



THE DRIVEN ENVIRONMENT IN 2015

CONCEPTS IN ENHANCED MOBILITY DESIGN

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A FUNDED EDUCATIONAL PROJECT
SPONSORED BY JOHNSON CONTROLS INTERIORS

This project would not have been possible without the help and support of the following Art Center staff and faculty:

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FOREWORD

Mariana Amatullo

Program Director, International Initiatives

Co-Director, **designmatters @ Art Center**

As members of a frail species, human beings are bound to encounter some forms of disability during their lifetimes. We all experience situations when our overall wellness is undermined by physical or emotional impairments: a passing ailment, a sports injury, a car accident, a nervous breakdown, a fleeting moment of sensory overload. Each of these events—as well as the inevitable phenomenon of advancing age—can trigger the loss of self-confidence, comfort, security, safety or personal mobility. When we find ourselves in such circumstances, our sense of independence is immediately curtailed, and we are stricken with the realization that the quality of life that we take for granted can be as tenuous as we are fragile.

This publication tackles some of the complex design issues that arise when “quality of life” is permanently altered by the partial or total loss of personal mobility due to age, accident, or illness. At the generous invitation of Johnson Controls, five transdisciplinary teams of students at Art Center College of Design undertook the challenge of imagining inclusive driving environments for the year 2015—with a particular emphasis on innovative interfaces between driver and personal road vehicles. The following pages offer a glimpse at the rigorous design processes behind the investigations carried out by each team, and provide a rich visual compilation of their creative solutions.

We were honored to join forces with Johnson Controls and our Transportation and Corporate Relations departments in this exploration that advocates for innovation and social responsibility through “inclusive design” that is barrier free and appealing to people with a wide range of abilities. These are goals closely aligned with the core mission of **designmatters @ Art Center**, our College-wide initiative promoting social and humanitarian applications of design and responsible business practices. We applaud the committed leadership in the field of mobility from Geoff Wardle, associate chair for Transportation Design and director of Advanced Mobility Research, as well as the exceptional contributions of the studio’s distinguished faculty: Karen Hofmann, Todd Belle, Gaylord Eckles and Merkel F. Weiss. The participation and insight of several scholars and expert practitioners in the fields of Gerontology and Disability were also essential to the in-depth research

accomplished, and merit special acknowledgement: Steve Rosenthal of Ability First, Pasadena; Gwen C. Uman of Vital Research; Diane Y. Carstens of Gerontological Services; and Maria Henke and Victor Regnier, FAIA, of the Andrus Gerontology Center, University of Southern California, Los Angeles. Equally invaluable were the firsthand perspectives and interviews granted by Robert Gorski, a wheelchair user who is also the City of Pasadena’s Accessibility/Disability coordinator, and by members of the Los Angeles-based wheelchair basketball team, Fast Breakin’ Lakers. We thank them for their participation and dedication to the studio. Finally, we are deeply indebted to Art Center President Richard Koshalek, whose vital advocacy for design’s expanded range of responsibilities in today’s world represents an inspiration to all of us.

A common thread that emerges from these projects—beyond the shared objective of advancing the independence and mobility of disabled and older people—is the deep empathy the students demonstrated by transcending the special needs of their user groups in favor of mobility-enhancing solutions that might prove useful and desirable to us all. The design visions herein discern the capabilities within disability, and the opportunities within constraint. ■

PARTNERS IN INNOVATION

Jean Swift

Director, Corporate Relations,
Art Center College of Design

Industry engagement has always been a hallmark of Art Center College of Design's educational initiatives. Through unparalleled corporate participation from a diverse range of companies, our students experience the demands of the professional design world that uniquely prepare them to excel in their careers. In return, our corporate partners experience renewed inspiration and innovative perspectives that often influence their own design strategies.



The Fall 2004 Johnson Controls Funded Educational Project asked students from Transportation Design, Product Design, Environmental Design, Graphic Design, and Film departments to examine the long-range future of the interface between the vehicle and its occupants. The demographic focus for each design team encompassed end users with impaired personal mobility due to conditions including illness, age, and accident. The design focus on “interactive experience” included the ability to appropriately access and distribute information in order to create a safe, comfortable, and entertaining automotive environment.

This project allowed Johnson Controls, students, and faculty to hone problem-solving and critical-thinking skills within fresh approaches to the design challenge. Through the professional designers at Johnson Controls, students gained firsthand knowledge about sustainable solutions with important real-world applications. In turn, Johnson Controls gained further insights into areas of development and design that will fuel their continued growth and success as responsible corporate citizens. ■

THE DRIVEN ENVIRONMENT IN 2015

Karen Hofmann

Faculty, Product and Transportation Design,
Art Center College of Design

Johnson Controls challenged Art Center students to rethink what mobility will mean for people in the future. In the year 2015, our lives may not be all that different than they are today, but our world will be faced with some challenging issues—the aging of our society, technology and information management, social security and economic stability—to name just a few. Emerging technologies will play an important role in enabling people to have positive relationships with the products and environments surrounding them. The automotive industry is realizing that it needs to pay attention to future mobility challenges, and this project was a great opportunity to start visualizing what that might mean.

Each team of students embraced one of the five scenarios that Johnson Controls proposed as inspiration to rethink the future of mobility, with the following envisioned end users:

- A 90-YEAR-OLD ACTIVE WIDOW WANTING TO HOLD ON TO HER FREEDOM;
- AN AMBITIOUS DEAF COLLEGE STUDENT WHO IS ALWAYS ON THE GO;
- AN ATHLETIC WHEELCHAIR USER AND HIS FAMILY;
- A 60-YEAR-OLD WORKING MOTHER OF A YOUNG GIRL, TRYING TO BALANCE HER LIFE;
- THE QUINTESSENTIAL BABY BOOMER COUPLE EMBRACING THEIR “RETIRED” LIFE.

