have to pay the **cost of travel, housing, and food**.

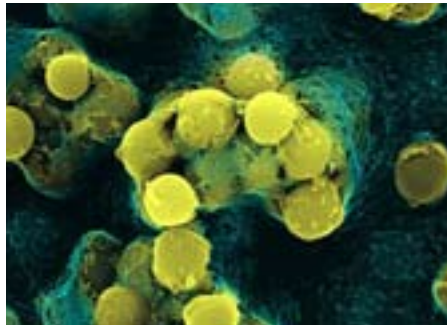


Inspiration and Research:



> We looked at communities in nature.

> Dandelion seeds are packed together for security and assured success. Each **individual is attached to the whole** until it is time to go it alone.



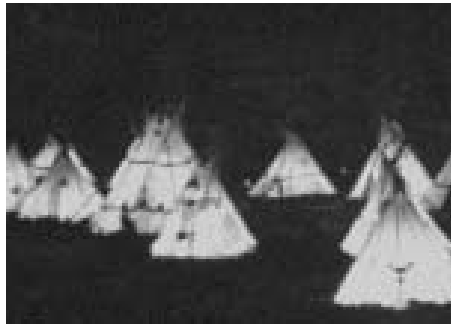
> Bacteria **naturally clusters** to be more effective. Bacteria work as a unit to assure survival. They move around as units, though these units are **constantly changing as individuals move from cluster to cluster**.



> Bees tend towards groups for communication and efficiency purposes. Some bees act alone, but the **community acts as one**. This is an **everchanging community**.



Inspiration and Research:



> We looked at manmade communities

> **Geodesic domes cluster** together for a fun atmosphere. The structure itself is **very strong** while it feels very open inside.

> Native American communities are **mobile** and can group at will. An entire housing unit can be carried on the back on one animal. **All domestic needs are met** within the unit, while the unit itself is **designed around these communal activities.**

> Habitat at Expo '67 in Montreal designed by Moshe Safdie. Basic units **connect together** in an irregular pattern. This **creates usable** negative, exterior wall and roof **space.**



Inspiration and Research:



> Other cultures ways of living

> **Yurts are nomadic dwellings** that are strong as well as highly mobile. They are **centered around domestic activities** such as cooking.



> **Camels carry Saudi Arabian homes on their backs.** They are lightweight and specific to the environment.



> Refugee housing in the Persian Gulf 2002. These went up very **fast** and are made from **local materials**.



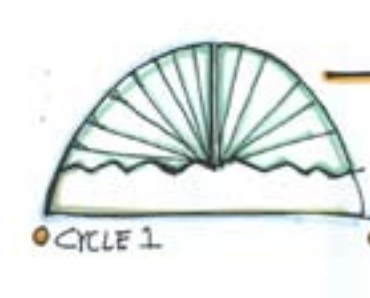
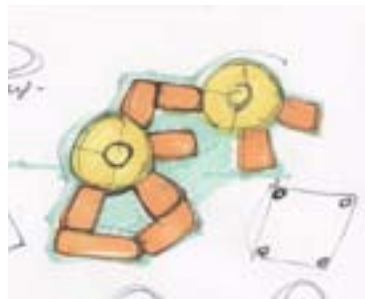
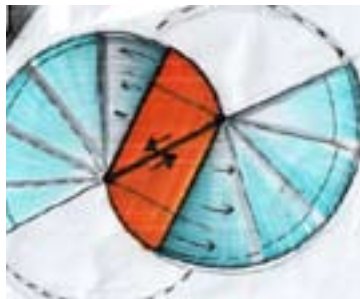
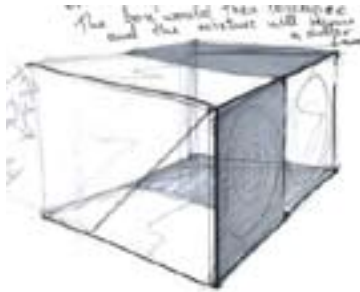
CRITERIA:

- > **Community Oriented:** build a sense of community through arrangements of smaller units.
- > **Private Spaces vs. Public Spaces:** there will be smaller personal spaces and larger communal spaces.
- > **Living, Organic Community:** the populace/individuals of the community will change with time. As new people join, the community is made anew. As the community is made up of living, changing people, it too is a living entity.
- > **Mutable, adaptable:** configurations can change depending on the environment as well as communal/personal needs and preferences.
- > **Sustainable, eco-conscious:** limit the impact that the structure will have on the environment around it and its creation.
- > **Human Needs:** the basics should be provided for: sink, shower, toilet, bed, table, seating, storage, food storage and prep, light, heating, and power.





CONCEPTS:



- > We had many brainstorming sessions and came up with several concepts which many had overlapping ideas.



