Reimagining The Bedroom Space

M.Des Industrial Design Project II

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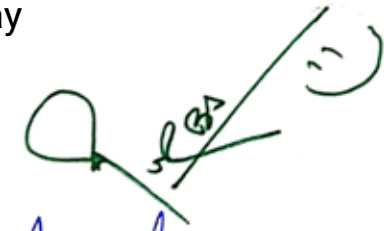
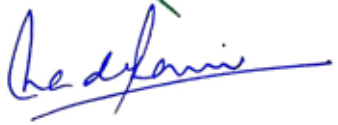
2017-2019

Approval

Industrial Design Project II

The project titled “ Reimagining The Bedroom Spaces” by Saijith M S, is approved for the partial fulfilment of the requirements of a postgraduate degree in Industrial Design at IDC, IIT Bombay

Project Guide 

Chair Person 

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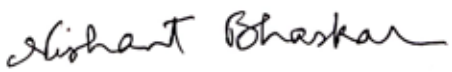
External Examiner 

Declaration

I declare that this written document represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Acknowledgement

I take this opportunity to express my gratitude to my guide Prof P.Kumaresan for his consistent support and guidance in this project.
I thank the entire faculty at IDC school of design for the inputs that helped me successfully complete this project. The feedbacks I received at every stage of the project were immensely helpful and it allowed to look at a wider perspective of the project.
Last but not the least I am grateful to my classmates for contributing their valuable insights to this project.

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Contents

Abstract

In today's ever changing world, material and people move places, cities and countries. As we migrate from city to city in search of better education, jobs or lifestyle, how well are these able to absorb the unprecedented population influx? As spaces become smaller, it is imperative for us designers to appropriate the same into compact liveable spaces. While the world is tending towards smart technology, isn't it time to celebrate smart living – for a minimal, compact yet efficient living for the future?

This project is an venture to reformulate the current perception of existing household furniture system. A good night's sleep is vital to our physical health and emotional well-being in this busy urban lifestyle. Here its an attempt to redesign the existing bedroom furnitures into a single module which is compact, minimal and smart.

Image 1: Crowd in metro-cities

1 Introduction

The urban population growth is increasing day by day. People migrate into the cities seeking for better opportunities. Urban population has grown from 109 million to 377 million from 1971 to 2011in India, which is expected to grow even higher. Studies show that by 2030 the expected urban population growth is going to be 600 million.

Land becomes a major concern to accommodate these fast growing population. Spaces become scarce, houses becoming smaller. In 2011 census 22% of migrants travel along with their households. In this project we are trying to rethink about the whole concept of household furnitures. How we can come up with a solution which makes their transportation easy .

2 Primary Study

2.1 What are the problems ?

Migrant population in cities increases

The world's population is becoming increasingly urban. Sometime in 2007 is usually calculated to be the turning point when city dwellers formed the majority of the global population for the first time in history. Today, still the trend toward urbanisation continues: as of 2014, it's thought that 54% of the world's population lives in cities – and it's expected to reach 66% by 2050. Migration forms a significant, and often controversial, part of this urban population growth.

In fact, cities grow in three ways, which can be difficult to distinguish: through migration (whether it's internal migration from rural to urban areas, or international migration between countries); the natural growth of the city's population; and the reclassification of nearby non-urban districts. Although migration is only responsible for one share of this growth, it varies widely from country to country.

Image 2: Skyline of metro-cities

Space becomes a constraint for living

As the world celebrates World Population Day, the nation has much to worry. While the land per person is diminishing, the metropolitan cities are witnessed as havens providing numerable opportunities. But the question arises, till when can these cities bear the burden.

In many urban cities, residents of the core city lack sufficient living space. Adequate housing is a major problem. Now a days renting out of small spaces in the name of studio apartment is coming into trend in metro cities. People rent out 3x6 meter space in the name of studio apartments. People travelling with their households often find it difficult to get accommodate in these smaller spaces. They are forced to rent out bigger houses just because their household goods are big, not because their lifestyle demands them. This leads them to spend them sufficiently more money as rent. People who stays in these small apartment with their household often ends up not having sufficient space for them and ending up in having a poor liveable space

Image 3: view of studio apartments

Degrading of lifestyle

A lifestyle typically reflects an individual's attitudes, way of life, values etc. Standard of living is effected due to migration, non availability of space, lack of infrastructure. This leading to degrading of lifestyle.

The place where we stay will reflect our actions personality. lack of sufficient living space in metro-cities is one of the main reason. Can we make the most out of that small spaces available? Can that space rather than degrading can it enhance the lifestyle.

Transporting households become a major problem

There is a good percentage of migrant population who travel along with their households in India. They move to metropolitan cities where spaces are becoming scarce, there is very less space available for the people that they are tend to adjust to that spaces. Often transportation becomes a major issue. If we look at the houses today there are a lot of furniture serving single purpose, is there a way by which we can reduce the number of furniture without compromising much on our daily functions is the question to be answered here.

Image 4: transportation of household goods

Cities need to move towards more compact, minimal and smart living solution.

Image 5: minimal living

Minimal living

Minimalism is a word that carries a lot of weight these days. Ironic, considering it refers to a lifestyle that is all about living with less or living with just what is needed.

MINIMALISM IS INTENTIONALITY. It is marked by clarity, purpose, and intentionality. At its core, minimalism is the intentional promotion of the things we most value and the removal of everything that distracts us from it. It is a life that forces intentionality.

Image 6: compact living

Compact living

To live small, you have to think big

Compact Living is about making the most of your square metres when you either live in a small space, move to something smaller or want to make room for more.

The global issues of population explosion and land scarcity have forced us to arrive at a comprehensive solution for a sustainable future. Compact living helps us be a part of this solution.

Image 7: smart living

Smart living

We understand the importance of having safe, energy efficient and secure living spaces that is built in a smart way so that you take your home with you wherever you go, watch the happenings home and enjoy watching your playful kids or aged parents from where you are at the click of a button either in your smart phone, i-pad, note book or any device which has internet connectivity and video play back and of course we also understand the requirement of convenience and comfortable living, all this with a feeling of security.

Image 8: empty space

Image 9: functional space

2.3 What makes a space meaningful?

What are the essential things to make a space into a bedroom? What about a dining space? We don't have to think very hard to answer either of those questions. That's because we use the furniture in a room as context clues. They provide us with essential information about the space's purpose.

It is the furniture and products that falls into the space that makes a space meaningful.

Rather than serving just the function of the space furniture in a room adds to a lot more than that.

- Furniture Dictates Flow of Movement

Talking about arranging furniture, in addition to helping define function, these groupings also decide how occupants will move through the space. People might have often experienced shimming their way out of a too-tight seating area. This can probably tell you the importance of leaving the proper amount of physical and visual breathing room.

- Furniture Balances Visual Weight

Visual weight is all about helping balance a room. When dealing with multiple, big, heavy components one need to stagger them throughout the space so that one side does not feel more weighted down than another.

- Furniture Shows Personal Style

Product that we choose is expression of unique sense of style and personality.

2.4 What all spaces make a home?

Bedroom

Image 10 : bedroom

Kitchen

Image 11 : kitchen

Bathroom

Image 12 : bathroom

Living room

Image 13 : living room

=

Image 14 : house logo

To call a space home we need some spaces which reflect the activities of the house. The minimum requirement to call a space home is it needs a sleeping space(bedroom), a living room where you can greet your friends, a cooking space and a bathroom.

2.5 Introducing new concept

Image 15 :wardrobe

What if all the rooms comes in a size of a wardrobe !

The person just have to carry four or five wardrobe with him/her and the whole house is with them.

Image 16 : image to represent transportation becomes easy

The whole concept is to make ones travelling easy when travelling with their own household articles. Through this idea the transportation of household becomes really easy.

Regardless of the space one occupies the furniture and the belonging remains the same, hence giving them an experience of your own house where ever one travels. The idea of keeping the furniture compact and minimal will allow the user to occupy any space despite of the space constraints.

2.6 Design Brief

Reimagining bedroom spaces for a working individual staying in a studio apartment, embracing the activities of the space and yet making it compact, transportable and smart.
(keeping the size constraint - 1m (max.) x 2m x 1m and imagining the space is not more than 3 x3 meter for the single furniture to occupy)

2.7 Activities involved in bedroom space.

- **Sleeping.**
  Sleep is associated with a state of muscle relaxation and reduced perception of environmental stimuli.
- **Working on the bed.**
  Lot of new generation people tend to work on their laptops sitting in the bed.
- **Watching, browsing in laptop, mobile etc.**
  As technology has advanced and everything has come in a single click in their smart devices people just tend to use them just lying in their beds
- **Watching TV.**
  It has become a usual scenario where people have TV's in their bedroom.
- **Reading.**
  People have the habit of reading at night before going to the bed.
- **Relaxing / napping.**
  Lazy hours of the day often end up in a nap in the bed.
- **Playing video games & interaction with friends(Social time).**
  More often the bed becomes a couch when some get together happens.
- **Having procreation.**
  Bedroom becomes a major space when it comes to procreation because it offers privacy and comfort.
- **Getting ready for the day.**
  Often the wardrobe and dressing area is more likely inside the bed room

Image 17 : different activities in bedroom

Spacial requirement for different activities.

Sleeping, Relaxing & Napping.

Minimum Space needed : 38” wide x 75” long (single person).
54” wide x 75” long (two person).

Items needed
: Mattress and pillows.
: Bedsheets and pillow cover.
: Blankets

Factors affecting
: No lighting.
: Air conditioning - Temperature control.
: Air quality.
: Noise level.
: Mattress quality, bed sheet & blanket fabric quality.
: Humidity

Image 18 : person sleeping

Image 19 : using gadgets in bed

Working, Watching, Browsing, Reading etc.

Items needed	: Adjustable/transformable bed to suit the need (back rest, recliner). : Platform to work, keep lap top,book etc : Power outlet : Light : Space for keeping accesso ries. : Space for keeping snacks and drinks. : Speakers/Headphones.
Factors affecting	: Lighting - Task / ambient lighting. : Air conditioning - Tempera ture control. : Posture : Humidity

Watching TV & Playing video game.

Items needed	: Adjustable/transformable bed to suit the need (backrest, recliner). : TV / Projector / Display. : Power outlet : Light : Space for keeping snacks and drinks. : Speakers/Headphones.
Factors affecting	: Lighting - dim lighting. : Air conditioning - Temperature control. : Posture : Humidity

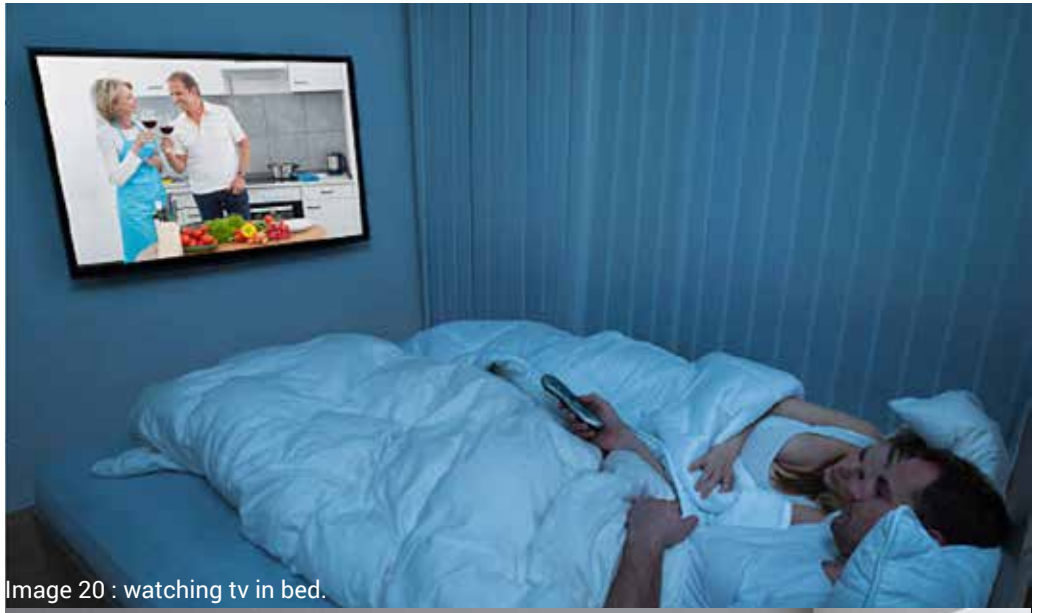


Image 20 : watching tv in bed.

