IDC School of Design
अभिकल्प विद्यालय

IIT Bombay

City Commute Vehicle for Women

Mobility and Vehicle Design Project II

By

Akhil Krishna Pradeep

216390004

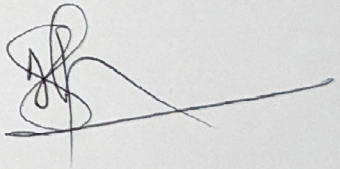
Guide: **Prof. Sugandh Malhotra**

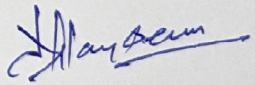
Prof. Aseef Kadir

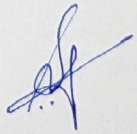
Approval Sheet

This project titled **"City Commute Vehicle for Women"**, by Akhil Krishna Pradeep of Mobility and Vehicle Design (2021-2023) is approved as a partial fulfillment of requirements for Project 2 in M.Des (Mobility and Vehicle Design) at IDC School of Design, IIT Bombay.

Project Guide: 

Internal Examiner: 

External Examiner: 

Chairman: 

Date

Declaration

I hereby declare that this written submission submited to IDC School of Design, IIT Bombay, is a record of original work done by me. The written submission represents my idea in my words. I have adequately cited and referenced the original source. I also declare that I have adhered to all principals of academic honesty and integrety and have not misinterpreted or falsifed any idea/ 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 poperly cited or from whom proper permission has not been taken when needed

Akhil Krishna Pradeep
216390004

Acknowledgement

I would like to thank each and everyone within and outside of IDC School of Design IIT Bombay, who have helped me throughout this project. I am grateful to my guides Prof. Aseef Kadir and Prof Sugandh Malhotra for the valuable and insightful feedbacks which guided me in the right direction for this project. I also extend my gratitude to Prof. Nishant Sharma and all other faculties at IDC and Mobility and Vehicle Design, IIT Bombay.

I would like to thank my parents, relatives, friends and all the people who provided me with their honest views and opinions which provided me with right insights for this project.

Akhil Krishna Pradeep
216390004

Abstarct

Humans use transportation for various purposes, but transportation for daily commute is arguably the most commonly used one. Every individual uses one or the other types of daily commutes. It may be personal mobility, public transport, vehicle pooling etc. This project focuses on addressing the issue of audiences preferring personal mobility for their daily commute.

The main essence of the project was to design a protector or guardian angel for the primary user group. The idea to design a vehicle which satisfies all user needs by providing a layer of safety and a sense of protection without being too literal was the main key. For this, several ideations based on user inputs were made before finalising a single concept

The project begins with one-to-one interaction with the users who are already using personal mobility or are willing to invest in one. The user's interviews provided various insights which was converted to product attributes for final design. The very base of the project was to understand the user requirements when it comes to personal mobility and design a suitable vehicle which satisfies all kinds of their needs, wants and aspirations to the best possible level. The project also focuses on adding some clever features that users can feel good about in their daily life. The user research provided an idea for the mindset of such users and this led to the development of the persona board. The character was painted and the user's values and personality were developed. Product attributes was solely based on the user insights.

The vehicle interior was designed first, followed by the exterior so that the whole story of the vehicle design is showcased. The design language followed was also user-inspired and the aesthetics was optimised to appeal to the primary audience and also to the wide range of customers. The final design was carefully optimised so that every user insight collected was addressed and to make sure that all user aspirations are met.

Contents

Timeline

Timeline

Stage 1 — Stage 2 — Stage 3

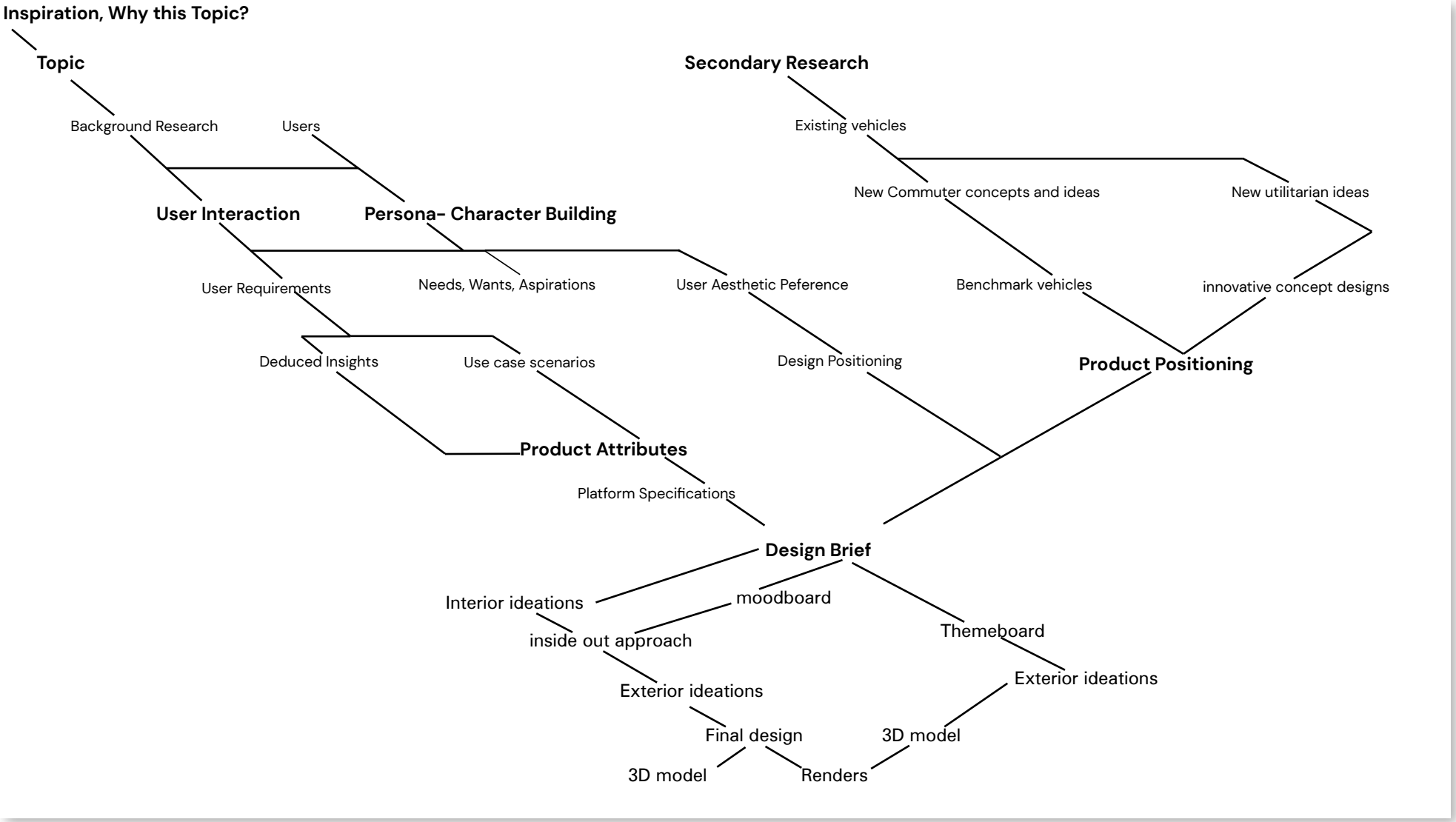
TASKS	WEEK 1 15-21 Aug	WEEK 2 22-28 Aug	WEEK 3 29Aug-4Sep	WEEK 4 5-11 Sep	WEEK 5 12-18 Sep	WEEK 6 19-25Sep	WEEK 7 26-2 Oct	WEEK 8 3-9 Oct	WEEK 9 10-16 Oct	WEEK 10 17-23 Oct	WEEK 11 24- 30 Oct	WEEK 12 31-6 Nov	WEEK 13 7-13 Nov	WEEK 14 14-20 Nov	WEEK 14 21-27 Nov	WEEK 14 28-4 Dec
Problem Statement Brief on project plan User study-Pshychological, emotional, cognitive																
User interview Insights																
Background research Benchmarks, New innovative technology and trends, Benchmark positioning User feedbacks																
Design Brief, initial platform -basic idea Maping use case scenarios Final benchmarks Shortlist new trends/features/technology **Dimensions**, sizing of basic elements																
Interior layout packaging Use case scenarios, interior modes user feedback																
User Ergonomics Ingress, Egress Context research																
Exterior, final dimension Ideations Adding features shortlisted																
Exterior ideations sketching, quick models																
final design user feedback																
design validation final renders																
3d model final use case scenario renders																
interior renders physical model																

Inspiration

Great designs come from genuine personal experiences and need to develop a solution at a personal level. This project is also driven by such a story, the story of my mother.
My mother as a person is very enthusiatic and self motivated. She never had the chance to drive her own, but she always wanted to do it. At the age of 46, she herself learned cycling and car driving to aquire driving license. She bought a two wheeler with the expectation of using it for commute. It was not very far, before she had a small fall and injuries which distanced her from vehicles. She still had the instill passion and motivation to drive herself even after the fall. One thing which she is concerned in simple terms is safety and comfort. She is now 50 years old, and she still fancies to use a vehicle own her own.

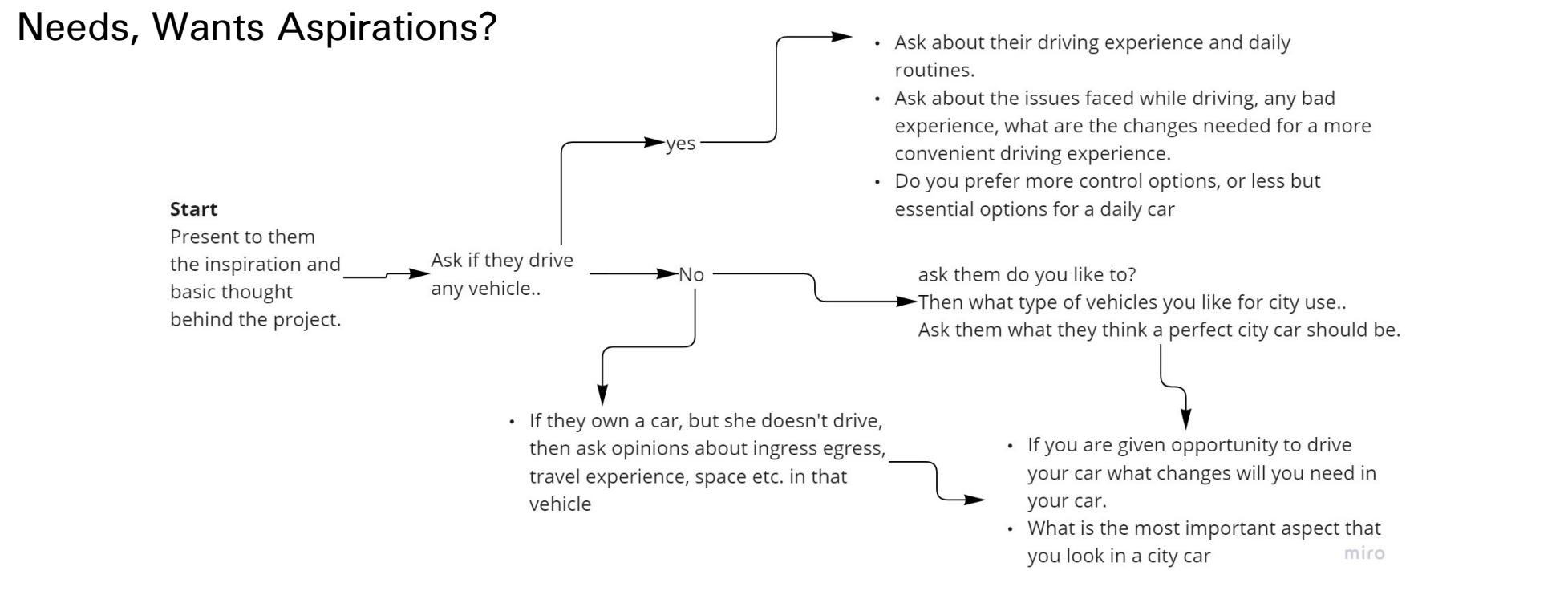
The fact is that, this story is not very rare. In my family, majority of women does not drive cars or use two wheelers. These are women of the same age group, that is 45-55. People of these age group are mainly parents whose son/daughter is at the end of college education or leaving for higher studies/job. These people during their 20s or 30s did not have easy access to vehicles, due to many reasons. But as they grew old, they have started using vehicles like cars, scooters, bike etc for commute and transport. But due to ageing, many if them who still aspires to commute independently does’nt have a propervehicle to confidently do so.

Design Process



User Research

Research

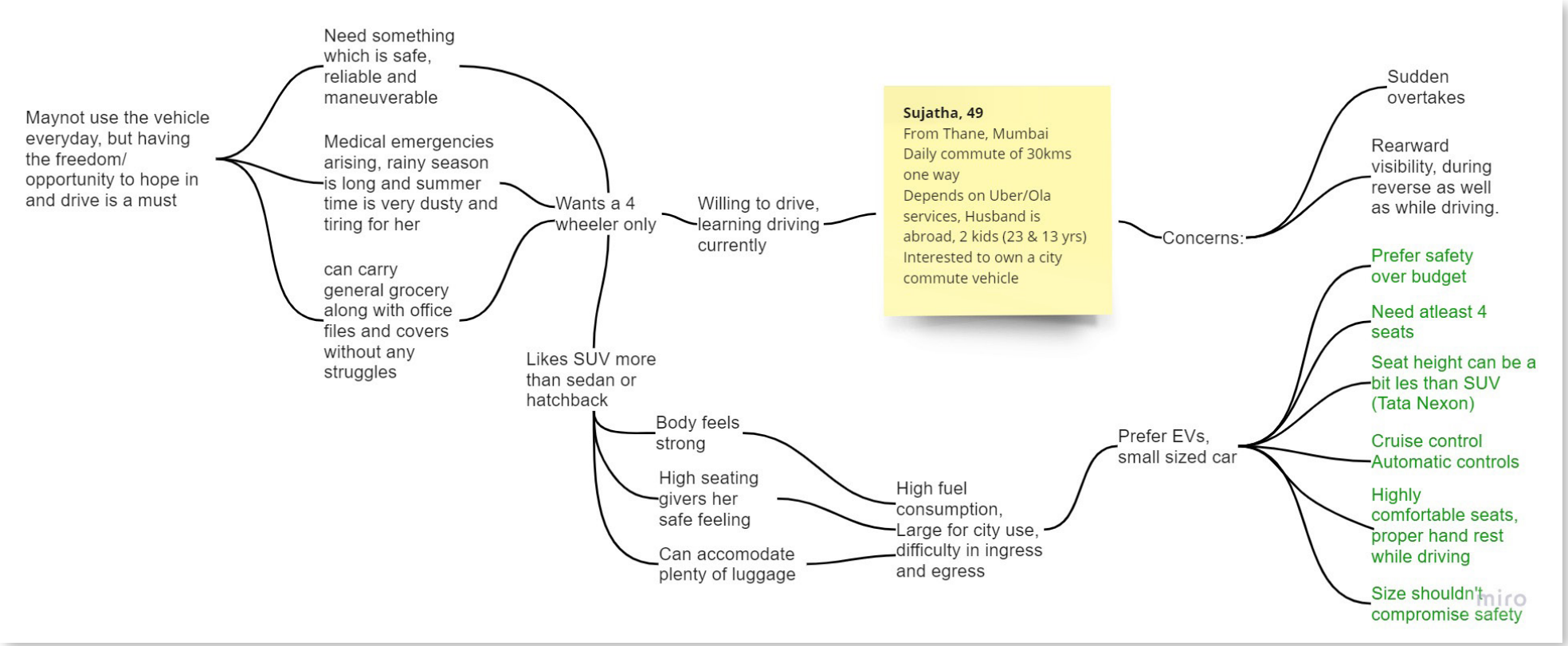


User interviews were conducted across a wide range of people of the age group 45-55. All the users were either using their own vehicle for commute or were being dependent on external means (public/carpool/scooter pool) etc provided they are interested to use personal mobility for various reasons. The interaction was quite casual, beginning with talk regarding their daily routines, daily activities other than commute, places they visit over the weekend and general details about their daily lives.

The goal of the interview was to understand their preferences when it comes to vehicles and daily commute. Questions regarding the difficulties faced currently, and about their dream experiences were raised to understand their aspirations. Since most of the users interviewed had driving license and are active drivers, they could clearly explain their current situations, concerns, future aspirations which is vital for this project

Interview

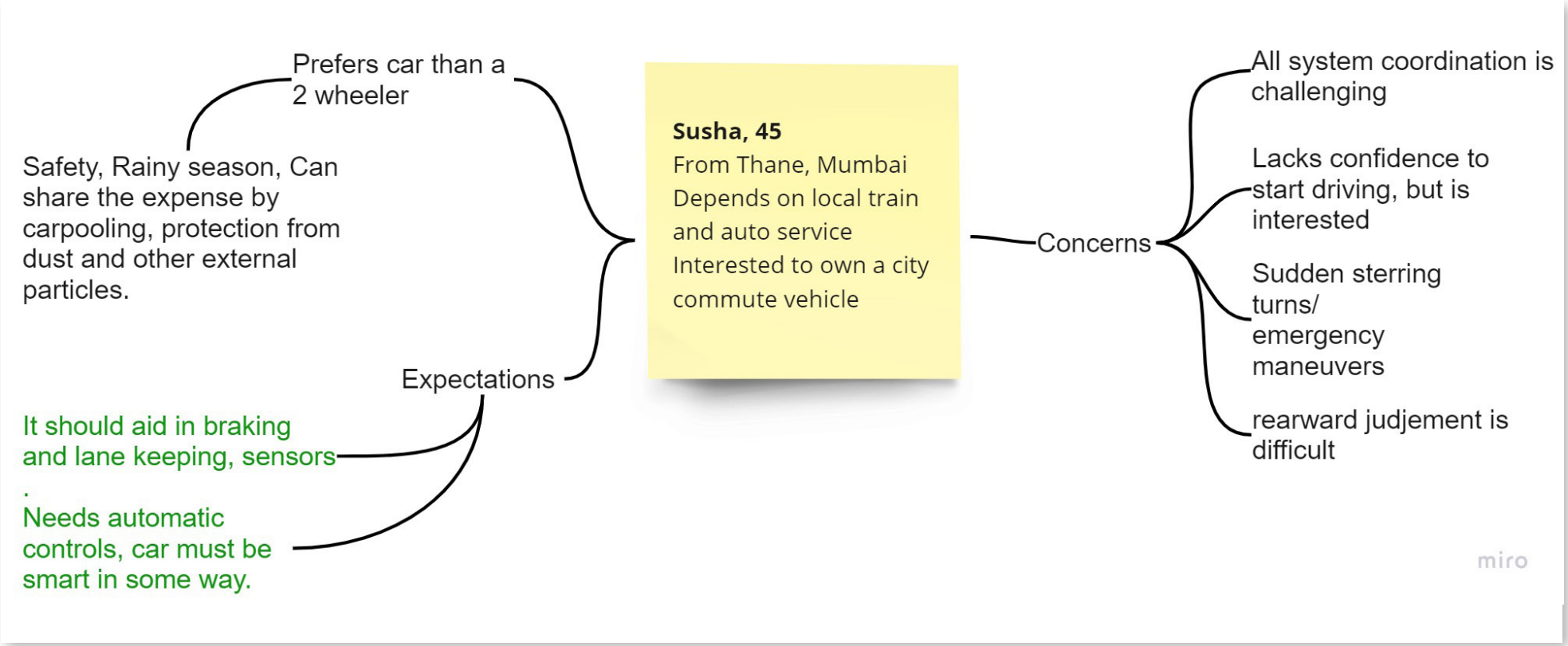
Research



Sujatha is actively looking for a personal mobility vehicle. She is 49 and prefers something safe and sturdy. She likes SUVs more than sedans, due to their bold appearance and high seating which inherently provide better visibility and a sense of control. She also prefers safety over budget while buying a personal vehicle. Her husband is abroad, and she shared cases when her son got sick and the absence of a vehicle created tension and worry during a rainy night. She works 20km away nd commutes daily in Autorickshaw. She wishes to have the option of having 4 seats and space for groceries and hand bags.

Interview

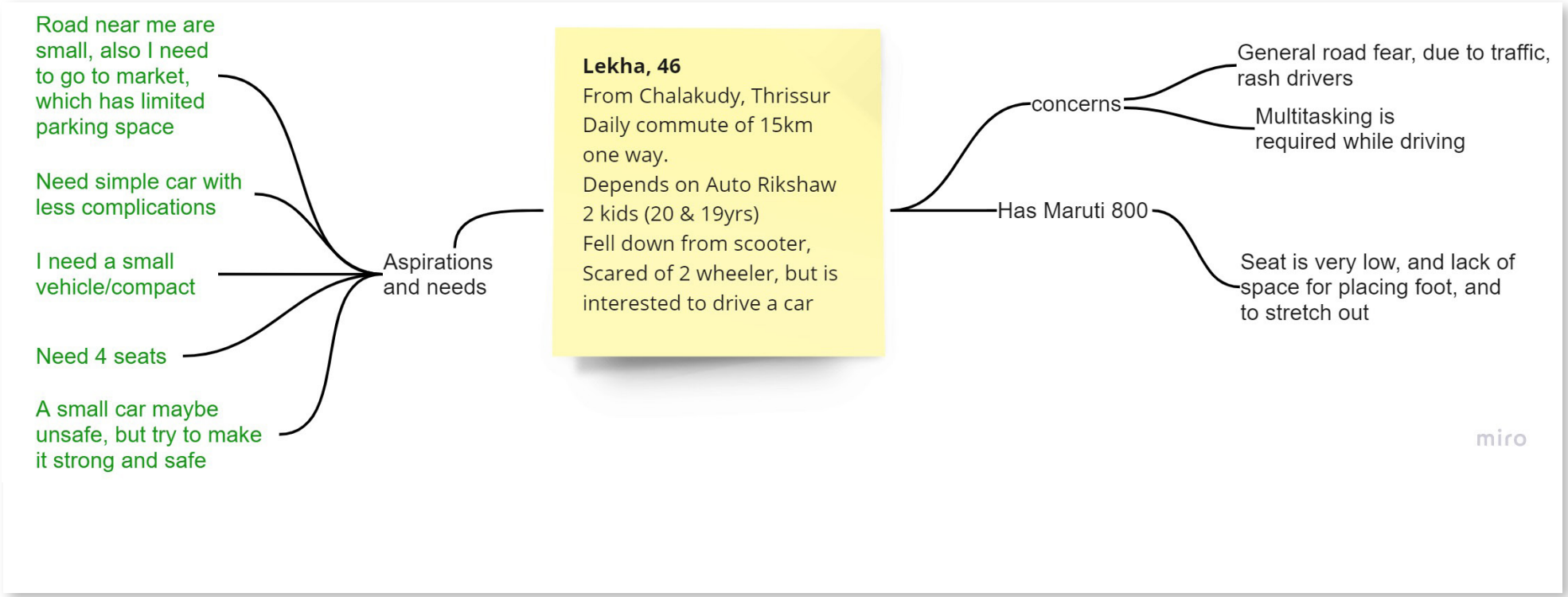
Research



Susha, from Thane prefers cars for her personal use. She is concerned about the rain, dust, smoke and pollution in cities. She like modern features and smart technology enabling an easy and hassle-free drive for the commute. She likes to socialise and requires extra seats in her vehicle, she is also not an expert driver, and requires something stable and easy to use.

Interview

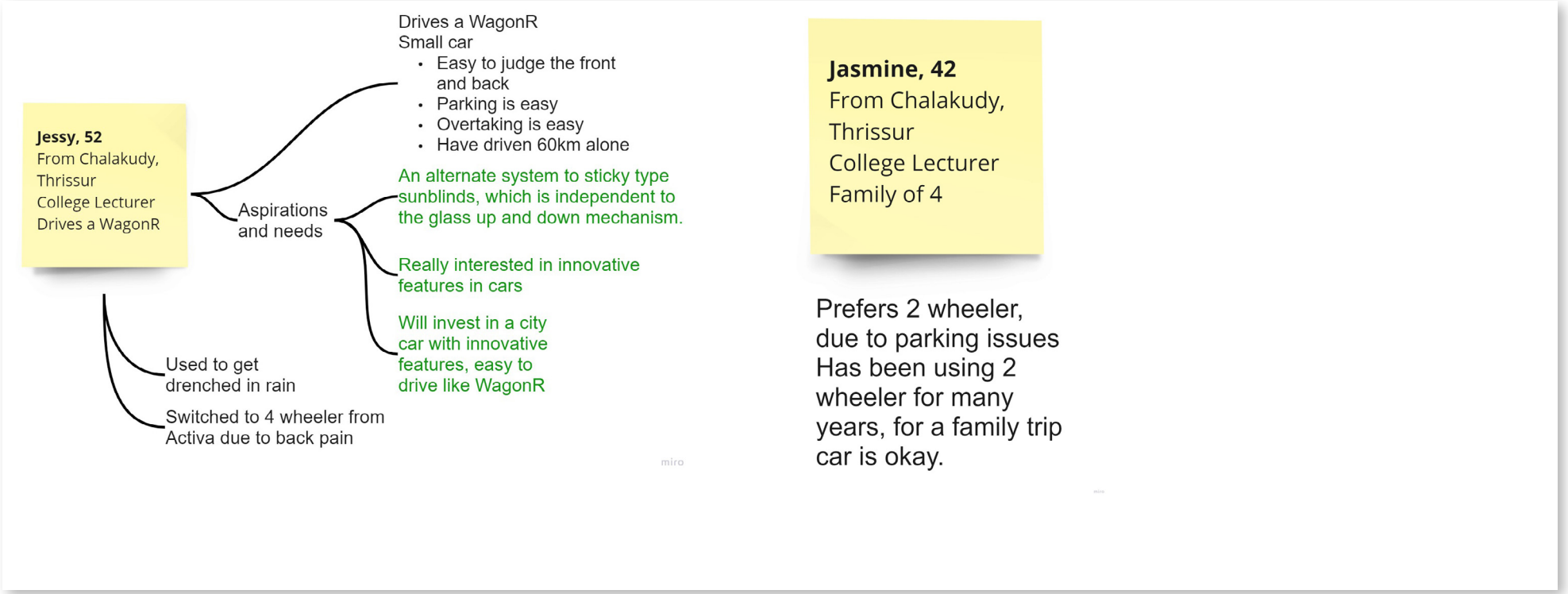
Research



Lekha prefers a small car as her personal mobility since she doesn't have cycle balance and she is confident to drive a car rather than learn 2 wheeler at the age of 46. She does frequent grocery runs to her nearby market where road is a bit congested.