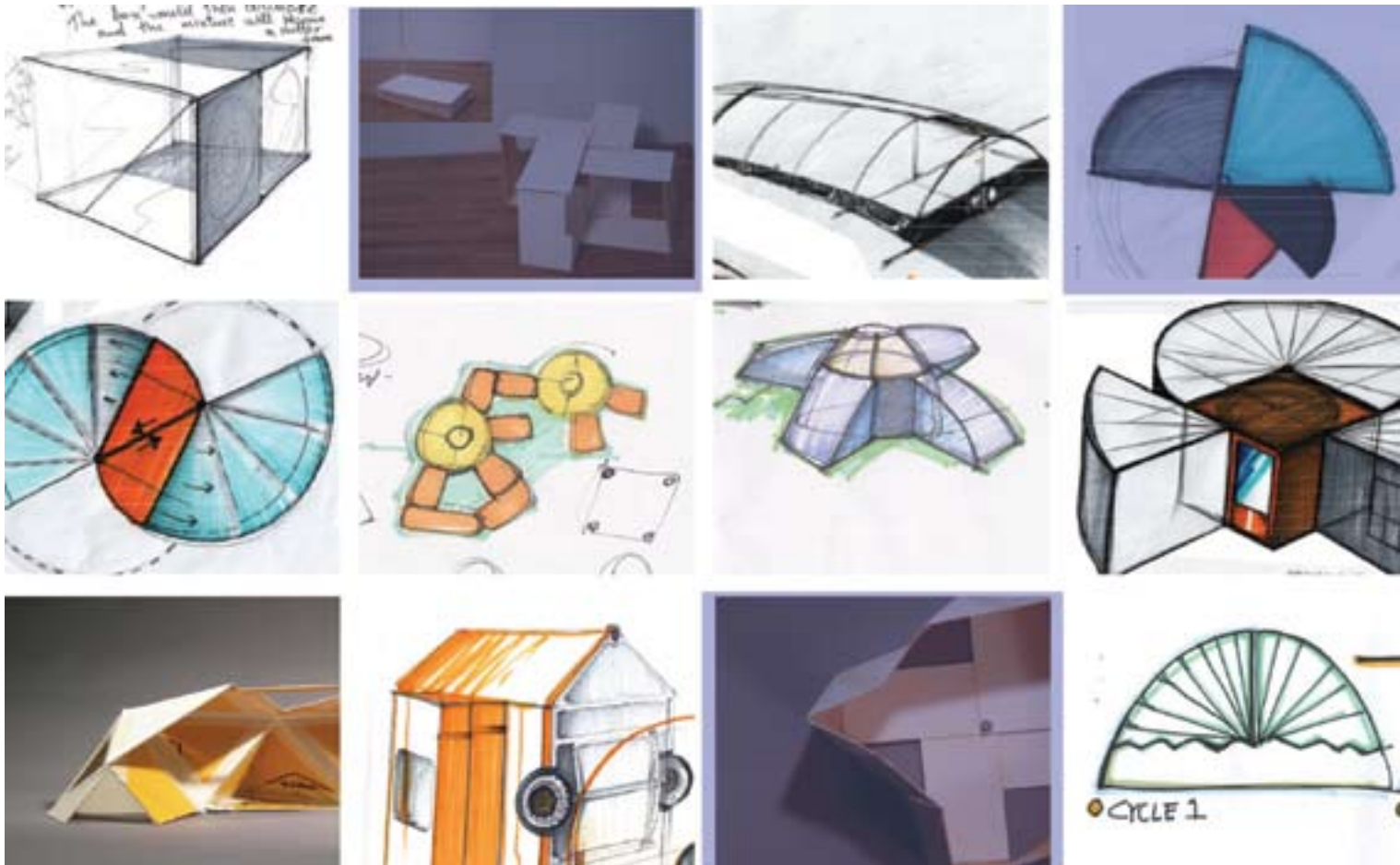
CONCEPTS:



- > These ideas deal with **fast, multiple-configurations.** which as you see is high on our criteria list.



