

Modern Expedition Vehicle for Family Exploration

Submitted in partial fulfillment of the requirements
of the degree of

Masters of Design

by

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IDC School of Design
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
(2024)

APPROVAL SHEET

This Mobility & Vehicle Design Project II titled 'Modern Expedition Vehicle for Family Exploration' by Sangeeth Sivan M is approved in partial fulfillment of the requirements for Master of Design Degree in Mobility & Vehicle Design, IIT Bombay.

Project Guide:



Chairperson:



Internal Examiner:



External Examiner



DECLARATION

I declare that this written submission 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 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.

Sangeeth Sivan M

22m2285

A handwritten signature in black ink, appearing to read 'Sangeeth', with a long horizontal line extending to the right.

Date: 20/05/2024

Mobility and Vehicle Design

IDC School of Design, IIT Bombay

ACKNOWLEDGMENT

My project Design of 'Modern Expedition Vehicle for Family Exploration' has been a great experience overall. It has taught me how to look at the problems faced by users on a day to day basis and how to design for the people. All these wouldn't be possible without proper guidance so I would like to sincerely thank my guide, Prof. Prof. Sugandh Malhotra for their valuable guidance throughout this project. The experience and knowledge gained during this time are a priceless in addition to my journey of being a capable designer.

A big thank you to all the users and the people who contributed to my project. Finally a huge thanks to all my classmates for the valuable inputs and feedback throughout the project.

Abstract

This project introduces a new type of compact vehicle designed for family adventures: the Modern Expedition Vehicle for Family Exploration. It combines innovative ideas and a focus on strengthening family connections through travel. The goal is to go beyond traditional travel methods by designing a vehicle that is not just for getting from one place to another, but a capable and versatile mobile home that meets the varied needs of today's traveling journey.

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(image representing what will be the mobility solution?)

1. Introduction

This project heralds a new chapter in the realm of family adventure with its visionary approach to travel: the Modern Expedition Vehicle for Family Exploration. Representing the need of forward-thinking concepts, to escape into nature, and an unwavering dedication to fostering familial bonds through exploration.

At its core, this project encapsulates a bold departure from conventional travel paradigms. Through meticulous design, endeavored to create a vehicle that transcends mere transportation, evolving into a veritable mobile sanctuary tailored to accommodate the diverse needs and aspirations of modern families on the move.

2. Story behind the project

Can you design a van for celebrities ?



(From ojes website)

The idea for this project started from a casual chat with an architect friend who recently designed a house for a famous Malayalam actor. He asked about designing a vanity van for celebrities, which got me interested. As I looked into special purpose vehicles, I saw an opportunity. It can do a lot of things a home can do. Instead of serving celebrities, I realized there are a lot of people who are struggling to get quality family time. We could create something meaningful for families who are busy with their jobs, who lack quality time with their loved ones, and who need a break from their busy lives. It created a question among myself why it is not easy to attain how I can cater their needs. This led to the idea of the Modern Expedition Vehicle for Family Exploration. It shows how curiosity can open new paths and help us rethink old ideas.



(Images from internet)

3. Research

3.1 Types of special purpose vehicles

Special purpose vehicles come in various forms to cater to diverse needs and preferences. Among them, luxurious caravans offer opulent travel experiences, providing all the comforts of home while on the road. Vanity vans, on the other hand, are tailored for celebrities and individuals in need of mobile dressing rooms, equipped with lavish amenities to accommodate their needs. For adventurers craving exploration, expedition vehicles offer rugged capabilities and off-grid living essentials, enabling journeys to remote destinations with ease. Lastly, motorhomes provide a versatile solution for travelers seeking mobility and convenience, serving as compact yet fully-functional residences on wheels. From luxury to utility, special purpose vehicles encompass a wide spectrum of options to suit every lifestyle and aspiration.



(Images from internet)

3.2 Production and maintenance

Production and maintenance of special purpose vans pose unique challenges. Typically, their production is time-consuming and expensive due to the lack of repetitive processes, necessitating skilled labor. This results in higher costs and longer lead times compared to standard vehicle manufacturing. Additionally, maintaining these vans can be complex, especially in the event of accidents, as specialized parts and expertise are often required. Consequently, owners may face higher maintenance costs and longer repair times, underscoring the importance of careful handling and proactive maintenance practices.

AUTOMOTIVE INDUSTRY STANDARD

Procedure for Type Approval and Certification of Motor Caravans for compliance to Central Motor Vehicles Rules

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P.B. NO. 832, PUNE 411 004

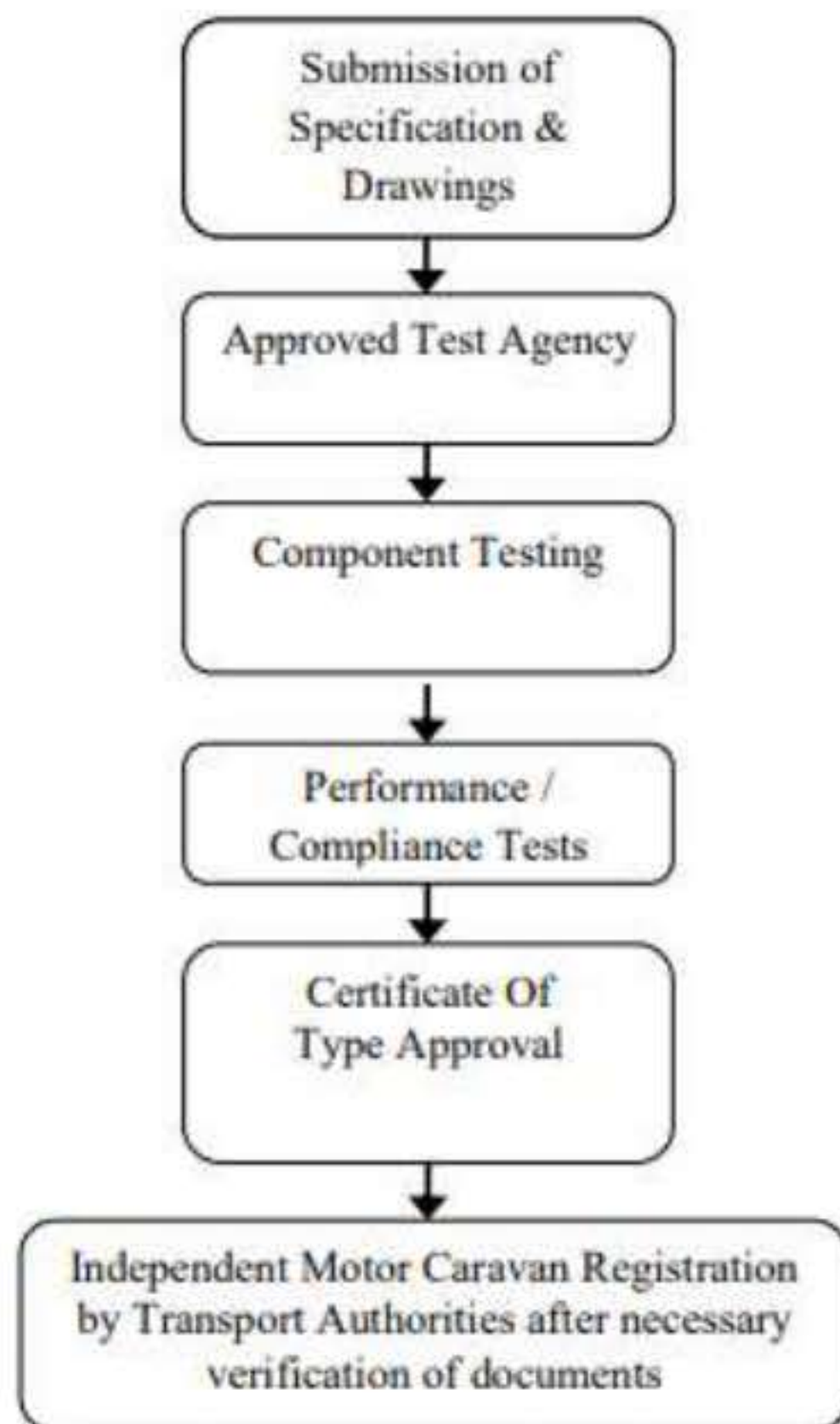
3.3 Laws and registration

Laws and registration for special purpose vehicles adhere to stringent standards set by organizations like ARAI (Automotive Research Association of India). These standards ensure that special purpose vehicles meet specific safety requirements, protecting both occupants and other road users. However, modifying vehicles to serve specialized functions comes with constraints. Any alterations must comply with safety regulations and undergo thorough inspections to ensure they meet prescribed standards. The process of converting a standard vehicle into a special purpose vehicle involves meticulous planning and execution, often requiring the expertise of certified professionals. From structural modifications to the installation of specialized equipment, every aspect must align with safety protocols to ensure compliance with regulatory frameworks and facilitate seamless registration.

ANNEX- D
(Sec 8.3)

Guidelines for Type Approval and Registration of Motor Caravan

Type approval and Registration for Motor Caravans



3.4 Fire extinguishers

- 3.4.1 The motor caravan shall be equipped with two fire extinguishers, one being near to the driver's seat.
- 3.4.2 Type and the minimum number of extinguishers to be provided shall be as follows:

Motor Caravan			
M1 ≤ 2500 kg	M1 > 2500 kg	M2	M3
Minimum two fire extinguishers of 2 kg each, totaling to 4kg	Minimum two fire extinguishers of 2 kg each, totaling to 4kg	Minimum two fire extinguisher of 2 kg each, totaling to 4kg	Minimum two fire extinguisher of 2 kg each, totaling to 4kg

Note: Fire extinguishers shall comply with IS: 13849 or IS: 2171 as amended from time to time, as may be applicable.

- Alteration in passenger vehicles are not allowed. (like omini and innova converting into mobile home)
- Changing seats and replacing it with bed are illegal.
- Can use language portion or boot space for cooking and other activities.
- Using mobile toilets and water tanks in passenger vehicles are not allowed.
- There are certain vehicles approved to convert it into motorhomes or special purpose vehicles, only those kind of vehicles get registration.
- Can rebuild an mobile home on the chassis of these kind of approved vehicles. Based on area these vehicles are taxed and allowed



4. Market Research

4.1 Specifications of rental caravans

Rental caravans; motohom force traveler

Seating Capacity : 8 adults

Sleeping Capacity : 6 adults + extra sleeping for 2 with add on tents on caravan terrace. Facilities : Comfortable queen size beds. Proper washroom with basic kitchenette facility. Smart TV with speaker system. Ample storage space.

Driver will be provided

Spacious rooftop sun deck

Wheelchair accessible.

Hammock stand.

Cost : 70 per Km (minimum 350 km per day)(18 hours)

including fuel ,cleaner,driver and MTDC facilities. Or 18000 to 25000 for 18 hrs



(Image from motohom)



(Image from motohom)

4.2 Specifications of rental caravans

Rental caravans; motohom bus

Seating Capacity : 10 Adults

Sleeping Capacity : 6 adults + 2 kids

Facilities;Sofa cum bed 6.5ft. X 5.5ft.seating and sleeping Fixed bed 4ft. X 6ft.Sofa 5.ft X 3ft.

Driver & cleaner will be provided

Proper washroom with basic kitchenette facility.

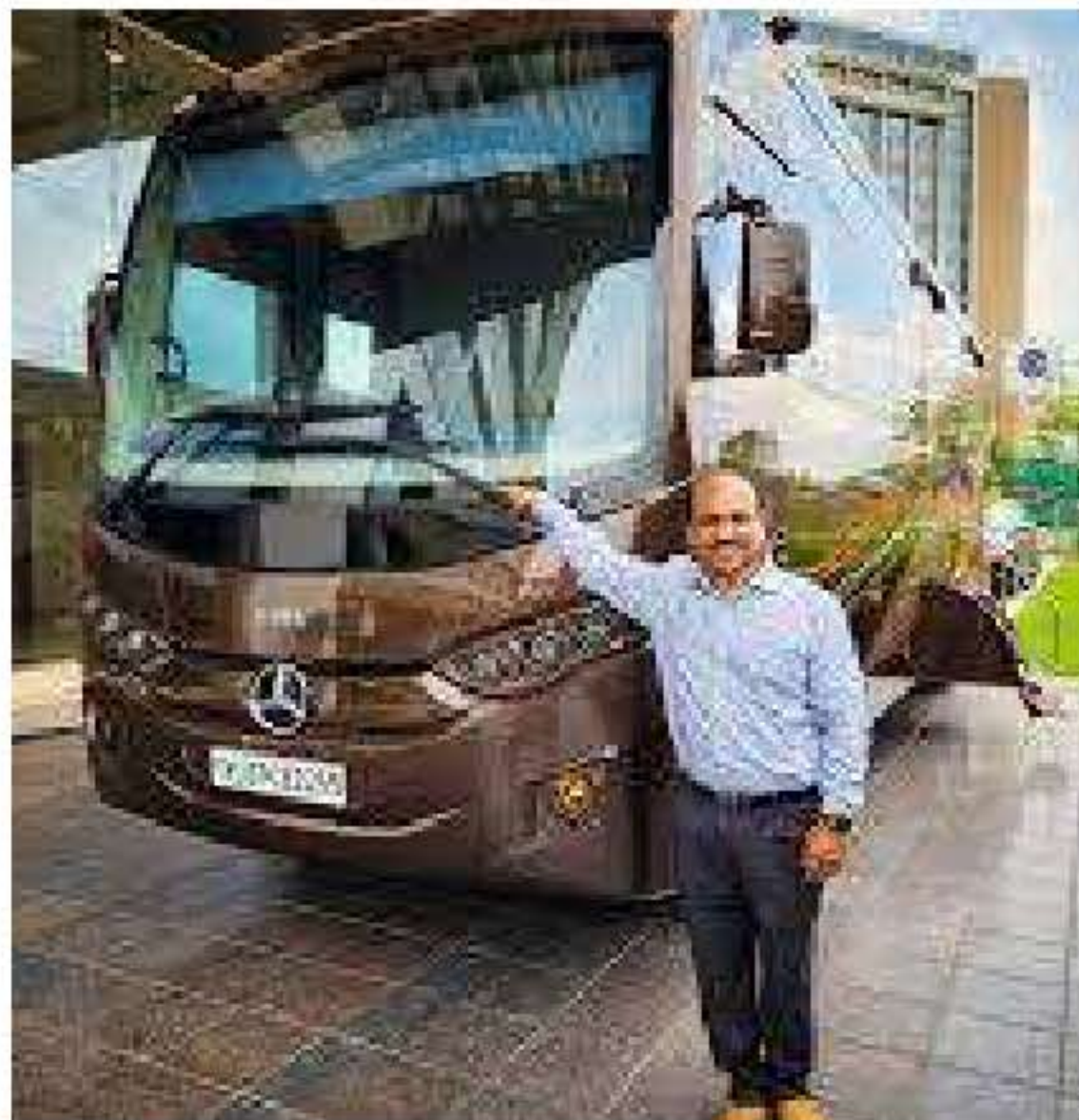
TV with speaker system.

1 Queen size bed.

Wardrobe and ample storage space.

Cost : 85 per Km (minimum 350 km per day)(18 hours)

₹22,000/- per day , Ac on engine power in halting caravan : ₹1000/- per hour



(Images from OJES website)

4.3 Registered manufactures

OJES stands as a premier automotive design and custom body building manufacturer in India, boasting nearly three decades of experience. Specializing in luxury coaches, motorhomes, caravans, RVs, and various specialty vehicles, OJES prides itself on its agile and dedicated workforce. The commitment to quality is evident through strict quality control measures, ensuring excellence in every product. While OJES has received awards for its excellence, the brand identity among its models is yet to be established.



4.4 Initial users of SPV

Initially, special purpose vehicles in India were primarily utilized by celebrities and VIPs. These vehicles catered to their unique needs, providing luxurious amenities and personalized features for comfortable and exclusive travel experiences. These high-profile individuals relied on special purpose vehicles like vanity vans and customized motorhomes to maintain privacy and convenience while on the move. As such, these vehicles were synonymous with prestige and sophistication, serving as status symbols for the elite.

(Images from internet)

India's 'ONLY' Luxury Overland Truck for Best Outdoor Experience ...

September 3, 2012 admin 4 Comments Blog



(Images from internet)

5. Trends and opportunities

5.1 Rise of camping vehicle packages

In the wake of the pandemic in India, a notable surge in mobile camping activities has emerged, fueled in large part by heightened exposure on social media platforms. The allure of outdoor exploration, coupled with the desire for safe and socially distanced travel options, has propelled this trend forward. As a result, mobile camping has gained considerable popularity, prompting a growing number of individuals to either rent or build specialized vehicles tailored for such adventures. This surge in interest serves as a significant indicator of an impending trend within the industry, suggesting a shift towards a greater emphasis on outdoor exploration and experiential travel in the post-pandemic landscape.

5.2 India's first camping vehicle packages

Green dot expedition



(Image from green dot expedition website)

- Accommodates 8 guests (for seating and sleeping) 8 front facing reclining/ push-back seats, other than the crew and sometimes 12 guests (as a special case).
- The most elaborate kitchen on any overland truck globally to provide healthy food on the move.
- Taurus(vehicle) has the best sleeping arrangements for mobile camping and nomadic overlanding.
- One toilet onboard, two field toilets to make guests comfortable, sometimes all are deployed and sometimes only one.



(Image from green dot expedition website)

- 2 water pumps (Hitachi and Honda) to fill water tanks from sources on the move.
 - 12 Volts DC water pump for delivery.
 - Honda genset 800 W and 2 solar panels for charging the batteries of cell phones, cameras, laptops, etc. with 220 volts AC power supply as well as 12 V DC charging sockets.
 - Stainless steel water tanks with storage capacity of 800 liters.
 - One of the best water filters for RVs in the market to ensure plastic bottles are not generated from packaged water.
 - Three hammocks; where possible we anchor these for guests.
 - Individual lockers with good space, one per participant for equipment and baggage.
 - Equipped with a comprehensive first aid kit, multi-purpose kit, and firefighting kit. • Equipped with field-craft tools.
 - Vehicle is being continuously improved and equipped with small little things to enhance experience and make holiday expeditions unique and memorable.
- The self-driving option for this luxury truck isn't available and it comes with a crew of two to three people who prepare meals, drive, clean, etc. Cost: Rs. 7000-10,000 per person per night.

5.3 Early retirement and influence of social media

The FIRE (Financial Independence, Retire Early) movement, predominantly embraced by millennials, has significantly contributed to the growth of expedition vehicles and related activities. By advocating for financial independence and early retirement, this lifestyle movement has spurred increased interest in adventurous pursuits, such as exploring the great outdoors and embarking on extended travel journeys. As individuals strive to achieve financial freedom and retire early, they seek out experiences that align with their newfound flexibility and independence. This has led to a growing demand for expedition vehicles, as they offer the freedom to travel and explore while maintaining a sense of comfort and security on the road. Additionally, the FIRE movement encourages individuals to prioritize experiences and personal fulfillment, making activities like outdoor adventures and exploration more appealing and accessible to a wider audience.



(Images from internet)

5.4 Scenario of mob litching and hate

In the scenario where a millionaire businessman's Ford F650 super truck is vandalized by an angry public, the exterior design of the vehicle could be influenced in several ways. Highly visible branding or ostentatious features may exacerbate tensions, prompting further backlash from those perceiving wealth disparity. Therefore, a more discreet and understated design could mitigate such reactions. Additionally, features perceived as flaunting wealth, like oversized dimensions or flashy paintwork, could provoke negative sentiment. Prioritizing functionality over extravagance and ensuring ease of navigation could also help prevent incidents of public anger, especially when the vehicle is involved in road blockages.



(Images from mathrubhumi news)

5.5 Why expedition vehicle



(Image generated with photoshop that represent the buzzing city and peaceful nature)



How much of the city a child can access independently is getting smaller with every passing generation, a trend repeated across the world, says urban researcher Tim Gill. In his book, [Urban Playground](#), he profiles one family and shows how back in 1919, a child's great grandfather could roam six miles across the city without supervision. Today, that child can only walk 300 meters to the end of his road, and that's more than most of urban children

Expedition vehicles play a crucial role in addressing the shrinking accessibility of cities for children, as highlighted by urban researcher Tim Gill. With each passing generation, children's freedom to explore independently within urban environments diminishes drastically. Gill's comparison between a child's great grandfather in 1919, who could roam six miles across the city unsupervised, and a modern child limited to a mere 300 meters, underscores this concerning trend. Moreover, as family time dwindles in today's fast-paced society, expedition trips offer a unique opportunity to strengthen familial bonds. By immersing families in shared outdoor experiences and adventures, these trips foster deep connections and create lasting memories, countering the societal trend of diminishing family interaction. Thus, expedition vehicles serve as catalysts for rekindling family bonds and providing children with valuable opportunities for exploration and adventure in an increasingly urbanized world.



(Image generated with photoshop)



(Image from their vlog)

Eager to explore more but feeling unsure about handling larger vehicles, the couple embarked on a 150-day journey, investing 2.6 lakhs. Throughout their 180-day trip, they spent 52 days in rented rooms, opting for a frugal lifestyle. Despite not having an integrated toilet in their car, they managed their journey efficiently. Their travel vlogs proved instrumental in covering expenses, with fuel and accommodation comprising the bulk of their spending. Their revenue from social media supported their adventures, showcasing the feasibility of combining a minimalist lifestyle with online engagement to fuel their passion for exploration.



(Image from youtube vlog)

6.2 User in the age of 40's

Ray, Catherine, and their three kids live and travel together in a 6x6 1998 Military Stewart and Stevenson m1088. They also tow a spacious trailer behind for extra storage and an additional bedroom. Initially intended for occasional vacations, they eventually decided to make it their full-time home on wheels. The interior resembles a conventional home, with ample space when slide-outs are extended, lots of natural light, and storage in the trailer. The total cost, including the vehicle, conversion, and trailer, was \$80,000 (50 lakhs) three years ago, but it might be higher now due to inflation. Despite challenges, such as daily ups and downs, the family enjoys this lifestyle, staying connected and creating lasting memories with their kids.



(Images from youtube)

6.3 User in the age of 50's

This experienced couple, aged over 50, stressed the need for a clear plan and a simple travel vehicle for adventures. They highlighted the many compromises involved and advised taking the simplest route to acquiring a vehicle. Moreover, they shared that for many, overlanding isn't just about seeing landscapes, but also about enjoying diverse cultures. This emphasizes the enriching aspect of travel and the importance of immersing oneself in different experiences and traditions.

“overlanding for most of the world is enjoying other cultures.”

“There are so many compromises, i think you actually get a plan. Get some kind of travel vehicle and get out there and travel.”



(Images from youtube)

6.4 User aspiring for cross country travel

This user has a vision of embarking on a months-long journey across various terrains, embracing a nomadic lifestyle. They require a vehicle that can withstand different environments, including dust and water resistance, to ensure durability and longevity. Thermal insulation within the cabin is essential to maintain comfort during their travels, regardless of external temperatures. Efficiency is a key consideration, aiming for maximum fuel economy to extend their journey without frequent refueling stops. Additionally, passive ventilation is crucial to ensure a constant supply of fresh air inside the vehicle. Ultimately, their ideal vehicle should strike a balance between compactness and capability, offering versatility and functionality to navigate diverse landscapes while providing a comfortable and sustainable living space on the road.



5 year project with 2 year research	it took 2-3 years to complete the vehicle	registration itself cost 4.5 lacks	just parts and labor costed him 18 lacks	most of the things are done by them self's	it will cost 70 lacks if it is done by any coach builders
3 years of time		over all cost is 45 lakhs			

(Images from youtube)

This user has a vision of embarking on a months-long journey across various terrains, embracing a nomadic lifestyle. They require a vehicle that can withstand different environments, including dust and water resistance, to ensure durability and longevity. Thermal insulation within the cabin is essential to maintain comfort during their travels, regardless of external temperatures. Efficiency is a key consideration, aiming for maximum fuel economy to extend their journey without frequent refueling stops. Additionally, passive ventilation is crucial to ensure a constant supply of fresh air inside the vehicle. Ultimately, their ideal vehicle should strike a balance between compactness and capability, offering versatility and functionality to navigate diverse landscapes while providing a comfortable and sustainable living space on the road.

6.5 Effect of social media influencers on society



Experience journey to destination.

Go camping, cause therapy is expensive.

Social media influences society by showcasing the allure of camping through captivating images and inspiring stories, enticing people to explore nature. Platforms like Instagram and YouTube create a sense of FOMO (Fear Of Missing Out), driving individuals to seek similar experiences and share their adventures, thereby fueling the camping trend.

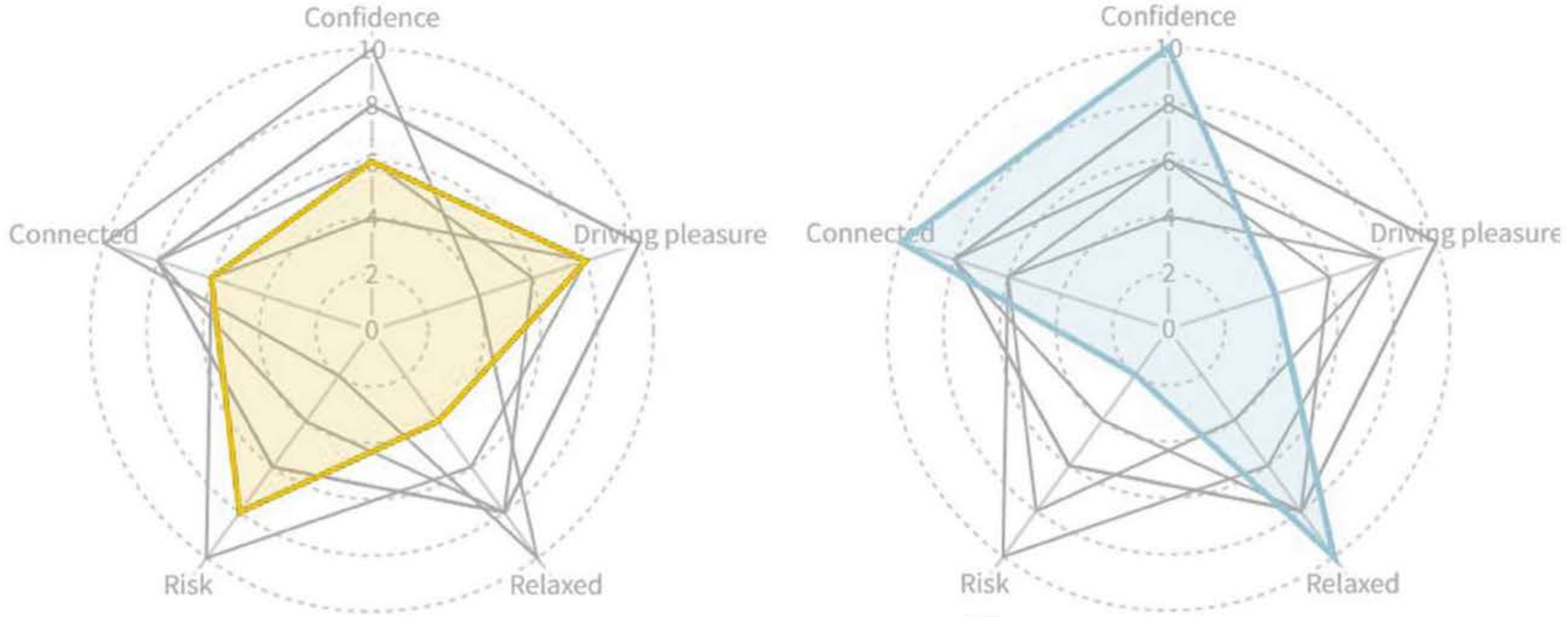
6.6 User emotion study based on terrain

In order to assess user perceptions of various challenging terrains, including rock, sand, snow, water bodies, forests, and country roads, a survey was

conducted among a group of friends who are potential future users of the project. Participants were asked to rate each terrain on five factors: confidence, risk, peacefulness/relaxation,



(Images from pinterest)

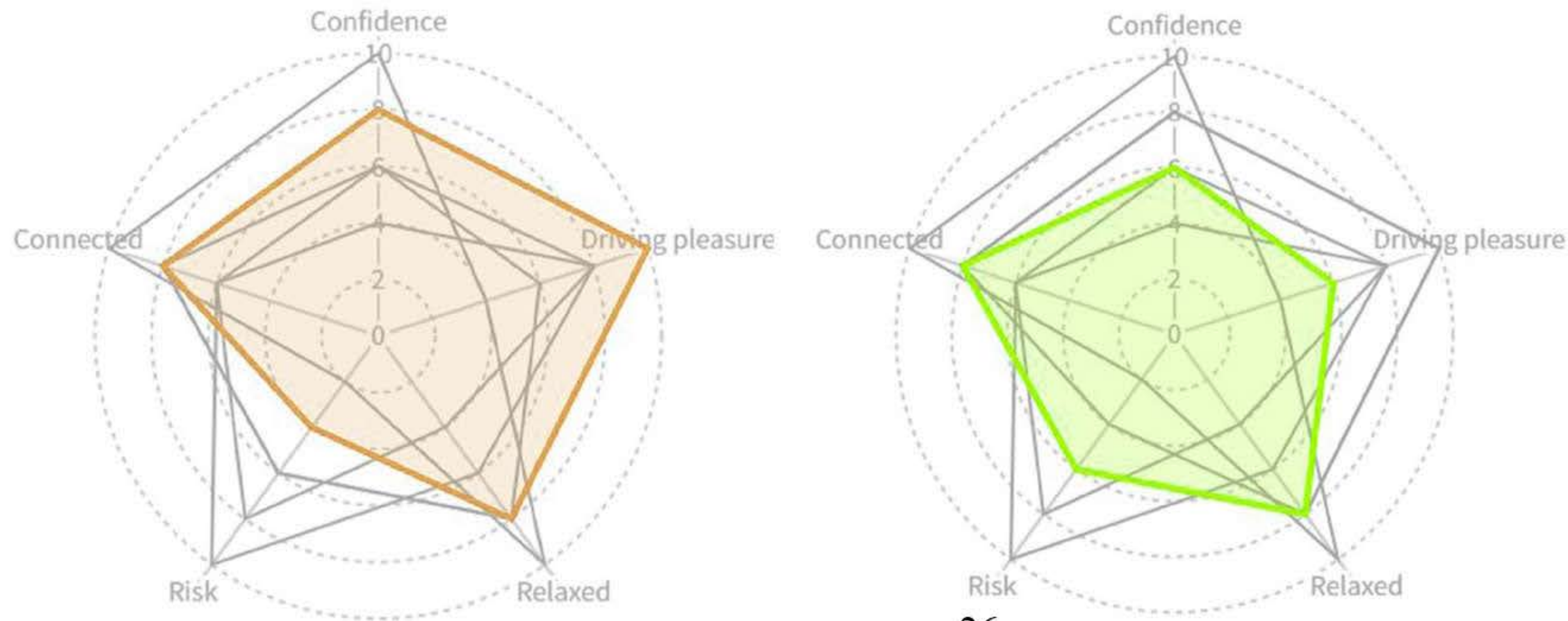




(Images from pinterest)

driving sensation, and connection among family members.