Interview

Research



Jessy drives a wagonR and is quite happy with it. She is satisfied with its space, size and driving comfort. She feels the visibility is really good. She is ready to invest in a better car with same size as wagonR but with improved user experience and features

Jasmine prefers a two-wheeler since she has been using her scooter for many years now. She believes 4-wheeler is required only for family trips and when there are multiple people.

User Aesthetic Preferences

Research

Linear patterns combining organic materials and textures, traditional colours, completed with simple geometric shaped products alighting is also minimal with repeated patterns and transparency.

Linear **Pleasant** **Neat**

User Aesthetic Preferences

Research

Dominated with natural lighting, neatly arranged minimal products with lots of greenery uplifting the ambience. Light colours and nature-inspired panelling, wood, fibre etc. Fluffy and Cozy products all around create an intimate personal space.

Light **Nature** **Cozy**

User' Voice

Research

Key points directly coming from the user, relevant to the project were noted down. These points can be analysed and worked into insights and product attributes which can provide a base for benchmarking and secondary research. The user insight also provide a sense of direction for the project, and helps to narrow down to a certain type of vehicle.

I like SUVs more than sedans or hatchbacks.
It feels more strong
It has high seating and visibility is Wnice
Also it can a ccomodate lot of luggage
SUV > SEDAN

I want to carry grocery along with my office files, covers. So I need space.
GROCERY + WORK

Since my husband is abroad, I would prefer a car since I can drop Akash at school, and also manage things without worry
CAR

I feel SUVs are difficult to turn and park, also my boss complaints about high fuel consumption
FUELING

My boss has a Nexon, the seat height is a bit high, but safety wise its good
TATA NEXON

Once my sone got sick and no autos/ ubers where there! It was raining as well. I really thought we had a car at that moment!
EMERGENCY

I requiresmart features in my car. something which helps me in parking, highway driving, and slow speeds.
SMART

I lack multiple system coordination. I need a car which can be operated easily.
COMPLEXITY

I am concerned over the rear visibility. I need a sense of control over the rear part of vehicle.
REAR VIEW

User' Voice

Research

Mumbai has high amounts of dust and polution, which makes me highly uncomfortable while commuting
MUMBAI THINGS

I have felt the need for a front window sunblind which is independent of the glass movement.
SUNLIGHT

I drive a wagonR and i am satisfied with it. It has good visibility, parking is easy. Overtaking is easy.
WAGONR

I used to drench in rain while using a scooter. Now I only use my WagonR
RAIN

While driving, I felt there should be comfortable hand rest, because you wont turn the steering always.
WHILE DRIVING

I can carpool with my colleagues and get protected from rain, dust and heat of Mumbai
CARPOOL

I prefer a compact car with 4 seats so that i can use it alone/ take my kids and friends somewhere
SOCIALISING

I started getting back pain driving my Activa, Thants when I switched to 4 wheeler.
BACK PAIN

I prefer safety over budget, i will use the vehicle for my daily commute and for other activities of my like.
SAFETY > MONEY

Roads near my house are narrow, and I only get the grocery from market.
ROADS

I may not buy a small car just because its cheap, i need it to be sturdu and it must give me a reassuaring feeling insideout
SAFETY

I know thant a small car may be unsafe, but can you make it strong using new technology?
SMALL BUT STRONG

I use Maruti 800 and the seat is too low. The legroom and footsp-cace is very less in Maruti 800
MARUTI 800

Persona

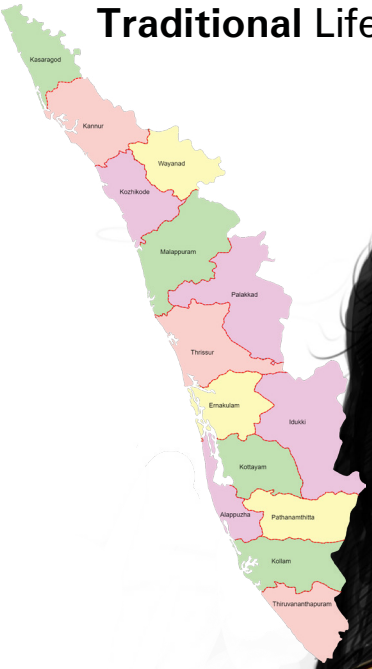
She is a good **LEARNER**

She is an **ACHIEVER**

Traditional Lifestyle

Sujatha, 52
Thrissur, Kerala

She likes to be **INDEPENDENT**



She helps in the **BETTERMENT** OF **SOCIETY**

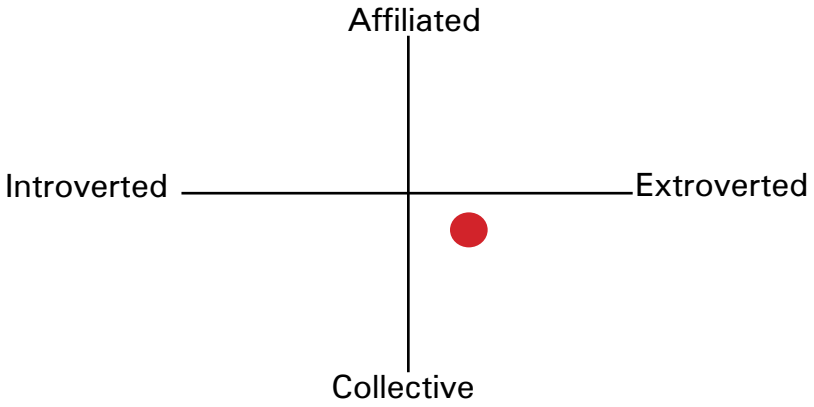
SOCIAL and **FRIENDLY**

User Values and Personality

Primary User

The primary user target, symbolised by Sujatha who is 52 years of age from Kerala, is a very social and friendly woman. She is an achiever, who never stops learning new things and is ready to take up new challenges in life, despite her age. She has a traditional yet progressive lifestyle.

Sujatha runs her own organic garden, producing fresh vegetable supplies for her own family and selling them in her own small outlet. She is an independent lady, who likes to carry out her daily chores without depending on anyone. She is a loving and caring mother of 2 who is very much concerned about them, even though they are away from home doing higher studies. She lives with her husband and mother-in-law, in their own villa in Thrissur, Kerala.



Persona

The primary user group includes people with collective personality. They are very cooperative and adjusting to any situation. They work for the collective good and not just their own betterment. They are social workers who believes every citizen has his/her own role in nation building.They are also moderately extroverted, and not complete introverts. They like going around the society, connecting with neighbours and creating good relationships with everyone.

Her typical day starts at around 6:00. She waters the plants in her garden, spends some time with them and starts with her household chores. By 8:00 she will be ready to collect the fresh vegetable supplies and take them to her own outlet, which is 5km away. Someday, there won't be any new supplies, but still, she visits her shop and provide the necessary instructions to the worker there. She comes back to her house for lunch. Often, she goes to banks and offices for carrying out required actions. After coming back to her house, she usually goes to parks to walk her beloved dog, or maybe even go for shopping with her friend. She along with her husband, often visits a lake nearby for evening strolls and sometimes spending some quality time together.

A day in the life

Persona

6:30am

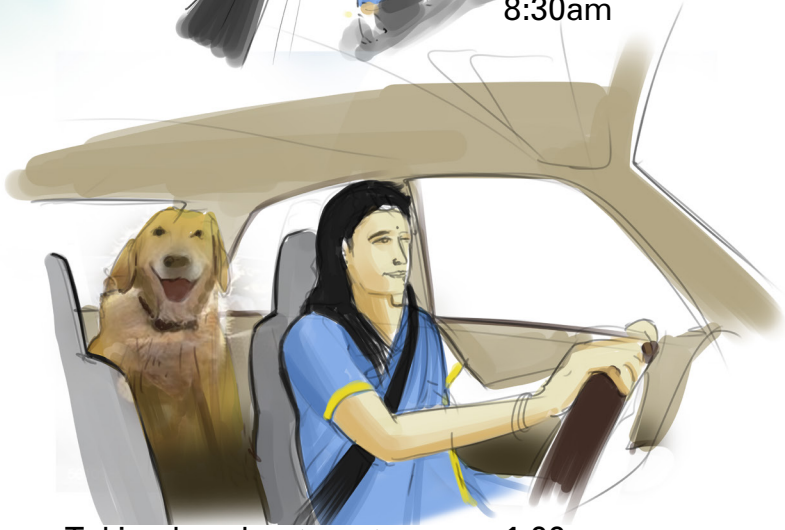
7:00am

Drives to her organic mart

8:30am

Grocery run with her friend

6:00pm



Taking her dog to vet

1:00pm

Product Attributes

Insights to Attributes

Insights were derived from the user interview, and these insights were converted to product attributes. Product attributes include several details and aspects to be satisfied

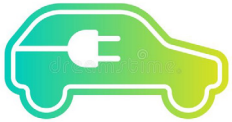
by the final design. The secondary research, benchmarking and ideations were completely based on the derived product attributes

Users prefer a car, since it can be used in multitude of scenarios, irrespective of the weather. Also, they feel more safe and secure from other road users and environmental particles.

A **compact micro car** with great visibility and low turning radius

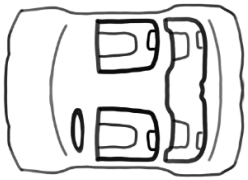
Users prefer electric cars, since they are silent and absence of fueling.An electric car ensures interior space can be maximised for utilities.

Electric powertrain with smart features
Auto charging below 40%



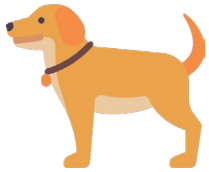
Users prefer having at least 4 seats and a spacious cabin, so that they can drop their friends and family, or carry some luggage and grocery for home.

2 front side by side seats with 2 rear seats which can squeeze in 2 persons/luggage



The car must have the ability to take in maximum passengers or maximum luggage or both in equal amounts. This means, the seats must be foldable/ adjustable which can change the cabin utility.

Rear seat tumble into flat bed for luggage/pet. Front passenger seat tumble into luggage space/ pet access.



Product Attributes

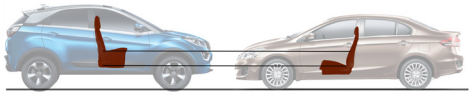
Insights to Attributes

The car must have no/less blind spots so that reversing, turning and overtaking manoeuvres are effortless. There must be sufficient sensors and camera previews of the surroundings

Surround view cameras.
Smart **driver assistant features** like lane keep assist, auto braking, hill hold as default

Current users find difficulty in ingress and egress from a low hatchback as well as from an SUV, however, C segment sedans like ciaz has decent seat height.

seat height in between and sedan and compact SUV



The interior materials must be durable and dust proof/washable. This ensures user gets a grippy holding position in case of getting onto the seat, or in case of sudden turns, jerks/jolts

Washable and easily cleanable interiors with drain plugs.
Durable and scratch resistant material at lower sections, Soft touch material towards top

Users doesnt require lots of driving datas while driving and a minimum relevant information must be shown at all times

Simplified **User interface**
Legible and clear dials
Dedicated knobs for A/C, radio.

Users are very much aware of safety, and they would prefer a car with solid feel and perception.

Sturdy form language for a perceived strong look in a compact car

Secondary Research

Benchmarking

PSA concept

The European Efficient Urban Light Vehicle (EU-LIVE) consortium unveiled a new electrified mobility solution.“positioned between the two-wheel and four-wheel segments, it is equipped with a plug-in hybrid electric vehicle (PHEV) powertrain, two electric in-wheel motors and a petrol internal combustion engine.”designed for urban and suburban trips with a zero-emission mode for city mobility. Small footprint of 2.4 x 0.85 meter as well as an enclosed, heated cabin, seatbelts and an airbag makes it an alternative for those commuters who want more comfort and speed than speed-pedelec riders.

Length	2400 mm
Width	850 mm

Seat Minimó

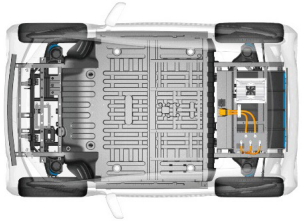
The Minimó is an all-electric quadricycle measuring 2,500 mm (98.4 in) long and 1,240 mm (48.8 in) wide and has a similar layout to the Renault Twizy, with two seats laid one behind the other.15 kWh battery with a claimed range of 100 km
Level Four autonomous capability together with 5G connectivityIBM is developing 'Mobility Advisor", system which tells optimized routes based on real time data.The solution will make use of IBM Watson’s machine learning capabilities to learn the user preferences and make personalized recommendations. While its connection to IBM Cloud means it will be able to adapt to changing conditions relating to weather forecasts, traffic reports, and other occurrences.

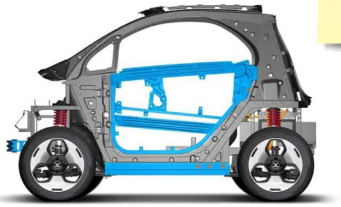
Secondary Research

Benchmarking

XEV

Length	2500 mm
Width	1,500 mm (59 in)
Height	1560 mm
Wheelbase	1680mm





ZERO EMISSIONS, MAXIMUM FREEDOM
The new, full-electric XEV YOYO allows you to reach all your urban destinations, in a quiet and ecological way.
3D printed vehicle parts
150km Range
450kg kerb weight
Swappable battery (10.3kWh)
Home charging possible
80kmph top speed

Microlina

Length	2,435 mm (96 in)
Width	1,500 mm (59 in)
Height	1,459 mm (57 in)

Seating for 2 + 3
crates as cargo
can park at 90degree
to road like a bike
95, 175 or even 230 km
Top speed 90 km/h

On average, a car is occupied by only 1.2 people and driven just 35km per day. This means that normal cars are too big for 95% of their usage. Sounds stupid, right? The Microlino is designed to be ideal for daily use, whether it is commuting to work, visiting friends or going shopping. four-wheeled motor vehicles that fall somewhere between an e-bike and an e-car and are supposed to be a game changer in micromobility.

Secondary Research

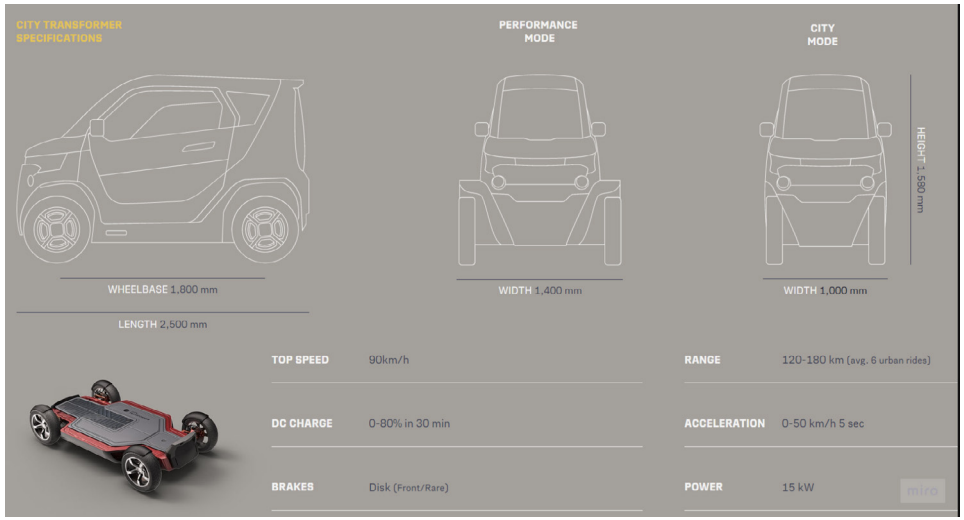
Benchmarking

City Transformer

Length	2500 mm
Width	1400 mm
Height	1580 mm
Wheelbase	1800 mm

Designed around what city people truly need, we have chosen parking superpowers, superior manoeuvrability, and thoughtful productivity over unclaimed performance, uber excessive space, and pricy luxury.

A perfectly sized innovative interpretation of what personal urban transportation was meant to be.



The unusual chassis of the vehicle, which was designed in Israel, allows the four wheels to be extended and retracted, making it possible to either drive the City Transformer with a width of only 100 cm in the city and get it perpendicularly into any parking space, or to fly it in performance mode with a width of 140 cm and a speed of up to 90 km/h over country roads.

180km range
80% charging in 30min

Secondary Research

Benchmarking

Baojun KiWi EV

Wheelbase	1,750–2,020 mm (68.9–79.5 in)
Length	2,625–2,894 mm (103.3–113.9 in)
Width	1,647–1,655 mm (64.8–65.2 in)
Height	1,588–1,595 mm (62.5–62.8 in)

AI enabled
62mph
double wishbone independent suspension
dc watt
220v power supply
smart battery system

Fomm-1

Length	2585 mm
Width	1295 mm
Height	1550 mm
Ground Clearance	150 mm

Room for 4
103mil range
50mph top speed
water wading, flood proof (for korea)
Battery:2.96kWh × 4(Li-ion)
Motor Type:In-Wheel Motor
Maximum Power : 10kW
Maximum torque : 560Nm
Maximum Speed:80km

Secondary Research

Benchmarking

Biro car

Length	1740mm
Width	1030mm
Height	1565mm
Ground Clearance	190mm

2 seater city car
Swappable battery
Glass doors
Smallest among other benchmanrks

Toyota i-Trail Concept

Track width	F: 1200mm R: 600mm
Length	3000 mm
Height	1510 mm

2030 concept
active lean technology
1 + 2 seating
No sterring wheel
Game like joystick for control
4 meter turning circle
swiveling front setas, upto 20 degree
no pedals
drive by wire for steering, accelerator, braking.

Secondary Research

Benchmarking

Hong-Guang Mini EV

Length	2917 mm
Width	1493 mm
Height	1621 mm
Wheelbase	1940 mm

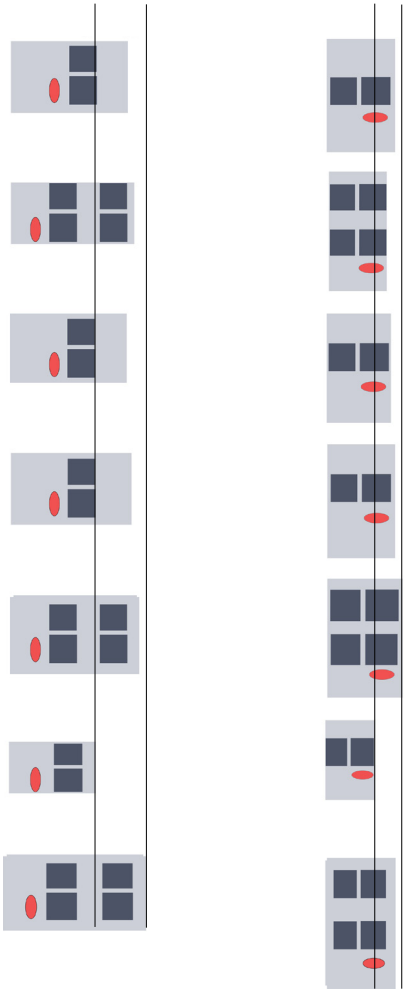
An upgraded version of the vehicle is expected to be launched in the near future:
over 300 km (186 miles); (instead of 120 or 170 km)
to qualify for subsidies as well as collect more zero-emission credits
26 kWh battery (instead of 9.3 kWh or 13.9 kWh)
30 kW electric motor (instead of 20 kW)
4 seats
wheelbase of 2,010 mm vs 1,940 mm, and a length of 2,997 mm vs 2,917
a higher price to be at least partially offset by the incentives

Wuling - Hong Guang MINI EV specs:
Two battery/range options
120 km (75 miles) of range using 9.3 kWh battery
170 km (106 miles) of range using 13.9 kWh battery
top speed of 100 km/h (62 mph)
electric motor: 20 kW peak and 85 Nm
4 seats
741 liters of space with the rear seats folded down
2,917 millimeters long, 1,493 millimeters wide and 1,621 millimeters high, with a 1,940-millimeter wheelbase

Comapring Dimensions

Benchmarking

VEHICLE		DIMENSION (L/W/H/W.B G.C)
	Microlina car	2435/1500/1459mm
	Fomm Corporation	2585/1295/1550mm 150mm
	CEVO Mobility	2430/1425/1550/1575mm
	XEV	2500/1500/1560/1680mm
	Baojun KiWi	2625/1647/1588/1750mm
	Biro car	1740/1030/1565 190mm
	Hong Guang	2917/1493/1621/1940



3 wheelers


2 seater
l/w/h/w.b:
2900/1450/1572/2012


2 seater
l/w/h/w.b: 2300/860


Reverse tilting trike
tandem seating
2350/850/1445/1700


open side panels
Wider than most micro cars
No tilting
2900/1500/1700/2000

3 Wheelers?

Tadpole Configuration Trikes

Reverse trikes and normal trikes are best for 2 seats, either tandem or side by side. When it comes to rear seat/space or a bit of cargo space, it will be required to widen the rear section. The rear section balanced by a single wheel will make the vehicle unstable and unpredictable during weight transfer while cornering. This can make the vehicle unstable and most importantly the looks will be very polarizing.The users require a no nonsense micro vehicle with maximum space and a sturdy look.Having 3 wheels will make the design very unique but also a head turner, which the users will not like.