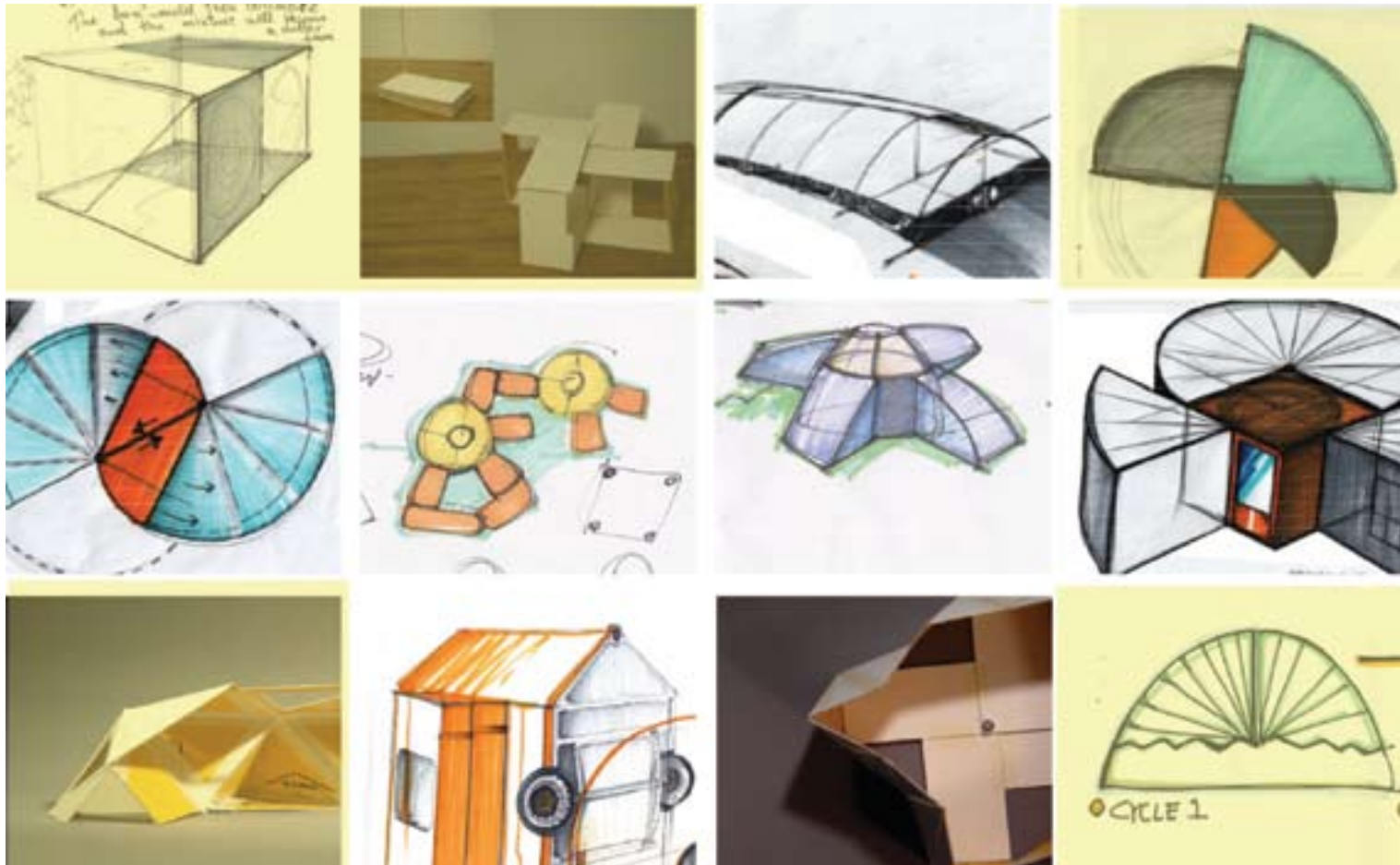
CONCEPTS:



- Many of our sketches included the idea of **expanding radially** outward to create more space.



CONCEPTS:



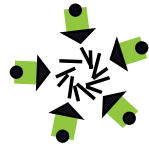
- > These spaces start out very small and **expand** to create a much larger space.



CONCEPTS:



- > We wanted a structure with a **central core** for things to expand out of and to **house the main elements**.



DEVELOPMENT:



- > From our initial sketches we refined our original criteria to include the following:
 - > The ability to be part of a group or be an individual.
 - > Ease of transport.
 - > Ease of setup.
 - > A central core to house the necessary appliances and furniture.
 - > Expanding spaces.



DEVELOPMENT:



> We discussed the pros and cons of tents.

> PROS: highly **transportable**, lightweight, breathable, **outdoors**, can be an **experience** or vacation

> CONS: lightweight, can leak, **sleep on the ground**, thin walls **can feel vulnerable**, outdoors, can hear everything, no privacy, **complicated to set up**

> We then weighed them against those of a house.

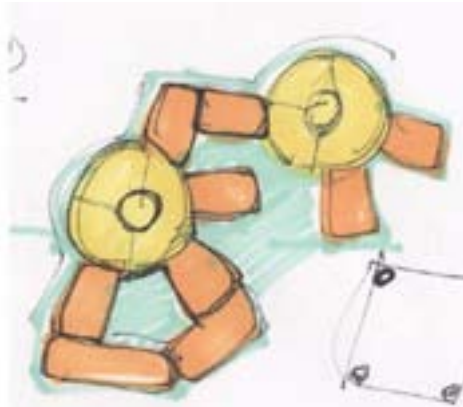
> PROS: **structural, feels safe**, can't hear the outside, walls delineate rooms for **privacy**, insulation, not sleeping on the floor

> CONS: not mobile, too structured, too used to it, not much of an experience, **full of things and distractions**

easy to transport, one unit,
lightweight, customizable dependent
on situation, structural, private,
easy to set up

