

Design project 2

# Designing interior for a long distance private taxi

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Guided by :  
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# Declaration

I declare that this written report represents my own idea in my own words, and where others, ideas or words have been included, I have mentioned the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or source in my submission. I understood that any violation of the above will be cause for disciplinary action by the institute and can also penal action from the source from which proper permission has not been taken, or improperly cited.

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Signature	

# Approval Sheet

This Mobility & Vehicle Design project report entitled “Designing interiors for a long distance private taxi”, by Anshuman Dixit is approved in partial fulfilment of the requirement for Master of Design degree in Mobility and Vehicle Design.

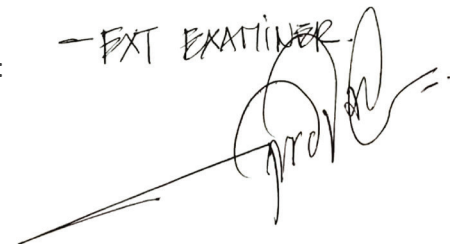
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Internal Examiner :



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Date : : 20 / 12 / 2018

# Acknowledgement

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I am grateful to Prof. Sugandh Malhotra for provision of expertise, and technical support in implementation. I am thankful to Prof. Nishant Sharma for his valuable feedback and reviews.

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# INTRODUCTION

## Scope of Project

Cars today provides decent comfort and convenience to passengers for them to go places , but when its about travelling long distances which could lasts for more than six to seven hours of continuous sitting in the vehicle, even the expensive cars are not good enough .

Passengers faces many issues , problems like compact space to sit for long hours, lack of legroom, restriction of one particular sitting position, insufficient space to efficiently work or relax in comfortable position, lack of luggage space, quality and maintenance of cabs are common.

This project aims to address the issues with various kinds of interior design problems occurring because of the conventional design of a personal car which later get transformed into a taxi.

# Preliminary Research

# Initial Probing

The estimated market size is \$9 billion and only 6-7% is organised. Taxi market witnessed a phenomenal growth in last 3-4 years, currently growing at 15-20% per year. These statistics clear the fact that this market is growing in a significant manner and needs modification with time.

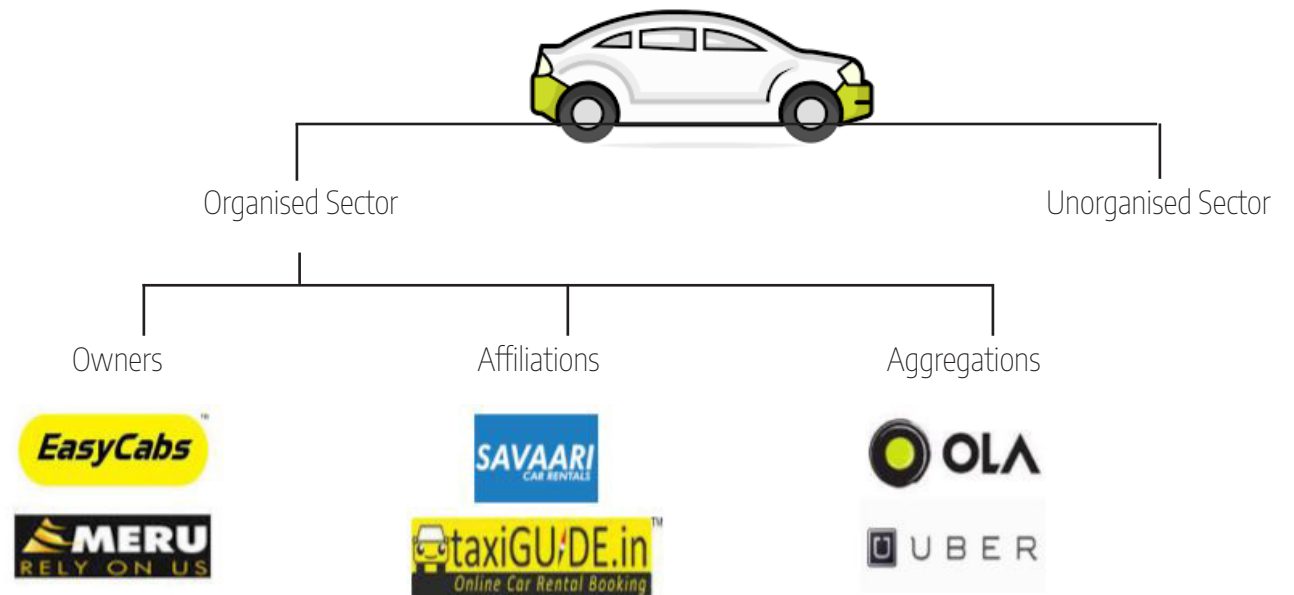


Figure 1 : Flow chart

Source: Industry Interviews, RedSeer



# BRAINSTORMING

## Long distance travel

Brainstorming was done with 2 people to understand the viewpoint of others on topics related to taxi , long distance travelling and what could be the possible problems one can face during a long distance travel in a cab (MPV)

Watching news

Board Games

Movie watching

Play video games

Work

Debates

Sleeping

Eating

Listening songs

Watching scenery passing by

Talk to drivers

Online shopping

Click pictures

# Pilot study

A preliminary research was conducted over the weekend to find the prerequisite questions and facts required to conduct the user study in more significant manner

Conversation with passengers

A brief talk to people to know a few things about their experience in cab gave some interesting insights which further set a platform to prepare and ask justified questions to gain interesting content to move further with the project.

Uncomfortable for  
longer durations

Untidy cab

Boot space taken  
by gas tank

Lack of privacy

No charging points

Lesser space to  
Work or relax



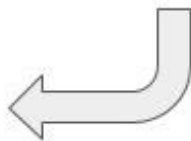
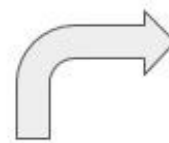
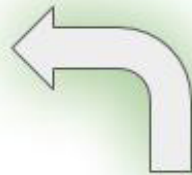
# RESEARCH

Research was done to find out the real life problems passengers and drivers face within the journey , what measures they take to resolve it ? How people customize personal car to make it a cab ?

To achieve this , different types of methodologies were used like brain storming , mind mapping, interviews and market trend analysis.

# Experiential Study

Pune , Goa and Nashik are the locations where majority of people go via taxi , to understand better the real problems occurring within the long distance journey a couple of visits were made to Pune



Mumbai study

Majorly long distance cabs goes which goes out of the city are towards three locations namely pune, Nashik and goa

Two trips to pune were done to experience the ride in local taxi in real time

# Observational study



Figure 2 : legroom

Lack of boot space for both front and back seats



Figure 3 : Drivers miscellaneous stuff

No space for driver personal belongings



Figure 4 : Dashboard



Figure 5 : Mobile GPS

Customizations are been done for efficient trip

# Questionnaire for Passengers

Few question were asked to the passengers to better understand the issues and scope of improvements in current cab system

1. Which mode of transport do you prefer for outstation trips ?
2. How frequently do you travel ?
3. Do you ride a taxi alone often or in a group ?
4. Share your experiences about the time spent in cab ?
5. What kind of car do you generally prefer ?
6. What would you like to change in the current taxi experience ?
7. What are the issues you faced in the journey ?
8. Do you carry any luggage during the ride ? If yes how much ?
9. What kind of luggages you carry when you take a taxi ?
10. Which car as a taxi you prefers the most ? Why ?
11. How do you find the interior space in the taxi ?

# Passengers Responses

## Passenger 1

Name : Pankaj

Age: 22

Insights

There is no facilities to charge or use laptop.

when riding at night , I usually sleeps the entire journey.

I prefer eating before the journey because of jerks and lack of space.

## Passenger 2

Name : Arun

Age: 26

Insights

I personally do not like to ask the driver to change music and AC temperatures again.

I prefer cars with LED screens for rear seat passengers to watch movies.

## Passenger

Name : Vikas

Age: 31

Insights

Car is comfortable for short distances, if seated more than 2-3 hours it is not comfortable, feeling of tiredness and lack of space happens

# Questionnaire for drivers

Few questions were asked to Drivers to better understand the ongoing issues they face daily

1. Since how long are you in the taxi business ?
2. Do you own taxi or hired it on rent ?
3. How much is the sitting time in a day approximately?
4. What are the materials needed for the trip ?
5. What is the biggest challenge you face in this job ?
6. What is your take on online cab services ?
7. Is there any specific problem or consistent complaint regarding interiors ?
8. Which car you like to become a taxi from Indian market ?
9. What are the problems often occurs because of long driving experience(ankle pain,headaches,sleepiness,etc.)?
10. Is there any recommendation you propose ?

# Drivers Responses

## Case 1

Name : Harnaam Bhagel

Age: 38

Experience: 6-7 years

Insights

Lack of space to keep personal luggage

Car display doesn't work many times so we mount mobile on dashboard.

## Case 2

Name : Shankar Lal

Age: 43

Experience: 10 years

Insights

Looking for directions in mobile GPS makes disturbance and lose concentration

The Ertiga feels way nicer & more premium than the Enjoy or the Tavera

## Case 3

Name : Arjun

Age: 28

Experience: 3 years

Insights

We get heavily tired in long distance journeys.

Body and head aches are common in all drivers.

Mobile got completely disconnected within the journey

# Insights

Sitting in the cab for more than 2-4 hours makes people uncomfortable

Keep sitting in the cab for longer duration causes people to get bored

Sometimes people tends to talk to the drivers to break the monotony within the ride to keep them and driver engaged and not sleepy and to create a comfortablehomely feeling.

In long distance cabs once passenger put the bags in boot space, there is no more space to keep other personal luggages

Driver prefers to keep the mobile mounted in the front on windshield so as to get better view on map along with the road rather than instrument panel

People prefers taxi rides for long distance when they are in a group

Cramped up interior space and not enough space for luggage

Lot of users prefer ertiga and innova as long distance taxi

Based on the insights few words were derived which could explain the experience people are looking

Convenience  
Comfort  
Pleasurable ride



# Trend Study

A study was done to find out the current trends and the vehicles that are been purposely designed for taxi and how people manage to convert a normal car into a cab.

To basically understand the previous approach people used to address the issues personal car causes when used as a cab

# NISSAN NV 200

The Nissan NV200 is supposed to become the city's sole taxi cab design for the next ten years. It is an electric hybrid. It is a MUV with ample seating space for four passengers. Also it has a luggage space which addresses the needs of the commuters of New York.



Figure 6 : Nissan NV 200



Figure 7 : Interior render Nissan NV 200



Figure 8 : Interiors Nissan NV



# VW MILANO

VW Milano Taxi  
The Volkswagen model VW Milano is  
a prototype of an electric taxi



Figure 9 : VW milano taxi



Figure 10 : VW milano Interior



Figure 11 : VW Milano Interior



# LTI TX4 London Taxi

The hackney cabs are an identity of London taxi. It has a spacious interiors and is disabled friendly. The taxis are based on Austin FX4 platform and it is the only cab designed completely to be used as a taxi.



Figure 12 : LTI TX4



Figure 13 : LTI TX4 interior



Figure 14 : LTI TX4 interior

# Toyota JPN taxi

The passenger door on the driver's seat side is a hinged door that can easily distinguish the opened and closed state from the front and rear, and prevent the passenger from jumping forward. Body style is 5 door station wagon .