Getting ready for the day.

Items needed	: Wardrobe Storage for clothes, shoes, accessories, cosmetics etc. : Mirror : Seating : Ironing
Factors affecting	: Lighting - Task lighting. : Mirror height, type, size etc. : usability of wardrobe

Image 21 : wardrobe space.

3 Secondary Study

Analysing similar Products in the market.

Image 22 : Hican smart bed.

3.1 HiCan : The smart bed.

HiCan design meets technology to define a new category of bed, crossing the traditional boundaries of furniture. It suggests a new interpretation of the classic canopy, creating an intimate cocoon to connect and communicate. Imagined to inspire extraordinary people who see things differently. Designed to bring in our most personal space the emotion of driving our life through our dreams and passions.

HiCan product features.

Reference : http://hi-can.com/hican-smart-bed-features/

Image 22 : Hican smart bed features.

3.2 The Sleep number 360 smart bed.

Image 24 : responsive air technology

Designed to keep the occupants effortlessly comfortable, the Sleep Number 360 smart bed uses Responsive Air technology that senses movement of the occupant then automatically adjusts firmness, comfort and support to keep the sleeping blissfully, all night long.

There are few things more satisfying than getting under sheets on a cold winter day and feeling the warmth envelop your body. But that relief can easily be ruined by cold feet—those pesky extremities that always seems to take more time to thaw out.

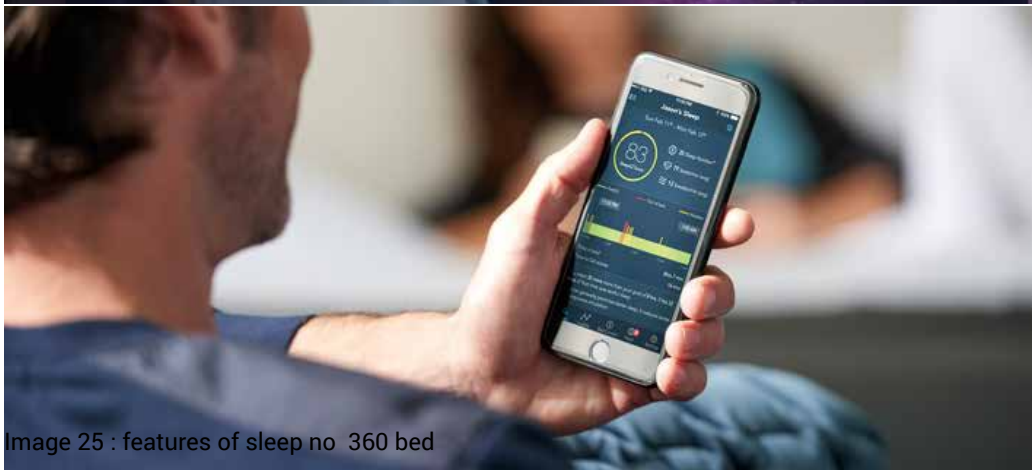
Sleep Number, the folks who have been using tech to create personalized mattresses, has announced a solution at this year's CES. The company's new 360 Smart Bed has feet-warming technology built in.

Take sleep to a whole new level

With a FlexFit adjustable base, one will enjoy the ultimate in individual comfort. From taking the roar out of snore to floating in the weightless feeling of zero gravity.

Designed to help fall asleep

People of us fall asleep faster if feet are gently warmed? The Sleep Number 360 smart bed can pre-warm each side of the bed so both occupants are ready for the best sleep.



Knows how you're sleeping

SleepIQ technology inside the bed tracks how well you sleep each night. In the morning, you'll both learn how the Sleep Number bed is adjusting to your individual comfort and the amazing effects the bed has on your sleep quality. It's called your SleepIQ score.

Image 25 : features of sleep no 360 bed

3.3 The Jupiter by Eight.

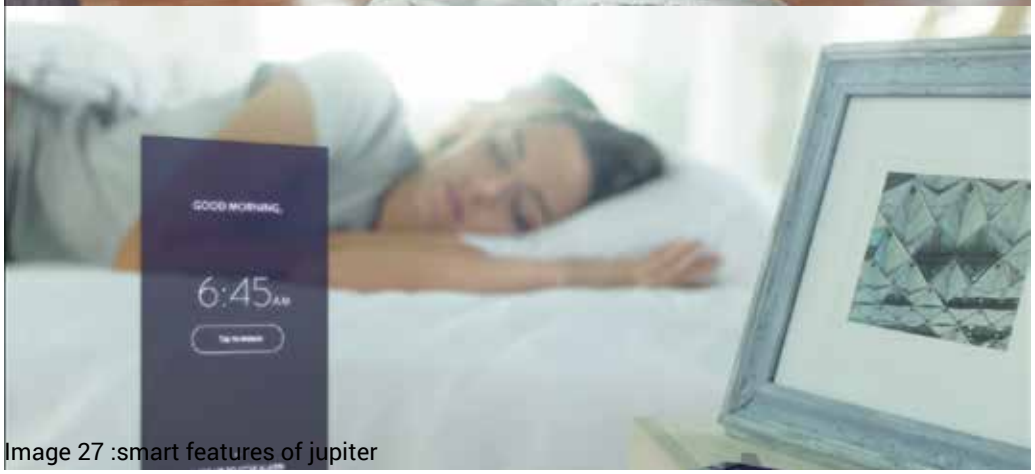
Eight Sleep is highly driven by data and science, and they made it their goal to make the world's most comprehensive sleep measurement and improvement system. They understand the common problems when it comes to getting a good night's rest, and they introduced the world's first smart bed. The sleep tracker goes on the mattress just like a fitted sheet and plugs into a hubspot that connects to your WiFi. We'll go into more detail about how all that works in a minute.

Sleep tracking

Track over 15 factors about your sleep and health, including REM sleep, deep sleep, heart rate and respiratory rate.

Temperature control

Sleep cold? Warm your bed side. Sleep hot? Blast the bedroom AC while warming your partner's side.



Smart alarm

Eight detects when you are in light sleep and triggers the alarm when it's easier for your body to wake up.

Image 27 :smart features of jupiter

Image 27 :effie product and features

3.4 Effie. The smart iron box

Effie can take up to 12 items at once. Simply hang all of your garments up on the exposed rail, and after clicking go, sit back as each item is treated one by one.

Don't have to split your loads, don't separate your colours, just take them straight from the washing machine and let them be dried and ironed.

Iron

effie can iron your clothes by contacting them and pressing the creases out. This emulates the steam ironing process.

Steam

effie can just push steam into your more delicate clothes without touching them, allowing the wrinkles to fall out.

Dry

effie can dry your items more gently than a tumble dryer. By just moving hot air over the clothes, they are not damaged.

Connected application

Keep en eye on effie's progress from anywhere, and be alerted when it's finished. Also order replacement pods and hangers with a click.

3.5 Bedjet

The patented BedJet is the first product to transform your existing bed into a luxurious temperature controlled sleeping environment without changing the feel of your mattress - no foreign mattress pads, no mattress toppers, no wires and no tubes to sleep on. Cool off nearly instantly or give your bedding a toasty hot sauna feeling in only 180 seconds. Using exclusive JetConvect air technology, the BedJet also eliminates body moisture and sweat from the bed to help you sleep more comfortably. BedJet is instant relief for hot sleepers, night sweats, evening hot flashes, cold feet and cold legs, cold winter sheet shock and memory foam mattresses that trap heat. Using the Bluetooth Sleep App for intelligent remote control from your smartphone or tablet, the BedJet reinvents your bed to become one of the most delightful places in your home. Better days start with better nights -- bring a BedJet home today and get back to some deep, restful, healthy sleep.

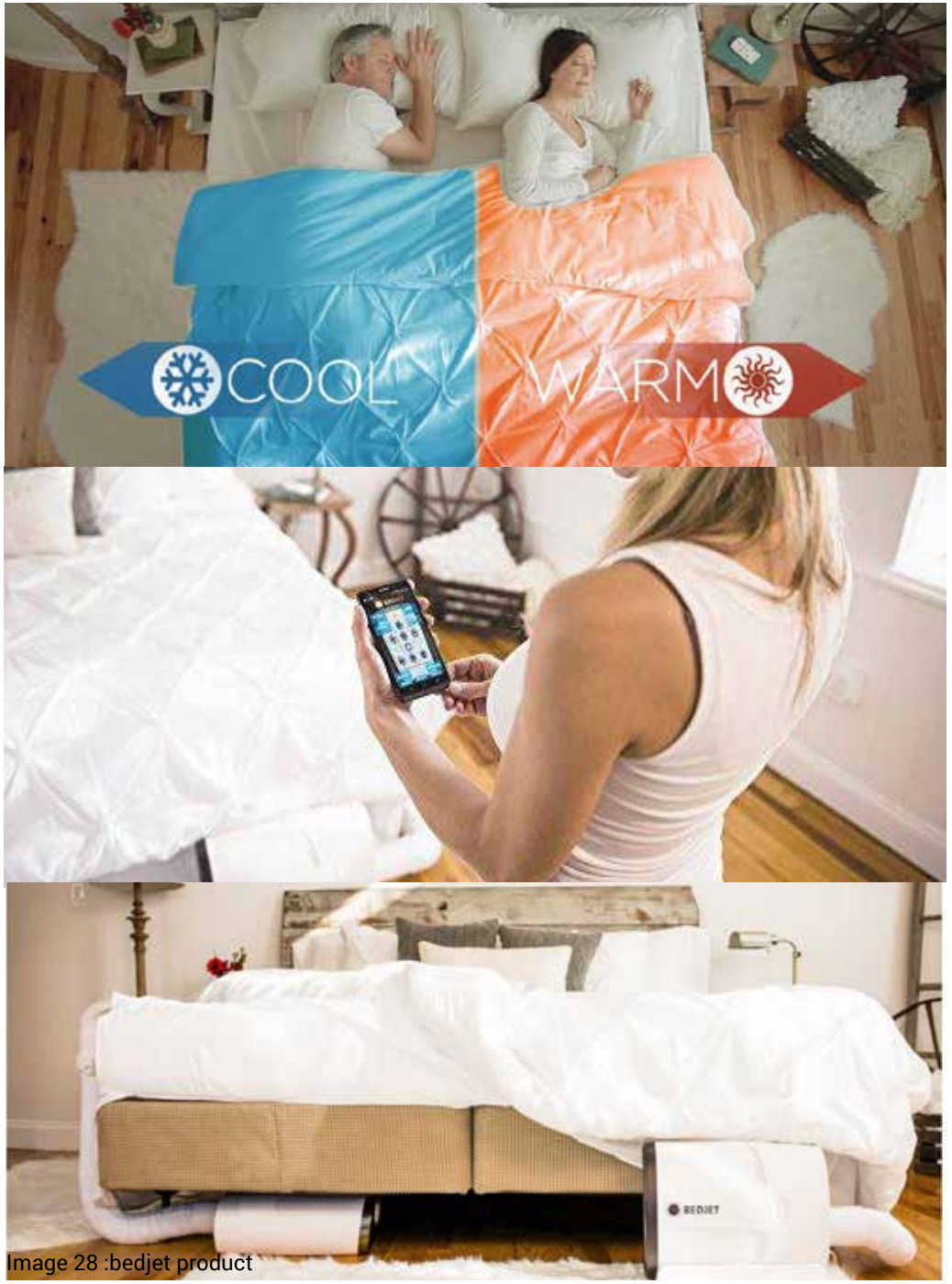
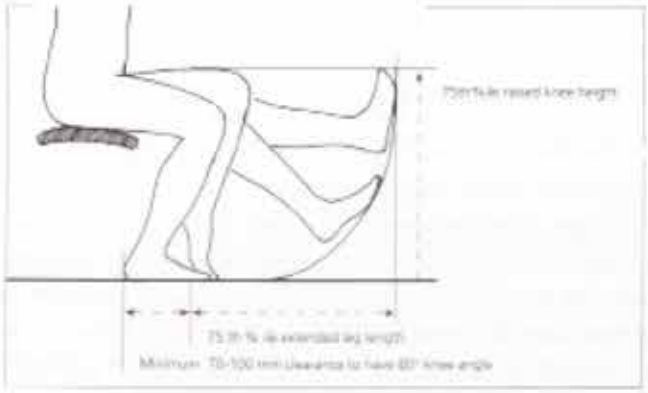