Each team developed meaningful solutions that visualize their end users experiencing “the driven environment”—with benefits that not only address these specific needs, but also some ideas that might ultimately be universally embraced by the automotive industry. ■

INTELLIGENT DESIGN AND THE MOBILE DISABILITY COMMUNITY

Steve Rosenthal

Director of Public Relations, Ability First



A group of Transportation Design students at Art Center College of Design, under the leadership of Geoff Wardle, the department's associate chair and director of Advanced Mobility Research, was asked to address the functional and aesthetic challenges of wheelchair design. Although many of us have found satisfaction from products that may be trendy or cool, a wheelchair that looks good must also be thoughtfully designed to support the mobility needs of a person with disabilities. The students in this group made sure that comfort and accessibility were their top priorities.

As Director of Public Relations and Marketing at Ability First (formerly the Crippled Children's Society), I am familiar with the mobility needs of wheelchair users and am thankful for the opportunity to have monitored this project. Choosing as their theoretical subject a young, active sportsman who became paralyzed from the waist down in an accident, the students committed to designing a wheelchair that would be versatile, support an active lifestyle, and that could sit in the driveway next to the subject's Ferrari and not look limiting. Their design would permit this young man to easily transfer from the wheelchair to his car, a sailing vessel, or a kayak. Hypothetically made from carbon fiber material, there's no doubt the proposed design would be an eye-catcher.

As the project progressed, the group realized that the transferring maneuver from one seat to another needed more study. Some of the group met with Robert Gorski, a wheelchair user who is also the City of Pasadena's Accessibility/Disability coordinator. They recorded video

of him getting in and out of his customized, accessible van, and paid particular attention to how he transferred from his wheelchair to the car seat, and back. Based on this information, the group revised certain aspects of their design. Then, satisfied that the functional design challenges were met, the focus was put on solving the mechanical aspects of their solution and wrapping it with an exciting visual look.

Empathetic designers understand the requirements of the end user. By taking into account the special design requirements of people with disabilities, accessibility product designers can help increase the potential of the disability population by assisting them in becoming independent and productive members of their communities.

I am grateful to the students and instructors at Art Center for exploring design that looks beyond disabilities to focus on capabilities and expand possibilities. ■



MOBILITY DESIGNS FOR THE AGED

Gwen Uman

Partner, Vital Research, LLC

It was a rare and wonderful opportunity to participate in this transdisciplinary experience, blending art and design with gerontology and practical matters that contribute to quality of life. Although the gerontology contributions were rather modest, and based upon personal experience with aging patients and relatives (and the aging self) as much as on academic background, it was most exciting to observe the students' creative implementation of ideas and concepts when I returned for a midterm visit. There wasn't enough time to drink in and appreciate all of the mobilizing features that the students had designed in such a short period of time. I was particularly excited that the concepts were both futuristic and retro, and that they all had the potential to improve quality of life for those with mobility challenges. And, of course, nothing is more fun for an "almost native" Angeleno, than a well-designed car! ■



AGING, TECHNOLOGY AND THE AUTOMOBILE

Diane Carstens

Consultant, Aging Expert

In 1992, the International Association of Homes & Services for the Aging reported two “inescapable trends” facing the world in the coming century: global aging and technological innovation. These trends, taken together, have the potential to create an entirely new paradigm for the automotive/transportation and personal products industries. Indeed, they will affect every aspect of our society, presenting new challenges and new opportunities.

To appropriately respond to these opportunities requires an understanding of the evolving older market (from demographic trends to shifting psychosocial profiles), and may also require that we broaden our vision, seeing the automobile as part of an integrated system of products and services.





THE EMERGING OLDER MARKET

It is not difficult to grasp the potential of the emerging older market in terms of its size, its buying power, and even its physical needs and health issues. Simply put, there are going to be a lot more older people. Furthermore, in almost every corner of the world, they will be better educated, more affluent, healthier, and longer-lived than the generations that preceded them. Now and into the future, we will expect to maintain our independence and our active lifestyles regardless of advancing age. Consider, for example, that the average age of a Porsche 911 buyer today is about 52 years—far beyond what might have been imagined just a few decades ago.

What is not so easy to anticipate is what these independent-minded elders will demand in later life—keeping in mind the distinction between market demands (what people want, and are willing to pay for) and physical

need (such as higher levels of illumination). The challenge is that older adults are extremely heterogeneous. We see differences by culture, subculture, socioeconomic status, race and ethnicity, geography, religion, etc. But there are some tangible trends.

EARLY LIFE EXPERIENCES AND LATER LIFE EXPECTATIONS

The emerging older adult market is vastly different in its expectations than the generations that preceded it. They are different to a great extent because of varied life experiences during their formative years (typically young adulthood), when core values that influence decision-making throughout life are solidified. A useful concept is that of “generational cohorts” in life experiences. Consider those Americans 55–65 years old versus those who are 80–90. The older cohort felt the impact of the depression era, benefited from the G.I. Bill with home loans, college funding, etc., and colonized the suburbs with a car in every garage. The younger cohort is part of the Boomer generation. They probably went directly from home to college, and were raised with high expectations for life. The older group is more likely to expect and accept a basic, reliable mode of transportation, and the younger to expect and demand a wide choice of colors, styles, and accouterments.