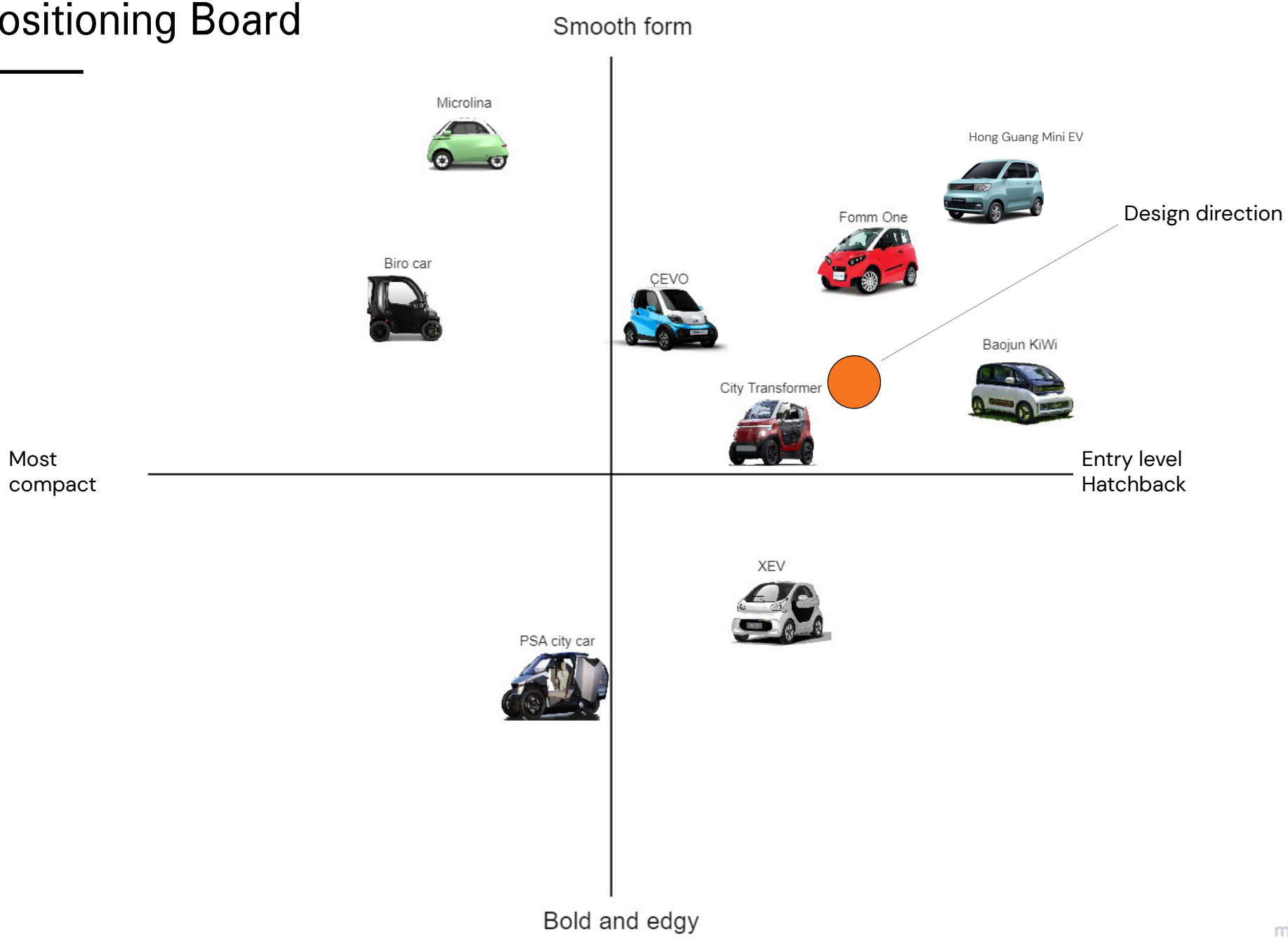
Best for 2 seater

Unique and head turning design

Sense of instability

Due to these reasons connecting to the user's needs, wants and aspirations, the idea of 3 wheelers were not taken forward

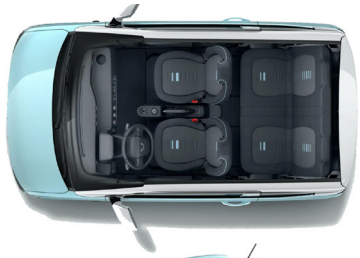
Positioning Board

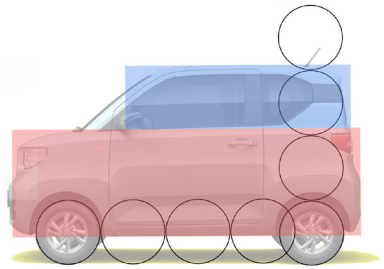


Final Benchmark

Specifications

Hong Guang Mini EV





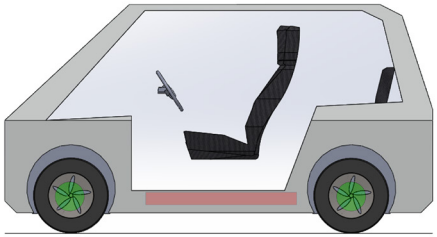
Body and Chassis	Class	Micro car
	Body Style	3 door hatchback
	Layout	Rear motor, RWD
	Seats	2+2
Dimensions	Length	2917mm
	Width	1493mm
	Height	1621mm
	Wheel Base	1940mm
	Ground Clearance	140mm
	Tyres	140/70/R12
Powertrain	Electric Motor	15kW, 20kW
	Transmission	Single-speed Automatic
	Battery	9.2, 13.8, 26kWh Li-ion

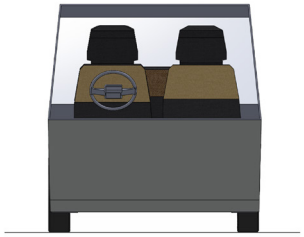
Hong Guang mini-EV qualifies as a good starting point or reference for this project. Being a micro commuter, it has only 2 side doors and a rear door. It has 4 seats with a small luggage space, which can be extended by folding down the rear seats. Various vehicle specifications like battery positioning, motor placement, seat height etc were studied from various online sources to develop the technical Package

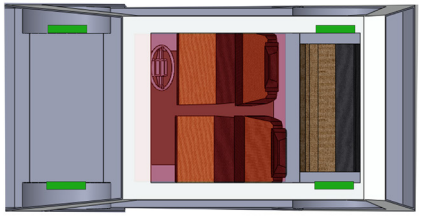
Platform Specifications

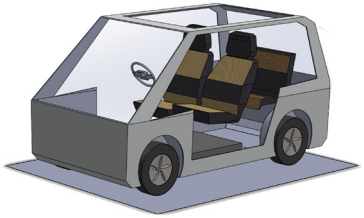
Specifications

Packaging









Technical Package was developed based on the product attributes. Details like tyre size, overhangs, Battery size and placement etc were referenced from Hong Guang Mini EV. The 3D model was modelled in Dassault Systemes Solid works 2020. All the required vehicle specifications are mention here.

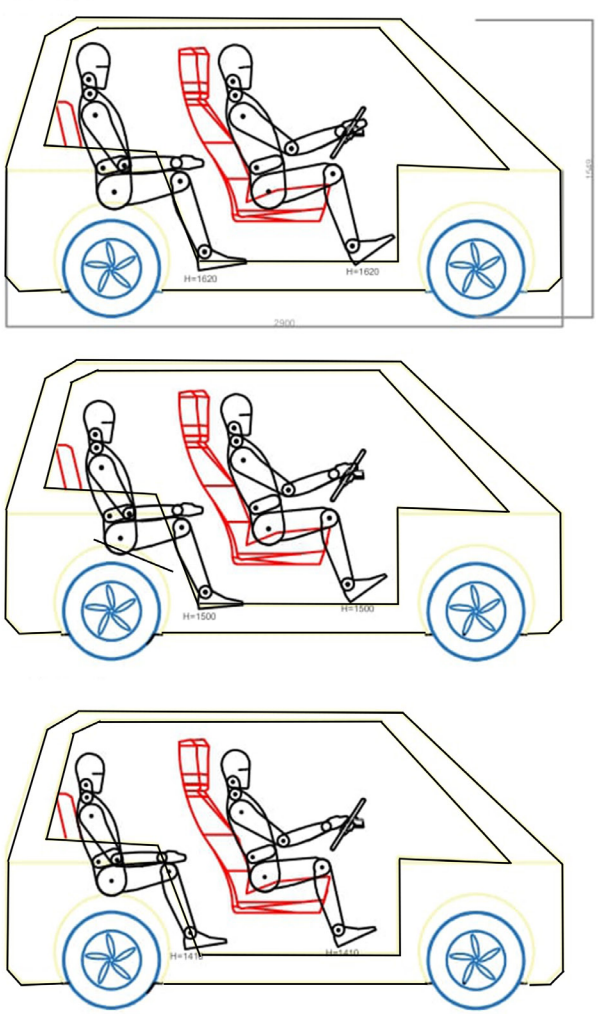
Specifications

Body and Chassis	Class	Micro car
	Body Style	3 door hatchback
	Layout	Independent motor AWD
	Seats	
Dimensions	Length	2950mm
	Width	1450mm
	Height	1550mm
	Wheel Base	1900mm
	Ground Clearance	130mm
	Front Overhang	450mm
	Rear Overhang	550mm
	Tyres	140/70/R12
Powertrain	Electric Motor	30kW, 20kW
	Transmission	Single-speed Automatic
	Battery	10,14,25kWh Li-ion

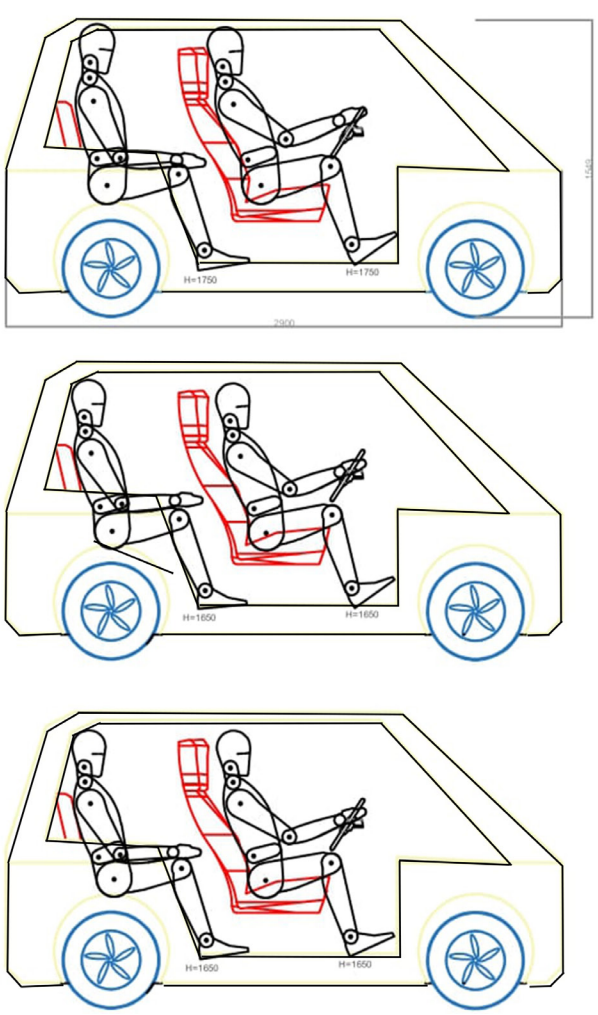
Occupant Package

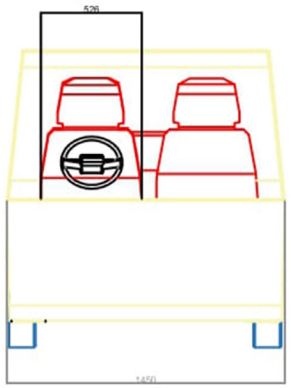
Specifications

95th, 50th, 5th Percentile Female

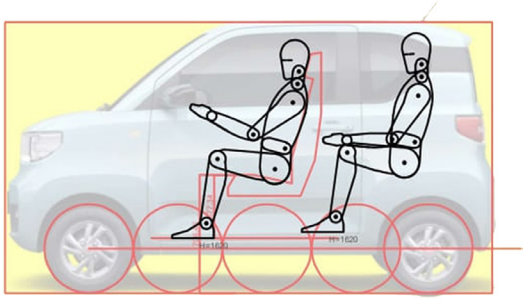


95th, 50th, 5th Percentile Male





Hong Guang Mini EV Reference



Design Brief

To design a micro 4 wheeler which the users can rely on with confidence at any occasion, be it daily commute, socializing or any emergency. The vehicle provides welcoming user space with flexible layout and ample storage.

The vehicle is designed to be your personal guardian angel. The basic idea behind the vehicle is that it provides a cocooned space which takes care of the users at all times. The design and the layout is decided solely based on ease of access and usability by the user The interior and exterior design is inspired from the likes and preferences of users with attention to detail for any specific needs that may arise.
The exterior has a well defined character. It beholds a strong and admirable form with matured stance, packaged in a respectful footprint for the users in mind. The semi organic yet defined silhouette commands an admirable road presence.
The interior talks the same story by continuing the design language from the exterior. Interior is clean and clutter free, with a driver focused layout. It has lean but strong design elements with carefully crafted design details as per the user's lifestyle requirements. They can be reassured about the driving feel and visibility around the car.

Design Brief

user centered
smart commuter
socializing
self sufficient
clever interior features

Narrow roads, tight parking, congested markets.	Dimensioning, slidinig door/scissor door, butterfly doors
Need for multiple seats, socializing, other leisure drives with someone.	4 seat layout
Safety feel, sturdiness, rear view	bold form and precise design language
Interior space, simplicity, non claustrophobic	bold form and precise design language
Smart features and driver assistance	

Trend Study

VW ID Life

Citroen Ami

VW Taxi Concept

VW ID Buzz

Hyundai Ioniq7

Trend study was done to understand the new and innovative concepts in vehicle interior from leading OEMs. Several vehicles including personal commuters, public vehicle, Recreational vehicles, and concepts were looked into. Some of the interesting tends seen as showcased here.

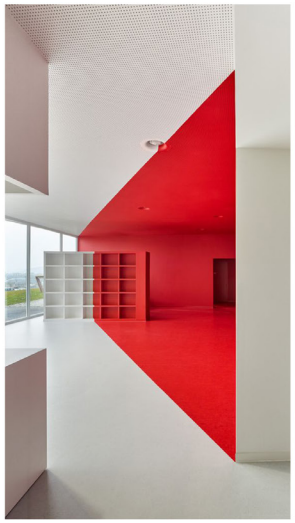
VW ID Life has a very pleasant and clean interior with many party tricks. It has flat folding and retractable seats for customisable interior space. Citroen Ami uses durable floor material to keep it very industrial and practical. It also as nifty storage cubbies around the cabin. VW Taxi concept has a user centred cabin for airport taxi purposes.

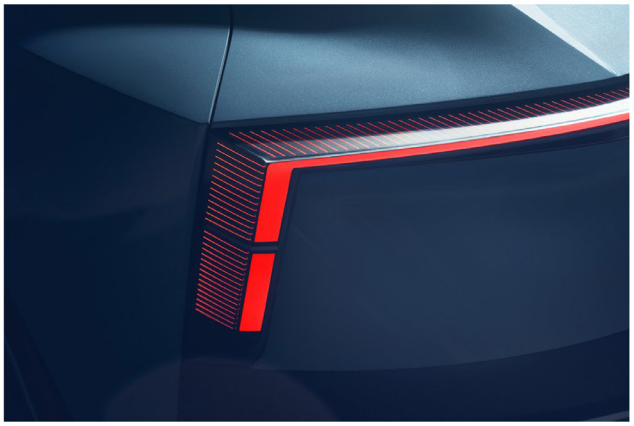
All these concepts focus on a core requirement, that is the user experience and wow factor while using a product. It is important to develop an interior concept specific to the selected user persona, along with the addition of some very useful and interesting utilities within the cabin.

Moodboard

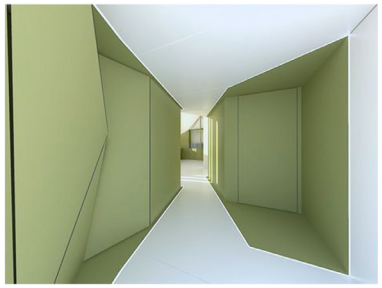
Moodboard

Vibrant





Bold



Celebrate

Modern

A mood board reflecting the personalities of the primary user was developed. The users enjoy a vibrant and celebrated experience with bold and modern design elements giving them the confidence and support they deserve.

Theme Board

Themeboard

Modern

Clean

Green

Pleasant

Ideation Stage

Ideation stage

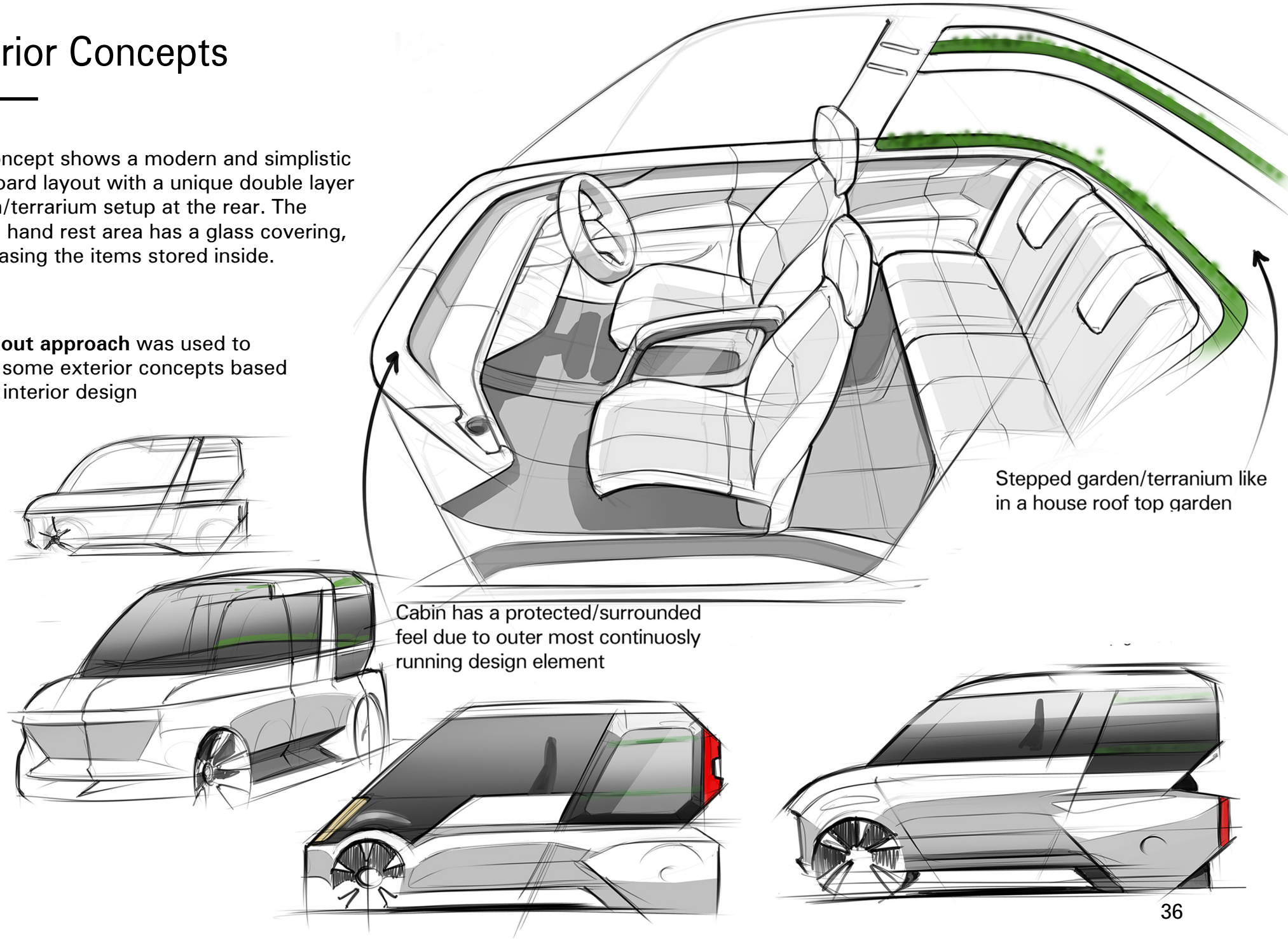
With the product attributes detailed out, ideation stage started with developing appropriate mood board and themeboard. The moodboard was required to reflect the primary users's personality and lifestyle. Care was taken while selecting the keywords through which the images were picked. The keywords for moodboard are, Celebrate, Vibrant, Bold and Modern. The board showcases a very colourful yet controlled to be bold and modern at the same time. This sort of mood should provide a very confident and inspiring exterior design for the primary user.

Themeboard was mainly used for interior ideation. The board has images reflecting the aspirations of the user, with a modern, clean, green and pleasant design elements all around. The images mainly comprised of concept interior designs and futuristic layouts. One of the main focus in interior ideation was to create a cabin which uplifts the spirits of the user, to be a meditative space where there is no clutter and confusion. The mindfulness aspect of design was to be incorporated through ideations and explorations.

Interior Concepts

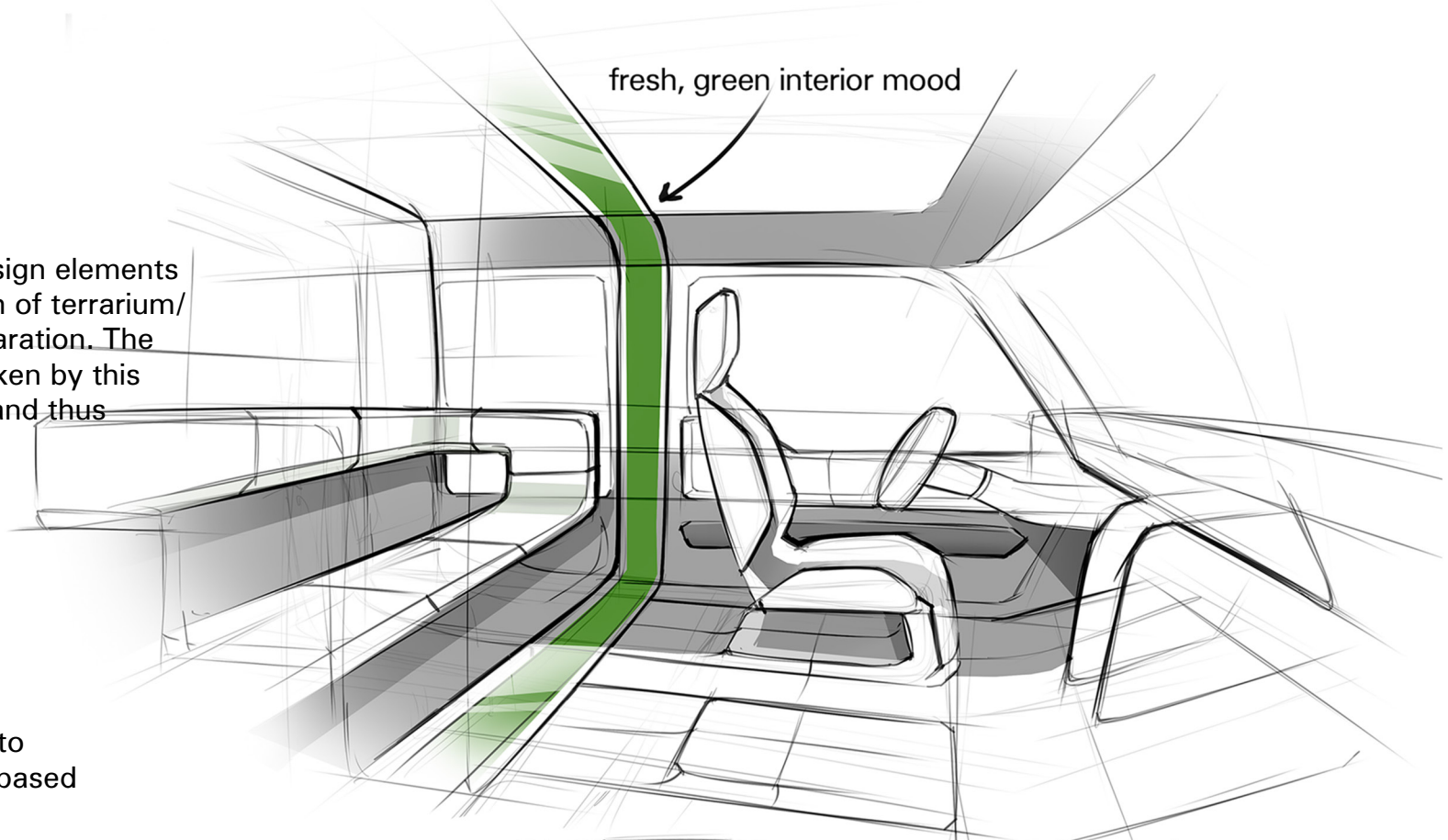
The concept shows a modern and simplistic dashboard layout with a unique double layer garden/terrarium setup at the rear. The central hand rest area has a glass covering, showcasing the items stored inside.

Inside out approach was used to create some exterior concepts based on the interior design

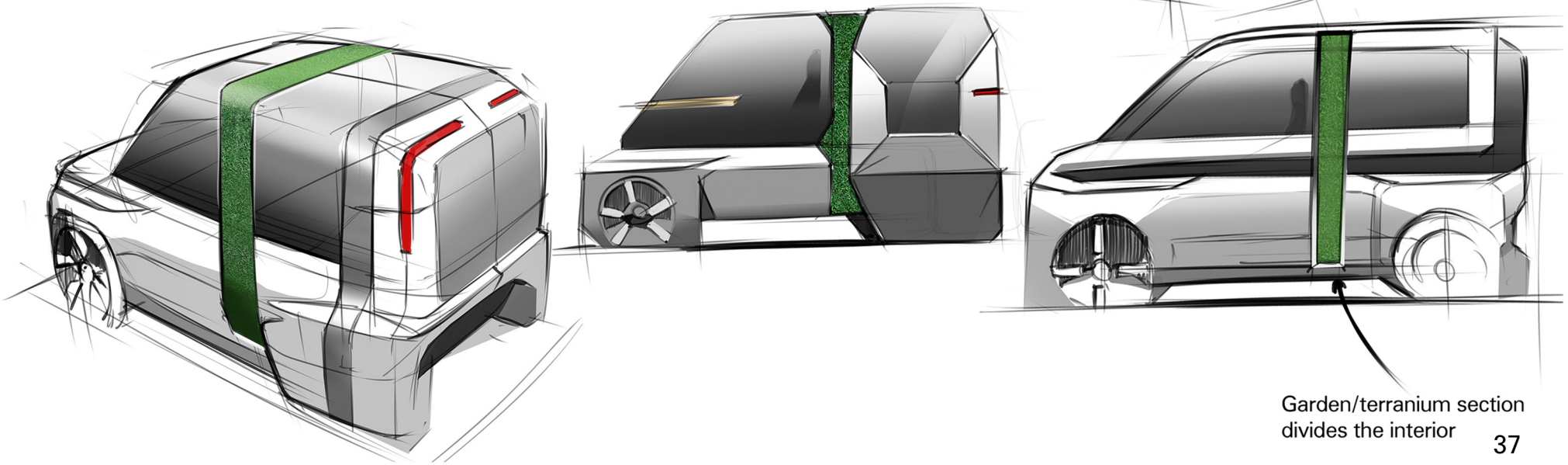


Interior Concepts

This concept has geometric design elements dominated by a central partition of terrarium/ green plants within a glass separation. The whole focus of the interior is taken by this partition, visible from exterior, and thus creating a distinct exterior look.