# Indian Market

To analyse the scope of the project in Indian context a brief study was done about the Indian market including the different segments and brands of cars are used for outstation visits and also what makes them preferred over other cars

In absence of good quality public transport system , taxi plays an important role as an option. According to road transport yearbook, 2.3 million registered taxis are running across different states of India, there are around 5-6 lakhs cabs offering taxi services in organised sector.

Majorly used cars in India as taxi

S. no.	Hatchback	Sedan	SUV	Premium SUV
1	Indica	Etios	Ertiga	Innova
2	Swift	Dezire	Xylo	
3	Liva	Xcent	Enjoy	
4	Micra	Sunny		
5	Ritz			



Figure 15 : Taxi in India

Source : Road transport year book (www.data.gov.in)

# Driver necessities and trend

To better understand the basic necessities and how current vehicles cater to it trend study was done.

The basic elements of dashboard panel are identified. Its shown here a typical instrument panel with basic functional elements.

Its observed that few elements are been actively used for interaction (highlighted in red)

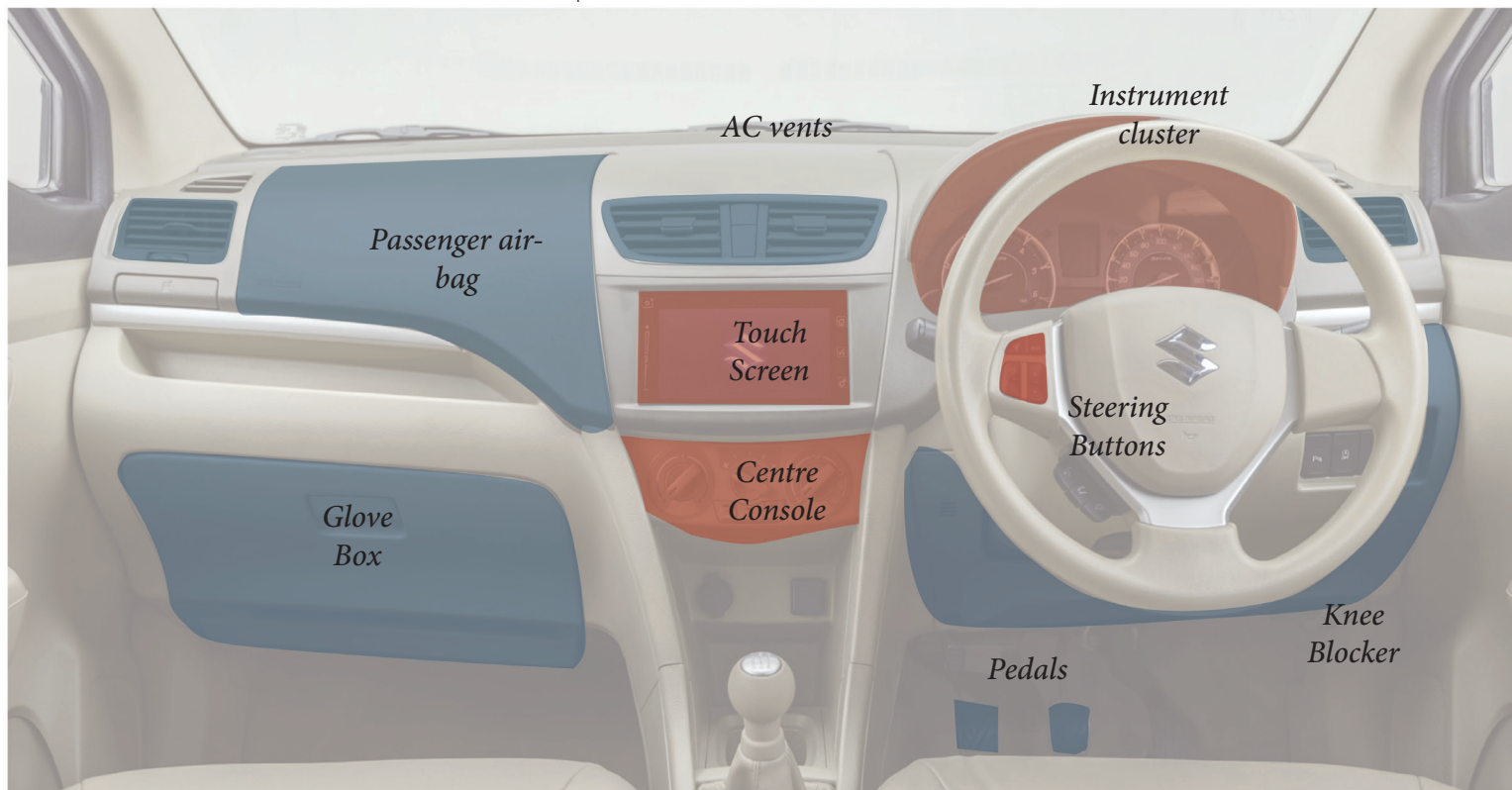


Figure 16 : Car dashboard components

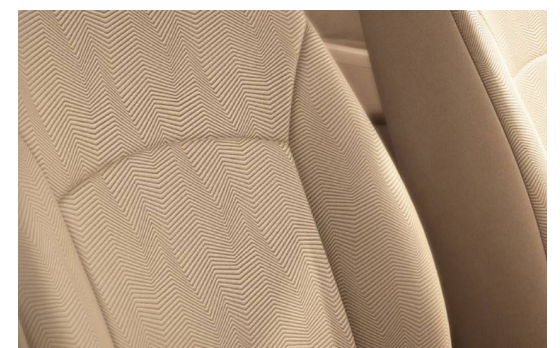
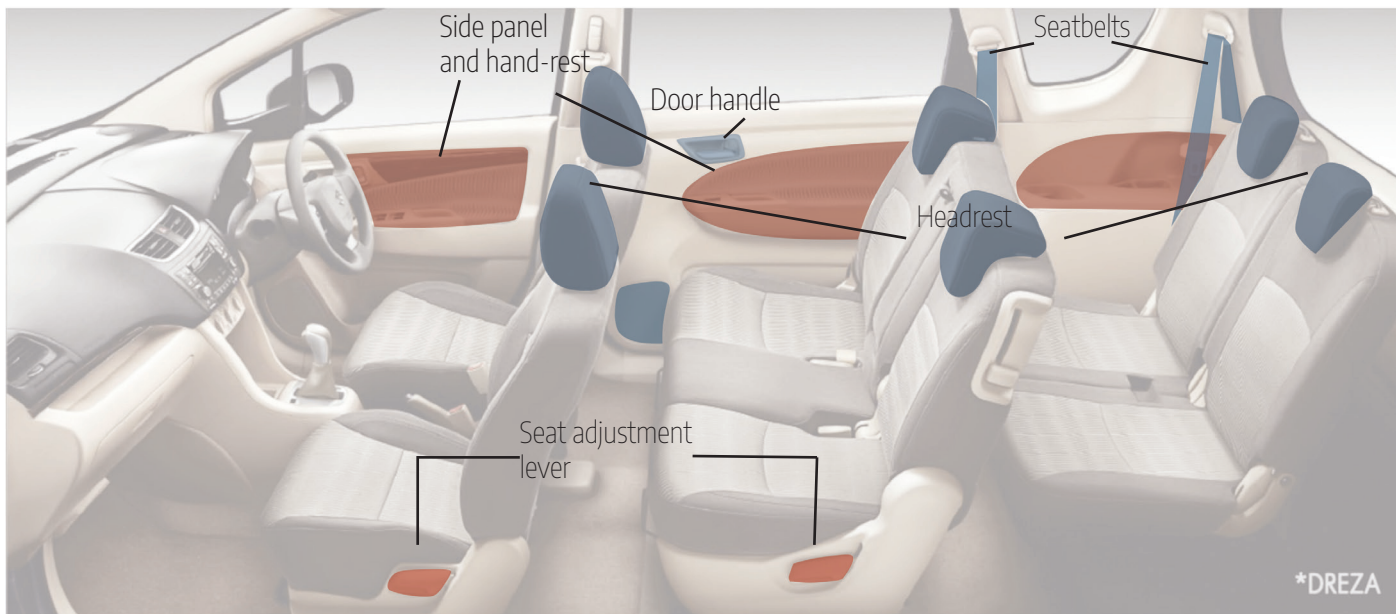


Figure 17 : Car Interior components



## Freezing Dimensions

Based on the research done and the insights it was found that the most preferred car as a long distance cab is Toyota Innova and Maruti Suzuki Ertiga.

Here when these two were compared, based on the interviews it was seen that people prefer ertiga over innova because of economic reasons.



Figure 18 : Maruti Suzuki Ertiga

# Design Brief

This project aims to address an economic and efficient interior design based on chassis dimensions of a mini MPV segment car (like Ertiga) of dimensions 4,296 mm L x 1,695 mm W x 1,685 mm H for a cab often used for long distance rides which should possess following requirements.

1. To design and adequate space for luggage and to keep personal stuff.
2. Better package for passengers to do basic movements and activities in the car.
3. Effective space distribution for the convenience of both passengers and drivers.
4. To design a cosy interior space for the passengers to experience efficient way to travel.

# Specifications and Considerations

Existing cabs are basically personal vehicles and serves its priority as driver centric interior design. Whereas when these vehicles are been used as outstation cabs scenario changes.

This part essentially focuses on the specifications and the considerations that has been followed before ideation.

# Vehicle Packaging

MUV dimensions are chosen taking Maruti Suzuki Ertiga as an reference  
The basic H point dimensions are used

Seat height : 425 mm (approx)  
H Point to ground : 775 mm (approx)  
Back angle : 20 deg