One of the many issues considered by the Art Center students in this project is the market’s receptivity to new technologies. Couching new concepts within the context of

the familiar is usually the best approach. But, here again, the concept of life experiences and formative years can be insightful. It is reasonable to expect that one's early experiences as a driver (even if it's late in life) can have a lifelong impact. Cultural, geographic, socioeconomic, and other influences also come into play. A 60-year-old in China, for example, who has only recently begun to drive, may be more familiar with (and expect) newer technologies than a similarly aged American who began driving in the 1960s.

CONSISTENT THEMES

Our market research, however, continues to reaffirm some consistent themes that are emerging as even greater influences in the market's decision-making processes. Though identified as general trends, they would seem to be particularly applicable to the automotive/transportation and personal products industries. Because of the magnitude of their impact on market behavior, the automobile (and its related operating systems) must:

- Maximize safety, security, and reliability;
- Enhance comfort and convenience—from getting groceries in/out, to such things as cane holders and temperature controls;
- Promote independence;
- Offer personal choice and control;
- Offer a high quality of service—for mechanical repairs, and beyond.

THE FUTURE?

The magnitude of change occurring in the market requires a similar magnitude of change in our vision for the automotive industry. It is time to change our perspective on the automobile. As we do, new visions of opportunities for the future will emerge. It is time to envision the automobile as a part of an integrated system of products and services designed to enhance the individual's safety, security, comfort, convenience, and independence. These "operating systems" include maintenance and service, driver training and communication (scheduled and on-demand), and may extend well beyond the automobile, interfacing with personal products, medical devices, communications systems, etc.

The students in this studio project have demonstrated an intense commitment to understanding both the challenges and the potential that the automobile can have for a rapidly growing population segment. Their visions for the future are inspiring.

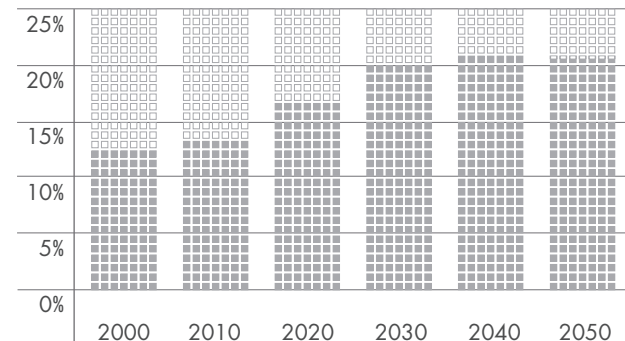
THE NUMBERS

Healthier lifestyles, coupled with advances in medicine and pharmacology, are driving an unprecedented surge in the older population. In 2000, there were 35 million people age 65 and over in the United States, accounting for almost 13 percent of the total population. Between 2000 and 2030, this population is expected to increase a whopping 102 percent. However, the United States is not the oldest country (presently ranking about 30th), nor is it expecting the fastest growth in those age 65 and over. Twenty-nine countries are expected to experience even more rapid growth in this segment of the population from 2000–2030. Furthermore, the top 25 “aging” nations are developing countries, led by Singapore (379-percent projected increase), and including such burgeoning new consumer populations as China (170-percent). ■

% OF THE U.S. POPULATION AGE 65+ BY YEAR

DATA FROM: [HTTP://WWW.AGAINSTATS.GOV/](http://www.agingstats.gov/)

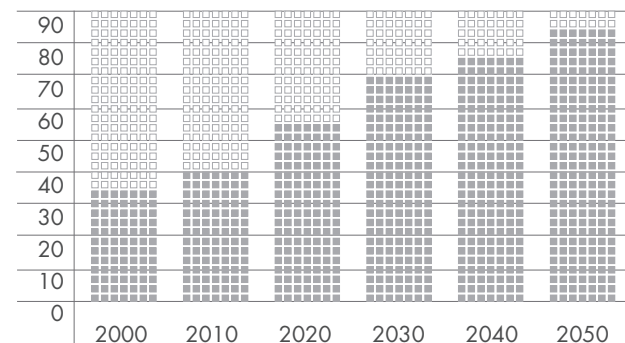
CHARBOOK2000/TABLES-POPULATION.HTML



OF U.S. PERSONS AGE 65+ BY YEAR (IN MILLIONS)

DATA FROM: [HTTP://WWW.AGAINSTATS.GOV/](http://www.agingstats.gov/)

