DEP703

M.DES PROJECT - 3

Project Title – **Personalized Subscription-Based Mobility for India in 2040**

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Contents

Proposed Theme

To design an Urban Vehicle for Working Professionals in 2040 India.

1. Introduction

This project is a speculative design work where the researcher aims to design a commuting vehicle for working professionals in India in 2040. The researcher first establishes a scenario for India in 2040 by following a speculative future research methodology, and the help of industry experts who have been working in the automotive design industry for more than 10 years.

Mobility in Indian megacities, such as Mumbai, presents a unique human-centered design problem for public-interest sociotechnical systems. First, India is characterized under the medium-human development index category in the United Nations Development Index. This means that a large number of people lie at the base of the economic pyramid. Despite this fact, at the same time, a handful of Indians also lie at the apex of the pyramid. Thus, in spite of the economic range that Indians fall into, everyone travels for their day-to-day activities, making urban mobility, as a public-interest technology, a major challenge for human centered designers in India. Second, India as a nation is undergoing a massive wave of urbanization due to internal migration towards the mega-cities, such as Mumbai, resulting in an increase in human density in concentrated regions. As a result, there is a growing need for mobility systems in cities for rapid urban transit. These mobility systems imply not only mass-rapid transit but also personal mobility.

One prominent in-road into the problem is to ask what sort of mass-rapid transit can be utilized, which could provide low cost solutions for everyday Indian commuters in megacities such as Mumbai. Another related question is to understand how personal mobility will change in megacities and how it can be comprehended as an important part of the mobility based socio technical system of the city. India as a country is democratic in nature, and with a growing GDP and purchasing power, the increase in automobiles continues despite various bottlenecks. Therefore, while we recognize that personal mobility is not a solution to the growing ills of megacities, we are also aware that personal mobility and the design of personal/family vehicles will not vanish. Therefore, we ask what forms personal mobility will take in megacities in a horizon of 15-20 years from now.

In addition, how can we use a structured approach to human-centered design for the unique requirements of personal mobility in urban megacities in India while recognizing it as a part of the public interest mobility system of cities? In this regard, the contribution of this paper is twofold. First, it presents a futures-oriented design methodology for comprehending forms of future technologies. Second, it provides a view toward alternative human-centered solutions to specific issues in sociotechnical design by moving away from blanket solutions related to low-cost public mobility.

The rest of the report presents the challenges of personal mobility and vehicle design for urban India for 2035-2040. Section 3 introduces scenario planning steps and details of the methodology followed. Section 4 presents the scenarios based on scenario logic and concludes with refinement of the scenarios based on probability, preferability, possibility, and plausibility of occurrence.

Public Interest Transit Systems And Personal Mobility And Vehicle Design For Urban India

Mumbai, as a megacity, is always filled with activity. The movement of people is high during the day with the peak levels of morning and evening rush hours. The traffic trickles down to a minimum in the wee hours of the morning, with the pace picking up with the sunrise. Within this milieu, Mumbai is turning towards setting up a network of metro lines along with its already existing train system (called "Mumbai Locals"). In addition, roadway traffic in Mumbai also suffers due to congestion due to the constant construction of its expanding metro system. The residents of Mumbai own a number of private vehicles as well as have access to a number of curbside taxis and auto-rickshaws, as well as ride-hailing app services. The challenge for Mumbaikars (residents of Mumbai) is not that there is any dearth of mobility services, but the bottleneck is due to large numbers, as well as arterial roadways in several regions in the city. Given these circumstances, we wanted to focus on the design of human-centered personal mobility in this rapidly evolving future with a horizon of 15-20 years (2035-2040).

The choice of this horizon is important as changes in large scale public interest systems are perceptible over a decade. Therefore, designing for the future with a horizon of one decade is typically where the impact of the design could be envisioned without breaking its moorings with the present. In other words, with the major ongoing trends and transformations, how can we leverage human-centered design to envision a personal-mobility-based future? Specifically, how can designers systematically develop new forms for the future using a structured human-centered design process?

2. Methodology

Speculative Design (also Design Fictions, Design Futures) is a sub-field of human-centered design where designers envision futuristic artifacts, services, systems, and the way people would deal with them in the future [1]-[16]. This is a rapidly growing area of design where people use lateral thinking, mock-ups, and rapid prototyping methods to generate novel design ideas about the future scenarios of human technology interactions. The envisioned futures can be developed using a number of envisioning and foresight methods. In this article, we use a scenario planning process for developing requirements for personal mobility in urban megacities in India.

In order to envision the future, scenarios can be developed. These scenarios consist of narratives to describe trends, events, and situations based on a number of alternative assumptions. These assumptions allow for the creation of exploratory scenarios that are based on insights from a number of expert designers. These scenarios were developed with a special focus on inner coherence, appropriate variation, and breadth, along with proper validity.

In order to create scenarios, the following steps were followed (detailed below further) :

1) Select the key issue and time frame: 2035-2040

2) Derive trends and forces from varied sources

3) Evaluate forces based on perceived importance and uncertainties with the help of experts

4) Establishing scenario logic by highlighting deep uncertainties by selecting unrelated dimensions useful for design activities.

5) Mapping the trends and forces in the quadrants created by the two identified dimensions

6) Creating scenarios based on the content of the quadrants identified in the previous step

7) Assessment of scenarios based on plausibility, richness, internal coherence, and consistency, as well as expert stakeholders' viewpoints.

8) Detailing and deepening the selected scenario for further insights and providing the pathway for design ideations.

3. Developed Scenarios For Next-Generation Mobility

3.1 Forces: Trends and uncertainties

Firstly, driving forces in terms of major trends with a special focus on India were gleaned from a number of industry reports, government reports, white papers, expert opinions, and other academic as well as gray literature. These driving forces are the factors that can influence and drive the future at a number of varying levels ranging from the technological to the political. These driving forces are categorized under six themes of the PESTLE Analysis method, namely Political, Economic, Social, Technological, Law, and Environmental. A total of 249 driving forces were listed. Following this, the list was shared with five industry experts from the automotive sector to rate the 'Importance' and 'Uncertainty' of the said driving forces on a Likert scale ranging from one (minimum) to five (maximum).

With the data from five industry experts, the driving forces are plotted on an Importance vs. Uncertainty graph to signify the influence of every factor on the future and to what degree of certainty. The forces that lie in the important and certain section of the plot are the forces that are definitely going to happen. Thus these forces are common to all future scenarios. The ones that are highly uncertain are the forces that can significantly alter the future.

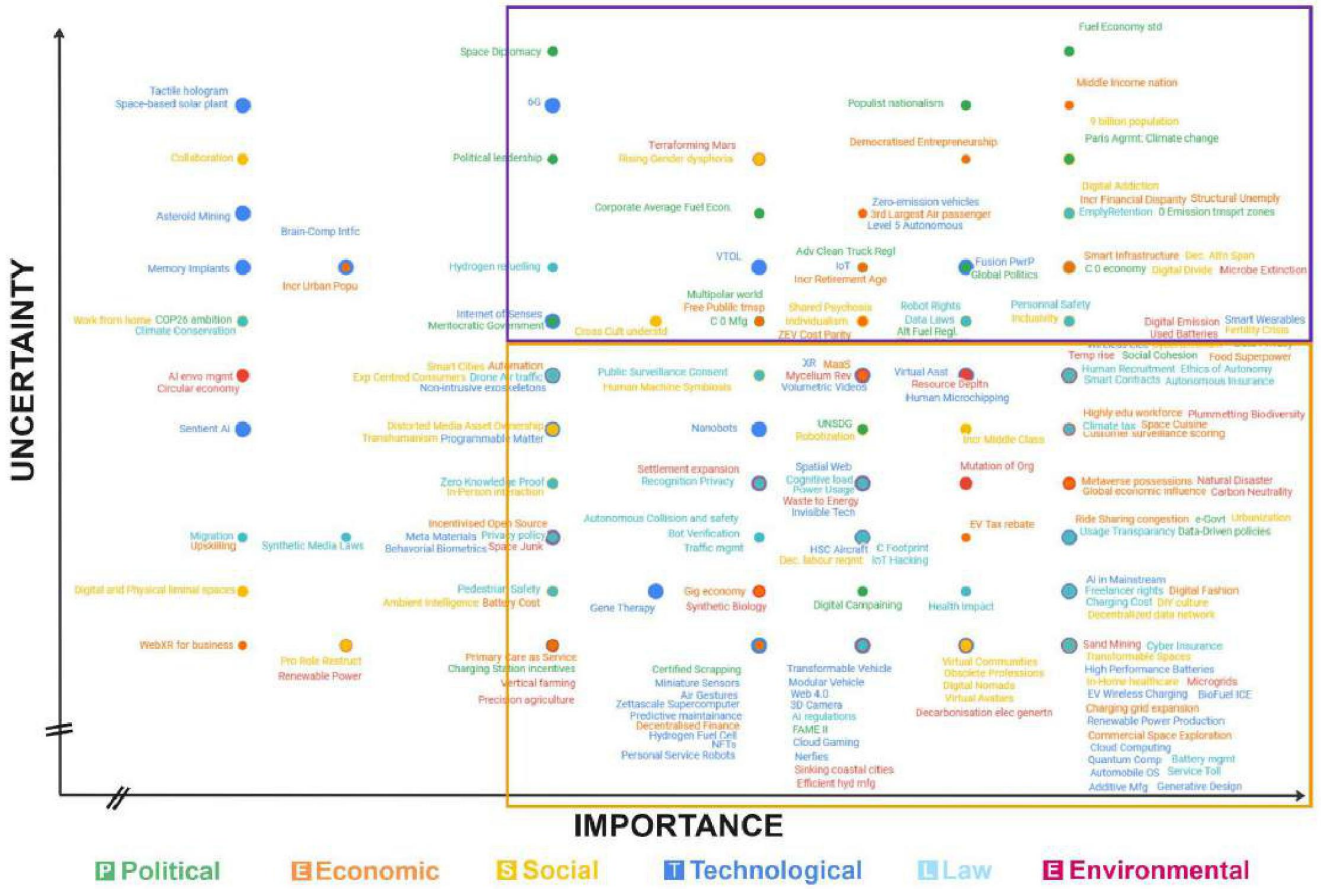

Fig. 3.1 Uncertainty vs Importance Plot for Design Drivers

Based on the Importance vs. Uncertainty plot in Fig 3.1, a matrix was created using two axes derived from the scenario logic—asset ownership and experience Fig. 3.2. The asset ownership ranged between personal and shared/leased. The experience ranged from personalized to standardized. These broad dimensions helped in providing coherence to the various forces identified in the PESTLE listing. The driving forces are divided into four quadrants. Four scenarios were created using these driving forces in each quadrant. These scenarios also derived from the earlier classification of importance and uncertainty. After the scenarios were detailed, they were rated by industry experts on a Likert scale in terms of Probability, Plausibility, Possibility, and the Preferability of each scenario.The scenario rated most highly amongst the dimensions was chosen as the final speculative scenario for developing the design project.

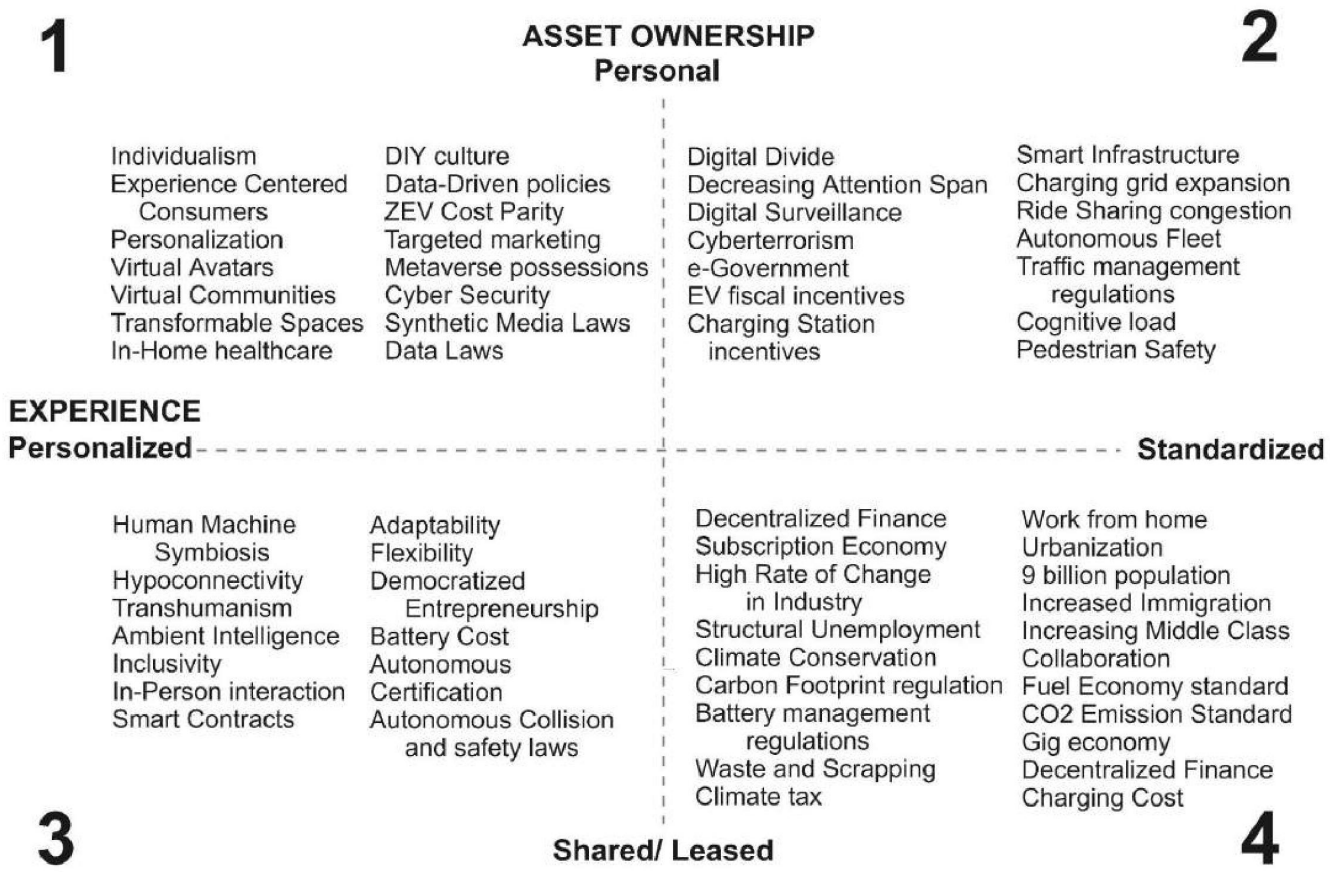

Fig. 3.2 Design Drivers separated into Four Scenarios along 'Asset Ownership' Axis and 'User Experience' Axis

4. Results

4.1 Scenario 1

Personalized UX with Personal Assets

Urban India in this scenario has a demand for personalized user experiences with personal assets, as the country's middle class grows and becomes more tech-savvy. We see a significant shift towards individualism, where people place greater importance on their personal needs, desires, and aspirations, where consumers' focus is not just on the product, but the overall experience associated with it. This trend gives way to personalization, where consumers seek customized experiences tailored to their preferences.

The rise of smart homes and IoT devices, which can be controlled and managed through personalized settings, is expected to gain significant traction in India. Such as, smart home technologies becoming popular in urban areas of India, enabling people to control everything from lighting to home entertainment systems through voice commands. The growth of wearable technology, such as smartwatches and fitness trackers, are contributing to the growth of personalized user experiences, particularly in the healthcare and fitness sectors.

The growth of virtual avatars and virtual communities is another trend that is on the rise, offering people the chance to interact and engage with others in a virtual environment. In the metaverse, digital possessions are becoming increasingly valuable, and cyber security is a top priority.

Transformable spaces are becoming increasingly popular, with people looking for ways to adapt their living and workspaces to meet their changing needs.

Data-driven policies are increasingly becoming the norm, with businesses and governments relying on data to make informed decisions and the push towards Zero Emissions Vehicles cost parity has made electric vehicles more affordable and accessible. Businesses focus on targeted marketing by using data to personalize their marketing campaigns and reach the right audience. Synthetic media laws are being put in place to regulate the use of AI-generated content, and data laws are becoming more stringent to protect individuals' privacy and security.

In-home healthcare is gaining traction, with people seeking ways to access medical care and services from the comfort of their own homes.

Key Trends Supporting This Scenario

- Social and economic factors such as increasing incomes, greater access to education and information, and the growth of social media in India promotes individualism. It also drives a desire for virtual connection and community in a world that is becoming more fragmented and individualistic.
- Rising interest in energy conservation and sustainability in India, leading to growing adoption of smart home technology and ZEVs for energy management and optimization
- Growing availability of affordable, high-speed internet connectivity in India, enabling users to access information and resources to create and build things themselves, access and customize products and services according to their preferences, and businesses to collect data from users.

Vehicles In Scenario 1

In this category, cars are designed to provide a personalized and customized experience for their owners. The car's interior and exterior

design can be customized to the owner's preferences and style. Additionally, advanced AI and machine learning algorithms can be used to learn the driver's habits and preferences and adjust the car's performance accordingly. The car may learn the driver's preferred routes and driving style and adjust the suspension and engine performance accordingly. Vehicles might be designed to integrate with other personal assets, such as smart homes or wearable devices, to provide a seamless and personalized experience.

Key Themes

- Tailored driving experiences that suit their individual needs and preferences
- A sense of ownership and pride in their customized vehicle
- Greater control over the maintenance and upkeep of their vehicle
- The ability to use their vehicle as an extension of their personal brand or identity
- The ability to modify and upgrade their vehicle over time to keep up with changing technology and personal preferences
- Customizable exterior and interior design options
- Smart connectivity options to allow seamless integration with personal devices and homes, including voice-activated controls, personalized music and entertainment options, and automatic home integration.
- Advanced AI and machine learning capabilities to learn the driver's habits and preferences, and adjust the vehicle settings accordingly, such as preferred route and temperature settings.
- Personalized safety features, such as adaptive cruise control and lane departure warning systems, that can be customized to the driver's preferences and driving style.
- Advanced autonomous driving features, allowing the driver to hand over control to the vehicle in certain situations, such as traffic jams or long highway drives.
- Advanced voice recognition and natural language processing to allow for more intuitive and hands-free interaction with the vehicle.
- Integration with wearable devices and smart home systems to create a seamless transition from home to car.
- Customizable interior lighting, seating arrangements, and temperature controls for a personalized driving experience.
- Extended reality to provide real-time information about the surroundings and improve situational awareness and for work and entertainment.
- With all the customization and personalization options, these vehicles may be more expensive than standardized options.
- As each vehicle is unique, maintenance and repairs may require specialized expertise and parts, which can be more expensive and time-consuming to obtain.

Following are the ratings on the Likert scale for scenario 1

SCENARIO 1	Your Rating (1 Lowest - 5 Highest)	Avg
Possibility (1-5)	5,3,5,5,5	4.6
Probability (1-5)	5,4,2,4,3	3.6
Plausibility (1-5)	4,5,3,4,4	4

Preferability (1-5)	5,3,2,4,4	3.6

Table. 4.1 Ratings for Scenario 1 by five Industry Experts on Likert Scale

4.2 Scenario 2

Standardized UX with Personal Assets

In this scenario in urban India in 2040 standardized user experiences have become more prevalent as technology and design standards continue to evolve. Operating systems, software interfaces, and website designs become streamlined and user-friendly, providing a consistent and familiar experience across different devices and platforms. Personal assets such as cars and homes become more connected and integrated with technology, providing a seamless and standardized user experience. They expect seamless and intuitive experiences, whether they are accessing e-Government services, using ride-sharing services, or charging their EVs. This trend is driven by a need for simplicity and efficiency as people's attention span decreases due to the digital overload.

Also with an abundance of information available at their fingertips, users' attention spans have decreased, leading to a need for more engaging and interactive content in extended reality.

Ride-sharing services have become increasingly popular, but concerns over congestion in these modes also substantially increase. To promote the adoption of electric vehicles, the government has introduced fiscal incentives and charging station incentives to encourage the growth of the charging infrastructure. Smart infrastructure and charging grid expansion have made EV charging accessible and convenient, with charging stations now available in most urban areas. The government has implemented smart traffic management systems to reduce accidents and congestion, with pedestrian walkways and crossings designed to minimize the risk of accidents.

The government and private companies have invested in infrastructure and initiatives to bridge the digital divide and provide access to digital technologies to all citizens. However, concerns over digital surveillance and cyberterrorism are on the rise, making users increasingly aware of the need to protect their privacy and security. The government has implemented stringent data privacy laws to protect citizens' personal data, and digital surveillance regulations are in place to prevent unauthorized access to sensitive information.

Key Trends Supporting This Scenario

- Increasing availability of affordable smartphones, improving digital infrastructure, and government initiatives to promote digital literacy is predicted to take internet penetration to over 90% by 2040.
- Increasing urbanization and traffic congestion in India, leading to a growing demand for ride-hailing and car rental services.
- Proposed Smart cities would be designed to leverage technology to improve efficiency, sustainability, and quality of life for citizens.

Vehicles In Scenario 2

In this scenario, vehicles would be designed to provide a consistent and familiar user experience across different devices and platforms. The operating system, software interfaces, would be streamlined and user-friendly, making it easy for owners to navigate and use their vehicles similar to how smartphones have standardized interfaces. . However, owners would still have the ability to customize certain aspects of the vehicle, such as the seating or sound system, to their personal preferences.

Key Themes

- A consistent and familiar user experience, regardless of the make and model of the vehicle
- Lower maintenance and repair costs, due to the use of standardized parts and interfaces
- Greater ease of use, with intuitive and user-friendly software and interfaces
- More affordable pricing, due to economies of scale from standardized manufacturing processes
- Lower depreciation rates, due to the widespread availability of similar vehicles on the market
- Simplified and streamlined user interfaces, with intuitive and user-friendly designs that prioritize ease of use and familiarity.
- Standardized dashboard configurations, allowing for easy navigation and access to important information
- Seamless integration with personal devices, allowing for easy access to music, entertainment, and other personal content.
- Integration with standardized interfaces and operating systems for a consistent user experience across different devices and platforms.
- Personalized infotainment systems that can be easily customized to individual preferences and usage patterns.
- Advanced navigation and route planning features to optimize driving routes and reduce travel time.
- Advanced driver assistance systems, such as adaptive cruise control and traffic jam assist, to reduce driver fatigue and improve safety.
- High-quality sound systems and in-car entertainment options, such as streaming services and video playback, to enhance the driving experience.
- As these vehicles have standardized features, they may lack the unique qualities and characteristics that some people desire.
- User experience may not be optimal for all users, a standardized UX may work well for most people, it may not meet the needs and preferences of all users.

Following are the ratings on the Likert scale for scenario 2.

SCENARIO 2	Your Rating (1 Lowest - 5 Highest)	Avg
Possibility	5,5,5,5,5	5
Probability	5,3,5,4,4	4.2

SCENARIO 2	Your Rating (1 Lowest - 5 Highest)	Avg
Plausibility	5,3,4,2,3	3.4
Preferability	5,2,5,2,3	3.4

Table. 4.2 Ratings for Scenario 2 by five Industry Experts on Likert Scale

4.3 Scenario 3

Personalized UX with Leased Assets

In 2040, India has made significant progress in adopting emerging technologies that have transformed the way people live and work. Human-machine symbiosis has become a common feature in many industries, with people working alongside machines to enhance their capabilities and productivity. This has also led to the rise of transhumanism, with people augmenting their physical and mental abilities with technology to become more adaptable and flexible.

Ambient intelligence has become ubiquitous, with homes, offices, and public spaces equipped with sensors and smart devices that provide personalized services and experiences. People have become accustomed to having their environments adapt to their needs and preferences, thanks to the proliferation of smart contracts that enable seamless interactions with technology.

Inclusivity has become a core value, with efforts to bridge the hypoconnectivity gap that previously limited access to technology for certain groups. Democratized entrepreneurship has also become a reality, with the rise of platforms that enable anyone with a good idea and the skills to implement it to launch a business.

Battery costs have plummeted, making electric vehicles and other battery-powered devices affordable for all. Autonomous certification and collision and safety laws have been developed, paving the way for the widespread adoption of autonomous vehicles and other machines. Ride-sharing has become the norm, reducing traffic congestion and pollution.

Despite the increasing reliance on technology, in-person interaction remains important, with people recognizing the value of face-to-face communication and community building. People have also become more adaptable and flexible, recognizing that change is constant and that they need to stay ahead of the curve to remain relevant in a rapidly evolving world.

The growth of the tech industry and the demand for customized solutions in fields such as healthcare and education drive demand for leased assets with highly personalized UX. The development of modular and flexible leased assets, such as 3D printing and modular furniture, enables businesses and individuals to tailor their assets to their specific needs. Customized software systems provide highly tailored and efficient user experiences such as advanced machine learning or artificial intelligence systems that automatically adjust to individual user preferences

Vehicles In Scenario 3

In this category, cars are designed to be shared and leased, so they need to be versatile and easily adaptable to different users' preferences. Users would subscribe to different kinds of vehicles as per their needs and reconfigure them to their immediate needs. The vehicles would be designed to provide a highly personalized and tailored experience for each individual user. The car's interior can be easily reconfigured to suit different users' needs, such as changing the seating arrangements or adjusting the climate control and lighting. Additionally, the car's AI can learn the usage habits of different users and adjust the car's performance accordingly to each user's interactions to provide a more intuitive and efficient experience. Additionally, vehicles may be designed to integrate with other shared or leased assets, such as co-working spaces or temporary accommodations, to provide a seamless and personalized experience.

Key Themes

- A sense of ownership and control over the vehicle, even if they do not own it outright
- Greater flexibility and convenience, with the ability to customize the vehicle to their specific needs and preferences
- Lower costs, since they do not have to bear the full burden of vehicle ownership and maintenance
- Reduced environmental impact, since shared or leased vehicles can be used more efficiently and effectively than individually owned vehicles
- The ability to switch between different vehicles and user experiences, depending on their needs and preferences at any given time
- Customizable user profiles, allowing each user to customize the vehicle settings to their preferences and needs.
- Smart connectivity options, allowing users to seamlessly integrate the vehicle with their personal devices and homes.
- Efficient and convenient charging options, with access to a range of charging stations and incentives for EV users.
- Customizable interior features, such as adjustable seats and lighting, to provide a more comfortable and personalized experience for each user.
- Integration with shared mobility platforms and services to allow for seamless transitions between different modes of transportation.
- Advanced user authentication and security features to ensure that only authorized users can access the vehicle.
- Intelligent scheduling and route planning capabilities to optimize usage and minimize downtime.
- Advanced telematics and data analytics features to track usage patterns and optimize vehicle performance.
- Shared assets may not be in optimal condition, as these vehicles may be used by multiple people, and they may not be maintained to the same standards as a personally owned vehicle.
- As these vehicles are shared, there may be limitations on when and where they can be accessed, which may be inconvenient for some users.

Following are the ratings on the Likert scale for scenario 3.

SCENARIO 3	Your Rating (1 Lowest - 5 Highest)	
Possibility	5,5,5,5,5	5
Probability	4,3,4,4,4	3.8
Plausibility	4,5,5,4,4	4.4
Preferability	5,3,5,5,5	4.6

Table 4.3 Ratings for Scenario 3 by five Industry Experts on Likert Scale

4.4 Scenario 4

Standardized Ux With Leased Assets

In 2040, India has experienced a significant increase in urbanization and population growth, with an estimated 9 billion people. However, the trend of work from home has become more prevalent, driven by advances in technology and the need for increased flexibility in the workforce. This has led to a decrease in the demand for traditional office spaces and an increase in the demand for shared workspaces and flexible office arrangements.

The middle class has grown, and collaboration has become more important than ever, as people seek out new opportunities to work together and create value. This has led to the rise of the gig economy, with people increasingly choosing to work on a project-by-project basis rather than pursuing traditional employment.

India has implemented strict fuel economy and CO2 emission standards, as well as battery management regulations and waste and scrapping regulations, in an effort to reduce the country's carbon footprint and address climate change. Climate tax and charging costs have also been introduced to encourage sustainable practices and discourage the use of non-renewable resources.

The subscription economy has become more popular, with people preferring to lease or share assets rather than own them outright. This trend has extended beyond physical assets to include services and experiences, such as streaming services and subscription-based fitness programs.

Structural unemployment has been a challenge, as the high rate of change in the industry has led to the displacement of workers in certain sectors. However, India has also seen a rise in decentralized finance, which has enabled more people to access financial services and participate in the economy.

The growth of the gig economy and freelance work drives the demand for leased assets with standardized UX. There is a rise in coworking spaces and shared offices, which offer flexible leasing arrangements and standardized amenities in the urban centers of the country. With the growth of remote work and cloud computing, the demand for such assets have risen in the technology sector.