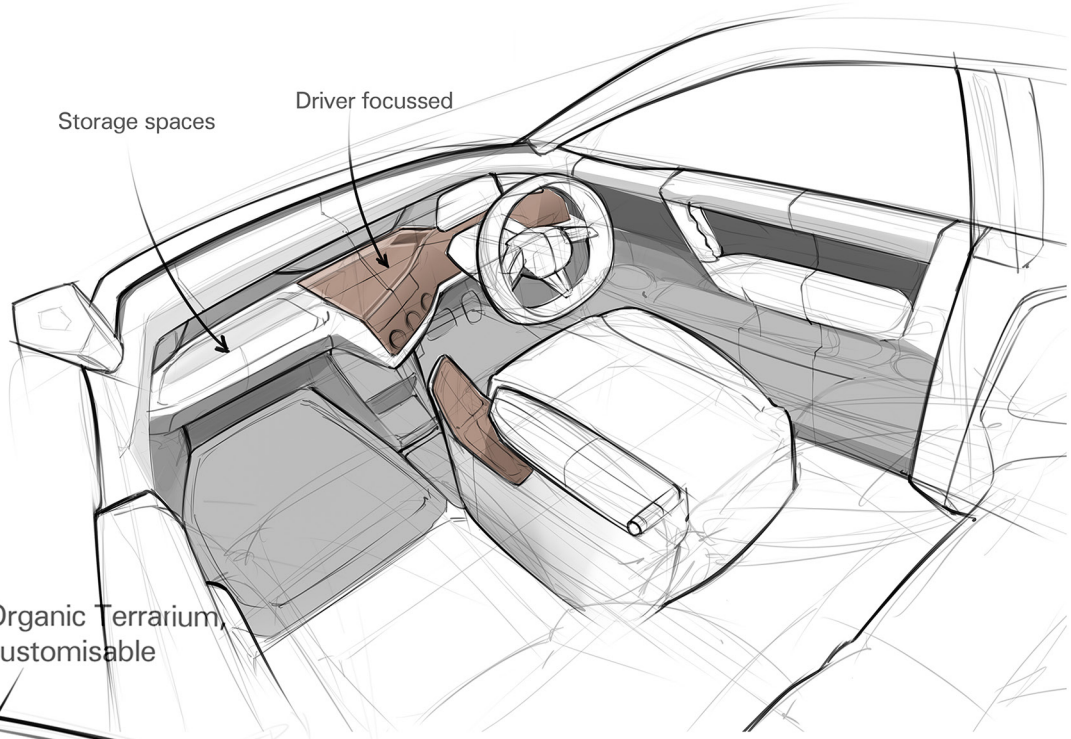


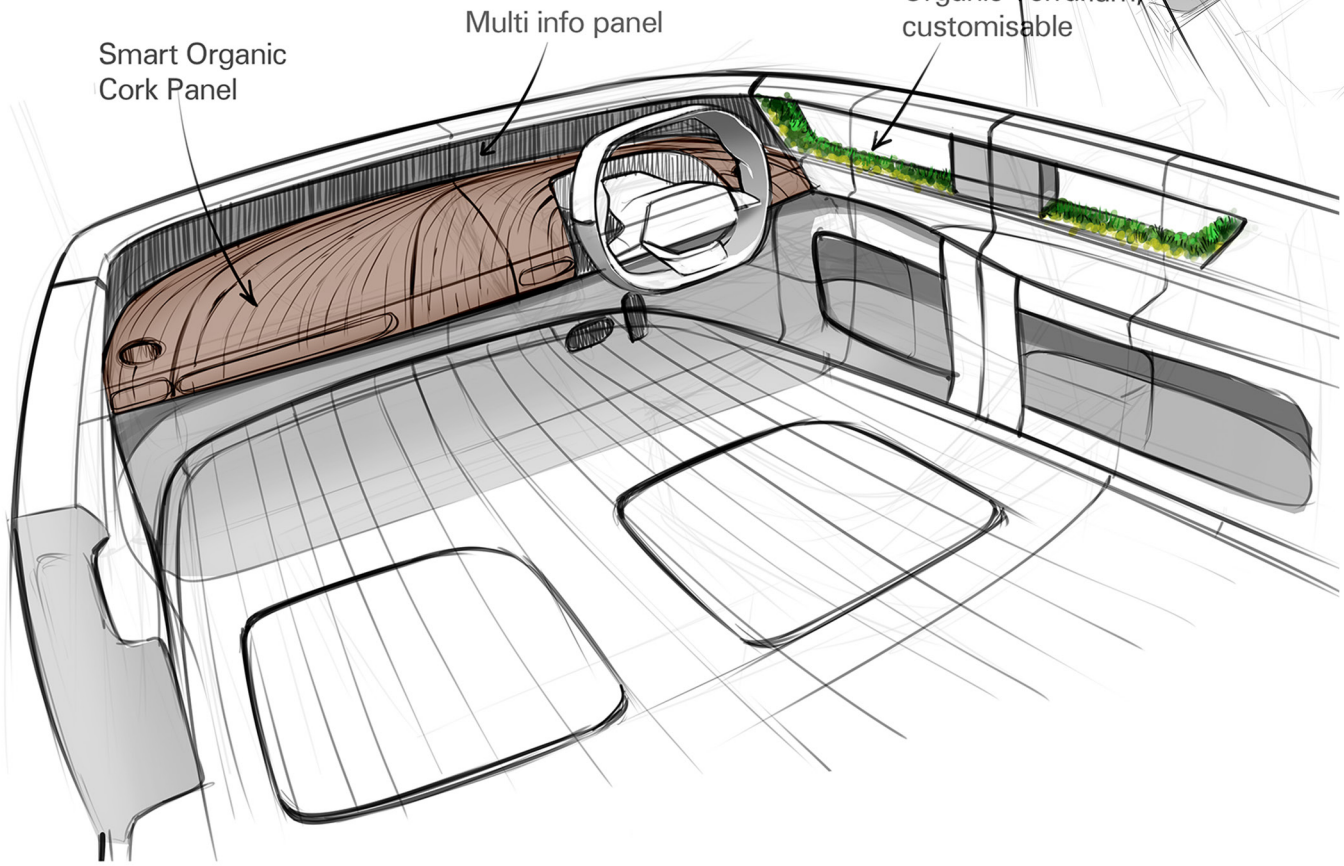
Inside out approach was used to create some exterior concepts based on the interior design



Interior Concepts

This concept has a minimalist dashboard layered in organic cork material. The buttons are embedded into the panel and rises up as and when required. The door panels also house see through terrariums.



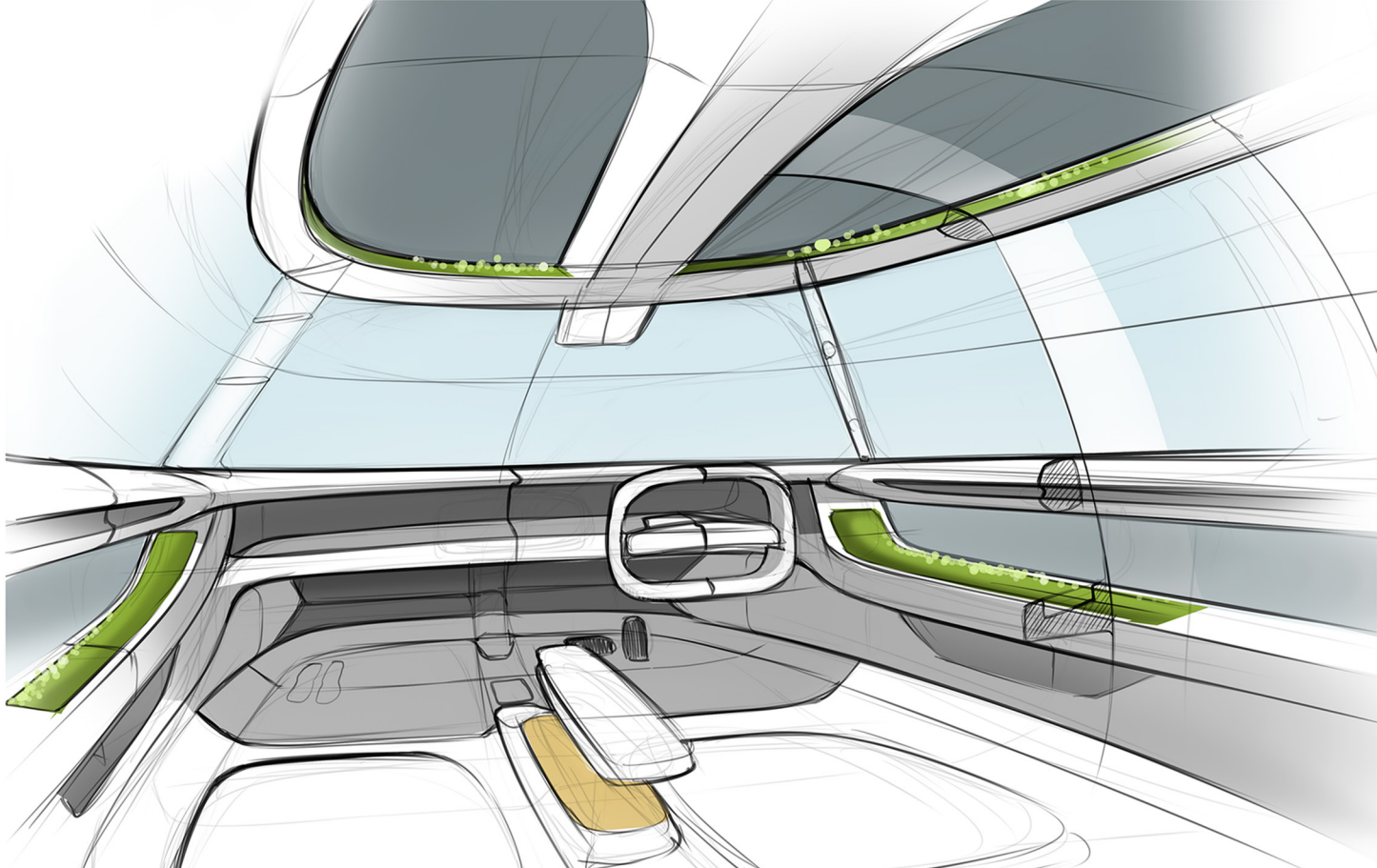


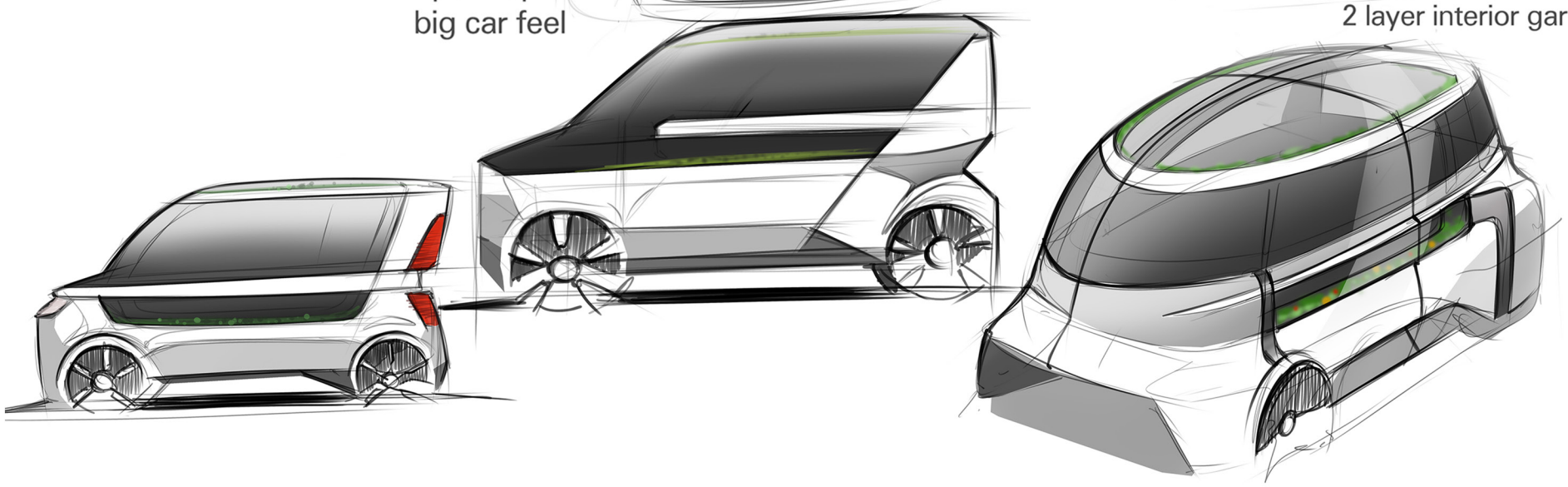
Few interior layout explorations showing basic controls around the driver

Interior Concepts

This concept has a lounge-like atmosphere, due to the all-around glass panelling creating an immersive experience. The door panels house terrariums which can be seen from outside as well. The roof is split into two by a prominent section running from the front windshield.

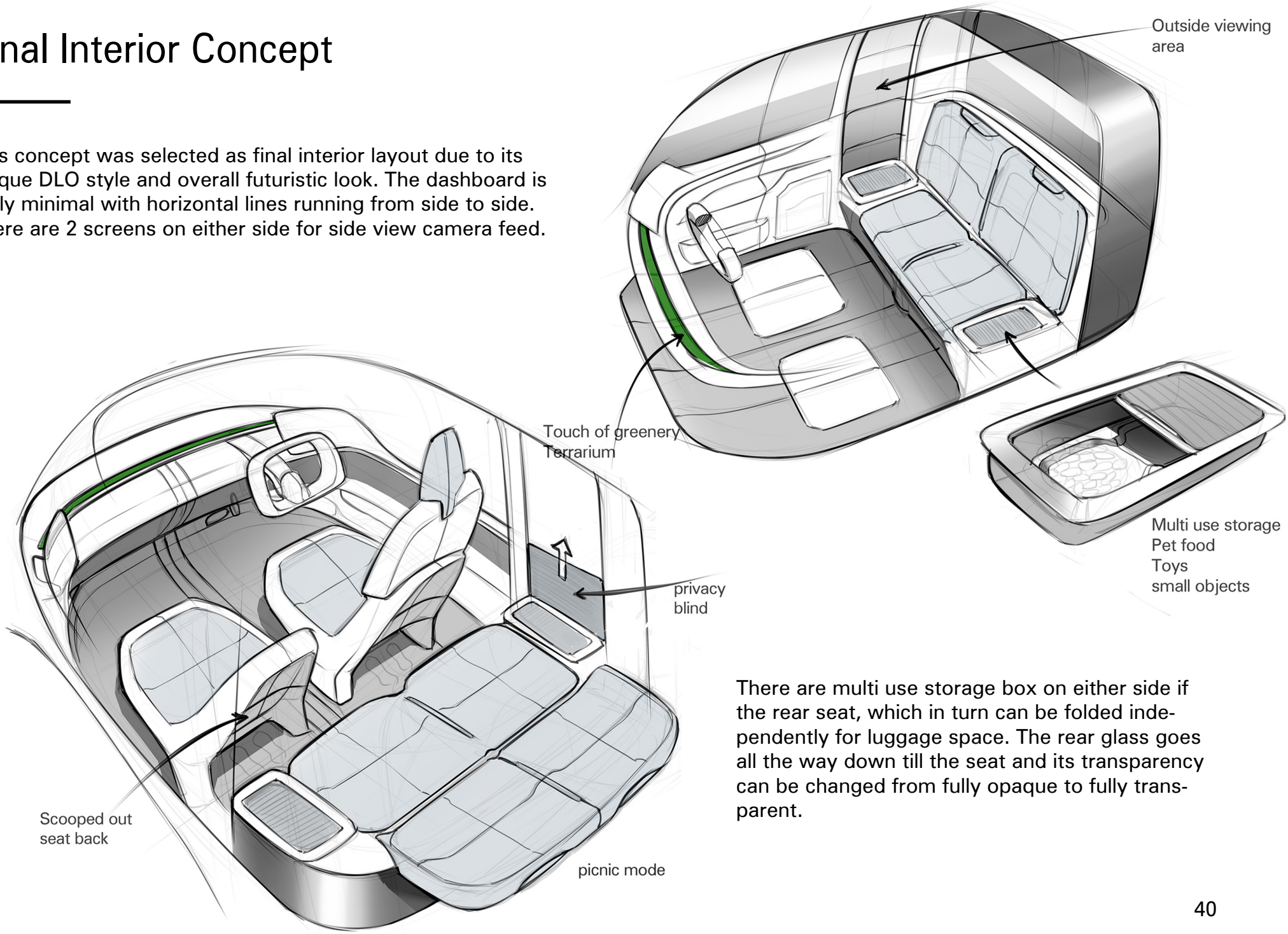
Inside out approach was used to create some exterior concepts based on the interior design





Final Interior Concept

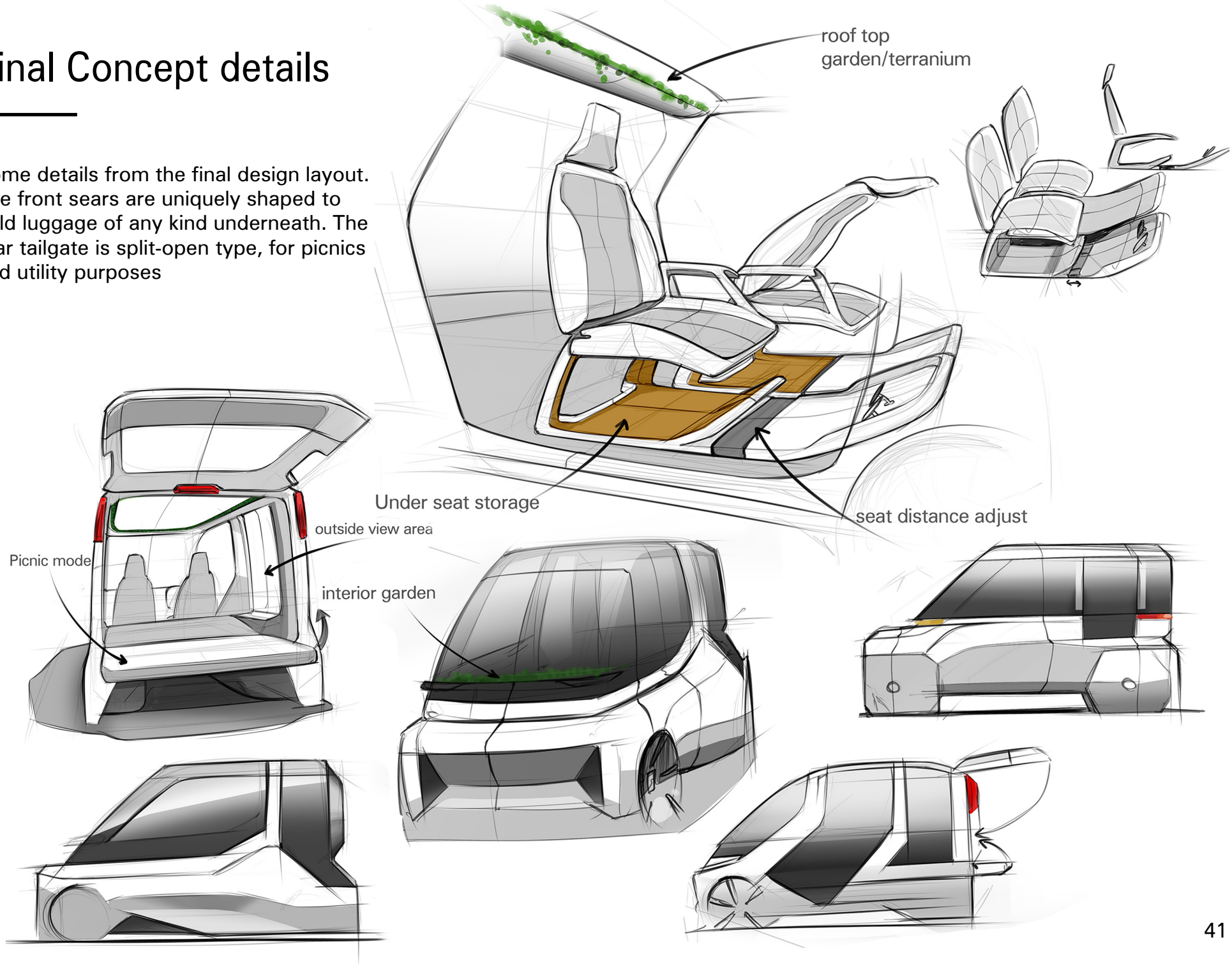
This concept was selected as final interior layout due to its unique DLO style and overall futuristic look. The dashboard is fairly minimal with horizontal lines running from side to side. There are 2 screens on either side for side view camera feed.



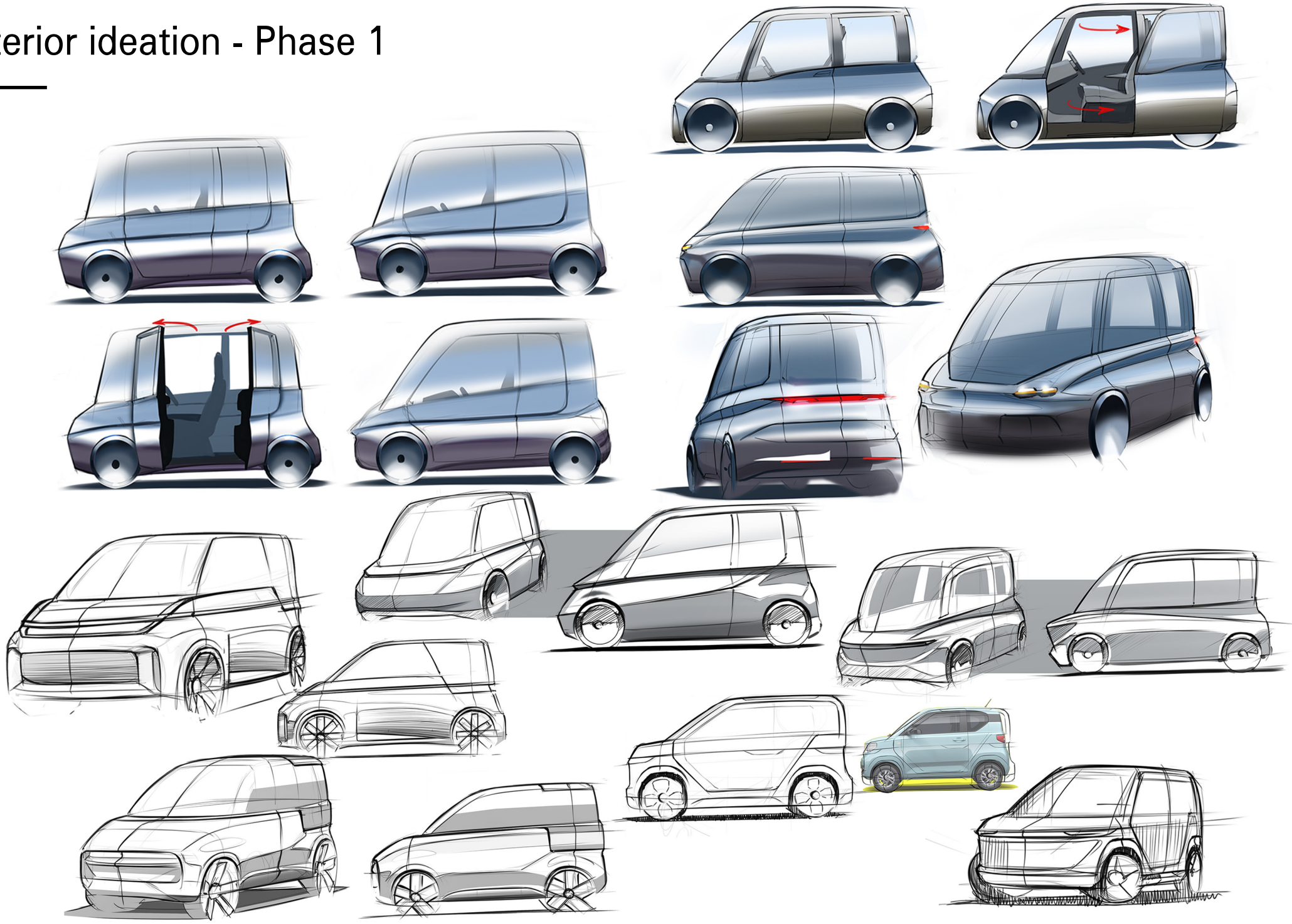
There are multi use storage box on either side if the rear seat, which in turn can be folded independently for luggage space. The rear glass goes all the way down till the seat and its transparency can be changed from fully opaque to fully transparent.