CHARBOOK2000/TABLES-POPULATION.HTML



THE DRIVEN ENVIRONMENT IN 2015

SIXPAC

OTIUM

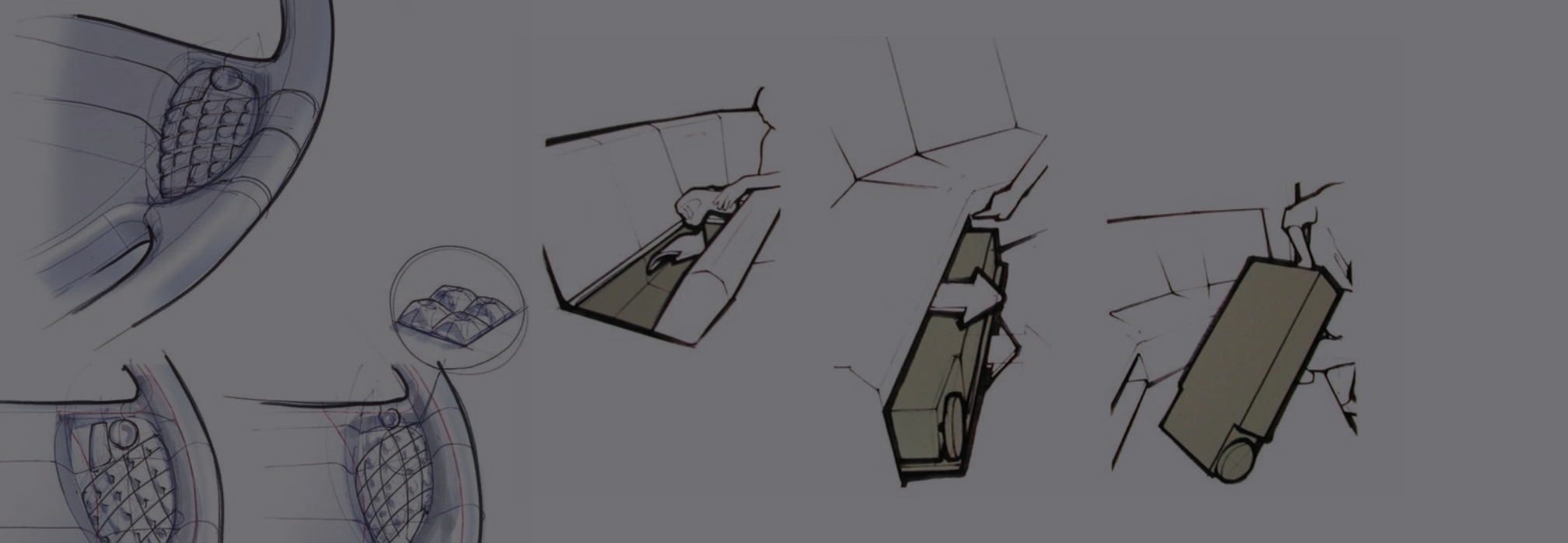
DREAMSCAPE

K-TEAM

MOTUS

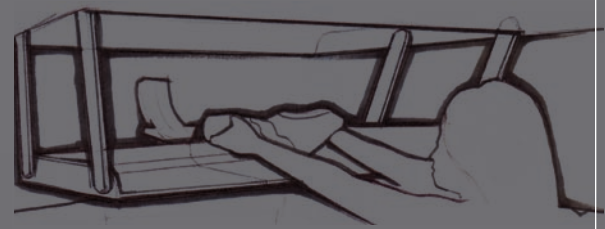




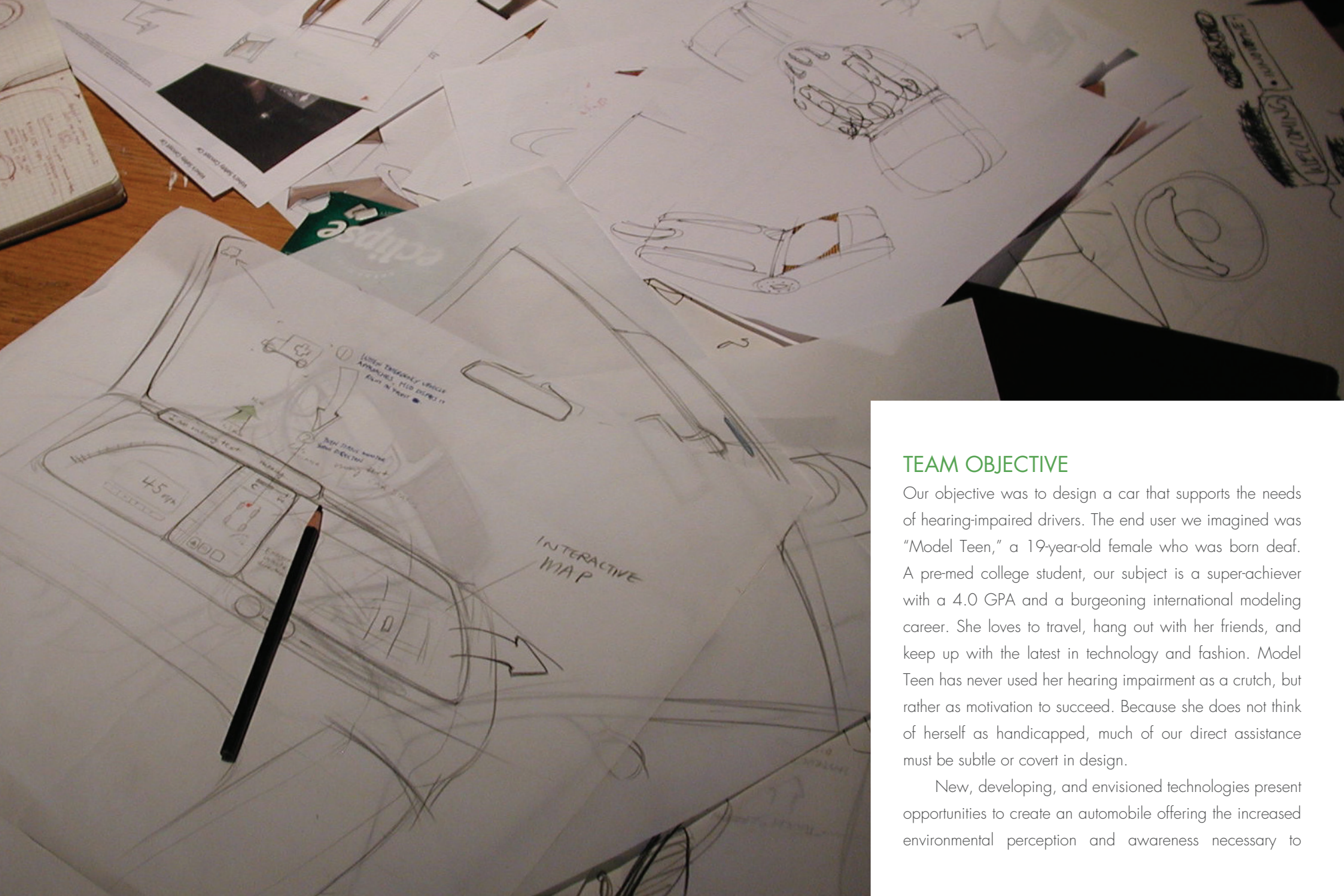


EVOLVE AWARENESS TO CREATE AN AMAZING CAR FOR THE DEAF, AND A REVOLUTIONARY CAR FOR THE HEARING.