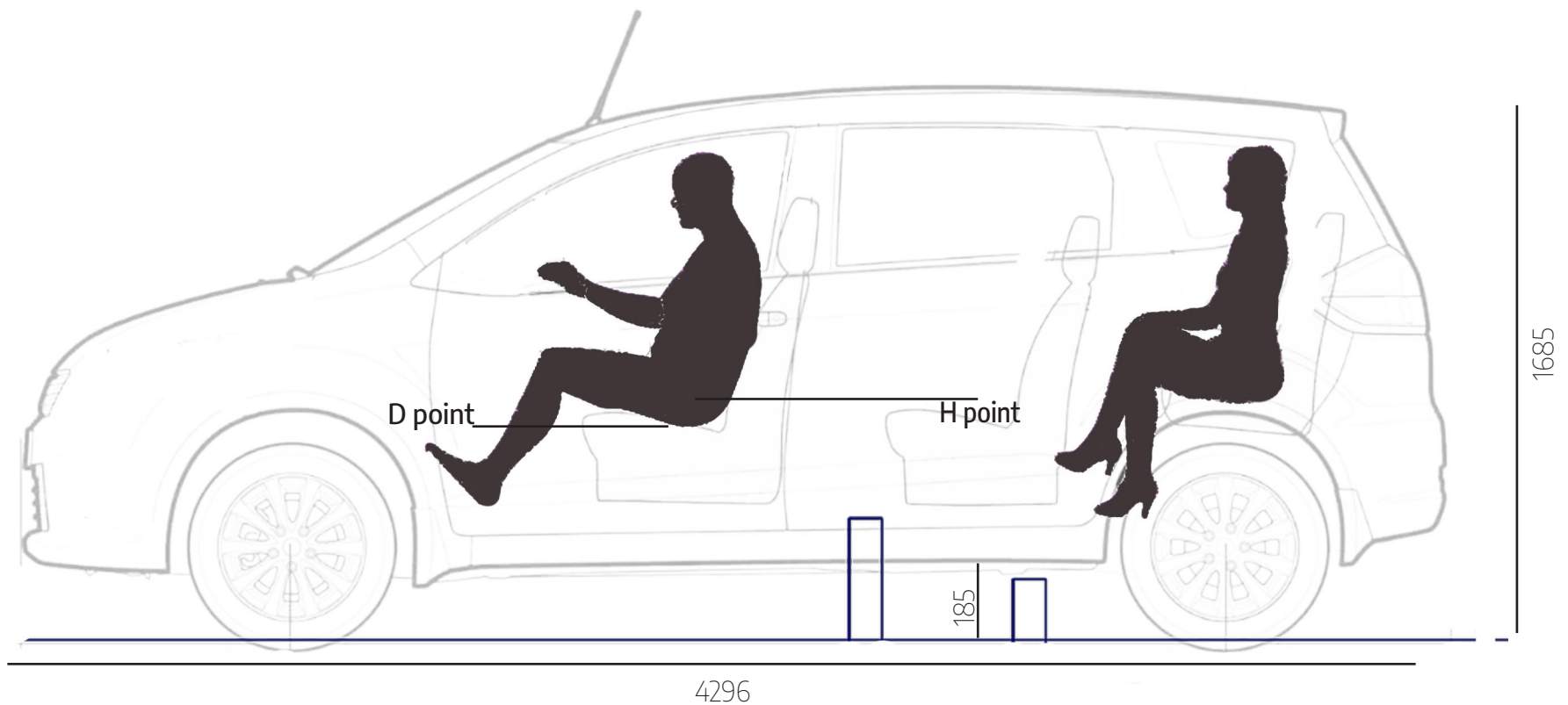


Figure 19 : Vehicle Packaging

Ref : Indian anthropometric data by  
Debkumar Chakrabarti

# Indian Anthropometric Data Sitting dimensions

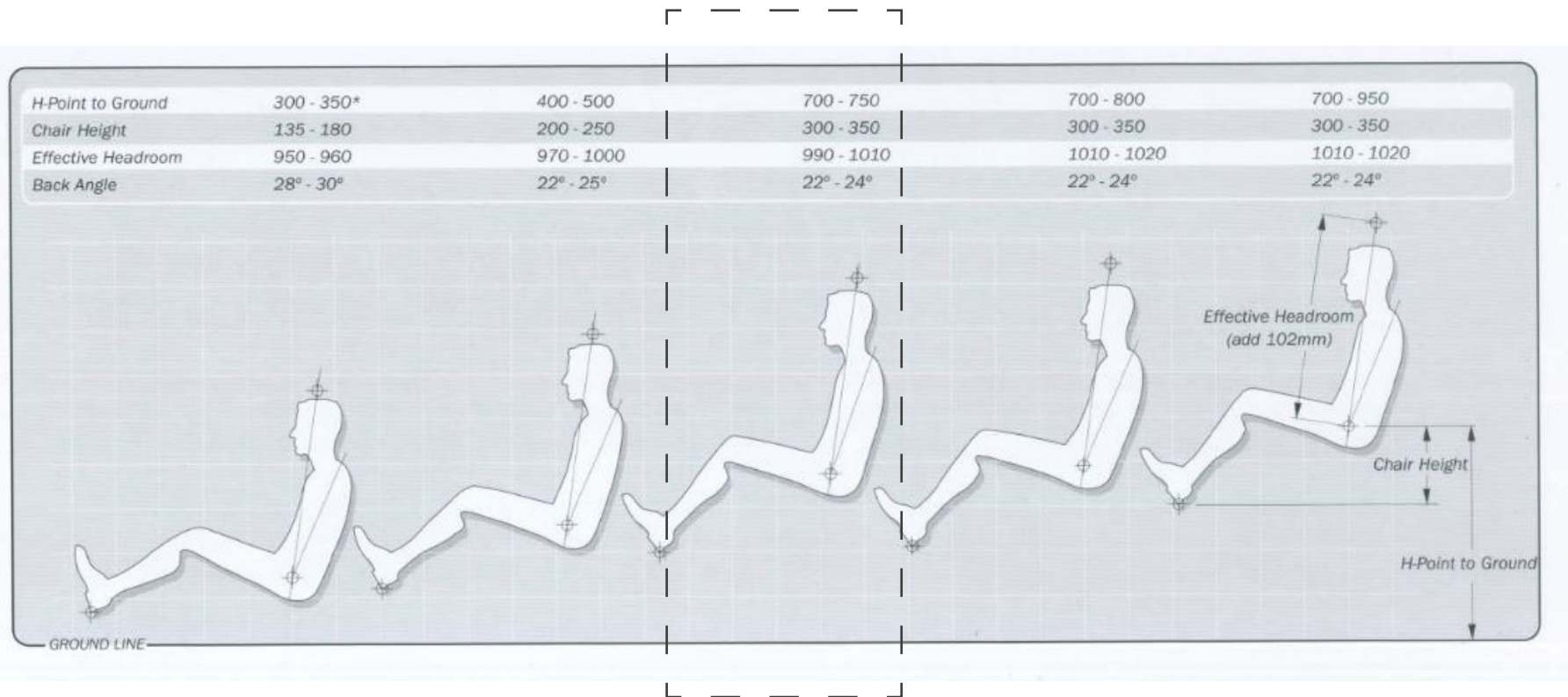


S.no	Measurements (mm)	5th	50th	95th	SD	MIN.	MAX.
1	sitting height	738	824	901	51	679	983
2	Cervical trunk	531	605	667	46	489	887
3	Mid shoulder	499	566	630	42	408	691
4	Shoulder breadth	349	417	479	41	276	672
5	Hip breadth	269	326	406	45	209	550
6	Buttock to popliteal	394	451	509	35	340	595
7	Popliteal	374	419	466	33	305	540
8	Elbow height	150	210	268	36	102	335

Figure 20 : Indian male and female silhouette

# Posture

The chart shows various recommended heights and posture according to the vehicle segment.  
For minivans  
Sitting posture is set up high to provide a sense of security and good visibility. The tall chair height also helps to create an efficient package and provides excellent ingress and egress.





# BODYSTORMING



Figure 21 : Bodystorming and seating configurations front



Figure 22 : Body-storming and seating configurations side



Figure 23 : Bodystorming and seating configurations side (2)



Figure 24 : Body-storming and seating configurations side



Figure 25 : Body storming and seating configurations Front



# Influencing Factors

Here is the few factors that essentially influences the experience of an individual in the cab.  
To understand the better meaning of the words “comfort and convenience” with respect to cab ,the experience has been further broke down into physical and mental. Comfort.






















	Sitting posture		Hand rest positions		Visual comfort
	Vibrations and jerks		Headrest positions		Ambient light
	Driving modes		Seat ventilation		Infotainment system
	Seats fabric		Lack of space		sunroof
	Seat positions		Lack of legroom		Rear seat entertainment
	ventilation and climate control		Cramps and sprains		Music
	Manual seat control		Head room		Ambience

Figure 26 : Body-storming and seating configurations side

# Luggage

Considering the fact that passengers need to carry luggage trolley with them for the long trip and also need to keep a personal handbag. Standard medium size luggage was taken into consideration for the packaging



Figure 27 : luggage



Cabin

36L

550\*360\*200



Medium

62L

660\*430\*260



Large

95L

770\*500\*300

Figure 28 :Different Luggage Types

Ref. : Air India

# Luggage

The images showcase the different types of luggages people generally use within the journey time to time.

People tend to carry these thing separate from the big trolley .

Hence it was important to give a separate space for the people to keep these thing and use them with ease

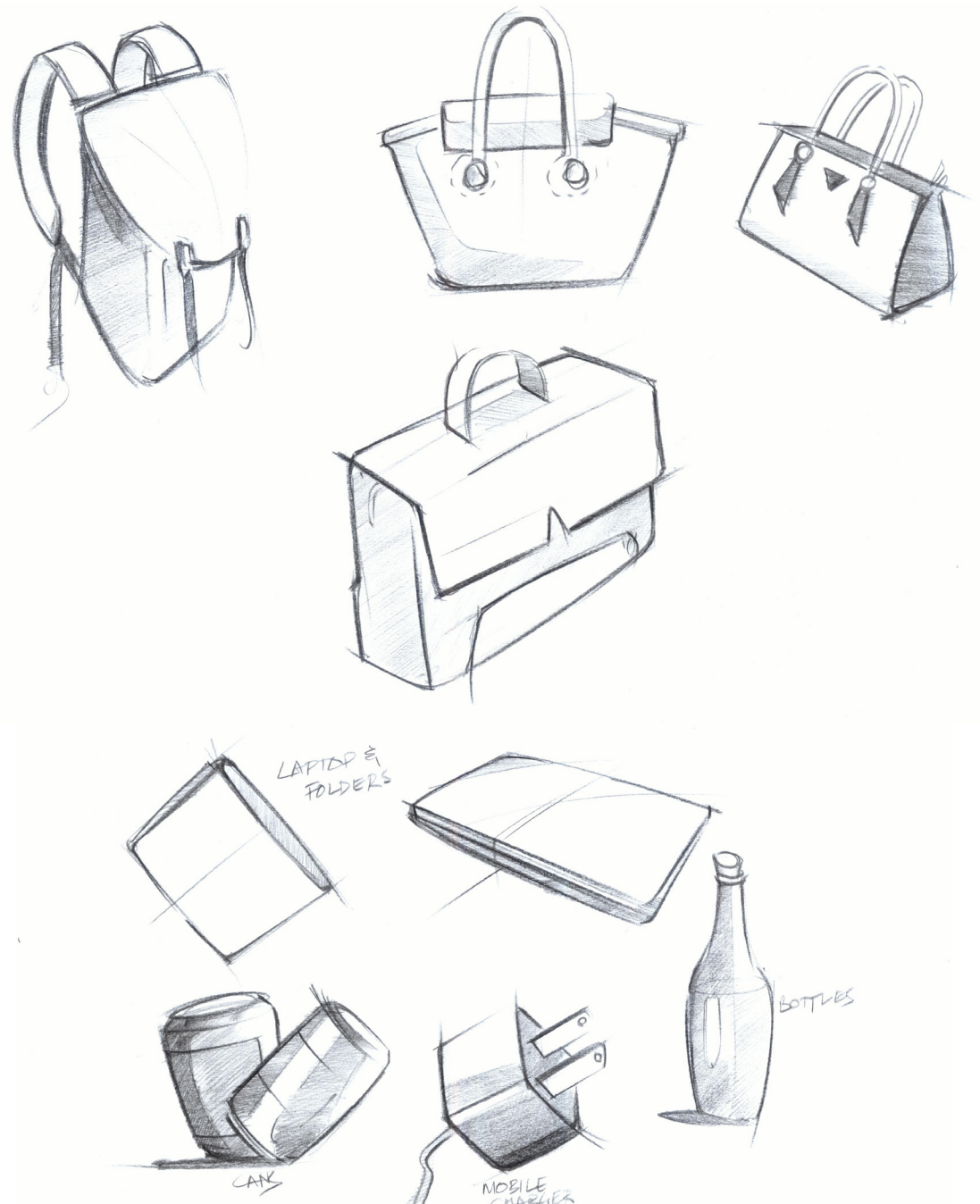


Figure 29 : Sketches representing different types of miscellaneous luggages

Types of luggages

# Ideation and Concept Generation

This part focus on the design development and creation of different concepts based on the research done keeping in mind the considerations.