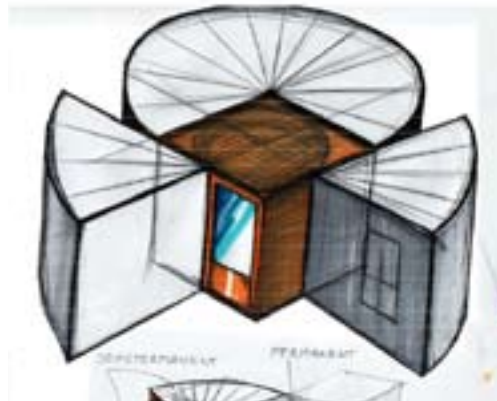
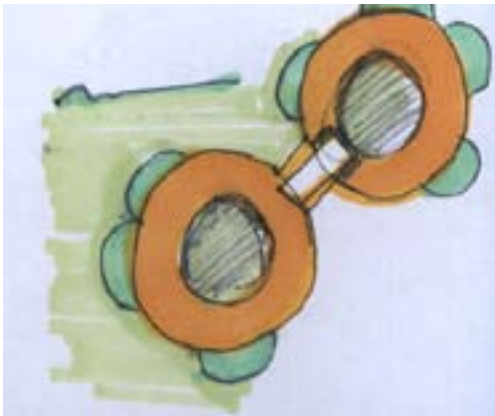


DEVELOPMENT:



> We developed a new concept based on our assessments

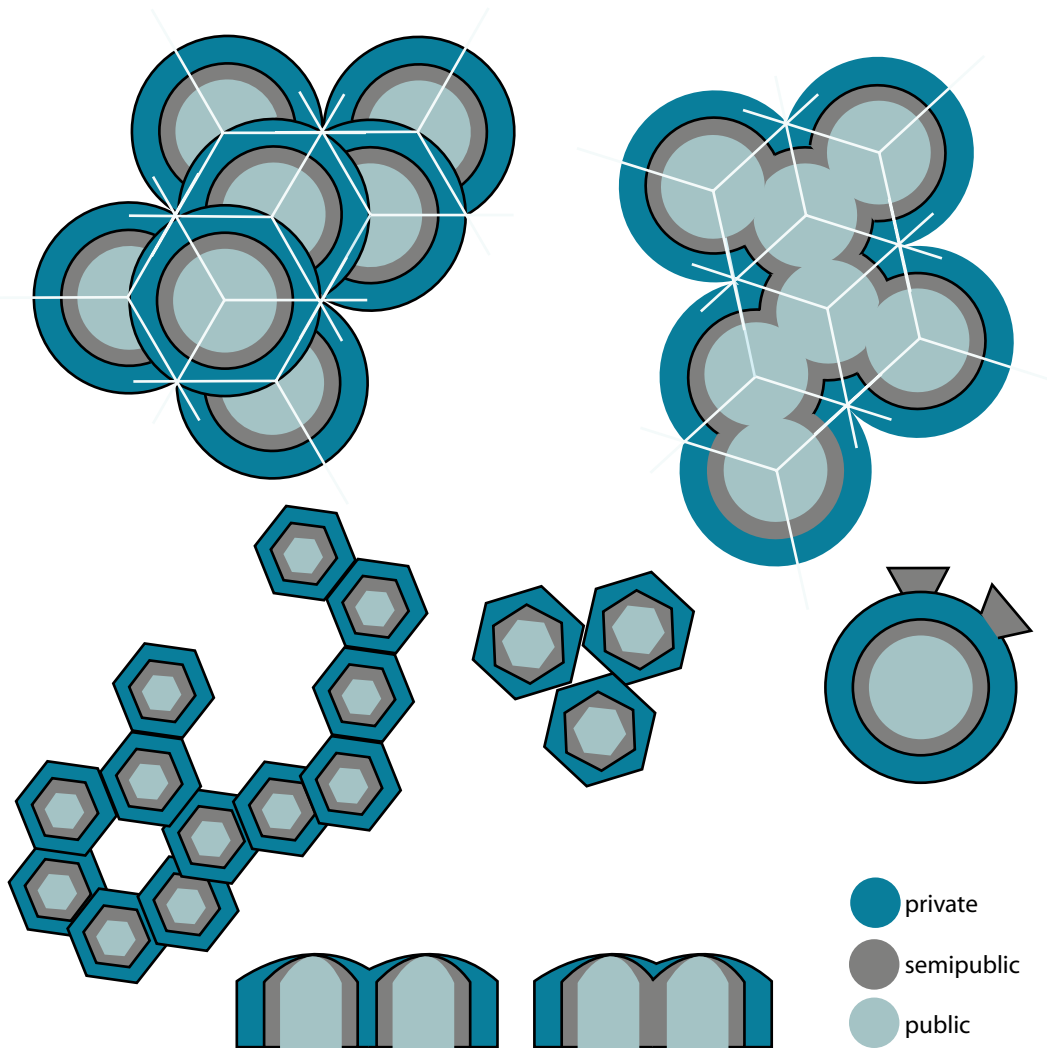
> The **personal space** is **separate from the main structure**. This allows for both public and private space.



> The spaces can be **connected in different arrangements** to create new space and new shapes.



DEVELOPMENT:



> A **core common area** is surrounded by private **personal spaces**. These spaces are separated by walls. These are clustering shapes inspired by bacterial colonies.

> The walls would have a skeletal structure covered with nylon. The roof would be a rigid material, making the structure feel more secure.