KEY TRENDS SUPPORTING THIS SCENARIO

- Increasing preference for flexible and agile workspaces among Indian startups and small businesses
- Growing demand for rental homes among the millennial generation in India, who prefer a hassle-free lifestyle and do not want to commit to long-term mortgages
- Rising popularity of online rental marketplaces that allow users to lease a wide range of assets, including vehicles, furniture, and home appliances

Vehicles In Scenario 4

In this category, cars are designed to provide a consistent and standardized user experience for all users. The most popular modes of transportation now are shared mobility as a service where users utilize options such as public transport and ride-hailing. The vehicle's interior and exterior will have a standardized design, making it easier to maintain and repair. Additionally, the car's AI will be used to adjust to different users' habits and preferences while still maintaining a consistent user experience. The vehicles may be designed to integrate with other shared or leased assets to provide a seamless and standardized experience across different modes of transportation.

Key Features

- A consistent and familiar user experience, regardless of the make and model of the vehicle
- Lower costs, since users do not have to bear the full burden of vehicle ownership and maintenance
- Reduced environmental impact, since shared or leased vehicles can be used more efficiently and effectively than individually owned vehicles
- Greater convenience, with the ability to access vehicles on demand without having to worry about maintenance or repair issues
- More affordable pricing, due to economies of scale from standardized manufacturing processes
- Simplified and streamlined user interfaces, with intuitive and user-friendly designs that prioritize ease of use and familiarity.
- Standardized dashboard configurations, allowing for easy navigation and access to important information
- Seamless integration with ride-sharing and car-sharing services, allowing for easy booking and payment options.
- Advanced safety features, such as collision detection and automatic braking systems, that are standardized across all vehicles in this category.
- Integration with standardized interfaces and operating systems to provide a consistent user experience across different vehicles and services.
- Advanced vehicle tracking and fleet management feature to optimize vehicle usage and minimize downtime.
- Intelligent route planning and optimization features to reduce travel time and improve efficiency.
- Integration with smart city infrastructure and services, such as traffic management systems and public transportation, to provide a more comprehensive mobility solution.
- Limited personalization, With standardized features, there may be limited opportunities for personalization and customization, which may not be suitable for some users.
- Shared assets may not be in optimal condition, As with personalized vehicles, shared assets may not be maintained to the same standards as a personally owned vehicle.

Following are the ratings on the Likert scale for scenario 4.

SCENARIO 4	Your Rating (1 Lowest - 5 Highest)	Avg
Possibility	5,2,5,5,5	4.4
Probability	5,1,3,3,2	2.8
Plausibility	5,2,4,3,2	3.2
Preferability	5,1,3,3,3	3.0

Table 4.4 Ratings for Scenario 4 by five Industry Experts on Likert Scale

4.5 Scenario Assessment

These four scenarios were shown to five experts in the field of mobility design. They were asked to rate the five scenarios (on a Likert Scale) in terms of their Plausibility, Preferability, Probability, and Possibility of occurrence. In addition, all the scenarios were discussed with the experts, and they were asked about their choices and ratings. These insights were then used to strengthen and fine-tune the scenarios and broaden them.

Based on their insights, scenario 3 was selected and broadened in its possible manifestation and meanings

The following table shows the average of the ratings by five industry experts tables.

	Sce. 1	Sce. 2	Sce. 3	Sce. 4
Avg Possibility	4.5	5	5	4.4
Avg Probability	3.6	4.2	3.8	2.8
Avg Plausibility	4	3.4	4.4	3.2
Avg Preferability	3.6	3.4	4.6	3

Table 4.5 Average ratings for 4 scenarios by industry experts

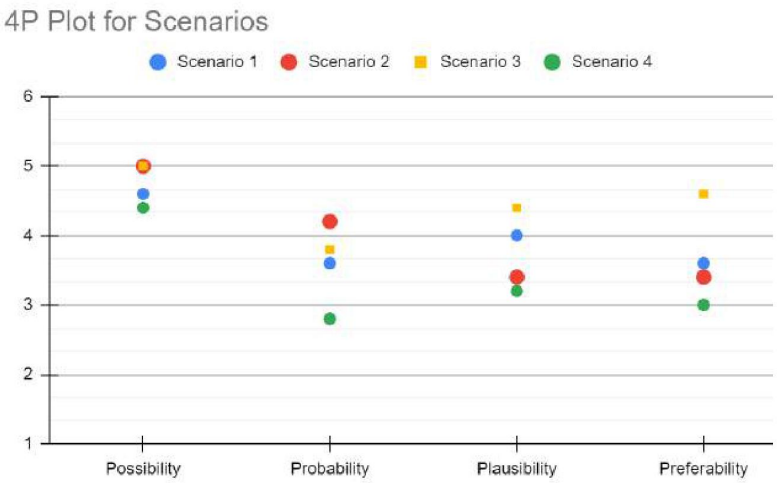

Fig. 4.1 Average ratings of 4 scenarios by Industry experts

4.6 CHOSEN SCENARIO: SCENARIO 3

Discussion: Implications Of Vehicle Design For Personalized Experience And Leased Assets

One of the main drivers is the desire for flexibility and convenience. As people become more mobile and less tied to a specific location or job, they may be less interested in owning physical assets that require maintenance and upkeep. By subscribing to assets, such as cars or homes, people could enjoy the benefits of ownership without the associated responsibilities.

Another factor driving this trend cis the desire for personalized experiences. In a world where everything from music to fashion is personalized, people may also want to customize their transportation, living arrangements, and other assets to suit their specific needs and preferences. Subscribing to assets could allow people to access a wider variety of options and tailor their experiences to their individual tastes.

The rise of the sharing economy and the increasing awareness of environmental sustainability also contribute to this trend. By sharing resources and subscribing to assets, people could reduce waste and minimize their environmental impact.

- Owning assets can be expensive, particularly for large items like homes, cars, or boats. Subscribing to these assets may be more affordable for some people, particularly those who may not have the resources to purchase them outright.
- By subscribing to assets people could have access to the latest technology without having to constantly buy new devices. This could be particularly appealing to those who value having the newest and most advanced technology available.
- The sharing economy has grown in popularity in recent years, with platforms like Airbnb and Uber allowing people to share their homes or cars with others. In this type of economy, subscribing to assets instead of owning them could be a natural extension, as people embrace the idea of sharing resources and reducing waste.
- For some people, subscribing to a home or apartment could provide greater flexibility in terms of where they live and for how long. This could be particularly appealing to those who move frequently for work or personal reasons, or who value the ability to change their living arrangements as needed.

- Owning assets can require a significant investment of time and effort, particularly when it comes to maintenance and upkeep. By subscribing to assets, people could save time and focus on other priorities, such as work or leisure activities.

4.7 SUB THEMES in SCENARIO 3

4.7.1. Personalized Experience On Ride-Hailing Service

A busy professional who has a demanding work schedule and needs flexibility in their transportation needs. They subscribe to a ride-hailing service that offers personalized experiences and allows them to choose from a variety of vehicles for different durations of time.

While using the ride-hailing app, one sees a variety of options based on their preferences and needs such as different vehicle types depending on their mood and destination. One can also customize their ride with different amenities like Wi-Fi, music, or snacks, to make their journey more comfortable and enjoyable.

A user can subscribe to a vehicle for varying durations of time, depending on the needs. For a few hours for a business meeting, one can subscribe to a short-term plan. For a longer period, such as a weekend getaway there are long-term plans. The ride-hailing service offers flexible subscription plans that cater to their needs, allowing them to choose the duration and pricing that works best.

The ride-hailing service also uses advanced technologies to provide other personalized experiences such as the app remembers preferences and usage history and suggests personalized routes, destinations, and services based on past behavior. Say if a user always orders coffee during their morning commute, the app suggests nearby coffee shops on their route. If one has a favorite playlist or lighting preferences, the app plays it automatically.

4.7.2. If Multiple Families Were To Share Ownership Of One Vehicle

Sharing a vehicle with another family can sometimes lead to disagreements over its usage. If one family needs the car on short notice, it can cause conflict with the other family's plans. To mitigate such disputes, clear usage policies and agreements need to be in place from the beginning.

Shared ownership of a vehicle can make it difficult to track maintenance and repair costs, especially if both families are using the car equally. This can result in disputes over who should bear the cost of repairs and maintenance.

If one family uses the car more frequently than the other, it can cause unequal wear and tear on the vehicle, which can lead to disputes over maintenance and repair costs.

Shared ownership of a vehicle can raise complex insurance and liability issues, especially in case of an accident or damage to the vehicle. It can be difficult to determine who is responsible for the damage or how insurance claims should be handled.

Sharing a vehicle with another family can raise privacy concerns, especially if the car has advanced technologies that track usage and driving behavior. It can be difficult to determine who has access to the data and how it is being used.

4.7.3. Personalized Experiences On Subscribed Self-Drive Car

A young working professional who needs a car to commute to work and run errands. However, they don't want to buy a car outright, as it's too expensive and not sustainable. Instead, they opt for a self-drive car subscription service that allows them to lease a car for months at a time.

The self-drive car subscription service offers a range of vehicle options, from basic models to high-end luxury cars. They may select a mid-range car that meets their budget and needs. The subscription service also offers a range of customization options including but not limited to car color, seating, features, and accessories, allowing one to personalize their vehicle to their liking.

This subscription service also offers a personalized experience, using data analytics and artificial intelligence to provide recommendations for routes, destinations, and amenities. One can input their preferences, such as music, food, and sights to see, and the car's Ai will create a customized itinerary . The car is also equipped with seamless connectivity tech to stay connected while on the go.

One enjoys the flexibility and convenience of their self-drive car subscription service. They can change their vehicle as per their need and don't have to worry about maintenance or servicing, as the subscription service takes care of all that. The service also provides 24/7 customer support, in case of any emergencies or issues.

4.7.4. Personalized Experience In Public Transport

With a network of well-connected metro rail and bus rapid transit systems across all major cities public transport has gained significant popularity. People increasingly prefer to subscribe to public transport services rather than own personal vehicles, given the rising costs of car ownership and the growing environmental awareness.

To cater to this growing demand, public transport operators have started offering highly personalized user experiences. Commuters can select from a range of subscription packages that cater to their specific needs, such as daily, weekly, monthly or even yearly passes. These packages come with various levels of personalization options and perks, ranging from premium seating, dedicated coaches, in-train entertainment, and complimentary refreshments.

Through a mobile app that users can download to customize their journey. The app is integrated with the transport operator's data system, allowing users to get real-time information on the train or bus's location, expected arrival time, and even the number of passengers onboard. Commuters can also choose their preferred seats, book additional services, like bike rentals or taxi services, and even pre-order food and drinks, making their journeys more comfortable and convenient.

In addition to these features, the public transport operator also employs data analytics and artificial intelligence to offer personalized recommendations and suggestions to the users. The system can recommend alternative routes, based on the user's past travel patterns, to avoid traffic congestion or suggest interesting places to visit near their destination. Users can also set their preferences for music, news, or other entertainment options, and the system will curate a personalized playlist for them.

CHOSEN SUB-THEME: Personalized Experiences On Subscribed Self-Drive Car

5. Persona

NAME: Aarav Rabha

AGE: 29 years

PROFESSION: Immersive Experience Curator

LOCATION: Hyderabad

MARITAL STATUS: Unmarried

PERSONALITY:

Aarav Rabha belongs to the **generation Alpha**. He is very **expressive** about himself and his **style**. He is **tech-savvy** and enjoys using the **latest technology** to enhance his daily experiences. His job involves **collaborating** with his colleagues on various projects. Outside work he enjoys **socializing** with friends and **experiencing new things**. He is open to trying out **new experiences** like diverse types of workout classes, restaurant experiences, or extended reality travel. He also values the ability to **relax and unwind** in the comfort of his home. Like his friends, he is conscious about **sustainability** and makes calculated decisions for it.

ASSETS:

Aarav had always dreamed of owning a car, but the high costs and hassle of maintenance had made that dream difficult to realize. However, with the new subscription-based economy, Aarav can subscribe to a self-drive car for work every day.

Aarav's apartment is also a subscription, fully furnished with a smart home system and energy-efficient appliances. He chose from different interior design styles and furniture options, making his apartment feel like a reflection of his own personal taste.

He receives notifications on his phone from his meal delivery service, which is tailored to his individual dietary needs. He is grateful for the convenience and the time saved because of this enabling him to focus on other priorities.

Aarav does not need to own houses or cars to enjoy the benefits of having access to them and that attracts people of his generation, who prioritize flexibility and experiences over ownership

ASPIRATIONS:

He aspires to continue to advance in his career and make a positive impact on the world making sure that he is contributing to society in a meaningful way.

He is interested in exploring new experiences and trying new things. He wants to expand his horizons and see what the world has to offer. He is curious about different cultures and ways of life, and he hopes to travel and learn more about them.

APPREHENSIONS:

He worries about the impact of technology on society and the environment, and he wonders whether the subscription-based economy will lead to greater social inequality. He also worries about the potential for privacy violations and other ethical concerns as technology continues to advance.

Despite these concerns, Aarav remains optimistic about the future. He believes that technology has the potential to make the world a better place, and he is excited to see what the future holds.

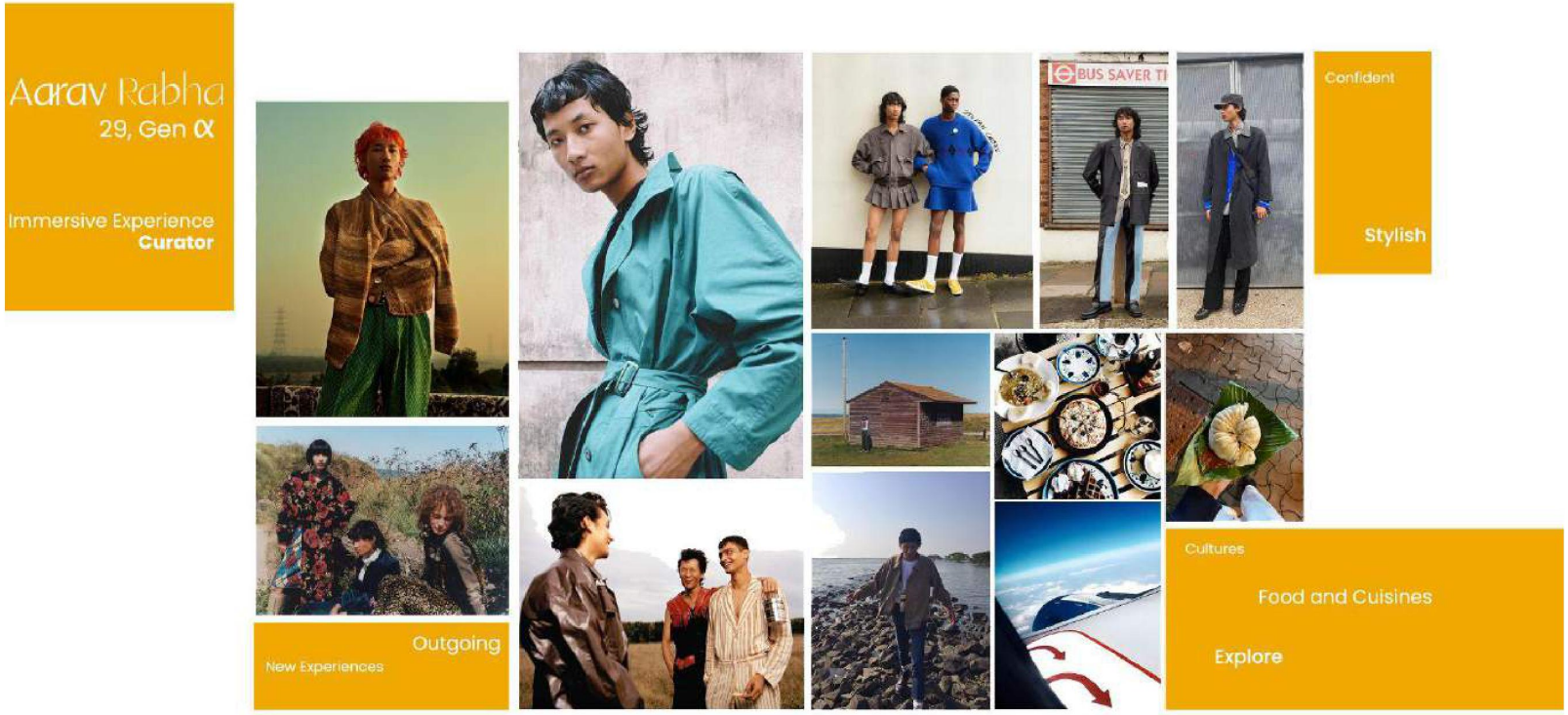

Fig. 5.1 User Persona Board

5.1 About Aarav's Profession:

With his passion for technology and desire to explore new things, Aarav has built a profession as an **Immersive Experience Curator**.

He collaborates with his clients to curate unique and tailored experiences that cater to their individual interests and preferences.

Aarav's job involves working with a team of designers, technologists, and hospitality professionals to create immersive and personalized experiences for his clients. He uses extended reality and other advanced technologies to create virtual environments and enhance the overall experience for his clients.

Aarav's clients come from all walks of life, ranging from corporate executives looking for team-building activities to families seeking unique and memorable vacations. Aarav works closely with his clients to understand their needs and preferences and creates experiences that are tailored to their specific desires.

In his free time, Aarav enjoys socializing with friends and exploring new experiences. He often attends events and exhibitions, seeking inspiration for his work. Aarav is always on the lookout for new technologies and trends that can be

incorporated into his work to create more immersive and engaging experiences.

5.2 Day in the Life of Aarav

Each morning, he wakes up to his smart home system, which automatically adjusts the temperature, lighting, and music to his preferred settings. He then puts on his latest AR glasses, which would provide him with a heads-up display of his schedule for the day and any important notifications.

He then goes for a run in the park near his home. He values the fresh air and exercise, which helps him to start his day off on the right foot.

He gets back to his home which is adjusted for his post-run relaxation on office preparation. His subscribed meal gets delivered to him during this time as he picks his outfit for the day.

As he walks outside, his glasses display information about the weather, traffic, and even the latest news headlines. Aarav then gets into a shuttle to his workplace. On his ride to the office thrice every week, he mostly prepares for his upcoming project discussions and prepares his files on his XR workspace. It sometimes becomes challenging for him to work during rush hours since he is unable to freely use his air gestures in the crowd. In this workspace, he attends virtual meetings, adjusts his schedule with his Ai assistant, or sometimes drifts away from reality with spatial sounds and the virtual world. He interacts with his colleagues as if they were right beside him. These are relationships he has built over physical interactions in real-time.

Once he arrives at his office, Aarav uses his XR tools to access various resources to help him collaborate with others more effectively.

After work, since his house is slightly far from his office Aarav often uses his glasses to enhance his social experiences. He attends VR exhibitions

and VR concerts, where he immerses himself in music and interacts with other fans from around the world. He sometimes is bitter from his shared ride experience since multiple stoppages delay him from his activities for the rest of the day.

If it is not an office day, he goes out to try out new experiences with his friends physically. Similarly, on weekends he goes out hiking or trips to scenic places around Hyderabad.

Back at his apartment, the smart home system is prepared to receive him with his preferences applied based on his mood. Voice commands and gestures make it even more convenient to adjust his preferences. He relaxes and does some yoga as a habit. On days he does not work out, he indulges in immersive movies or shows.

At night, he retires to his sleep pod, which provides him with a comfortable and personalized sleep environment.

5.3 Aarav prefers a self-drive car over public transport because

- By subscribing to a car, he has the flexibility to travel on his own schedule and at his own pace. He doesn't have to worry about the timing or availability of public transport, and he can avoid the hassle of waiting in lines or dealing with crowded buses or trains.
- Having a vehicle for himself enables him to dynamically adjust to his flexible work schedule.
- He prefers the comfort and privacy of having his own car, rather than having to share a vehicle with strangers.
- He can go along with his friends to gain new experiences.
- In a manner owning a car gives him a sense of independence and achievement.
- Crowded shared transport is relatively slow and does not allow him to work freely when he is on the move

5.4 Activities In His Subscribed Vehicle

- Travels to and from the office thrice a week in flexible hours. Prepares for upcoming team meetings on the way to the office and Unwinds on the way back.
- Physically exploring new experiences to add to his list of curated services.
- He travels within and out of city bounds to reach sites. - Exhibitions, Concerts, Tournaments, Games, Picnic Spots, Resorts, Treks, Campsites, Adventure Sports, Cafes, and Clubs,
- Meets clients around the city to provide consultancy and demonstrate portfolio.
- Commutes in the city with friends on weekdays. Road trips on weekends.

5.5 Aarav and His Vehicle : A visual representation

Fig. 5.2 Use cases of the vehicle for the User

5.6 Life in India 2040

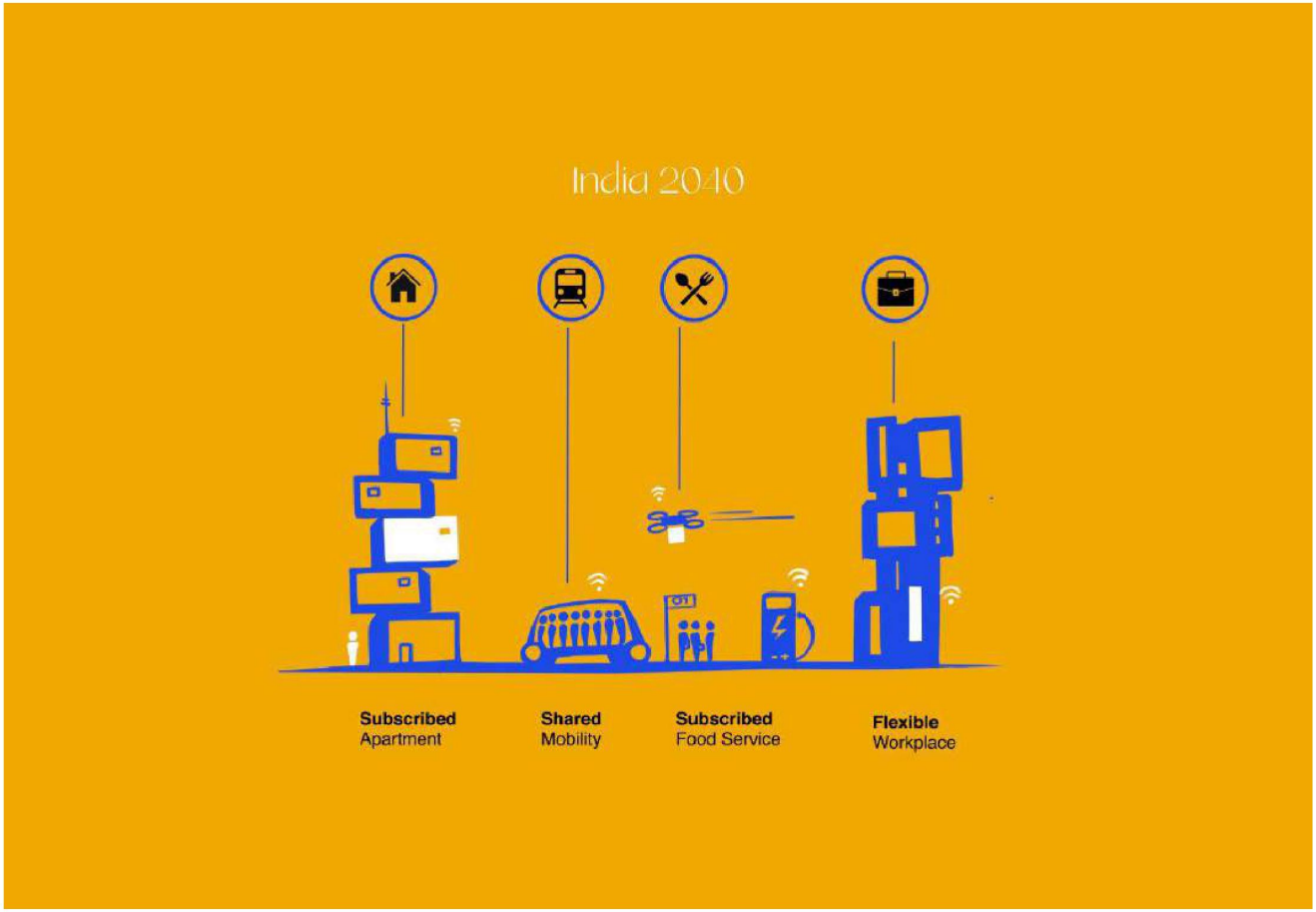

Fig. 5.3 Visual representation of User's lifestyle, their subscriptions for home, food and office space

6. Design Brief

To design an urban commuting vehicle for a working professional in India in 2040, from a line-up of subscription-based self-drive-vehicles.

The vehicle should enable the user to work from their vehicle and aid the users in exploring the city and beyond in their quest to discover new experiences. It should enhance the users' productivity and create a relaxing space when required during commute. The vehicle should be customizable to the user's needs in terms of its interior space, features, accessories and appearance, as an extension of their personality.

7. The Big Picture

The Idea of the project is to develop a subscription based mobility system where a user can subscribe to various different cars for flexible durations of time and configure them to their particular needs. People can pick any combination of components for any vehicle of their choice and pay the flexible fare for their personalized option. The idea thus involves modularity , enabling ease of change. Thus Mod'U', modular for you.

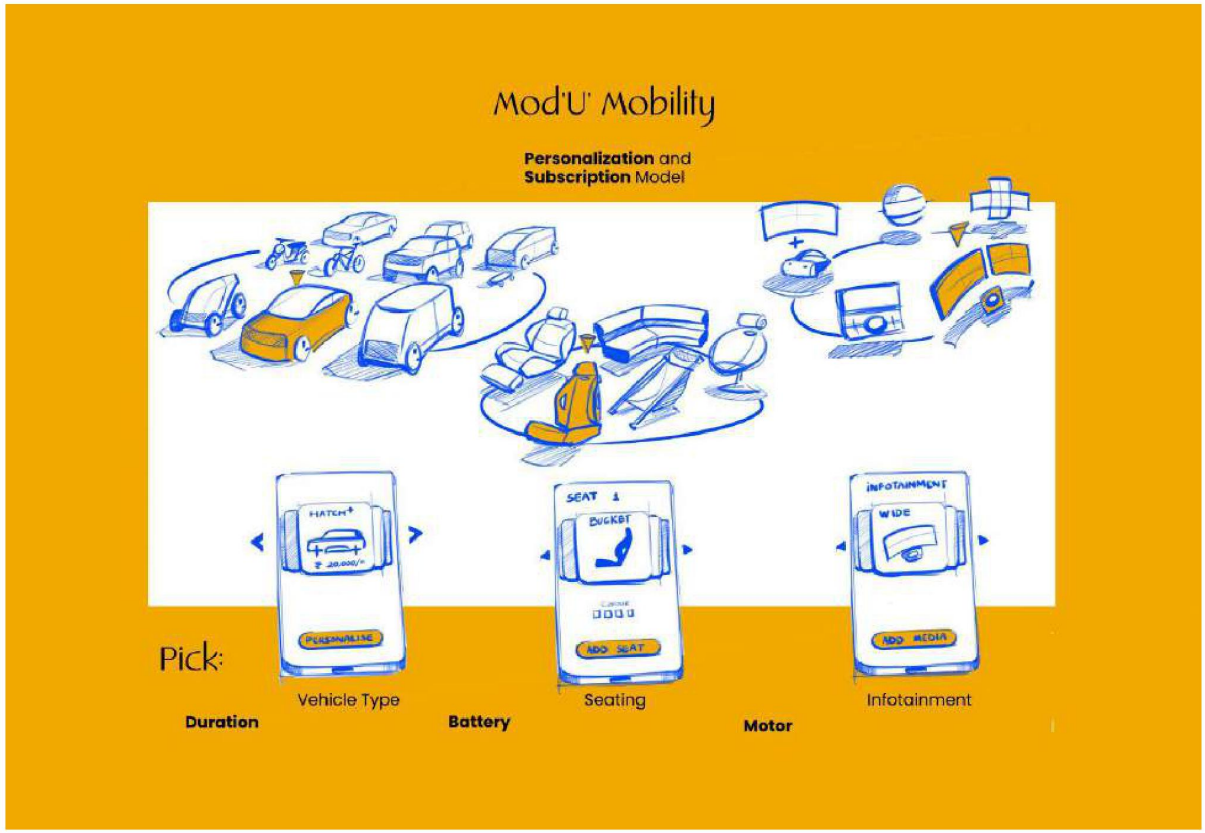

Fig. 7.1 Visual representation of the idea where a person chooses their vehicle and all its components from an app before subscribing to a car for a varied duration

The idea is to incorporate easy attaching and detaching components so that every vehicle can be quickly personalized with ease. The mounting points would be standardized for all vehicles using this platform and the parts are interchangeable.