Final Concept details

Some details from the final design layout. The front sears are uniquely shaped to hold luggage of any kind underneath. The rear tailgate is split-open type, for picnics and utility purposes

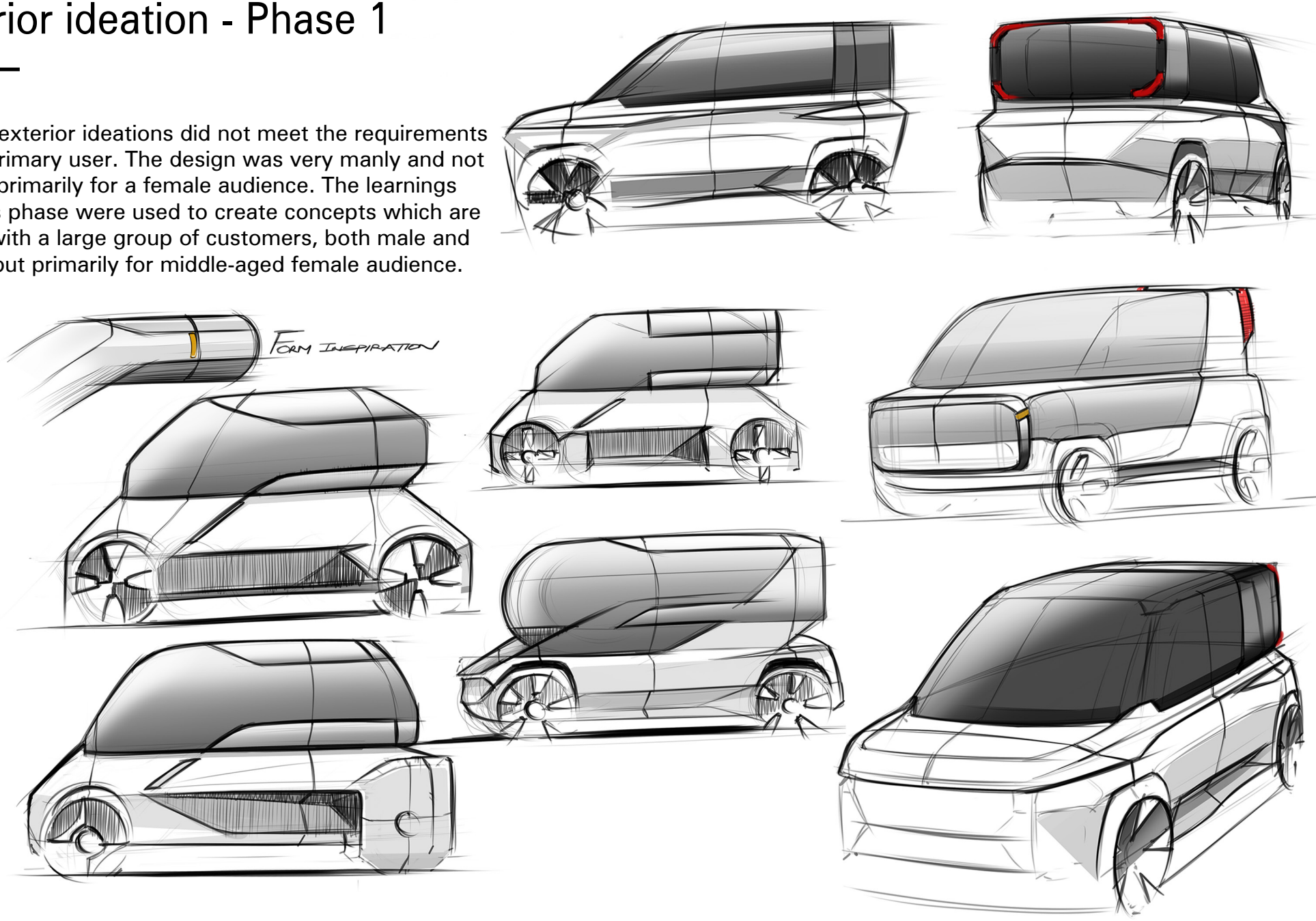


Exterior ideation - Phase 1



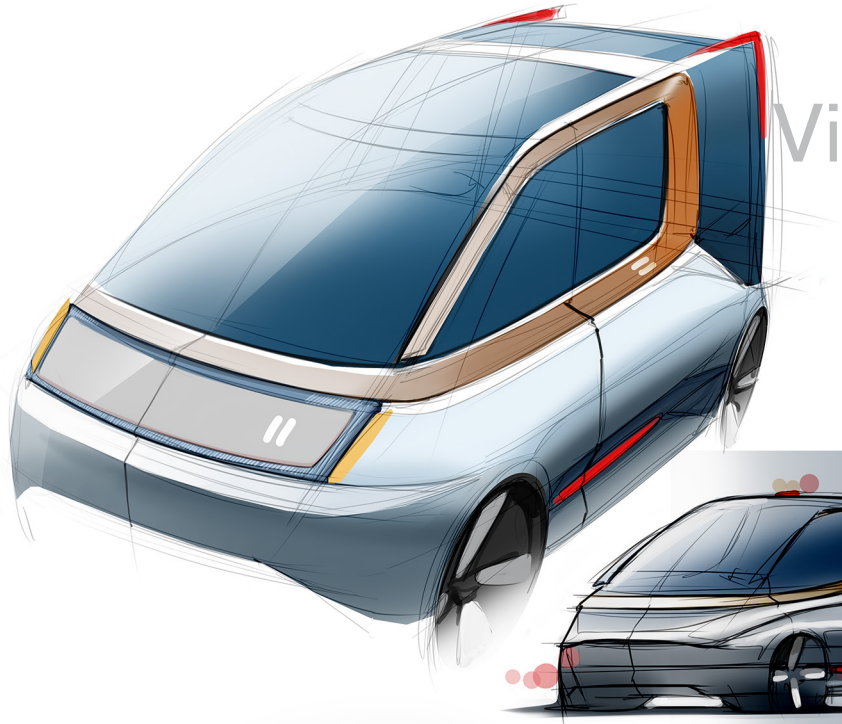
Exterior ideation - Phase 1

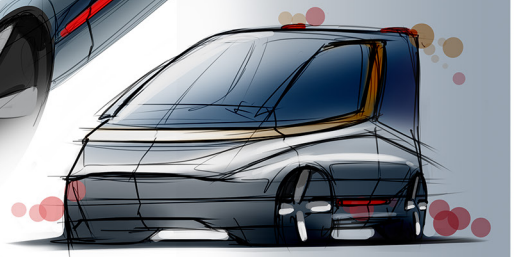
Phase 1 exterior ideations did not meet the requirements for the primary user. The design was very manly and not suitable primarily for a female audience. The learnings from this phase were used to create concepts which are in sync with a large group of customers, both male and female, but primarily for middle-aged female audience.

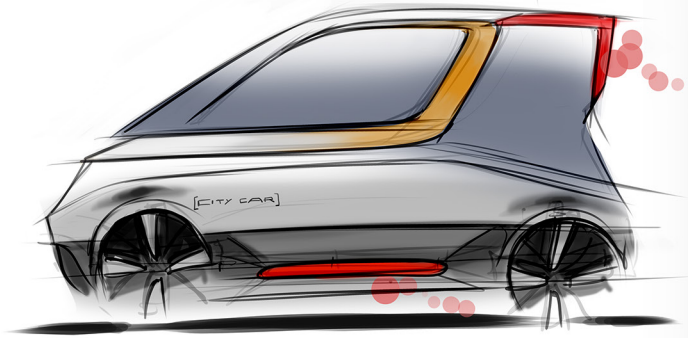


Exterior ideation - Phase 2

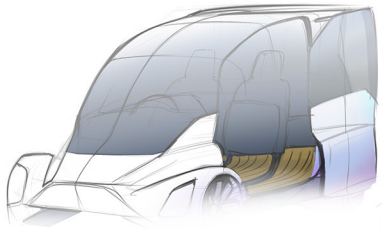
Celebrate

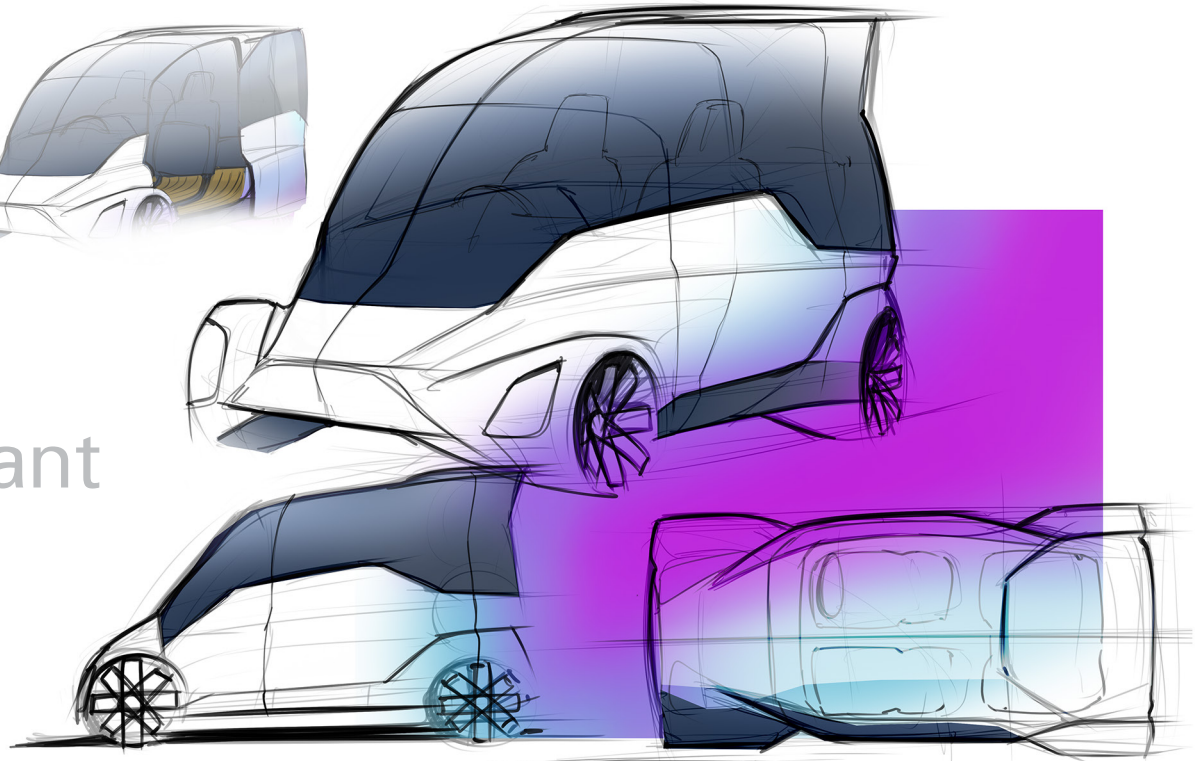




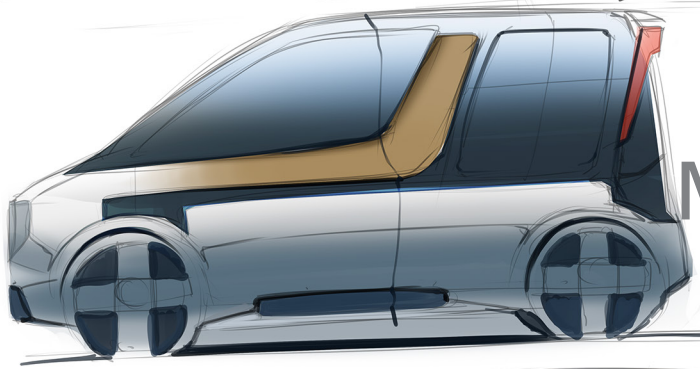


Vibrant

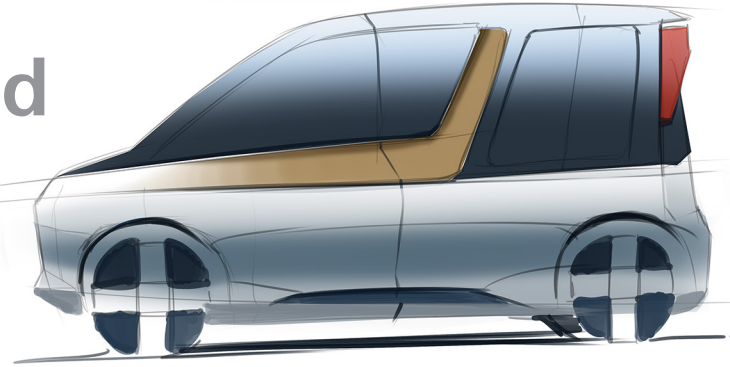




Modern

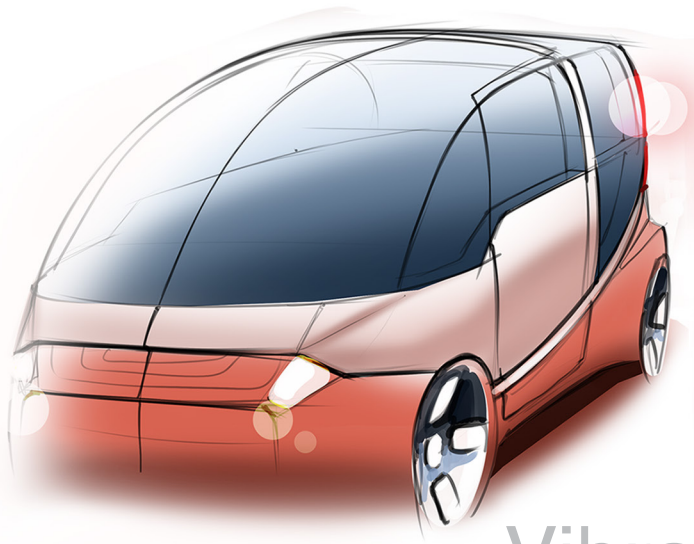


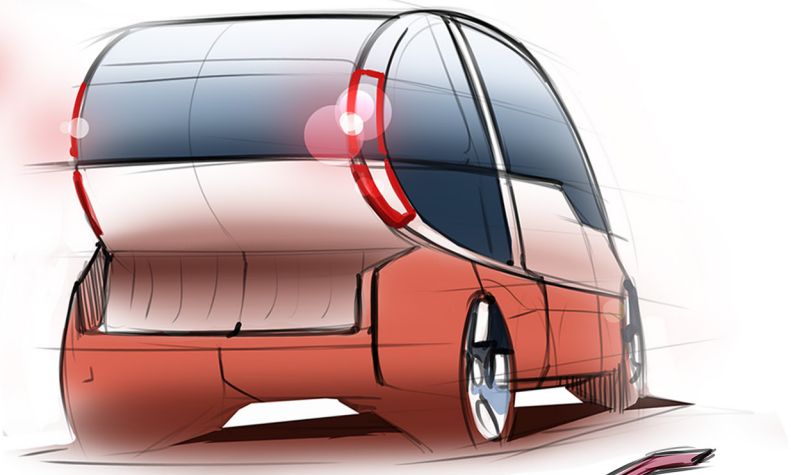
Bold



Exterior Concepts

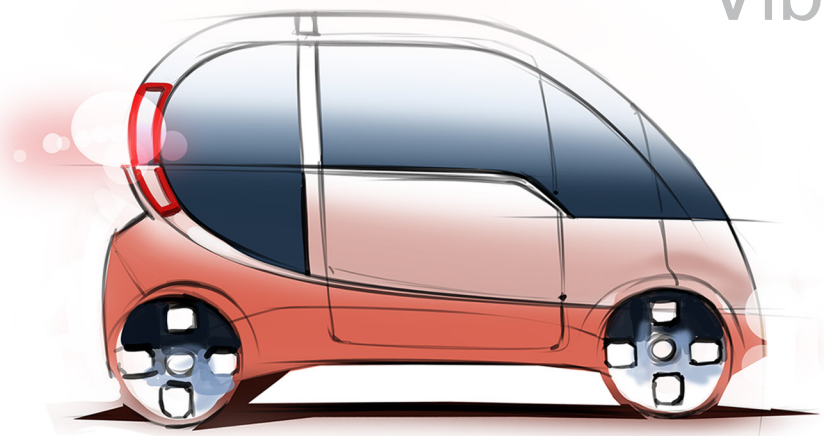
Celebrate

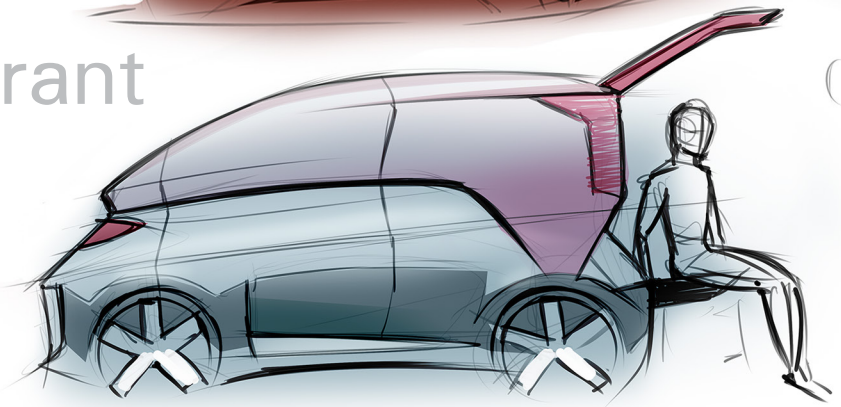




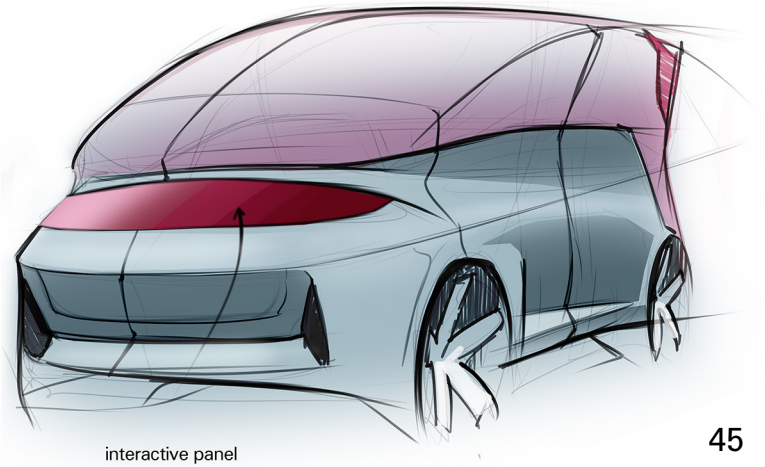
Vibrant

Modern





Bold



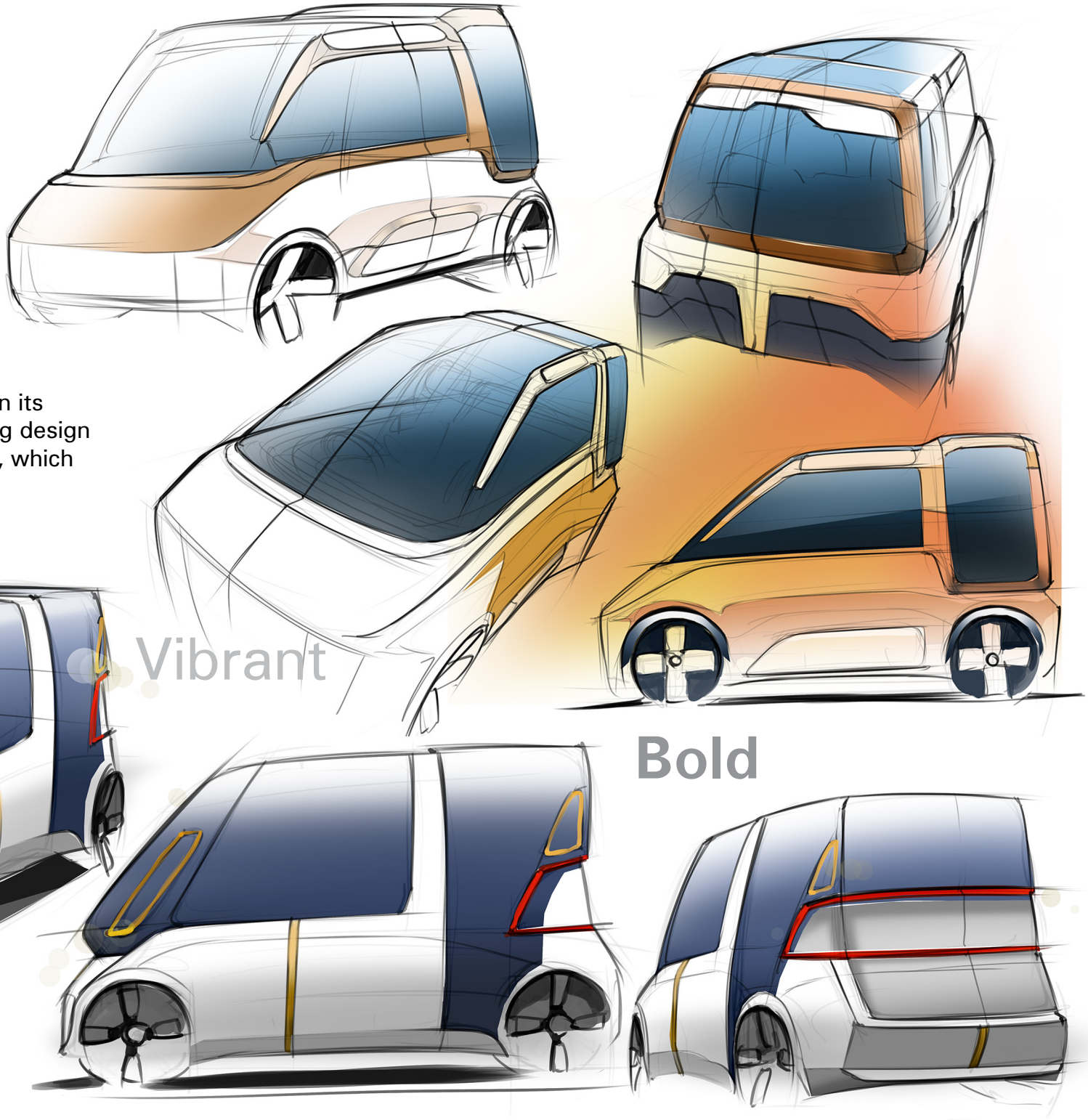
Phase 2 ideations really tried to incorporate the keywords from moodboard along with the interior layout so that the design is user specific.

interactive panel

Exterior Concepts

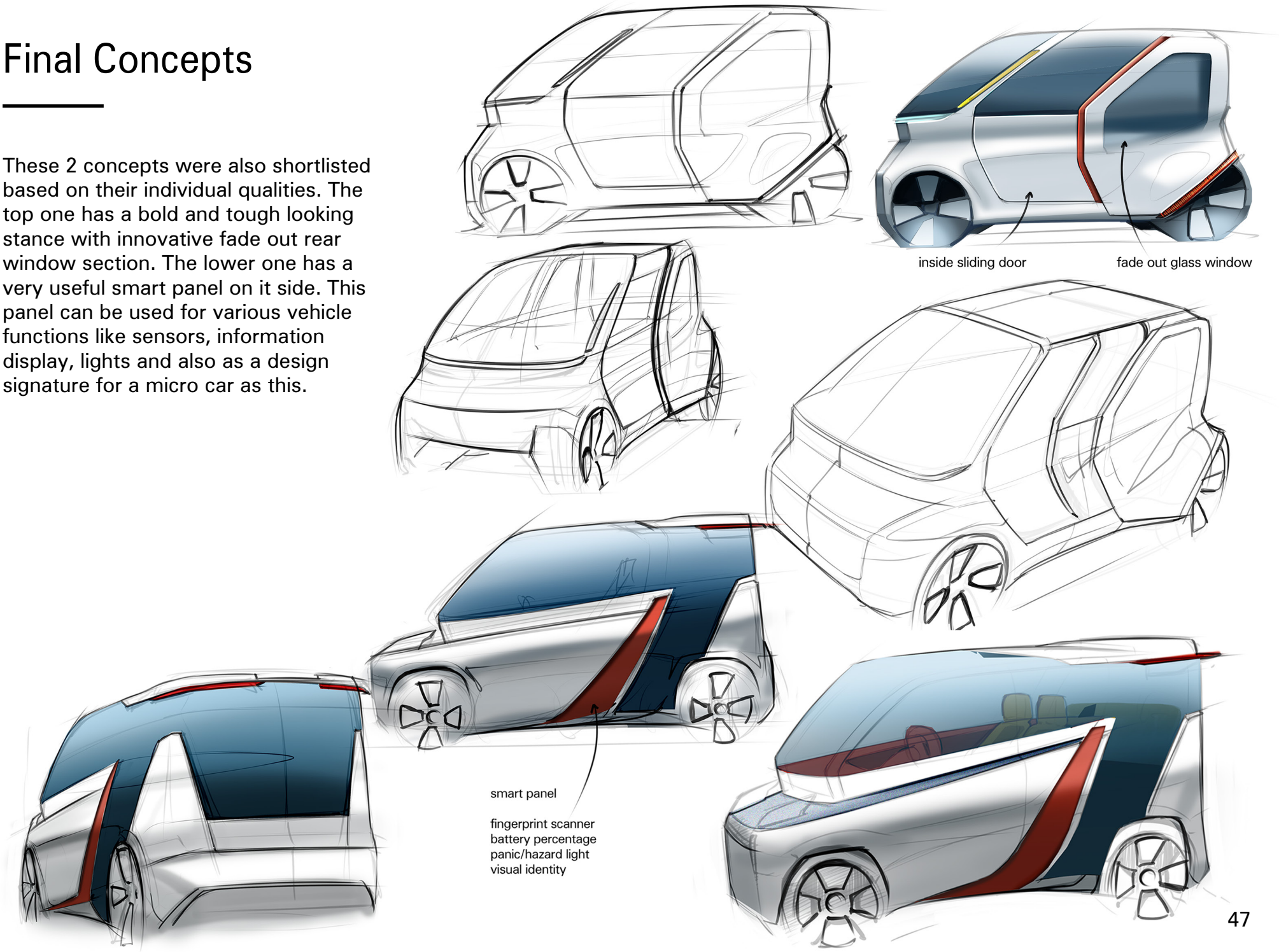
Celebrate

The lower concept was shortlisted, based on its futuristic look, bold silhouette and interesting design details such as lights and prominent B-pillar, which makes it a smart choice for the user.