In this stage user profile were created and based on the words came out from insights and user study an image board was created for inspiration.

Ideation and concept sketches were done based on that.

# User profiles and scenarios

Three different scenarios were created where families needs to go on a trip and book a cab to visit places which essentially takes long time to reach.

Now as the different families have different priorities and are looking for different aspects of convenience in the vehicle, hence it is very important for the vehicle to be able to cater to the requirements and give optimum satisfaction to all these families in most efficient manner.



3-4 Hours

## Sanjay, Priya and Arpit (Family Trip)

**Age :** Sanjay is 32 and Priya is 30 years old and 2 year old baby Arpit.

**Place :** Both lives in Chennai

**Occupation:** Sanjay is a automobile dealer and Priya is a tuition teacher.

**Trip:** They finally got time to plan a vacation after their first baby, they find travelling with a baby in car is convenient than in bus or train.

**Location :** Pondicherry

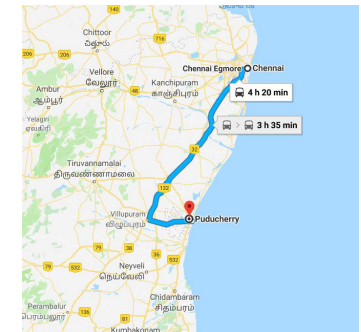
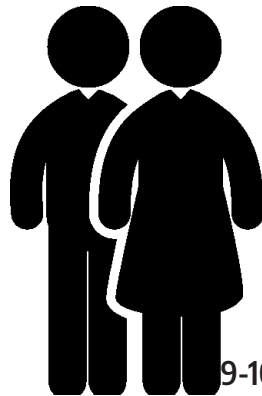


Figure 33 : Map Chennai to Pondicherry



9-10 Hours

## Rajeev and Shalini (Honeymoon trip)

**Age :** Rajeev is 28 and shalini is 29 years old

**Place :** Both lives in New delhi

**Occupation:** Rajeev works as incident manager and shalini as HR in different locations

**Trip:** They wants to go out on a short vacation where they can spend good time with each other and can get a escape out of their rigorous jobs

**Location:** Shimla

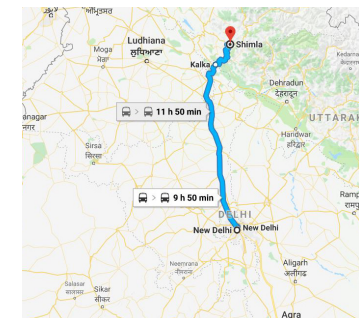


Figure 34 : New Delhi to Shimla



3-4 Hours

## Preeti , Sukhbir , Raghav (Business Trip)

**Age :** Preeti(29) and sukhbir(30) and Raghav(45)

**Place :** They all live and Work in Mumbai

**Occupation:** All three works in IT company , Raghav is boss, Preeti and sukhbir works under him.

**Trip:** All of them needs to attend a very important business meet in nashik, Raghav needs to work on his laptop to prepare speech and discuss with other two within the journey to save time.

**Location:** Nasik

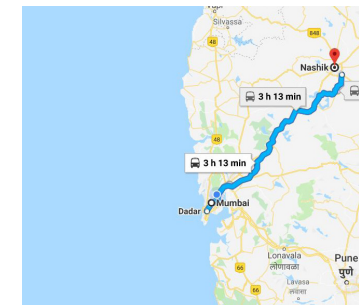


Figure 35 : Mumbai to Nashik

CONVENIENCE  
COMFORT  
PLEASURE

Based on the study three words were chosen as inspiration for further explorations and design of the interiors of the cab. Based on these words Image board was created.



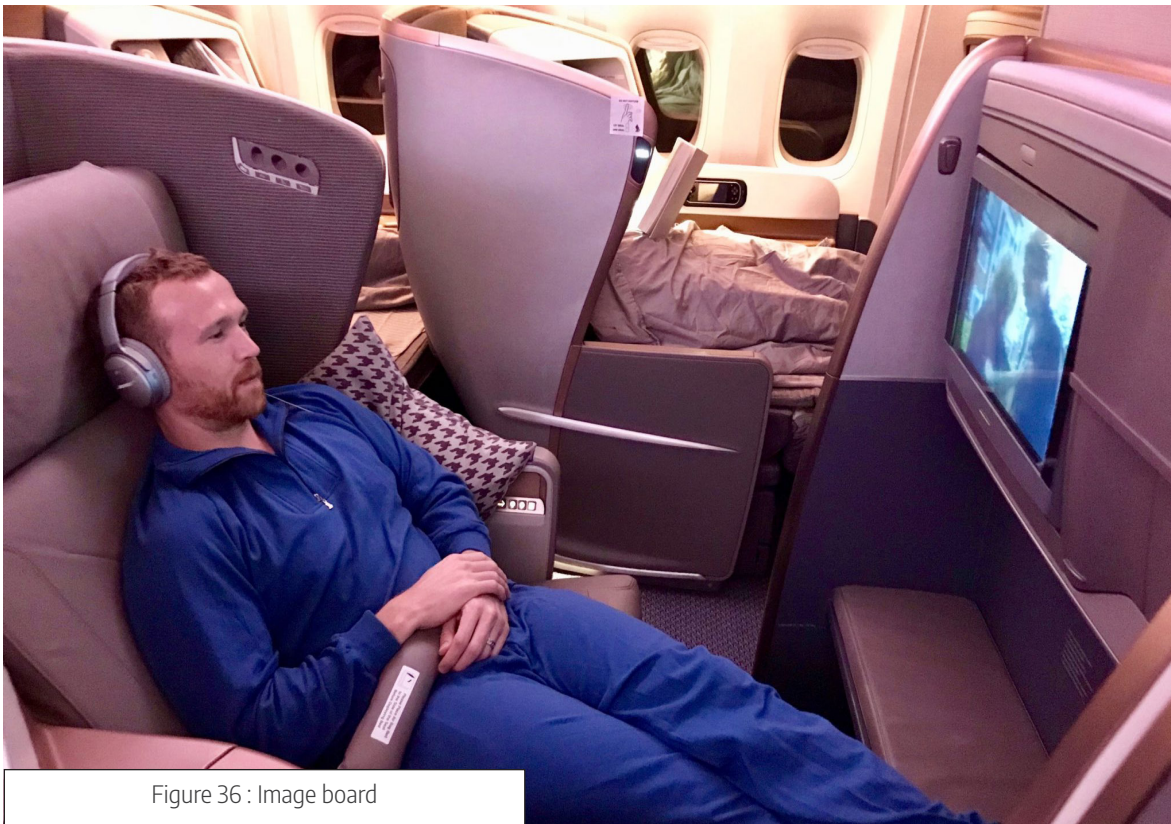


Figure 36 : Image board



# Form Ideation



# Ideation sketches

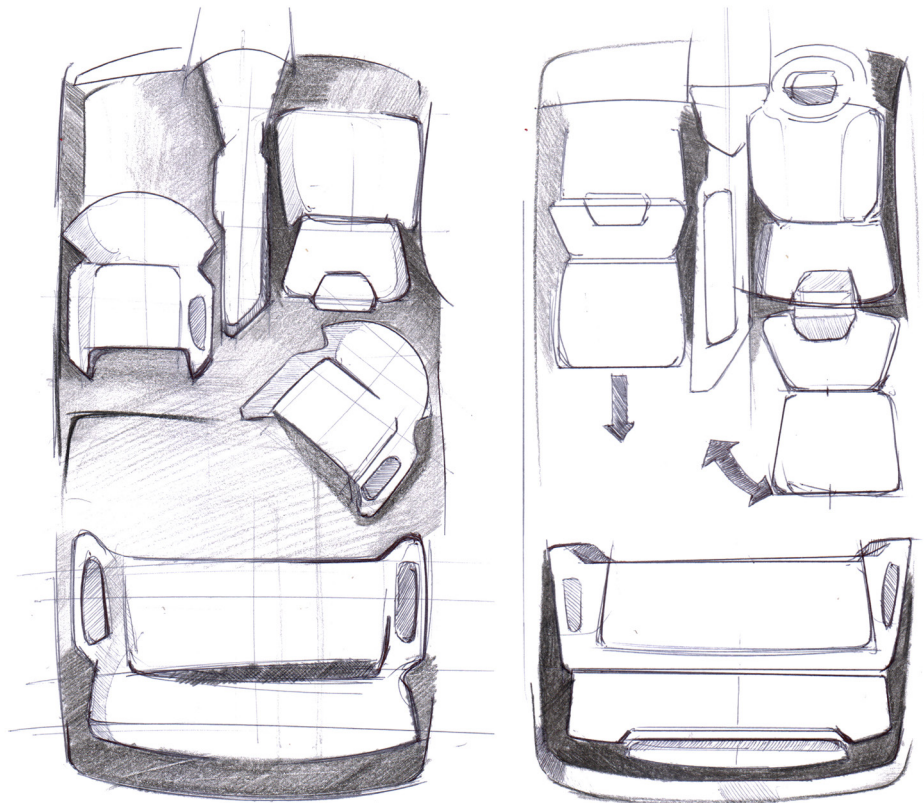


Figure 37 : Sketch showing the top view of the vehicle interior, ideation of seat configurations