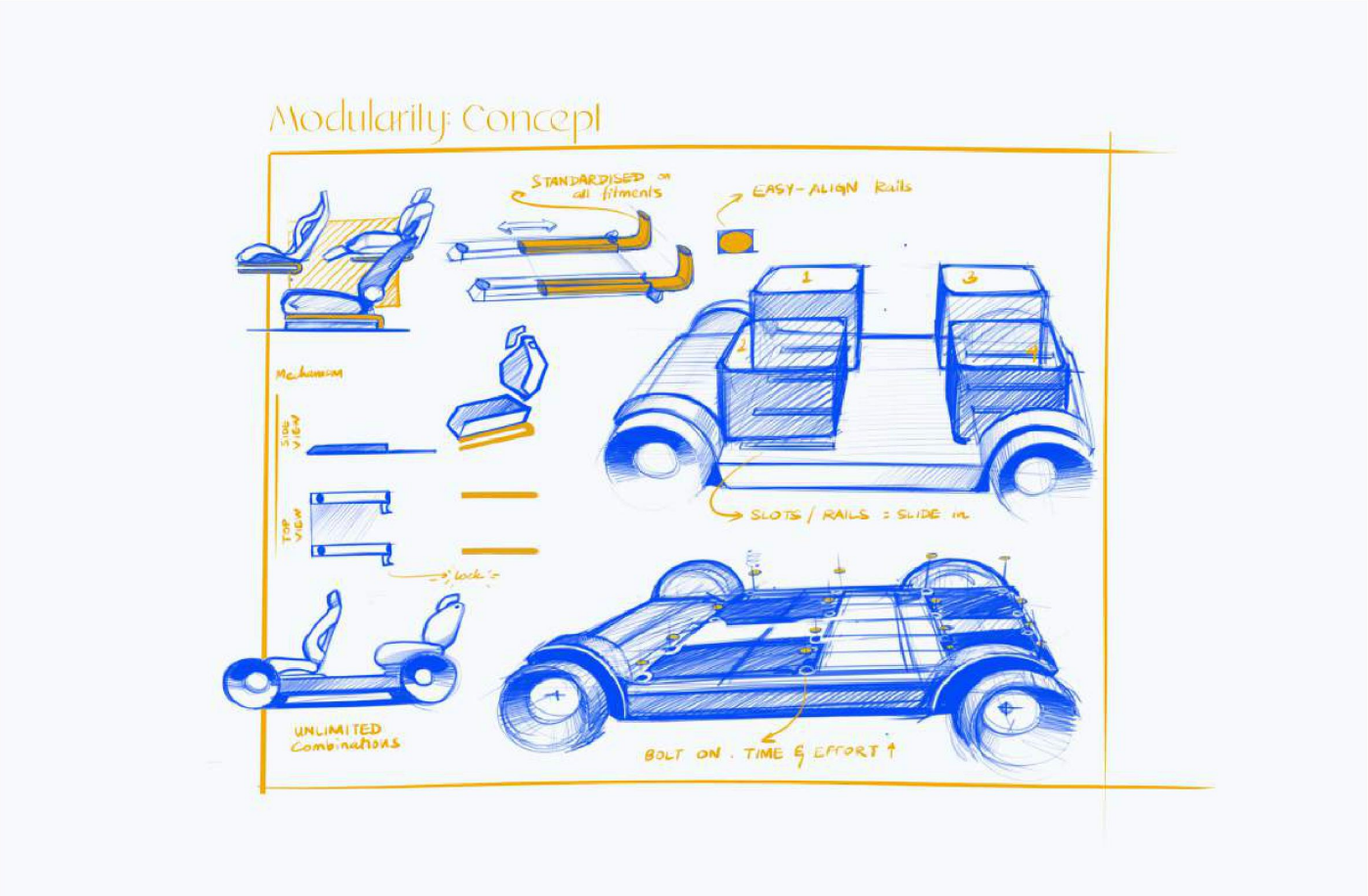

Fig. 7.2 Animated GIF showing the concept of easy swapping seats for all seat positions

The primary components that can be tailored to the particular needs are the dashboard, seats, infotainment system, steering wheel, center console, storage units and certain accessories.

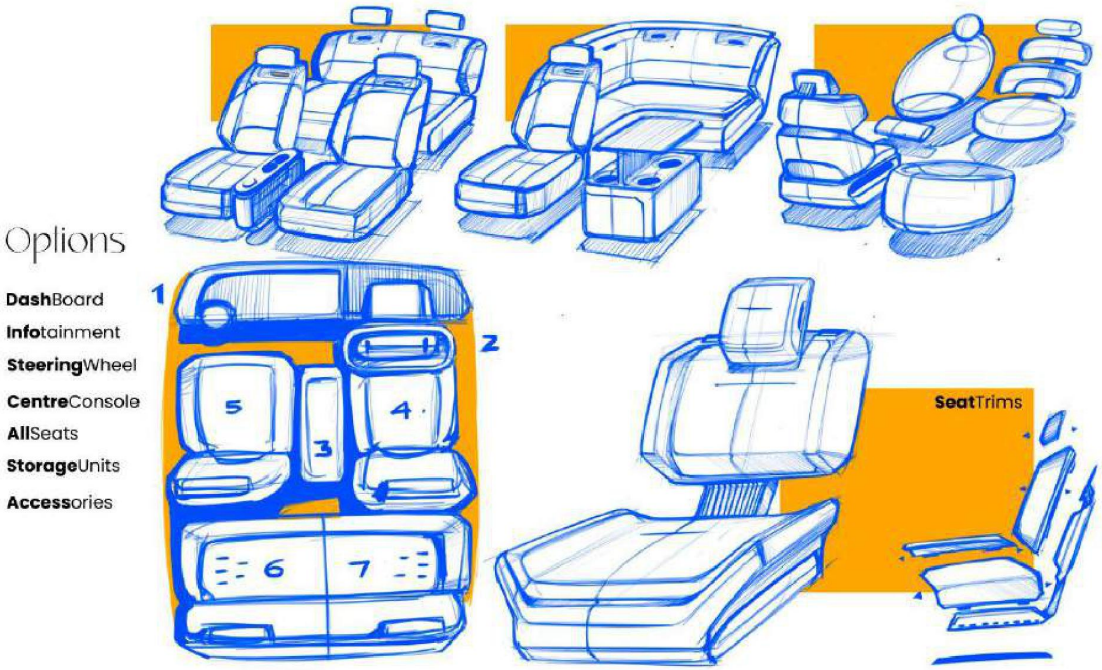

Fig. 7.3 Visual representation of the components that can be chosen for personalization inside the vehicle

8. Platform

The following image demonstrates a 3D model of the swappable units marked in yellow. This is a representation of the modular platform for a hatchback.

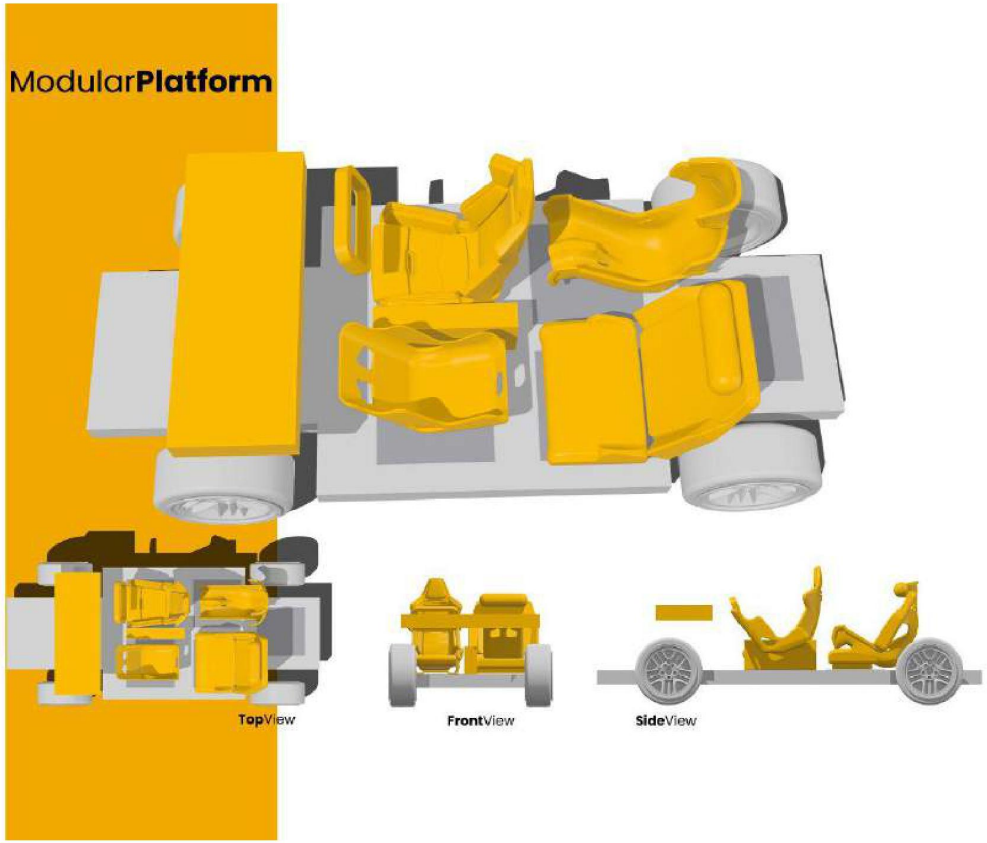

Fig. 8.1 3D representation of customizable components highlighted in yellow

9. Technical Package

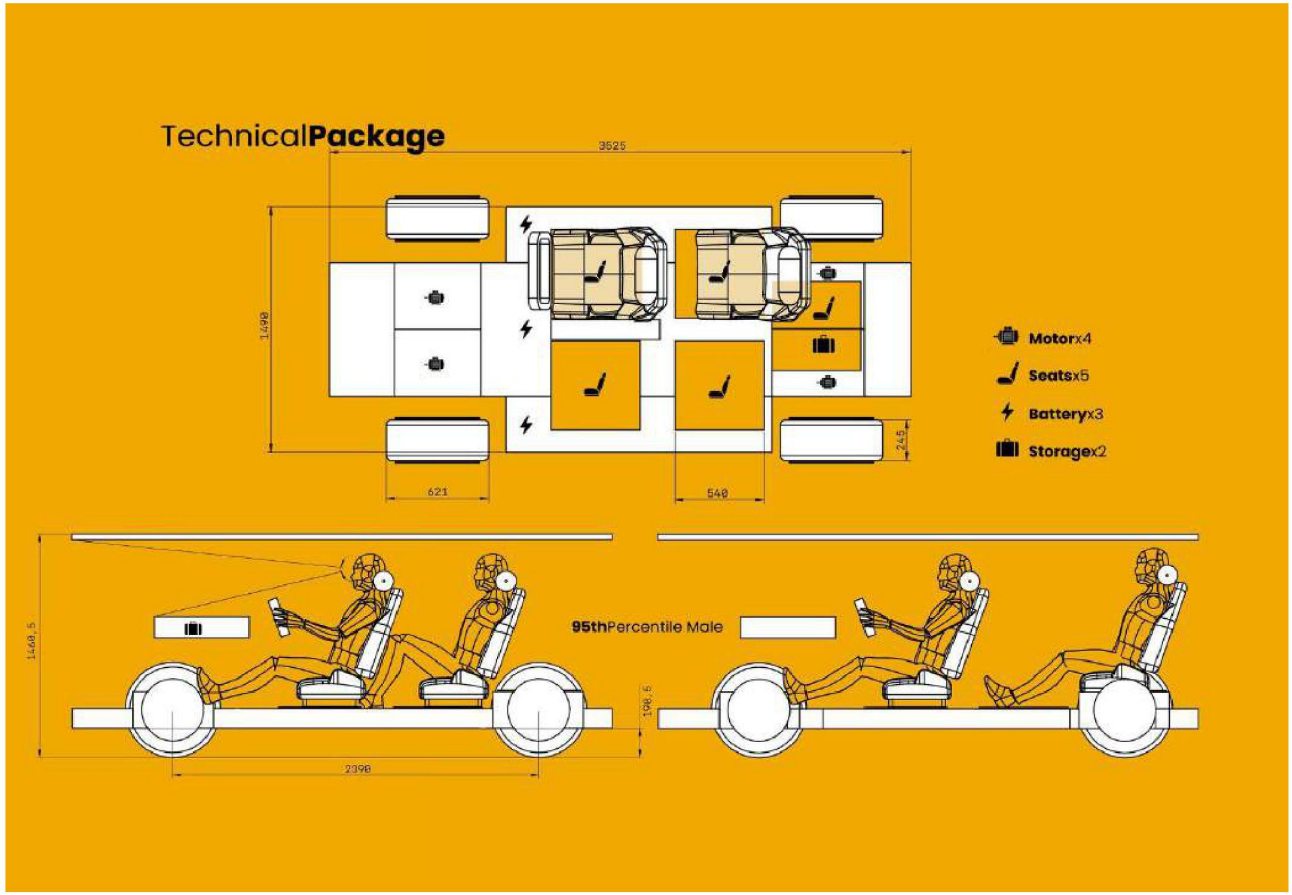

Fig. 9.1 Technical Package showing 95th Percentile male seated in the platform with modular components marked symbolically with their locations

10. User Study : Professionals working from their Cars

To understand the nuances of working professionally from cars, interviews were conducted of 4 individuals. The interviewed professionals were from various different fields and established in different locations. In one of the interviews, I met with the individual and watched him demonstrate his working methods from his vehicle. In-action pictures were taken from the same interaction. The other three interviews were telephonic, where the researcher followed an unstructured and informal interview around the themes of kind of work, work setup, challenges , and adaptations implemented to smoothly work from a car.

10.a. Dhriti Singha

Profession- Market Analyst

Company- Quiddich [Startup]

Work timing - Flexible

Tasks in Car

- Reviews and Changes on the Road
- Client Consultation
- Official Calls
- Seldom Team meetings

Challenges

- Dashboard curves not made to hold things
- Seat pushed all the way back
- Managing laptop is difficult

Adaptations

- Devices always fully charged
- Carries: Backpack, Laptop, Phone, Chargers, Earphones, Notepad, Pen
- Works from the front, adjusted now
- Camera switched off in Meetings, distance is very less from camera.

Car is second hand 1 year- **Spinny Cars, Assured buyback, flexible tenures**

Fig. 10.1 Images from User Study where the user is seen working on his laptop from inside his car. The equipment and things carried along are marked in the images

10.b. Charvi Kathuria

Profession- Content Writer

Company- She the People

Work from car for **3.5 months, Winter**

Challenges

- Cannot charge devices, used to work till charge died
- Difficult to arrange essentials in the front seat
- Very hot during summers

- Quietest place in the house during lockdown
- Car gives a private space to analyze and organize her thoughts
- Clients were amused to see her
- Worked from back seat

Adaptations

- Moves front seat to the front extreme
- Carries: Water Bottle, tiffin, Phone
- Uses wifi from home router
- Custom background or Blurred background during client meetings

Fig. 10.2 Images of the second user working from inside her car. [Image source LinkedIn]

10.c. Dinesh Shaw

Profession - Client Relations Associate

Company - Beyond Enough [Startup]

Tasks in Car

- Client Meetings daily, for feedback
- Daily updates from Car
- New Client interactions and preps
- Works a lot on excel

Office relocation and reallocation motivated to work from car

Challenges

- Sideways working strains neck
- Sweating on Seats
- Summer is difficult in car

Adaptations

- Changes seats if long day, different feeling
- Good backup laptop, also keeps on Sleep to save power
- Carries: Laptop, Phone, Charger, Plug-in Fan, Car charger
- Ambience lighting installed
- Listens to songs on speakers

Wishes natural cooling

Wishes HMI screen was smart

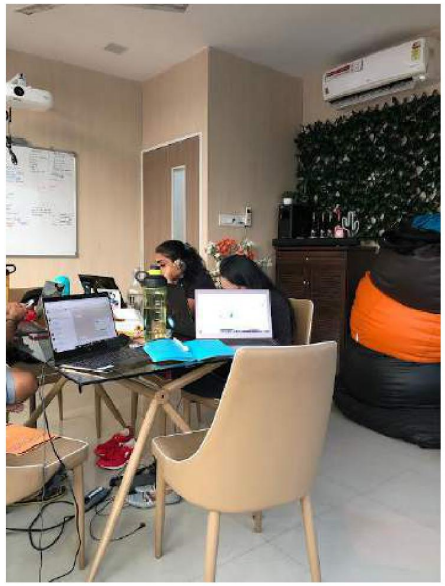

Fig. 10.3 Workspace in Beyond Enough startup in Mumbai where the third user works

10.d. Suprita Barua

Profession - Principal Interior Designer

Company - SSB Design Studio

Tasks from Car

- On-site visits and changes
- Client Updates from site
- Vendor meetings from car, because construction site is noisy

Adaptations

- Carries: Macbook, ipad, Pencil, Airpods, Phone, Handbag
- Prefers ipad because compact, unified
- Has sunshades for privacy
- Uses backseat if Macbook needs to be used
- Feels the need for Wifi in Car
- Runs engine for AC
- Tries to minimize to declutter

10.2 Secondary Research

Requirements of essentials for a comfortable work from car experience involve the following :

- Power to run devices
- Good internet connection
- Access to data, local or online
- Desk to work on
- Notebook and pen
- Snacks
- WindowShades
- Lights
- Upright seats

Following are some attachments and car-office setups popular around the world.

Fig. 10.4 Images showing different accessories popularly used by users working from their cars

Following are some equipment and accessories currently used to enable effective work from a car

11. Inspiration Board

The following board represents the design intent for the interior configuration for a working professional. The keywords and themes are inspired by aeroplane cabins and cubicles. The interior should facilitate a functional working environment but also simply switch to a familiar vehicular experience when needed.

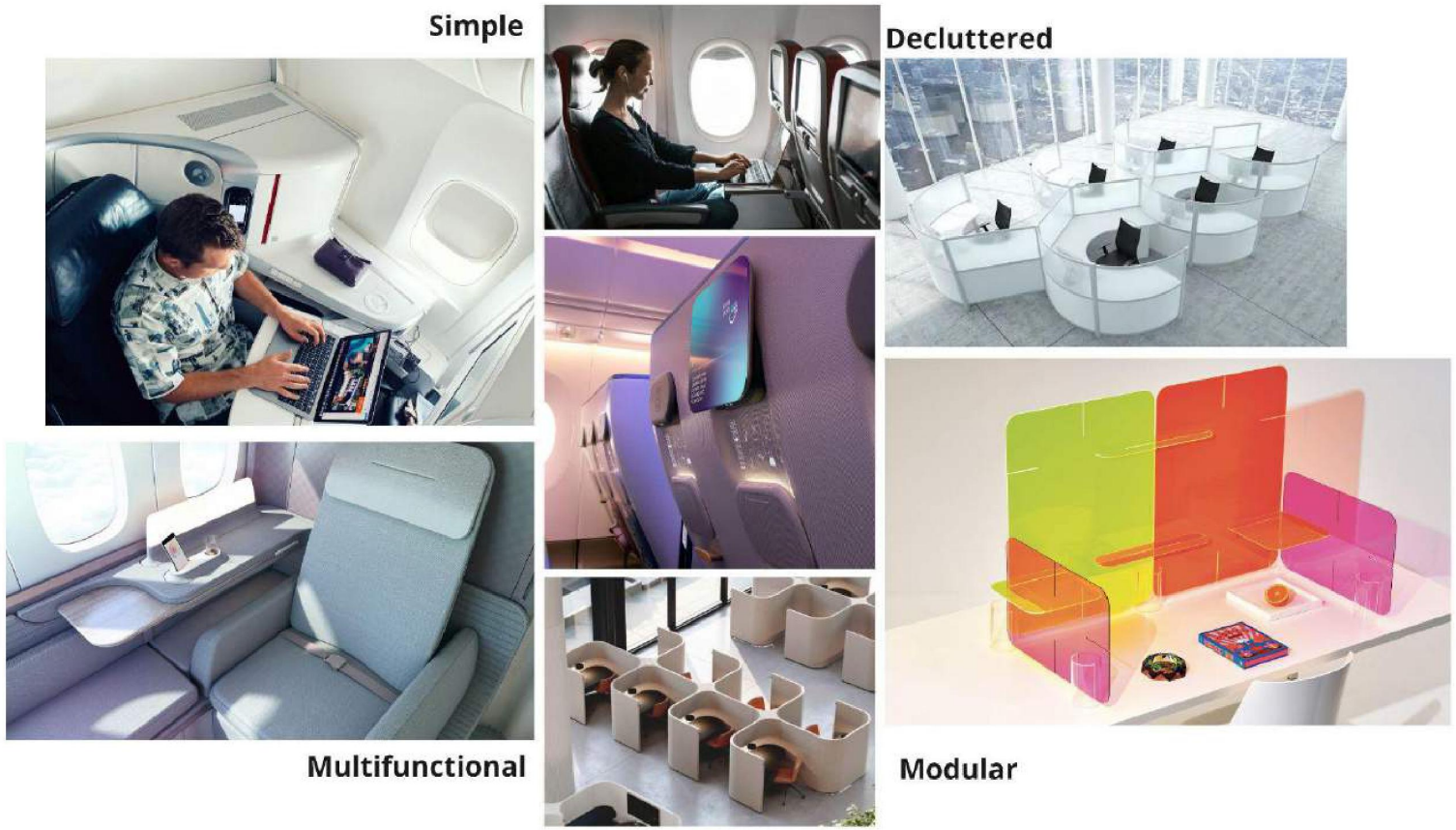

Fig. 11.1 Inspiration board for Interior.

12. Interior Ideations

The following is a sketch showing very first ideas to tackle challenges of working from a car. New technologies are the focus of these concepts. The major theme in this sketch revolves around reconfiguring the screens of present times. It shows dual screens, retractable screens and folding screens, inclining heavily on the notion that screens will still be the mode of primary interaction in 2040, which may not be true as established in the section 4.

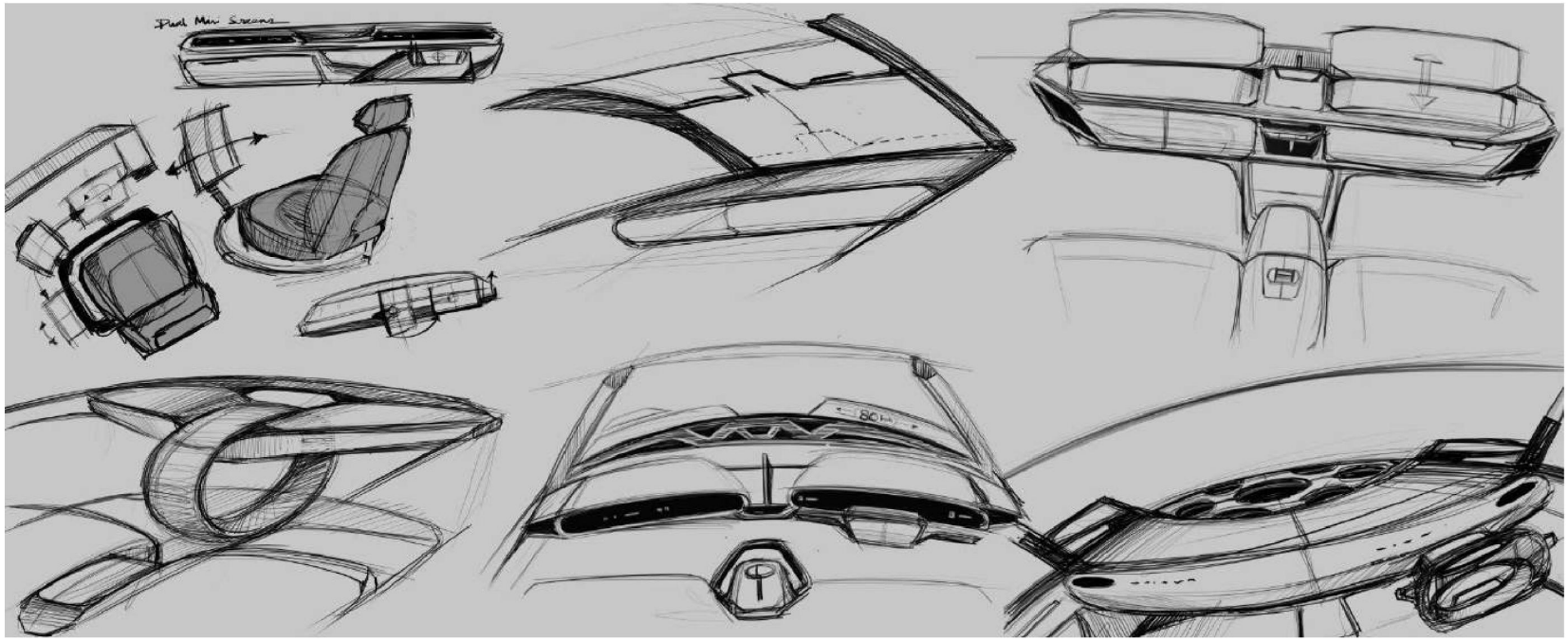

Fig. 12.1 Initial Concept sketches

Exploring newer types of interactions with the vehicle using futuristic technologies such as 3D Holograms, XR windshield, XR Dome. These ideations were done to explore fresh ideas focusing on the aspect of decluttering and resorting to only the essentials.

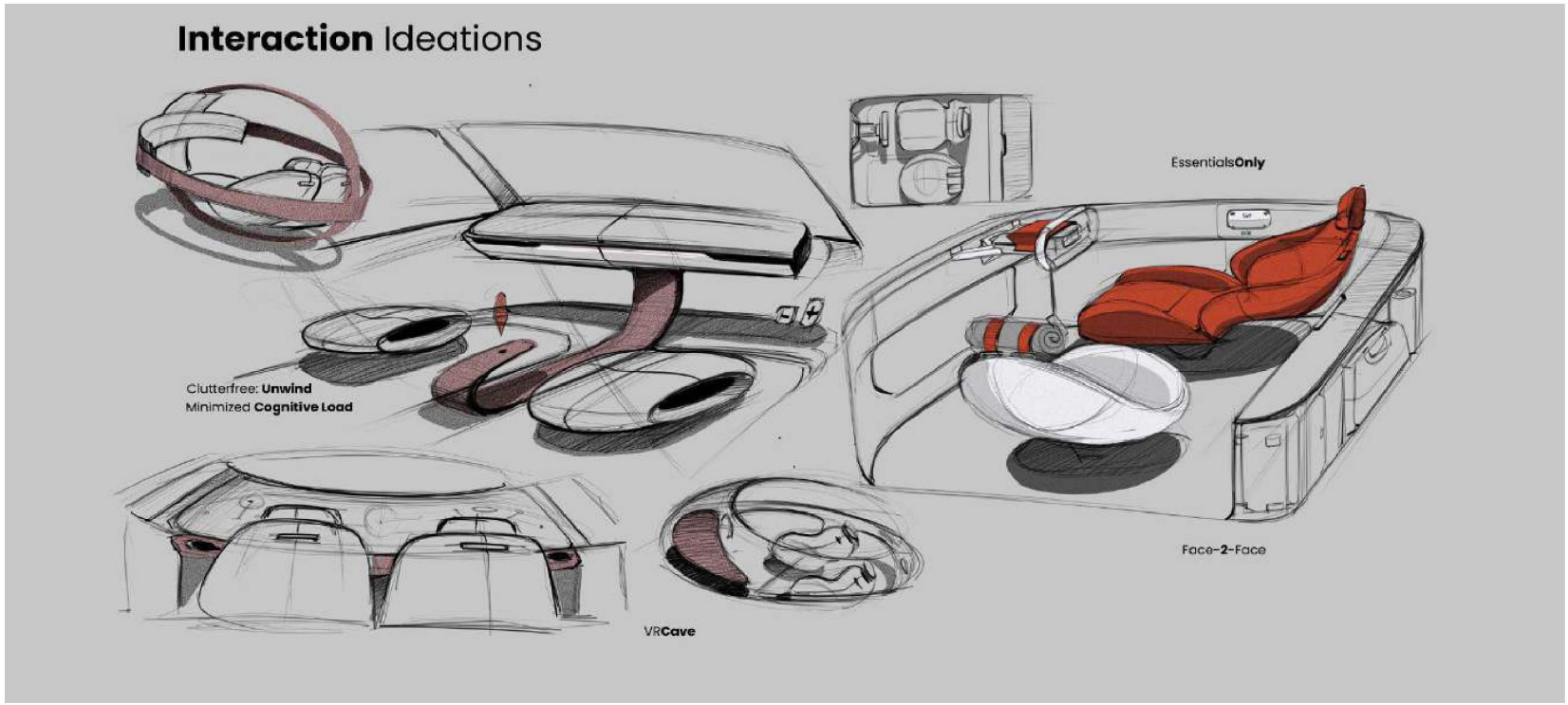

Fig. 12.2 Initial Concepts exploring directions for interior, free space, rotating seats, VR cave using glass surfaces.