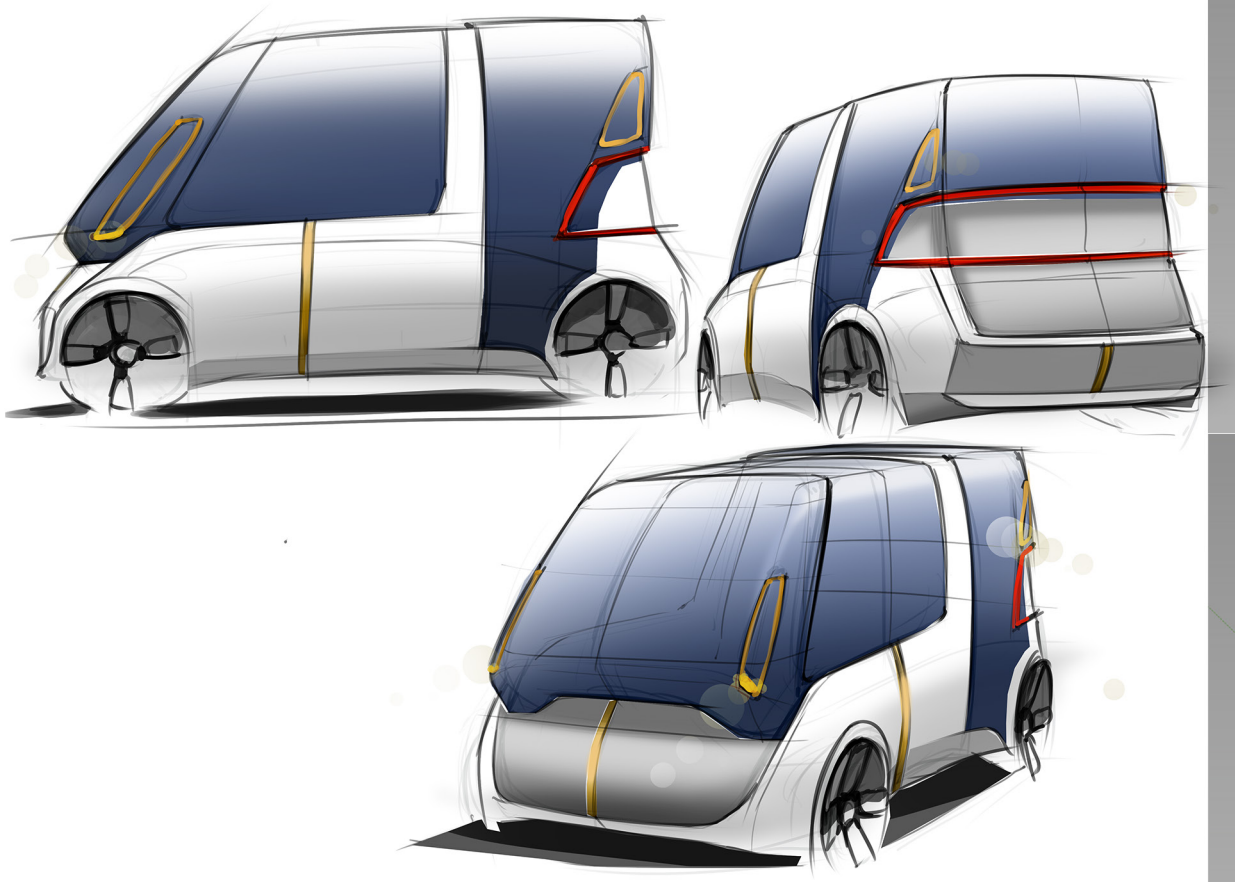
Final Concepts

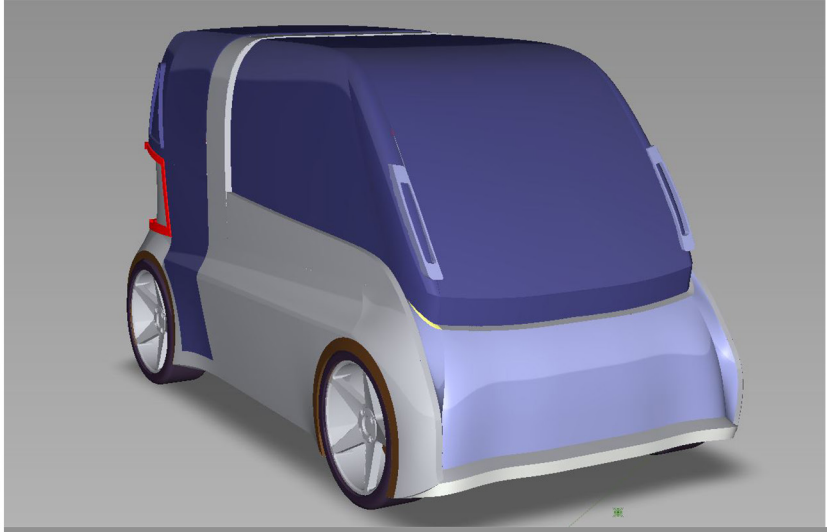
These 2 concepts were also shortlisted based on their individual qualities. The top one has a bold and tough looking stance with innovative fade out rear window section. The lower one has a very useful smart panel on it side. This panel can be used for various vehicle functions like sensors, information display, lights and also as a design signature for a micro car as this.

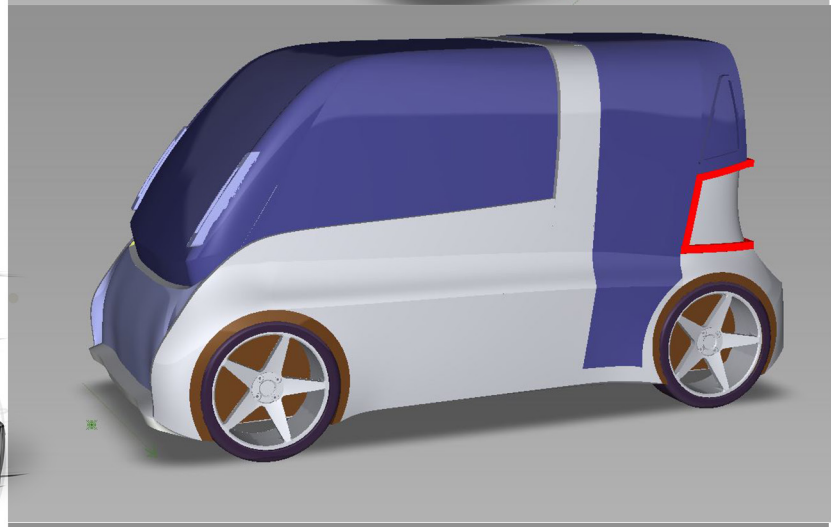


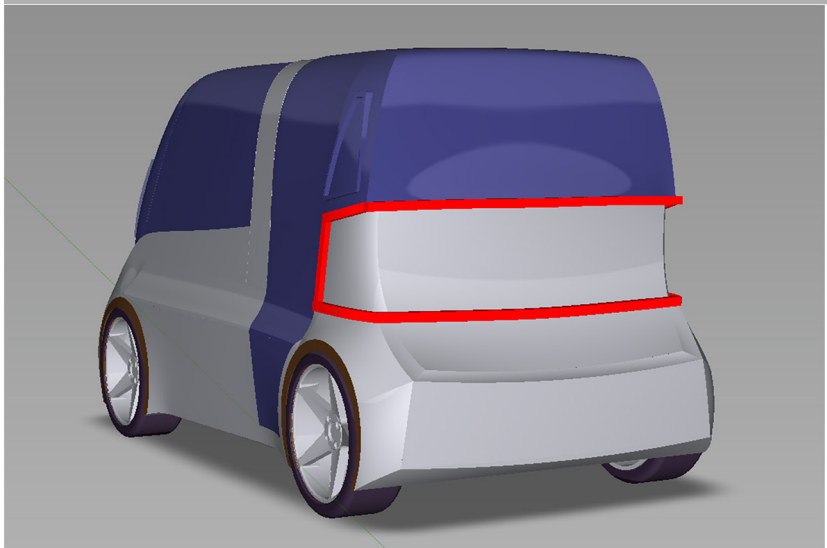
3D Model - 1

A 3D Cad model was made based on the first shortlisted concept for further ideations.



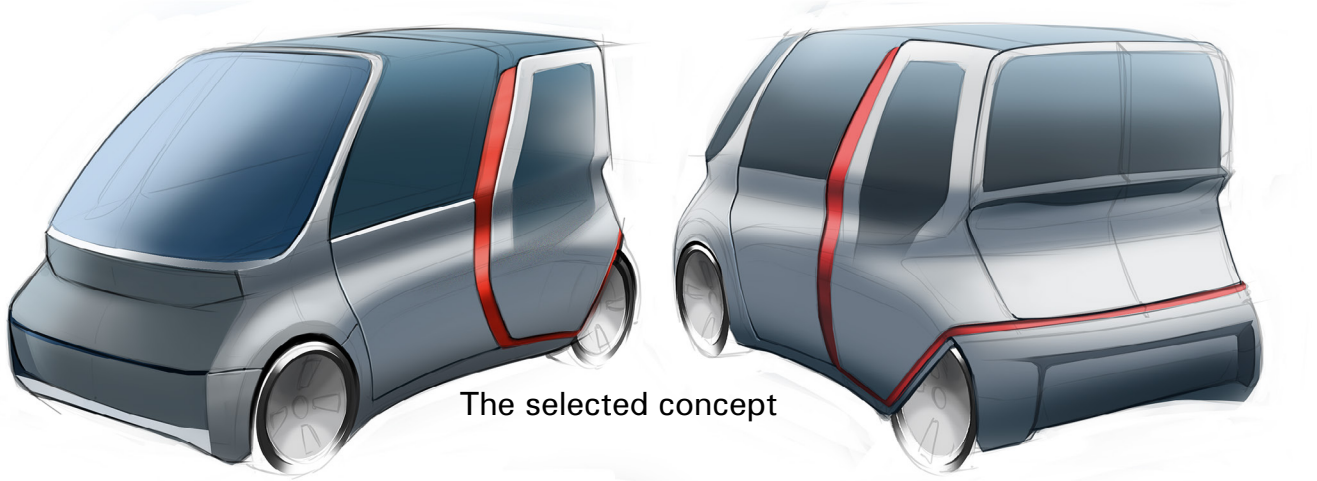




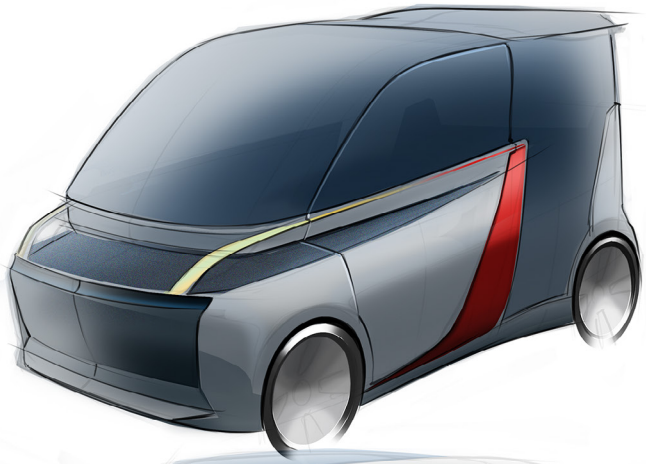


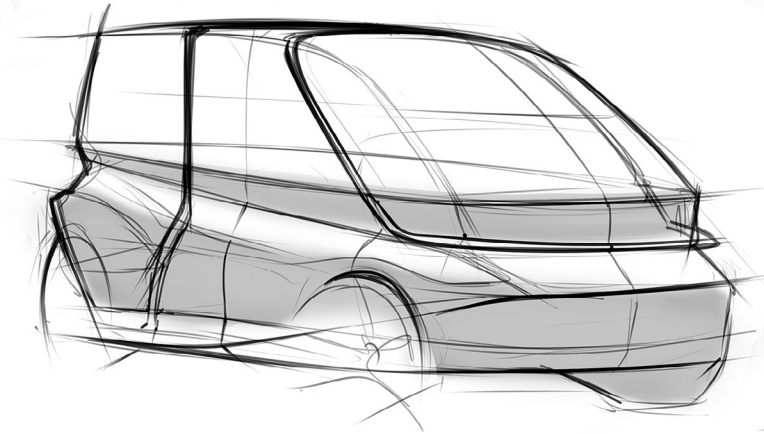
Key Sketches

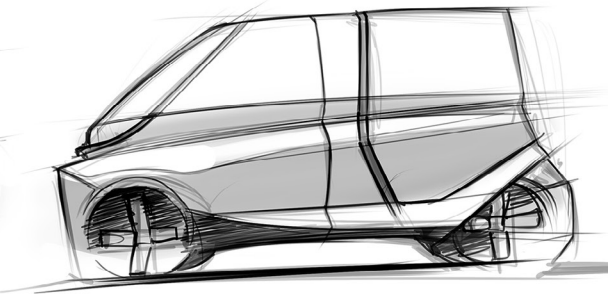
The second and third shortlisted concepts were sketched with the CAD model as underlay. More details in terms of light catchment, reflections, body surfacing was added on these renders so that the best one out of these can be selected.

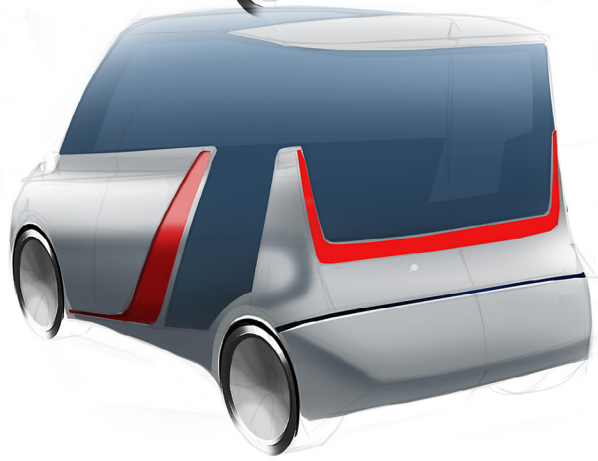


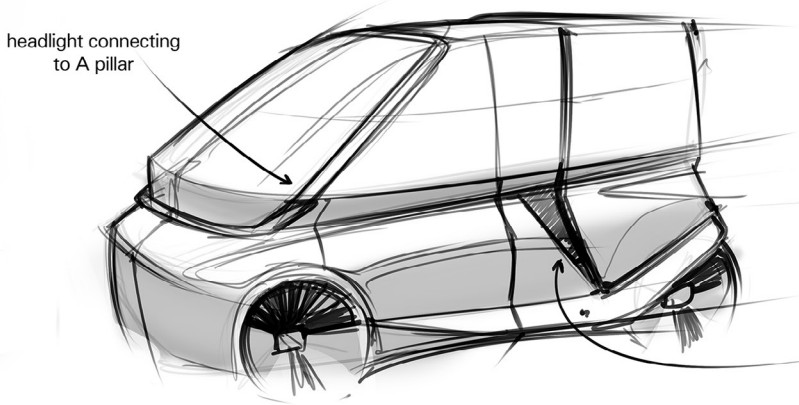
The selected concept

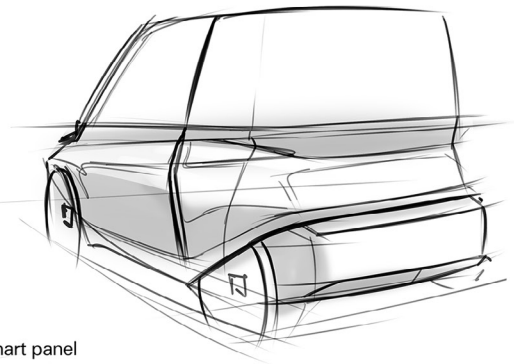








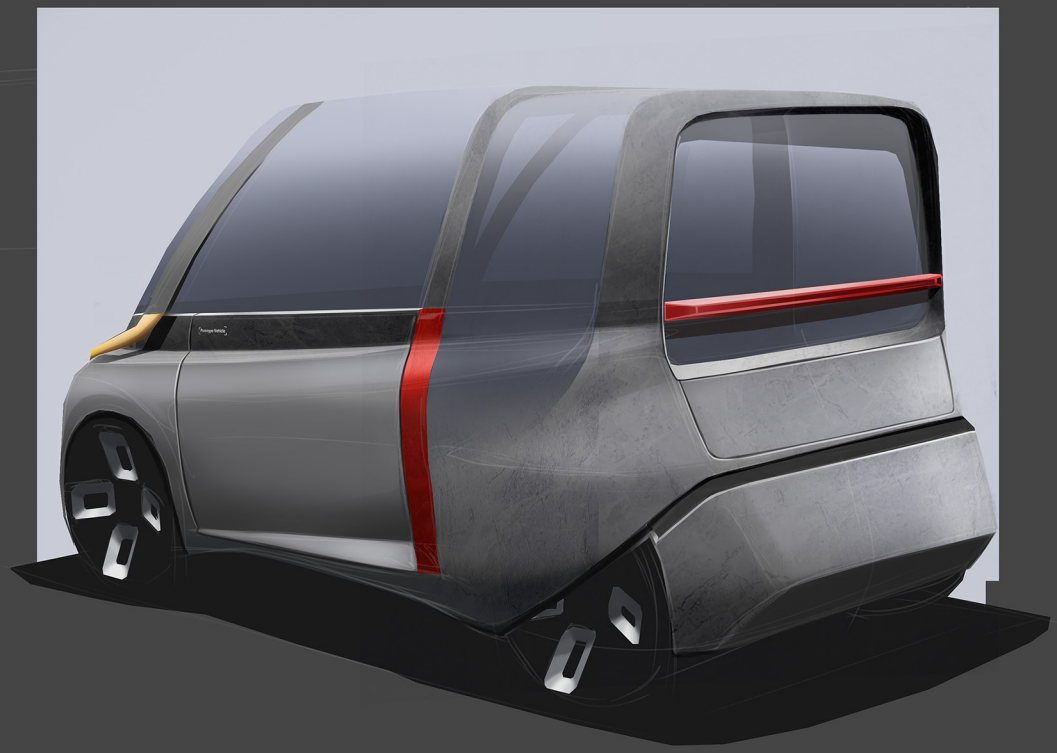


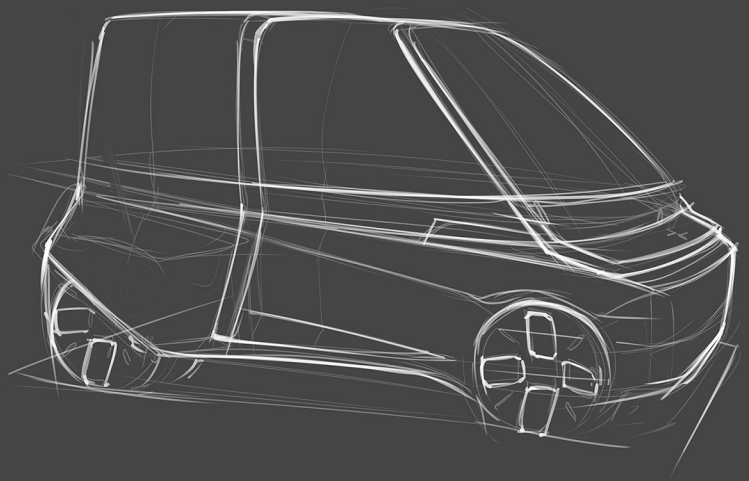


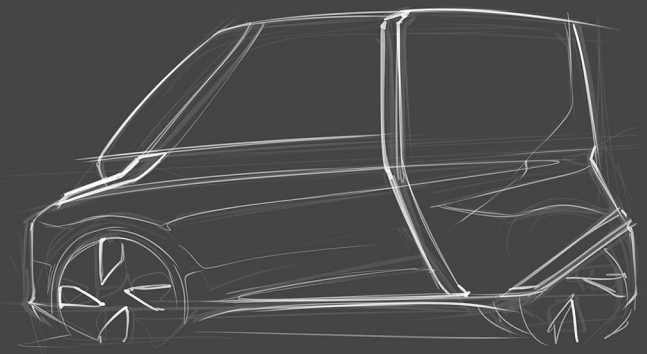
Final Direction

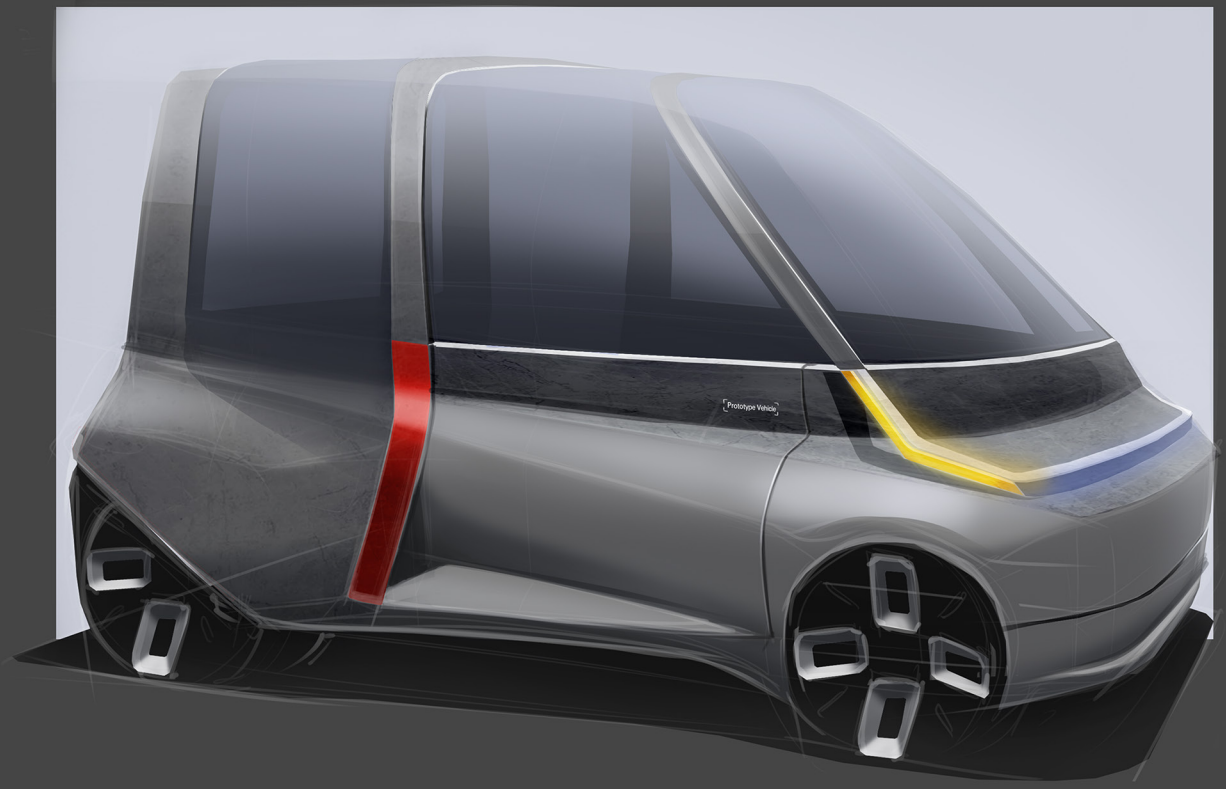
More detailed renders showcasing the body surfacing and other vehicle details were developed. Few feedbacks in terms of smart panel positioning, lower light catchment area and the DLO height were noted to be optimised for the next stage of renders

A 1:10 foam model was also made to verify the surface flows, and to visibly inspect any design changes required for the next phase.