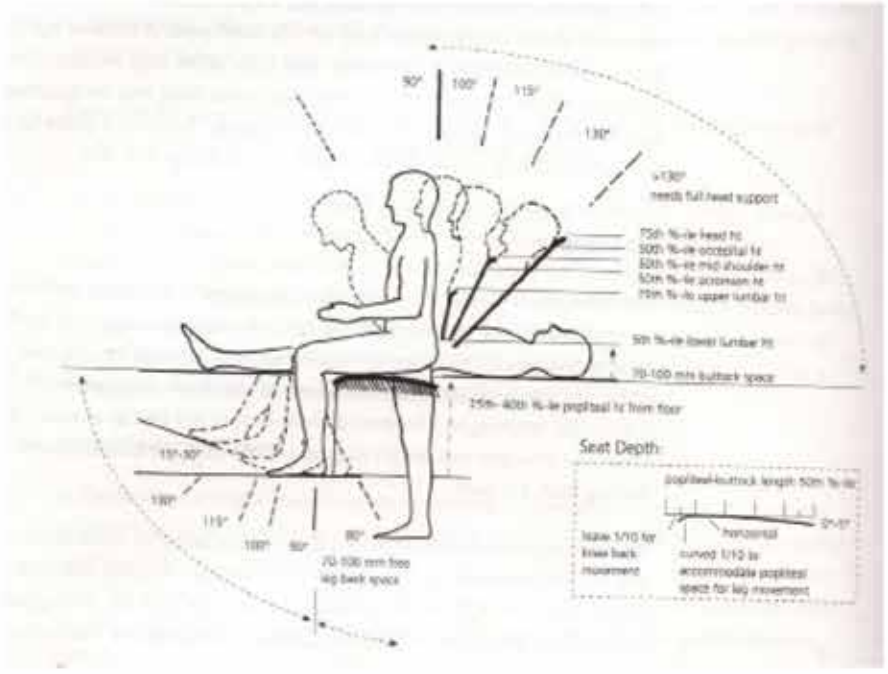
Image 28 :bedjet product

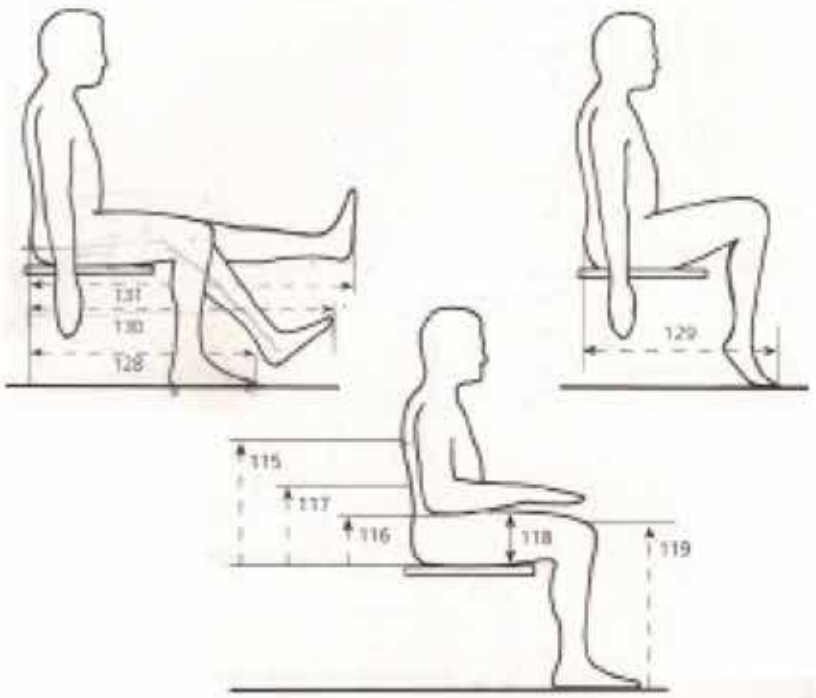
3.6 Anthropometric Dimensions

No.	PARAMETERS	5th percentile female	95th perc–entile male
Sleeping			
2	normal standing	1406	1751
3	stature	1429	1781
23	span akimbo	699	959
24	span	1431	1829
25	maximum body breadth,relaxed	391	619
Sitting			
107	Normal sitting	698	893
108	erect sitting	713	905
109	eye position while sitting	574	805
110	cervical (trunk)	531	670
116	elbow rest	124	270
118	mid thigh	83	158
119	knee	440	567
120	thigh clearence ht. with rasised knee	500	644
121	popliteal	365	471
126	buttock to knee length, normal sitting	459	615
127	buttock to popliteal length, normal sitting	384	512
128	buttock to leg length normal sitting	540	779
130	buttock to extended (raised on floor) leg comfortable length	719	1086
131	buttock to leg, full extended length	910	1209
133	bi-deltoid	319	482
137	hip breadth	259	405
139	mid thigh- to thigh breadth, relaxed	274	449
141	elbow to elbow (relaxed)	352	644
142	knee to knee (close)	143	235
143	knee to knee (relaxed)	225	535
146	abdomen	155	302
201	Erect sitting height	739	899
203	Right knee	169	309
Sitting angles			
	leg space	90degree -130 degree	
	leg back space	90degree- 80 degree	70-100 free
	back rest angle	90degree-130 degree	at 130degree need full head support
			1000mm backword clearance
Leg room			
	minimum 70-100 clearance to have 80 degree knee angle		

All dimensions in mm







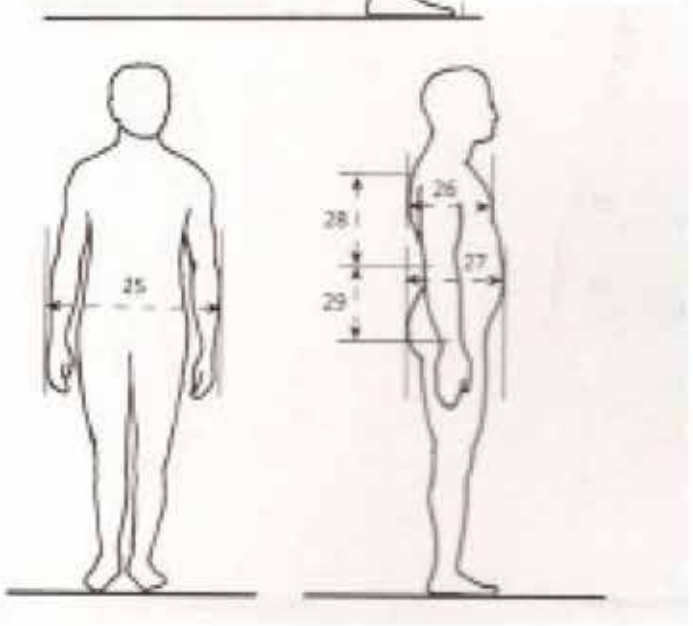


Image 29 :anthropometric dimensions

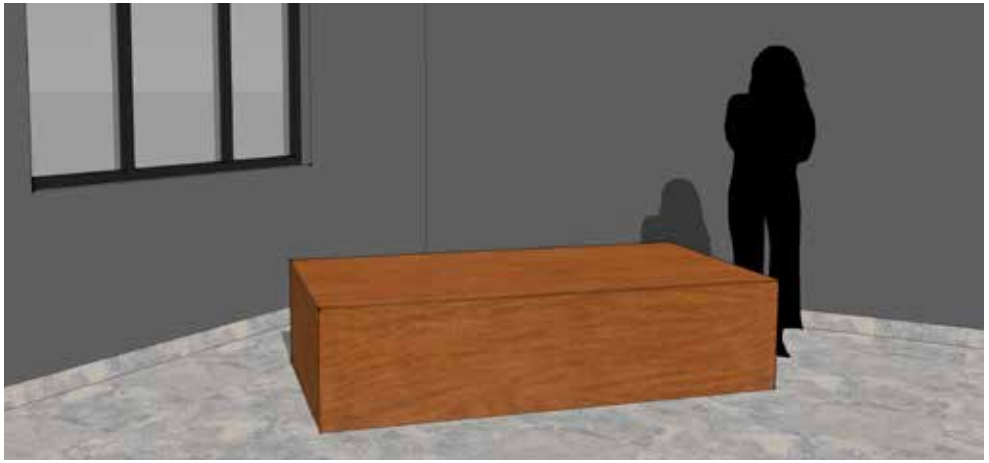
4 Ideation

Variation in the orientation.

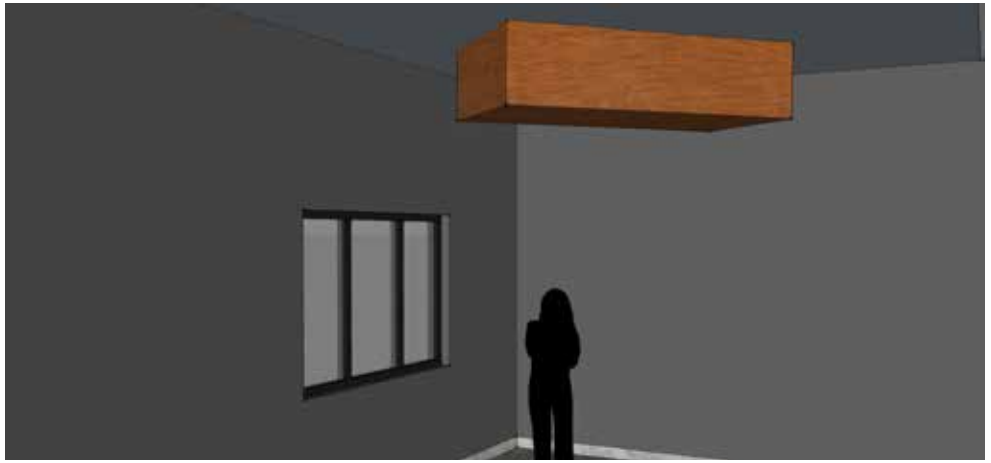
The same box has been kept in different orientation. Based on these orientation further ideation's has been done.