Exploring the idea of interacting with the vehicle with Curved Display units and Flexible Screens in the following sketches. These sketches reimagine the idea of having a unified control and interaction point for the systems within the car. These are isolated ideas and do not particularly align with the overall design, but were explored for future integration if possible.

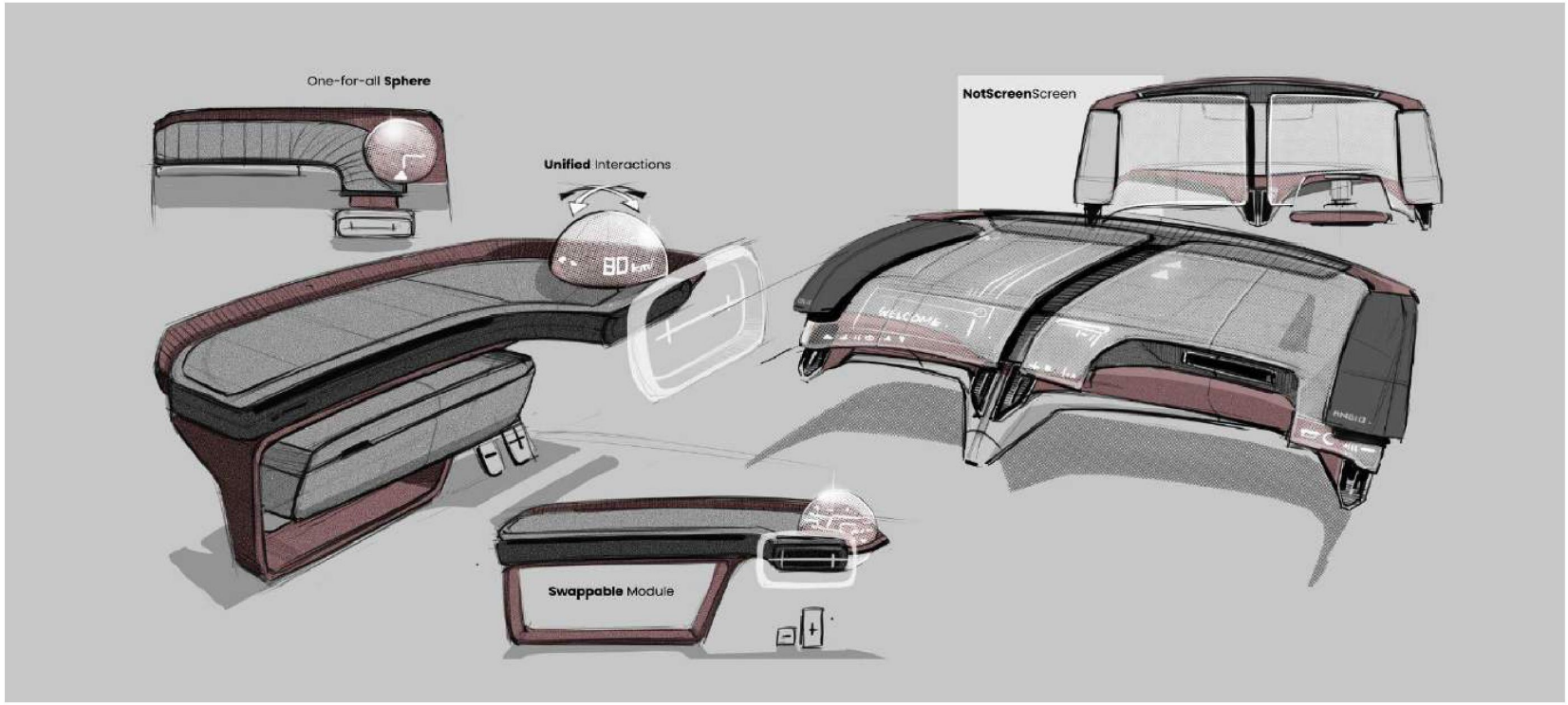

Fig. 12.3 Initial Concept sketches of interacting with the vehicle

Exploring the idea of adding modular components to the dashboard such as screens, storage, accessories as per user requirement This sketch is a continuation of the thought in Fig. 12.3, but integrates the theme of the inspiration board and the requirements of the user to an extent in terms of personalization and functionality. This concept paved the direction of future explorations, delving further into the concept of modularity and flexibility based on particular needs.

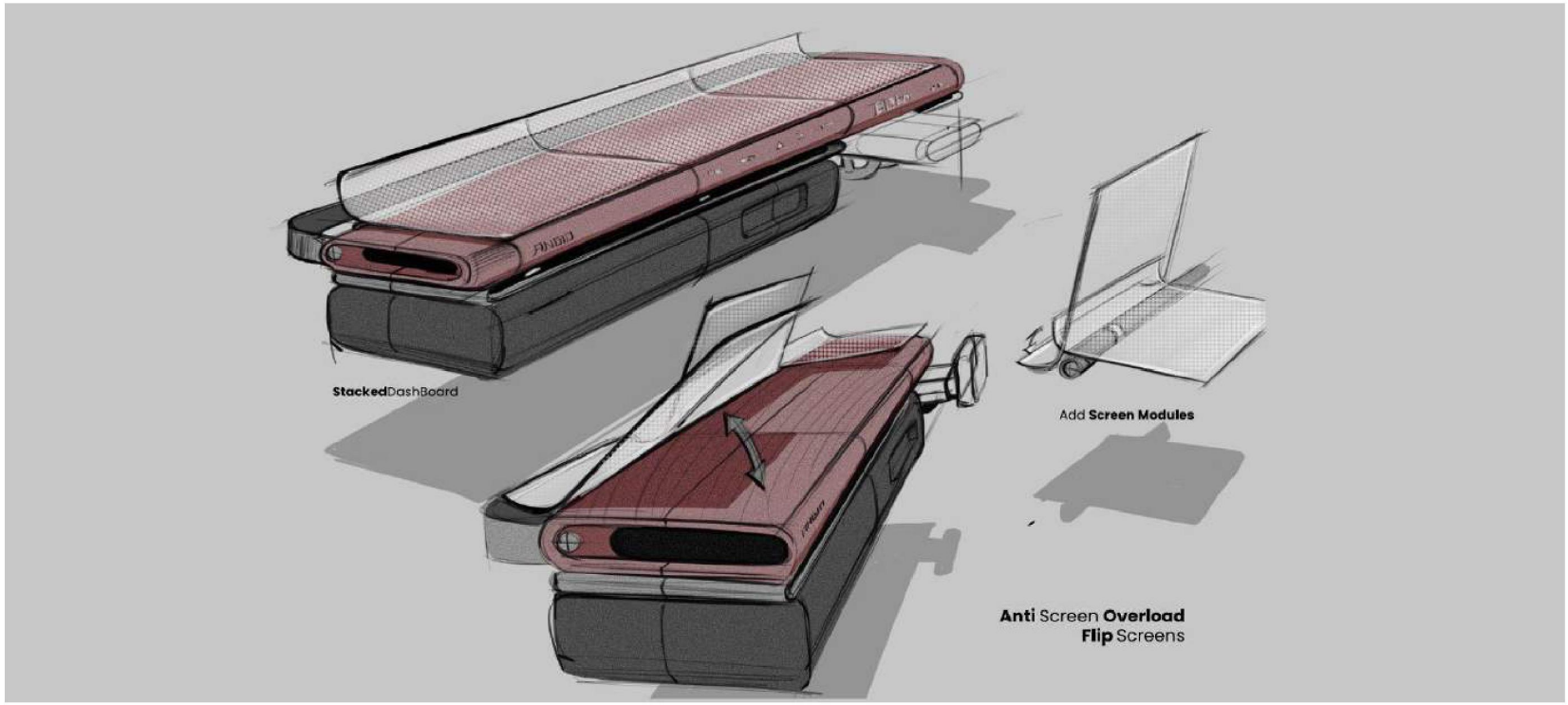

Fig. 12.4 Initial Concept sketches of interacting with the vehicle

13. Modular Platform Concept

Continuing on the idea of modularity briefly introduced in Fig.12.4, the concept is extended to the entire interior. A modular platform is developed for the interior where all the major components are easily swappable. All the elements are mounted onto a base frame. A user can choose the combinations of components that best suit their needs before subscribing to a particular vehicle thus enabling personalization..

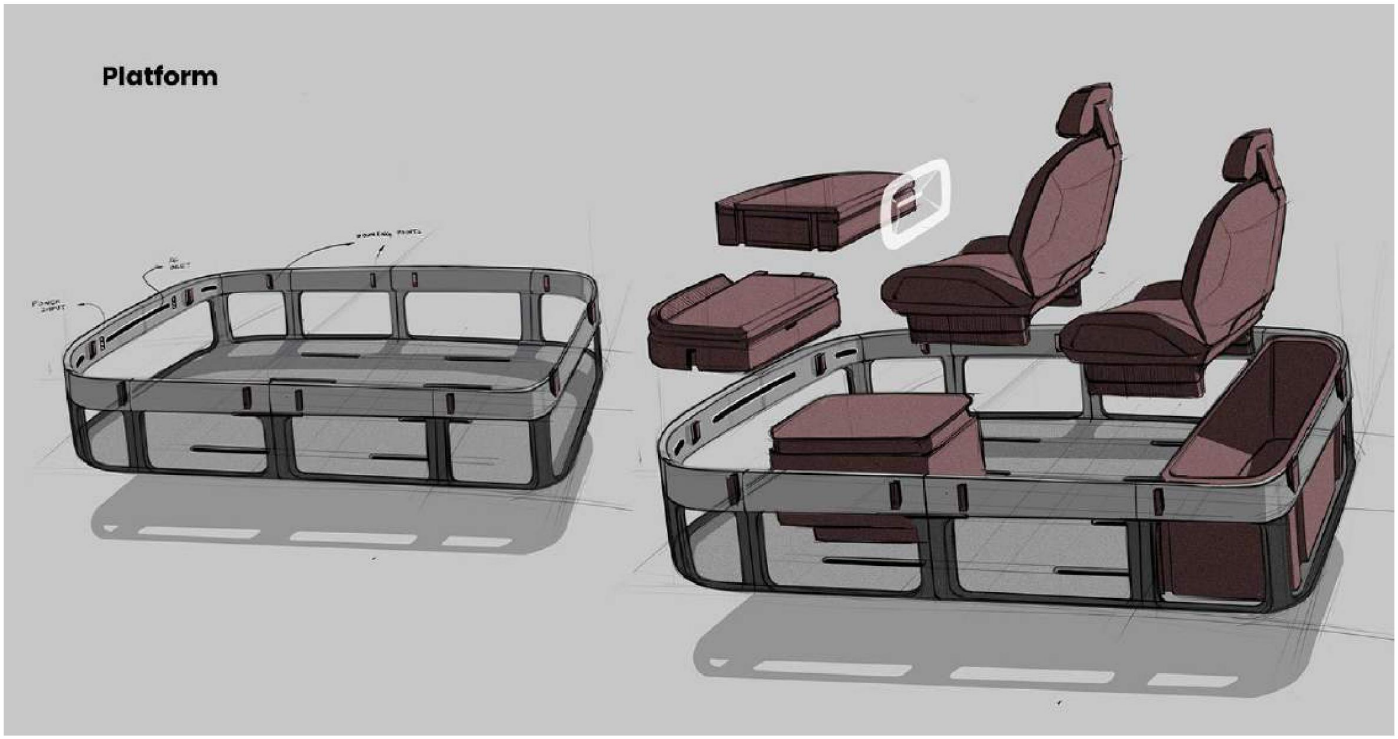

Fig. 13.1 Concept sketch of the modular platform for interior

14. Concept Exploration

With the modular platform in mind, and focussing on the requirements of the users, concepts were developed. This section illustrates a series of concepts largely categorized into 4 directions based on the seating location of the user in the car- namely Driver seat, passenger seat, rear seat, and central seating and one direction where the person is able to collaborate with others.

Driver Side

Exploring various concepts where the person is seated on the driver seat and the space around them enables them to work effectively.

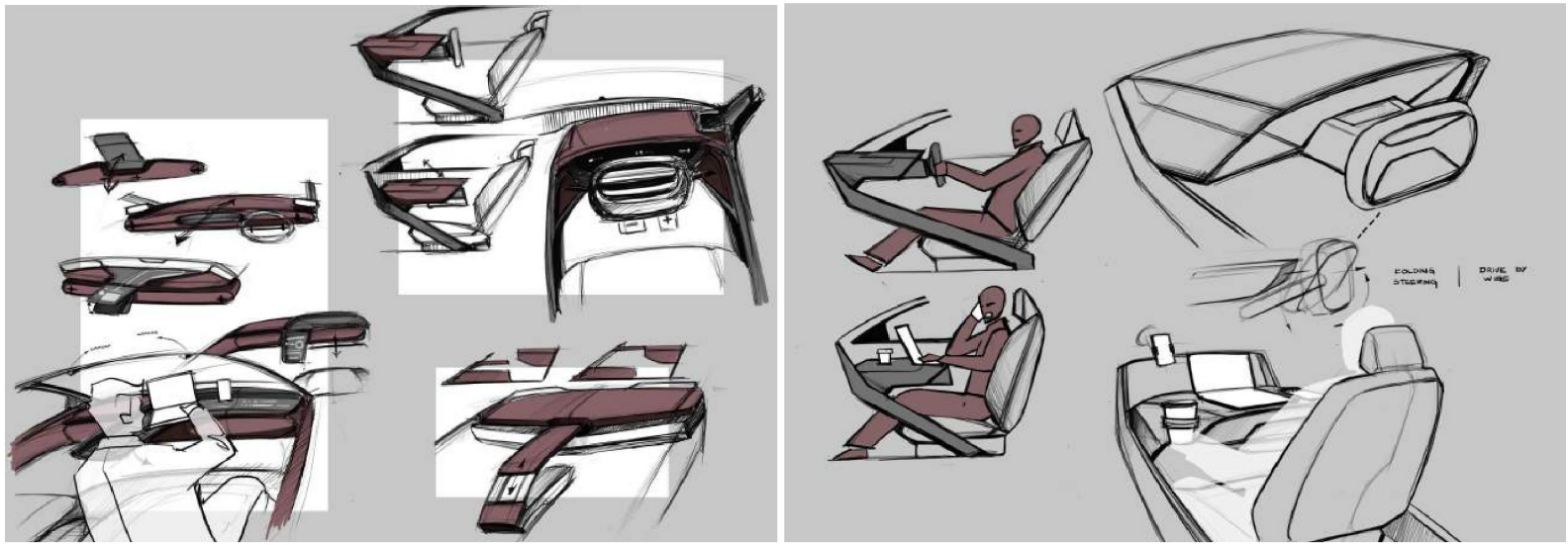

Fig. 14.1 Concept sketches : Set 1

Passenger Side

Exploring the idea of a wrap around table- like setup on the passenger side formed by the center console, dash and the door panels.

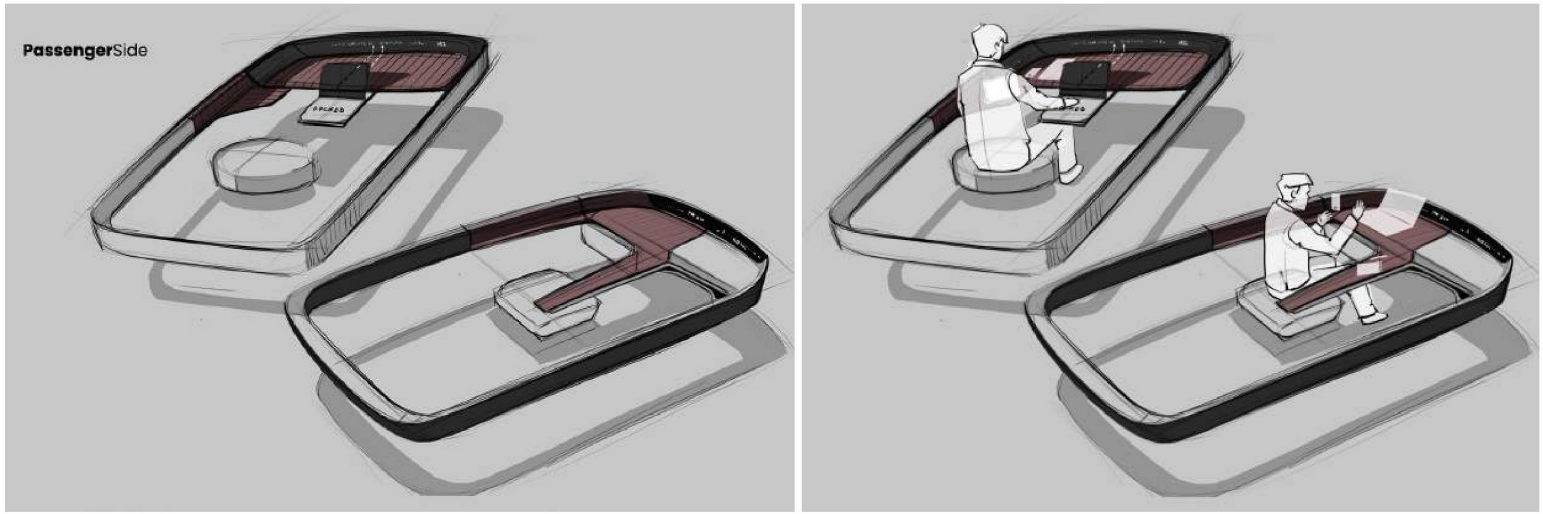

Fig. 14.2 Concept sketches : Set 2

Passenger Side

Exploring the idea of having an inclined table as an accessory which enables attachment of other accessories and provides a surface to work.

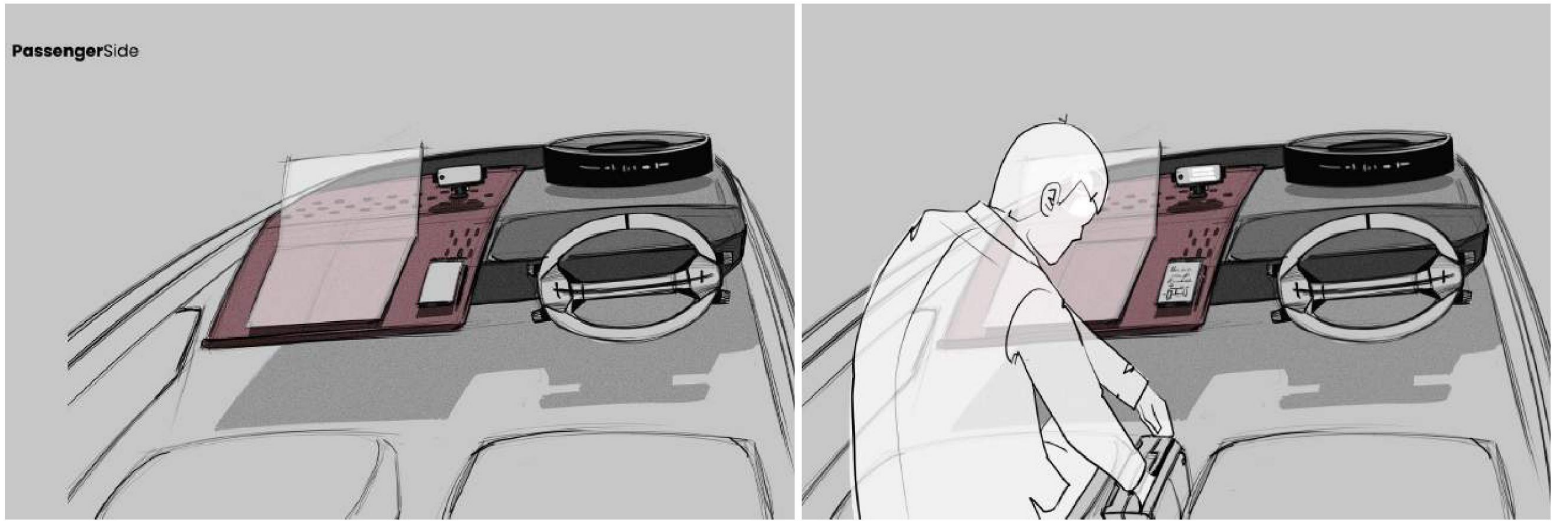

Fig. 14.3 Concept sketches : Set 3

Passenger Side

Exploring the concept of a collapsible table that attaches to the door panel inspired by train and aircraft tables.

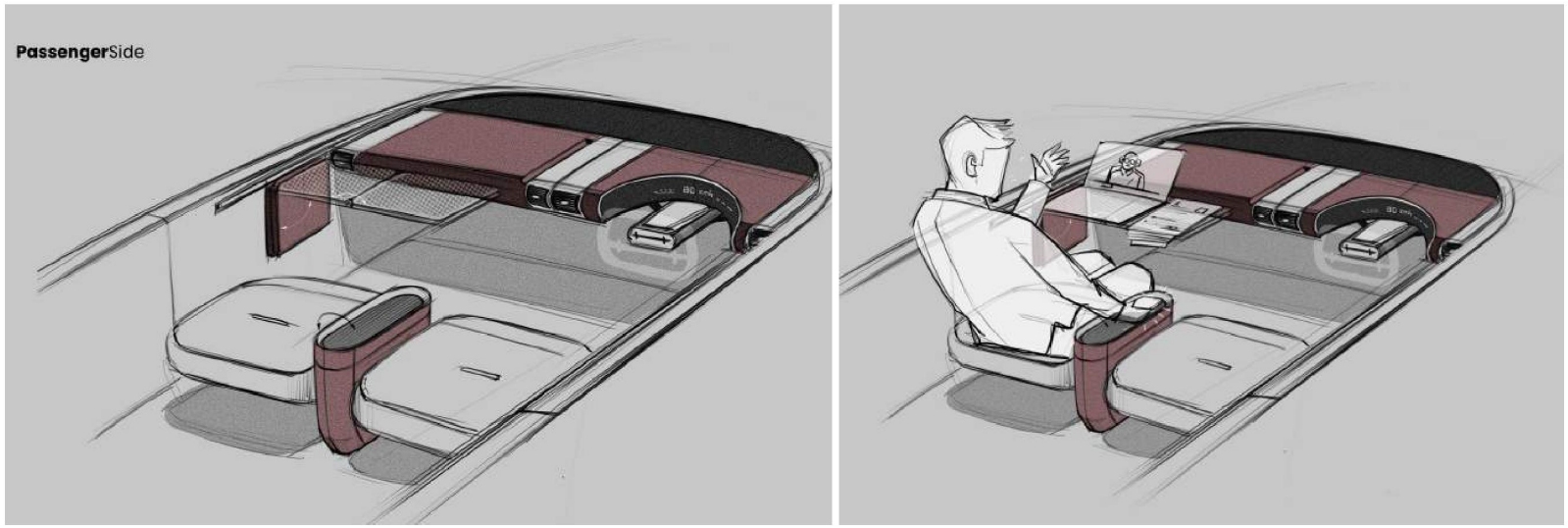

Fig. 14.4 Concept sketches : Set 4

Passenger Side

Exploring the idea of a foldable table surface that extends to the passenger seat with a storage space on the arm rest. It relates closely to the experience of sitting on a work desk.

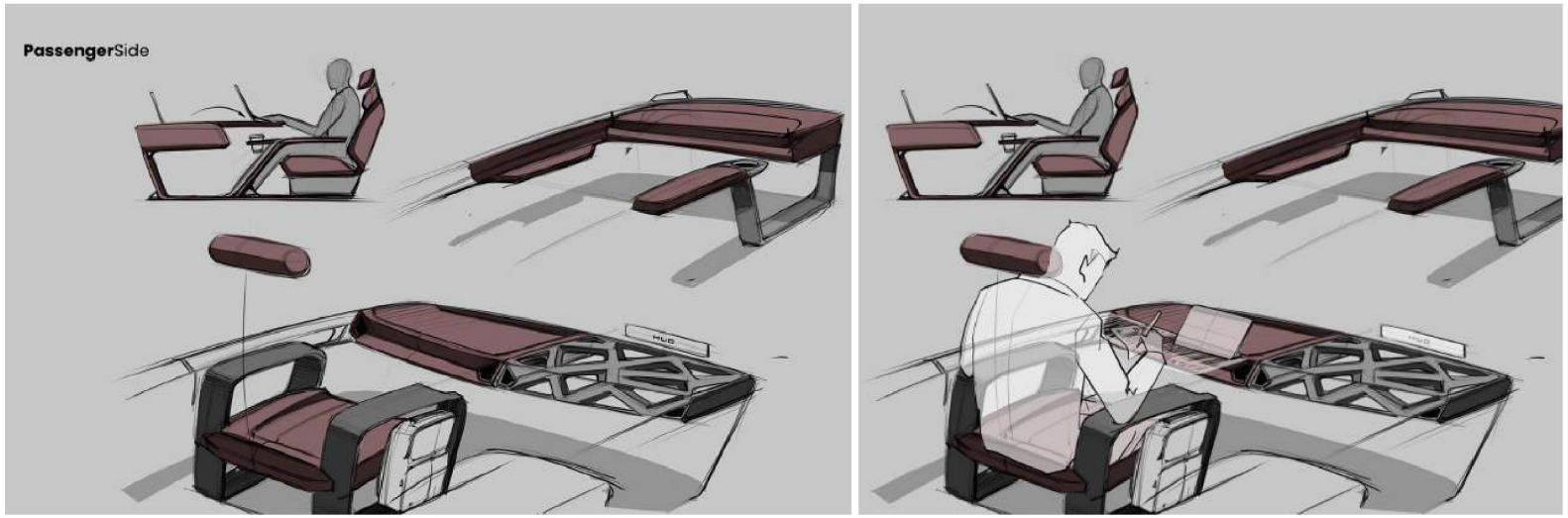

Fig. 14.5 Concept sketches : Set 5

Passenger Side

Exploring the idea of a swinging control unit paired with zero gravity seating and the windshield acting as a screen. The second concept explores the idea of a revolving seat with a table attached towards the rear seats.

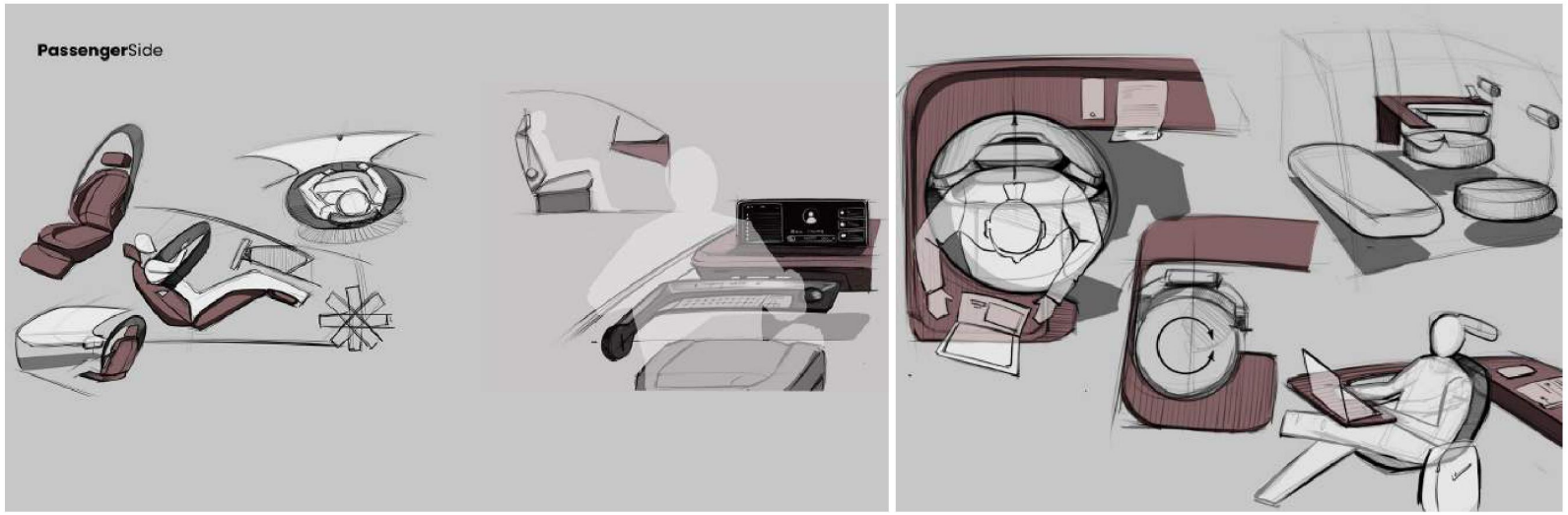

Fig. 14.6 Concept sketches : Set 6

Collaborative space

Exploring the idea of removing a passenger seat and replacing it with a desk unit with storage in concept 1. The second concept replaces half of the dashboard with a rear facing seat. These ideas allow for collaboration between two people in the vehicle.