DESIGN DECISIONS AND FULL SCALE MODEL:



- > After picking a direction, it was time to build a full scale mockup. The plan was to make a **small dome expand out into a larger one**. This would be a communal space for a group of people.
- > We were inspired by the D.B. Fletcher Capstone Table. This table expands by **rotating outward around a central pivot**. Our goal was to create a **contained space that expands out in one easy motion**. This mechanism fulfills our needs for the dome floor.
- > We constructed a small dome with an 8ft diameter. This was based on the **maximum width able to be transported on the road**. Using the geometry of the Capstone Table and an 8ft diameter of the small dome, we calculated the **maximum expanded floor possible** to be a 12 ft diameter.



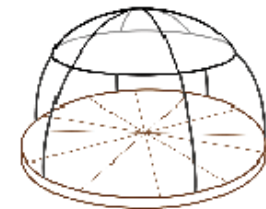
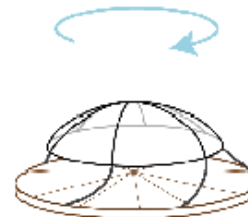
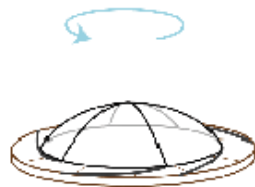
DESIGN DECISIONS AND FULL SCALE MODEL:



- > The space is a dome which collapses to the ground. It expands into a very comfortable 113 sq ft of communal space.
- > We decided on a dome because the **circle is a naturally community-provoking** shape.
- > This promotes the use of a common space for eating, cooking, and **interaction** between people.
- > Domes are **naturally sound structures**. We chose an arc that resembles a **catenary curve**. This enables the dome to channel gravitational **forces downward** instead of outward.



DESIGN DECISIONS AND FULL SCALE MODEL:



➤ Eventually our dome fell down, but as it fell it **spiraled down**. This was something that we had thought about very early on but were unsure of the practicality. We then decided to let the dome do what was natural: rotate.

➤ The **top is connected to the floor, it will spin up as the floor rotates out**. The floor will expand from an **8ft to 12ft diameter**. The benefit is that it will be **shipped in one piece** which eliminates the hassle of assembling a kit of parts.



DESIGN DECISIONS AND FULL SCALE MODEL:



- > Each disaster relief volunteer is entitled to their own personal pod.
- > The pod is **carried on the back** of the volunteer and then unrolled and set up for use.
- > This is primarily a **private space for sleeping** and storing belongings. A total of **12 pods** can **attach onto the main common area** individually.
- > Pods also **attach to each other** by removal of the common walls. This allows for customizable space. A family can, for example, connect multiple pods to keep everyone together at night. Pods can also act as a **hallway between common areas**.



THE DESIGN: DECISIONS



- > Having built the full scale model, we made new design decisions.
- > There will be a **fire pit in the middle** of the dome for **warmth and cooking** purposes.
- > The dome sides will be made out of **metal conduit** covered with **nylon**.
- > The dome top will be a **hard but translucent** material.
- > The pod ceiling will be a **thin plastic so it can roll up**. The fabric of the pod will be **darker for privacy**.
- > There will be a **sleeping pad** in the pod.



THE DESIGN: MATERIALS



Planned Materials	Purchased Materials	Cost
<i>4mm Coroplast for the dome top.</i>	<i>3 sheets 4mm clear Coroplast</i>	<i>\$ 24</i>
<i>Rip stop nylon for the dome walls and personal pod walls</i>	<i>32 yd white fire retardant silicone-impregnated ripstop nylon 26 yd navy silicone-coated ripstop nylon</i>	<i>\$296</i>
<i>Thin plastic, possibly HDPE, for the personal pod ceilings</i>	<i>4 sheets 4mm clear Coroplast</i>	<i>\$ 32</i>
<i>Zippers</i>	<i>125 ft white velcro</i>	<i>\$ 77</i>
<i>Foam rubber for the sleeping pads</i>	<i>2 packs carpet foam</i>	<i>\$ 50</i>
<i>1/2" Aluminum tubing for the frame of the dome</i>	<i>210 ft 1/2" electrical conduit and connectors</i>	<i>\$ 65</i>
<i>1/4" Aluminum tubing for the personal pod frames</i>	<i>64 ft 1/2" pvc</i>	<i>\$ 11</i>
<i>Wood for the floor</i>	<i>blue tarp plywood</i>	<i>\$ 15 \$ 0</i>
<i>Fire ring</i>	<i>stolen garbage can</i>	<i>\$ 0</i>
<i>Concave skillet or wok</i>	<i>26" carbon steel wok</i>	<i>\$ 35</i>
	<i>clear zipties</i>	<i>\$ 5</i>
		\$610

➤ We made a **conscious decision to make a full scale model out of different materials.** Some technical features like the expanding floor and dome structure were beyond our skill to craft. We decided to make simple changes to make a model we could reasonably produce.



THE DESIGN: OUR EXPERIENCE



> We took our structure on a **weekend trip** to Highland Forest State Park in order to **test our design**.



> The fabric walls **attach and detach easily**. Each panel can **join with another or be used as a door**.