1 Vertically up : in idle situation it occupies very less ground space

2 Horizontally up : can even act as a visual barrier in defining spaces.



3 Flat on ground : in idle situation it occupies most of the ground space

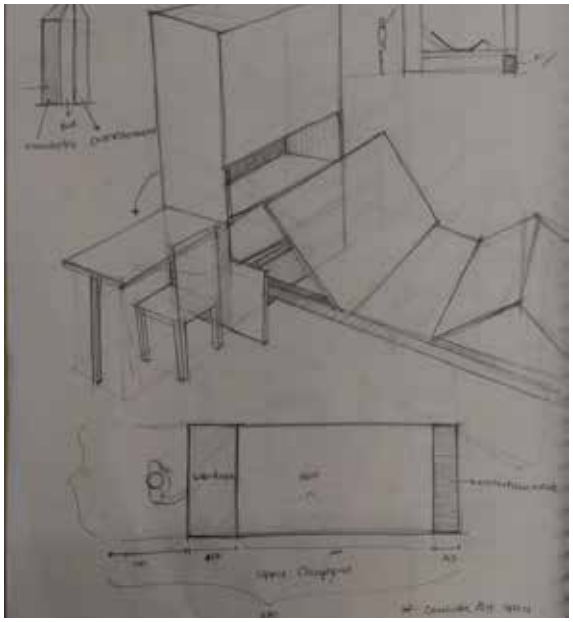


4 On ceiling : in practical cases it becomes difficult to place since transportation is a major concern here.

Image 30 : different possibility of placement

4.1 Option 1

This option has been developed in such a way that it opens up horizontally and the wardrobe space comes at the back. In usability point of view it takes up a lot of space since the wardrobe is placed at the back.



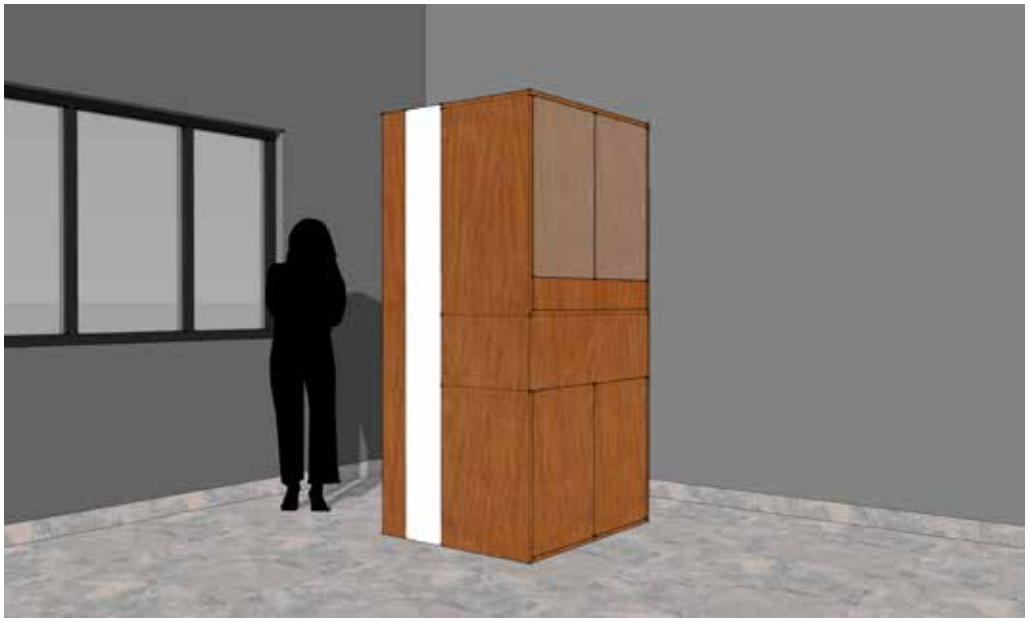


Image 30 : explaining idea 1

4.2 Option 2

This option has been also developed in such a way that it opens up horizontally and the wardrobe space is located at the back but the wardrobe opens up at the side. In usability point of view it takes less space that the previous option.

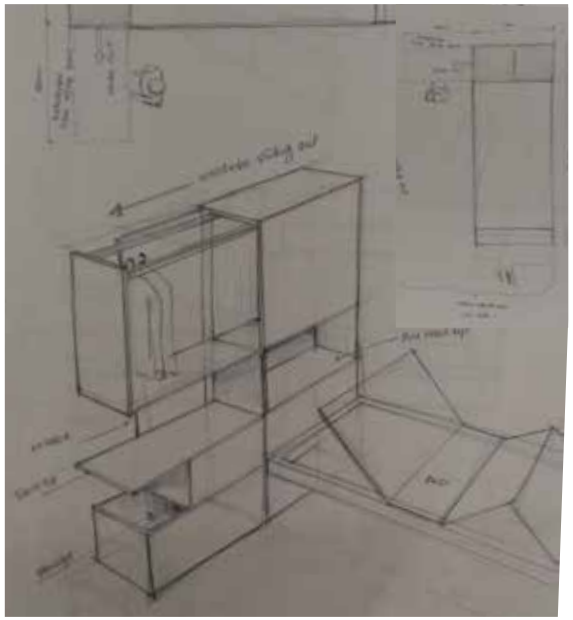
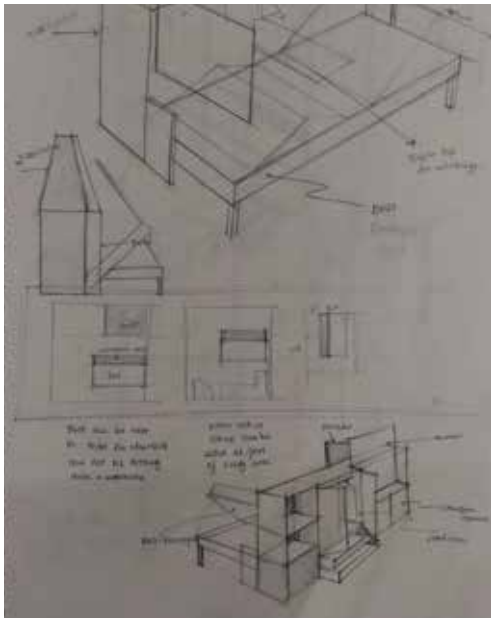
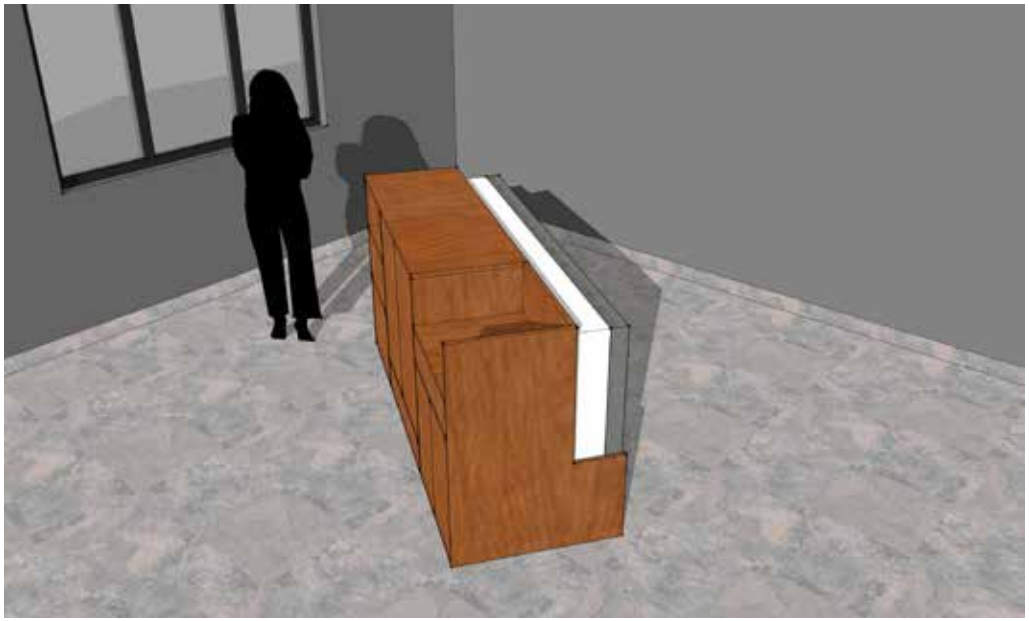


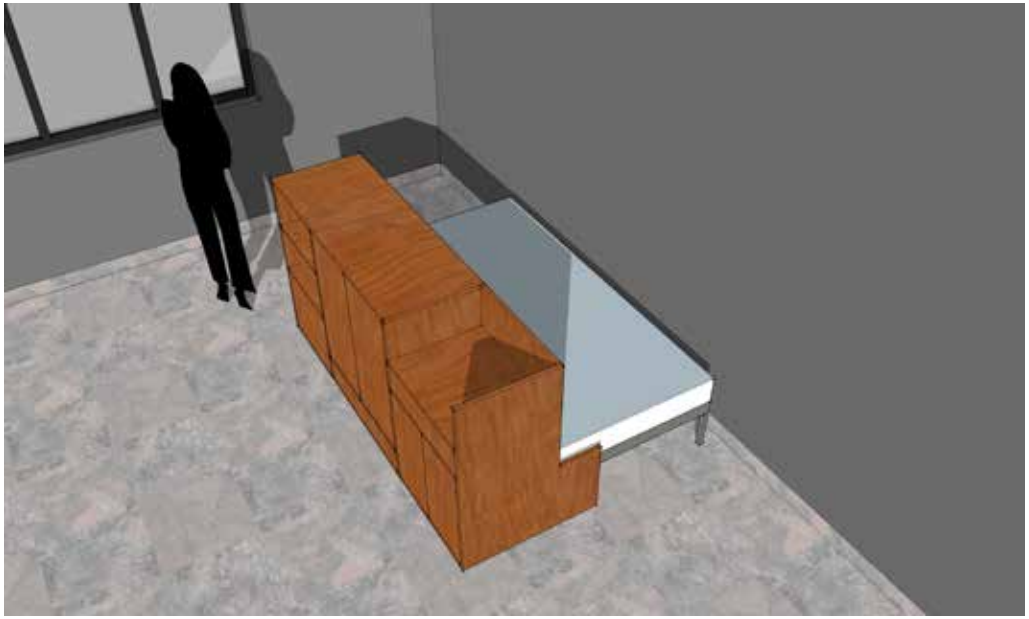
Image 31 : explaining idea 2

4.3 Option 3

The idea is to keep the design horizontally up one side of it becomes the wardrobe space and the other side becomes bed. murphy bed mechanism has been used for the bed here.