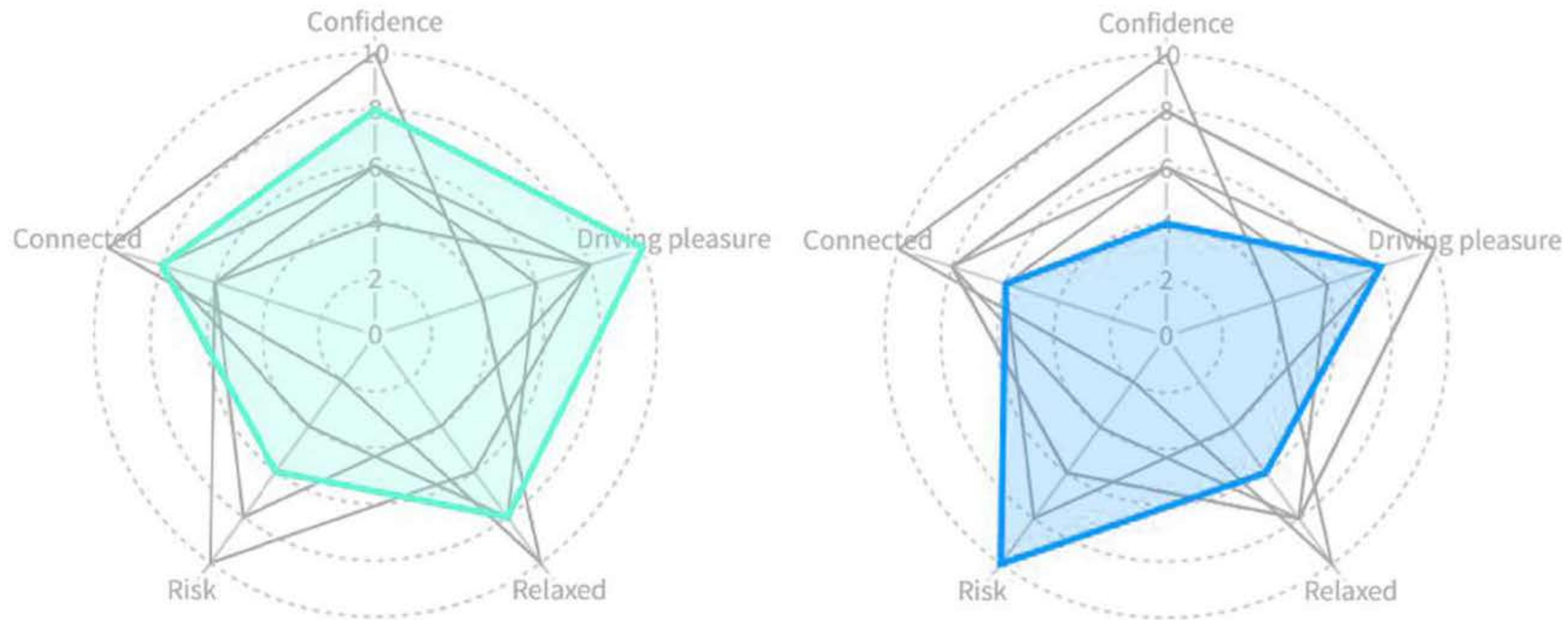
The data collected from the survey was used to plot a pentagon graph for each terrain, providing visual representations of user perceptions across the different factors. These insights will inform the design process, helping to tailor the project to meet the





needs and preferences of its intended users.

(Images from pinterest)



7. Design process

7.1 What users think

What if we gone stuck	What will be the budget and time requirements	How can we manage kids and their mental growth	How to ensure the safety of family or crew	
What kind of knowledge or skills are gaining during the journey	What are the precautions need to be done	How can we prepare efficient meal	How personal hygiene and toilet can be done	what are the inevitable risks we have
How maintain connectivity and safety in emergency situations	How to get quality sleep	What are the things kids wants to carry	How we are going to learn different cultures, environment and way of life.	how it will help in physical and mental health
Curious about how bonding will be enhanced as a family or crew	What are the effects of Leaving from the distraction of every day life	How can be get entertained in long stretch travel	How to get kids engaged	

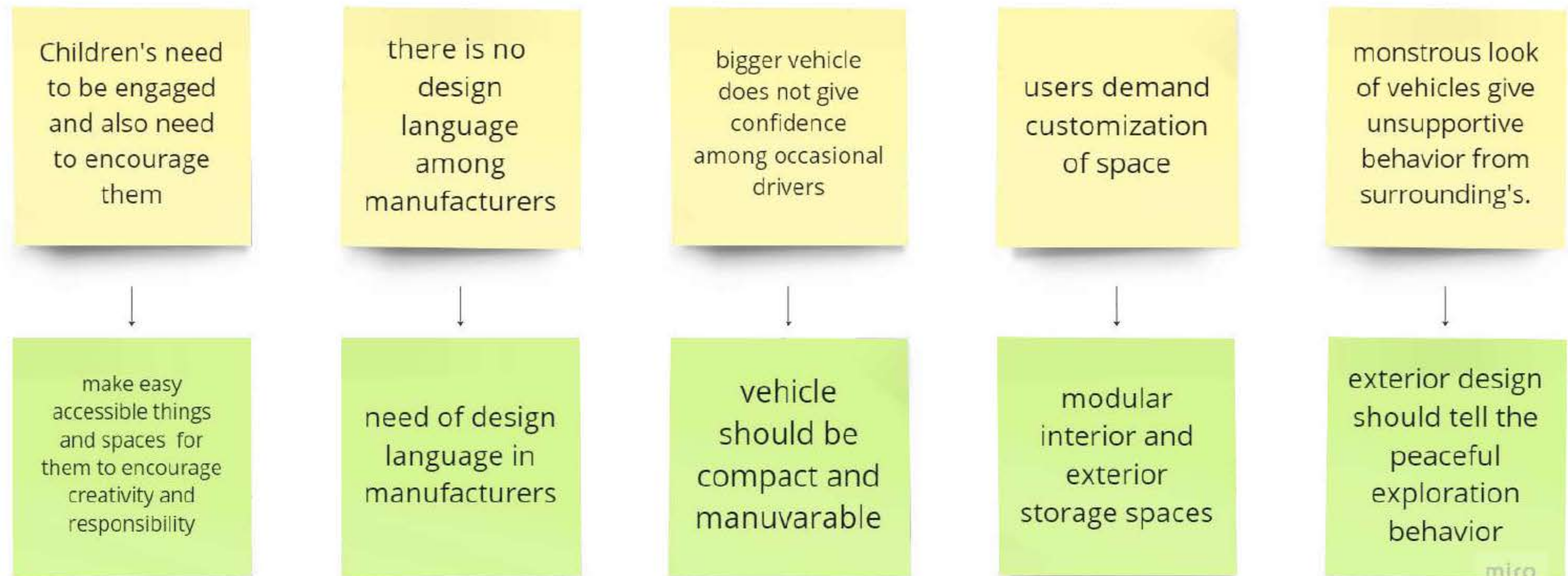
7.2 Factors that should consider for vehicle

under body vulnerabilities	should have leveling system on uneven terrain	extended roll cage to protect from trees	positioning of air intake	
toilet issues and black water storage	openings of storage spaces should prone to closure	importance of maintaining lower CG	positioning of water tank, battery fuel tank	necessity of vents and isolation of cabin
trucks are categorized and taxed based on weight	ways to reduce security deposits while cross country tour	high running cost of vehicle	non availability of maintenance team for expedition vehicle	huge one time investment
necessity of crawl thorough	need of marker lights around vehicle	weight should be reduced as much as possible	should have some extend of personalization	

miro

miro

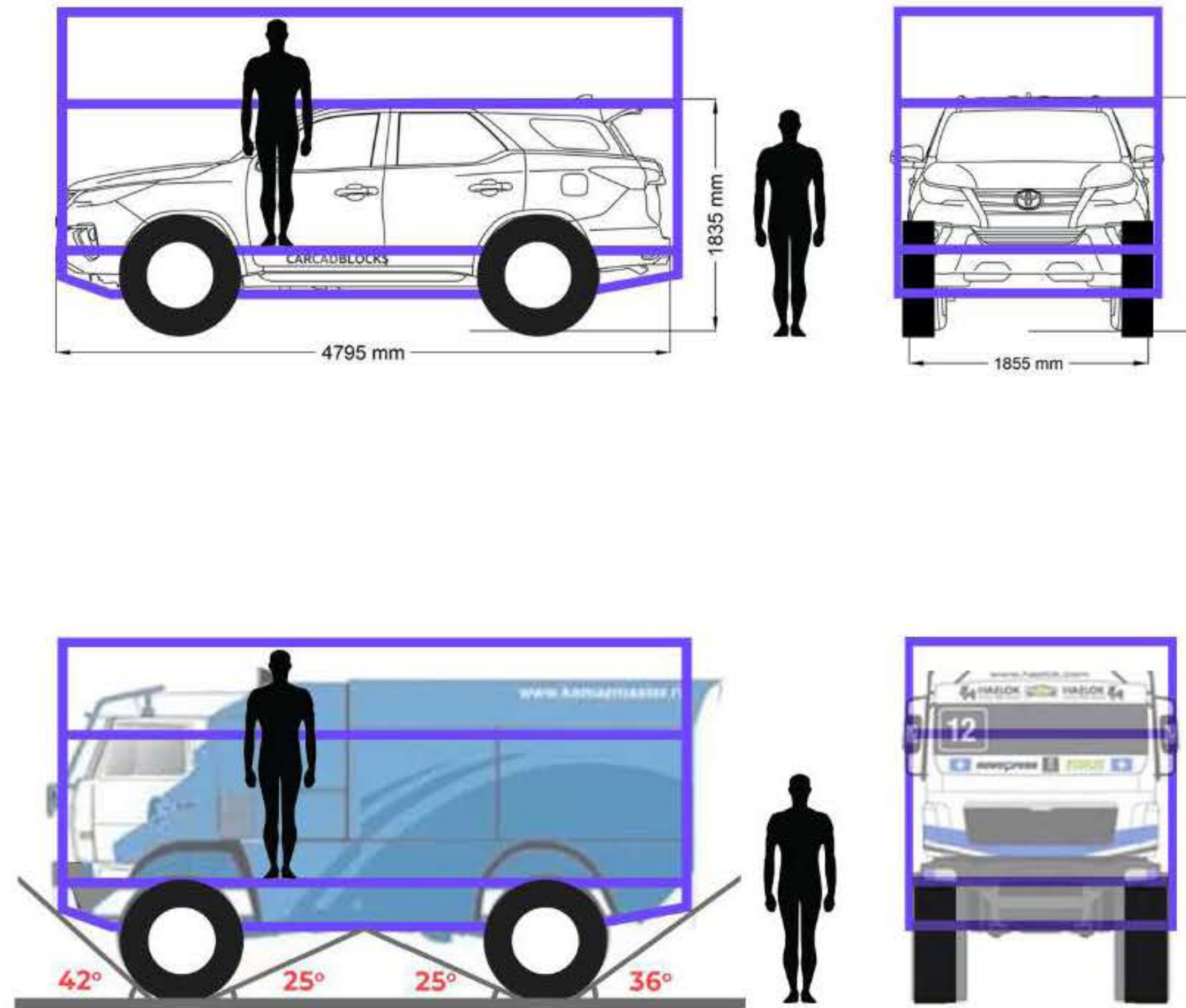
7.3 Identifying challenges and crafting solutions

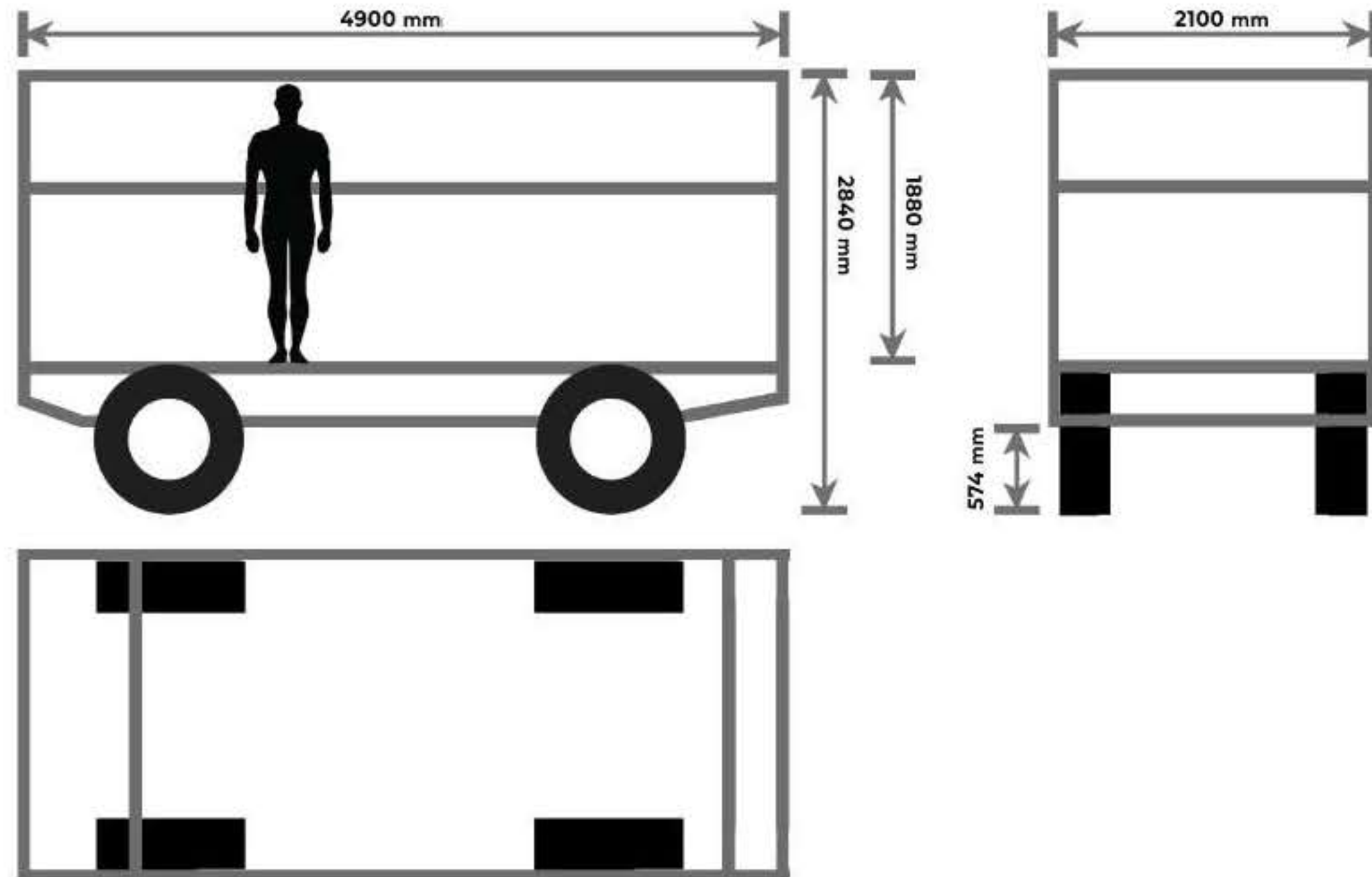


7.4 Setting dimensions

The project began by adopting the most common SUV footprint to ensure accessibility for all users. Furthermore, the design aimed to accommodate individuals up to 6 feet tall while maximizing compactness. This constraint was crucial in optimizing the vehicle's size, ensuring practicality and versatility for various travel scenarios. By prioritizing both accessibility and compactness, the design aimed to offer a balanced solution that meets the needs of a diverse range of users.

To enhance the vehicle's capability, the design incorporated scaled-down proportions inspired by the Dakar Kamaz truck. This strategic choice was aimed at maximizing key performance metrics such as approach and departure angles, as well as wheelbase length. By adopting features from the Dakar Kamaz truck, known for its off-road prowess, the vehicle's capability was optimized for traversing challenging terrain while maintaining a compact footprint. This approach ensured that the vehicle could tackle rugged environments with ease, offering users a heightened sense of confidence and versatility during their adventures.





8. Design brief

Modern Expedition Vehicle for Family Exploration

Create a compact vehicle with a sleek, expedition-ready appearance which gives confidence among users. Incorporate an interior layout with expandable spaces and user-centric design which connect the whole family.

Dimensions

Overall Length 4900 mm

Overall Width 2100 mm

Overall Height 2840 mm

Max Ground Clearance 570 mm.



9. Persona

AGE 30

photographer
content creator

Female, married

nuclear, 1 kid &
pet

About

Renuka menon was a nature, wildlife photographer and currently working as a content creator. She strives to find beauty in the elements of nature and grabs it with her camera. Her husband shyam(32) is a business man and kavya(4) going to kindergarten. they are living in their flat with their pet dog mittu. she is a passionate driver and explored nature with her Toyota fortuner. After a small break she is ready to take an adventure with here camera.

Values

- well being of nature and animals
- mental growth of daughter

Experience

- Wildlife photography
- Planning and execution
- Riding in long distances in wild and off roads.

Empathetic

Creative

Problem solving



Goal

To became a well known photographer and explore as much as possible.

Objectives

- Wants to take her family with her
- Imparts the values of nature and wildlife to her daughter

Frustrations

- Don't want to leave family.
- Unsatisfied with systematic family life in urban environment.



AGE 38

software developer

Male, married

nuclear, 2 kids

About

Mr rajesh is 38 year old software developer working in a leading company based in Bangalore. He is very Proficient in various programming languages and frameworks is essential for developing software applications. His wife veena(29) is a culinary enthusiast and have 2 kids abhi(8) and nadha(10). Most of the week days he tries to get quality family time in out doors and week ends they goes for trekking and riding his MTB in near by places with his Suzuki jimmy.

Values

- Quality family time
- Delivering works or promises on time.
- Explorer

Experience

- Full stack developing
- Managing a team
- Cycling, Traveling

Confident

Adventurous

Extrovert



Goal

To became Financial Independence, Retire Early and spend most of the time with family and working on his dream start up.

Objectives

- To manage finance to became independent
- To make family engaging plans

Frustrations

- City life hustles polution
- Kids missing a helthy Childhood with out exposed to nature.



10. Mood board

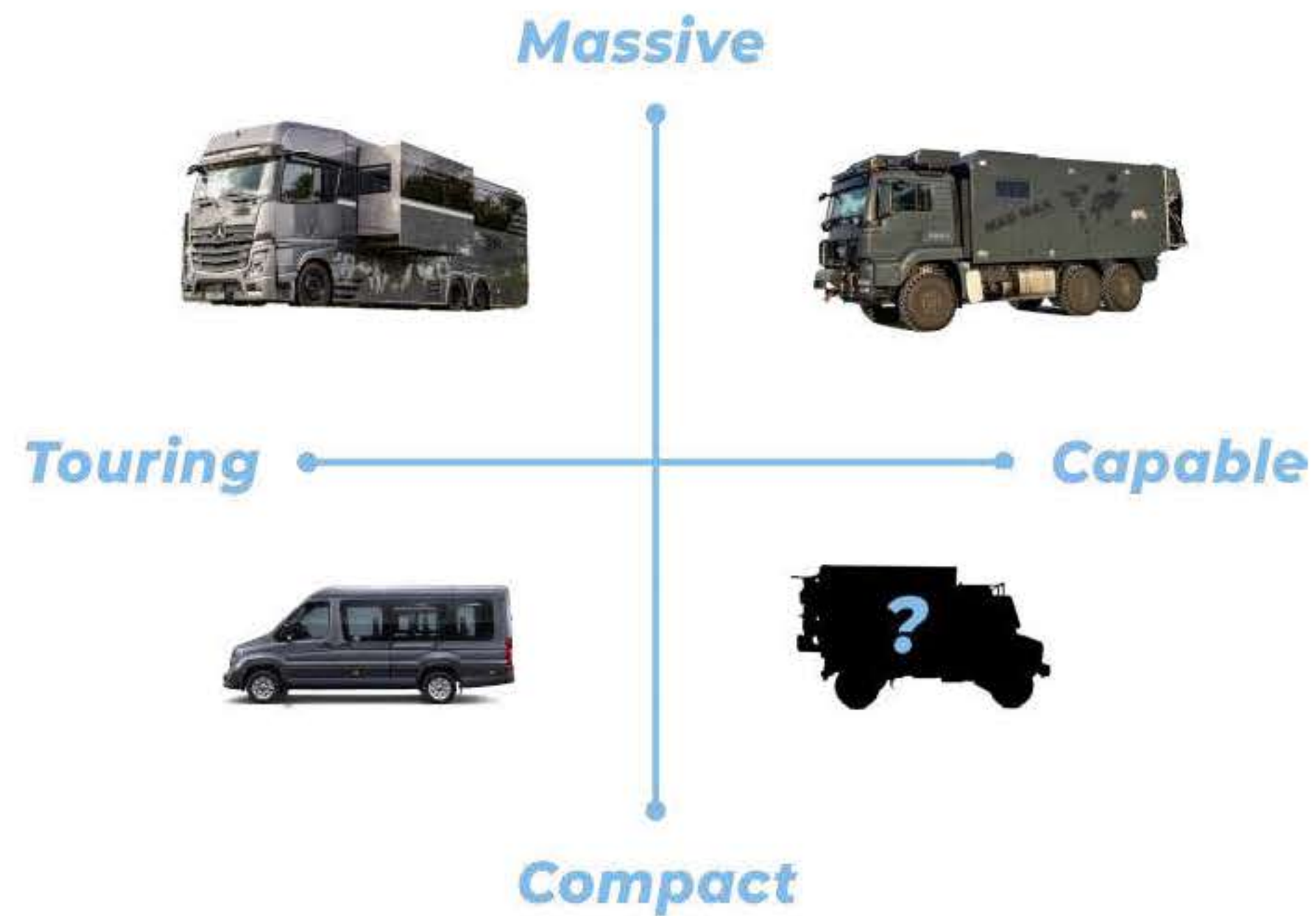
The mood board for the Modern Expedition Vehicle for Family Exploration captures a strong connection with the outdoors and highlights the importance of family exploration by immersing them in nature. It uses earthy tones to blend urban and natural environments, creating a harmonious mix of natural and modern forms. The migratory birds and their seasonal travel symbolizes family journeys at specific intervals of times, representing freedom and adventure. This visual theme supports the project's goal of bringing families closer through meaningful travel experiences.



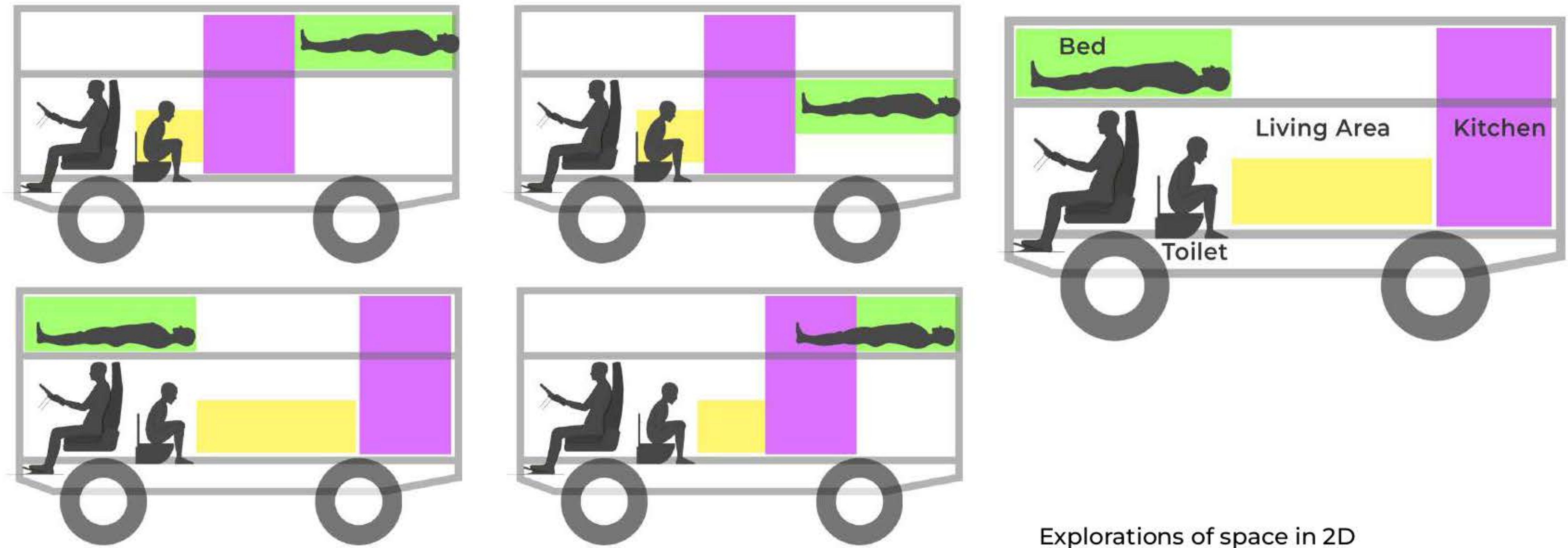
(photoshopped image)

11. Product placement

The expedition vehicle is positioned in the market between the capable and compact segments. This placement offers the best of both worlds, combining the rugged capability needed for off-road adventures with the practicality and maneuverability of a compact vehicle. By bridging these segments, the vehicle appeals to adventurers seeking versatile and agile transportation without compromising on performance or functionality.

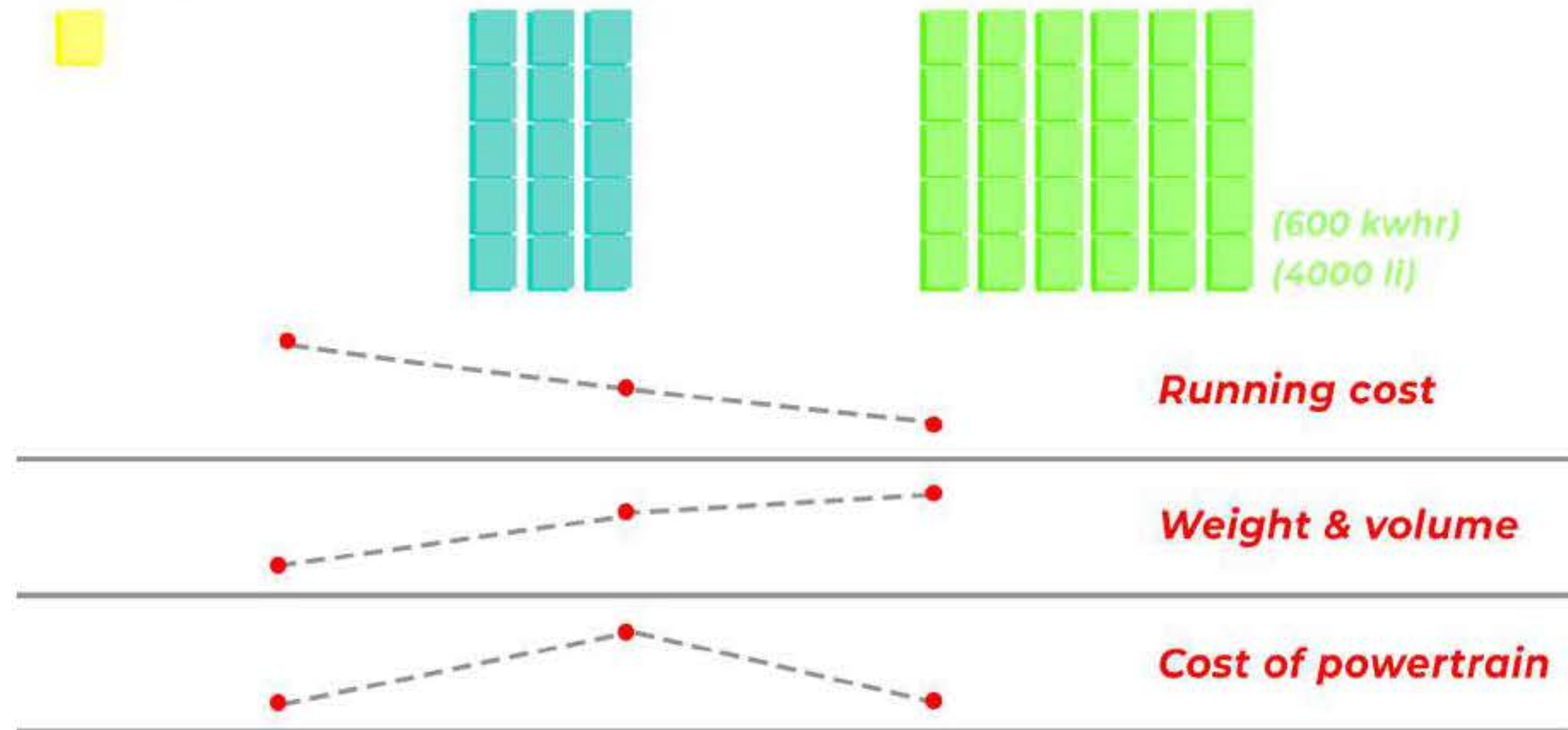


12. Packaging and tech integration



120 kw hr for 100 km
30 litre of diesel, 100km

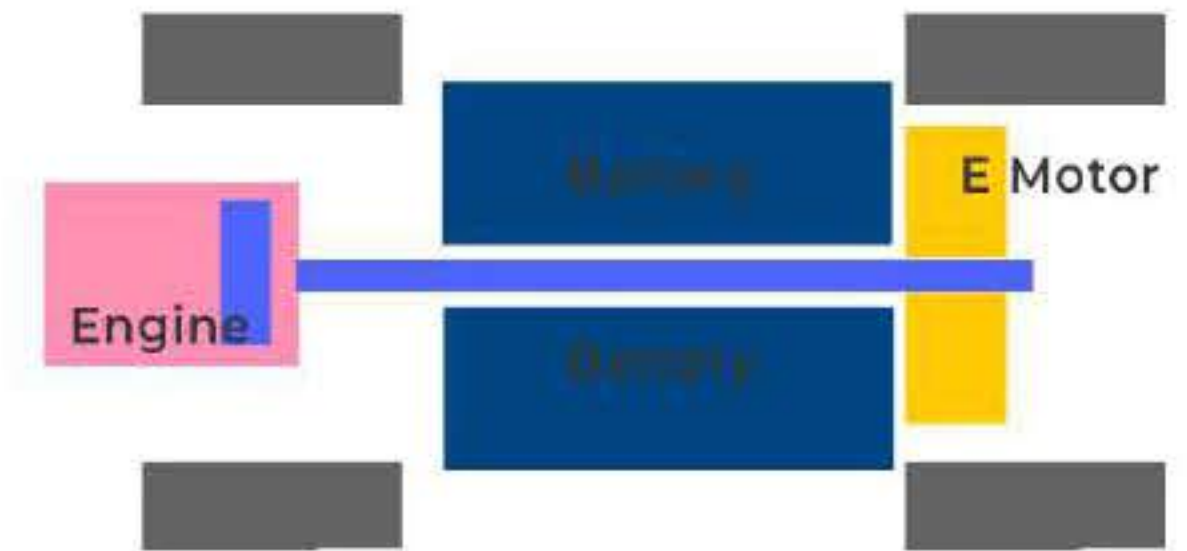
Volume analysis to run 500 km
Diesel(150l) H2 (15× D) Battery (30× D)



Hybrid drive system

300 kwhr battery
Range of 250km
60 kw diesel generator (5 hrs to recharge)
Range of 250km