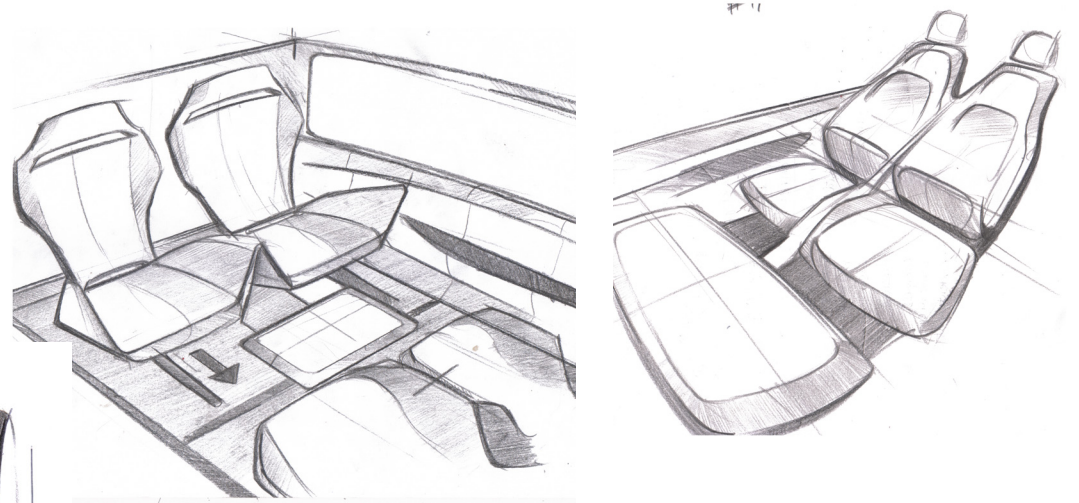


Figure 38 : Sketches showing the ideation of rear seats

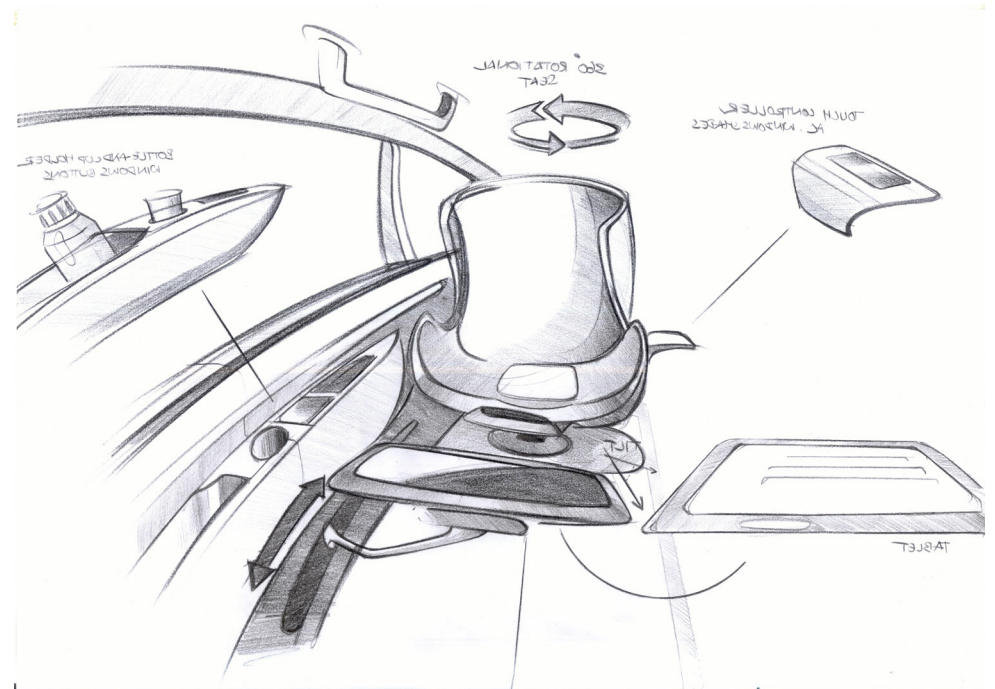


Figure 39 : Concept shows the co passenger seat positioned inverted towards the rear seat with a modular LED screen in front with bottle and cup holder on the door panel.

## Ideation sketches

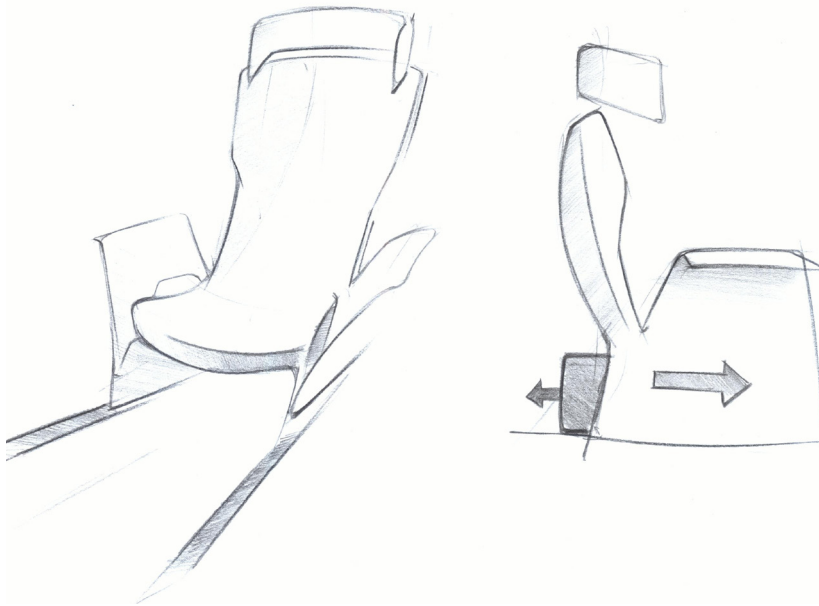
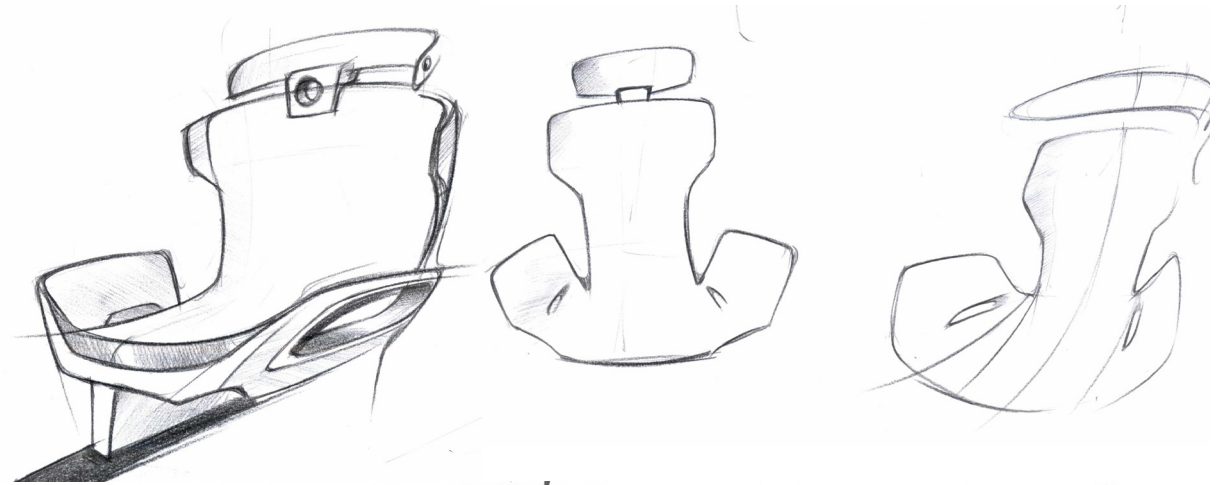


Figure 40 : Sketch of seat ideations

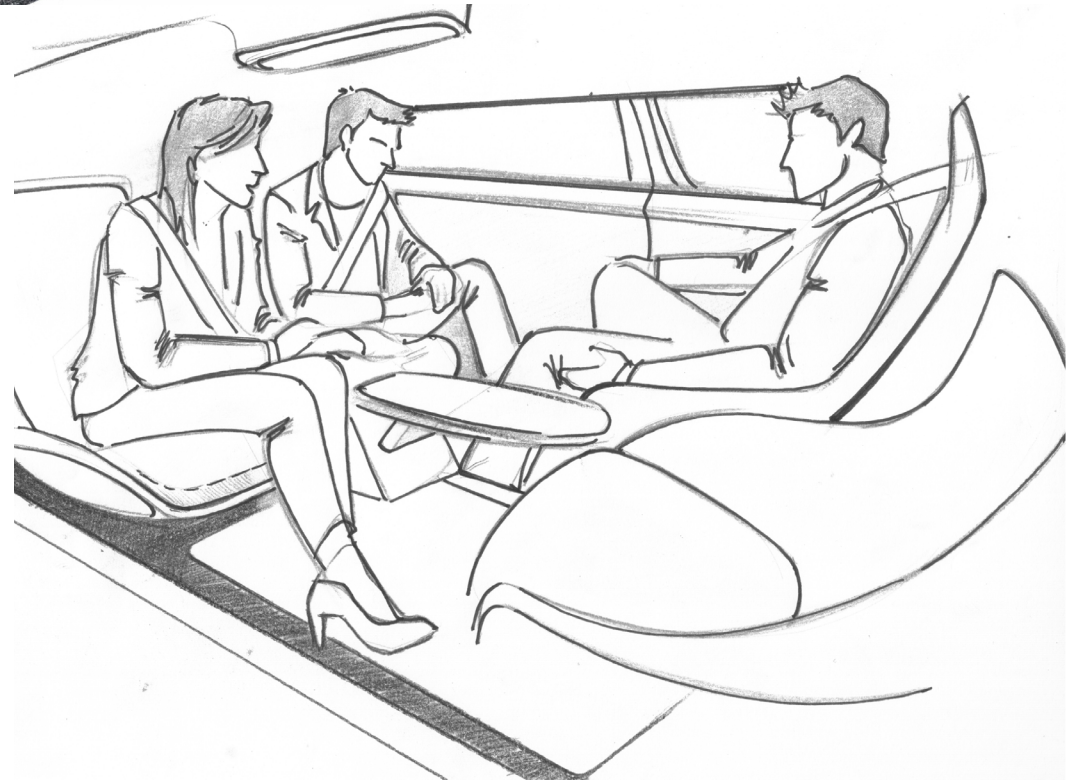


Figure 41 : Ideation sketches showing the different form explorations of inverted co passenger's seat



# Layout Ideations

The seating layout is designed in such a way that co passenger is facing back making it easy for him to talk and communicate with each other without blocking drivers view.