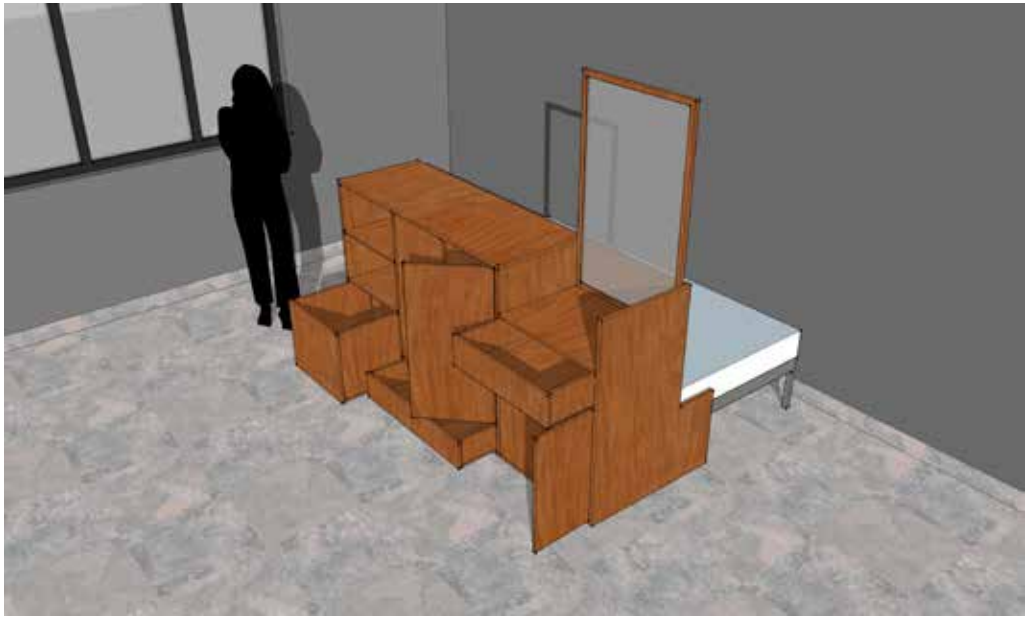
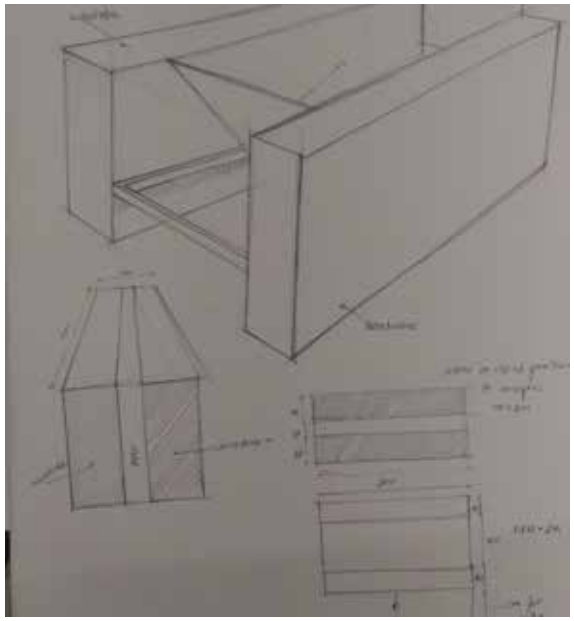
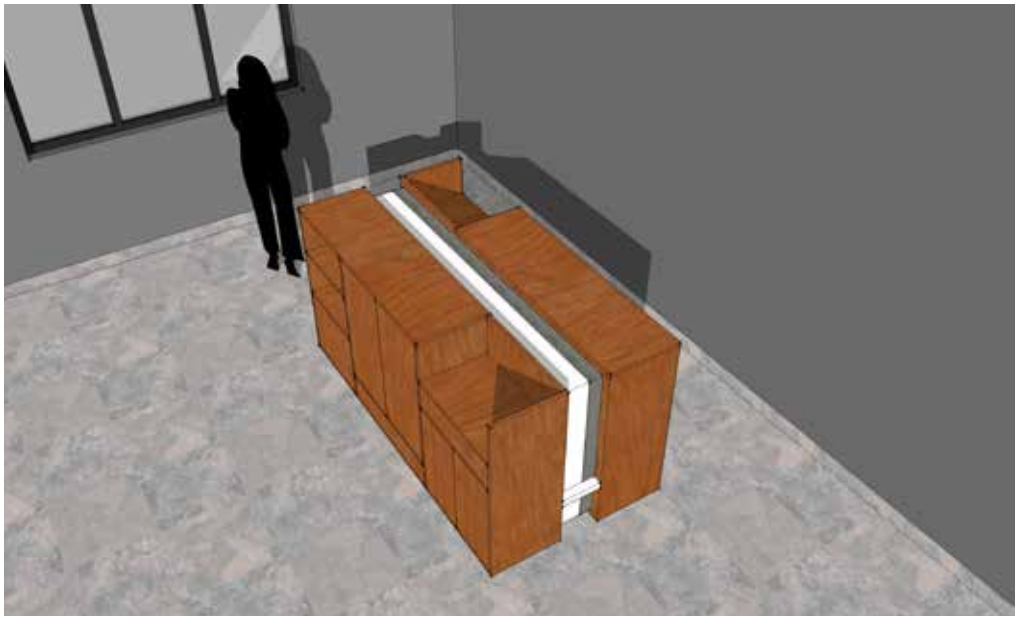


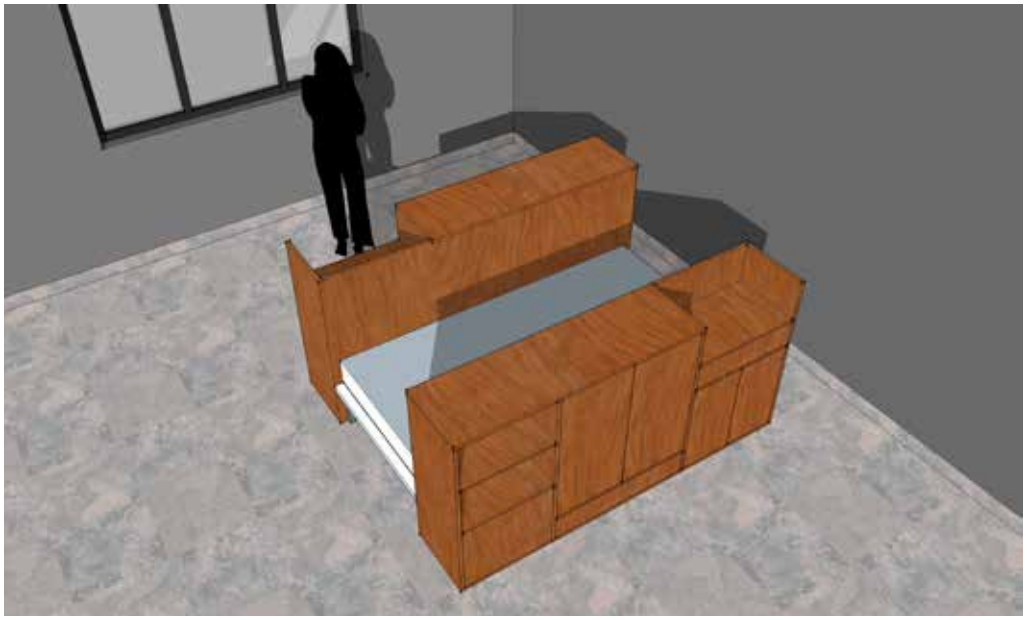
Image 32 : explaining idea 3

4.4 Option 4

In this idea the bed has been sandwiched in between wardrobes. Both the wardrobe slides to the side and the bed slides out. in the option the storage space has been increased but it occupies a lot of space when in use.







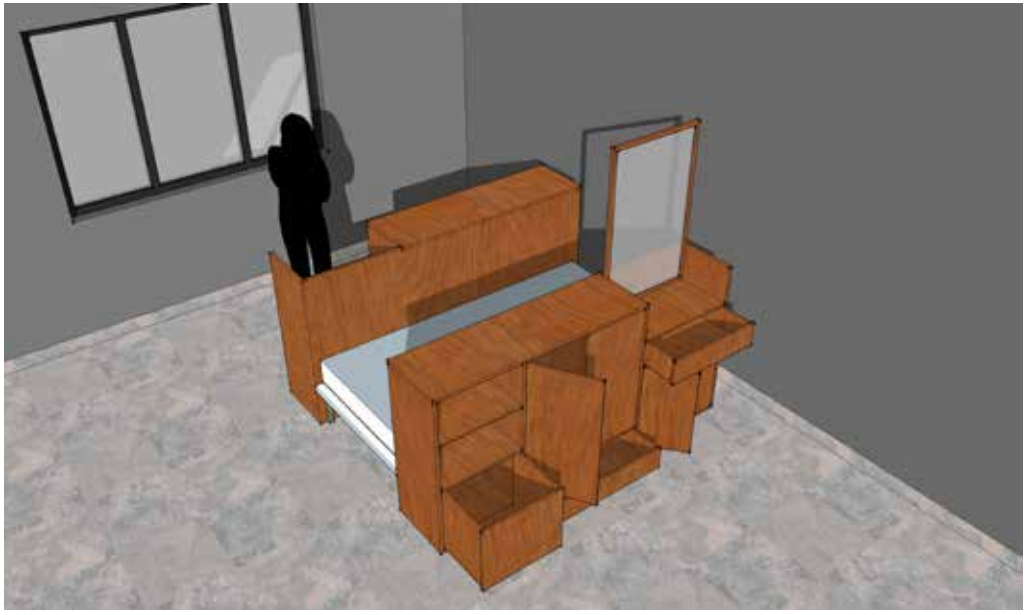
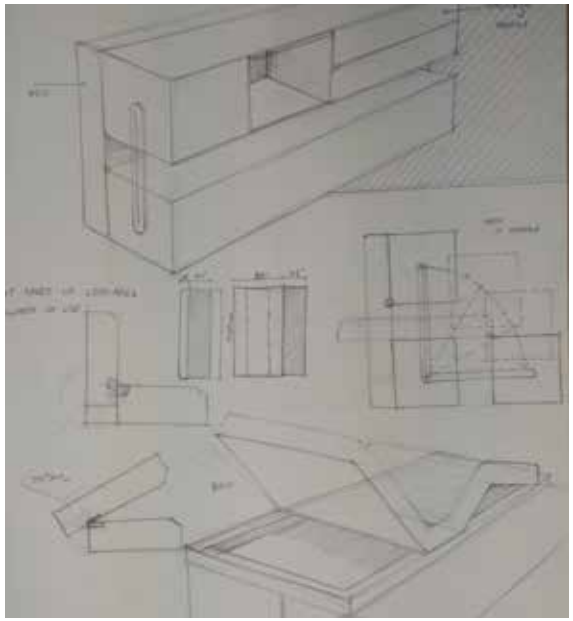
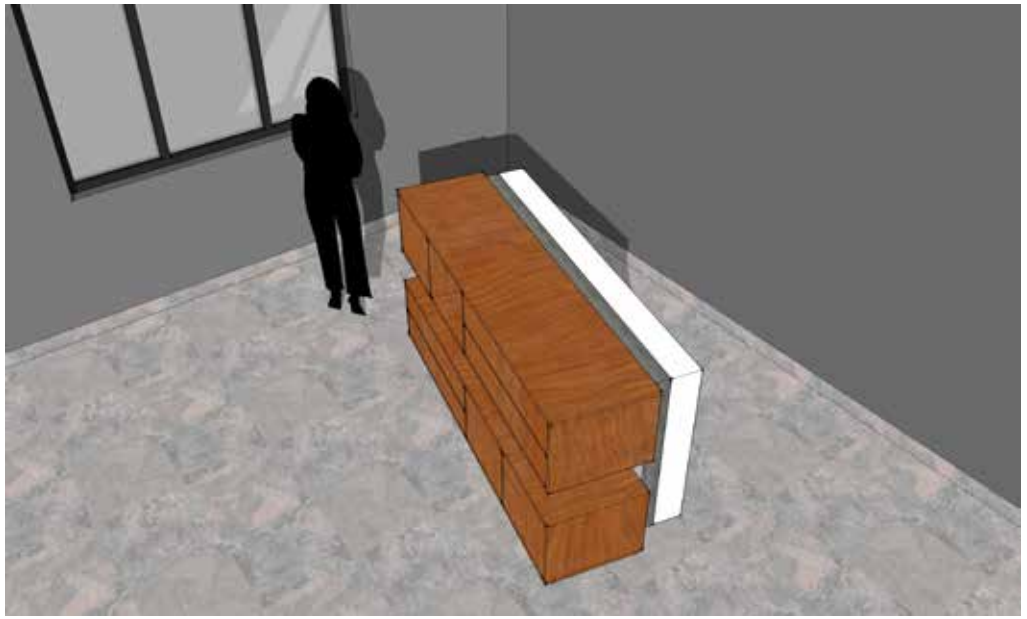