SIXPAC



- Matthew Tremblay** 7th term, Transportation Design
- Brian Wen** 6th term, Product Design
- Amar Dhadwal** 6th term, Transportation Design
- Chad DeJong** 6th term, Product Design
- Chris H. Kim** 6th term, Transportation Design
- Hector Holguin** 6th term, Graphic Design



TEAM OBJECTIVE

Our objective was to design a car that supports the needs of hearing-impaired drivers. The end user we imagined was "Model Teen," a 19-year-old female who was born deaf. A pre-med college student, our subject is a super-achiever with a 4.0 GPA and a burgeoning international modeling career. She loves to travel, hang out with her friends, and keep up with the latest in technology and fashion. Model Teen has never used her hearing impairment as a crutch, but rather as motivation to succeed. Because she does not think of herself as handicapped, much of our direct assistance must be subtle or covert in design.

New, developing, and envisioned technologies present opportunities to create an automobile offering the increased environmental perception and awareness necessary to

navigate with greater safety. By blending technology with design, we sought to give the user intelligent, interactive, and intuitive control over her environment, while creating an atmosphere that is inviting, approachable and warm. We delineated five areas of focus for our design: safety, user interface, comfort, atmosphere, and culture.

The hearing-impaired driver faces unique challenges. Because so many exterior driving cues are auditory in nature—notably, horns and sirens—increased driver awareness is critical to operational safety. To address this issue, we created an Emergency Vehicle Recognition system that senses auditory and electronic cues from emergency vehicles and translates them into physical and visual stimuli, including directional indicators, for the driver. We also designed a user interface that takes into account the specific needs of the hearing impaired for visual and tactile feedback that establishes a comfort level for confident vehicle operation.

Psychological comfort is paramount, but physical comfort is also a key in creating a successful and safe vehicle for the hearing impaired. For that reason, everything from ergonomics to generational preferences and taste was considered in designing the automotive environment for Model Teen and her passengers.

A project of this scope has far-reaching impact. As we broke down and reconstructed the boundaries of the traditional automobile environment in the service of our user, one thing became clear: a car created to be great for the deaf will be equally revolutionary for the hearing.