THE DESIGN: DETAILS



> The pods are **designed for one person**, but they have the ability to comfortably sleep three.



THE DESIGN: DETAILS



> The **metal firepit** sits in the **center** of the dome. It has holes on top and bottom for **ventilation and fire maintenance**.

> A **cooking surface** can easily be placed on top of the pit. It's concave surface allows for a **variety of dishes**.

> During our trip, the firepit became a place **around which the whole class congregated**. Once we placed the wok surface on top of the firepit, it began **radiating heat**. It was a lifesaver.





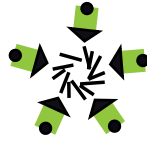
THE DESIGN: DETAILS



> This is a shot of our structure at night. As you can see the **structure glows** when there is activity in the structure. Which is a **visual way** to see if people are around.



> This is the **mark** our structure **left on the land** but the trip left a mark on us as well.



THE DESIGN: CHANGES



> The walls of the pod are a darker material for **privacy and light quality**.



> The pods have a **sleeping pad** on the floor for **comfort and insulation**. In the field, we found our version to act like an ice pack. In the future, we will change to a thicker floor material to feel more stable and to be off the ground.



THE DESIGN: CHANGES



> During our trip, the weight of the snow placed **too much pressure** on our flexed pvc piping structure. This forced the **arcs to invert**, and the pod collapsed.



> After the pods collapsed we were forced to move onto the **wood flooring** within the central dome. We found that the **increased elevation** off of the ground provided **greater warmth**.



CONTINUING THE DESIGN



- > The ceiling contains an oculus for night viewing, **ventilation**, and temperature control. It can be **closed easily** and **extra lighting** may be hung from the closure.



- > For our future design we would allow **more air to enter into our structure** through the floor to allow for **vertical circulation**



CONTINUING THE DESIGN



- > We noticed that storage was an issue on our trip. Bags were simply placed haphazardly on our floor.
- > The dome walls will contain **netting for storage** of small items. This storage could also act as insulation.

- > **Seating** within the dome will act as **storage**.
- > Seats around the fire will house items like **coolers as well as luggage**.