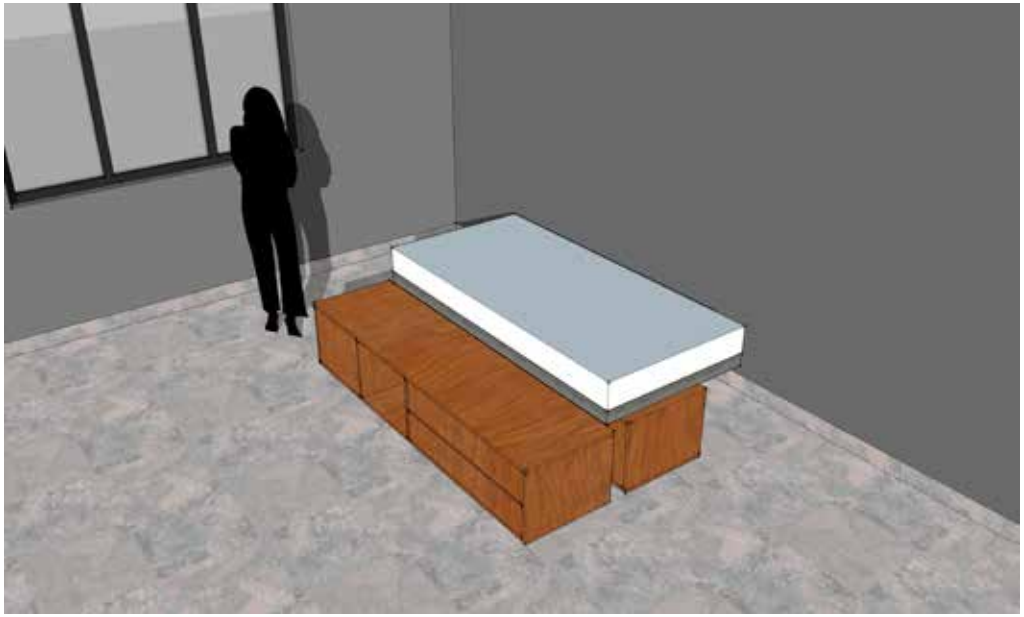
Image 33 : explaining idea 4

4.5 Option 5

The product has been kept in horizontally up direction. The ward-robe space at the top need to be pulled down to turn the furniture into a bed. In this option the sense of enclosure is lost.







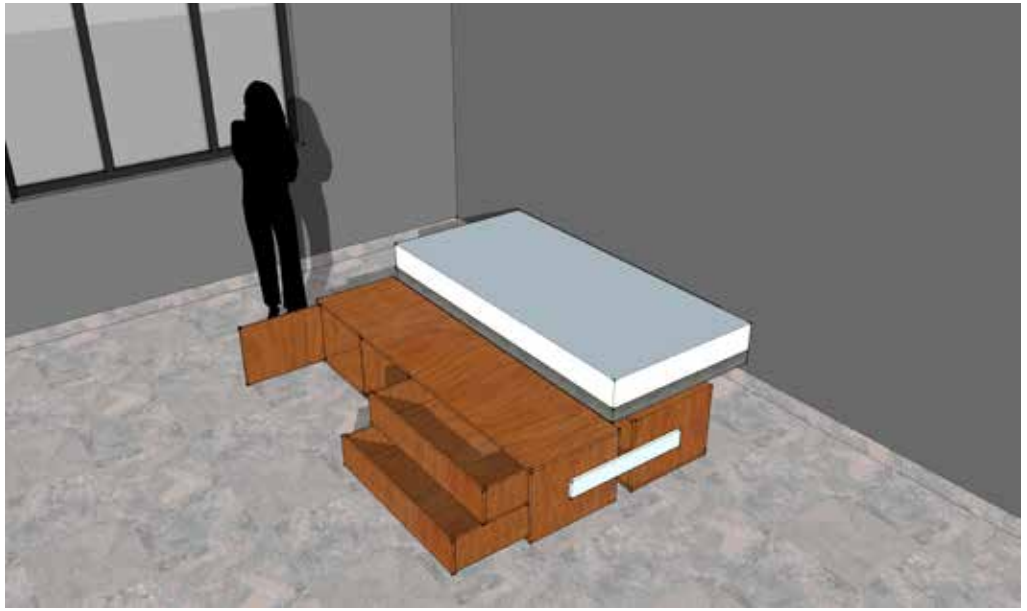
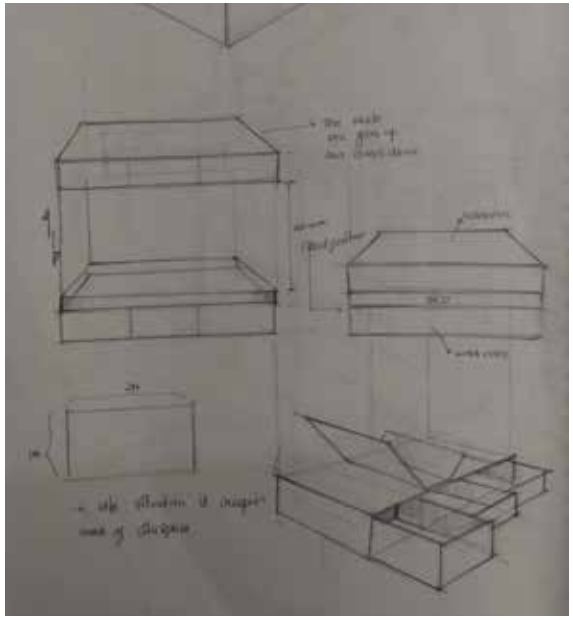


Image 34 : explaining idea 5

4.6 Option 6

This option has been developed keeping the product flat on ground. Here the bed has been sandwiched between wardrobes were one wardrobe moves vertically up. In idle cases the product occupies most of the ground space.



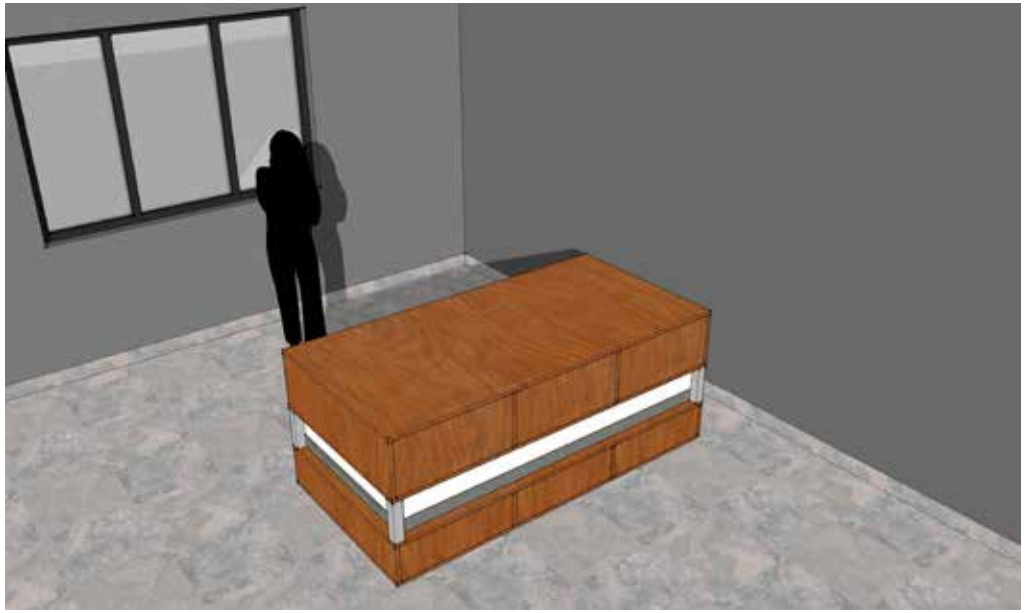
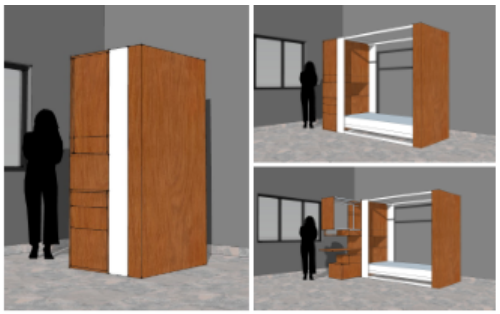
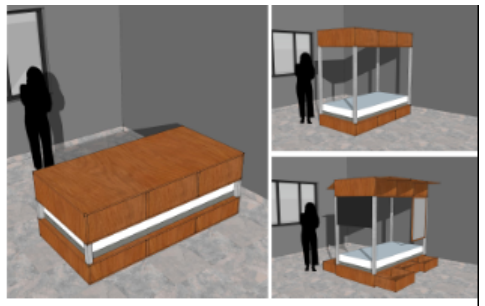


Image 35 : explaining idea 6

Concept evaluation





Criteria	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Area occupying (l x b)	270 x 100 cm	270 x 100 cm	200 x 150 cm	200 x 180 cm	200 x 150 cm	100 x 200 cm
Area occupying when in use	370 x 190 cm	270 x 190 cm	200 x 260 cm	200 x 380 cm	200 x 260 cm	300 x 200 cm
Transportable(w x l x h)	90x100x200cm	90x100x200cm	70x200x100cm	100x200x100cm	70x200x100cm	100x200x100cm
Provision for enclosure	Yes	Yes	No	No	No	Yes
Possibility for a complete entertainment unit.	Yes	Yes	No	No	No	Yes
Total	2	3.5	1	0	1	3

Image 36 : concept evaluation

Option 2 and option 3 had similar points so to break the tie transportability has been taken as a factor and evaluated for the two options. Option 2 was chosen forward for further concepts.