KEY ATTRIBUTES WORDS

Innovative

Inviting

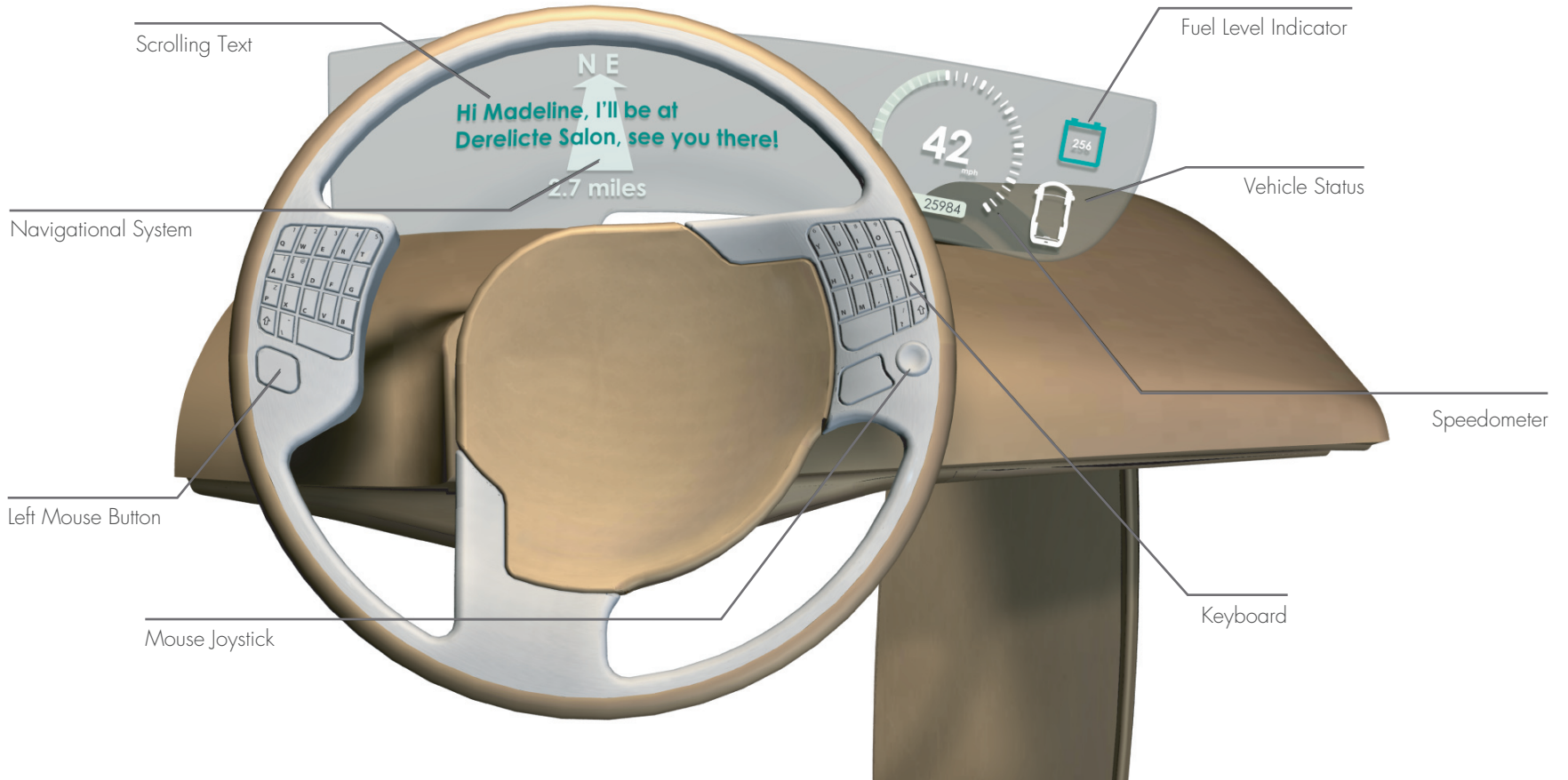
Interactive

Intelligent

Approachable

PROBLEM SOLVING

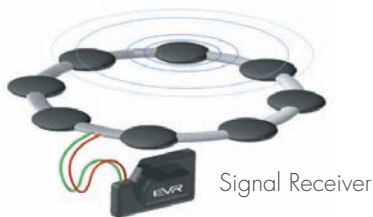
Through research and interviews, we isolated specific safety and environmental issues pertaining to deaf and hearing-impaired drivers. We then pursued technological and design approaches that addressed those needs in concert with the personal preferences of our target end user.



BECAUSE SO MANY EXTERIOR DRIVING CUES ARE AUDITORY IN NATURE—NOTABLY, HORNS AND SIRENS—INCREASED DRIVER AWARENESS IS CRITICAL TO OPERATIONAL SAFETY.



Vibration pods relay directional force-feedback warnings to driver.