CONTINUING THE DESIGN

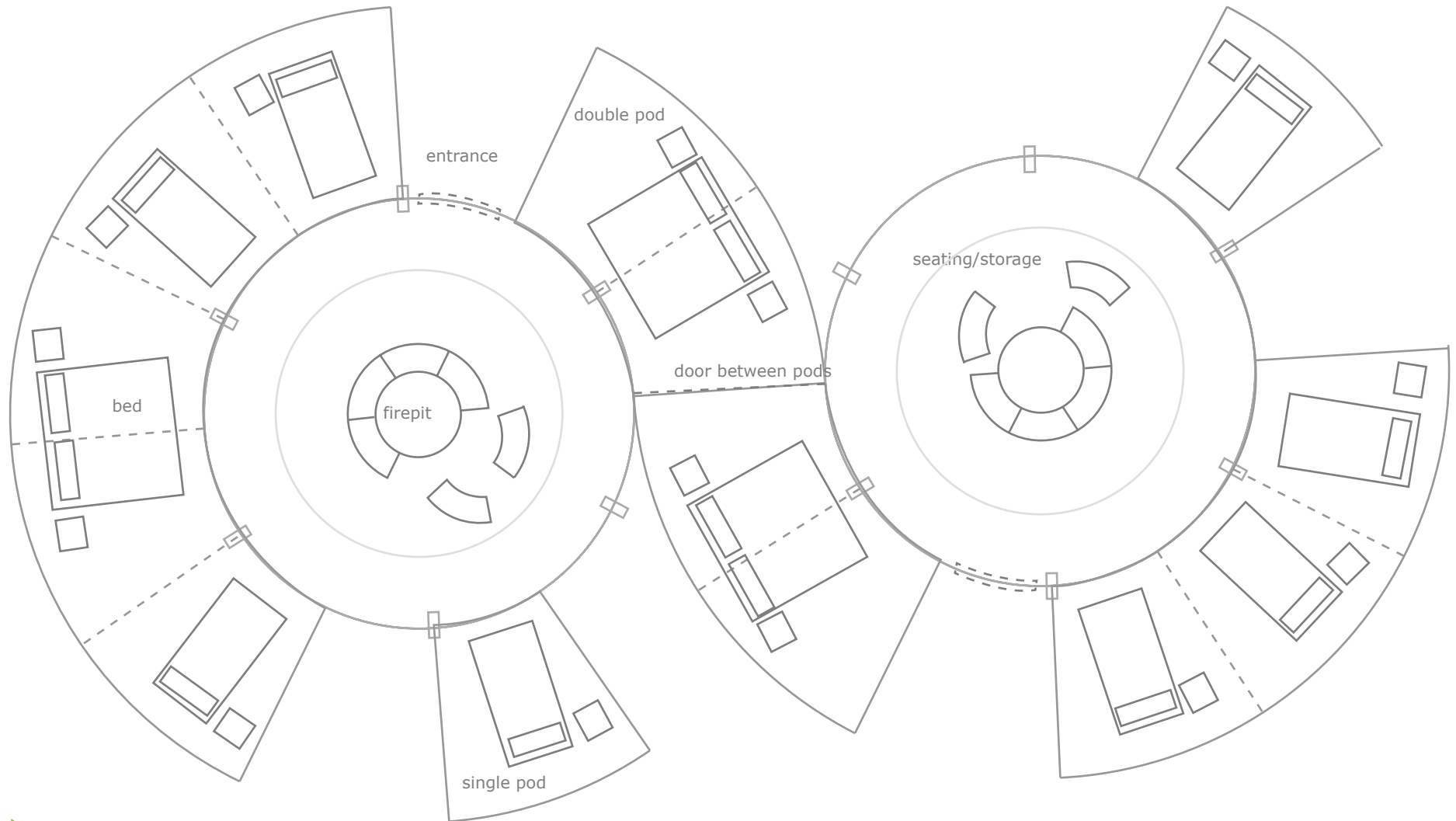


- > Pods could be **used for a number of other needs**. These include bathroom, kitchen, and storage facilities.



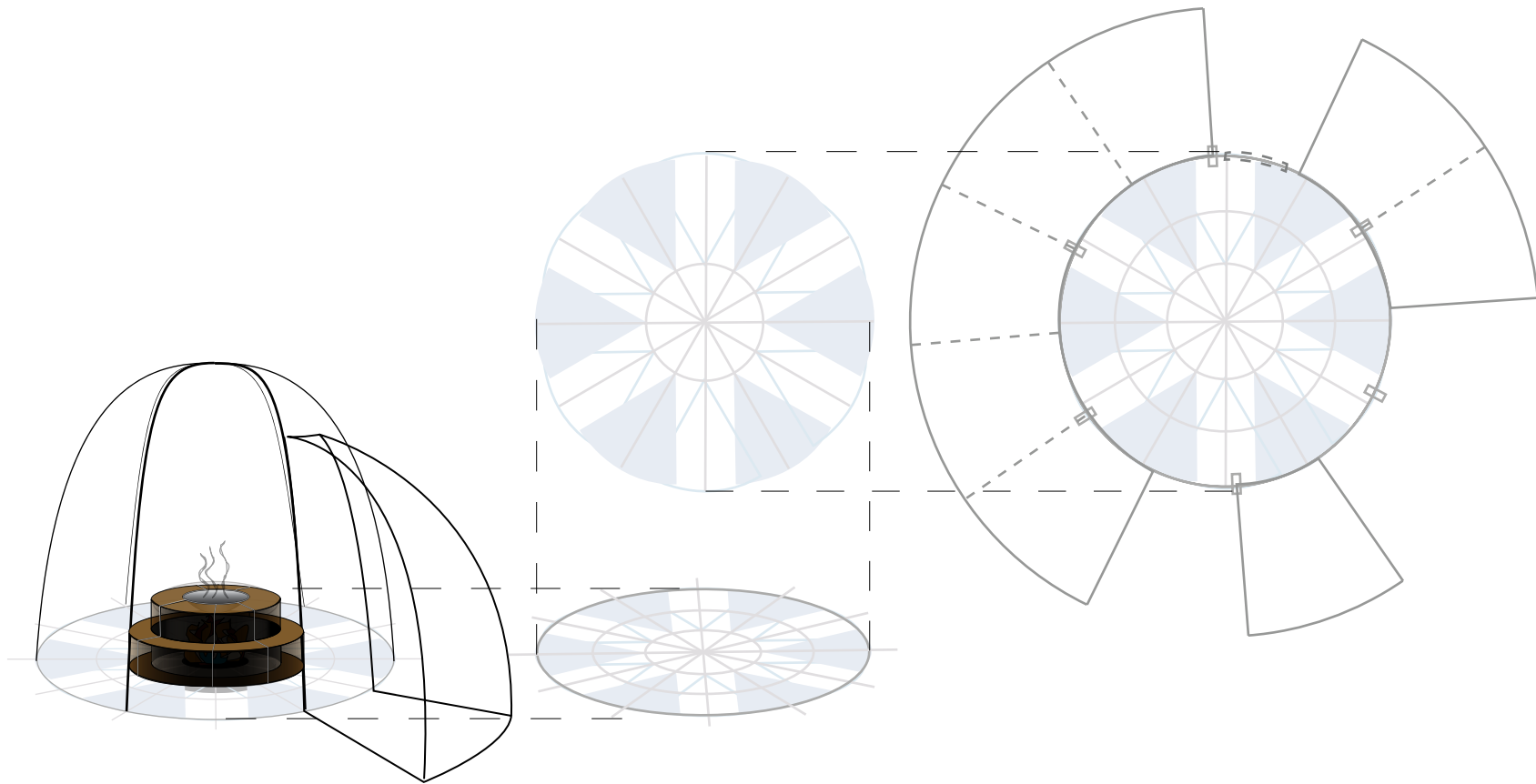
- > Pods **connect to each other** to form bigger spaces.
- > Pods could also connect domes and act as porches or entry ways.