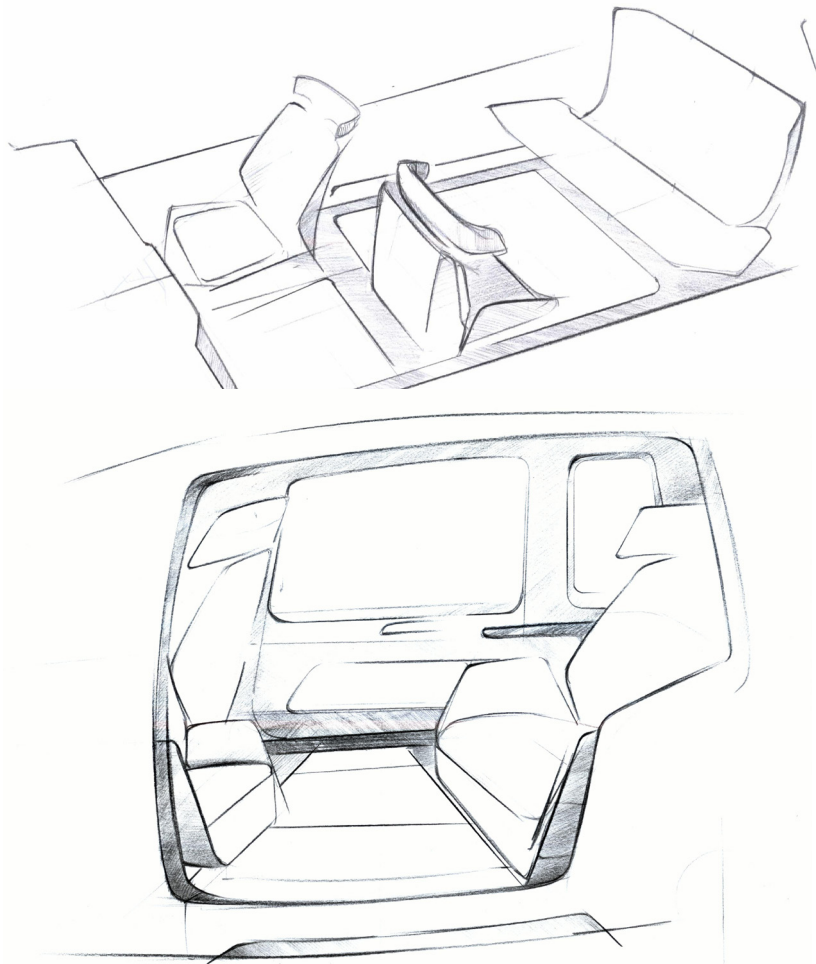


Figure 42 : Sketch representing seating layout

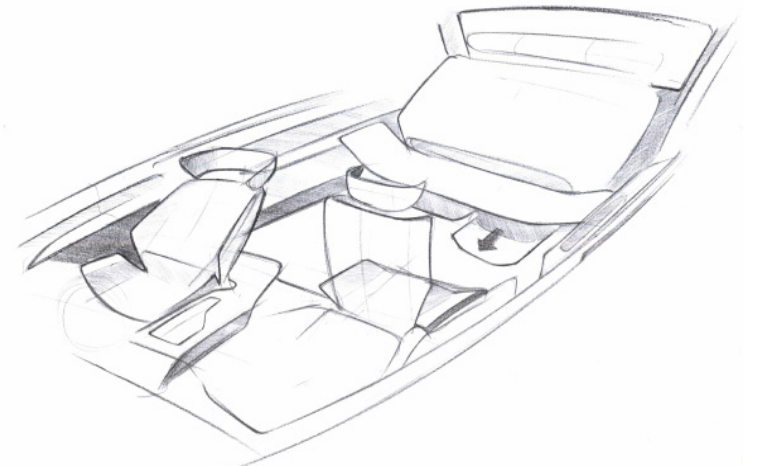


Figure 43 : Sketches representing the inverted co passengers seat next to the drivers seat and the luggage space behind it

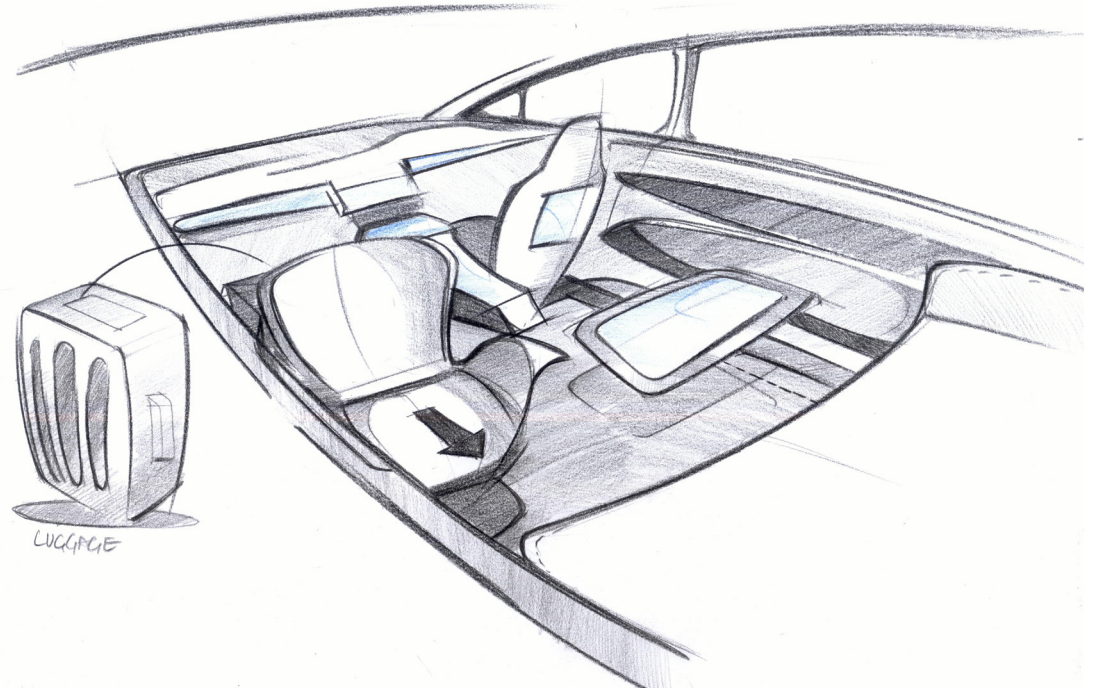


Figure 44 : Sketch showing the layout and seat configurations

# Seat Ideations

The basic idea is to give a relaxed position for the people to sit for long hours.  
All passengers seats have individual glove boxes underneath them to keep personal stuff people need within the journey

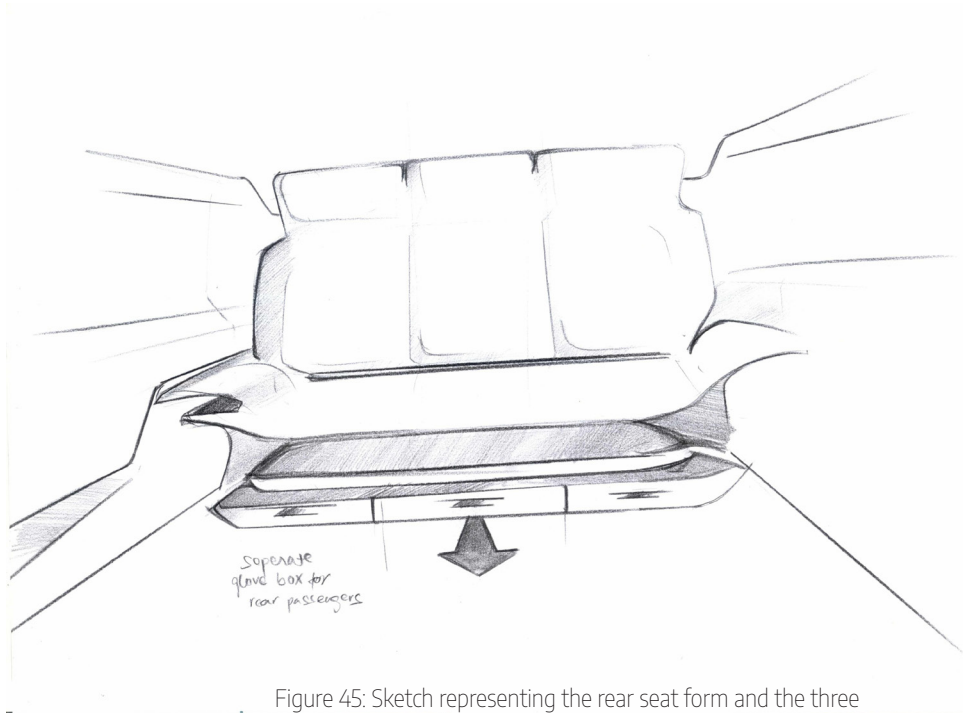


Figure 45: Sketch representing the rear seat form and the three different slide out compartment system under it

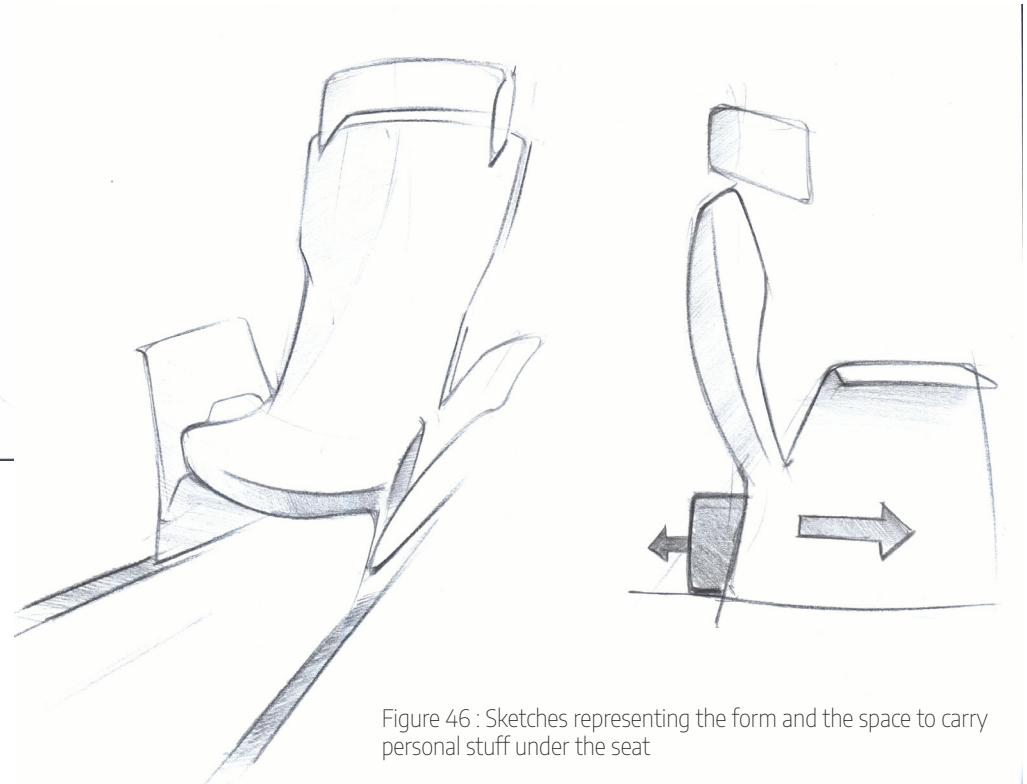
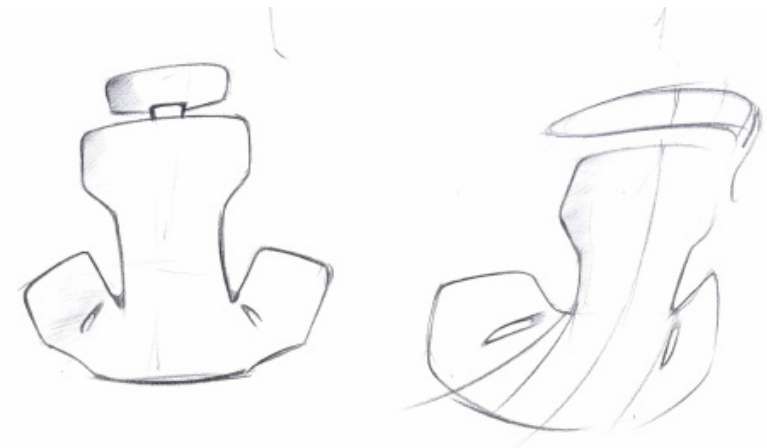
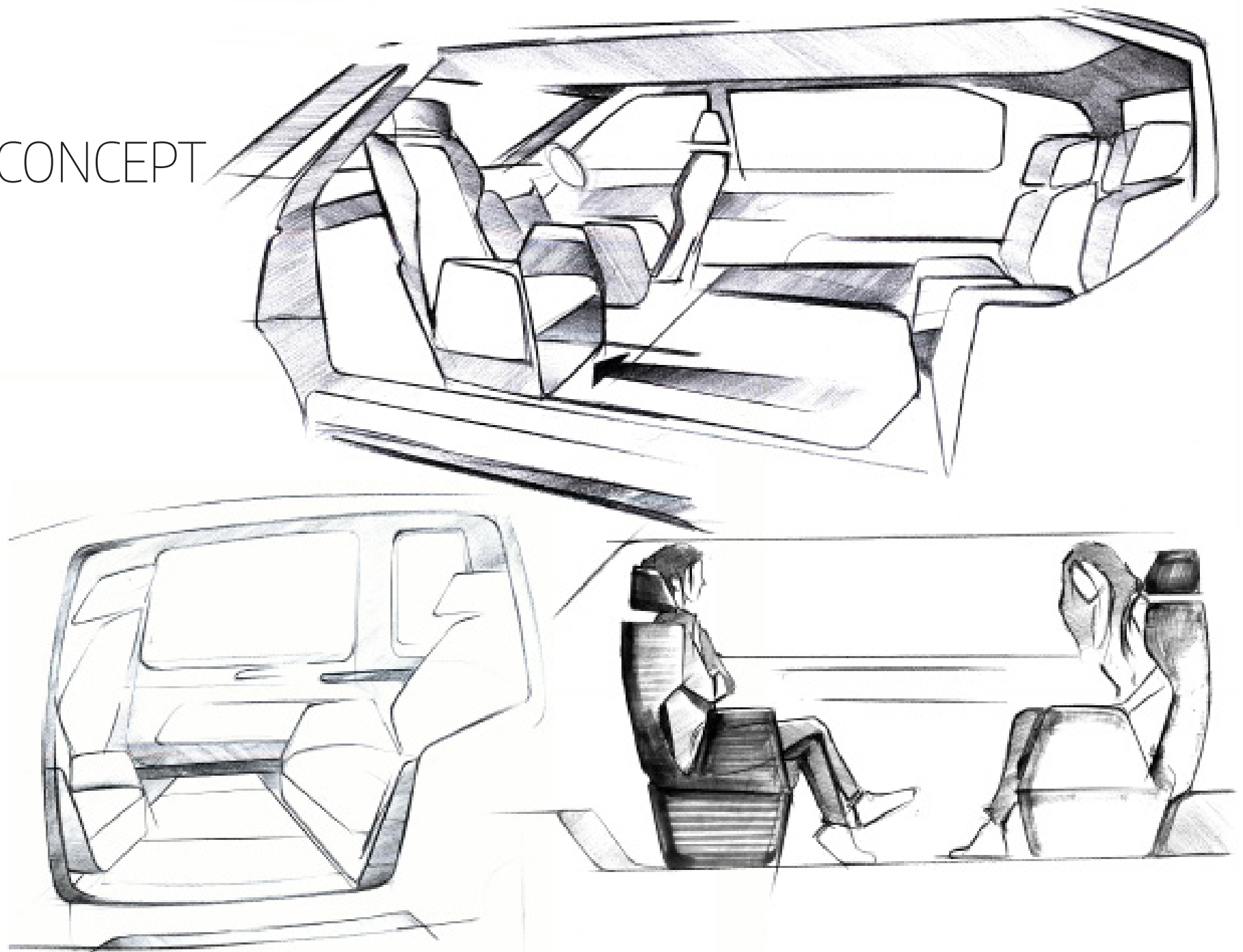