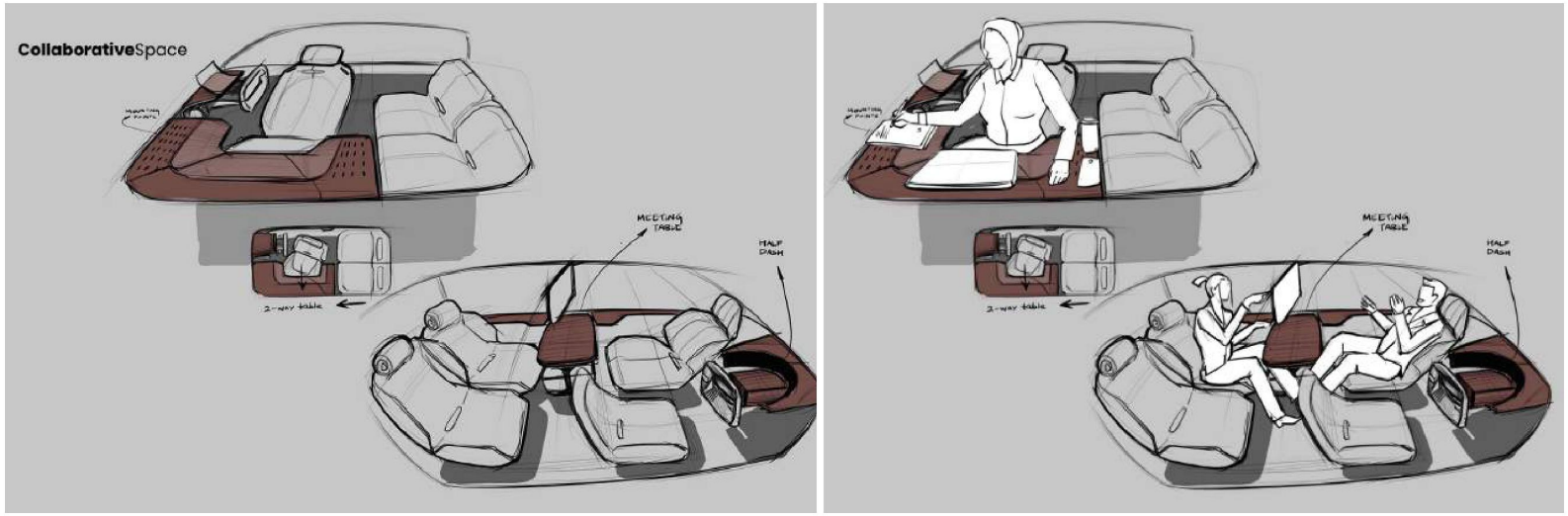

Fig. 14.7 Concept sketches : Set 7

Collaborative space

Exploring the idea of retractable tables from the back of the front seats. Users can sit in the rear seat and utilize the table surface after folding down the front seats.

Fig. 14.8 Concept sketches : Set 8

Rear Seats

The first concept explores the idea of a central folding table with a folding screen attached to the roof. The second concept demonstrates a uniquely shaped front seat that revolves to form a table top for the users seated on the rear seats.

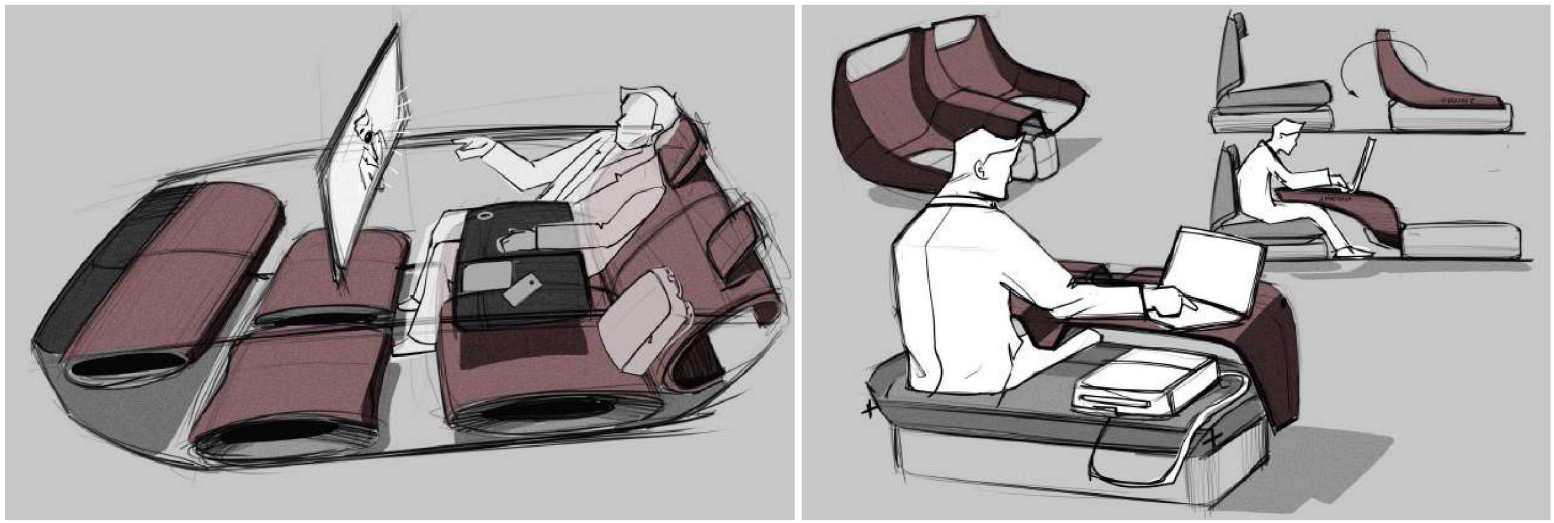

Fig. 14.9 Concept sketches : Set 9

Rear Seat

Exploring the idea of transformable front seats. The sections of the seats are used as table top surfaces. The movable dash concept explores the idea of a dashboard that can move back towards the rear seats after the front seats are folded.

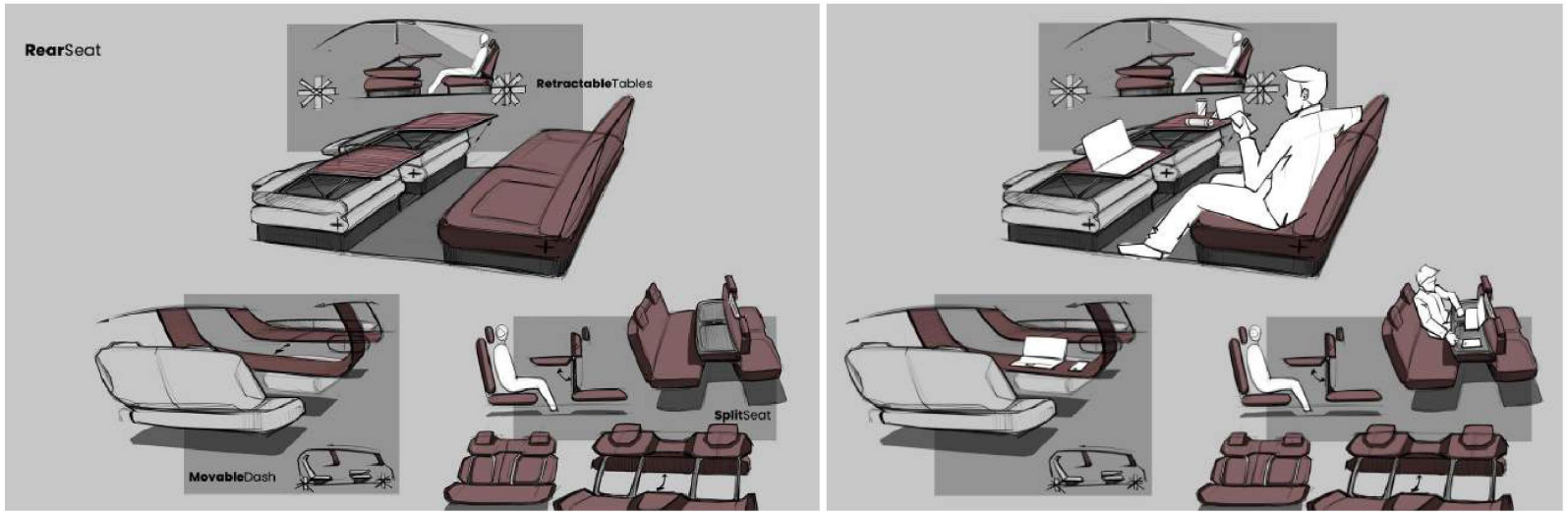

Fig. 14.10 Concept sketches : Set 10

Central Seating

This concept explores the idea of a bench seat in the front, the central section of which can slide back providing two smaller tabletops on either side. The roof mounted screen is the unified display for all professional work.

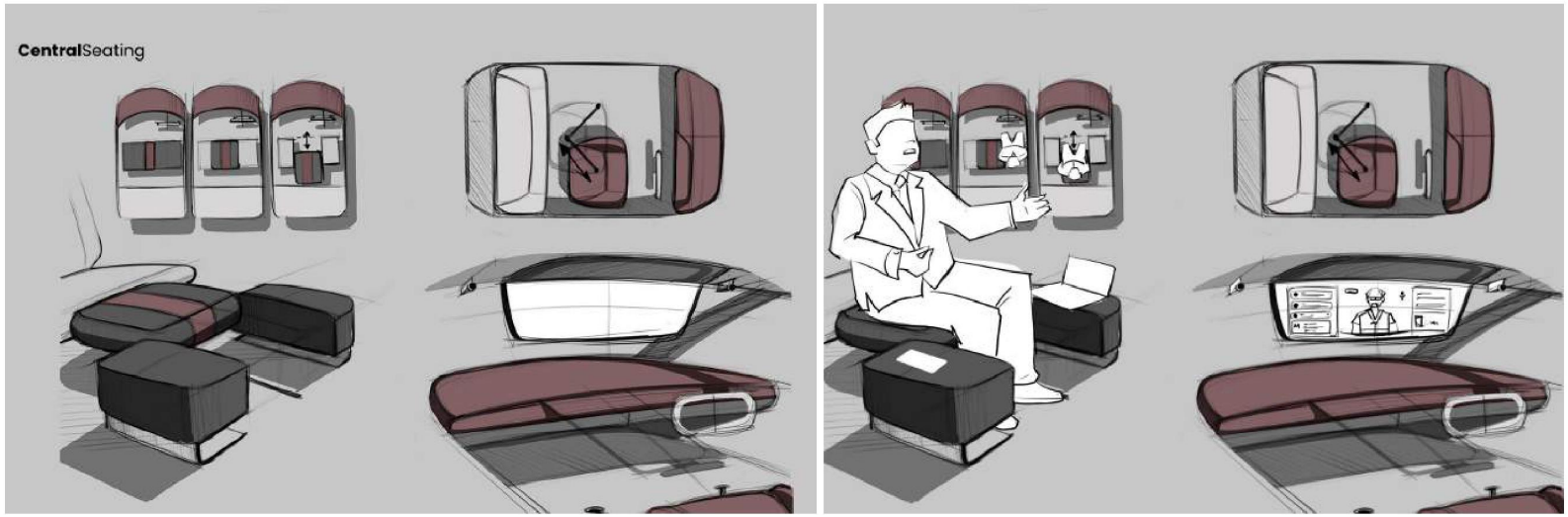

Fig. 14.11 Concept sketches : Set 11

15. Concept Comparison

All the concepts illustrated in section 14 demonstrate different ways to address the needs of a working professional from their car. To decide which concept suits the requirements of the user, the various different ideas were compared to each other. The comparison was done in terms of Usability, Manufacturing ease, Practicality, Ergonomics, Novelty, and Versatility. The following concepts fall short in some of these aspects (marked in the Fig.151) and are thus not taken forward into consideration for development although all of them provide unique benefits ideally..

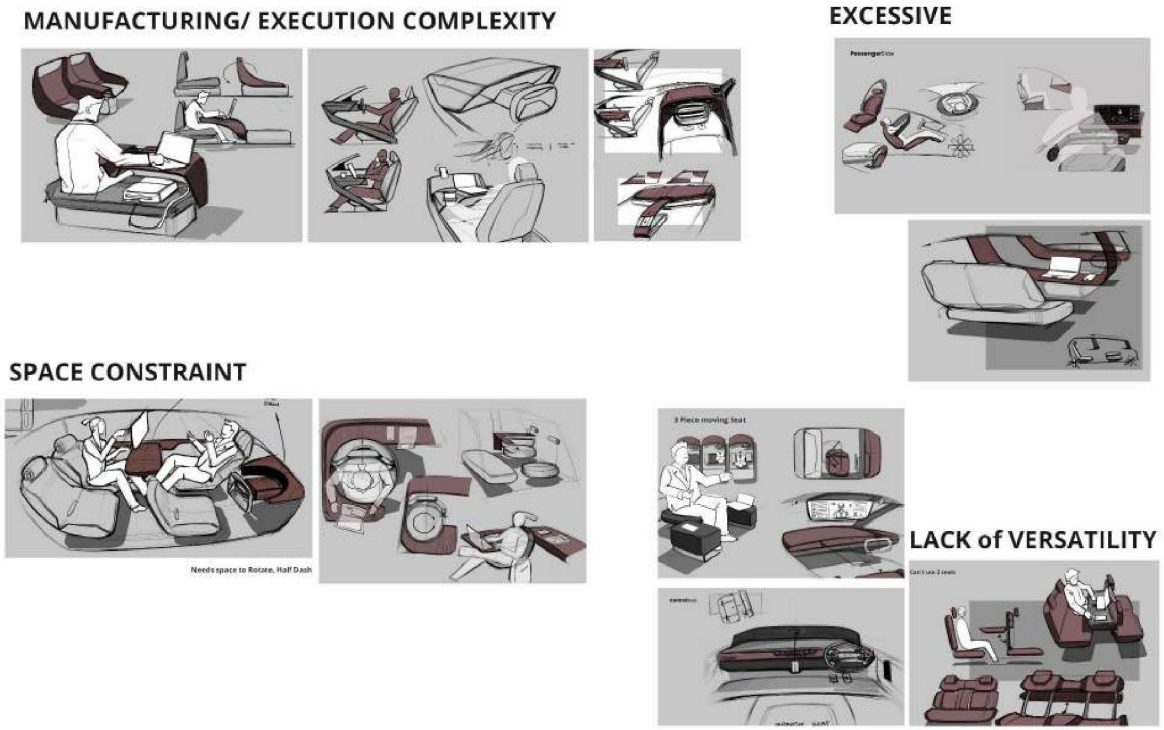

Fig. 15.1 Categorization of all interior concepts : Set 1

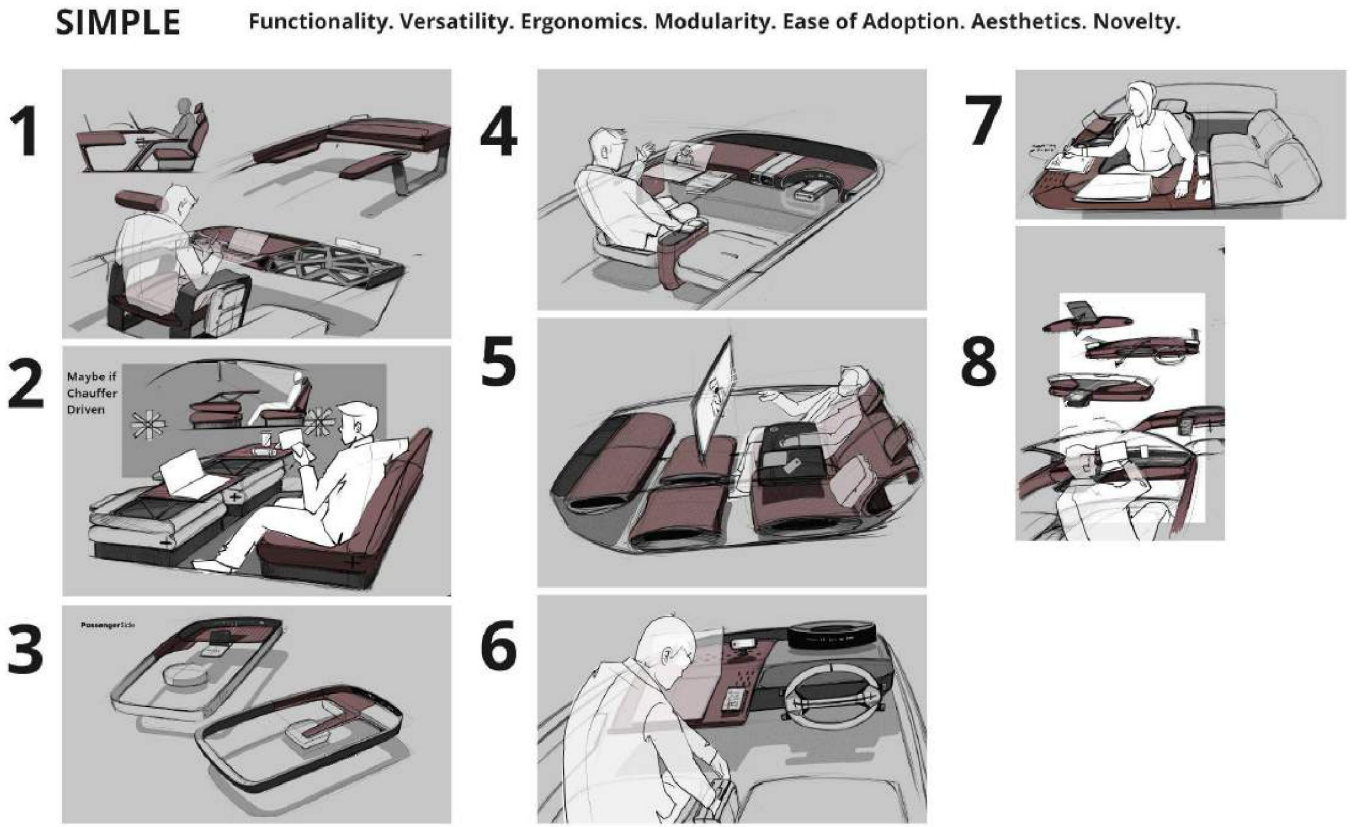

Fig. 15.2 Categorization of all interior concepts : Set 2

The above 8 concepts align closely with the intent set in the premise of the design , the theme from the inspiration board and most importantly the needs of the user in consideration. These ideas are taken forward for development.

16. Interior Concept Development

Derived from the previous section, the following concept utilizes the different elements from Fig. 15.2 and combines them in the most effective combination considering the use case and the user. The primary workstation idea is that of a foldable panel on the passenger side of the dashboard. The panel can be customized to act as a table, a mounting surface, or a screen enabled by the swappable nature of the design. In terms of design language, this option has flowing and connected styling elements which do not work best for modularity, due to the element of interconnectivity.

Fig. 16.1 Styling Direction 1 for interior

This concept has the same features as the concept in Fig. 15.2 but are more independent in the sense that they do not appear incomplete when isolated. Being modular the components need to be aesthetic when configured with other components and even independently. This style of blocks with soft edges is taken forward for further development.

Fig. 16.2 Styling Direction 2 for interior

Demonstration of usage scenarios for the chosen concept of interiors. The folding panel has multiple options in terms of material and also function. It can be a perforated panel that can act as mounts for accessories , be a screen, a wireless charging station, or a simple table top. These options are demonstrated in the digital renders section later in the report.

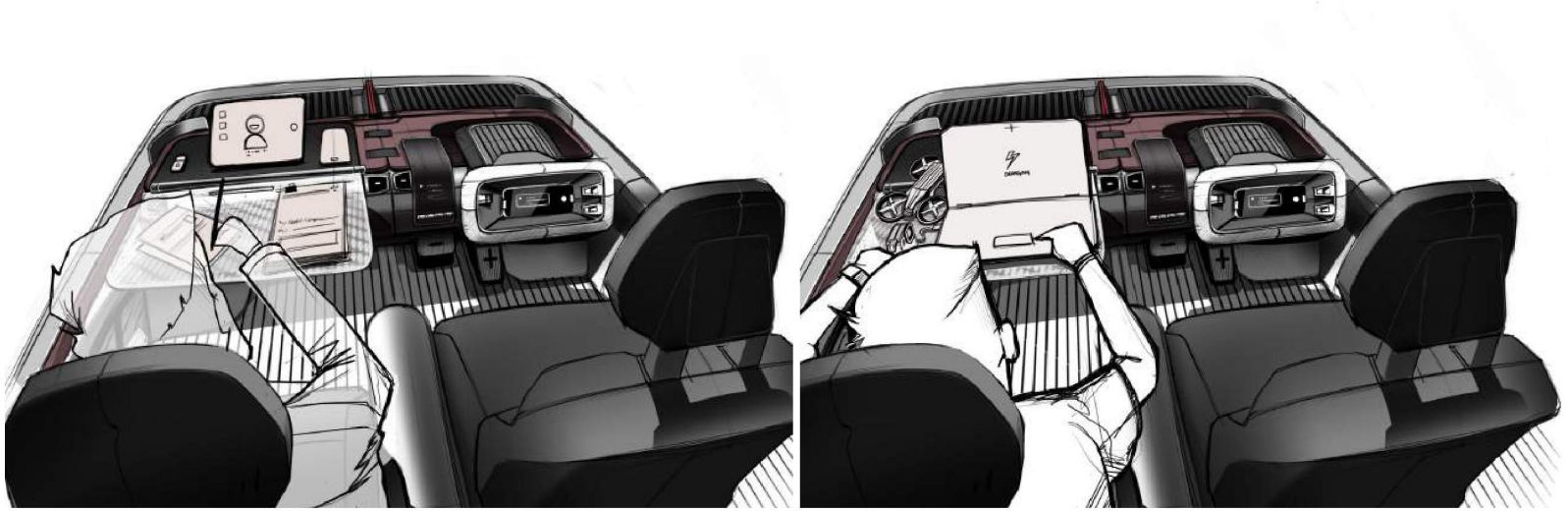

Fig. 16.3 Sketches showing user in Styling Direction 1

17. Interior Concept Form Exploration

Variations of the concept developed in Fig.16.3 are explored in this section. The attempt was to evoke a sense of harmony among the various components in the interior even if they are independently swappable.

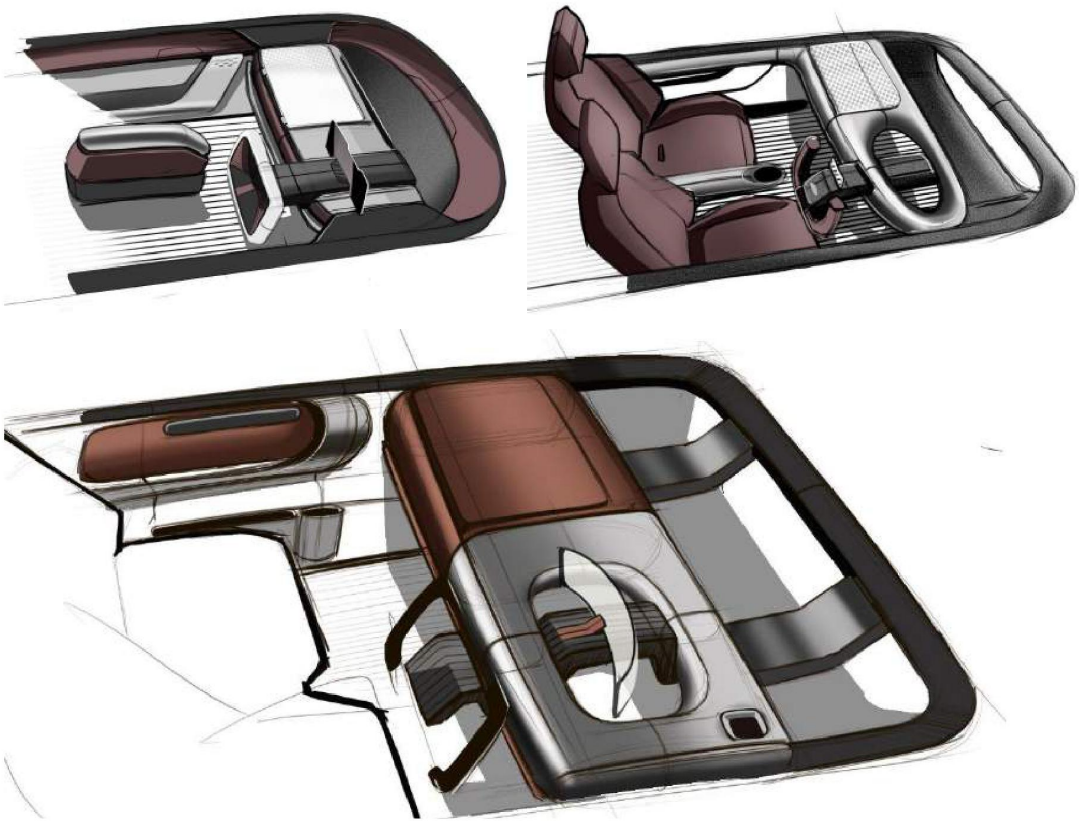

Fig. 17.1 Development sketches of Styling Direction 2

18. Work Scenarios

With the basic form determined in section 17, the working scenarios for the user are generated to demonstrate the use cases in the current setup.

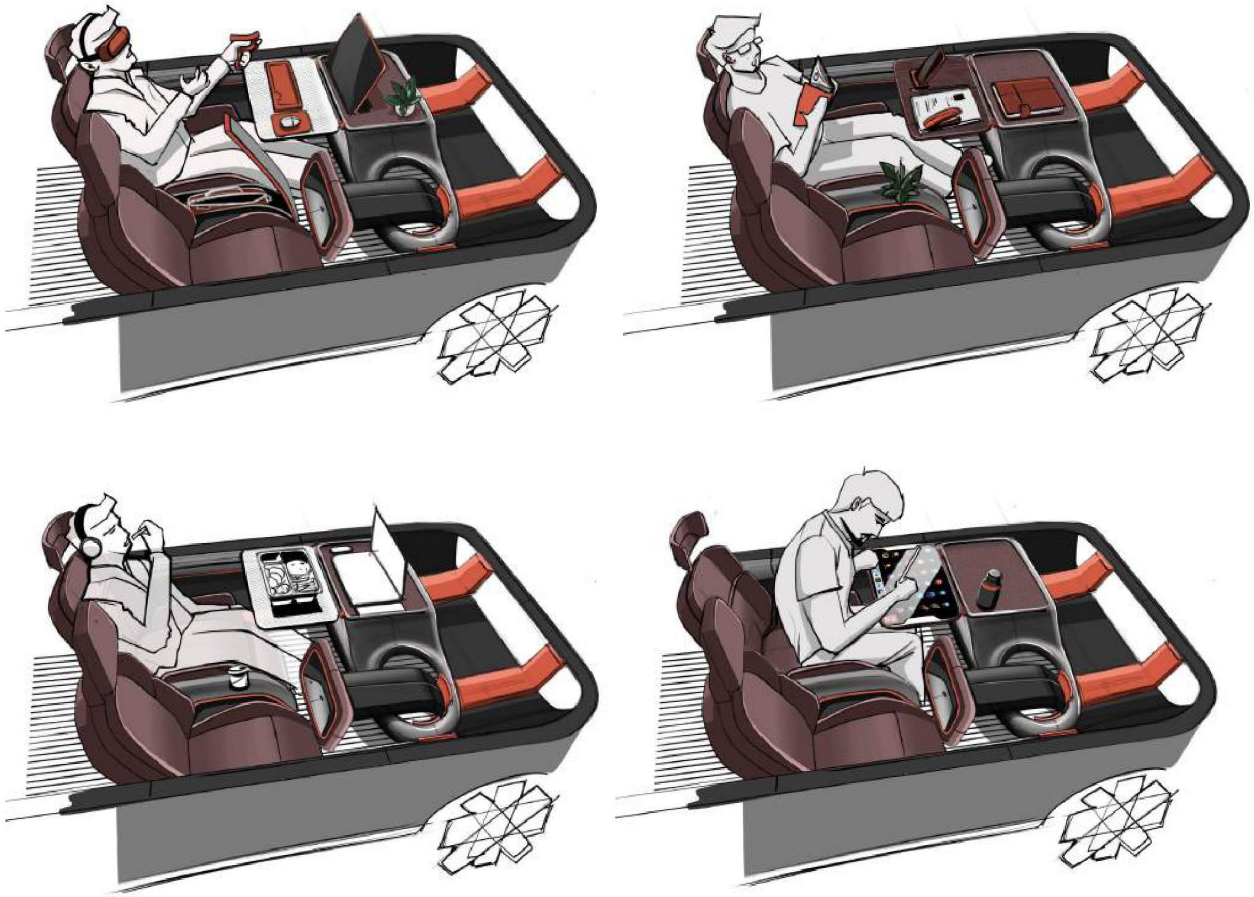

Fig. 18.1 Different work scenarios in the designed interior

19. Theme Board

After fixing the design direction and the layout of the interior in section 17, the exterior of the vehicle was to be developed and thus a theme board was created to inspire the styling for the same. The vehicle should connect the idea of flexibility and personalization in the interior to the exterior while invoking a sense of freshness, style and simplicity.