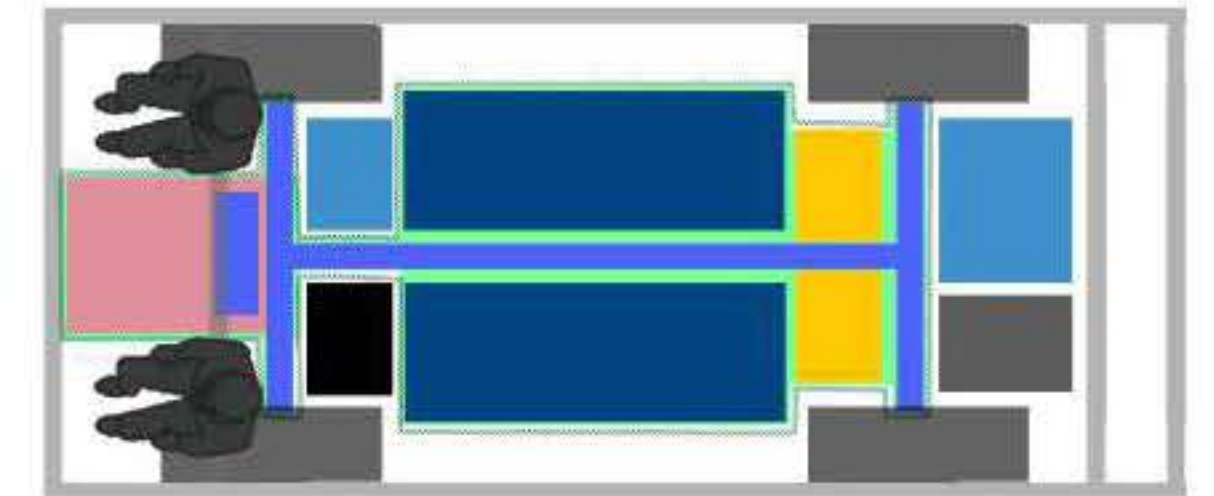
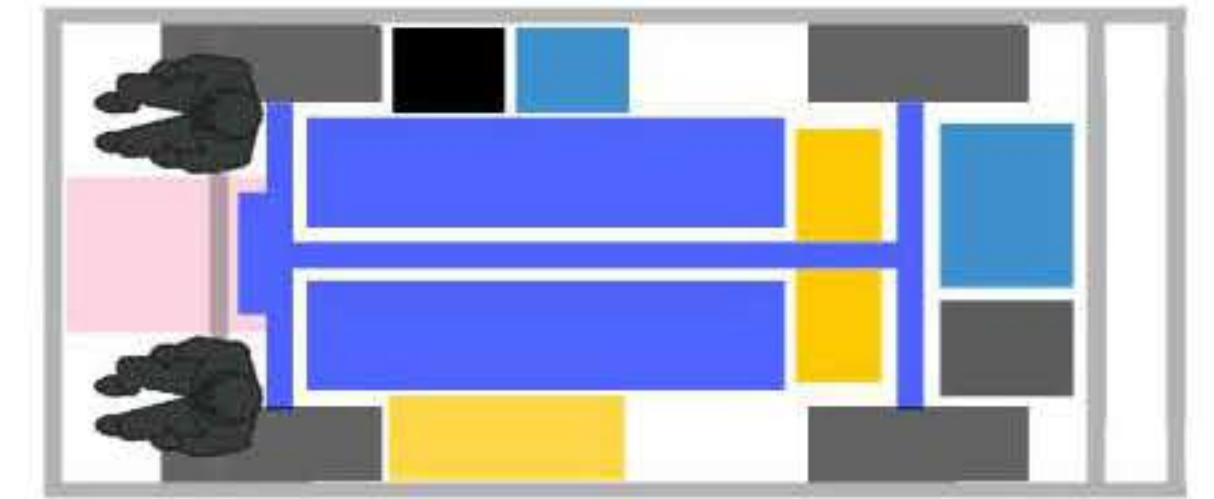
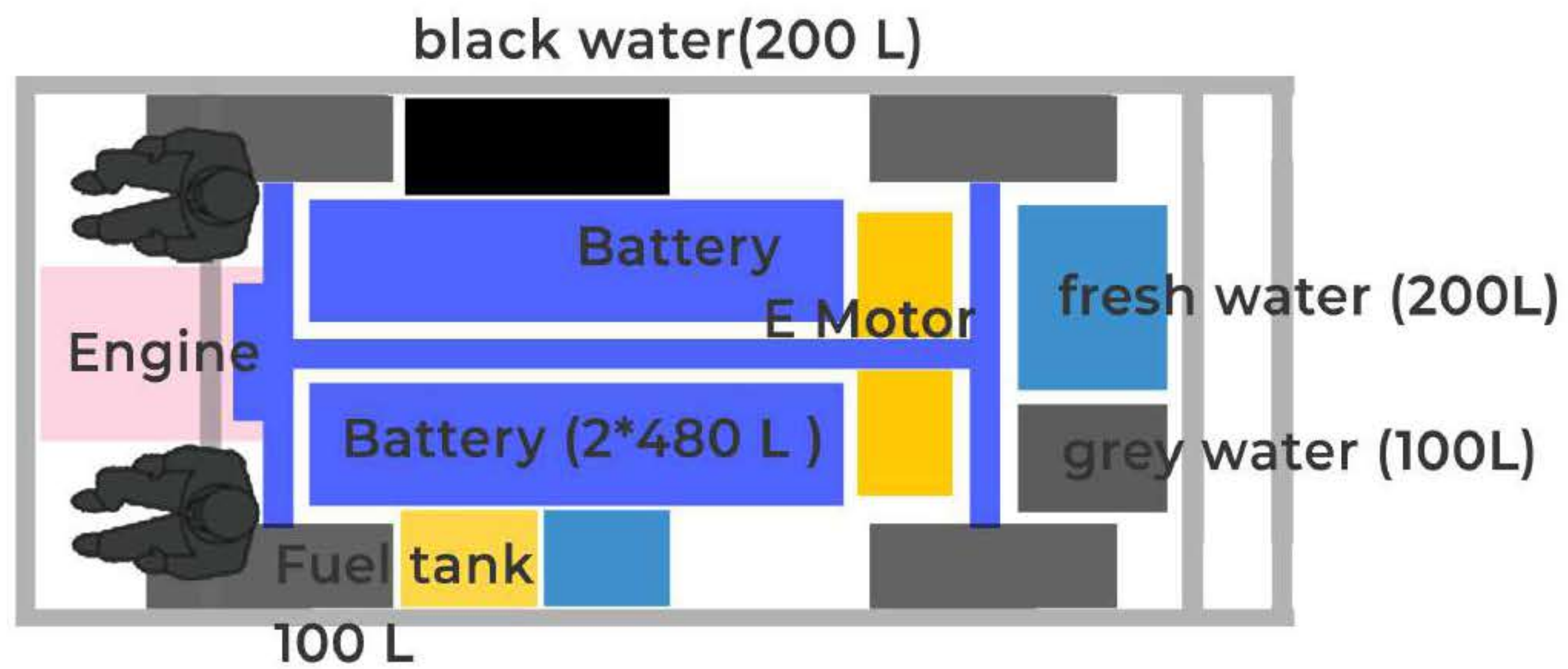
60 kw from engine
60 kw from motor 120 kw all wheel raw power

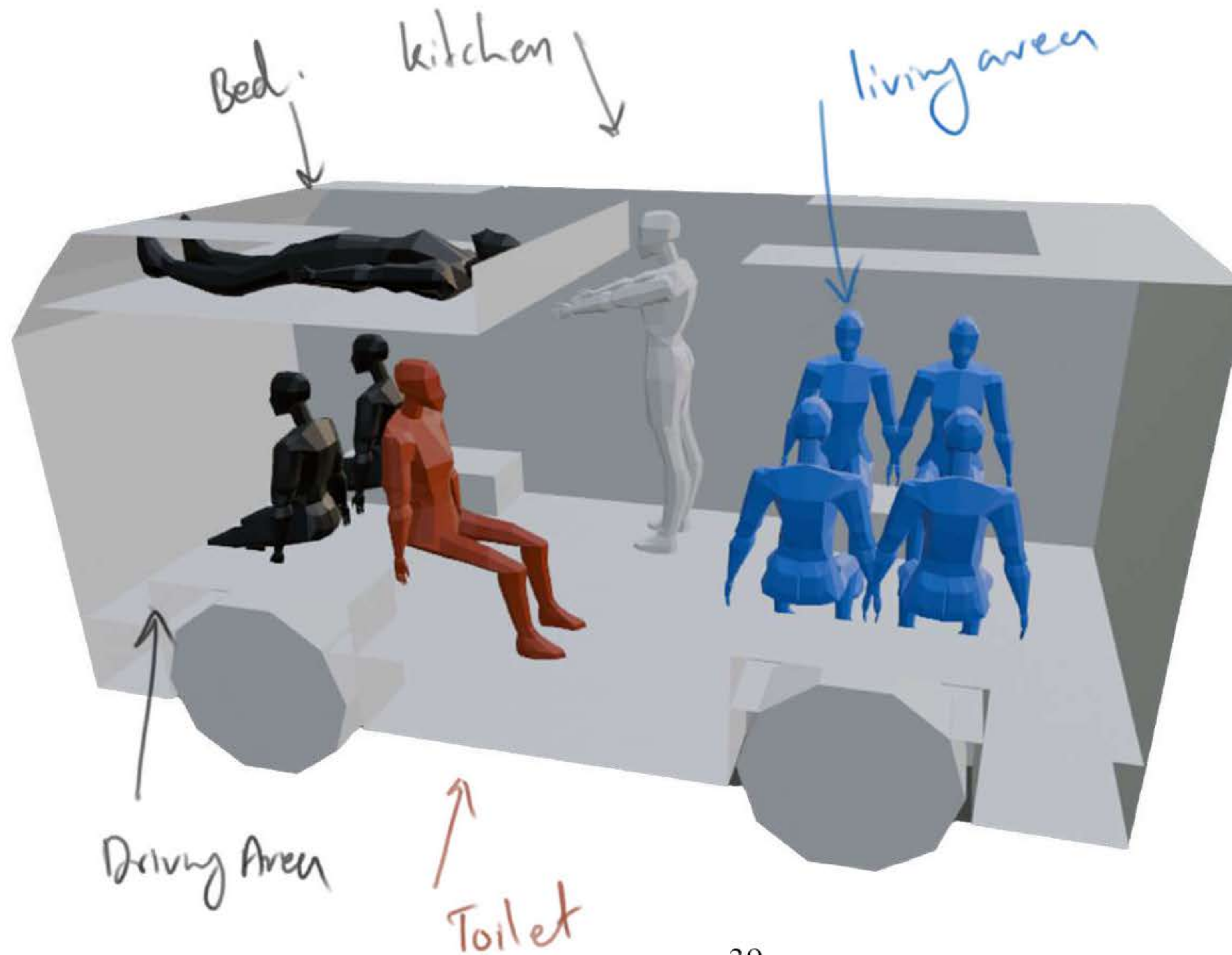


20 kw panels can make energy gen more sustainable

In the next 10 years, the space required for powertrains and batteries is expected to decrease by 50% due to advancements in technology. ("Electric Vehicle Technology Explained" by James Larminie and John Lowry, "The Future of the Automotive Industry" by Inma Martínez) This significant reduction means that the Modern Expedition Vehicle I am designing will be able to utilize much less space for these components. By planning for this reduced space, my vehicle will be more compact and efficient, making it perfectly suited for future scenarios where technology integration is more advanced. This will allow for a more spacious and versatile interior, enhancing the overall travel experience for families.

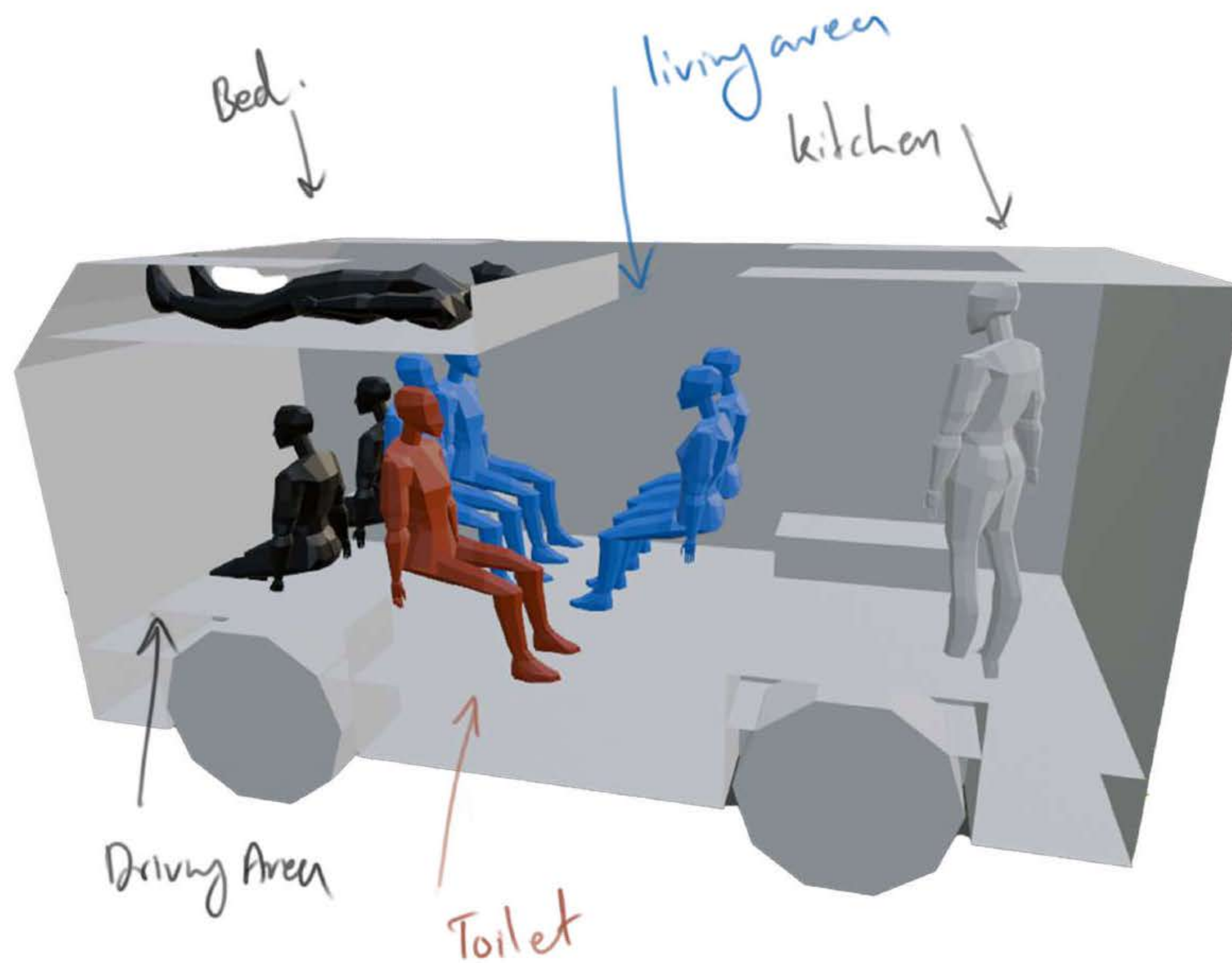
Height of base is .3m





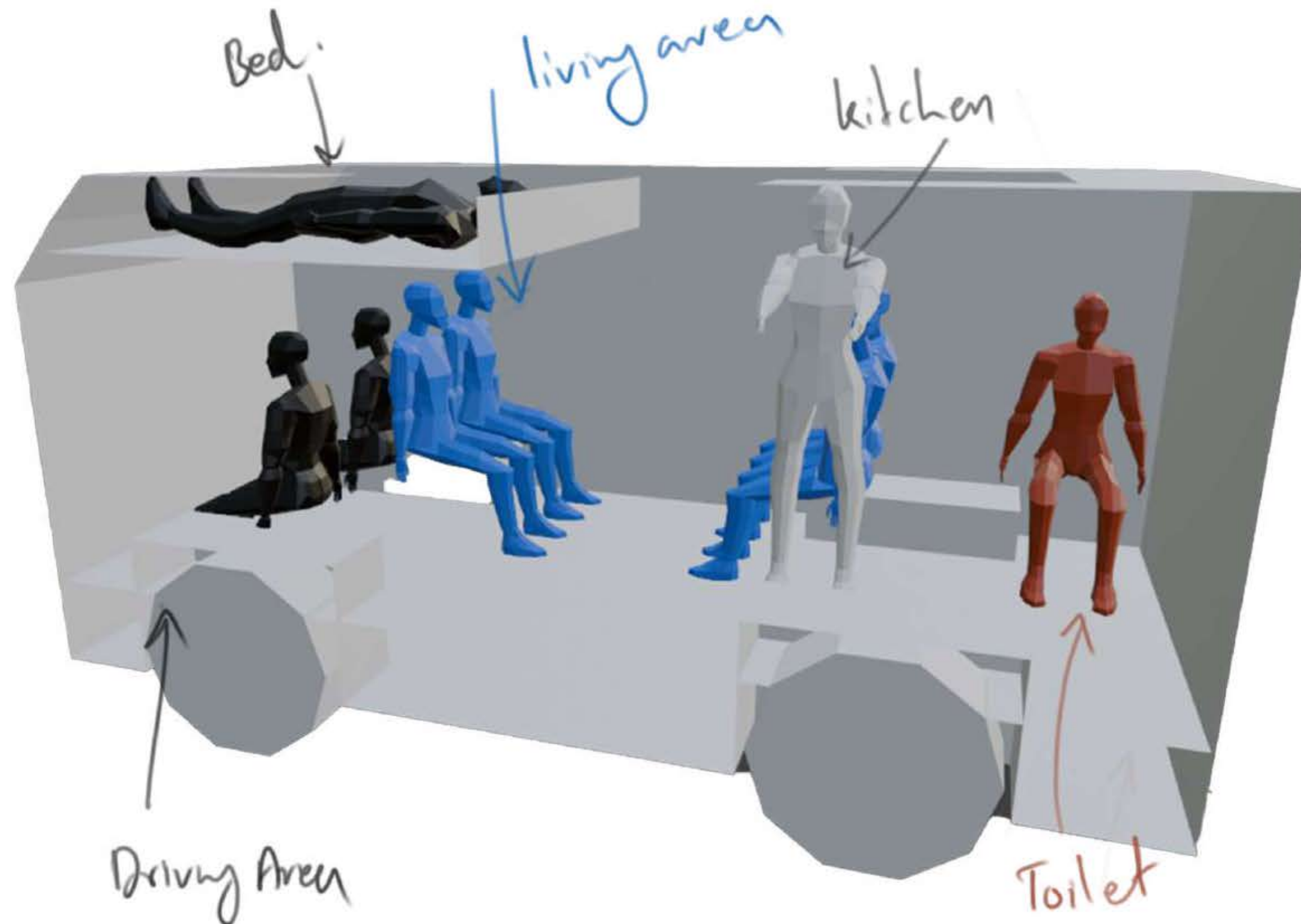
The bed and shower space can make multipurpose full space in every iteration, apart from 2 person beds on top. Living space can be converted into another 2 person bed.

The position of the living area reduces the passthrough to the rear side of the vehicle. Also the cooking and serving will be easier and it is in a comfortable position.



The position of the living area toilet and driver cabin feels so tightly packed and cooking and serving will need more effort

Kitchen will get more room and can make the rear portion expandible or multipurpose space.



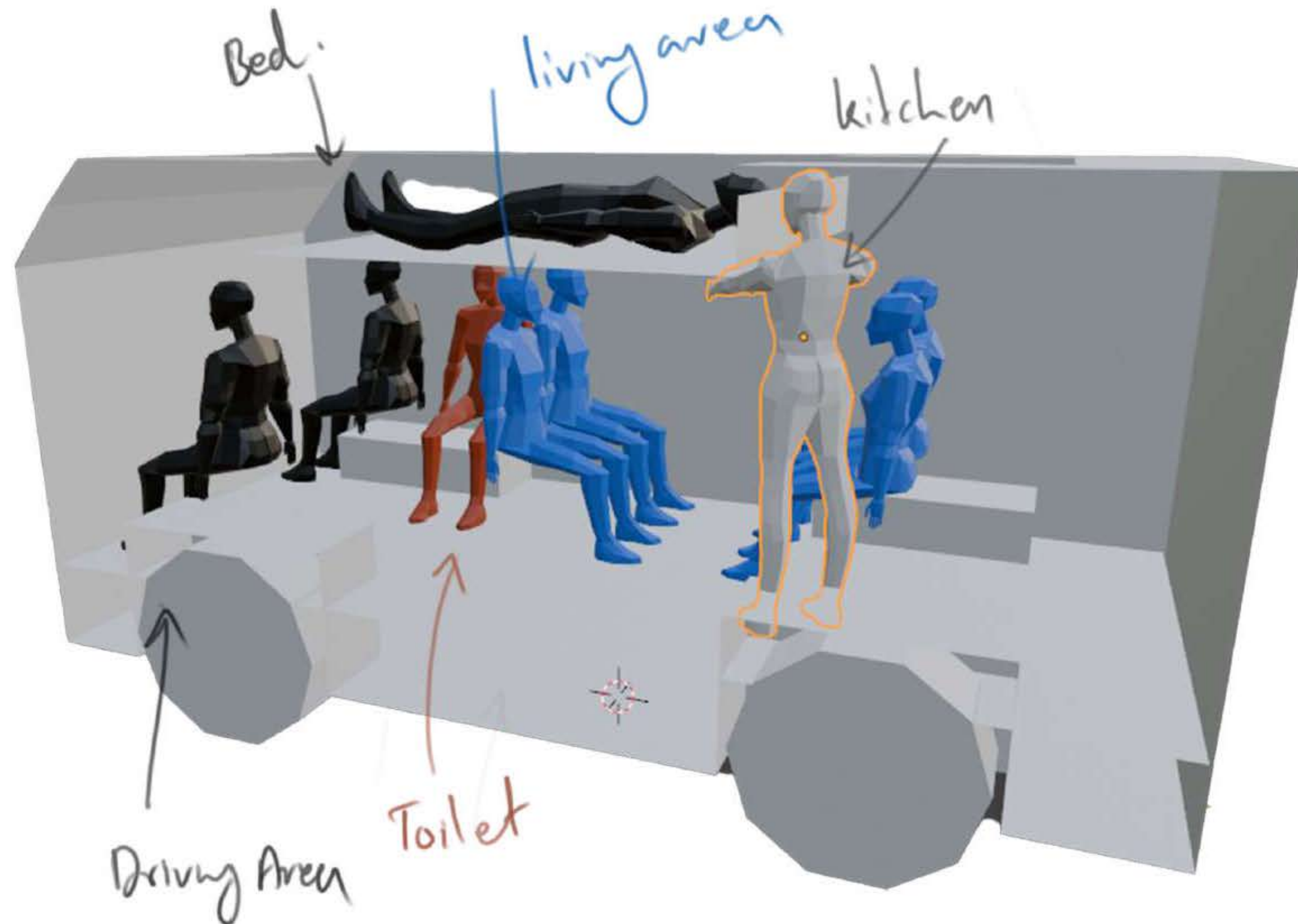
The position of the toilet reduces the usability of expandable area and view of wide open rear

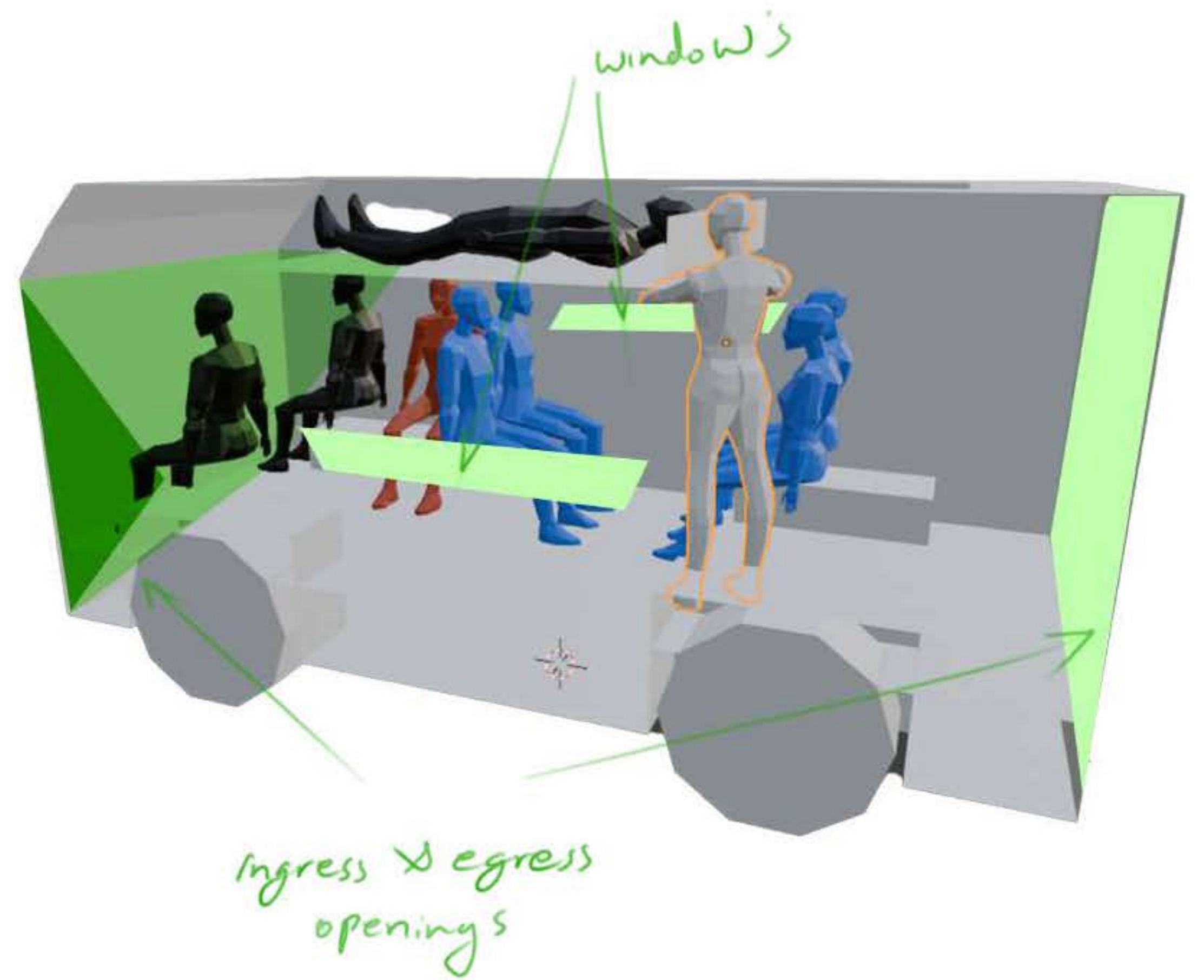
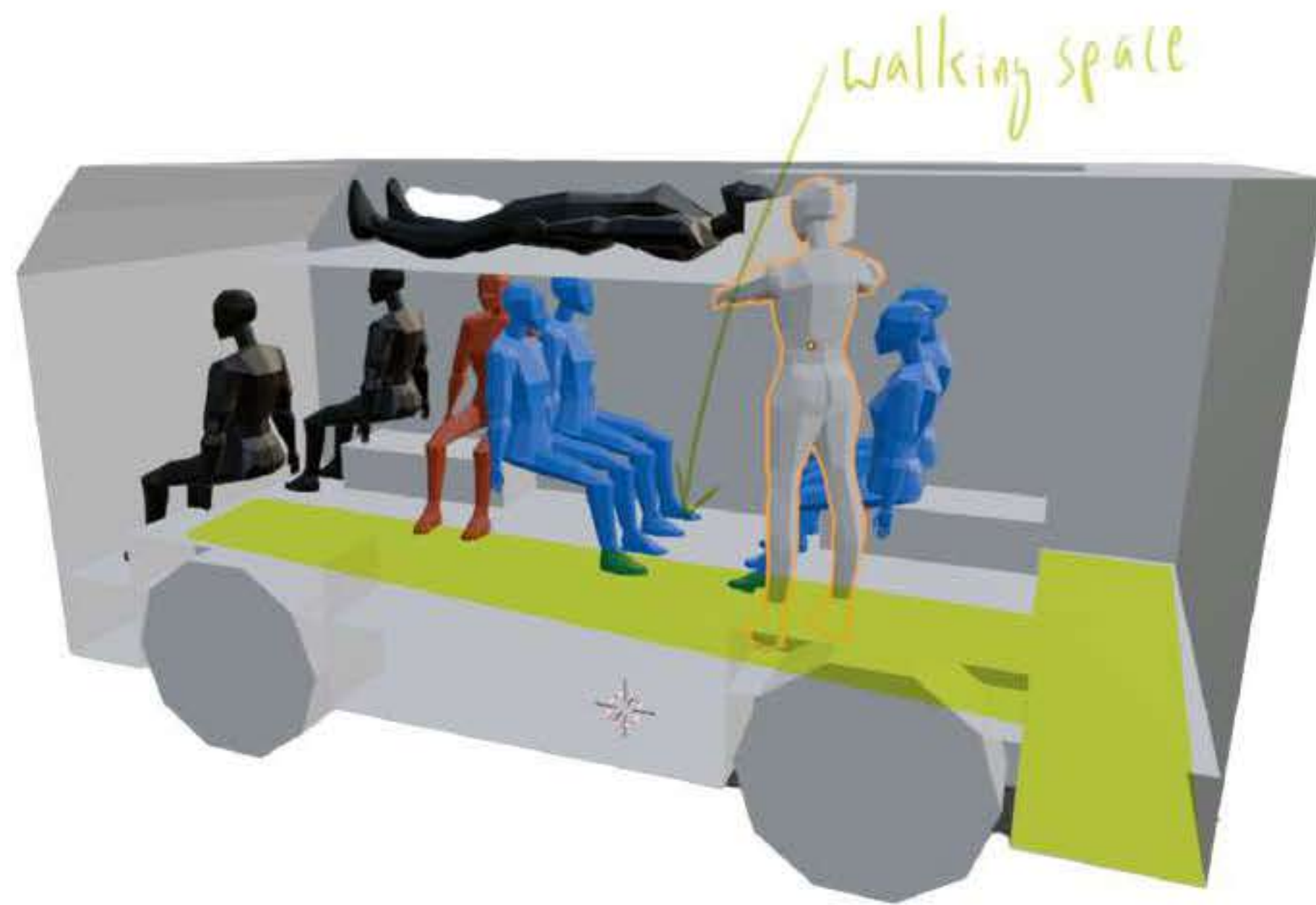
Also the living area and kitchen is in optimum position.

Finalized layout

It is hard to accommodate this layout with respect to the current wheelbase so the wheelbase is slightly increased.

The bed position changed to center so that driver can position much higher and it will improve visibility. Also the living area and kitchen is in optimum position and at rear there is free space so that it can make an expandable space so that the vehicle becomes more compact.