Figure 46 : Sketches representing the form and the space to carry personal stuff under the seat

CONCEPT



# Steering Ideation

The idea was to provide basic controls on the wheel so driver is not regularly required take his hands off the wheels.

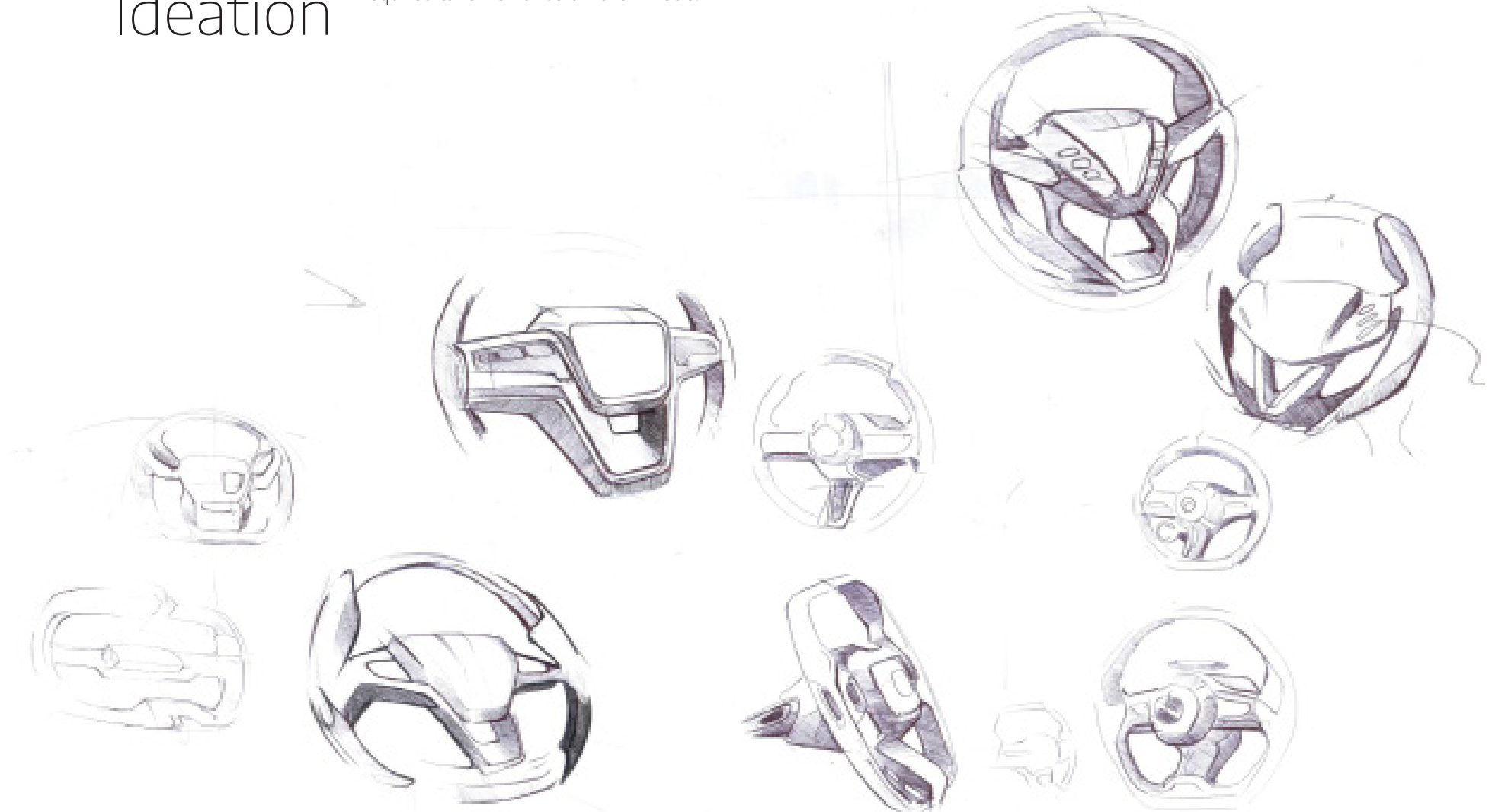


Figure 47: Steering Explorations



# Dashboard

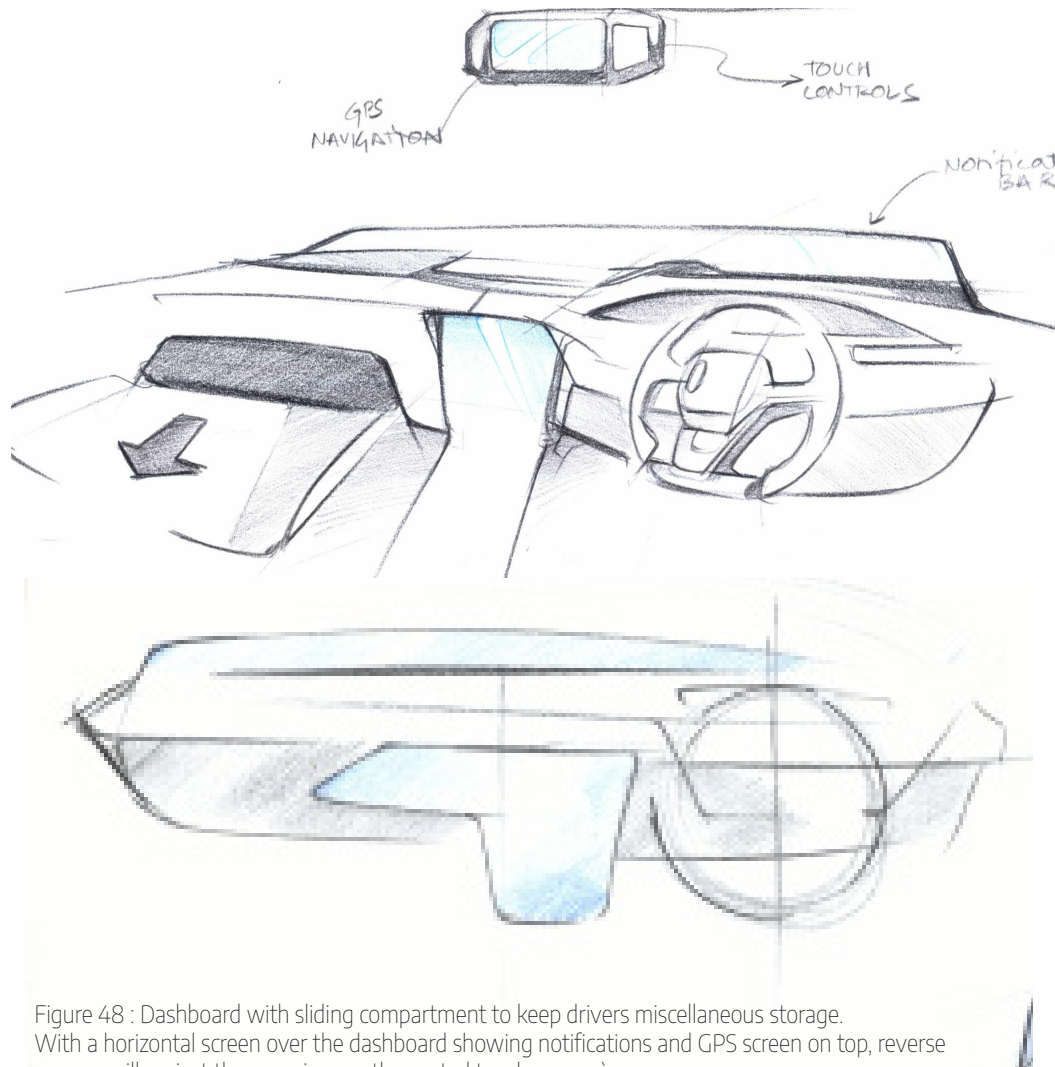


Figure 48 : Dashboard with sliding compartment to keep drivers miscellaneous storage. With a horizontal screen over the dashboard showing notifications and GPS screen on top, reverse camera will project the rear view on the central touch screen`