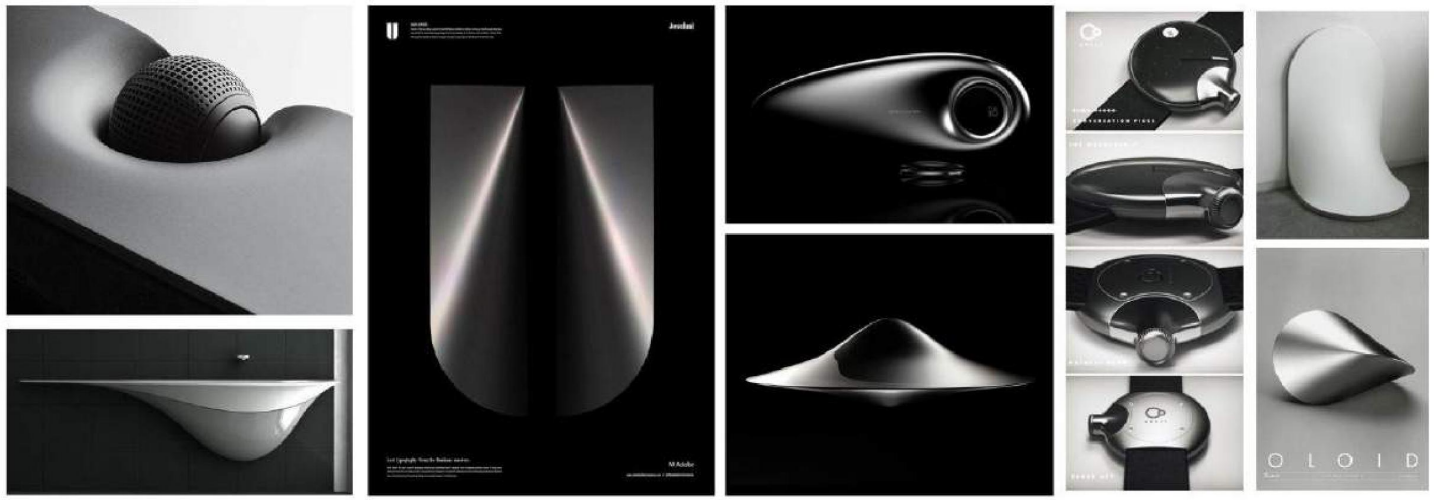

Fig. 19.1 Theme Board for Exterior Design

20. Form Exploration

Inspired by the Theme board in section 19, forms were generated in this section attempting to embrace the set intent.

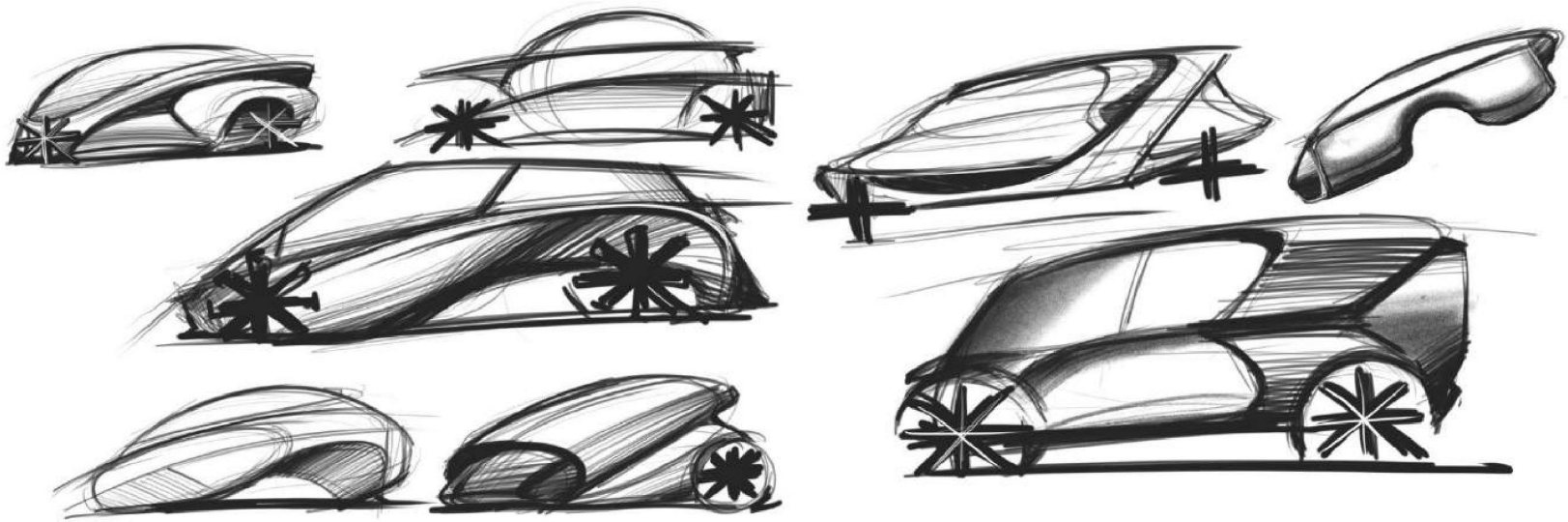

Fig. 20.1 Form Exploration Set 1

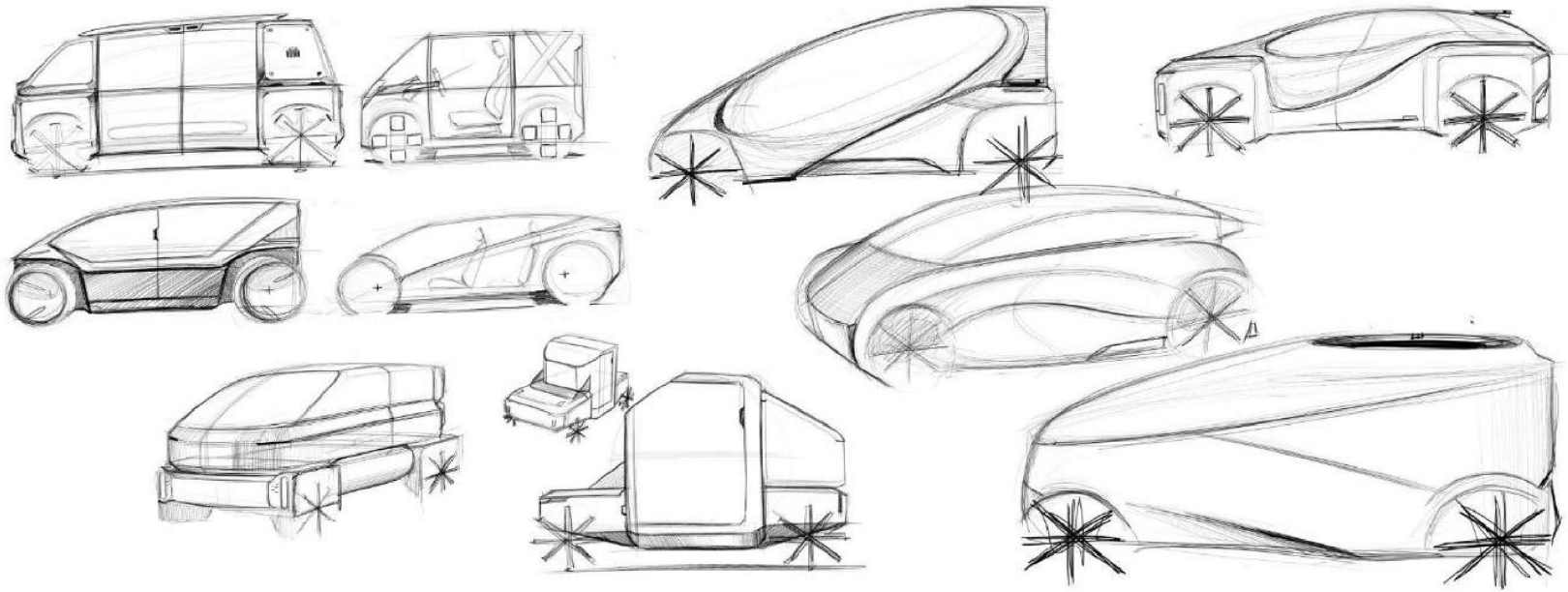

Fig. 20.2 Form Exploration Set 2

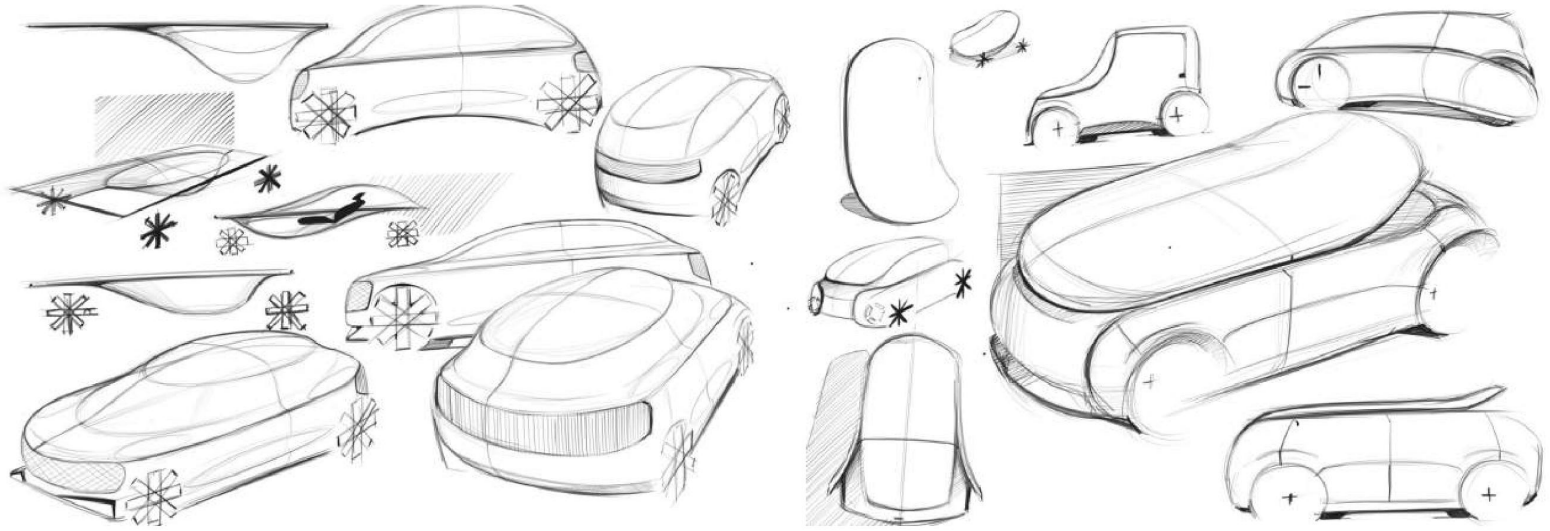

Fig. 20.3 Form Exploration Set 3

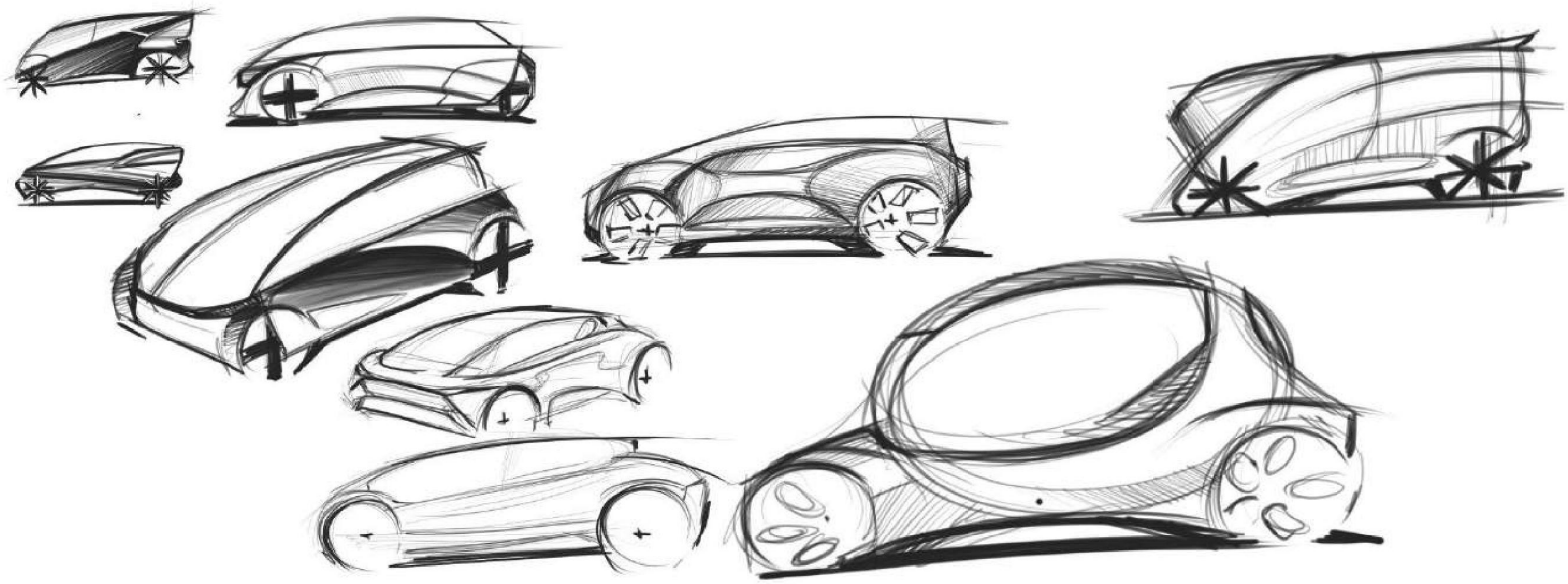

Fig. 20.4 Form Exploration Set 4

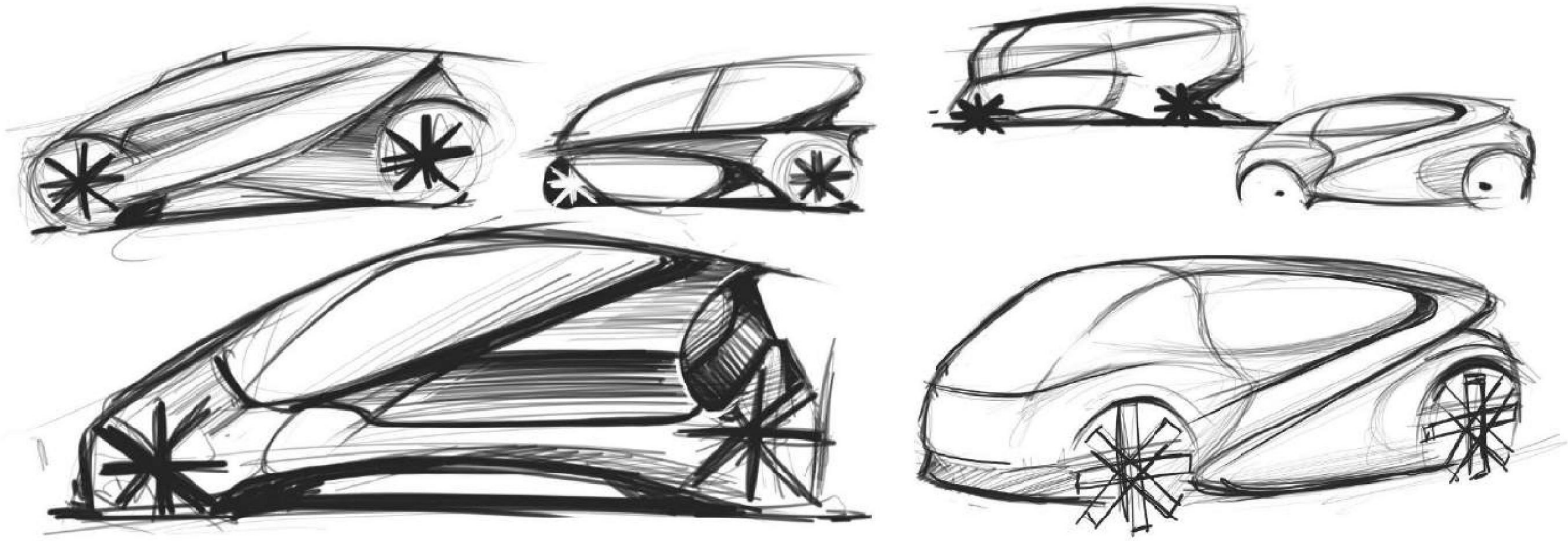

Fig. 20.5 Form Exploration Set 5

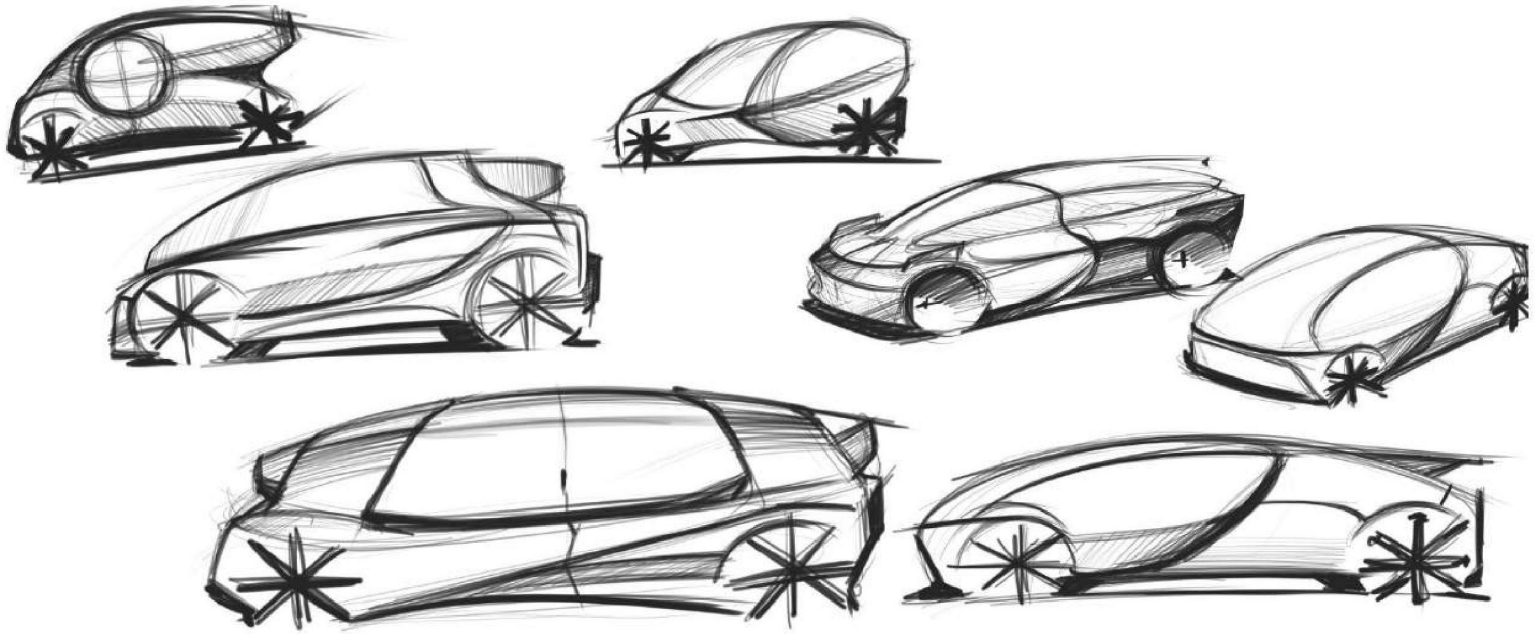

Fig. 20.6 Form Exploration Set 6

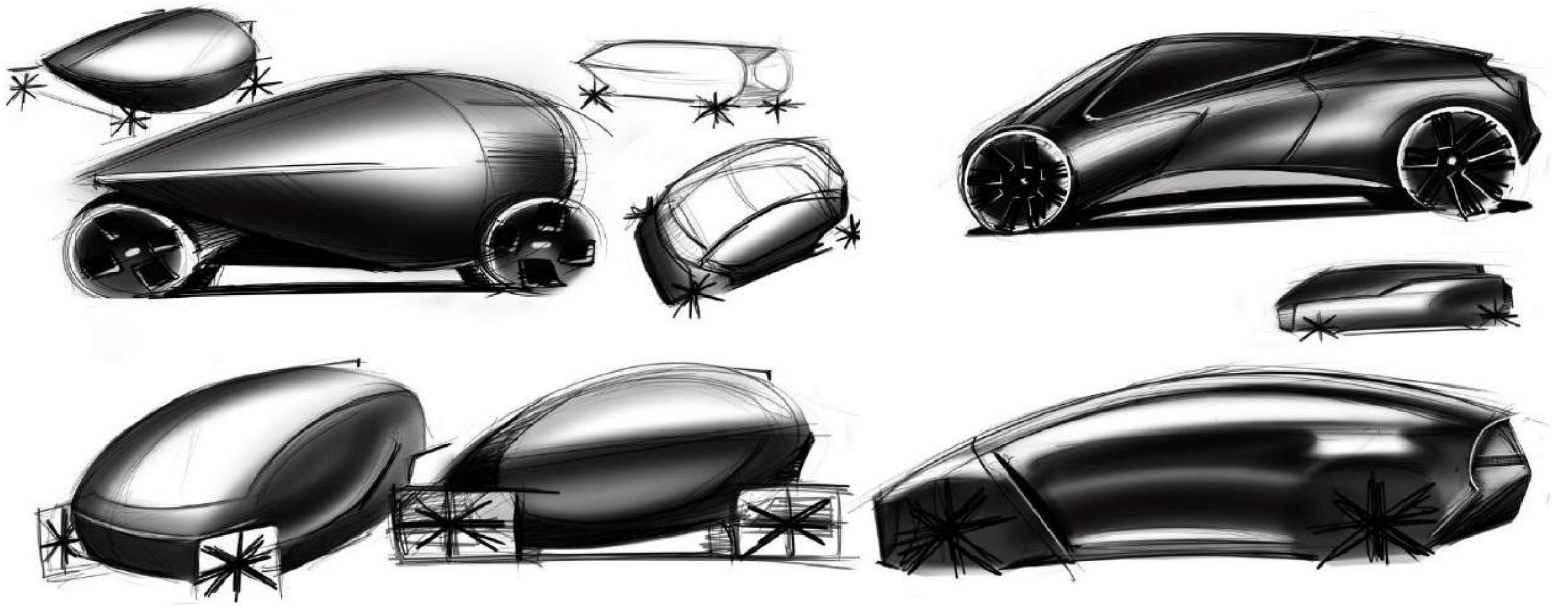

Fig. 20.7 Form Exploration Set 7

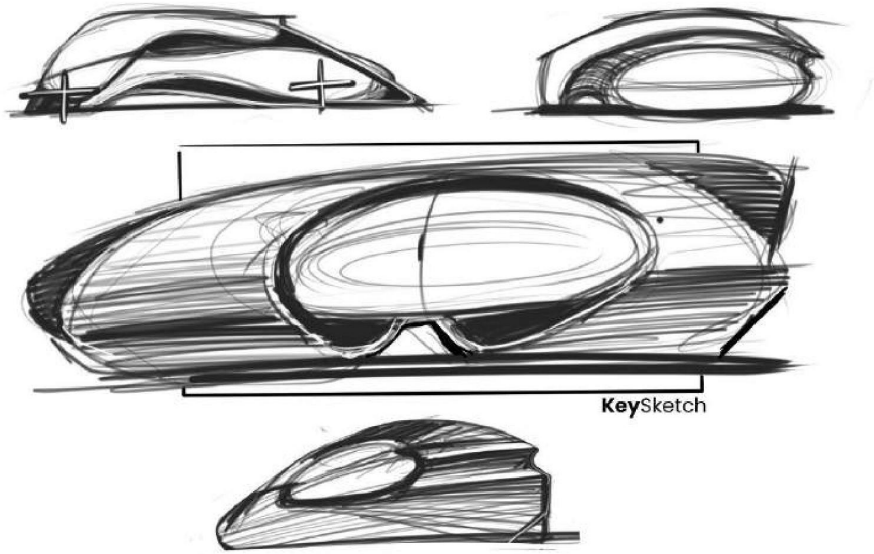

Fig. 20.8 Form Exploration Set 8 with Key Sketch

21. Form Development

The key sketch from section 20 is developed from various perspectives and styles in an attempt to create an interesting vision form for the vehicle. The chosen direction and development is based on the styling cues from the theme board in section 19, and the proportions of the vehicle set in section 9.

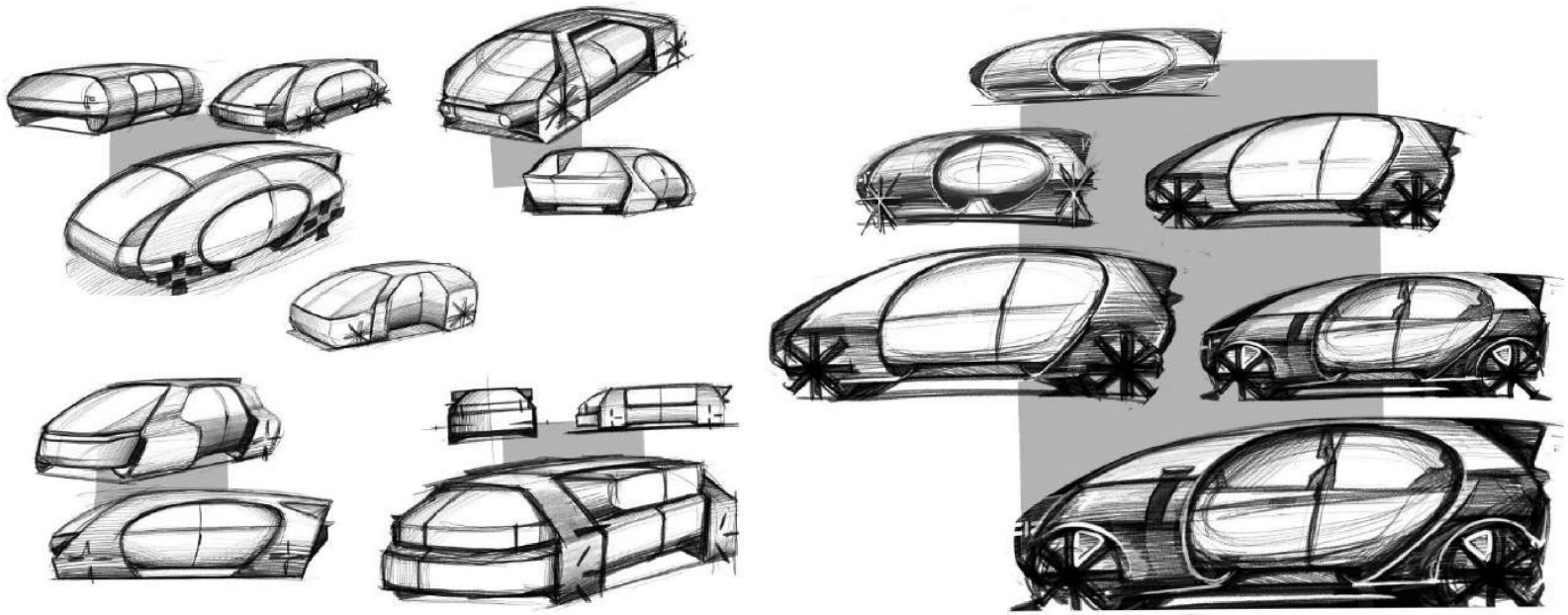

Fig. 21.1 Form Development from Key Sketch

22. Final Key Sketch

The side profile of the key sketch in Fig.21.1 is developed in perspective to guide the process of development of the exterior in 3D. The three-quarter sketches carry the intent of the key sketch and the form cues from the theme board with geometric sections of interest nested within strong curves.