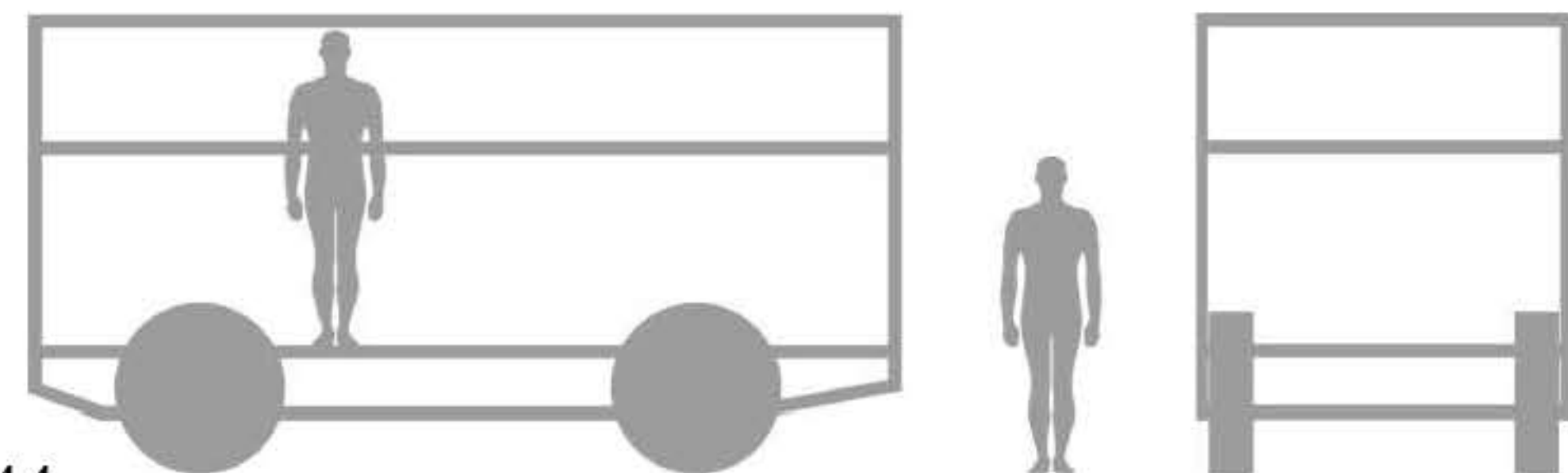
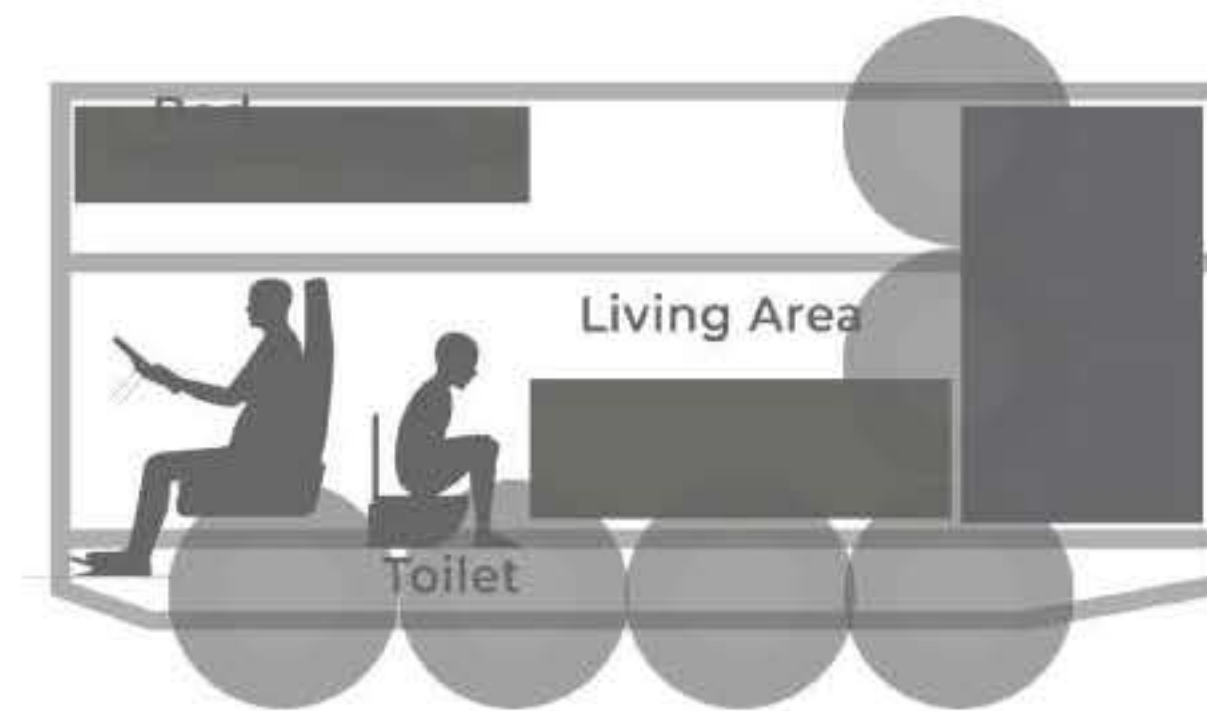
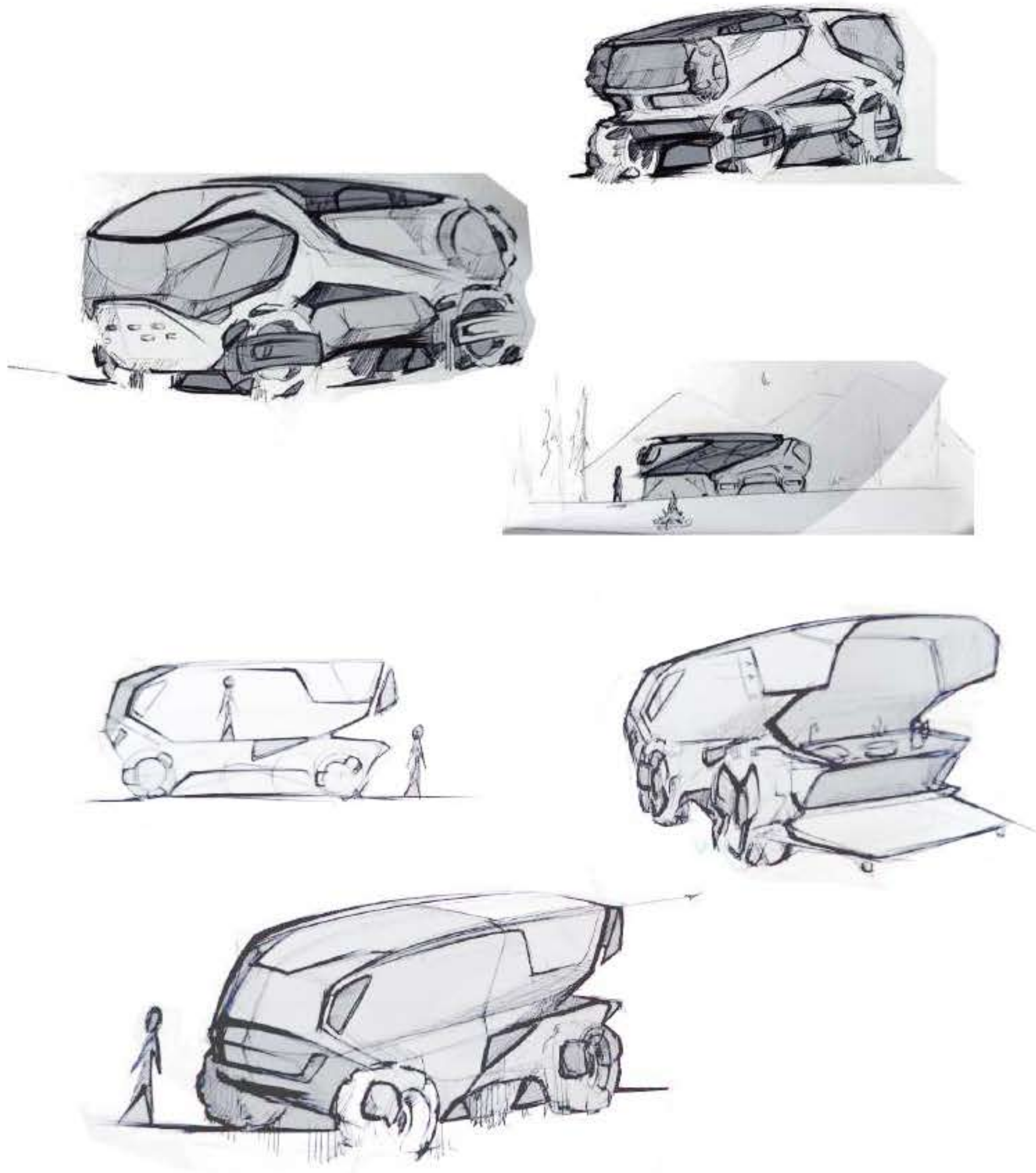




13. Ideation

13.1 volume and proportion study and throwing off ideas

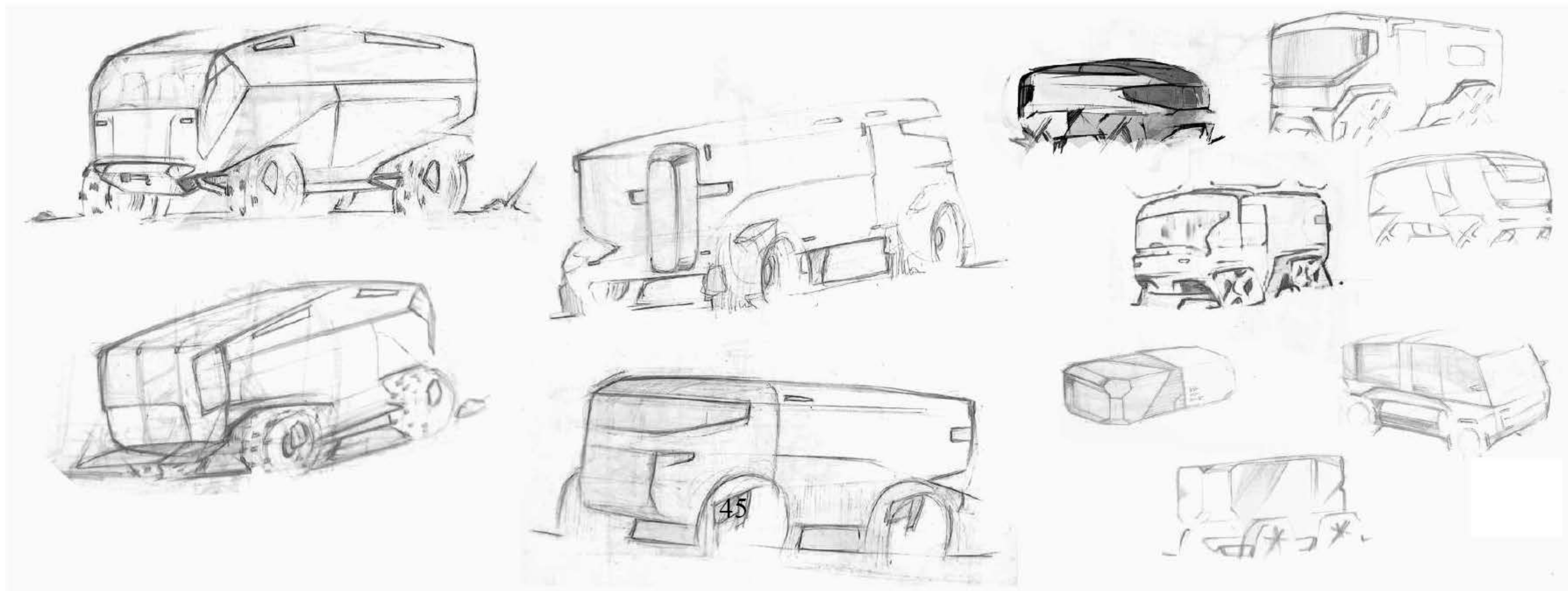
Volume and proportion studies streamline the ideation process by filtering out unnecessary ideas, allowing us to focus on essential elements. By analyzing spatial relationships and aesthetics early on, it can discard impractical concepts and concentrate on refining viable solutions that enhance both form and function.



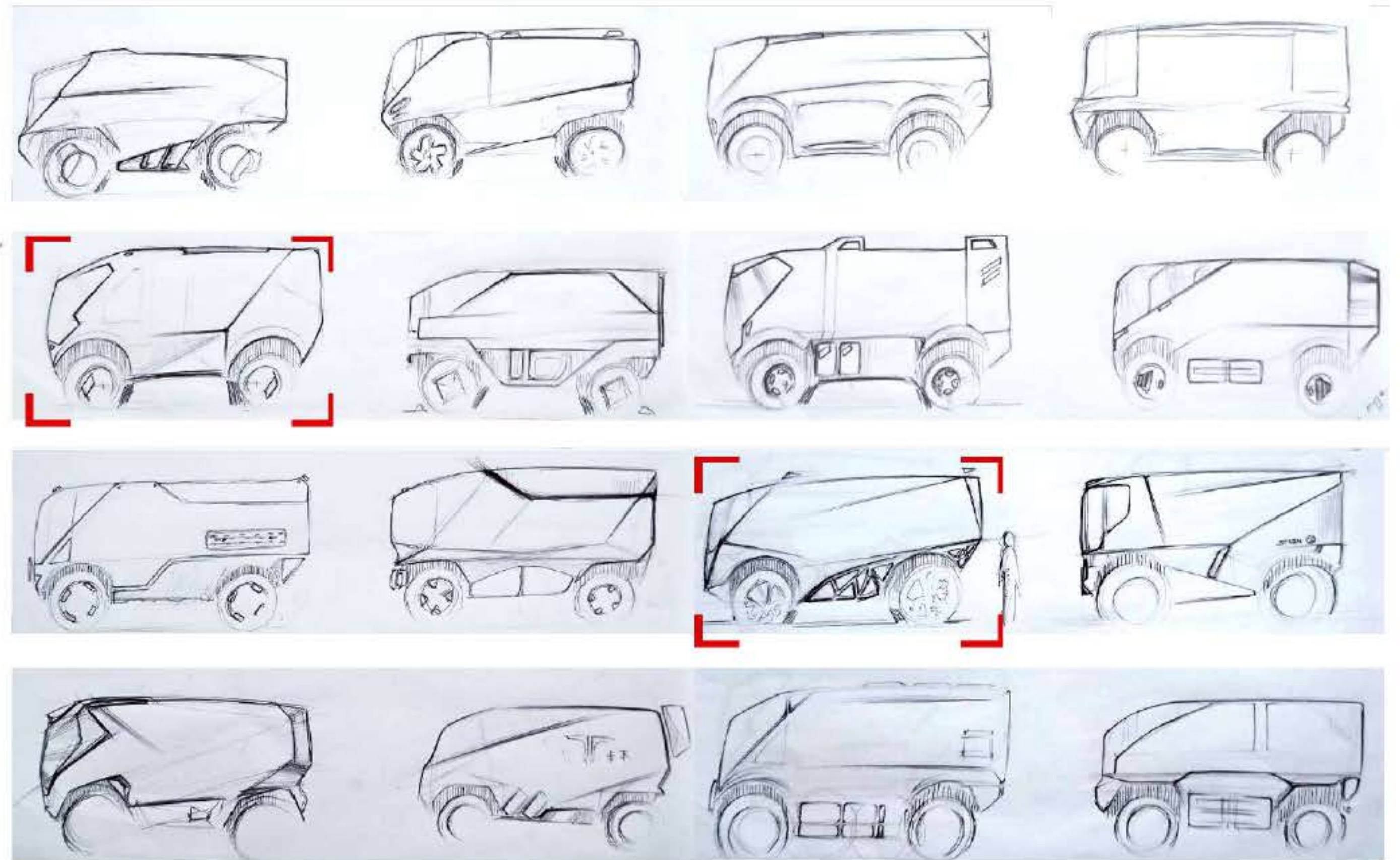
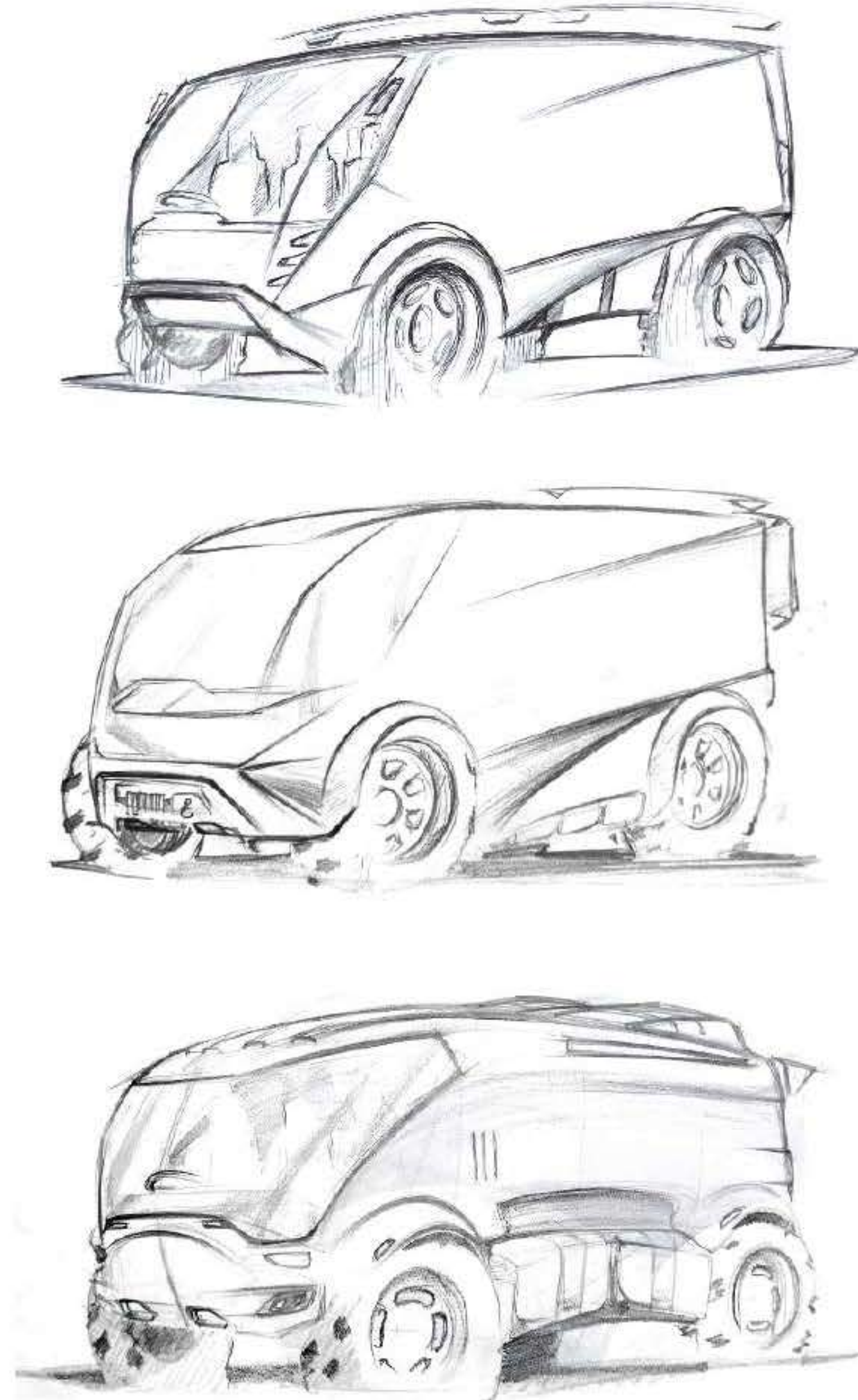
13.2 Initial ideations

The initial theme board centered around a simpler, edgy design with rugged elements. Multiple iterations of side view sketches followed, with design directions chosen based on potential user preferences.

This iterative process allowed for refinement, ensuring that the final design aligns with user expectations while retaining its distinctive

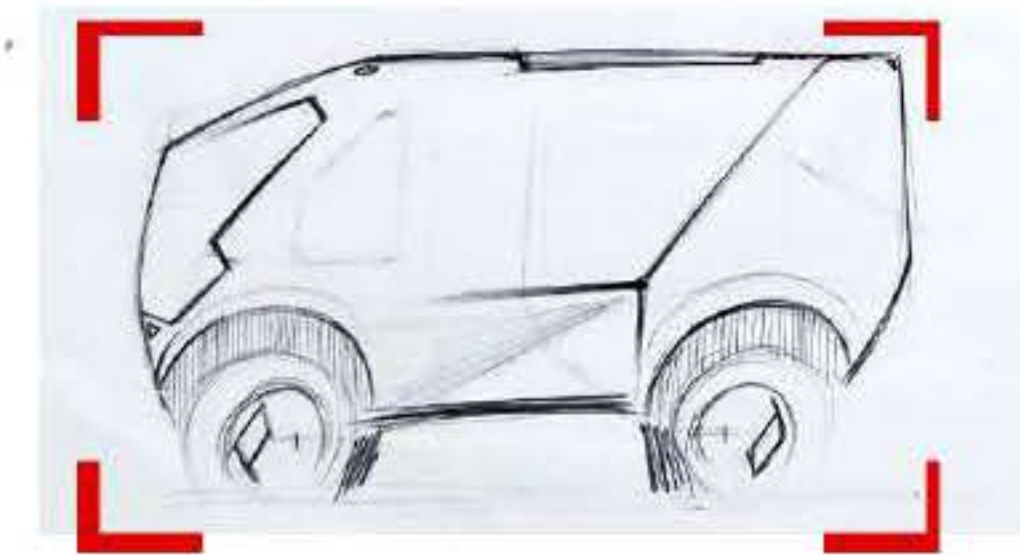
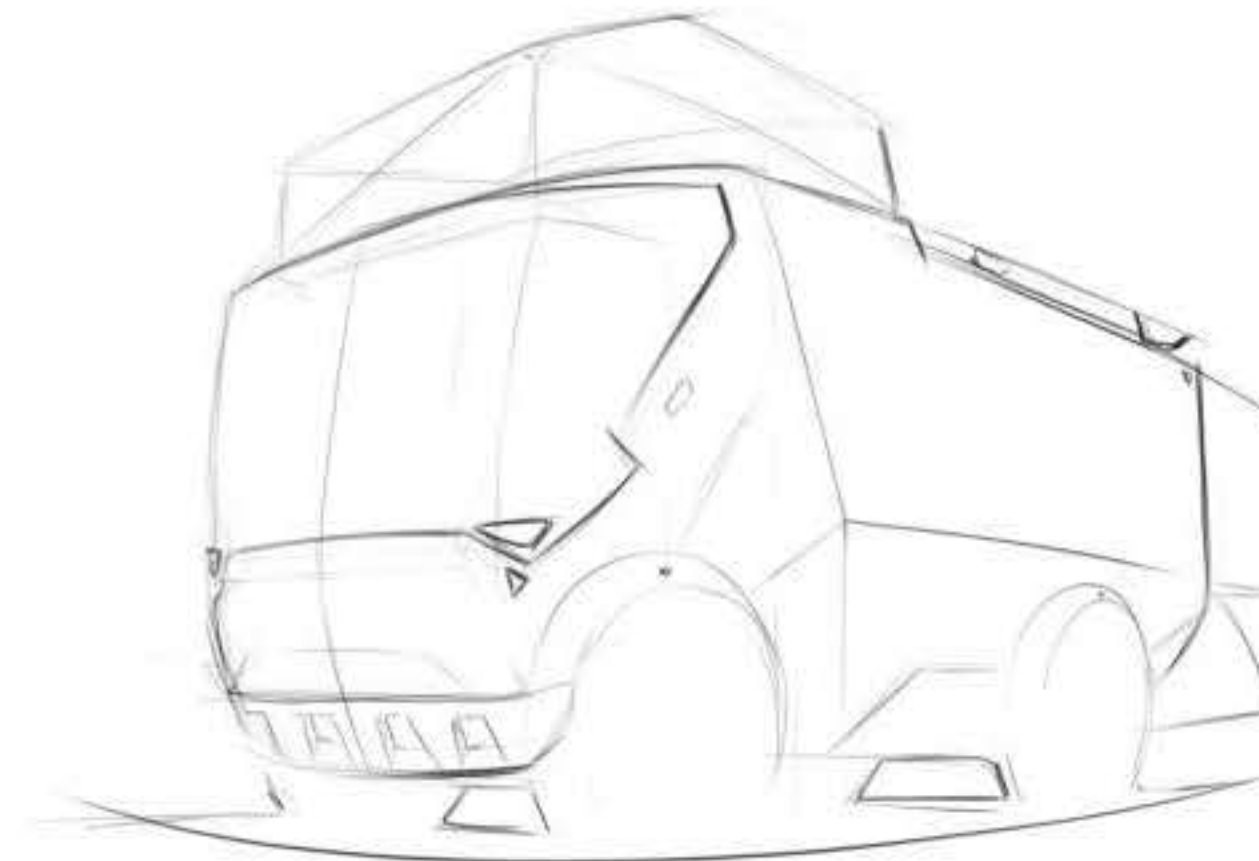
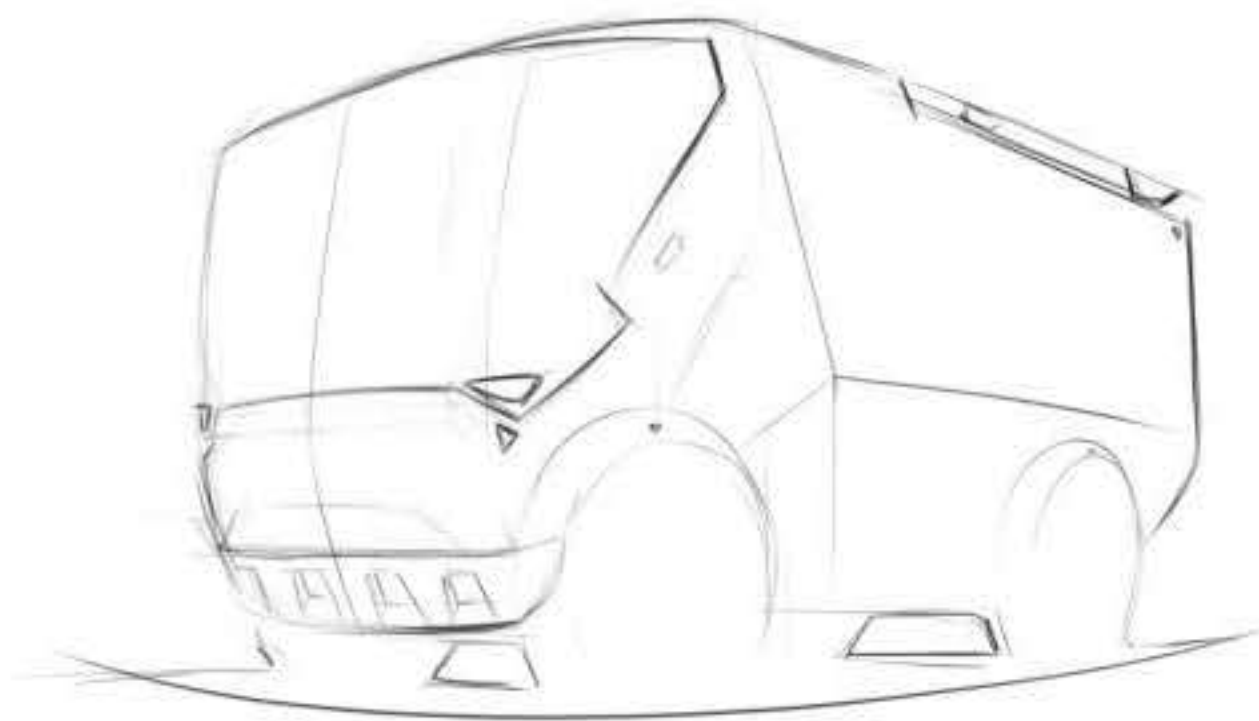
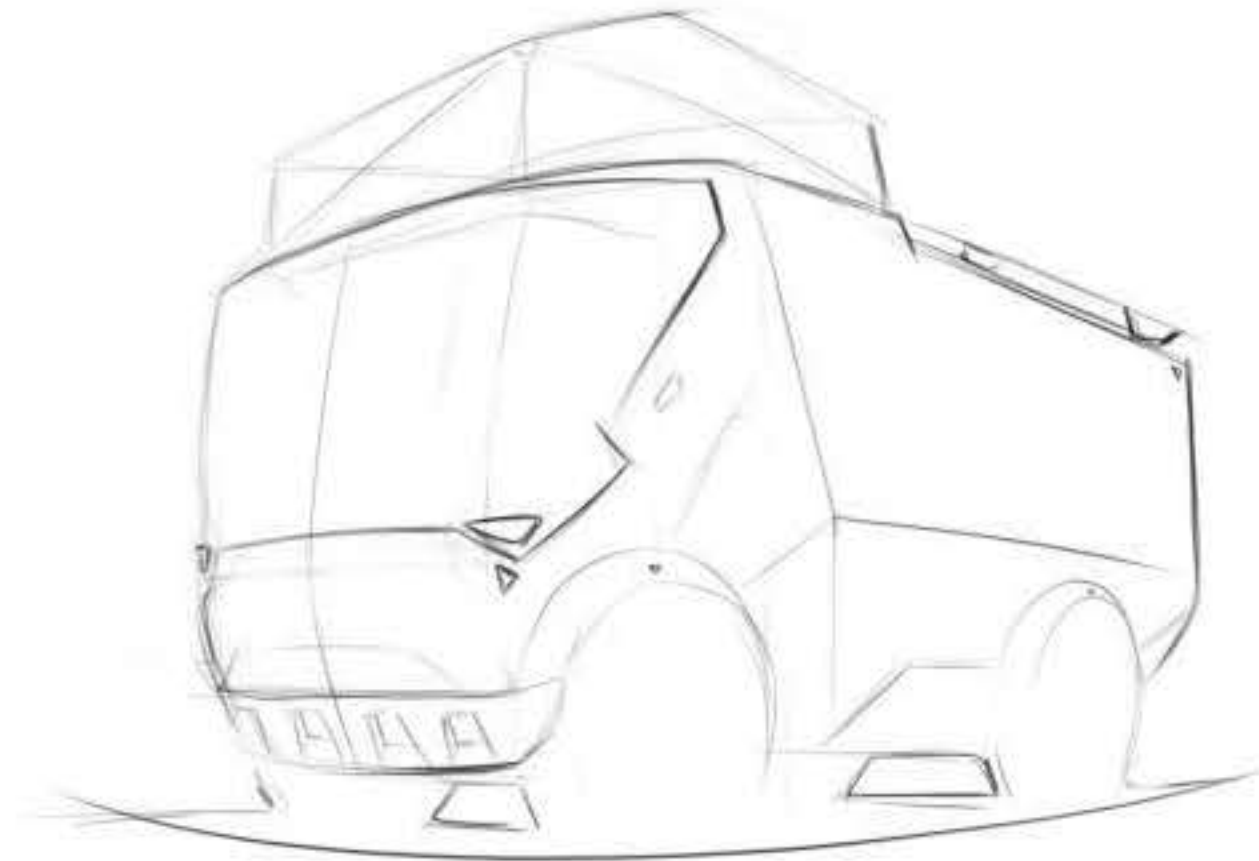
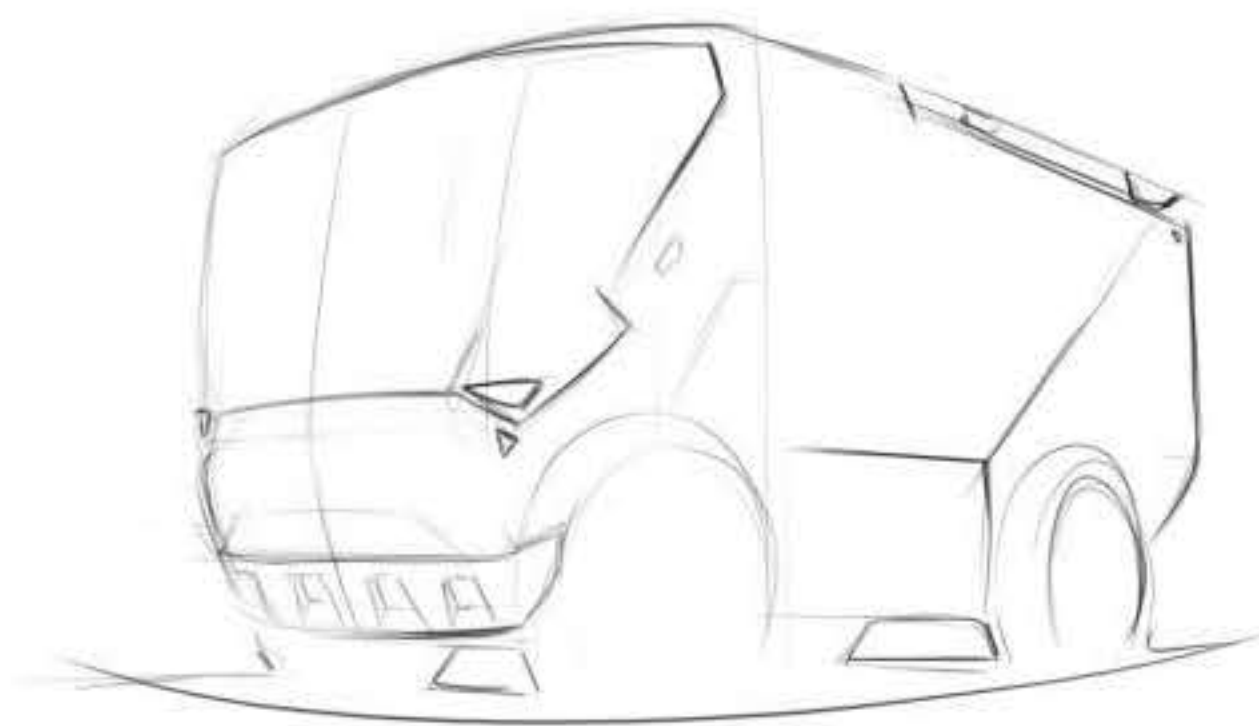