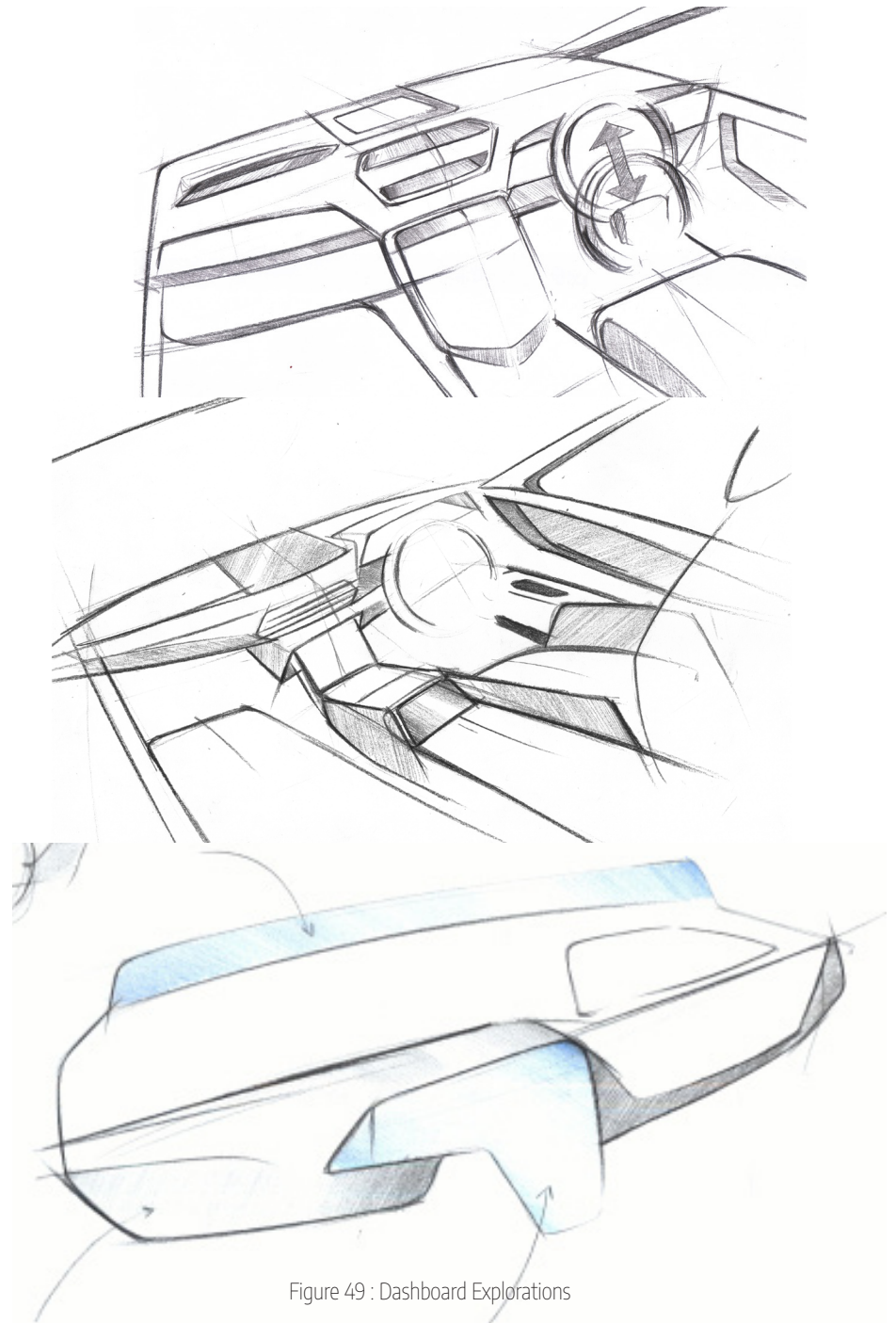
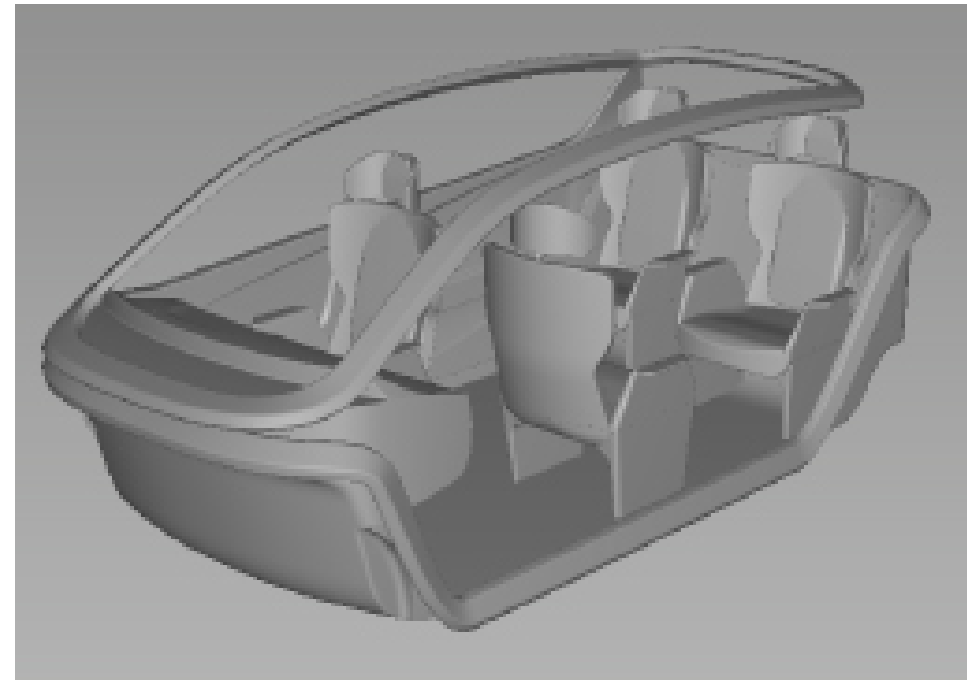
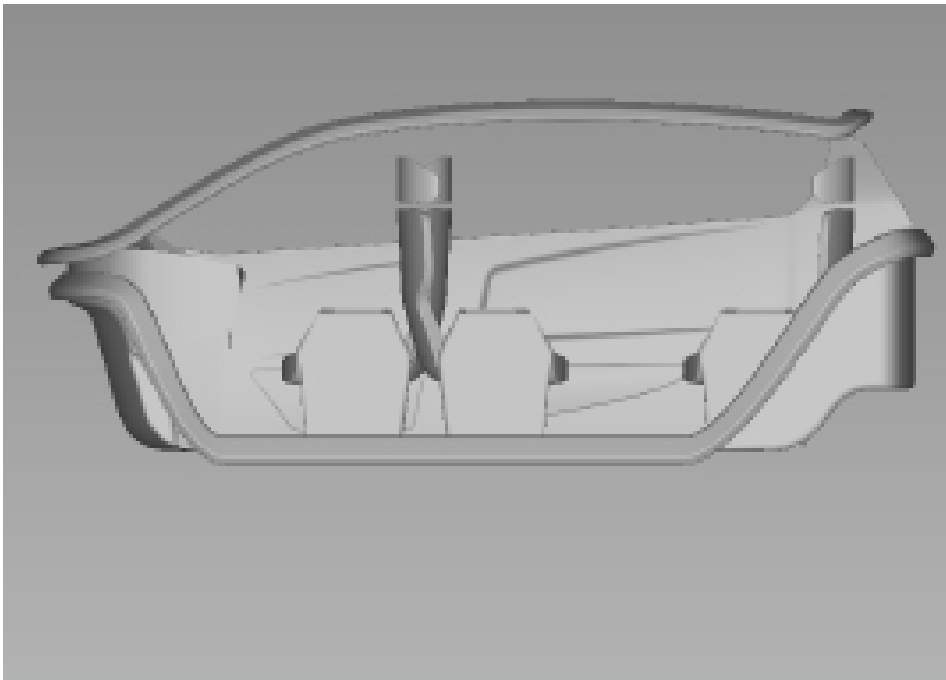
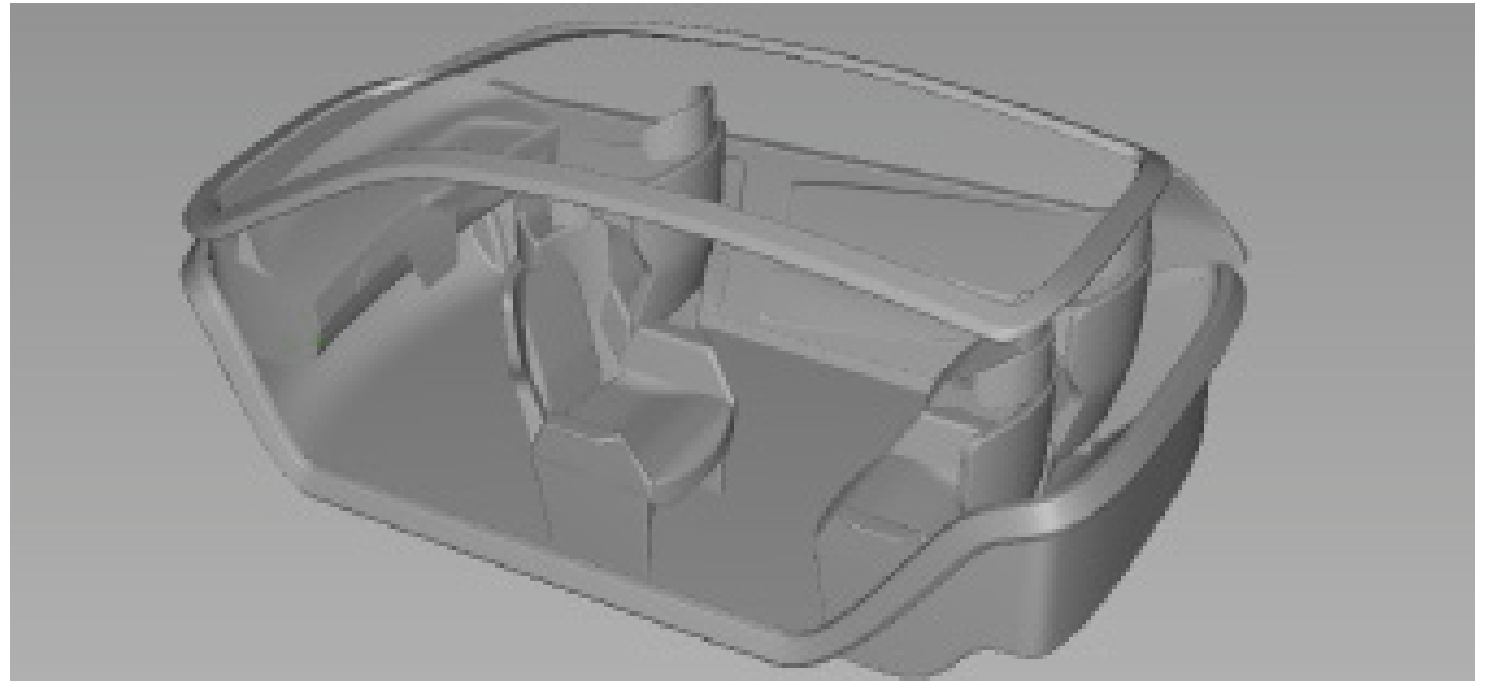


Figure 49 : Dashboard Explorations

CAD  
Model





# Physical Model

Work in progress



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