4.8 Volume distribution

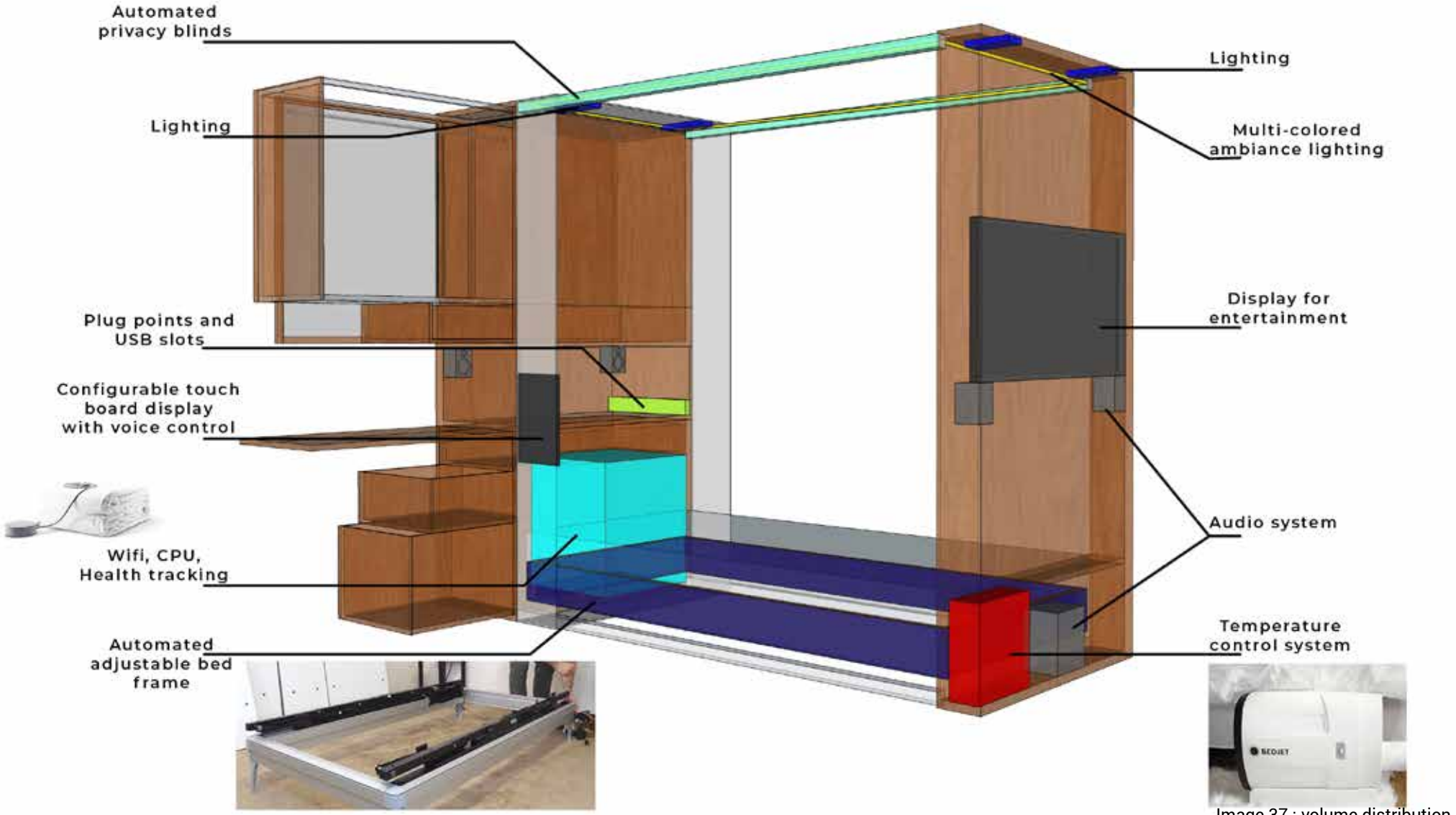


Image 37 : volume distribution

Volume distribution for the smart features that is to be incorporated in the design.

4.9 Basic Reg design

Image 38 : rig design

To get the basic idea of actual scale and proportion of the design a rig has been designed and made using aluminium, alcobond and plywood. Which helped in proceeding with the further designing of the project.

Building of the reg

Image 39 : process of rig building

Building of the reg

4.10 Mood Board

SOFT
CLASSY
FUTURISTIC
ELEGANT
SMOOTH
CONTRAST

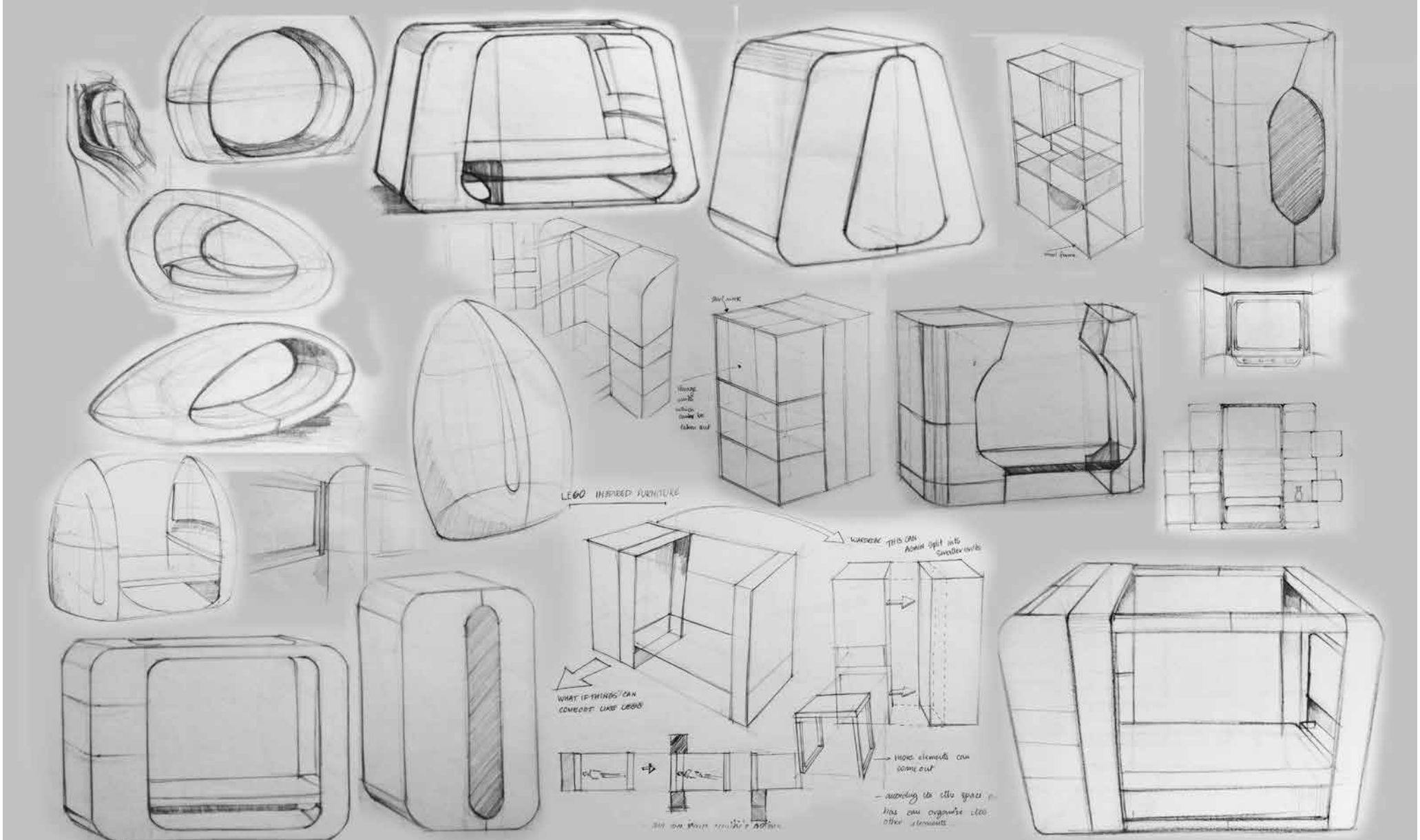
Image 41 : mood board

Mood Board

Image 42 : mood board

Formal Variation

Image 43 : formal variation sketches



Various formal language has been tried. The more organic the form, the design tends to leave negative spaces which counters the concept of space saving. So decision has been made to stick towards more rectilinear form.

5 Concept

5.1 Formal Language

Image 44 : formal language of design

A formal language has been fixed for the further concepts. The images shows when the furniture is closed completely and when it gets opened up. When the furniture needs to be transported it comes to a compact size of one meter in length ninety centimetre in breadth and two meter height. A feel of luxury has been tried to bring in here with the finishes and the material.

5.2 Concept 1

The wardrobe space have been given on the rare side of the bed. Carefully designed in such a way that it uses less space.

Image 45 : concept 1

The wardrobe has been designed in such a way that it is divided into two compartments in all racks. the first compartment can be pulled out directly, sliding that compartment to the side it makes space for the second compartment to come out.

Image 46 : concept 1wardrobe feature

Image 47 : concept 1 feature

Work table slides out from the main wardrobe area. Bed becomes as a recliner while watching TV or using laptop.

Bed can be transformed into a sofa when it comes to occasion for social interaction.

5.3 Concept 2

The concept is designed in such a way that the wardrobe can become two different entities from the main component. In this case, for transportation it acts as a single unit.

Image 48 : concept 2

This idea of wardrobe becoming different entities gives the user more flexibility in arranging their furniture according to the availability of space.

Image 49 : concept 2 usability features

5.4 Concept 3

In this concept the wardrobe space was been connected with a hinge at the corner of the main component, which rotates the wardrobe and brings it towards the two sides of the bed.

Image 50 : concept 3

For the user experience part of it few drawers has been made such a way that they can be moved to a side. The void spaces created there can be used to exhibit or store the household articles.

Image 51 : concept 3 usability features

5.5 Concept Evaluation

Concept evaluation has been done by doing the user review. The final three concepts where shown to the users and explained to them. they where asked to then evaluate he design based on four questions. The user feedback has been presented in the table below.

	Concept 1	Concept 2	Concept 3
Most effective storage solution?	2	3	0
User flexibility	0	5	0
User Experience	0	1	4
Which one do you buy?	0	1	4
Total	2	10	8

In the user feedback concept 2 got most of the points but when it came to buying perspective people switched to concept 4. Concept 4 was giving that experiential part of it being a bedroom.

Then an idea of combining concept 3 and 4 was introduced to them. Which all the users agreed to be a better option from the above concepts.