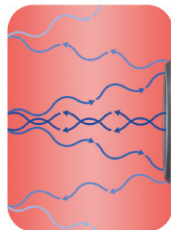


Signal Receiver



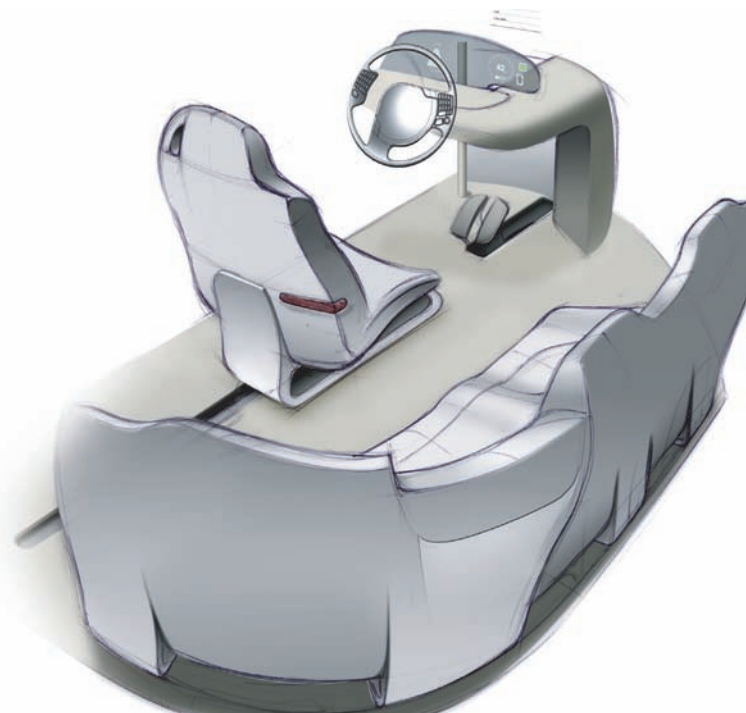
Air Bladder

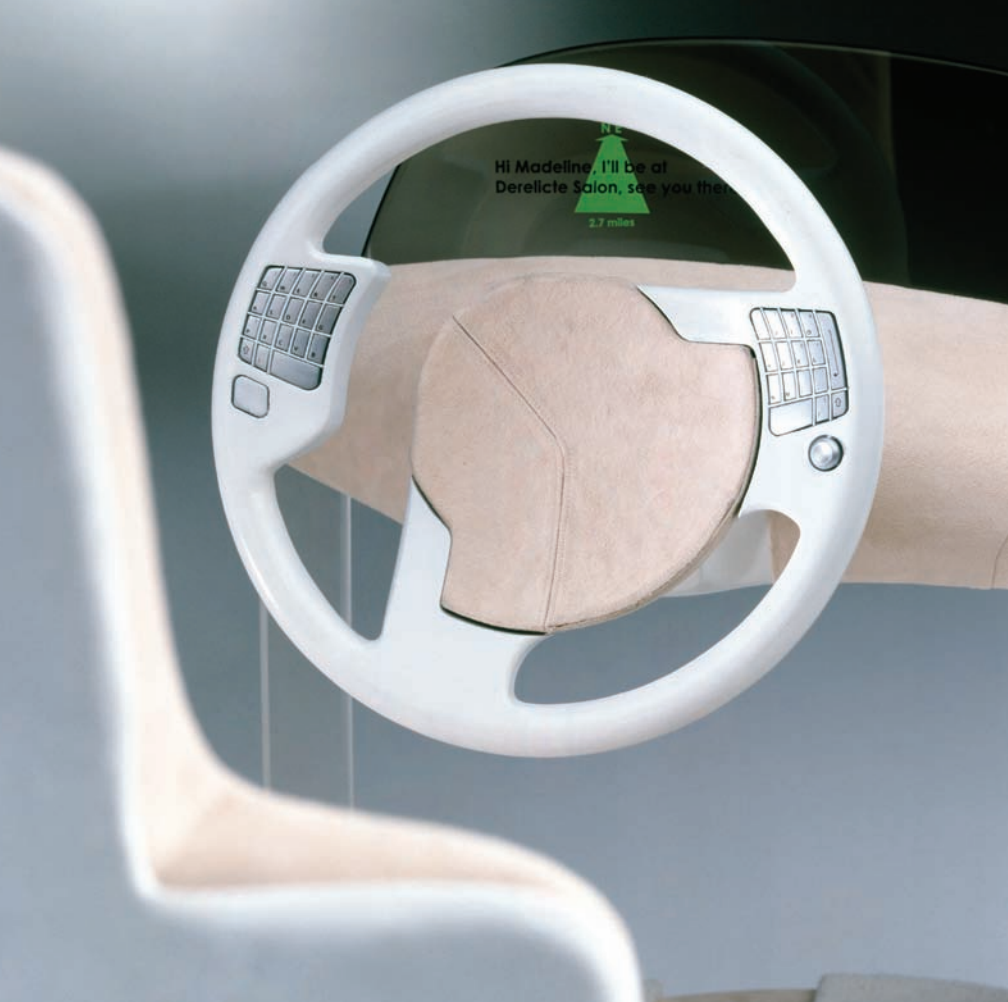
Sound waves ricochet off thin walls and translate sounds into vibrations.



Trapped Sound Waves

Embedded Low Profile Speaker

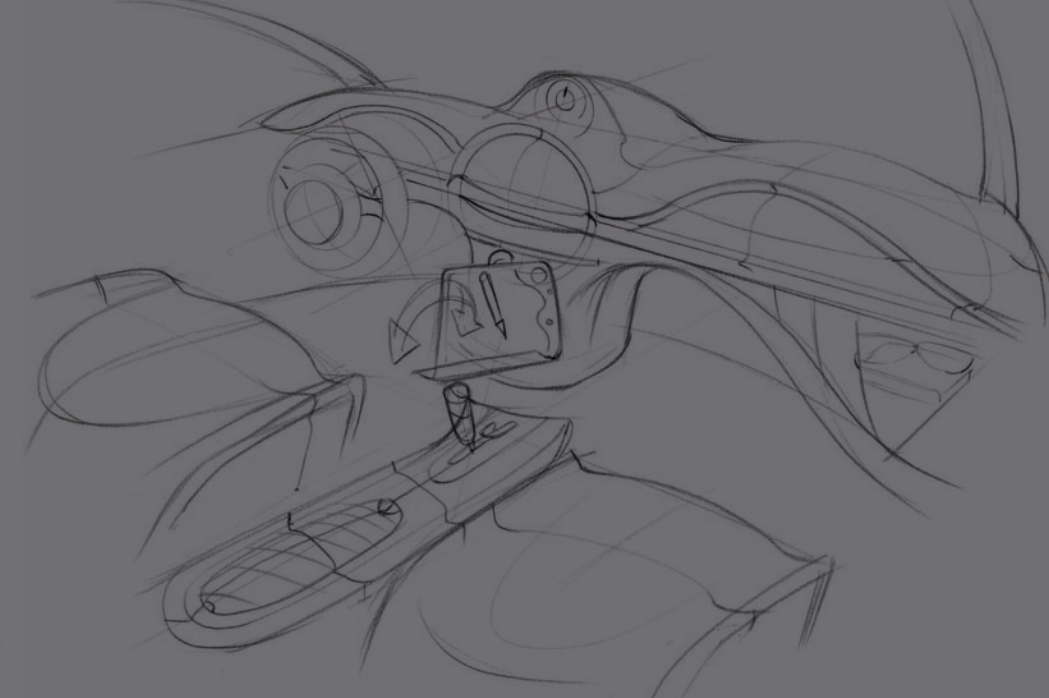
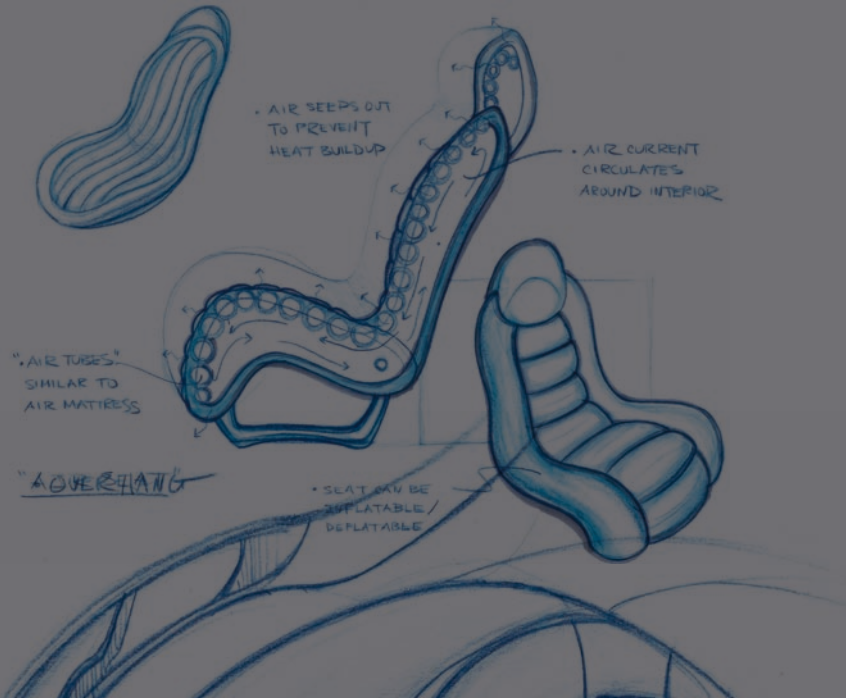