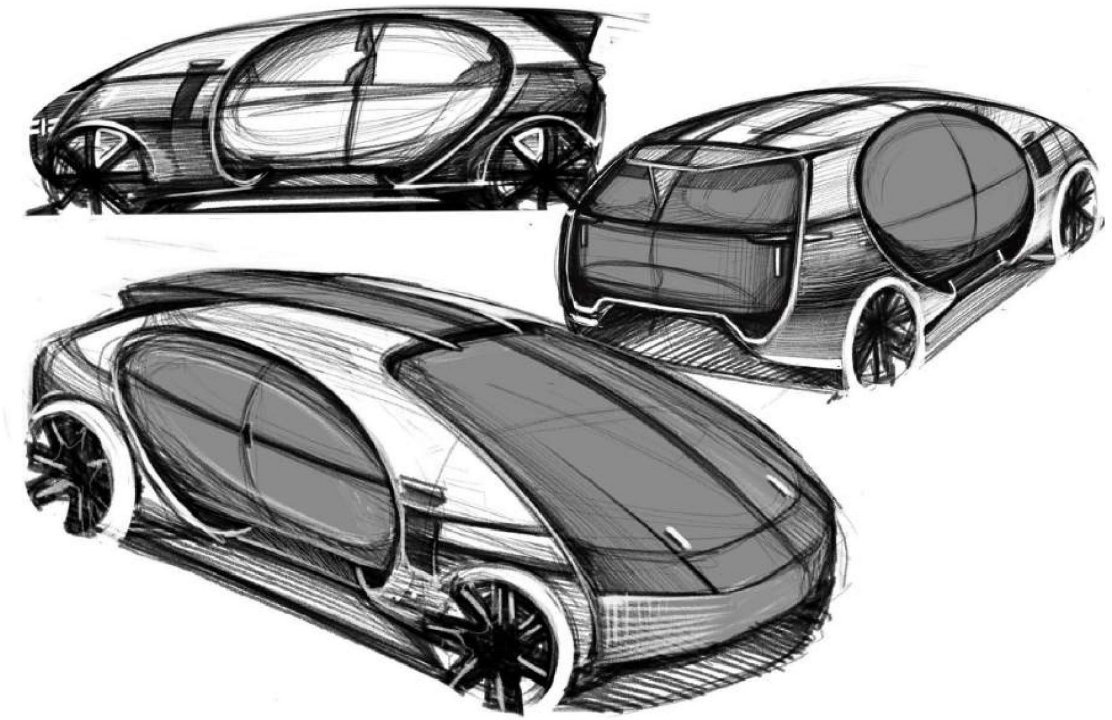

Fig. 22.1 Final Exterior Form Sketch

23. 3D Model

With the sketches finalized for both interior and exterior, 3D models of the same were developed based on the technical package and ergonomics. The Design is resolved considering these aspects and incorporating the styling language from the final sketches. The model is created in Blender.

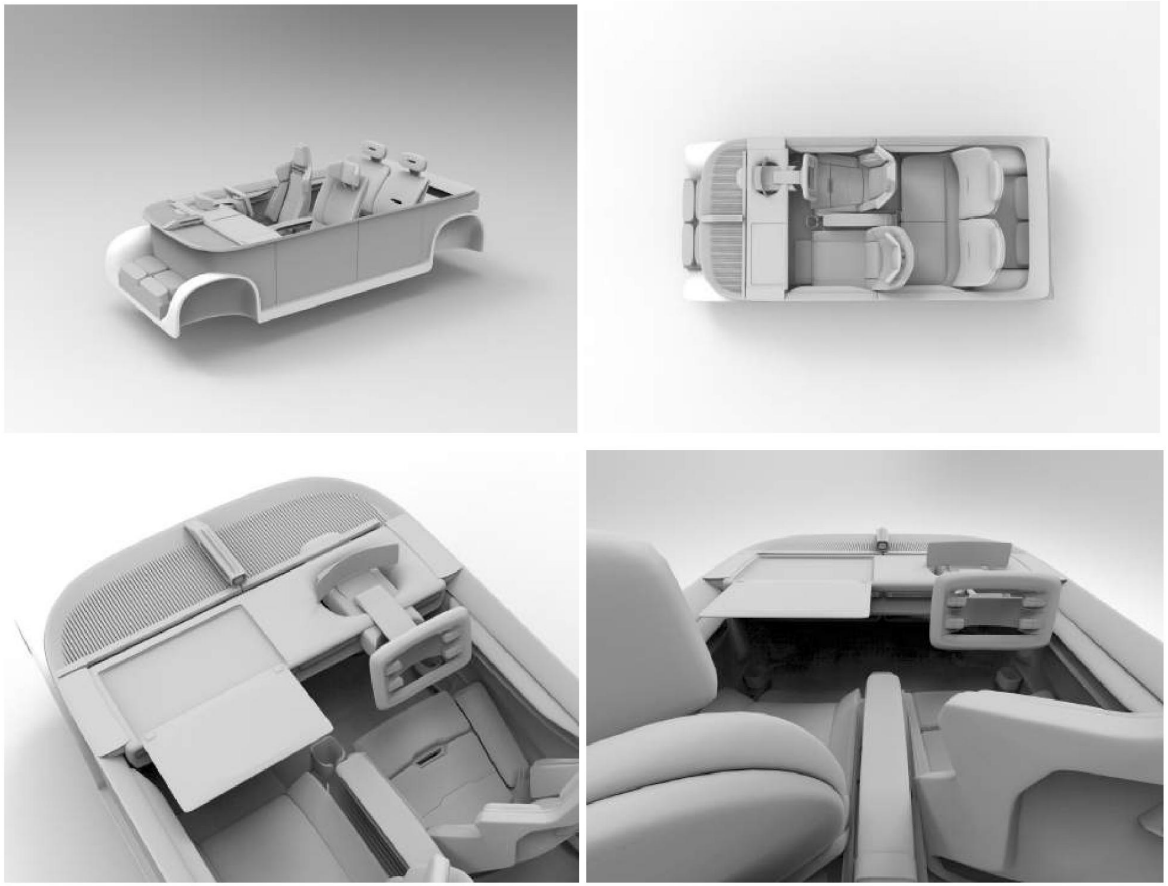

Fig. 23.1 3D Model of Interior

The exterior is modeled as close as possible to the final sketch while adhering to the technical parameters and package.

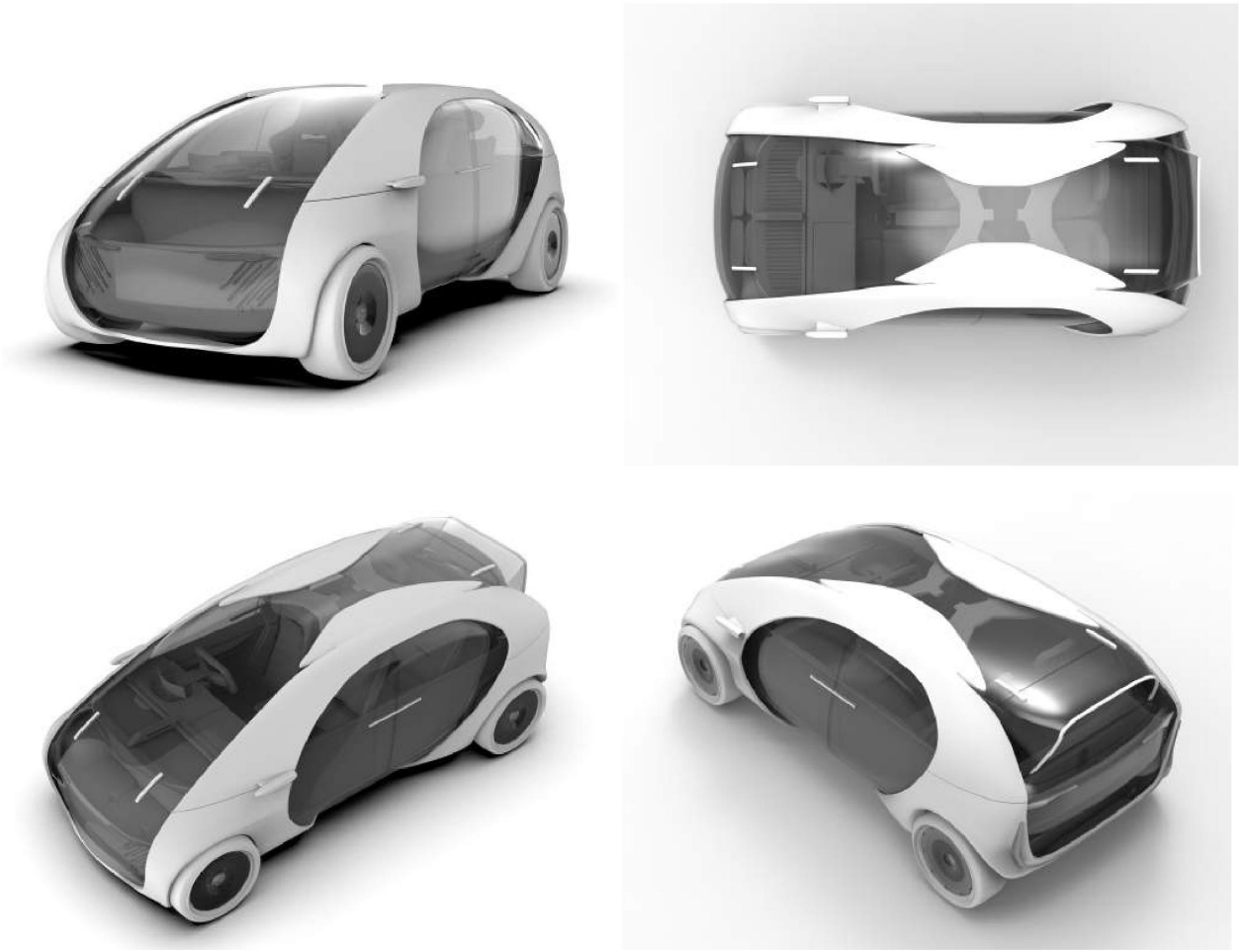

Fig. 23.2 3D Model of Exterior

24. The Final Concept

The following section contains renders showing the model and various aspects of it.. The renders were made on Luxion Keyshot.

24.1 Interior Variants

The key concept of having a reconfigurable interior is demonstrated here. Certain options are rendered to showcase some of the possibilities that the platform provides. The focus is largely on the seating and storage arrangements, but also extends to dashboards and center consoles, not represented in the following set of renders.

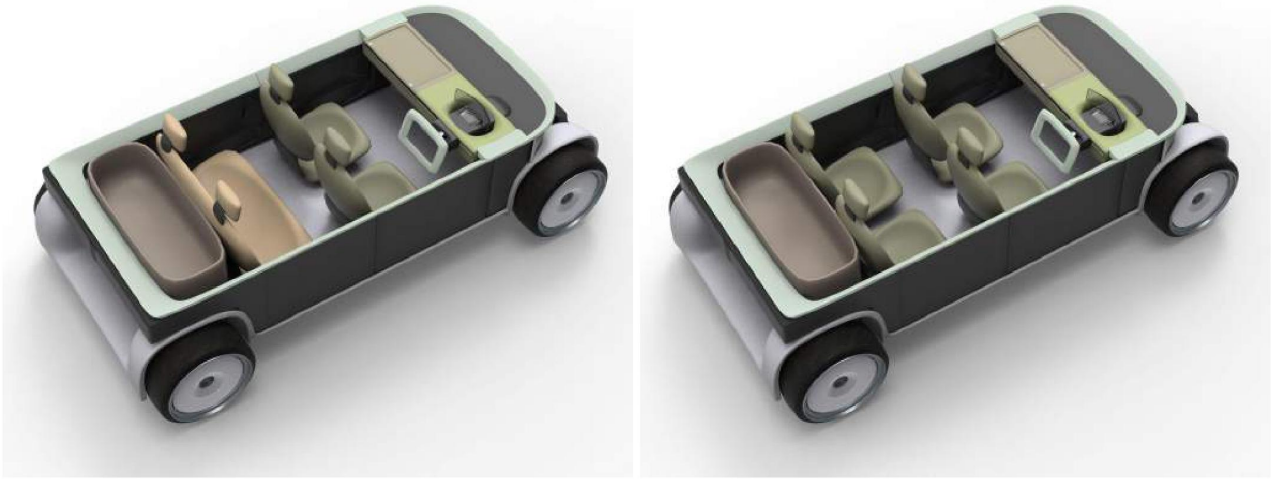

Fig. 24.1 Variants Set 1

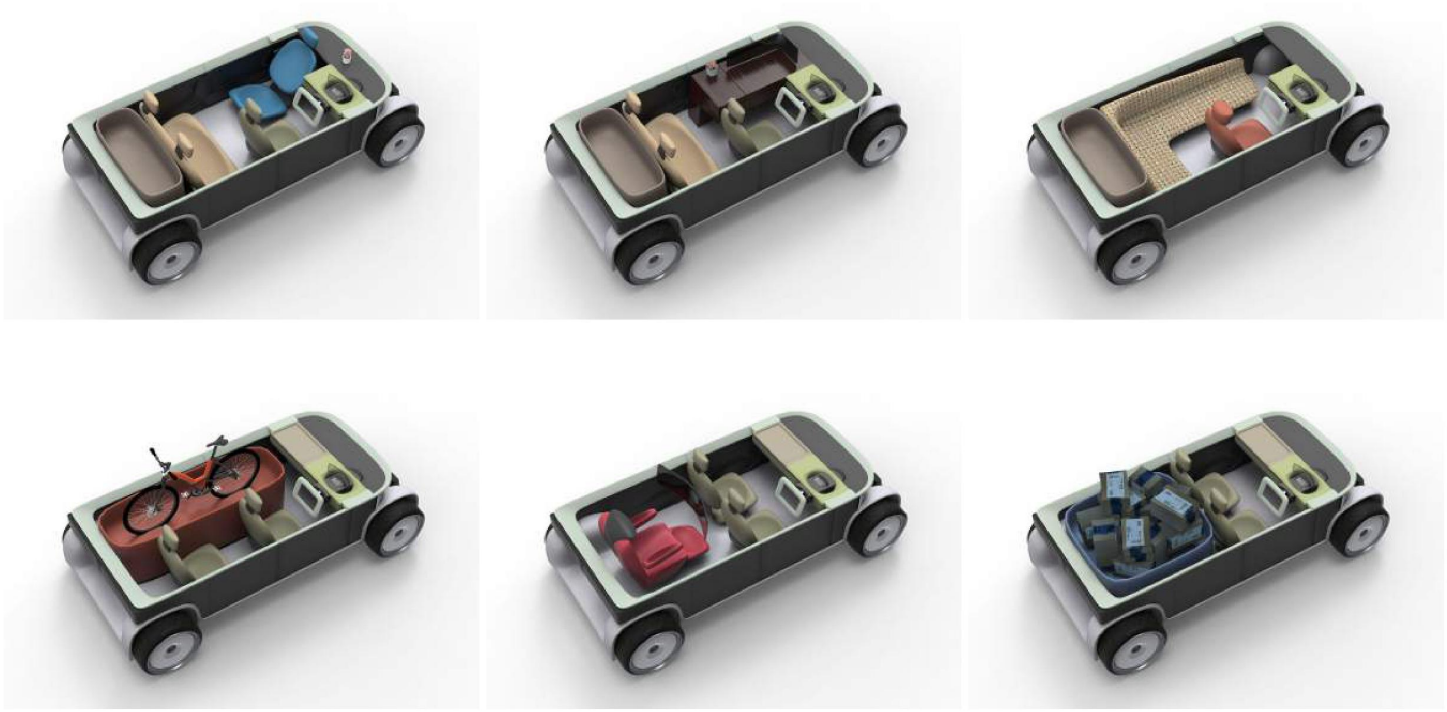

Fig. 24.2 Variants Set 2

24.2 Interior Layout: Work-From-Car Setup

The following image shows the rendered interior layout for the work-from-car setup for the user persona. This layout showcases 3 sets of seats, a bucket seat for engaging driving experience, a comfortable work chair on the passenger side with adjustable supports, and a set of simple split rear seats. The Steering Wheel houses most of the controls for the vehicle and has one infotainment screen integrated in it. There is an HUD for the instrument cluster over the steering column. The center console has wireless charging, a multipurpose holder and storage space for bags and Personal equipment. Both the dash splits have under storage integrated into them. There is a two-way camera mounted in the front for facial recognition, conference calls, face tracking, and dash recordings. The work-table section is explained in detail in the later sections.

Fig. 24.3 Interior Render showing overall layout of components for a Work-from-Car Setup

Fig. 24.4 Interior Render view from the back seats

The following renders demonstrate the key concept of work-station where a customizable panel on the passenger side dash extends out to provide a working surface. This panel can be customized to the kind of work the person mostly does from their vehicle. The Seat enables various different positions to enable comfortable and effective working postures for various different kinds of works.

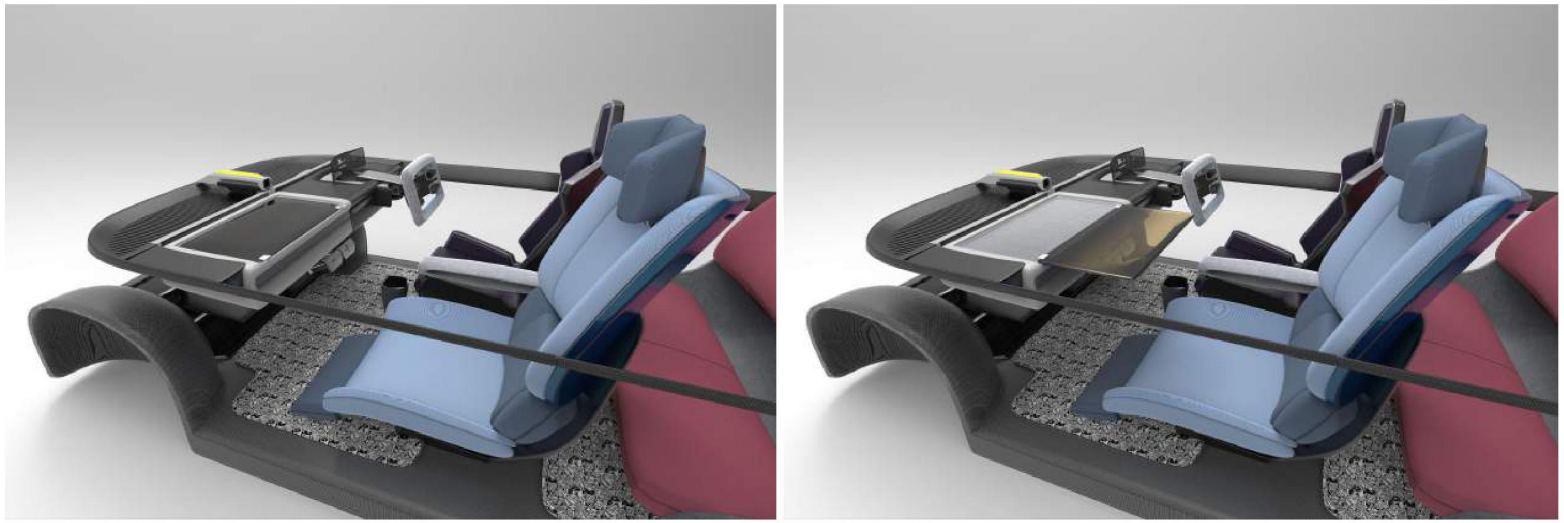

Fig. 24.5 Interior Renders showing Dashboard configuration 1, with folded table and DashBoard configuration 2, with worktable open

24.3 Work Scenarios for User

The following renders show a variation of conventional work scenarios where the user uses a computing device, or stationary for their work. The foldable panel here acts as a table top.

Fig. 24.6 Interior Render showing Dashboard configuration 2 with work setup 1 : With an external computing device, and associated accessories

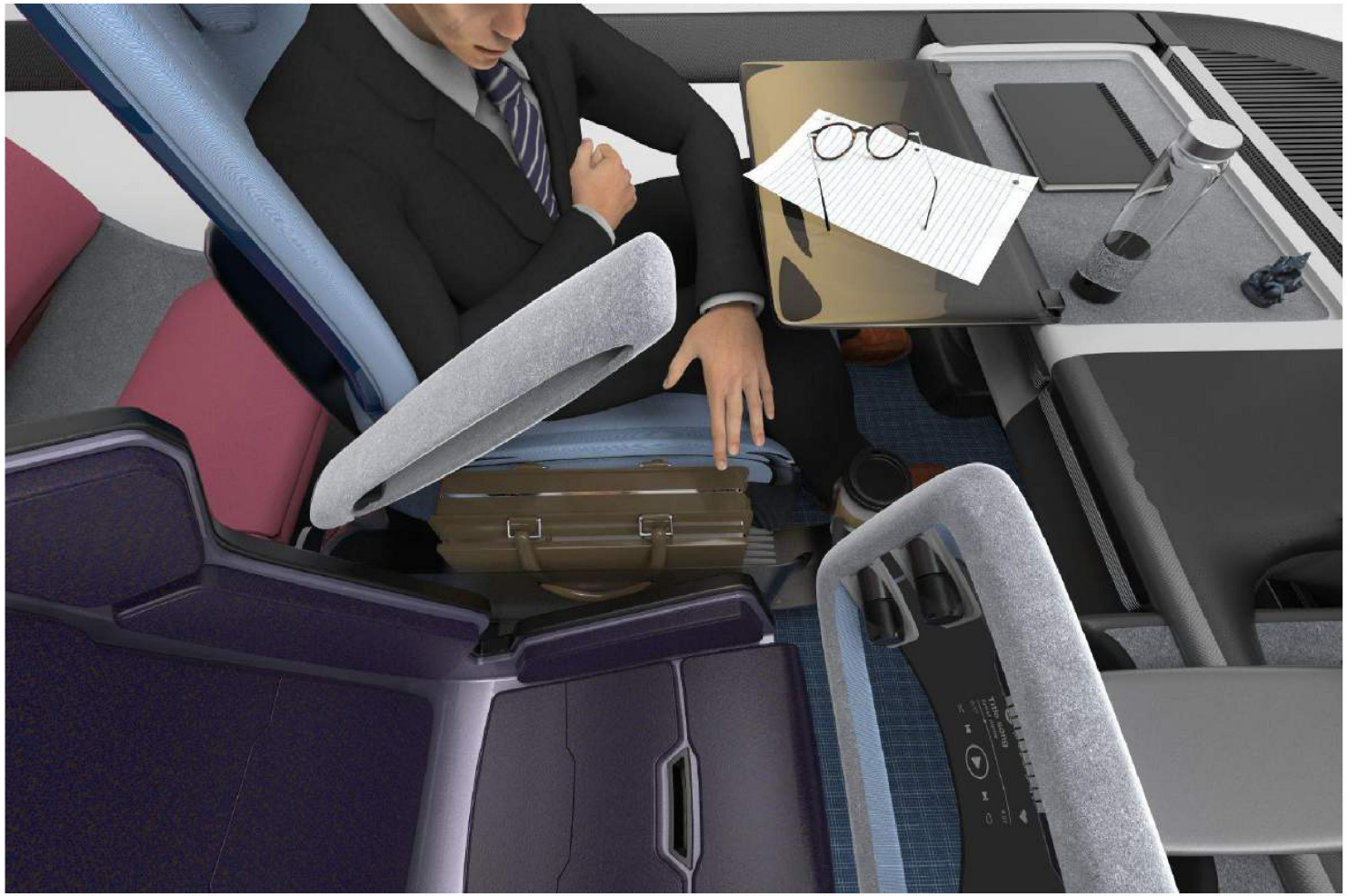

Fig. 24.7 User utilizing the storage space in the center console for storage and the panel for paperwork.

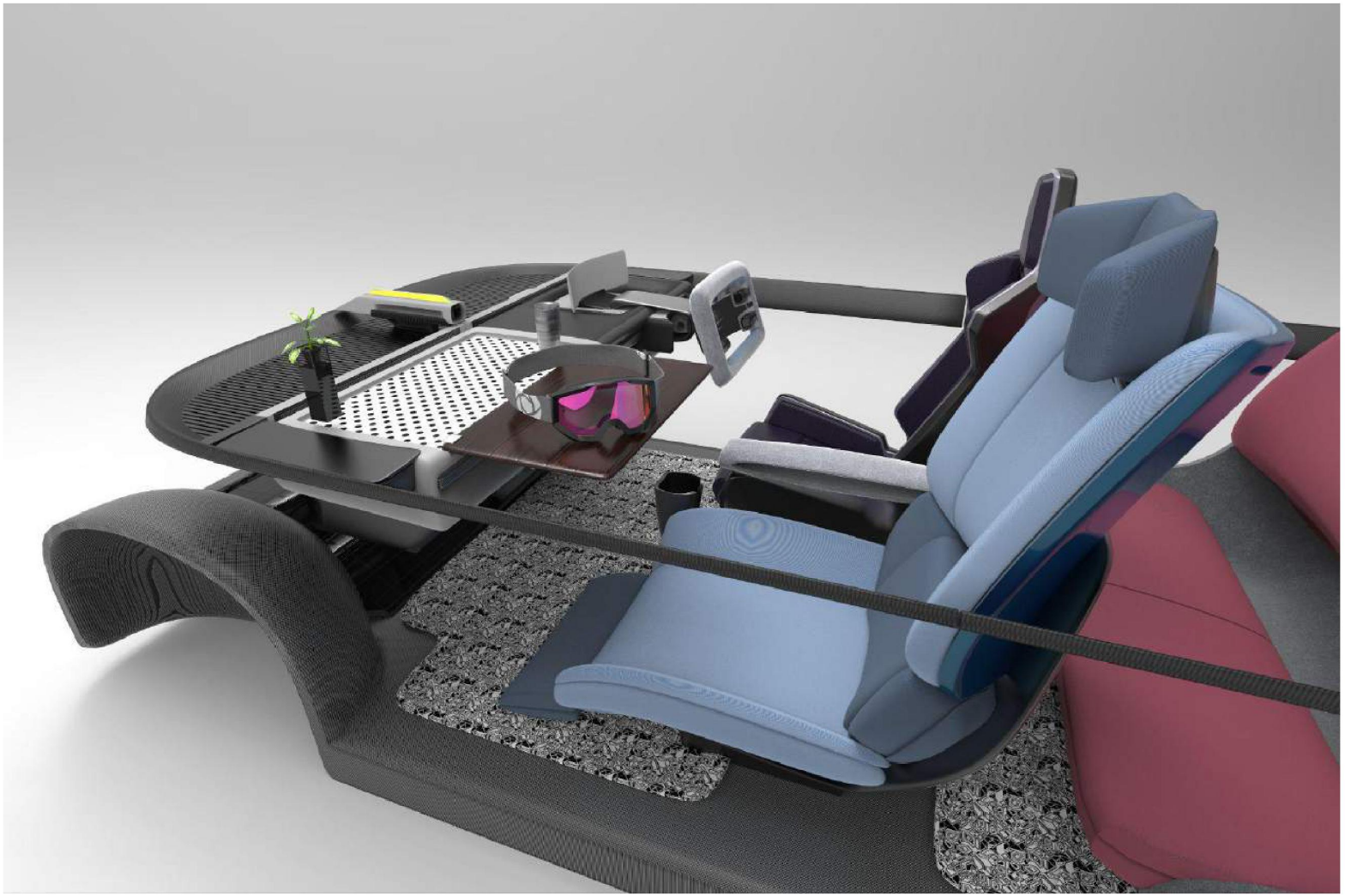

Fig. 24.8 Interior Render showing Dashboard configuration 2 with work setup 2: An XR headset with wooden table top

Fig. 24.8 User working in a VR Space with the seat pushed to the back and reclined for maximum space and comfort

Fig. 24.9 Interior Render showing Dashboard configuration 2 with work setup 3: A videography and photography kit on an accessory panel with slots for equipment mounting

Fig. 24.10 User working on their camera setup after coming back from an outdoor adventure.