The selection of two concepts was narrowed down based on the prevailing preferences among individuals in my vicinity. By identifying the most commonly favored features, these concepts were refined to resonate with the tastes and expectations, ensuring that the final design reflects their preferences and needs



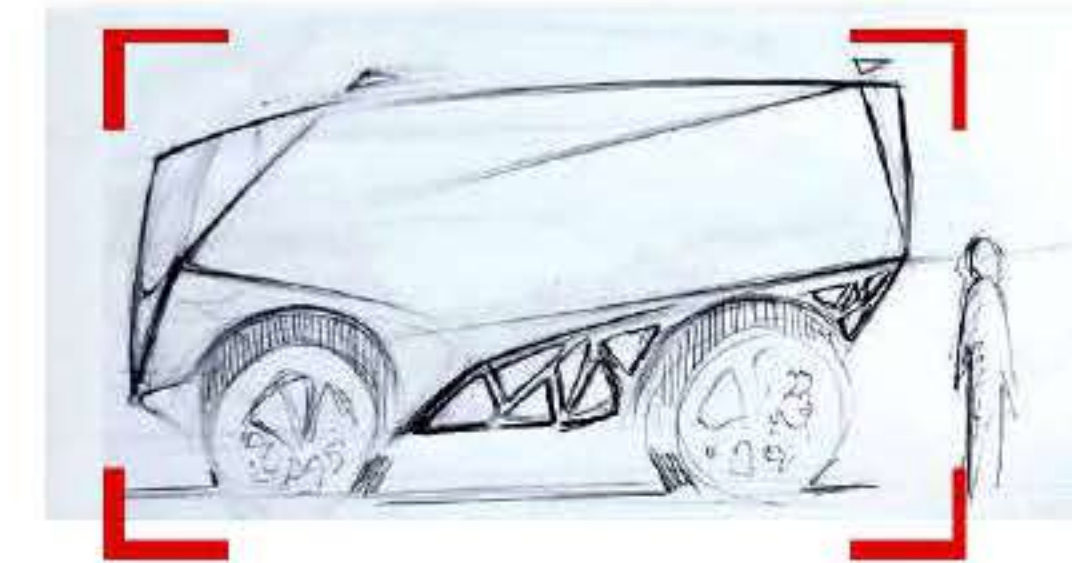
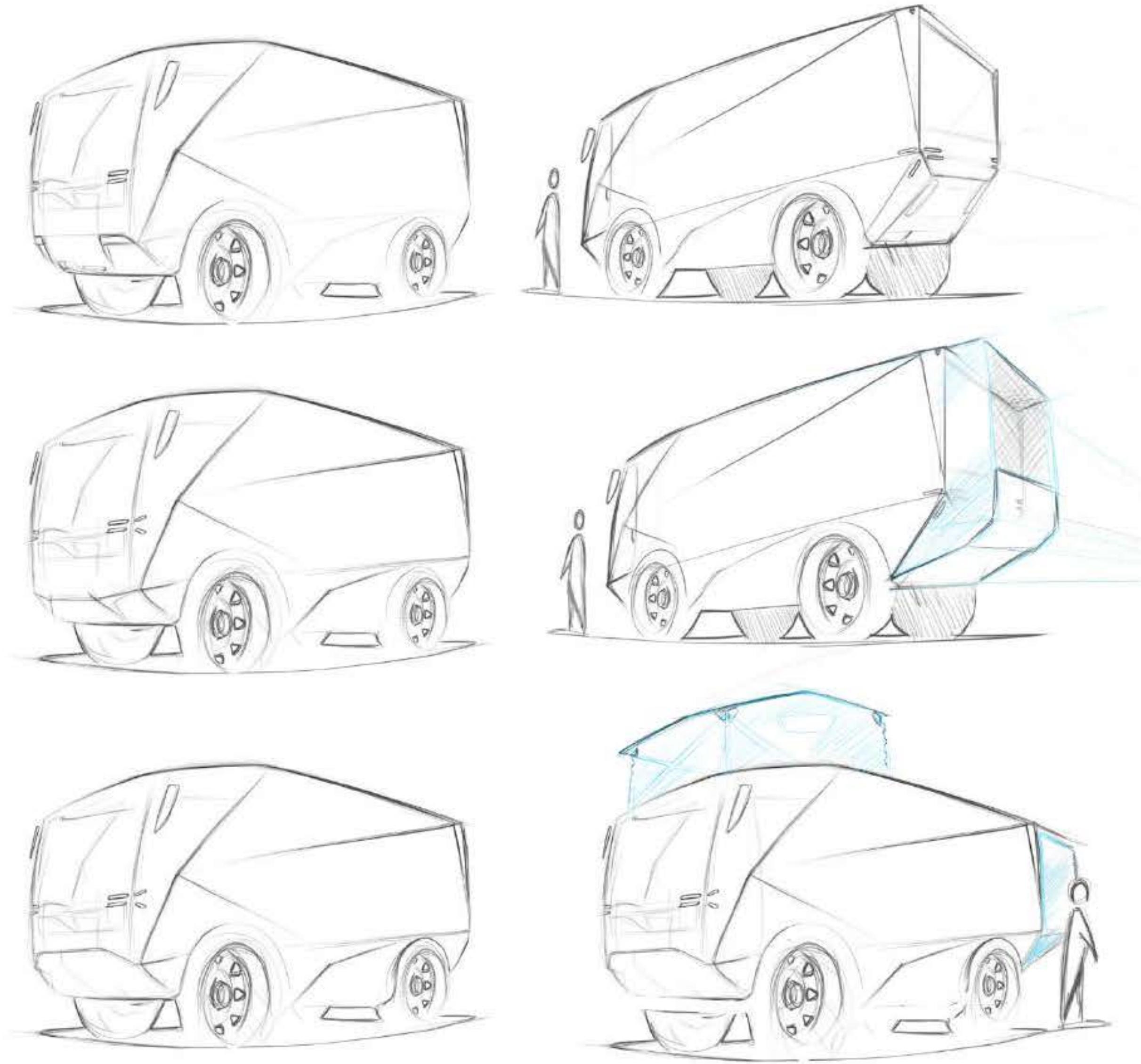
13.3 concept one

development

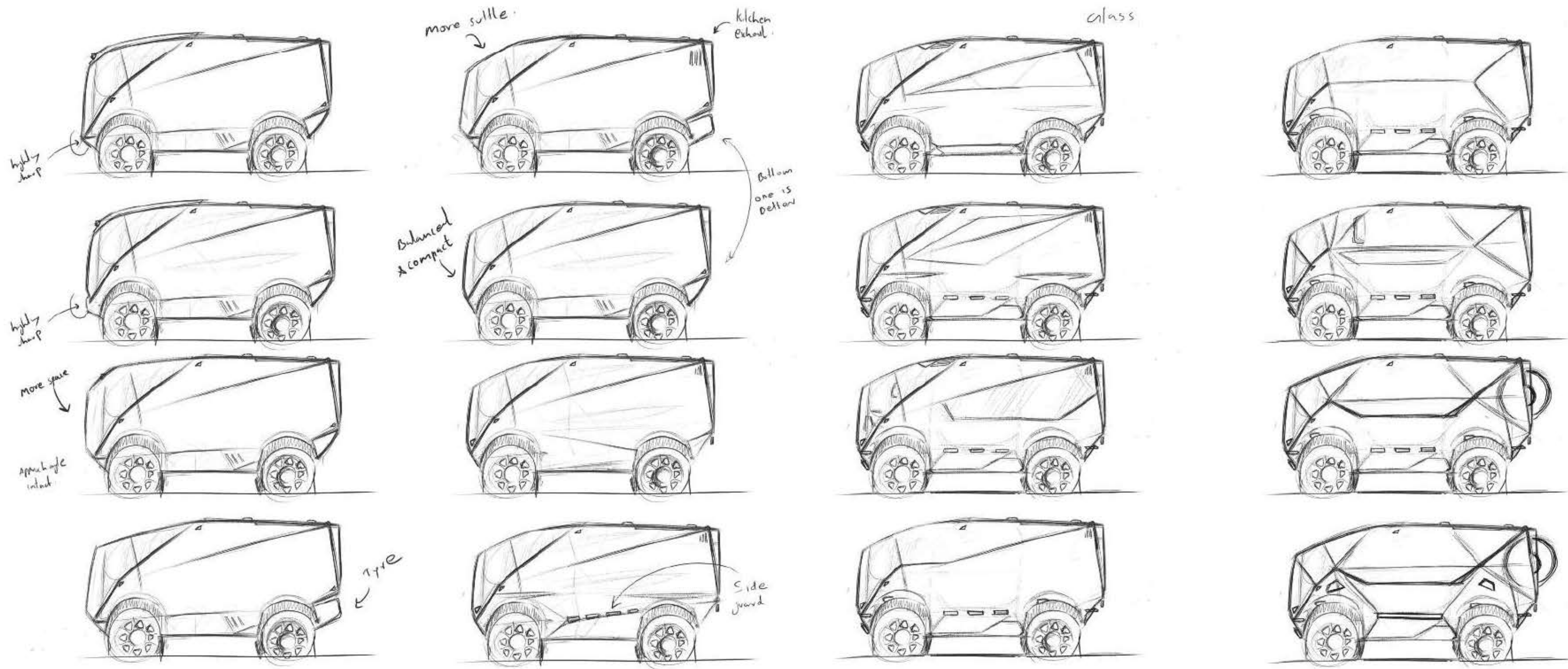


The expedition vehicle was perceived to have a resemblance to a caravan during the design process. This observation prompted further exploration to balance the desired expeditionary features without the **characteristics of a caravan**, ensuring the final design retains its functionality while embodying the desired aesthetic appeal.

13.4 concept two development (final design)

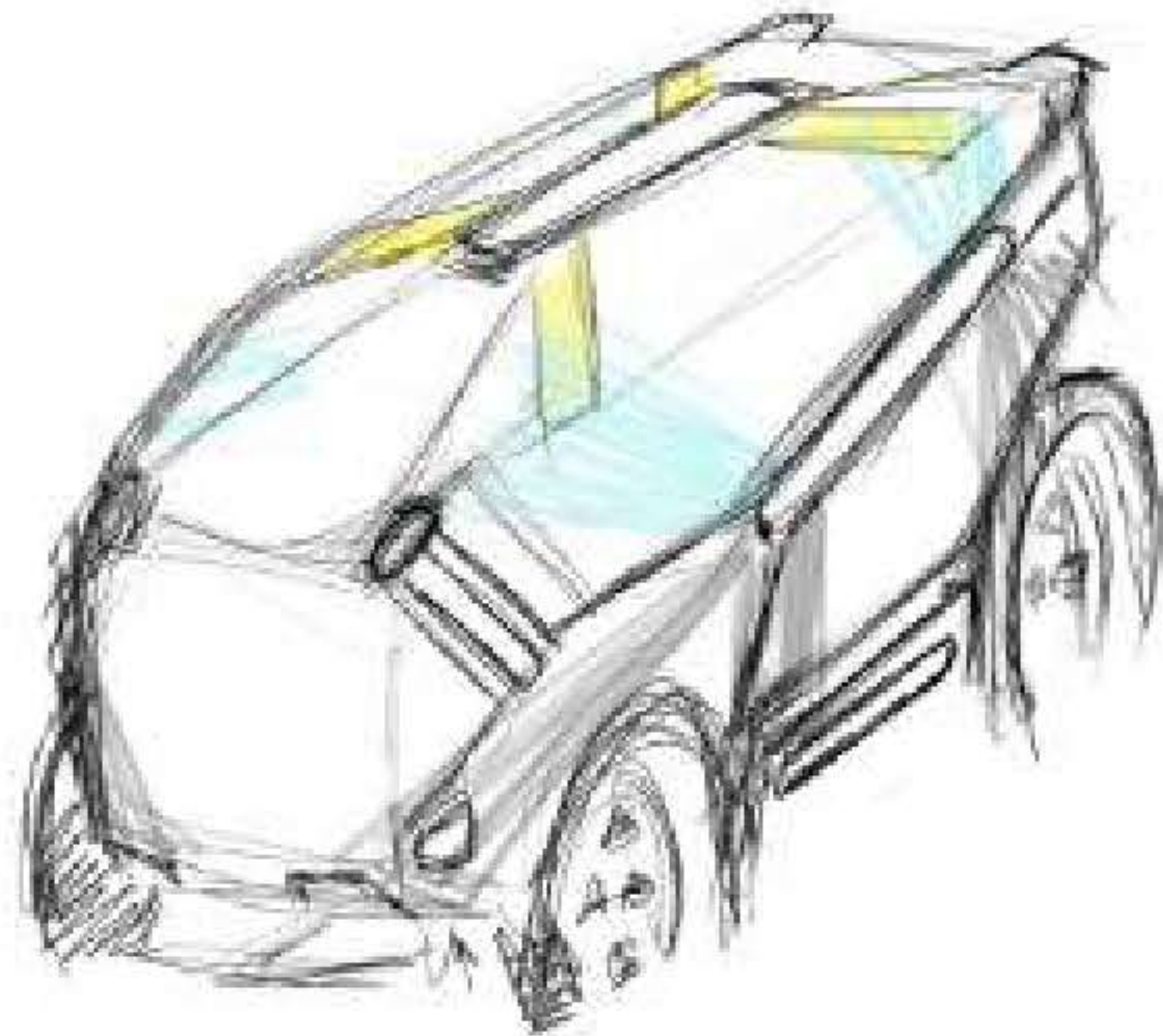
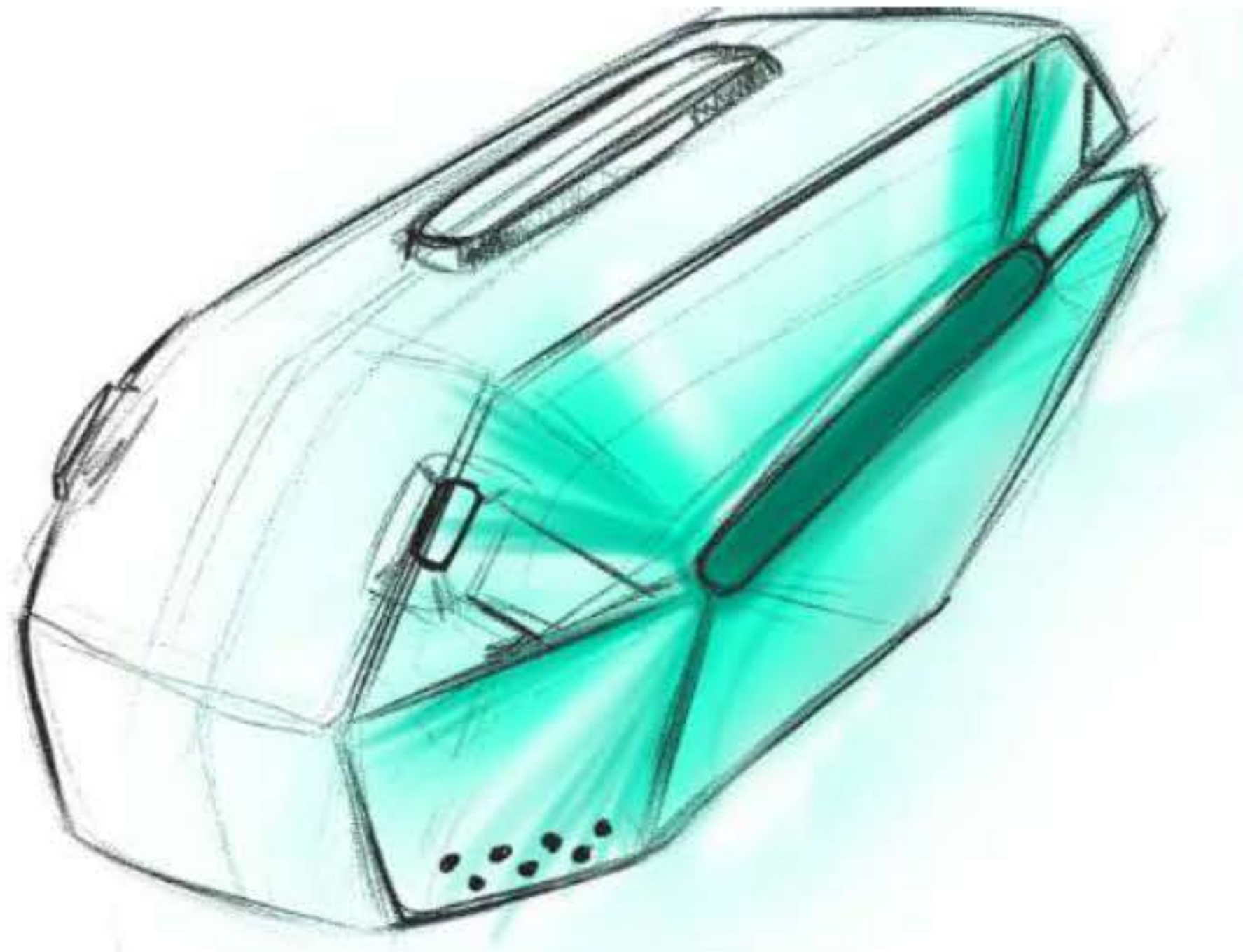


Considering the vehicle's release in a decade, the design must remain timeless. Thus, the current design language needs to transition into a more conceptual model, anticipating future trends to prevent obsolescence. By foreseeing potential outdated elements, the design needs evolve to maintain relevance and appeal, ensuring longevity in an ever-changing automotive landscape.

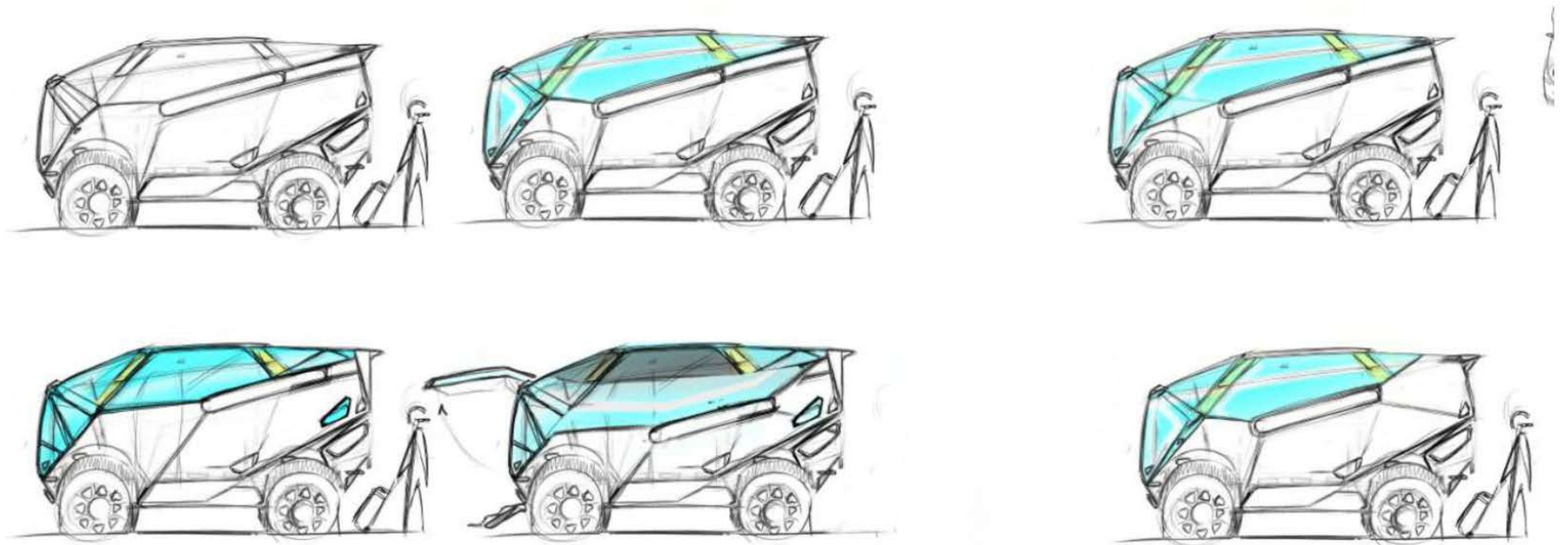


Optimizing the design: which involves enhancing its performance, functionality, and appeal while minimizing unnecessary elements to ensure superior quality and effectiveness.

It is evident that the current design process constraining the sketches and the vehicle is not looking modern. So based on the image board and current design language I have generated a form and key sketch.