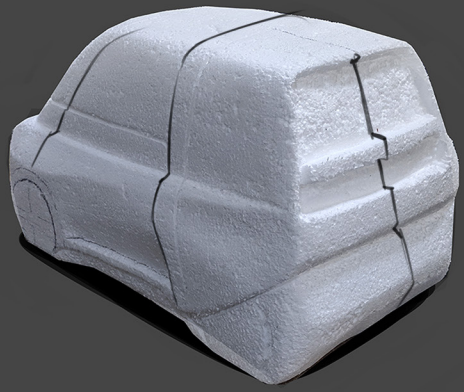








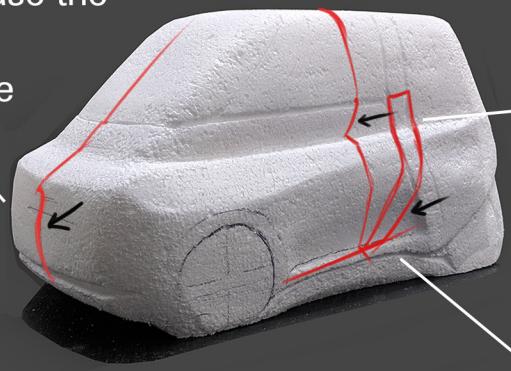
1:10 Foam Mockup



This can increase the boldness and improve stance

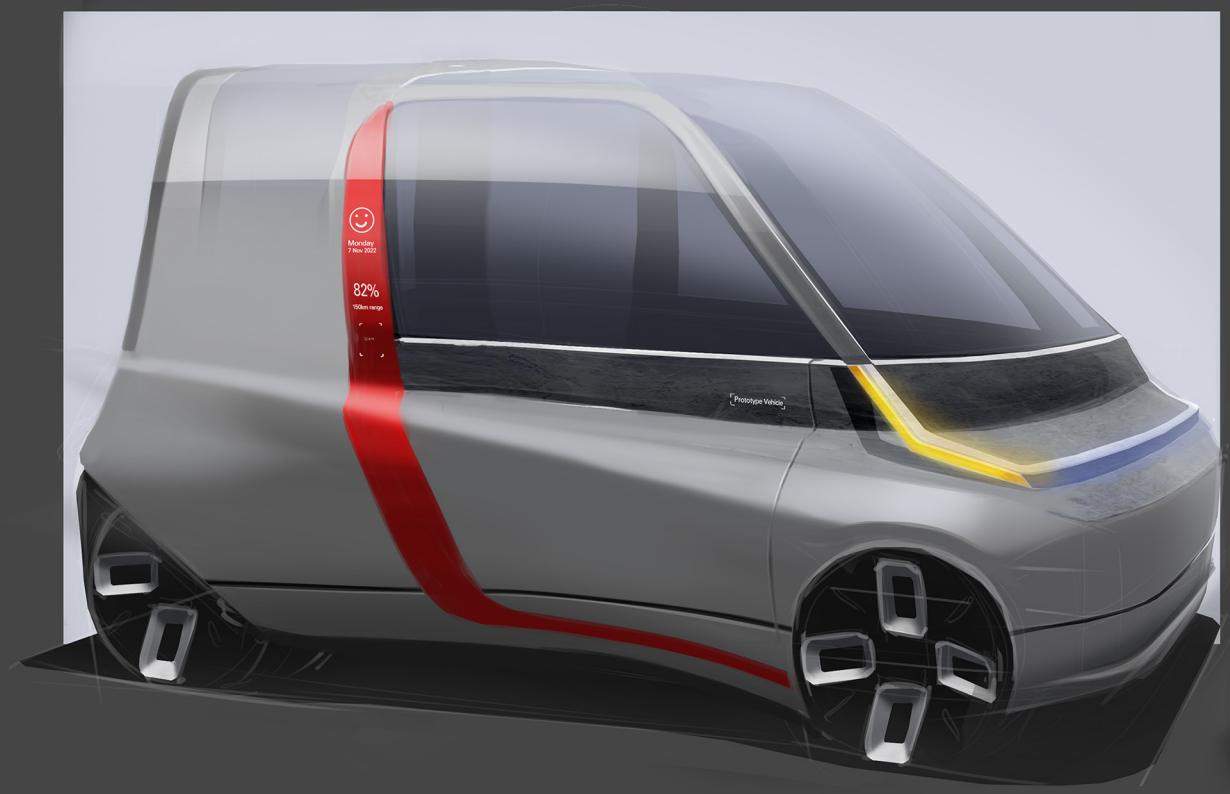
tuck in the shoulder panel

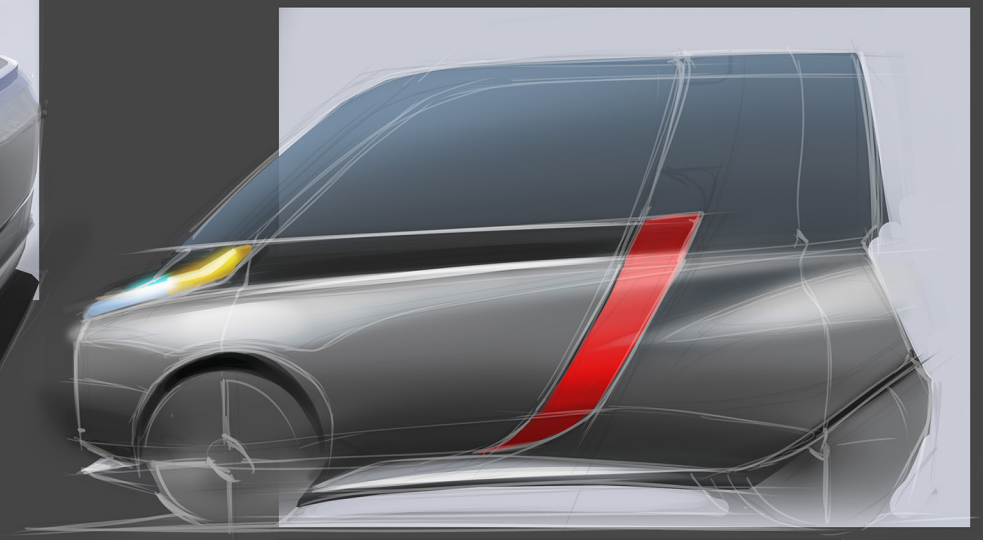
smart panel kicking frontwards

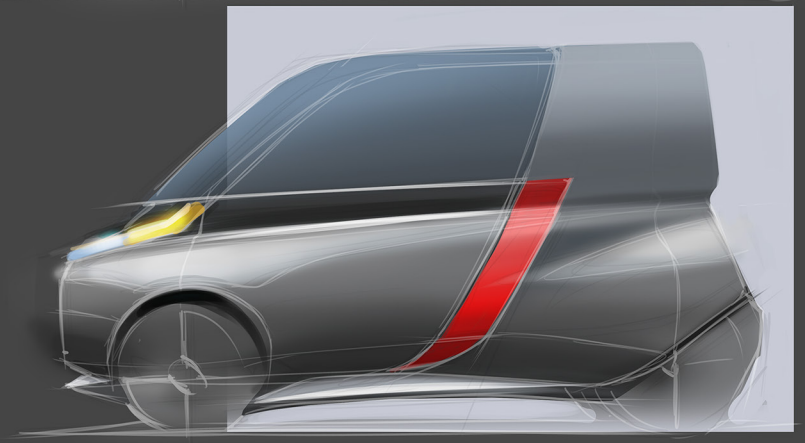


Changes required

Final Direction

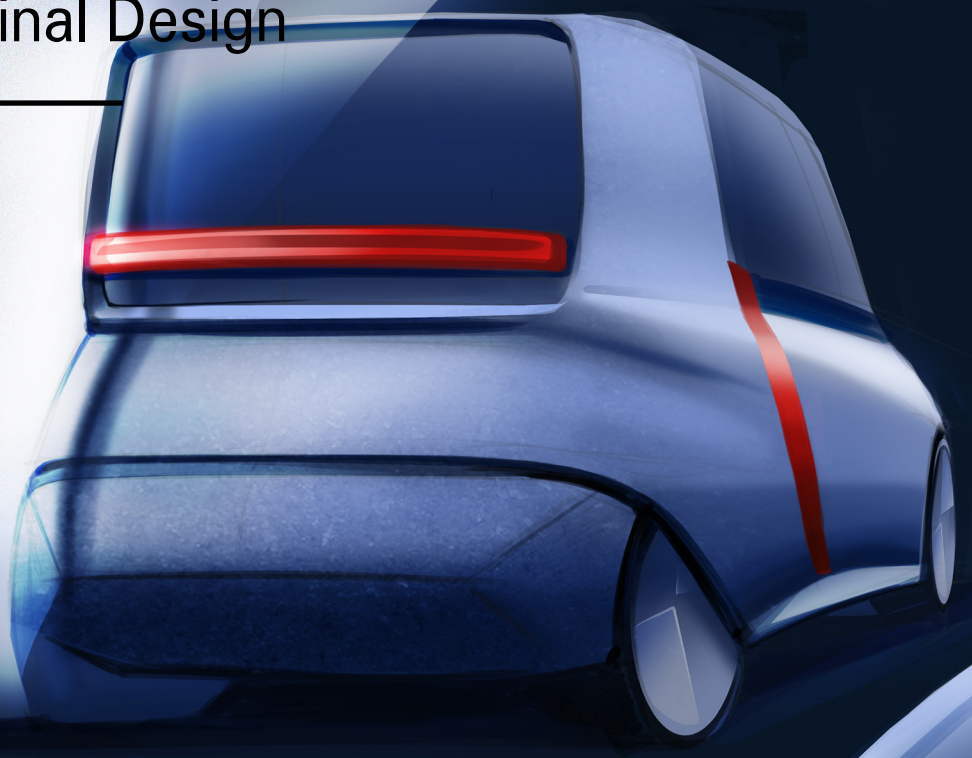


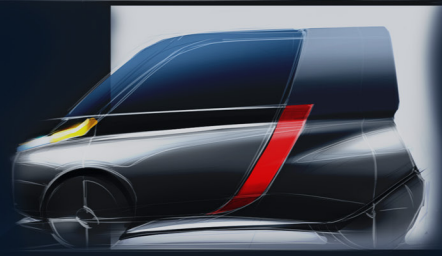


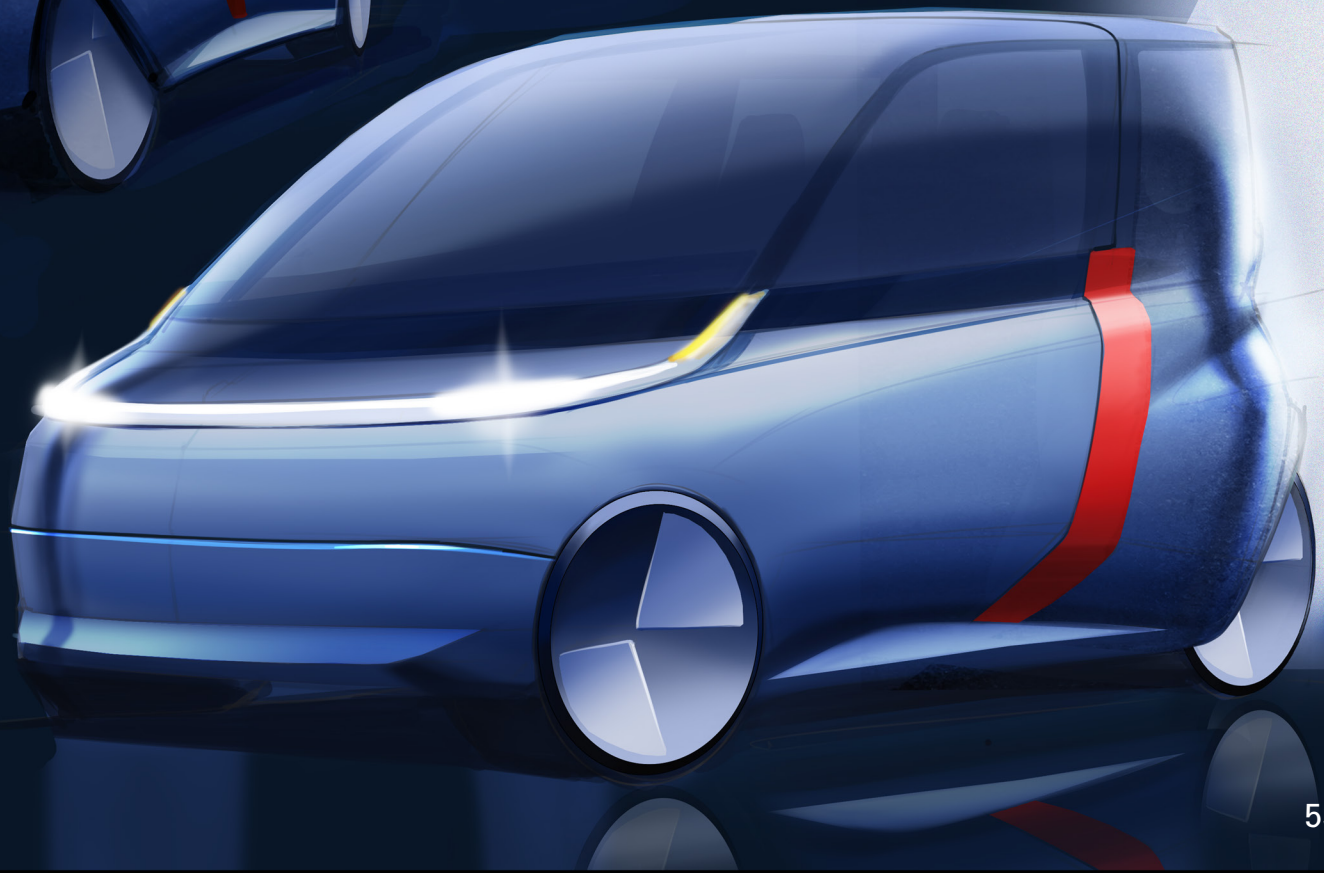


Few changes made on the final render. The rear section is covered up showing the smart rear windows which can change its transparency.

Final Design



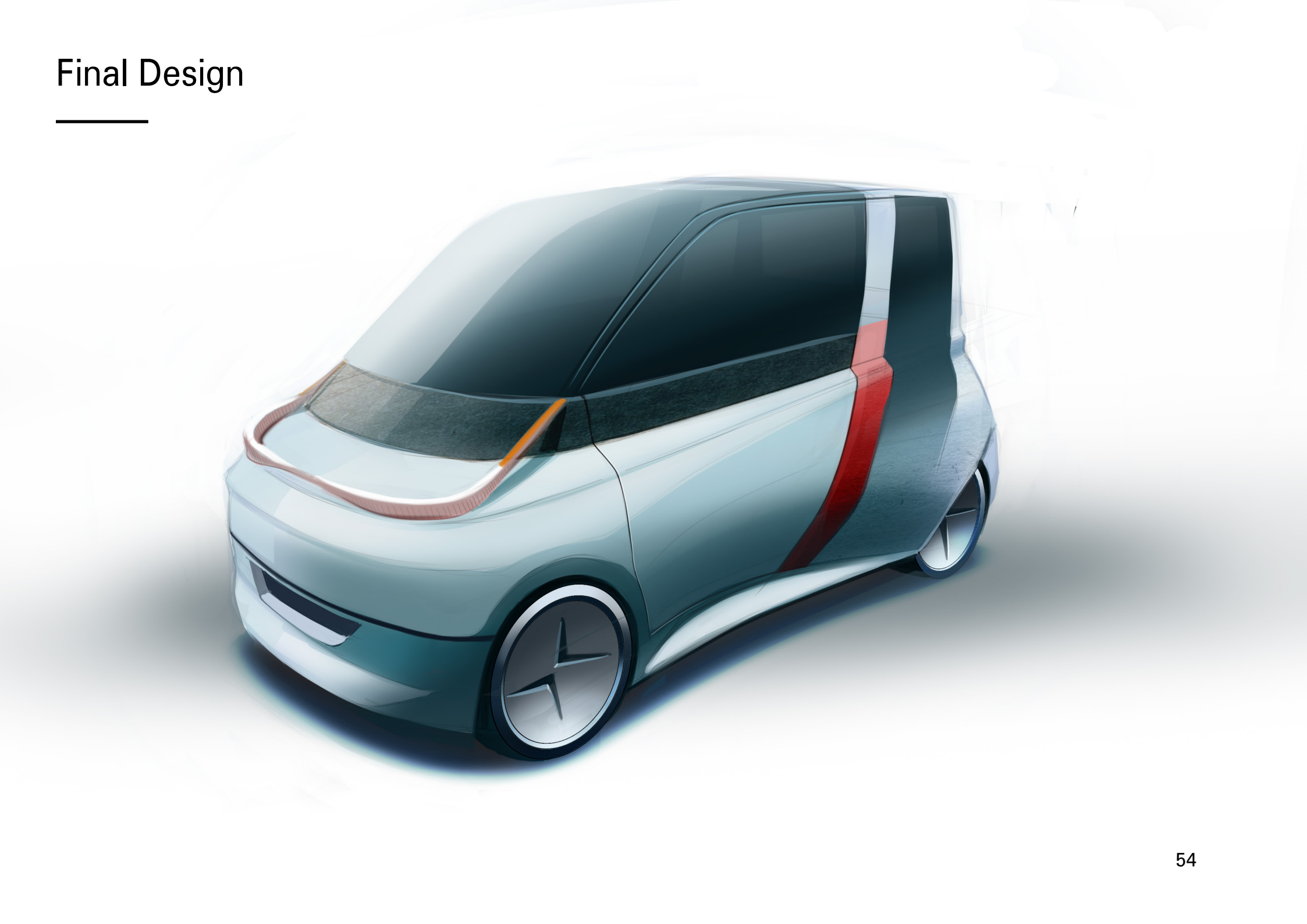




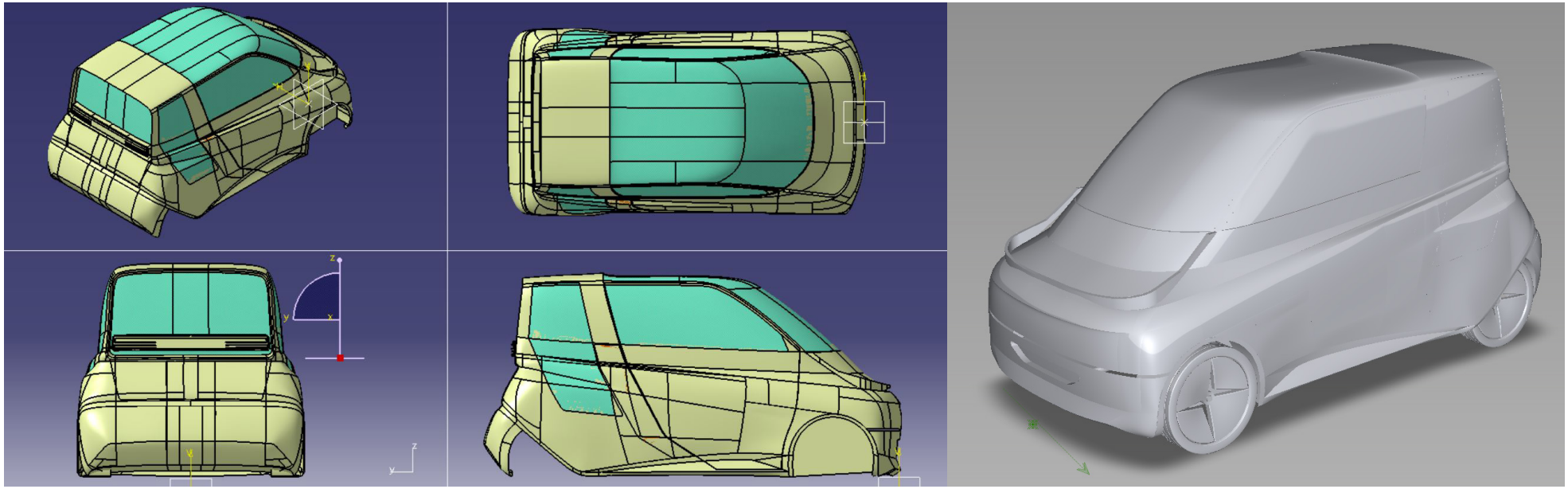
The design showcases modernity and boldness in an understated manner. The smooth and coherent lines makes it very approachable.

This vehicle being primarily designed for women of age 50-55 can be enjoyes by people of all age groups without any hesitation, this makes it instantly appealing.

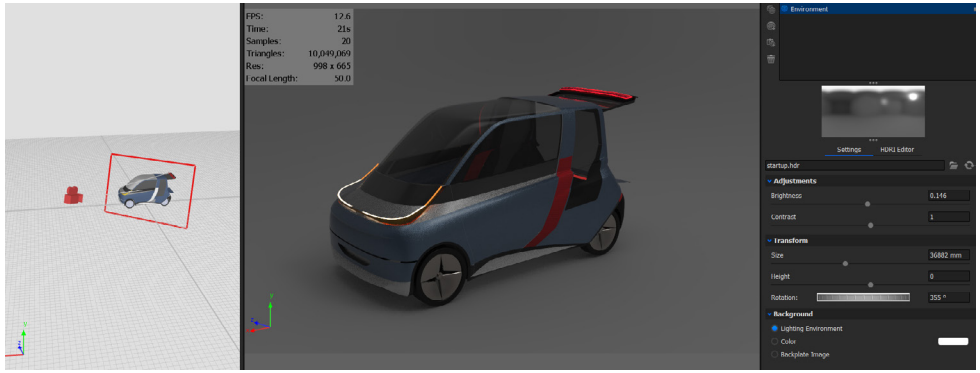
Final Design



3D Model



The final 3D model was developed in Catia V5 Wireframe and Surface Design Workbench. The model was optimised multiple times to get the right emotions and feel from final sketch. The model was taken to Alias for few surface corrections and wheel incorporation. The model was rendered in Keyshot 8 by adding suitable material finishes and colours.



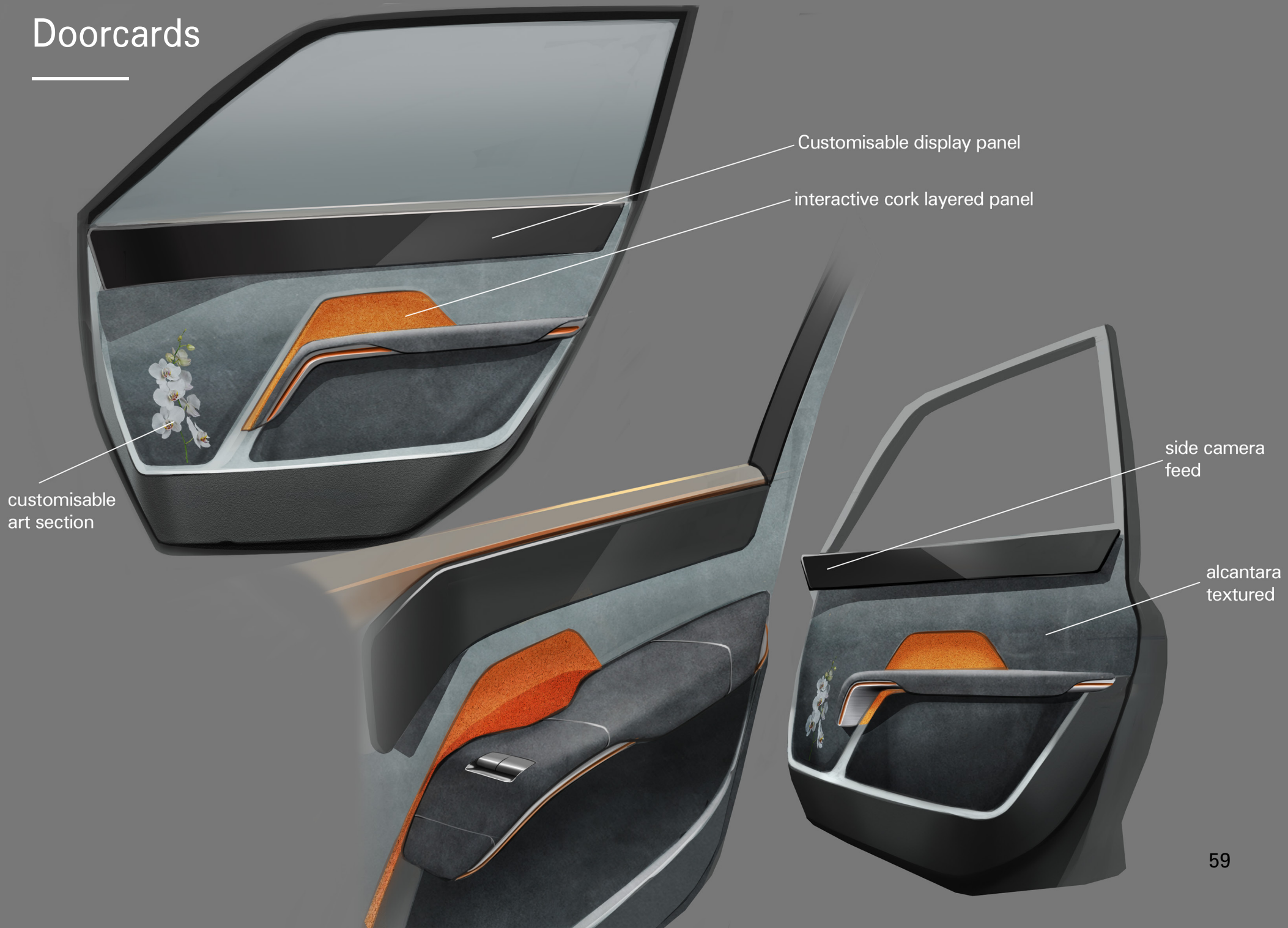

Good Morning Sujatha!
Drive safe :)
8:00 am
25°C

Interior Overview

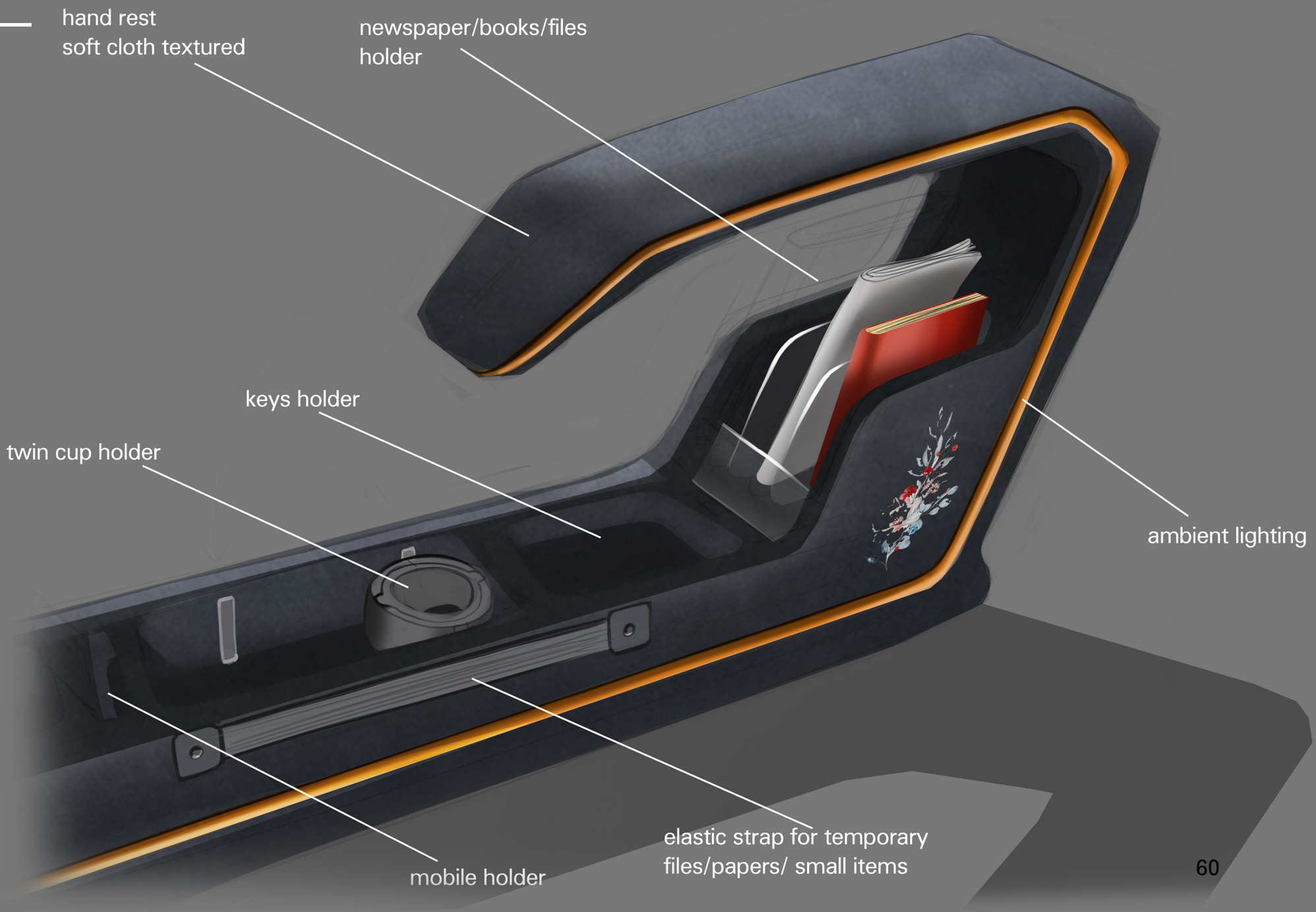
Note: floor concsole not shown so that floor design is highlighted. Refer page 59 for floor console