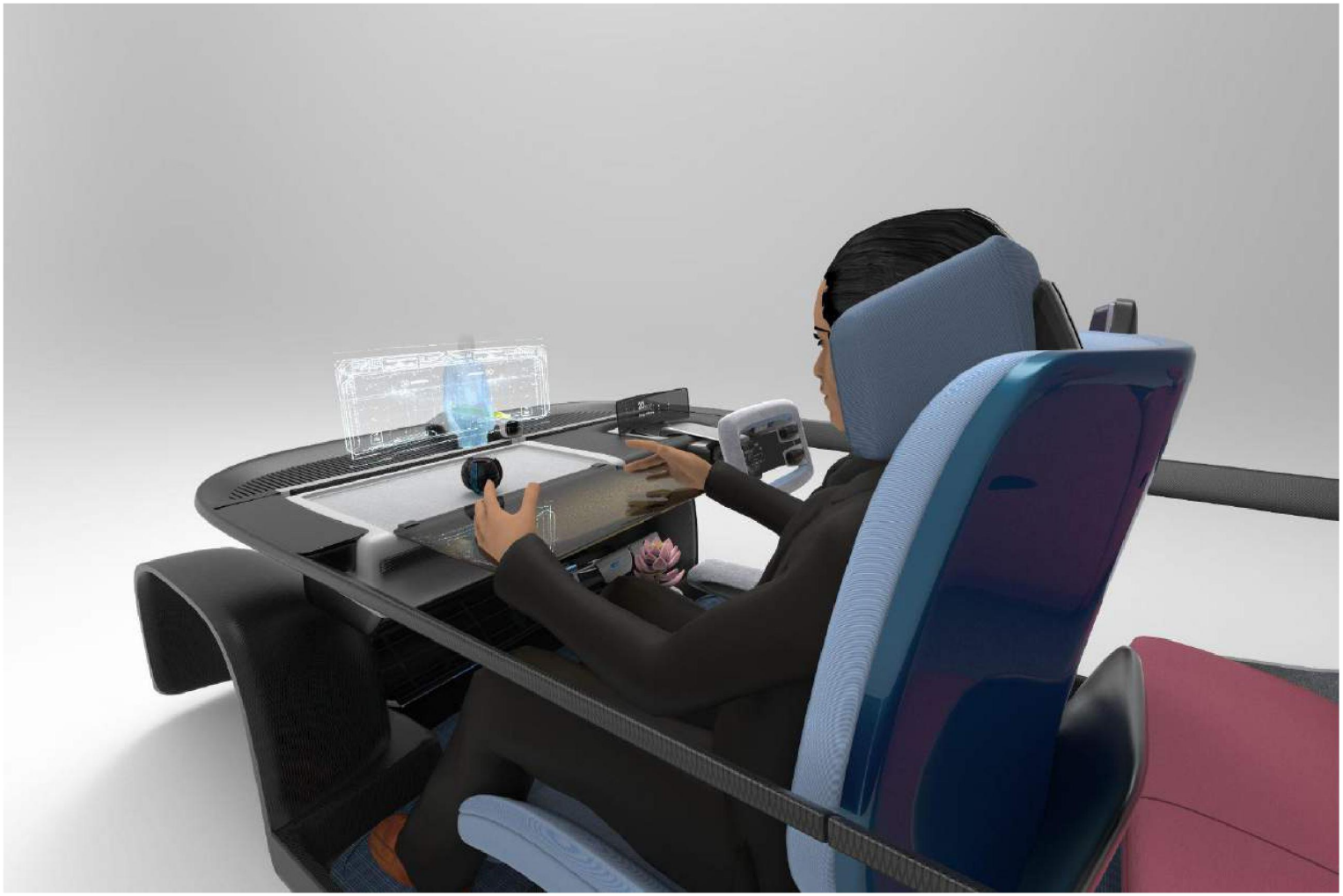

Fig. 24.11 User attending a Virtual Meeting with a 3D hologram Setup on his table

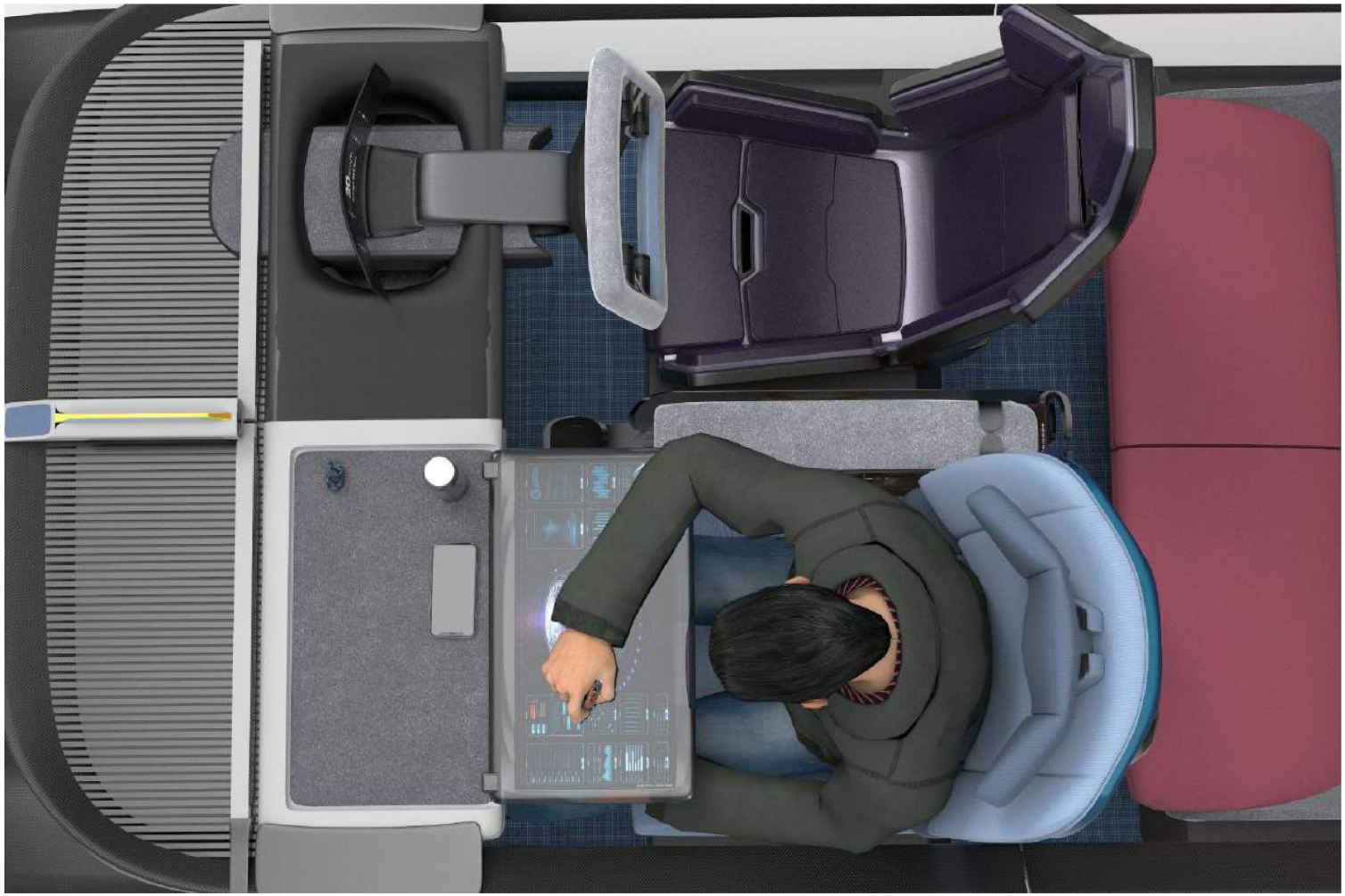

Fig. 24.12 User using an integrated computer in their foldable panel for work

24.4 Interior CMF

With the configuration designed for the particular usage scenario, the colors and trims were decided to suit the requirement. Being a configuration for work, the shades chosen are of neutral grayscale to represent professionalism of the user.

Fig. 24.13 CMF for a Professional Workspace

24.5 Exterior Design

The following subsection demonstrates the exterior design through studio renders

Fig. 24.14 Exterior Render of Front - top down angle

Fig. 24.15 Exterior Render of Side view

Fig. 24.16 Exterior Render of Rear Three quarters

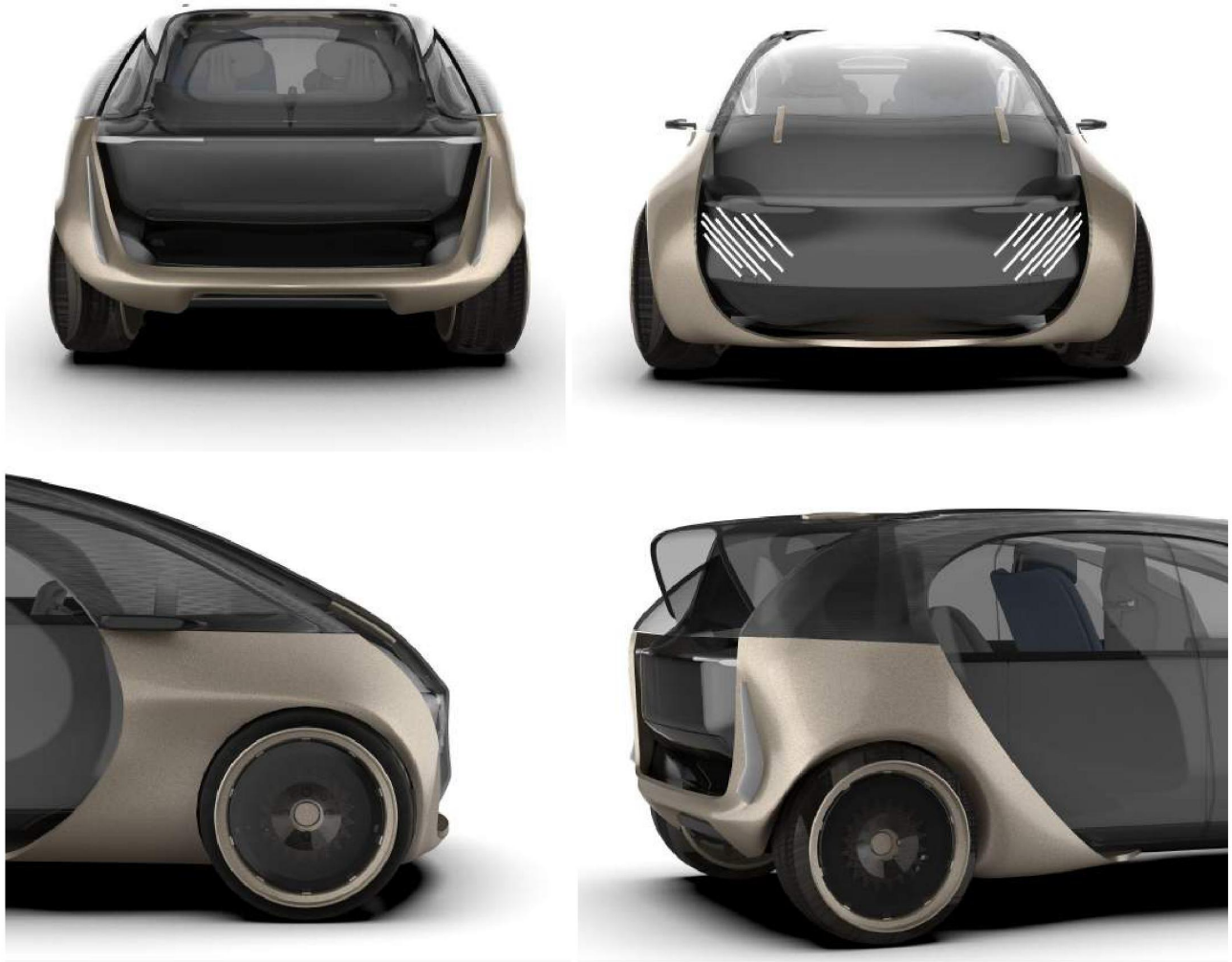

Fig. 24.17 Front and Rear Exterior Renders

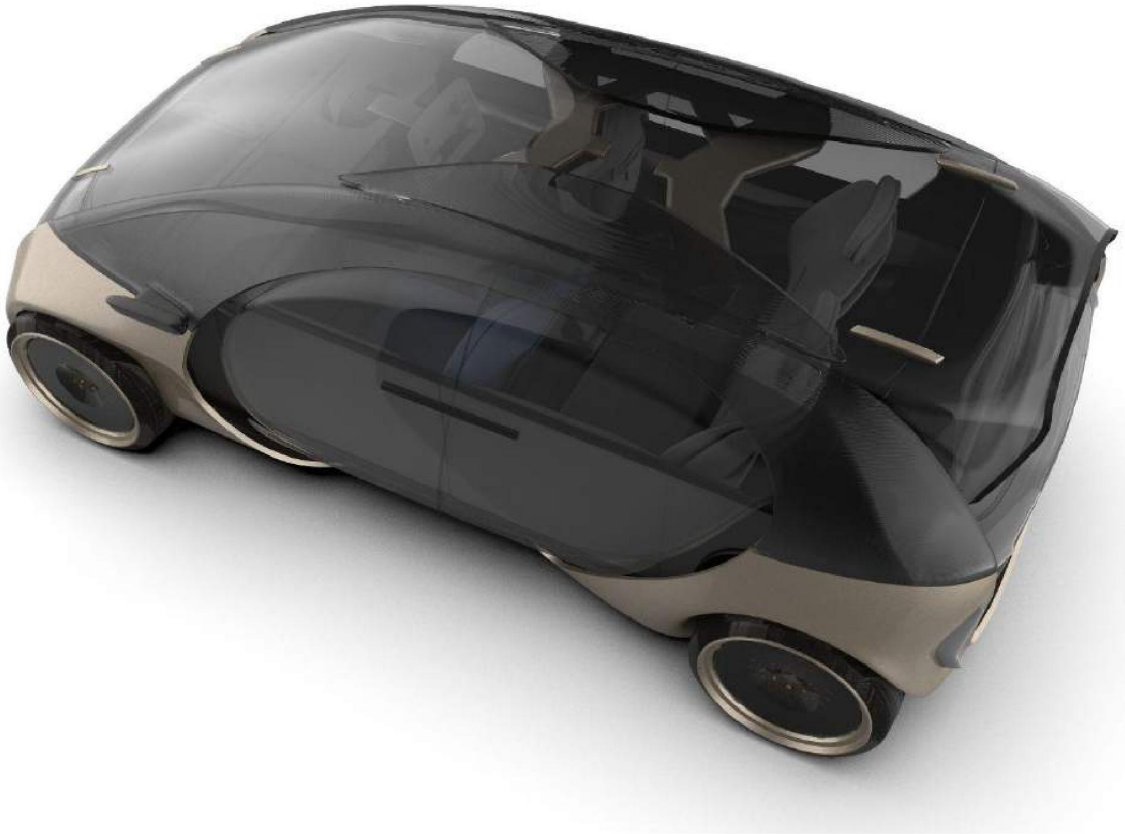

Fig. 24.18 Bird-Eye Exterior Render

24.6 Exterior Variants

Much like the interior, a user can configure their exterior as well to their taste. The wheels, the colors and trim pieces can be configured before subscribing. Following are some such configurations for different personality types.

Fig. 24.19 Renders of Exterior Variants

25. Details

Fig. 25.1 Steering Wheel with Drive and multimedia control and HUD for Battery levels

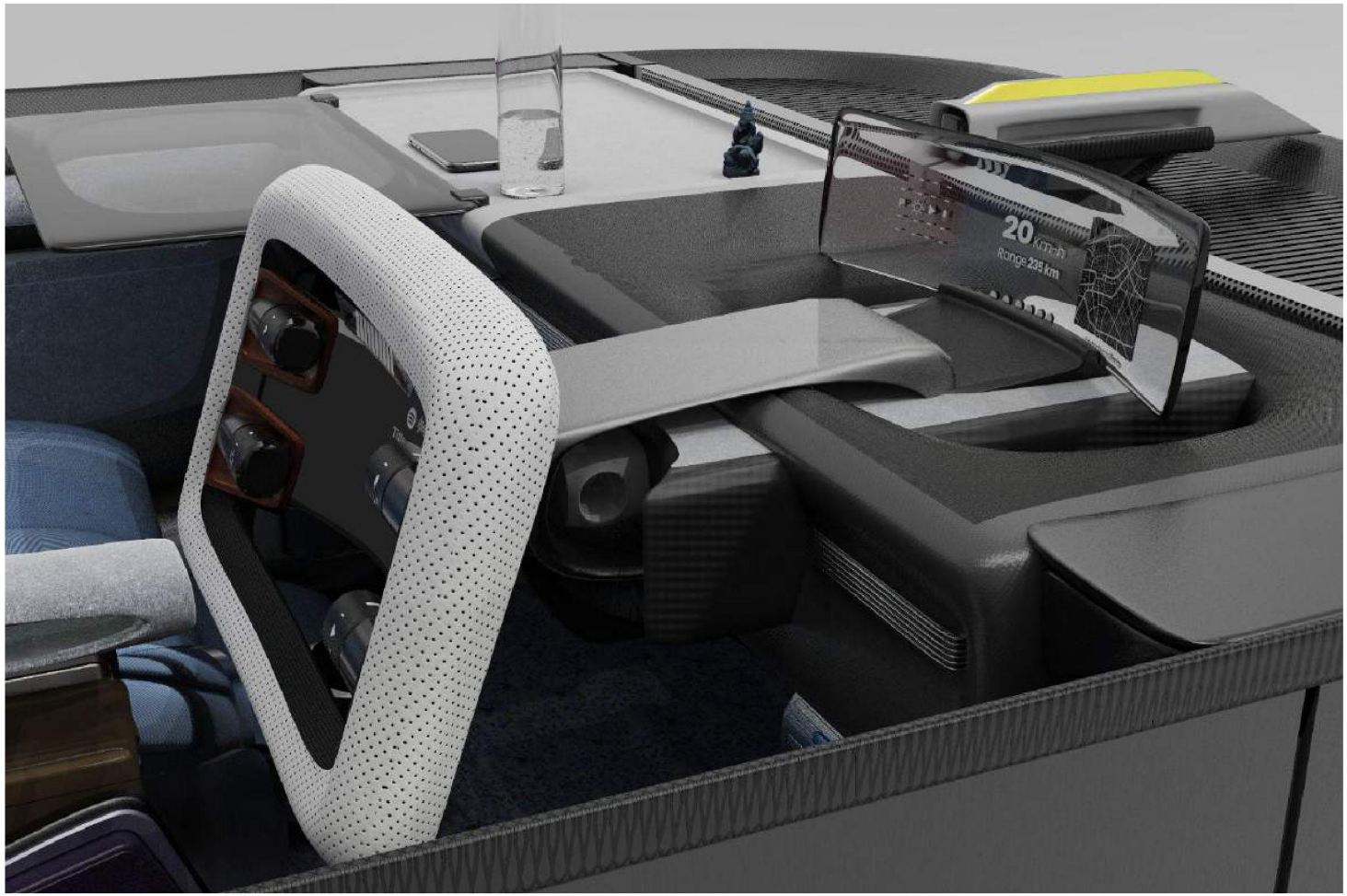

Fig. 25.2 Instrument Cluster HUD and Two-way camera

Fig. 25.3 POV shot of workstation with quick-note on unfolded table.

Fig. 25.4 Backseat view showing door trims, door bins, center console control screen and storage space.

Fig. 25.5 Interior from the back

Fig. 25.6 Interior from the front

26. Scenarios

The following section showcases the vehicle in various different usage scenarios.

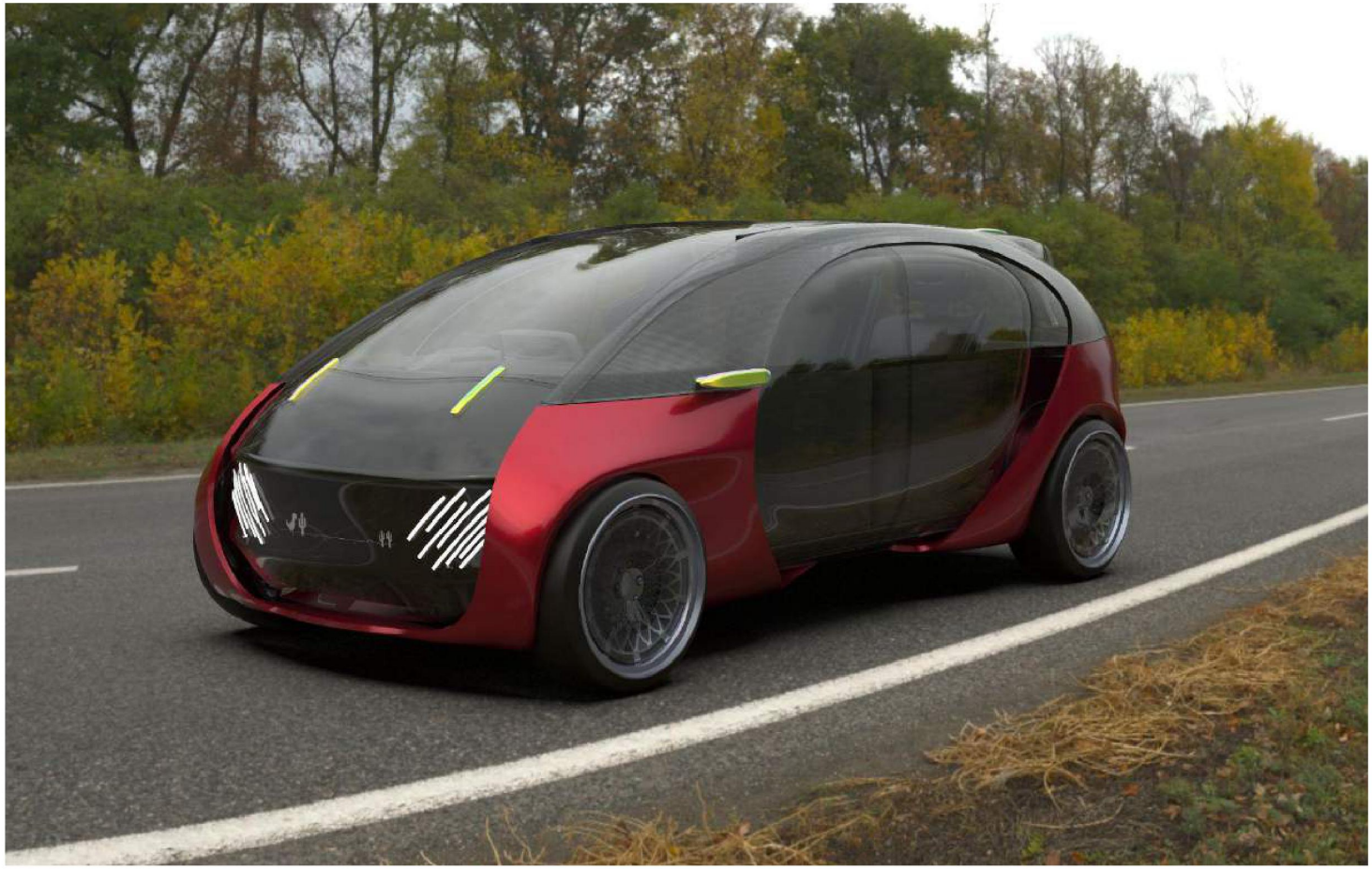

Fig. 26.1 Scenario Render 1

Fig. 26.2 Scenario Render 2

Fig. 26.3 Scenario Render 3

Fig. 26.4 Scenario Render 4

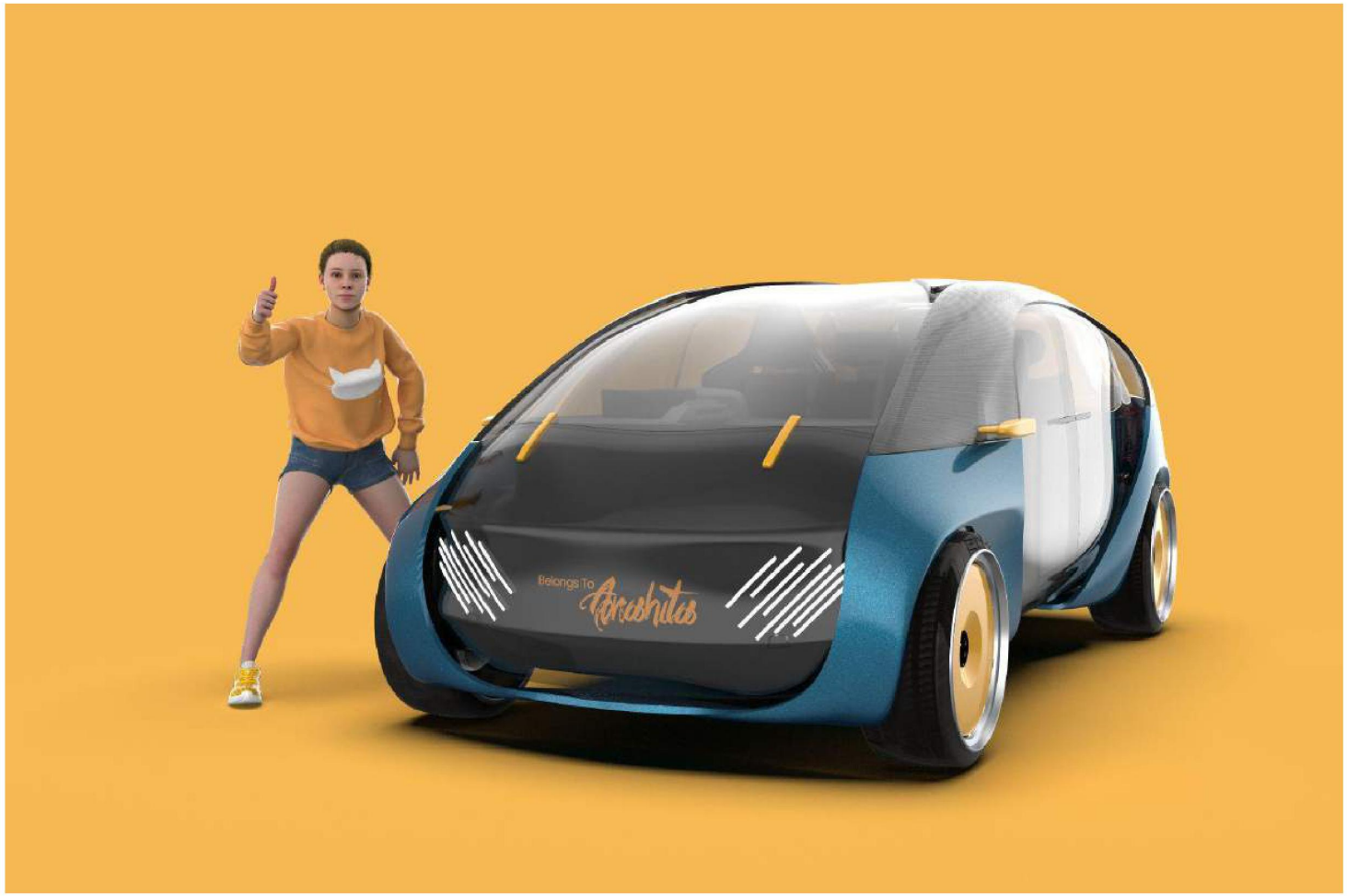

Fig. 26.5 Scenario Render 5

Fig. 26.6 Scenario Render 6

27. Scale Model

Fig. 27.1 Scale Model Progress

----------WORK in PROGRESS----------

References

[1] L. Prause and K. Dietz, "Just mobility futures: Challenges for e-mobility transitions from a global perspective," Futures, vol. 141, p. 102987, 2022.

[2] P. Moriarty and D. Honnery, "Low-mobility: The future of transport," Futures, vol. 40, no. 10, pp. 865–872, 2008.

[3] S. A. Shaheen, A. P. Cohen, J. Broader, R. Davis, L. Brown, R. Neelakantan, and D. Gopalakrishna, "Mobility on demand planning and implementation: current practices, innovations, and emerging mobility futures," United States. Department of Transportation. Intelligent Transportation ..., 2020.

[4] M. Büscher, M. Sheller, and D. Tyfield, "Mobility intersections: Social research, social futures," Mobilities, vol. 11, no. 4, pp. 485–497, 2016.

[5] H. Sustar, M. N. Mladenović, and M. Givoni, "The landscape of envisioning and speculative design methods for sustainable mobility futures," Sustainability, vol. 12, no. 6, p. 2447, 2020.

[6] T. Thwaites, GoatMan: How I took a holiday from being human. Chronicle Books, 2016.

[7] A. Dunne and F. Raby, Speculative everything: design, fiction, and social dreaming. MIT press, 2013.

[8] P. Coulton, J. Lindley, and H. A. Akmal, "Design Fiction: Does the search for plausibility lead to deception?," 2016.

[9] J. Bleecker, "Design fiction: A short essay on design, science, fact, and fiction," Machine Learning and the City: Applications in Architecture and Urban Design, pp. 561–578, 2022.

[10]A. Tiberio and L. Imbesi, ": Blackbox: A Design Fiction Research Project," The Design Journal, vol. 20, no. 1, pp. S3707–S3712, 2017.

[11]A. Dunne, Hertzian tales: Electronic products, aesthetic experience, and critical design. MIT press, 2008.

[12]T. Markussen and E. Knutz, "The poetics of design fiction," presented at the Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces, 2013, pp. 231–240.

[13]R. F. Gonzatto, F. M. Van Amstel, L. E. Merkle, and T. Hartmann, "The ideology of the future in design fictions," Digital Creativity, vol. 24, no. 1, pp. 36–45, 2013.

[14]A. Bokulich, "Rethinking Thought Experiments," Perspectives on Science, vol. 9, no. 3, pp. 285–307, Sep. 2001.

[15]J. Baggini, The Pig that Wants to be Eaten: And 99 Other Thought Experiments. Granta Books, 2010.

[16]L. Barendregt and N. S. Vaage, "Speculative Design as Thought Experiment," She Ji: The Journal of Design, Economics, and Innovation, vol. 7, no. 3, pp. 374–402, 2021.

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