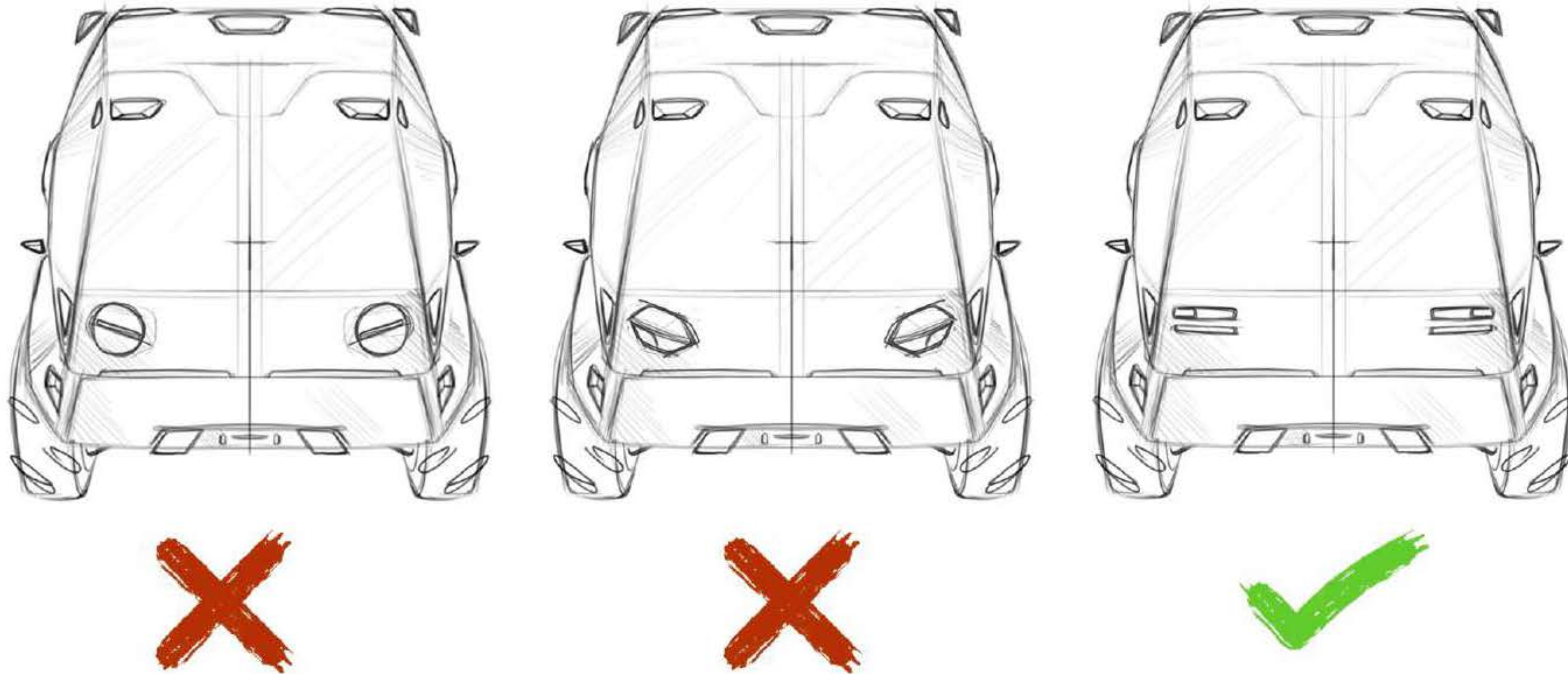


Key sketch

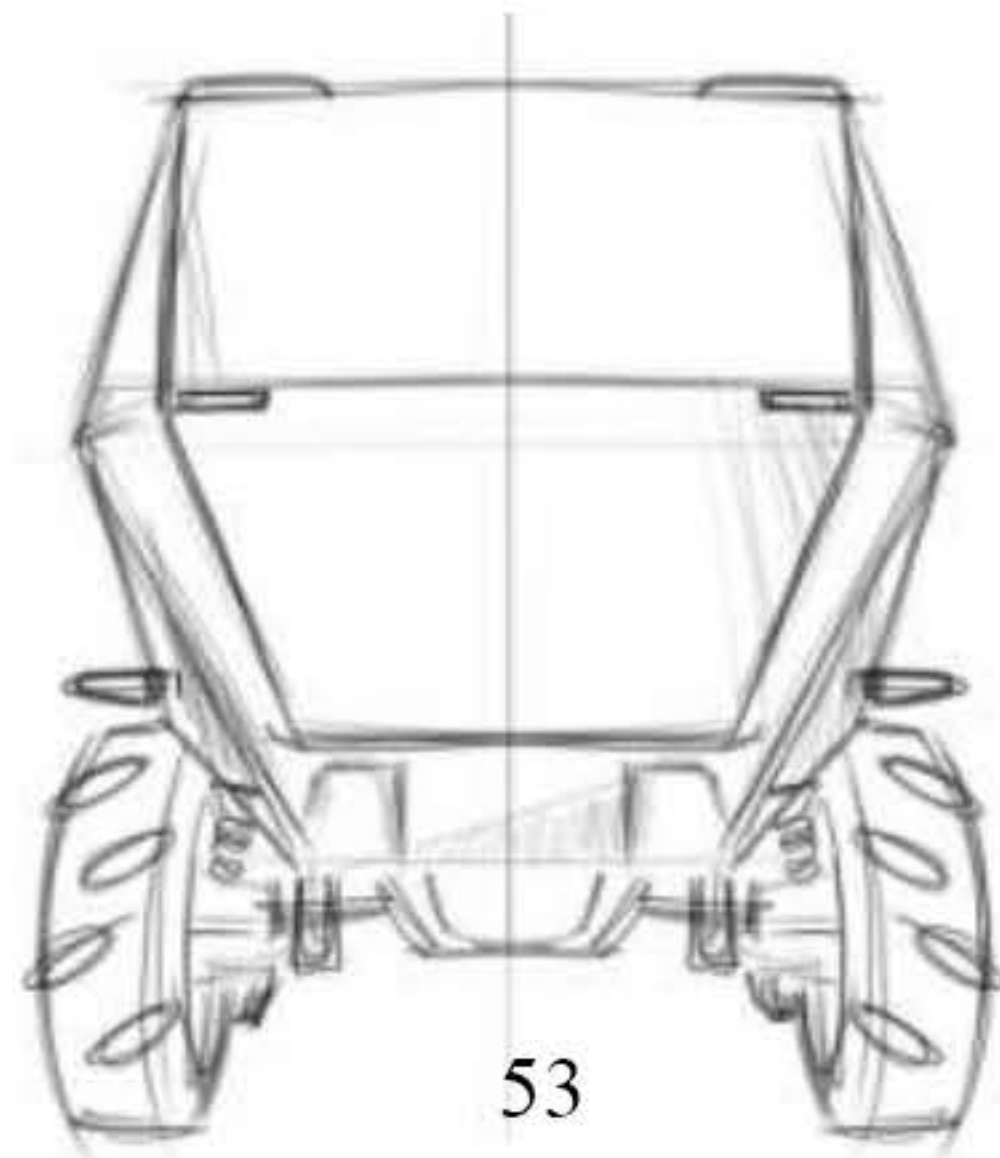
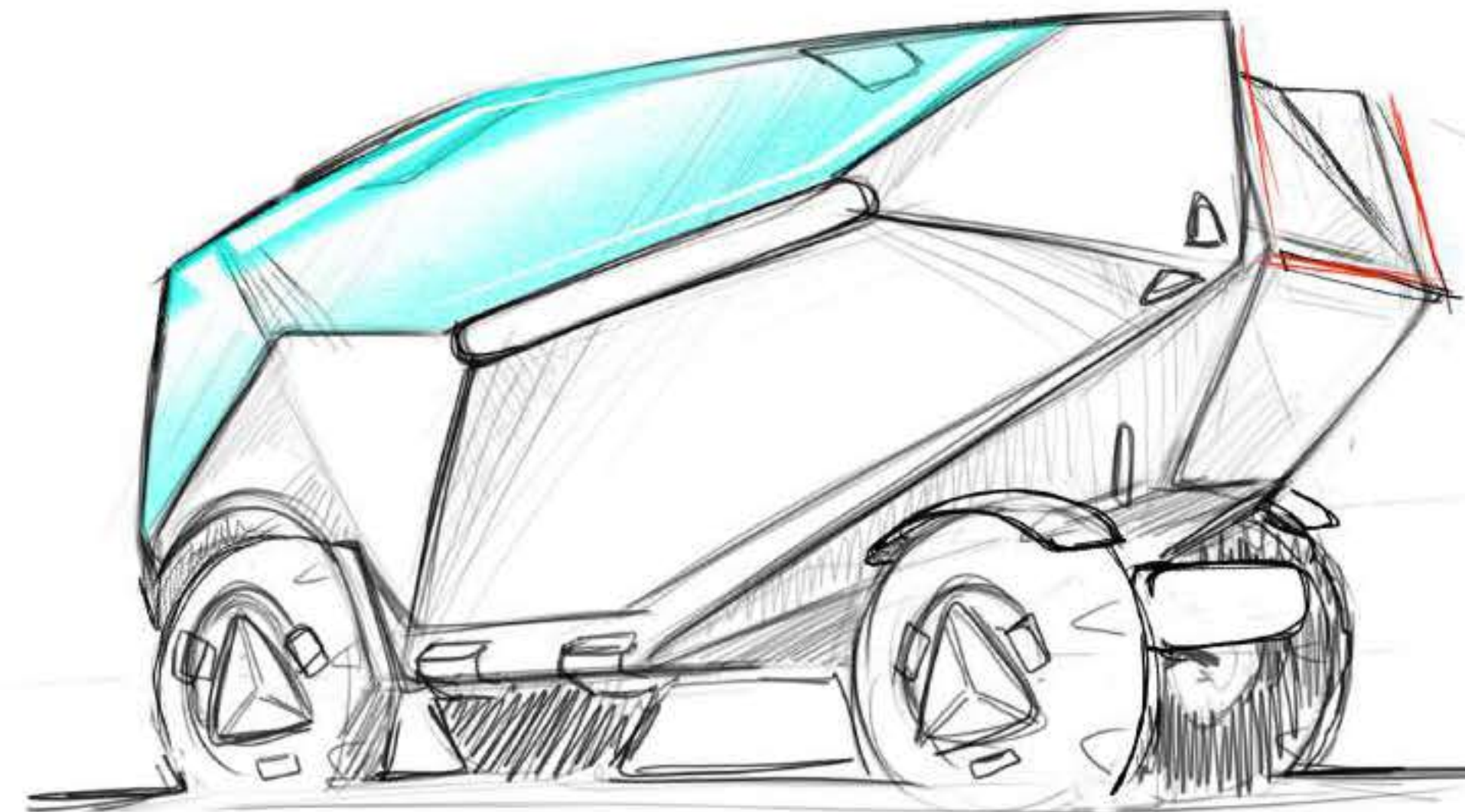
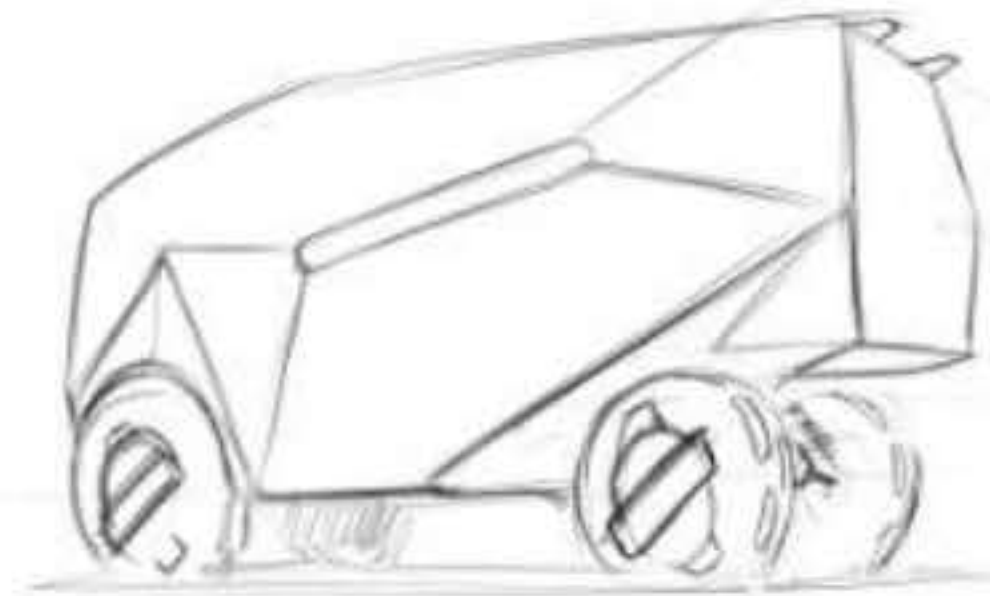
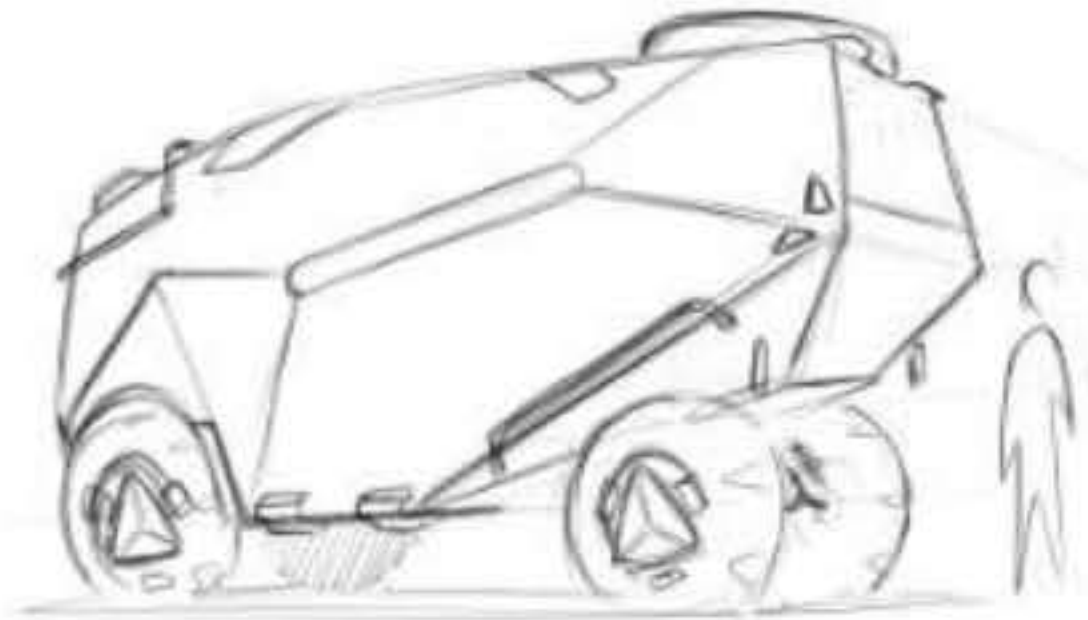
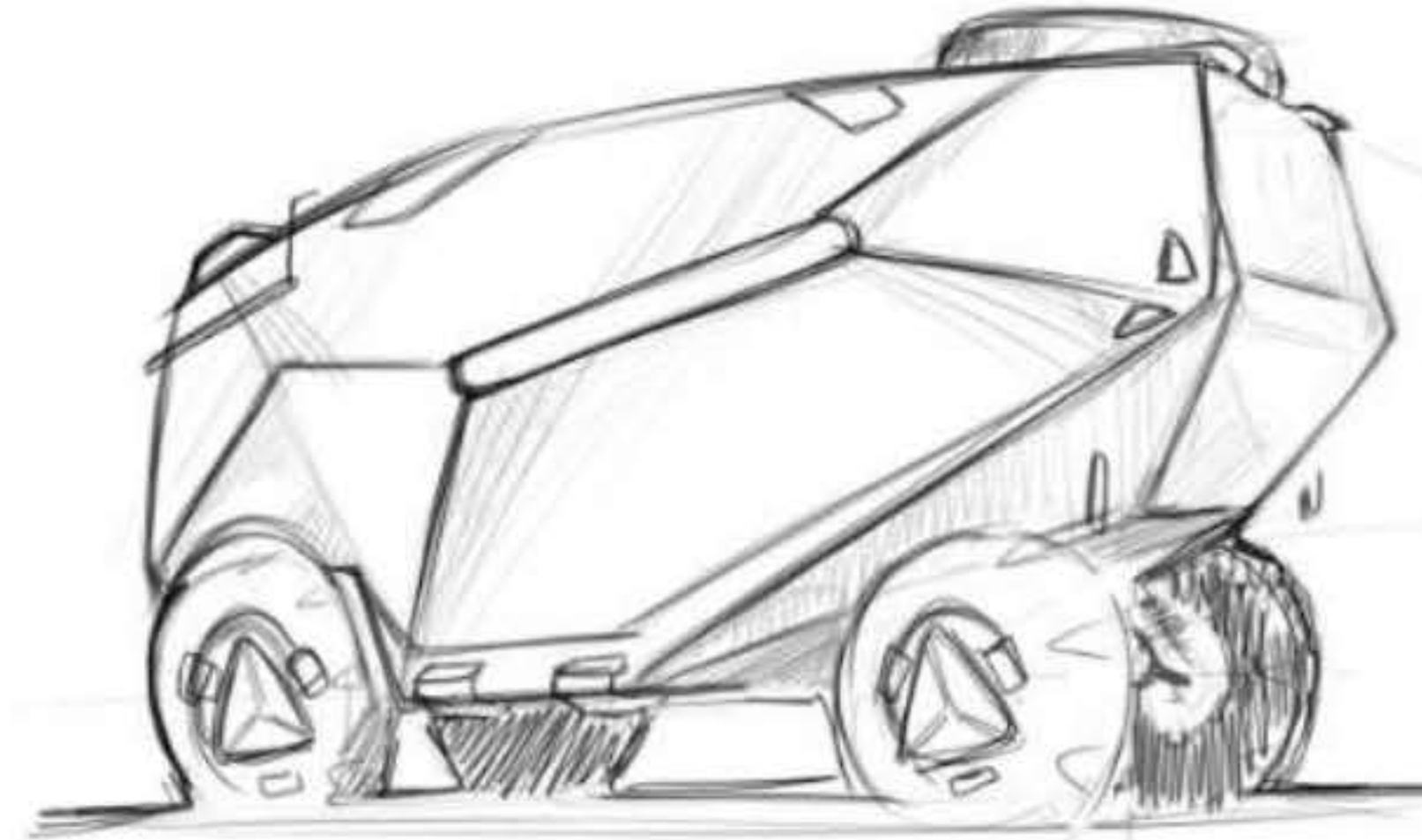
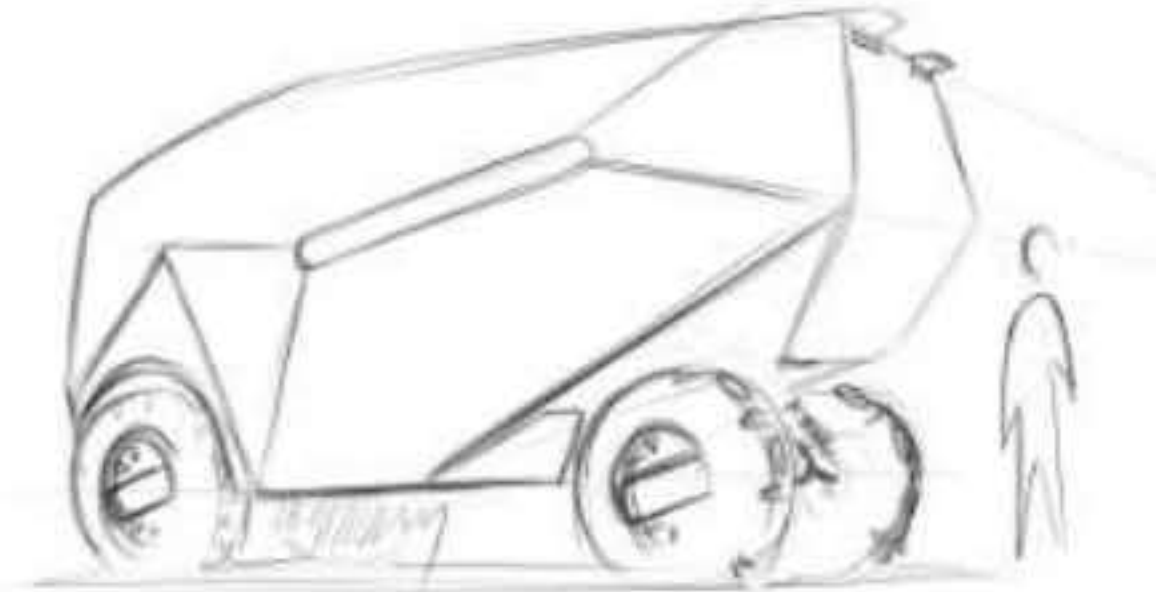
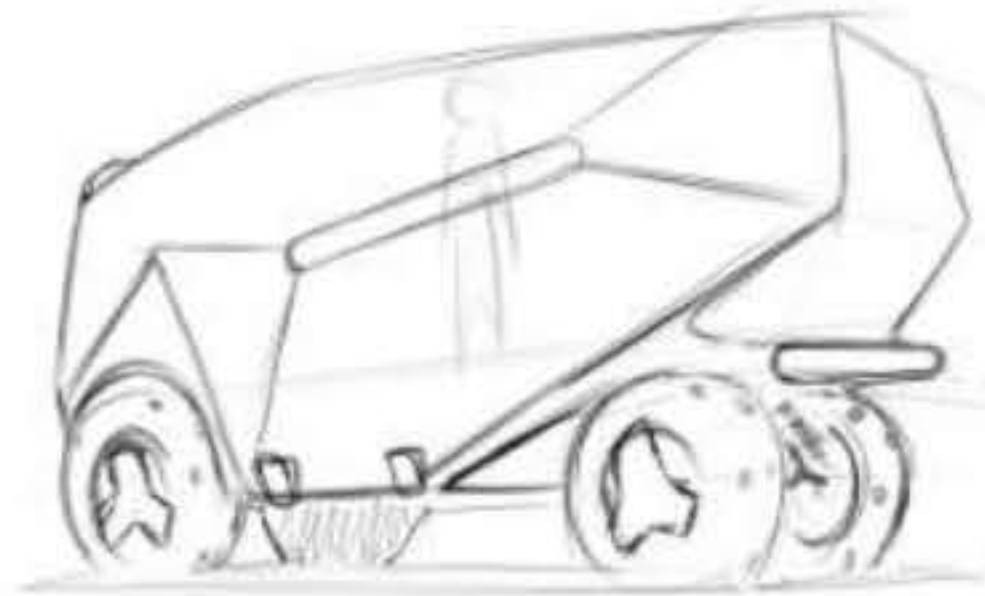


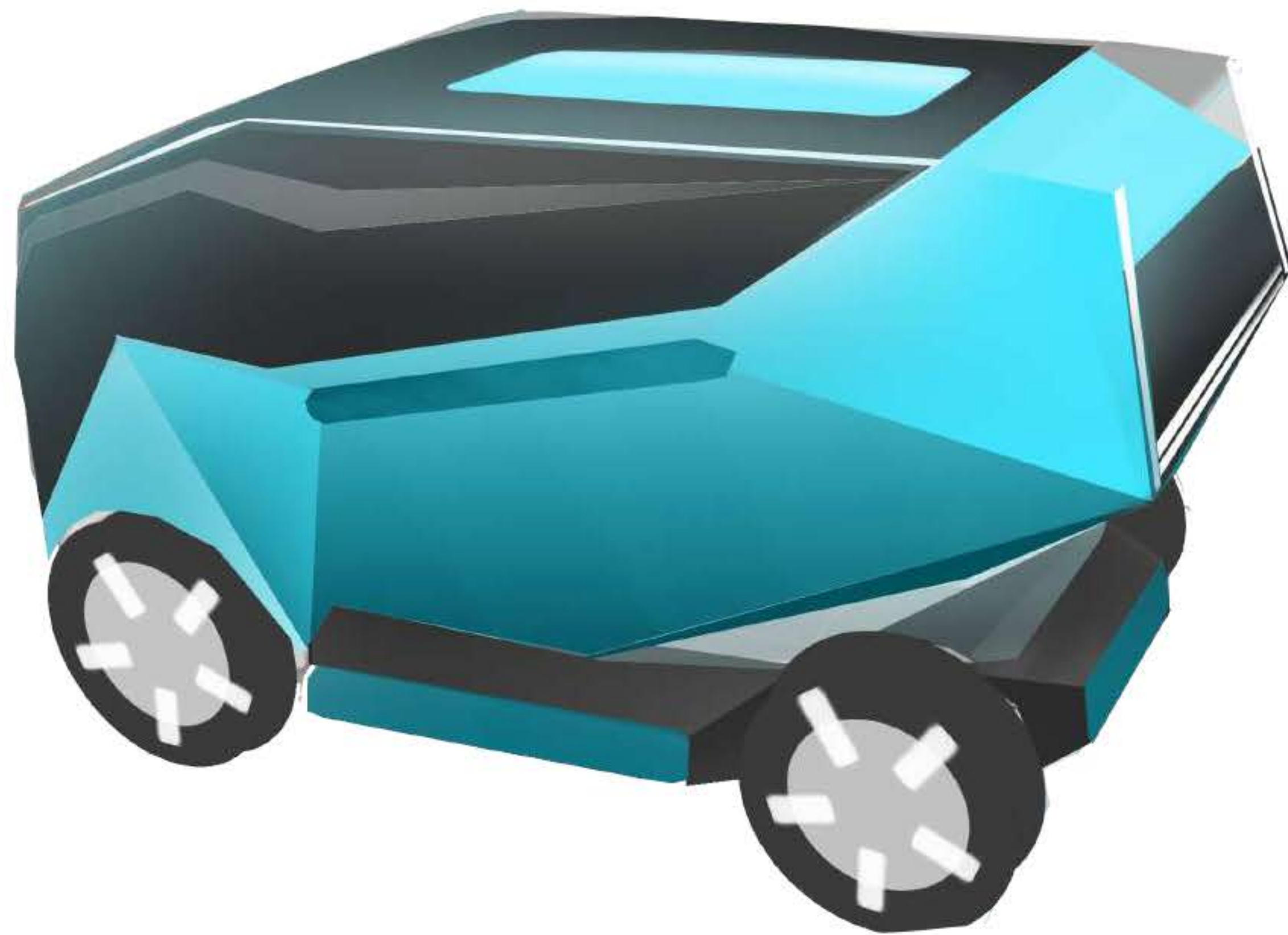
Finalized side view

Further development of vehicle based on key sketch. Optimizing the side view of the vehicle ensures that both passengers and the driver have sufficient outside visibility.



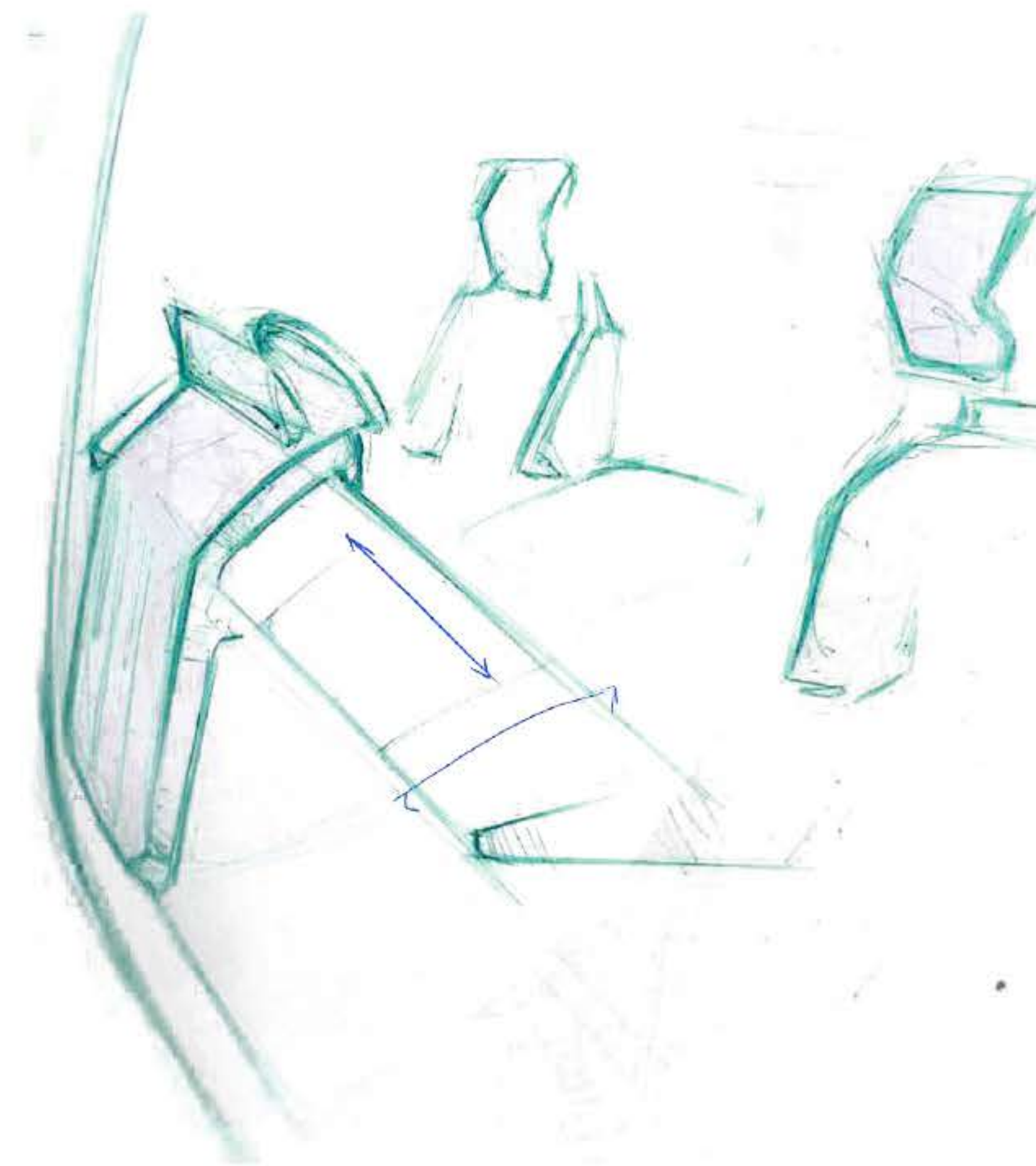
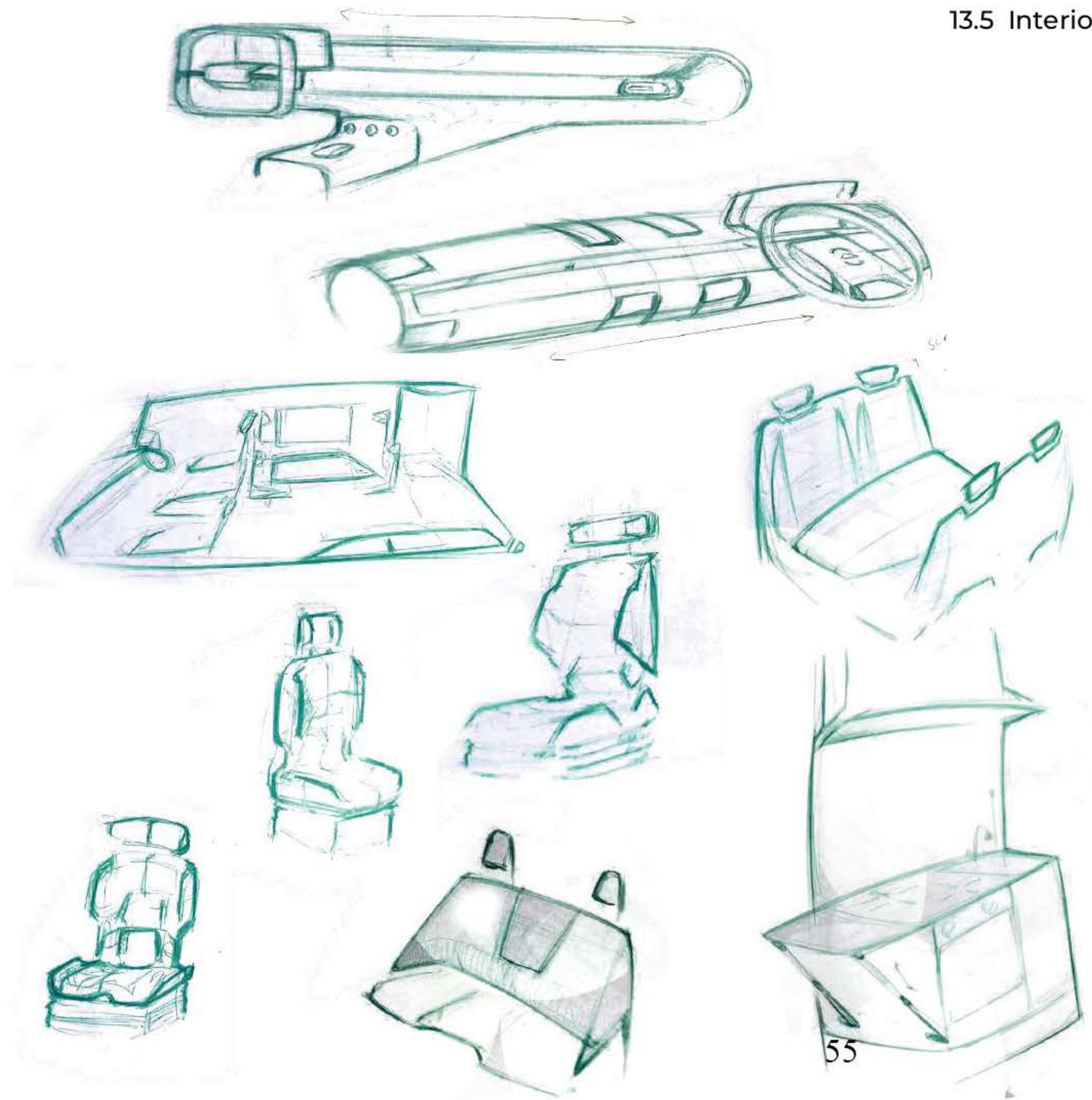
The overall character of the vehicle should go in a more subtle and capable way, so that it makes people around the vehicle think about the peaceful exploring behavior of users.





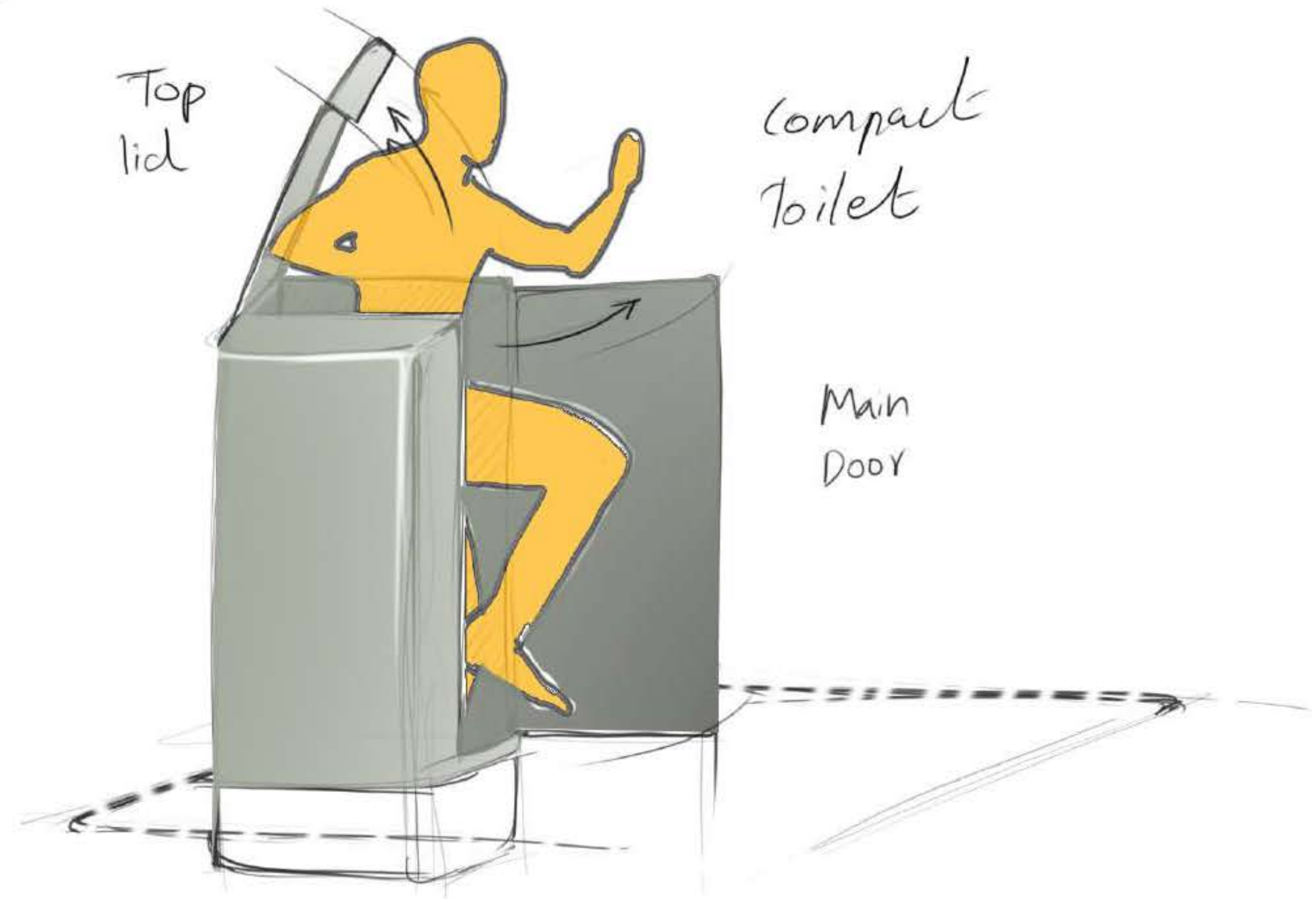
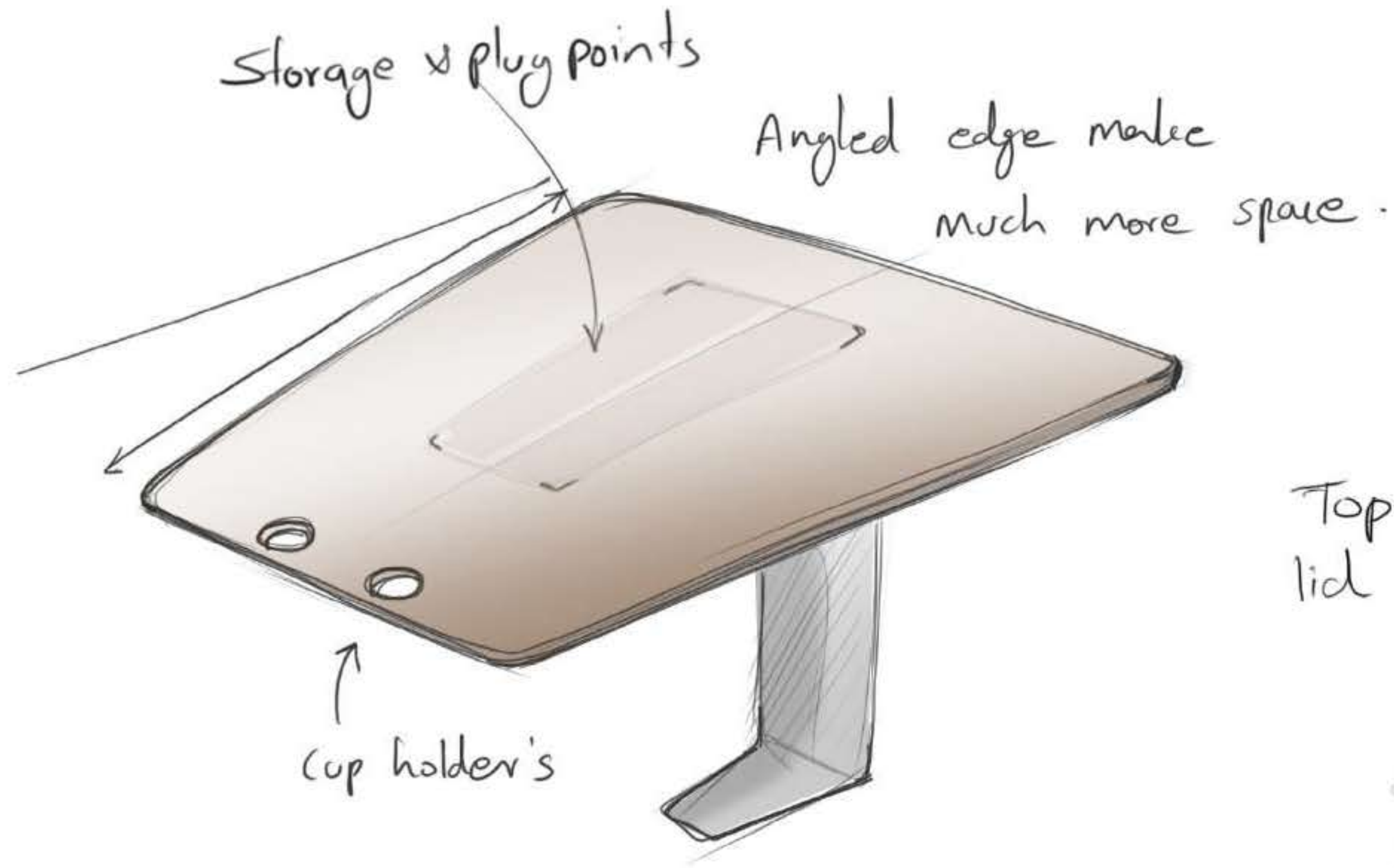
Quick rendering to get an idea about surface