5.6 Final Concept

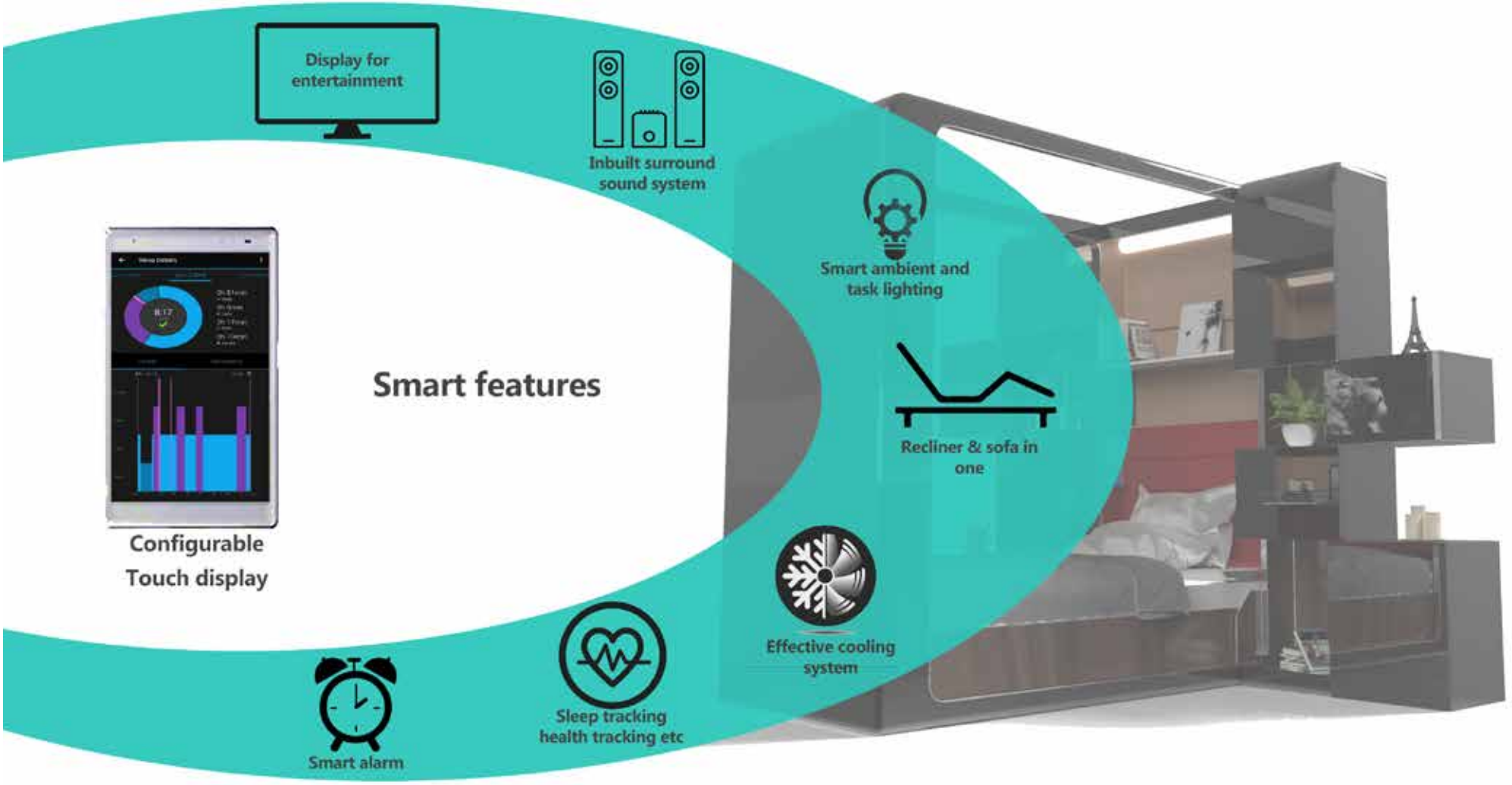
The final concept has been derived as a combination of concept two and three. It comes with detachable wardrobes at the rare end and it has the flexibility were some drawers can be pushed toward the side.

Image 52 : final concept

Image 53 : final concept features

Image 54 : final concept features

5.7 Smart Features

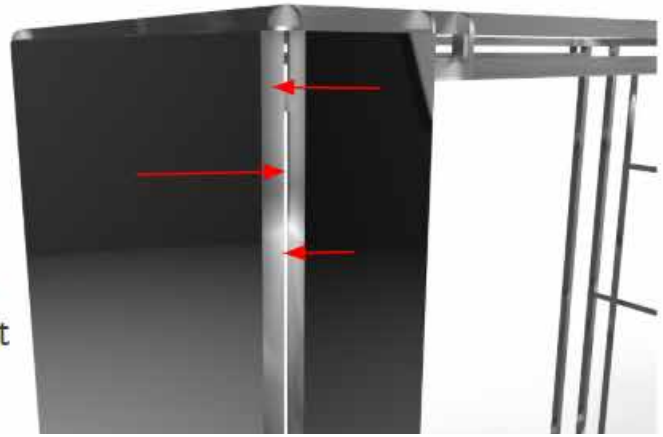



ZERO POD
REIMAGINING THE BEDROOM SPACES

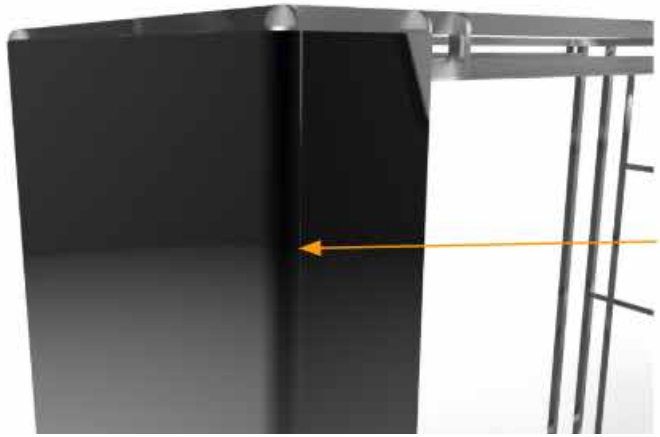
5.8 Details

Aluminium alloy framework

FRP/aluminium sheet with form inside



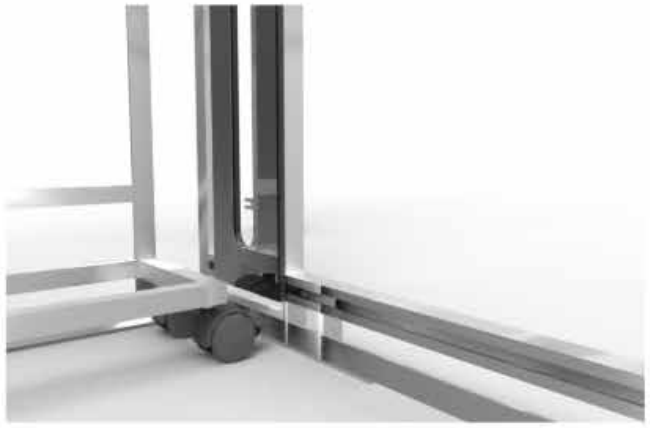
Will be screwed from two sides to the sheet



Snap fit detail

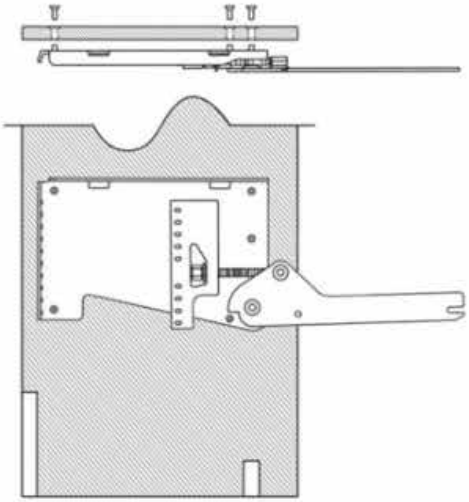
Heavy duty hinge

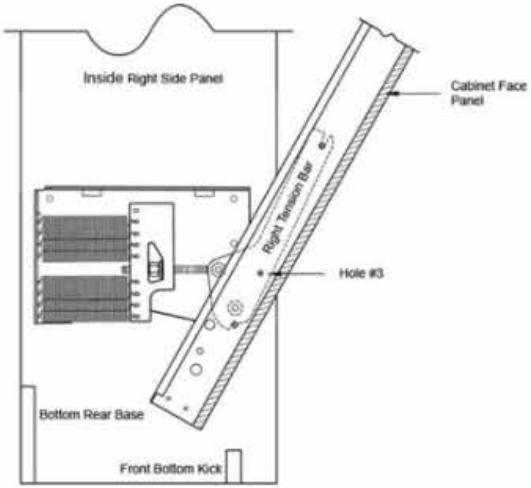
Main folding mechanism

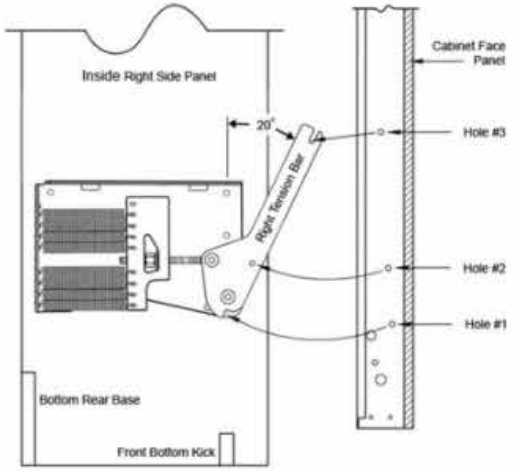


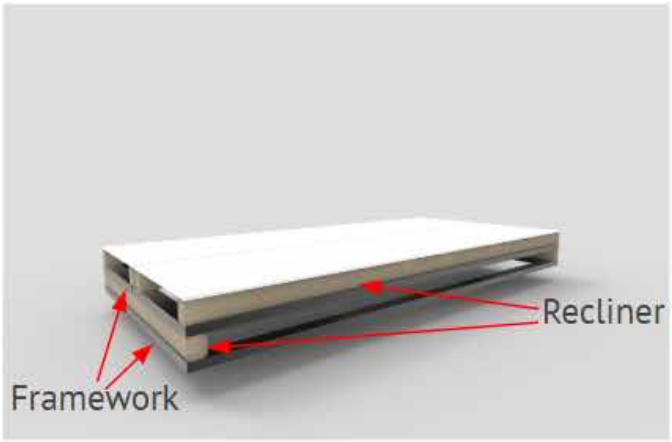
Floating table track

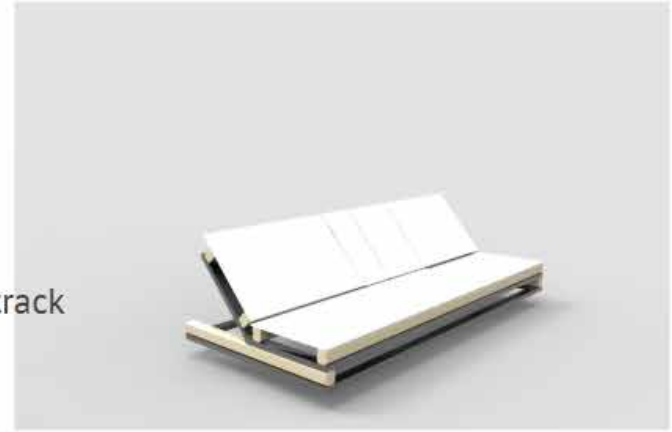
Murphy bed detail





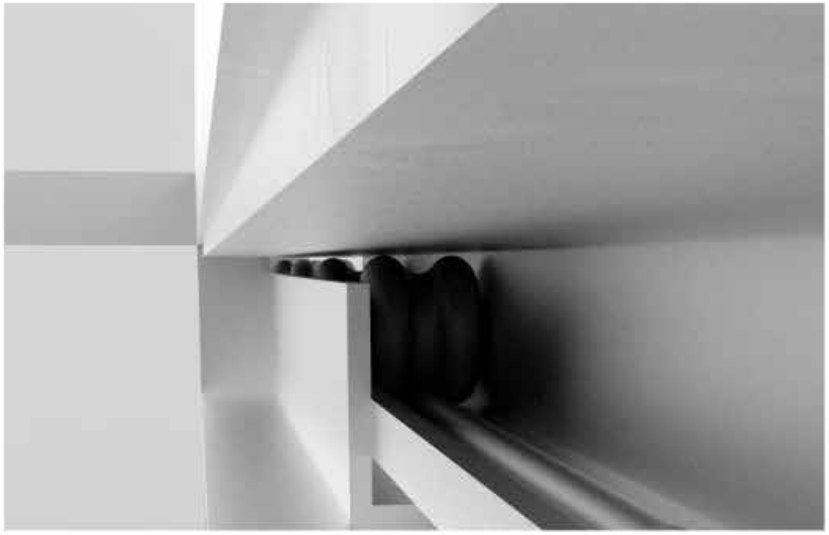






Recliner bed details

Detachable wardrobe detail



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