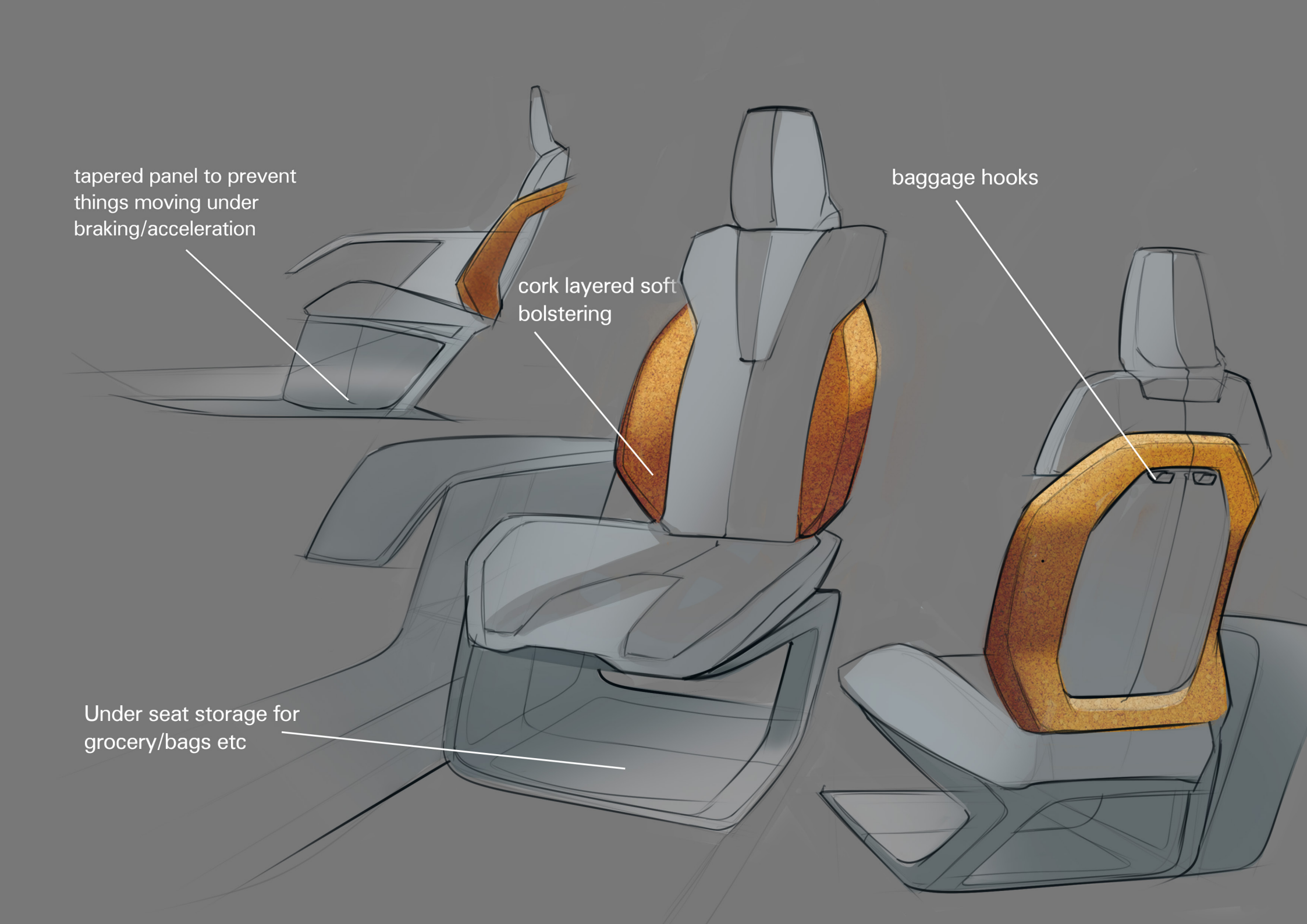

side storage boxes
rear foldable seats
Adjustable tint rear windows
wooden textured semi-rough flooring
drain plug
magnets for mats

Doorcards

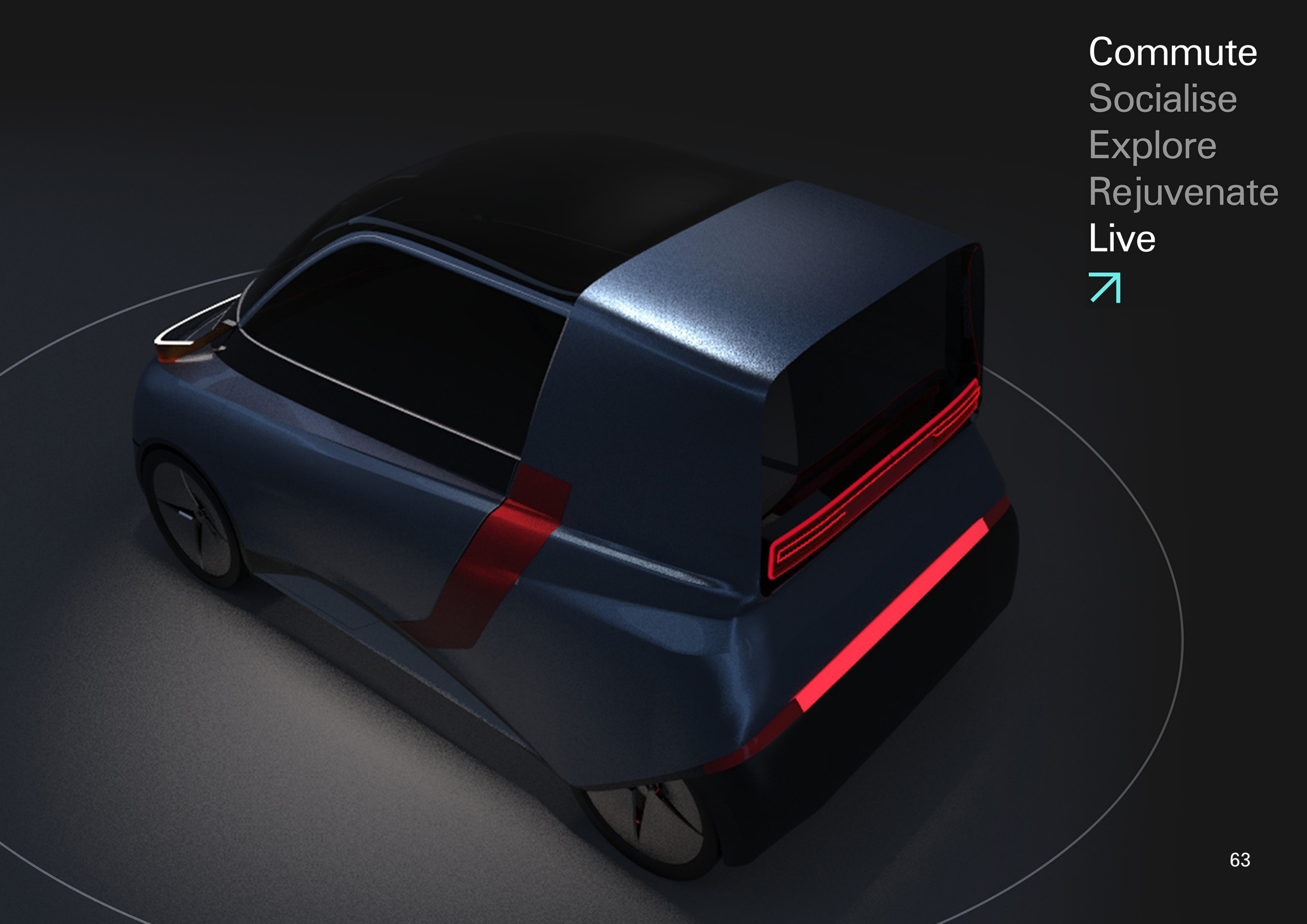

Customisable display panel
interactive cork layered panel
customisable
art section
side camera
feed
alcantara
textured

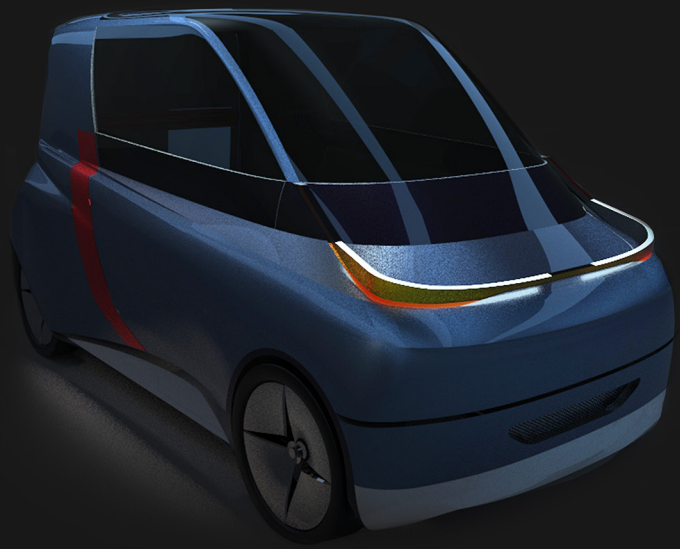
Console

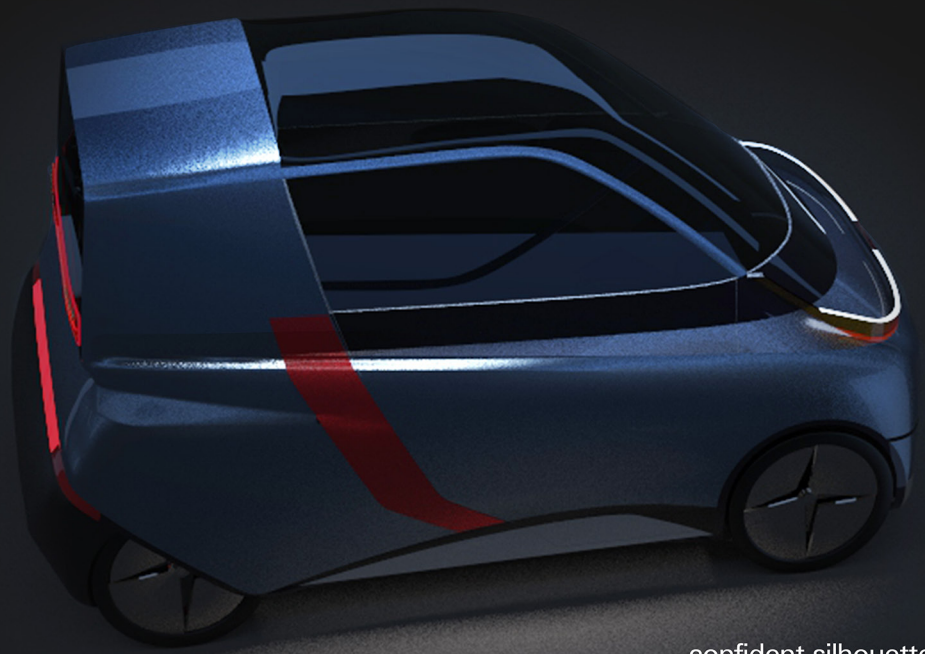

hand rest
soft cloth textured
newspaper/books/files
holder
keys holder
twin cup holder
ambient lighting
mobile holder
elastic strap for temporary
files/papers/ small items


tapered panel to prevent things moving under braking/acceleration
cork layered soft bolstering
baggage hooks
Under seat storage for grocery/bags etc

Keyshot Renders


Commute
Socialise
Explore
Rejuvenate
Live



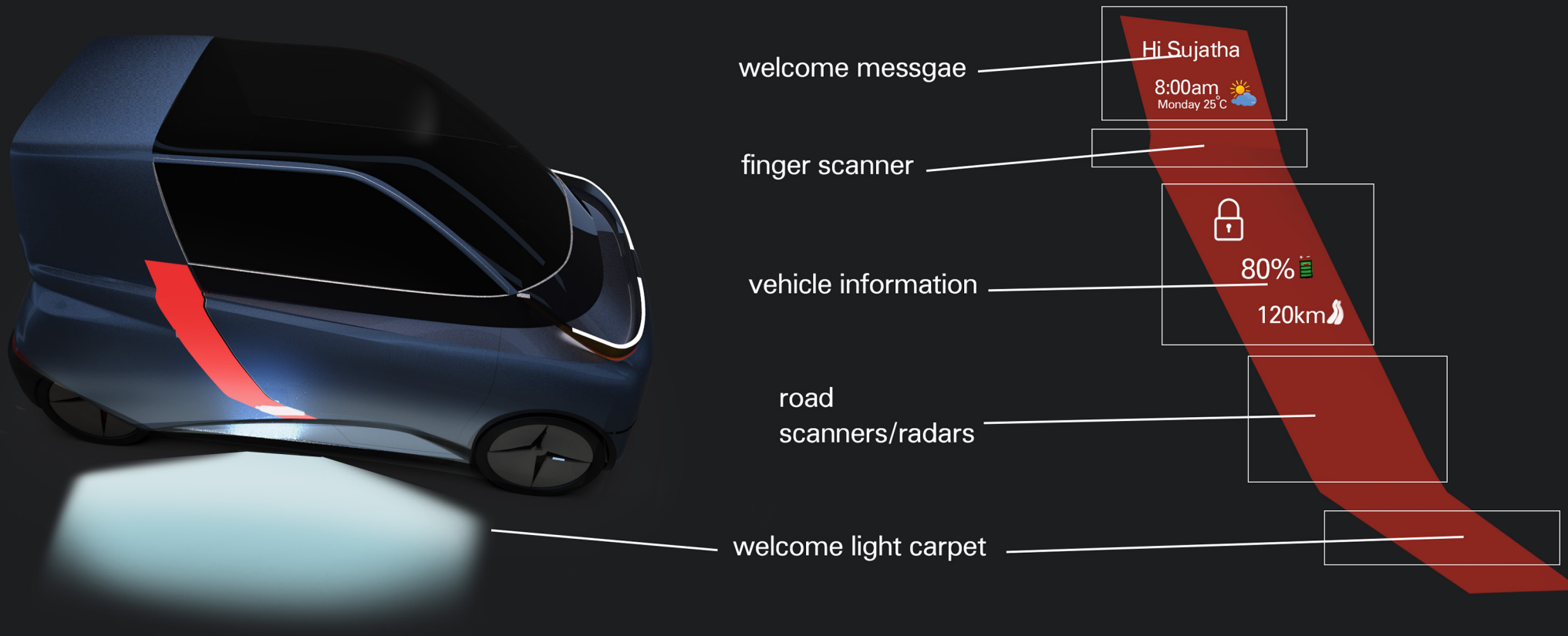


confident silhouette

Doors that slide

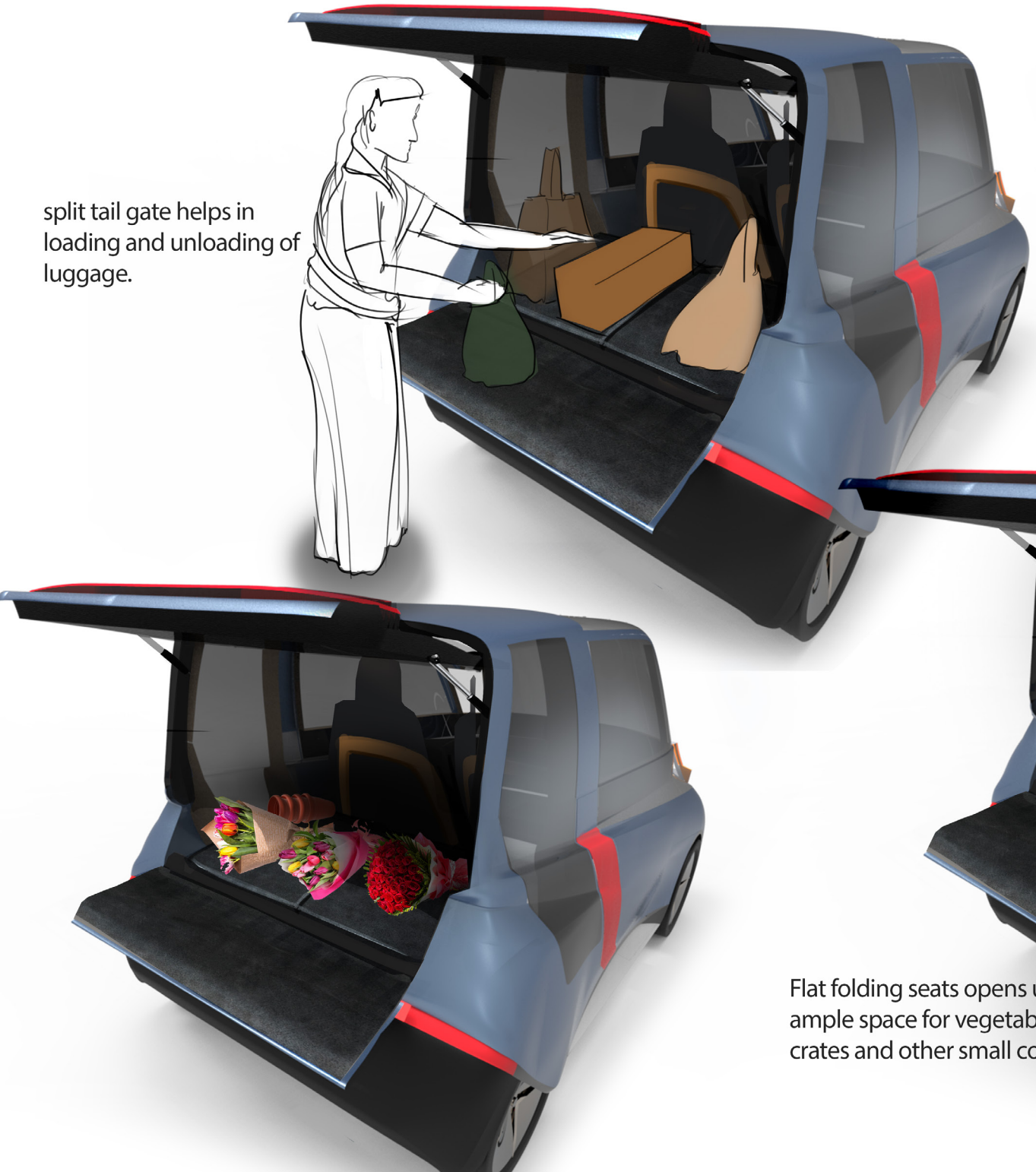
Smart Panel

The smart panel is the main design signature of this vehicle. The panel has several useful functionalities strategically positioned along its length. The top part is the user display panel. It shows messages and alerts like welcoming, goodbye, mobile phone reminder etc. The part below this panel is fingerprint scanner. Which is used to unlock vehicle when the key is within a distance of 1m. The part below this shows vehicle information like battery percentage range and security status. The part below the information panel is smart-zone housing radar and sensors for the ADAS features in the vehicle. The lower-most part houses lights for the light carpet feature while getting in and out of the car.




Split tail gate for easy loading and unloading
flat folding rear seats for luggage

split tail gate helps in loading and unloading of luggage.



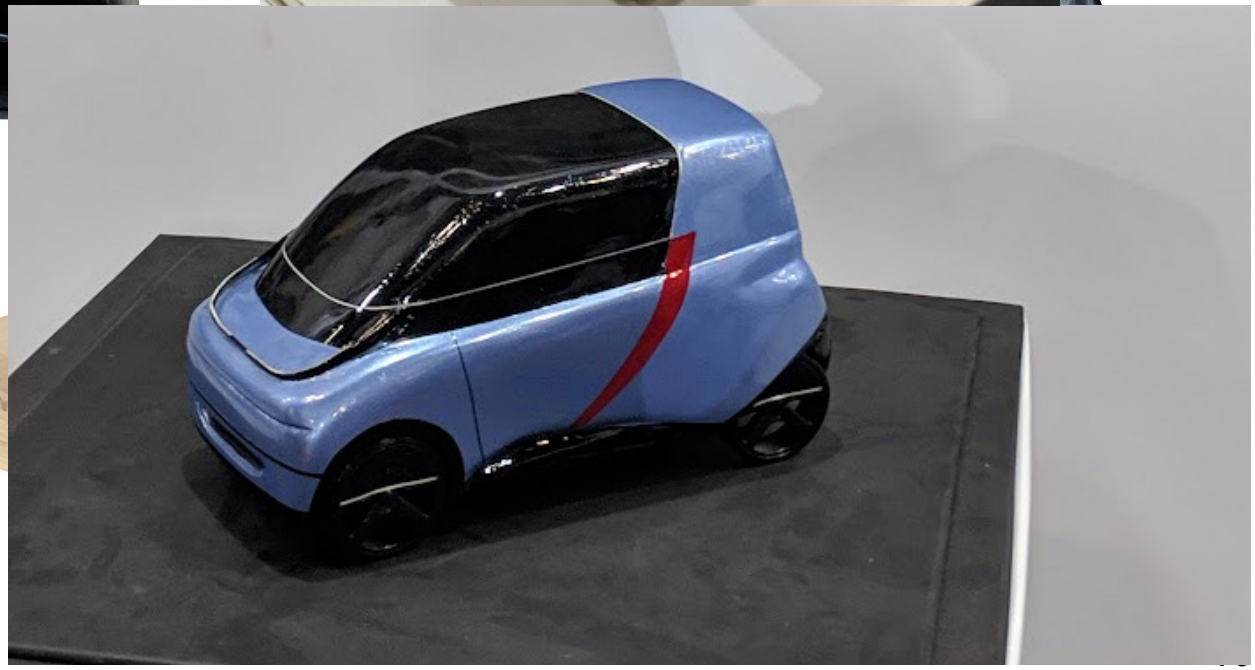
Flat folding seats opens up ample space for vegetable crates and other small covers

partition


3

Render showing the vehicle parked near a restaurant. Even though the size is considerably small compared to Nissan Xterra and Toyota Yaris parked nearby, the foam and stance of the design gives it a bold and confident appearance.

Physical Model



References

https://microlino-car.com/en/microletta

References for Benchmark

https://www.citytransformer.com/

https://downtown-mag.com/en/iaa-mobility-2021-highlights/

https://medium.com/nc-tails/driving-under-the-doggy-influence-what-are-the-laws-related-to-dogs-in-cars-cf21bbc7d7f5

https://www.xev-global.com/

https://www.cevo.co.kr/en/se.jsp

https://www.fomm.co.jp/index-en

https://www.youtube.com/watch?v＝ZQJx_rsbSyc

https://www.yumbomobility.com/

https://en.wikipedia.org/wiki/Wuling_Hongguang_Mini_EV

https://insideevs.com/news/560897/china-wuling-hongguang-sales-2021/