13.5 Interior development

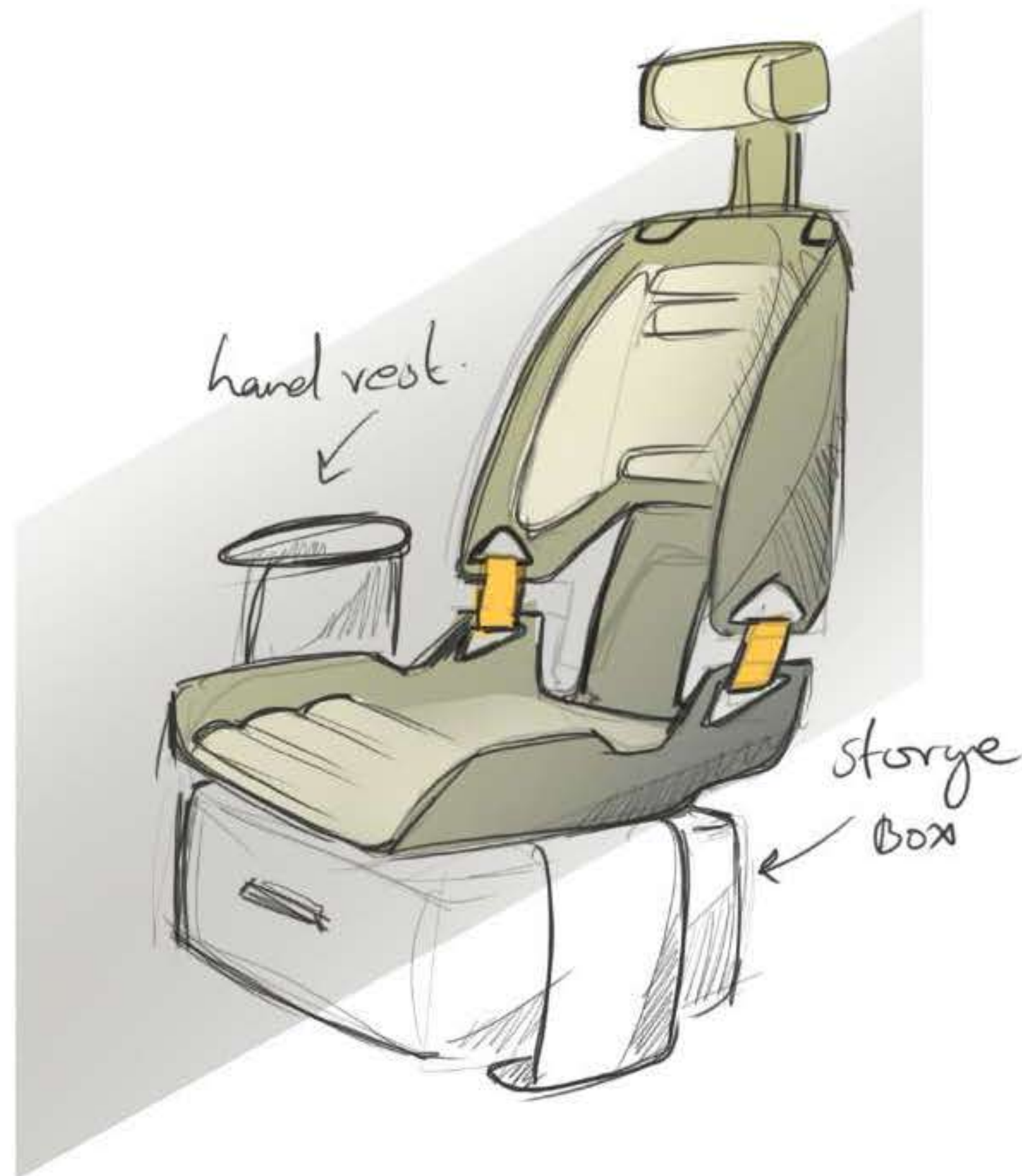


Interior ideations

Final table design and compact toilet

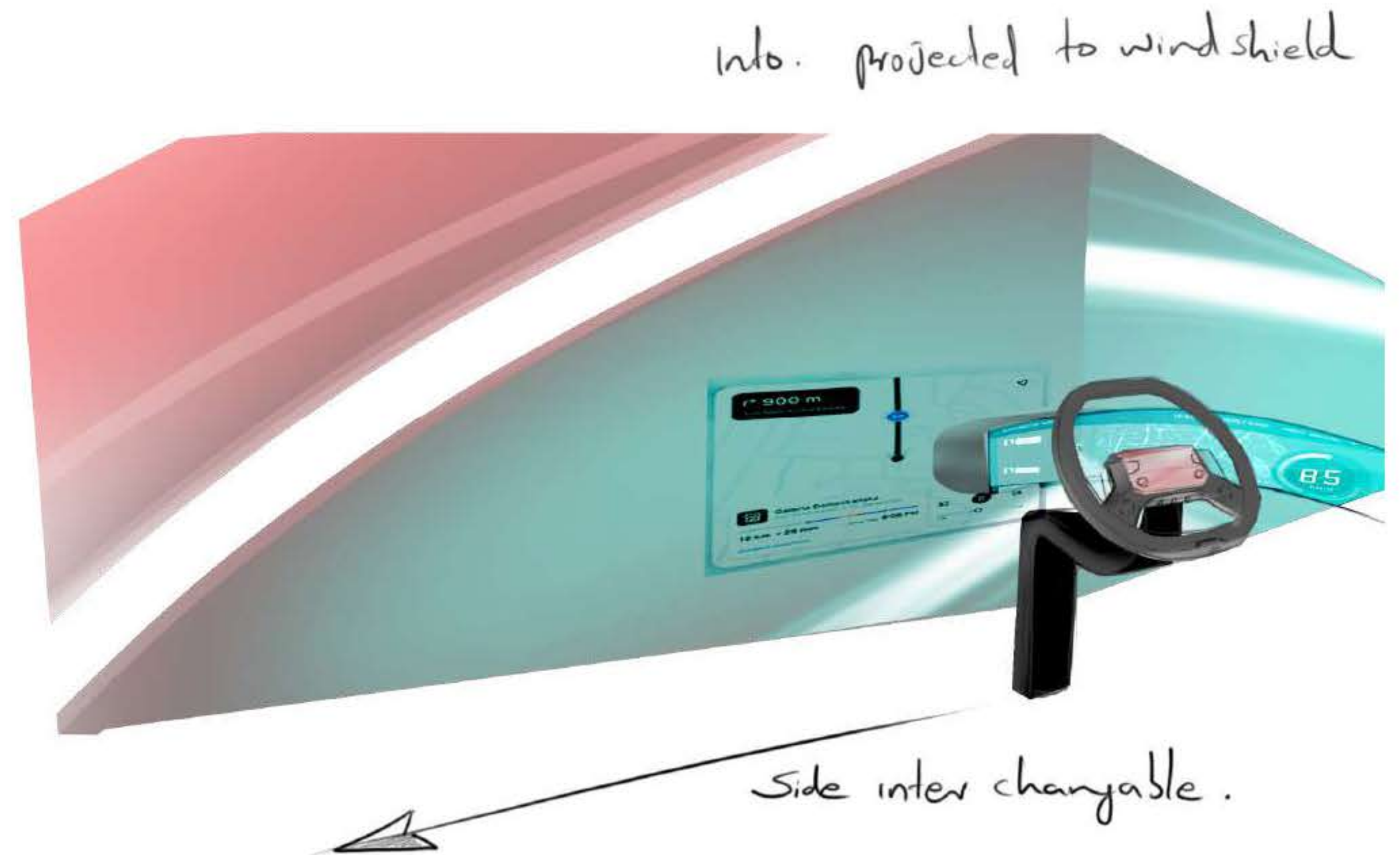


The toilet has a door on top so that it will make the ingress and egress in the compact toilet easy. Also it saves the non usable space after sitting.

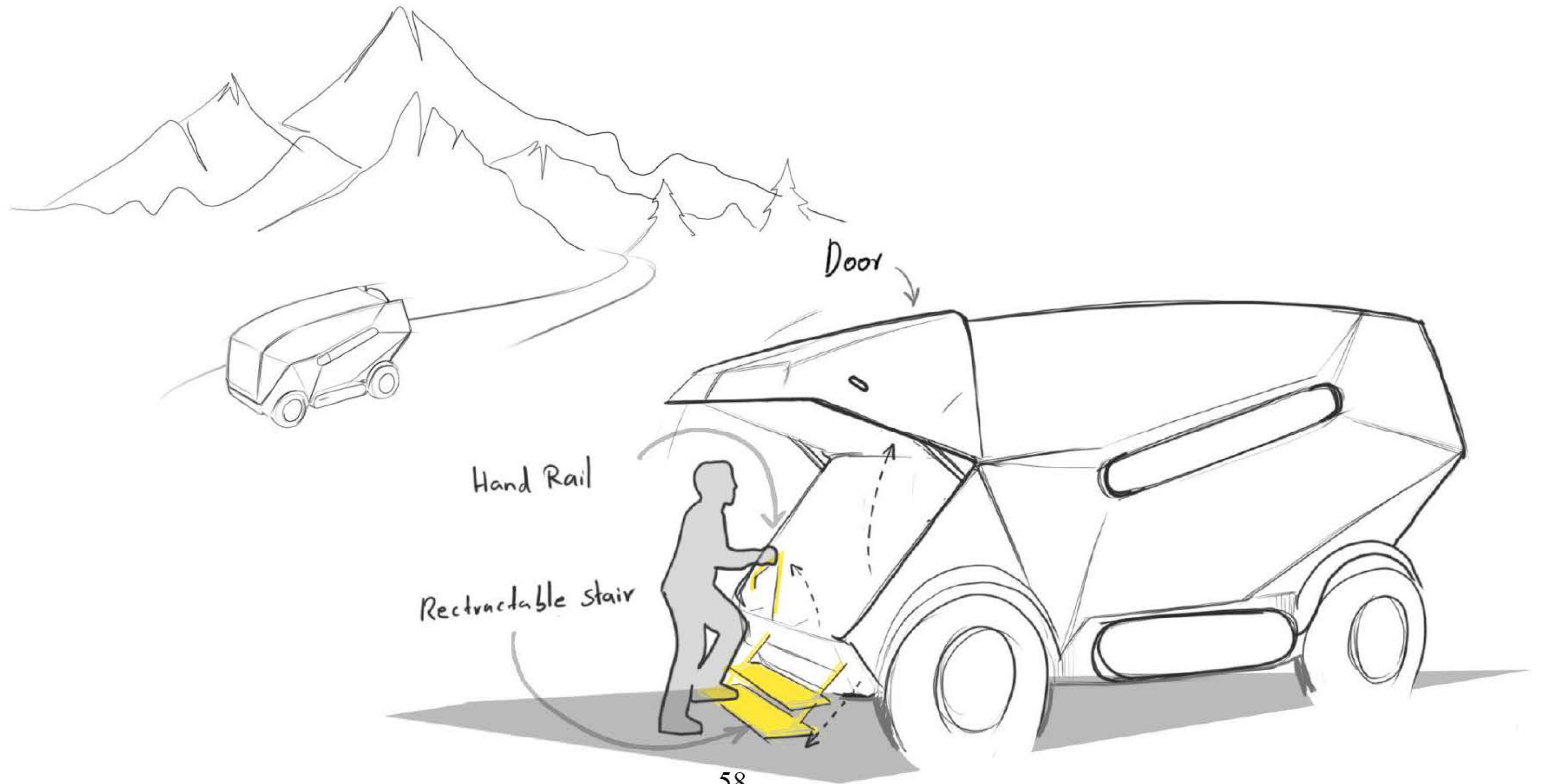


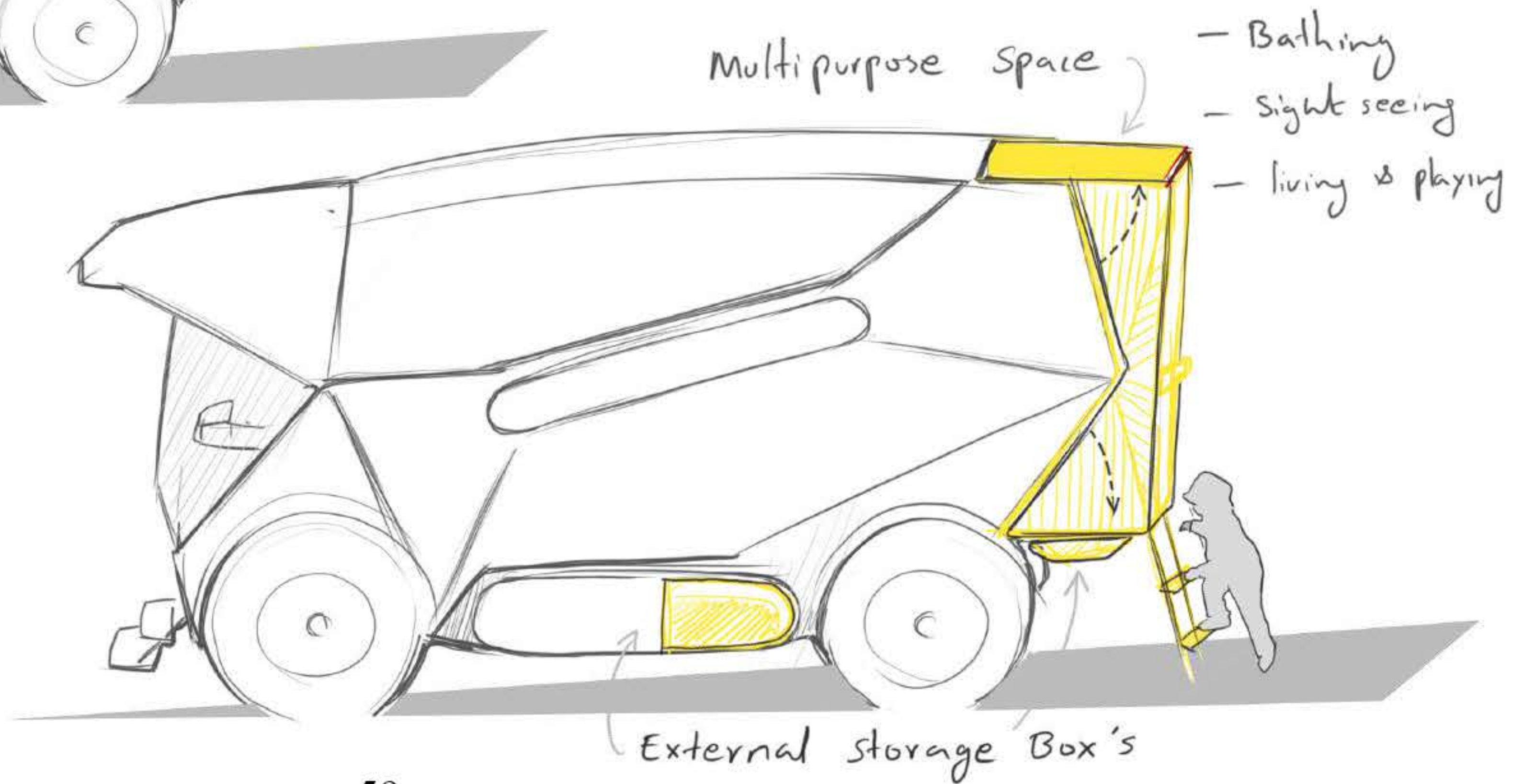
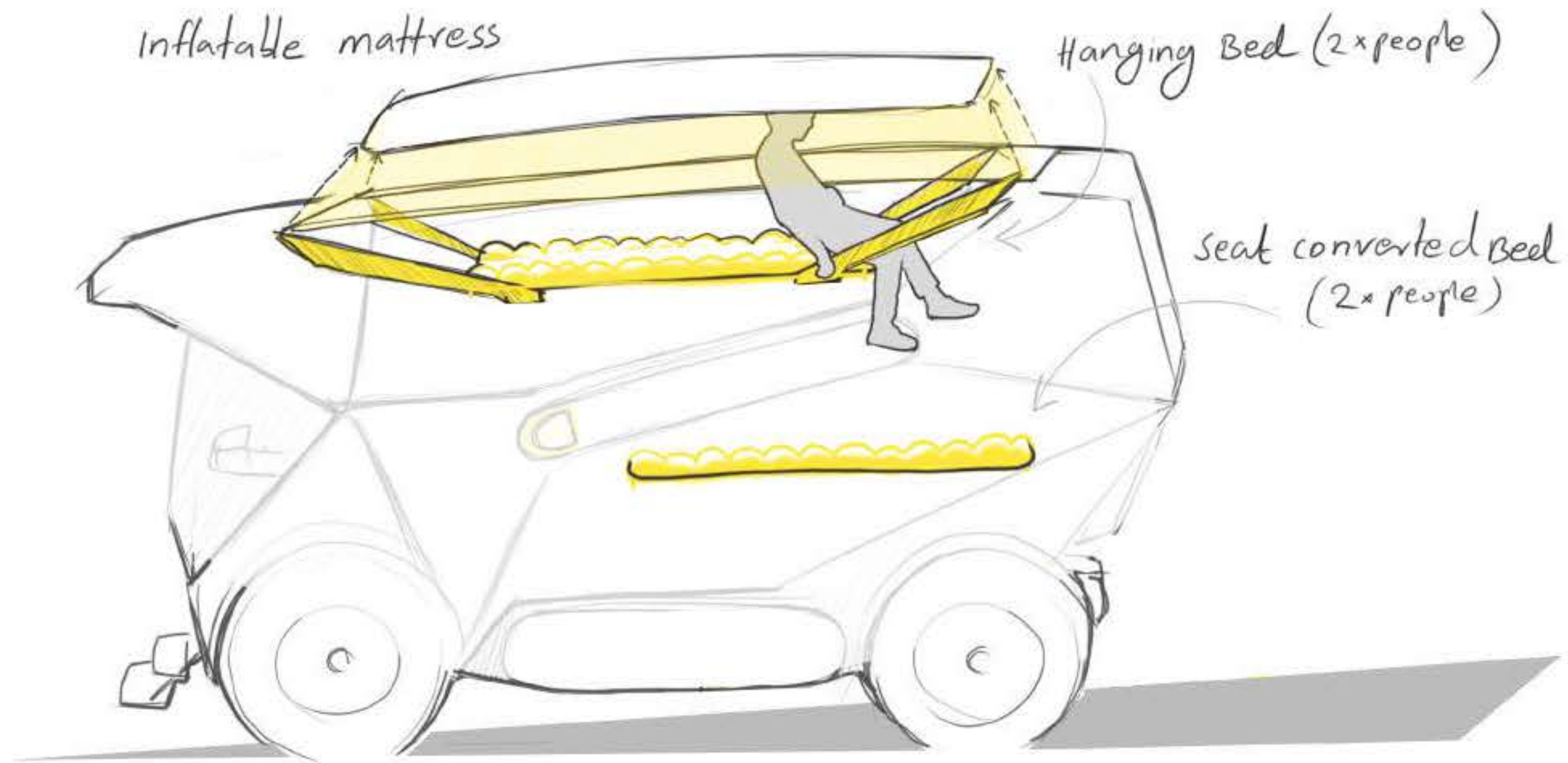
Design of seats and ideation of infotainment cluster.

The dash is designed in a way that it will give a pass through through drivers. With an advanced infotainment system with a lot of screen on dash for showing different views of the vehicle on demand and projected data such as maps etc..

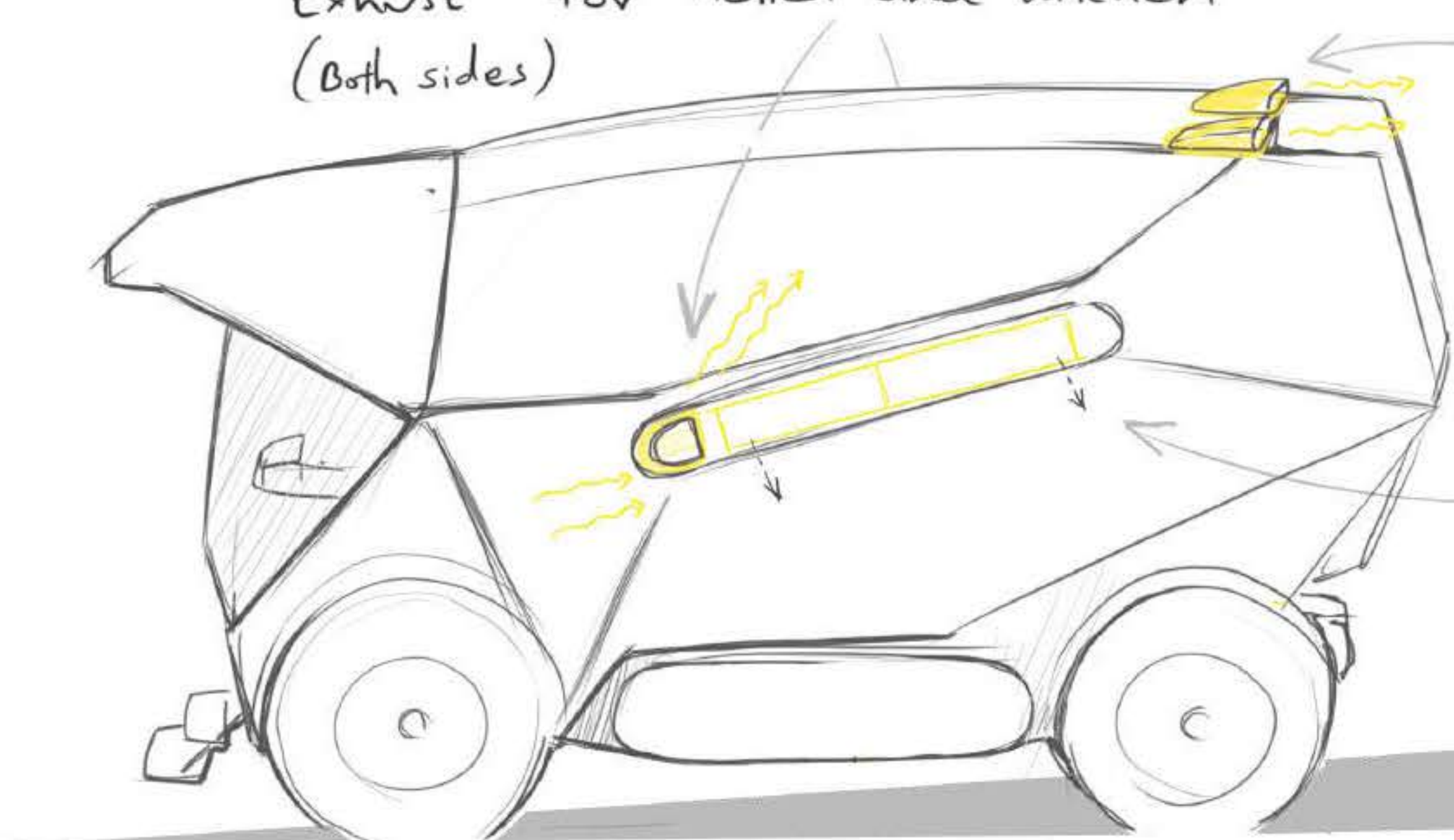


13.6 Storyboarding and functioning of concept





Exhaust for toilet and kitchen
(Both sides)

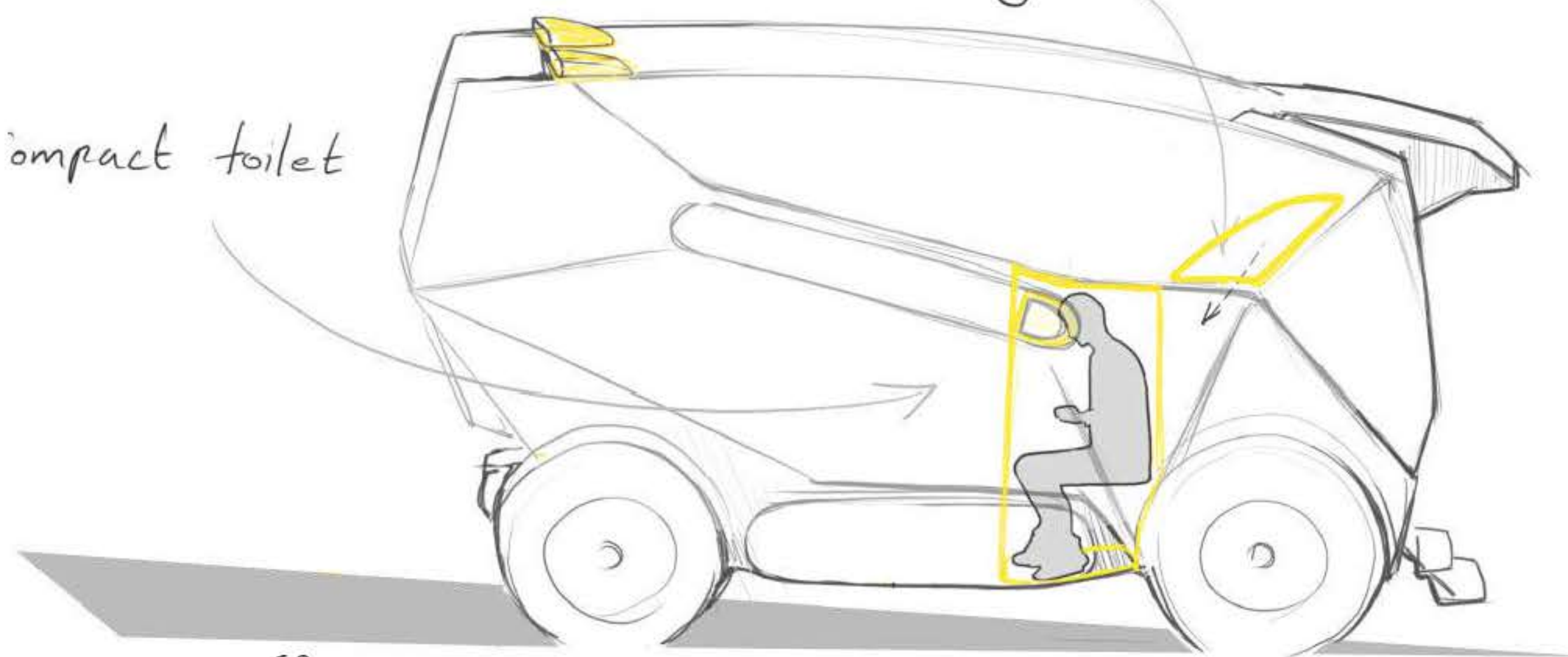


Vents for passive
ventilation.