CONTINUING THE DESIGN

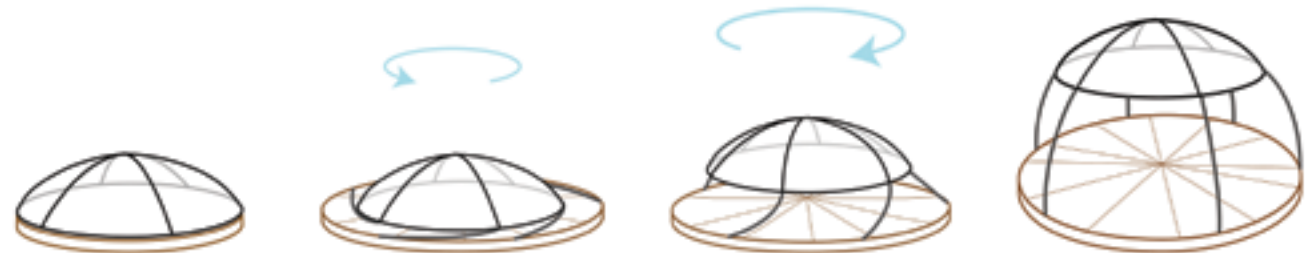


- > maximum occupancy of dome: 12
- maximum occupancy of colony: endless

CONTINUING THE DESIGN



- > With a firepit in the center for heat and cooking, the dome becomes a common area. Personal pods radiate from the center to create a full living space.



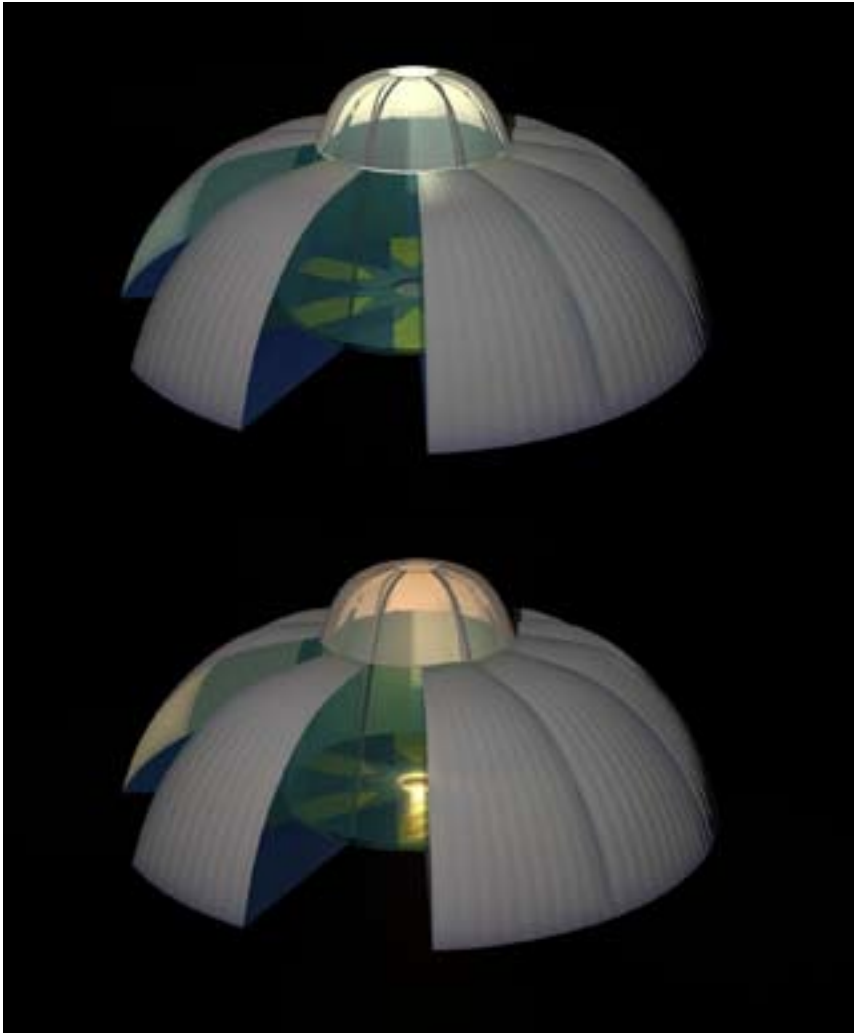
- > The dome as been designed to be delivered onto location on the back of 18-wheelers. Approximately 6 could fit on one load. Once placed on location, the dome is constructed by rotating the base outward to its' full diameter, and then rotating the dome upward over its' legs.

CONTINUING THE DESIGN



- > Once the dome expands to its full size, the **side panels can be rolled down**. They are connected by sleeves to the legs. Pods can then be added to the structure by **unzipping common walls**.

CONTINUING THE DESIGN



- > This is the dome lit up at night. A lantern can easily be hung from the ceiling.
- > The dome is heated and lit by fire light. From the outside, the dome glows warmly and life can be seen within.



CONTINUING THE DESIGN