Window opening
for passengers -

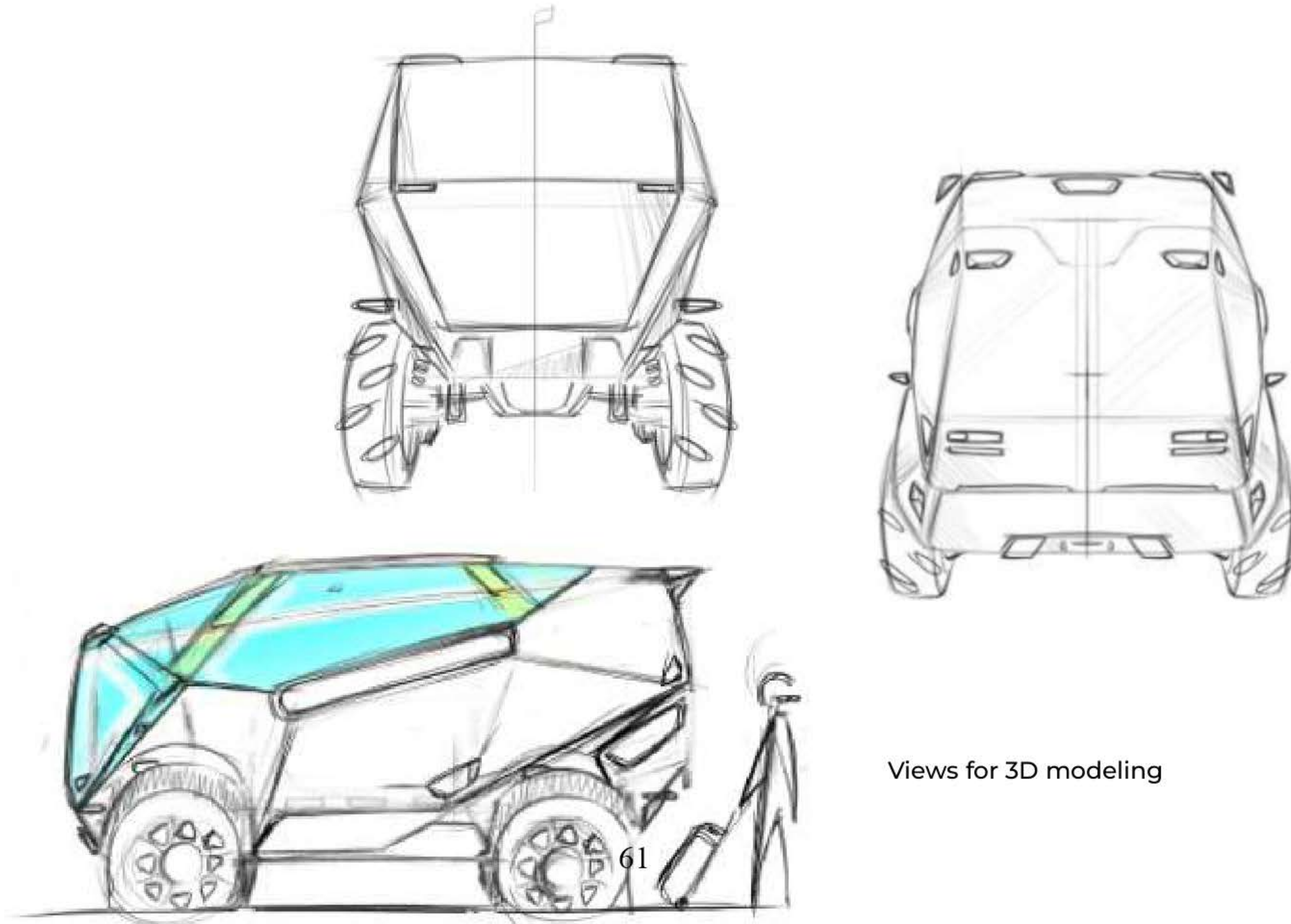
window opening for driver

compact toilet



14. 3D model development

14.1 Views for 3D modeling



Views for 3D modeling

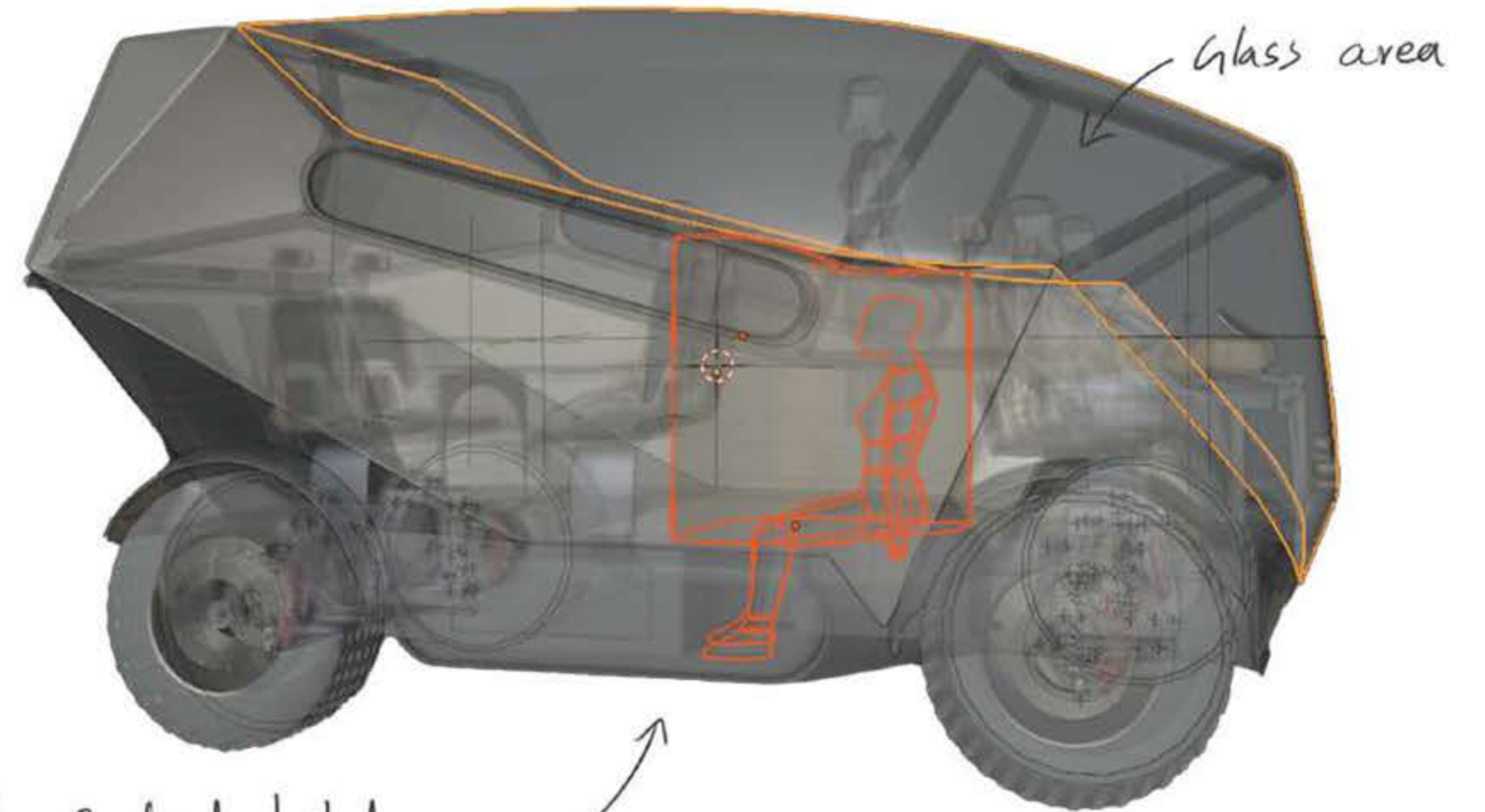
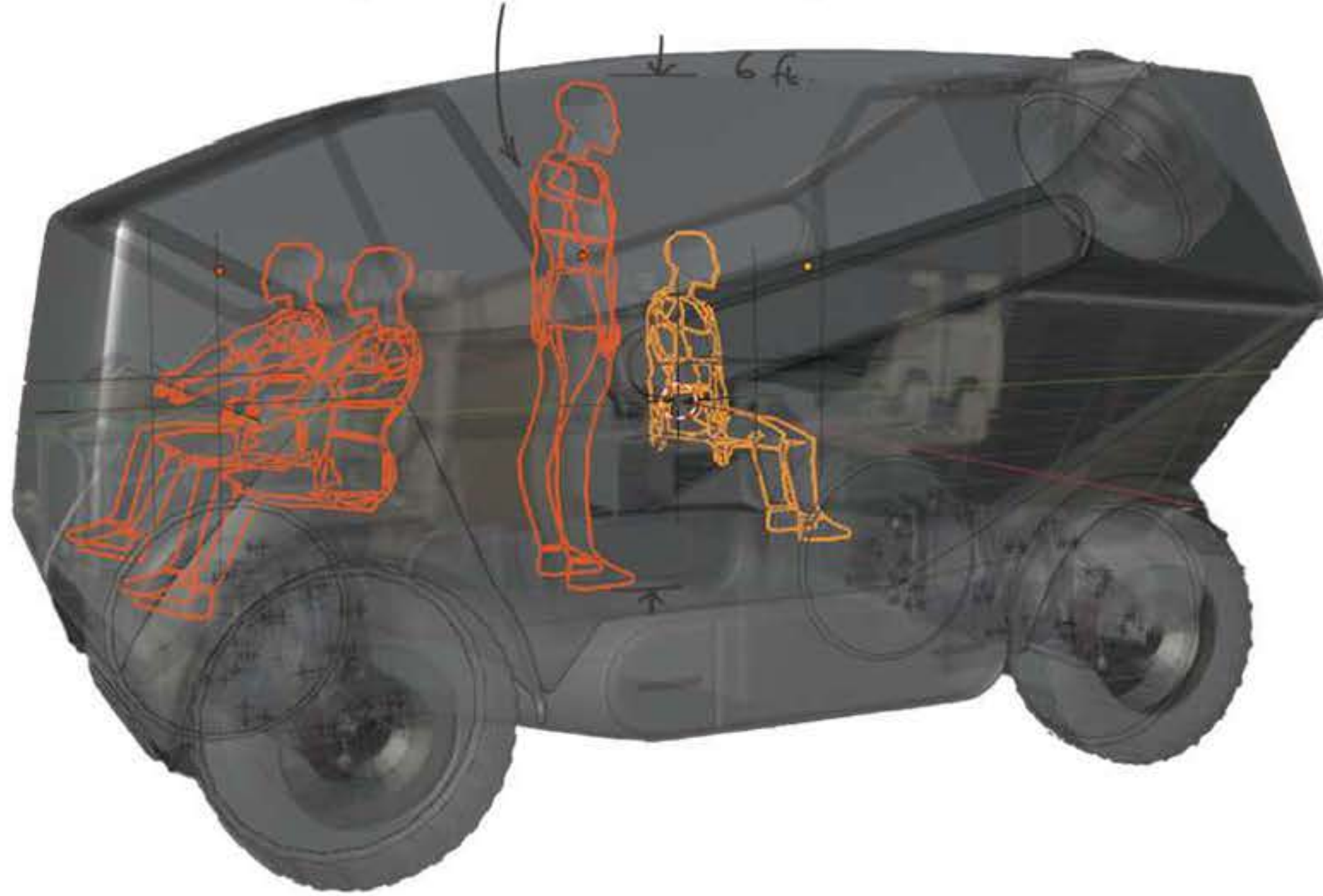
14.2 AI generated renders



AI generated renders for modeling reference.

14.3 CAD Model development

6 feet guy can walk through the cabin

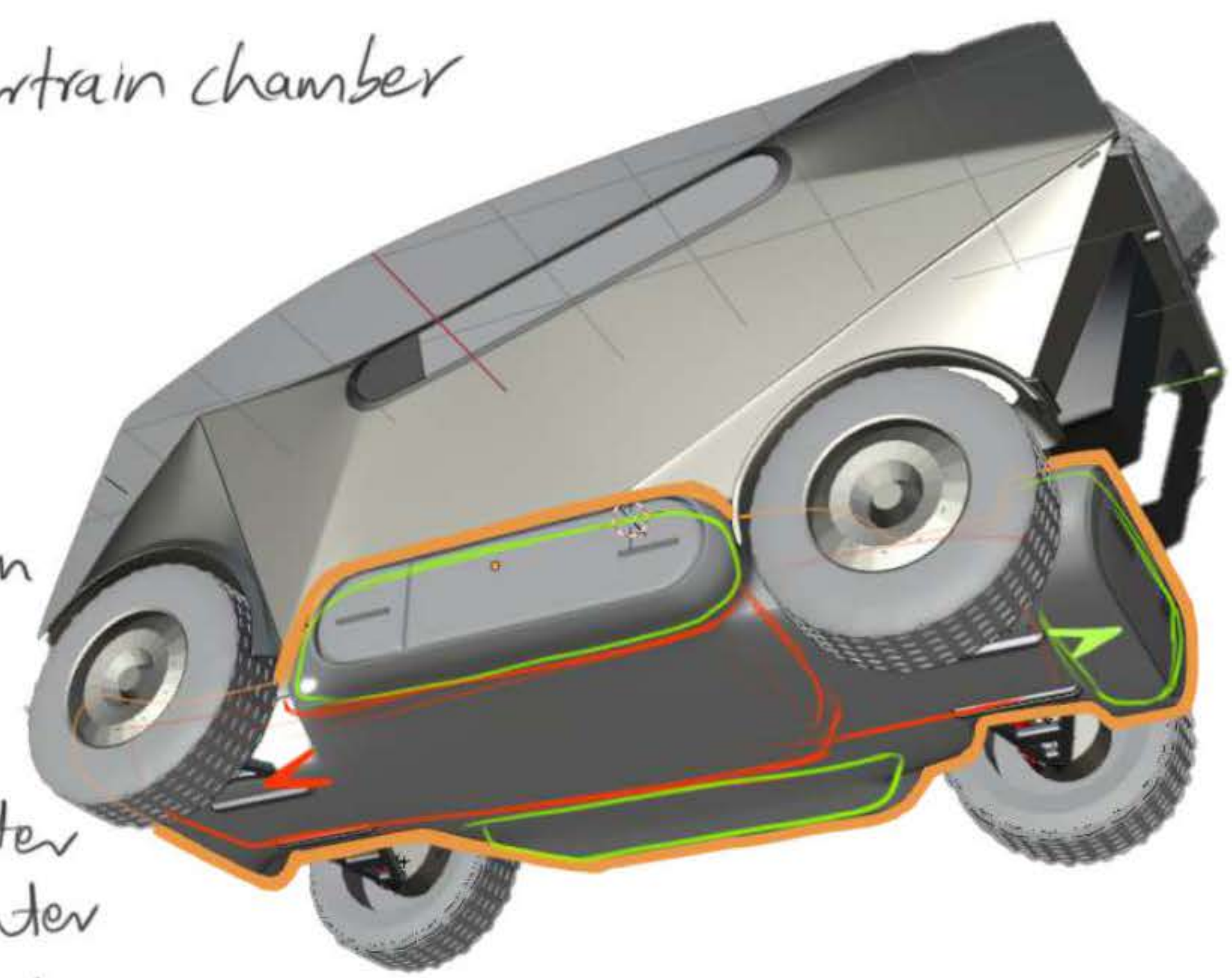


Glass area

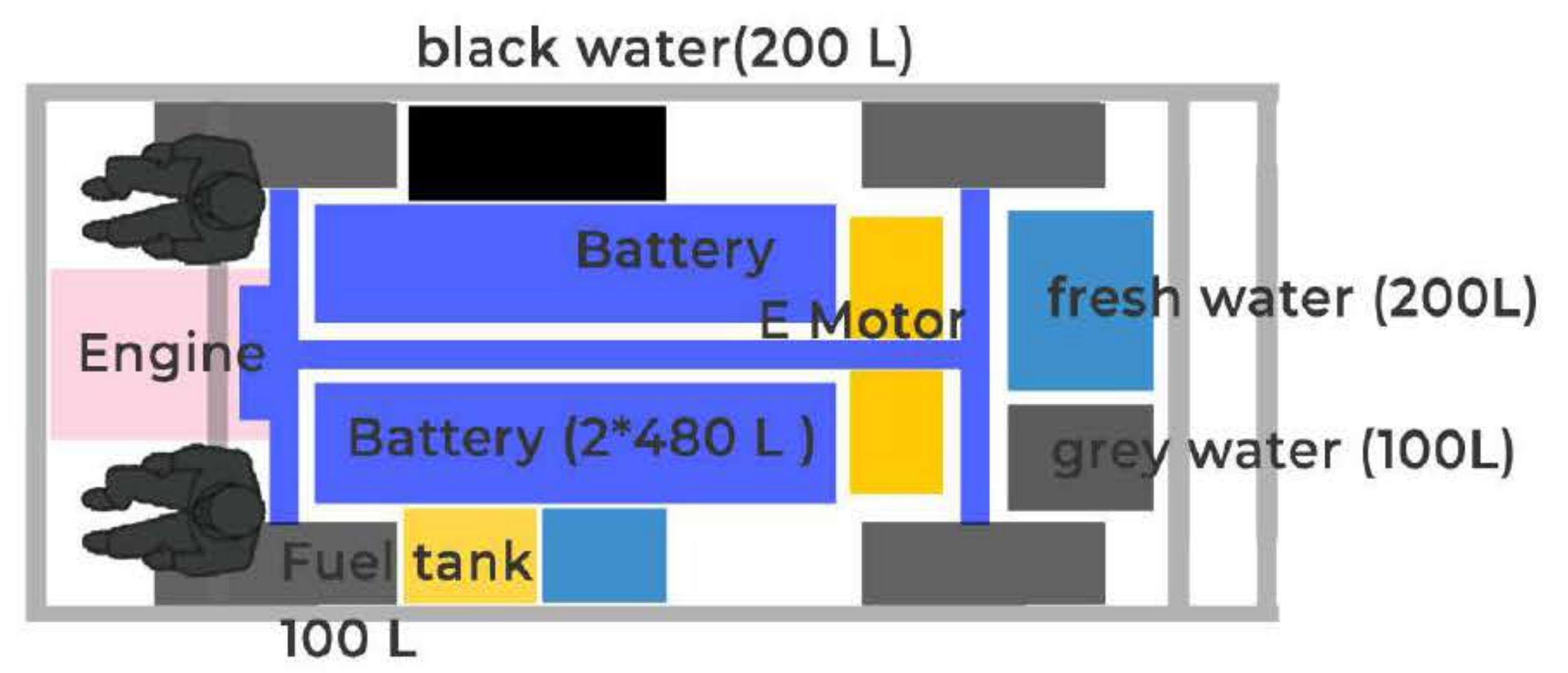
Tightly packed toilet
which will not block the outside view

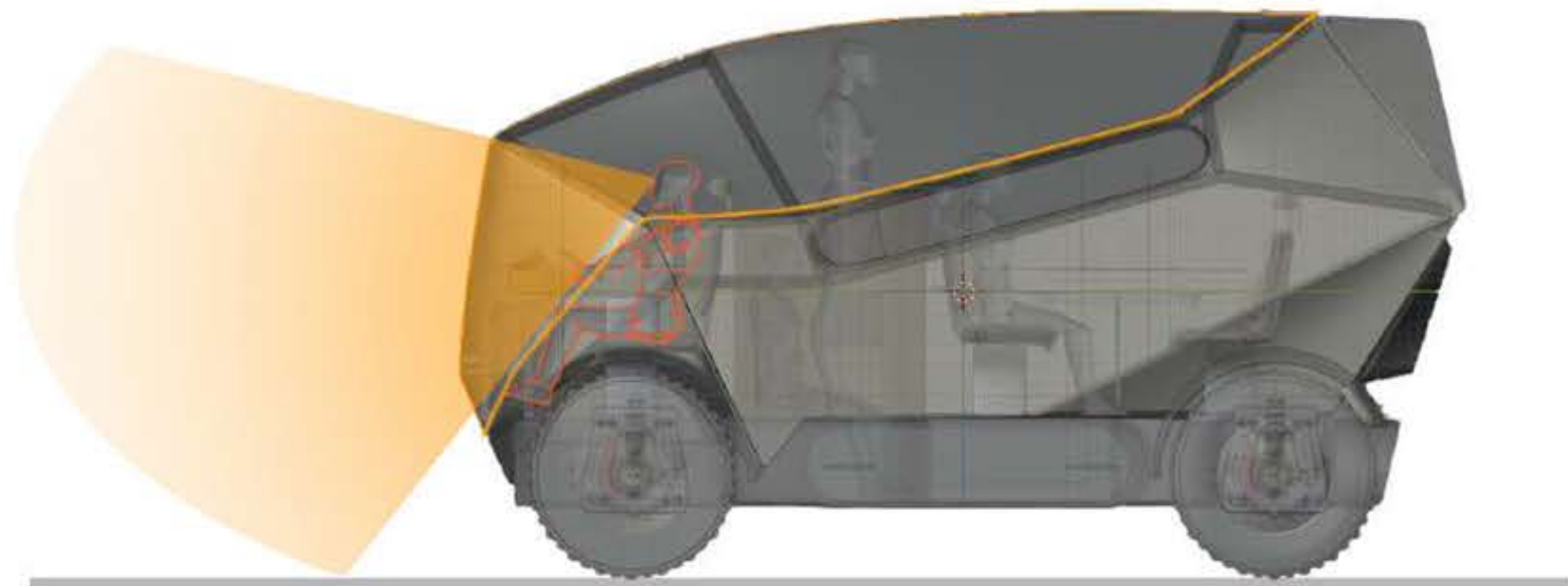
Powertrain chamber

- Engine
- E-motor
- Battery
- Transmission



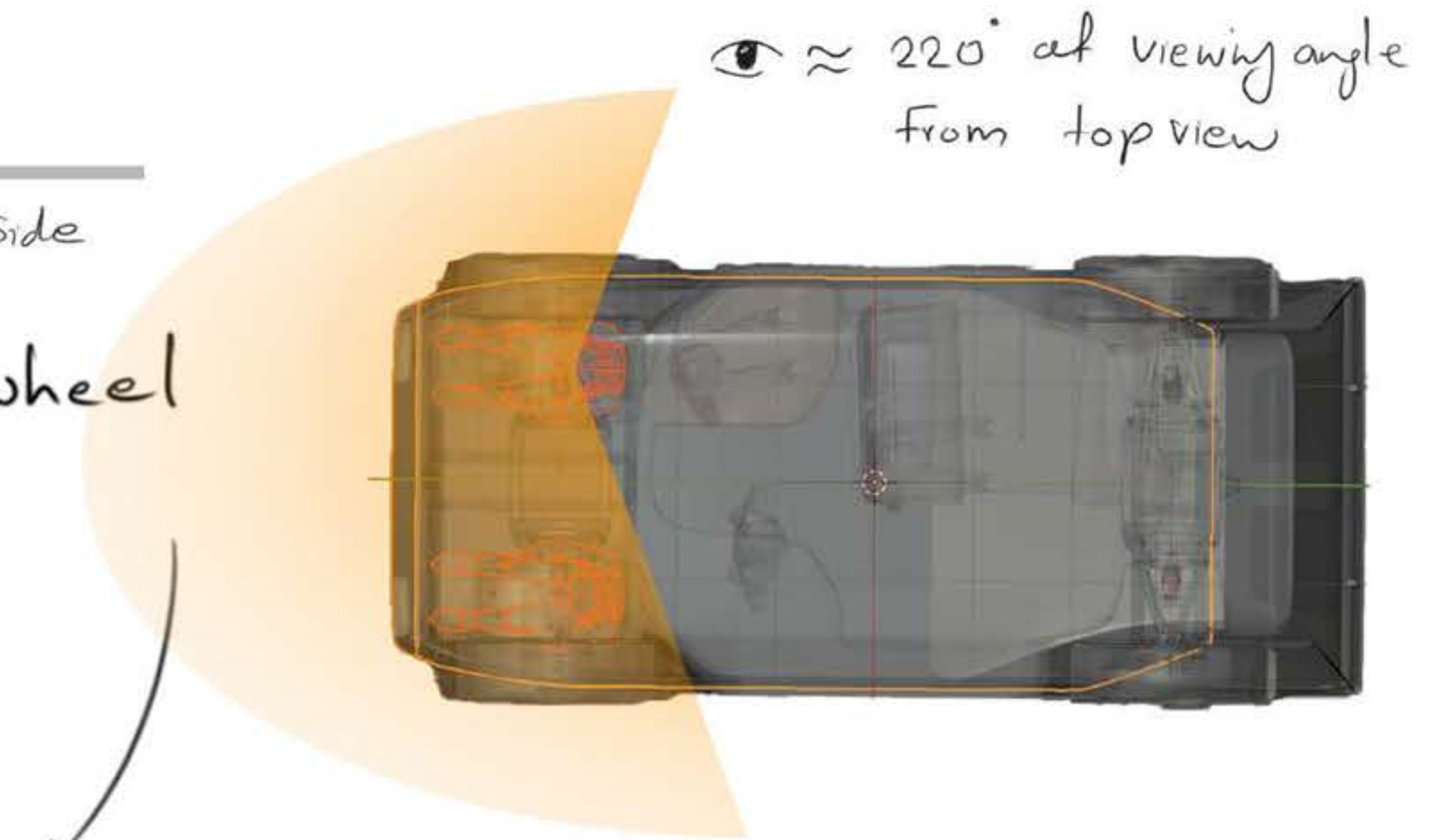
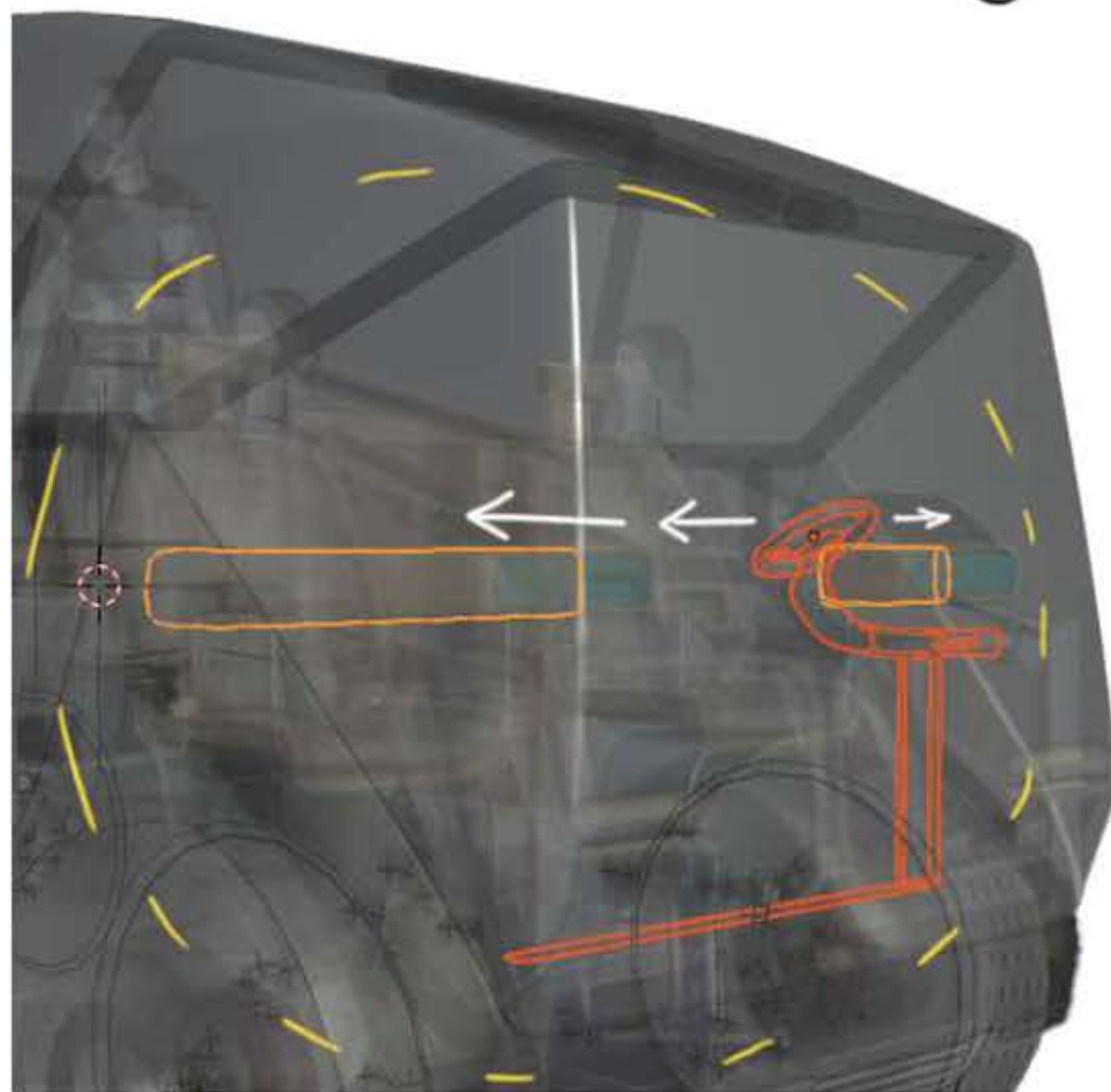
- Black water
- Grey water
- Fresh water





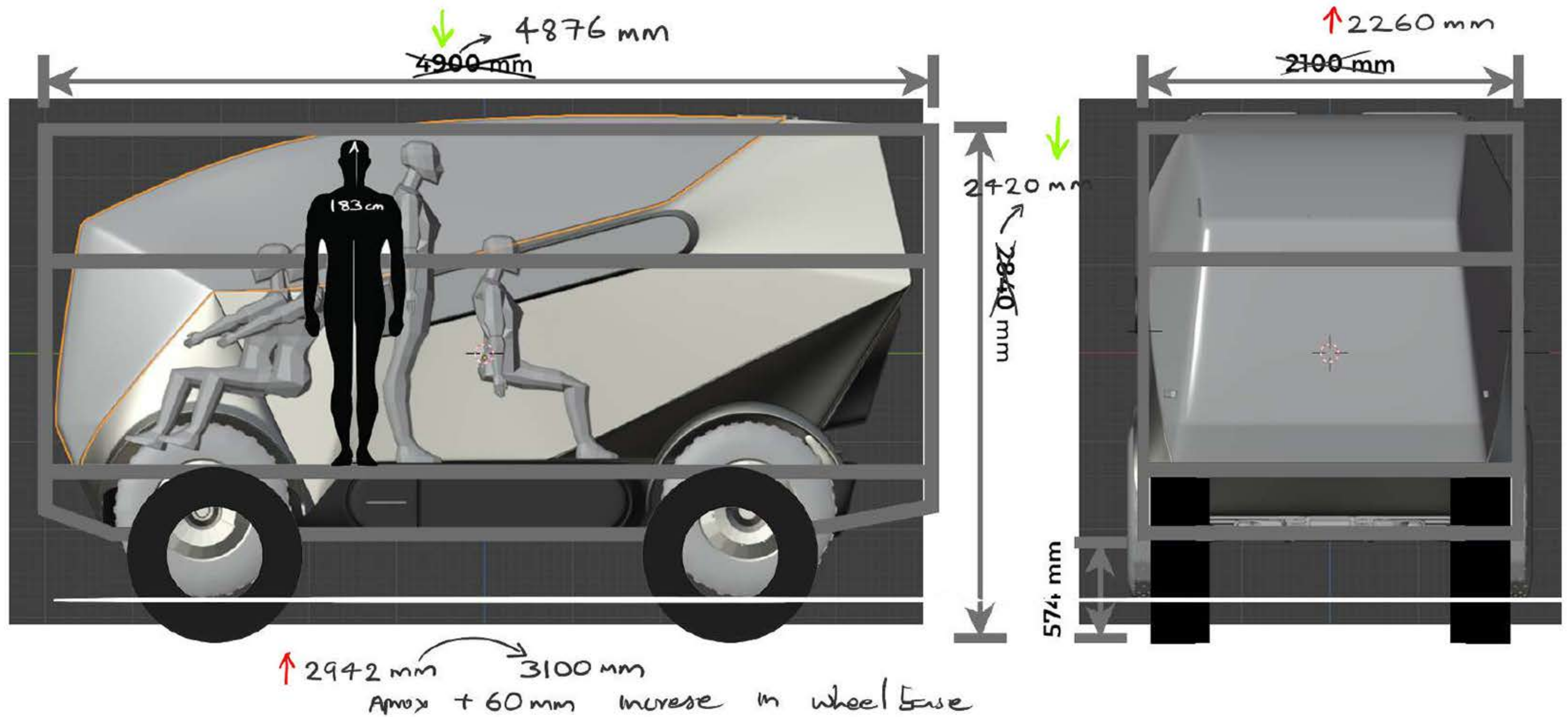
👁 About more than 65° of viewing angle. from side

Switchable steering wheel



👁 $\approx 220^\circ$ of viewing angle
From top view

Vehicle is designed in a way that it should be as compact as possible. From the side profile it is evident that the size is much smaller and the width is slightly increased 160mm due to the utility purposes without compromising capability.



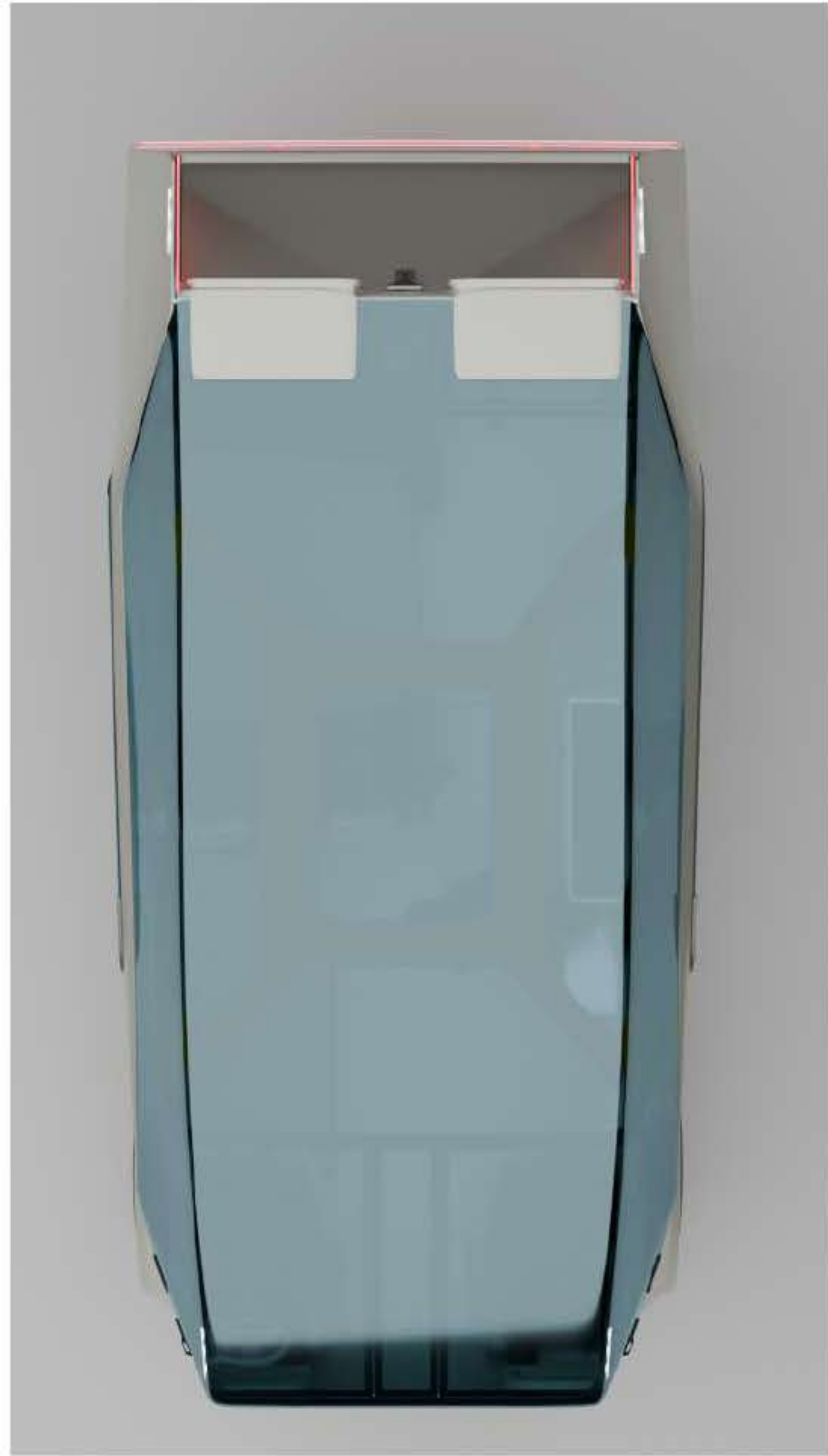


3D model generated.

15. 3D model renders







16. Scenario



17. Scale model



18. References

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<https://www.autoevolution.com/news/this-family-lives-in-a-fully-equipped-off-grid-6x6-military-vehicle-with-two-slide-outs-226648.html>
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