DESIGN INNOVATIONS

- Luxurious, practical materials for aesthetic enhancement.
- I-Drive interface, including modified Sidekick text-messaging system.
- Emergency Vehicle Recognition system.



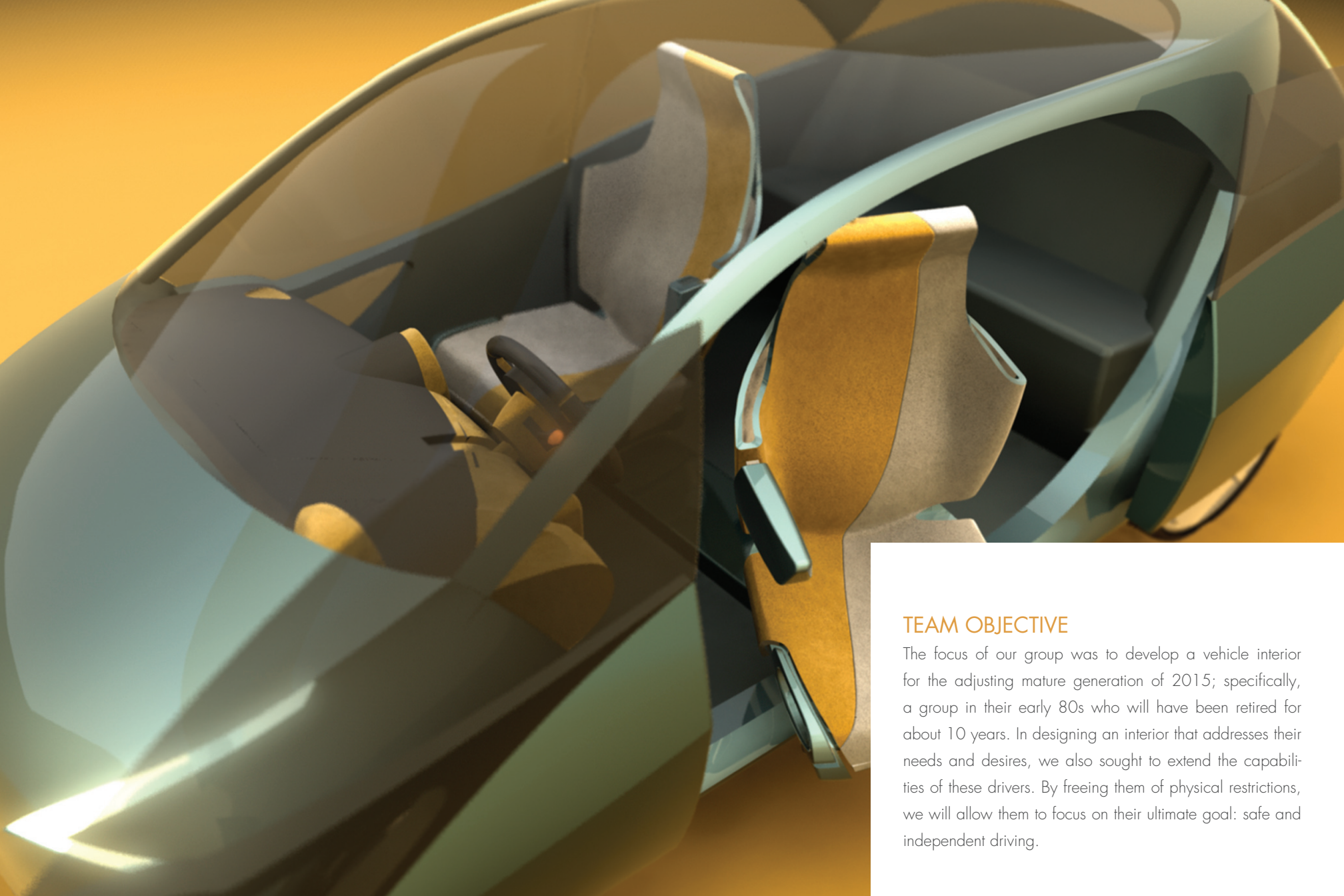


ENABLING THE ELDERLY TO DRIVE SAFELY AND INDEPENDENTLY.

OTIUM

• ONE CLEAN CONTINUOUS TOUCH SCREEN SURFACE FOR INSTRUMENT PANEL

- Sam Chiu** 6th term, Transportation Design
- Hiro Ikuma** 6th term, Transportation Design
- Ai Su** 5th term, Transportation Design
- Paul Fu** 6th term, Product Design
- Tim Meyer** 5th term, Environmental Design



TEAM OBJECTIVE

The focus of our group was to develop a vehicle interior for the adjusting mature generation of 2015; specifically, a group in their early 80s who will have been retired for about 10 years. In designing an interior that addresses their needs and desires, we also sought to extend the capabilities of these drivers. By freeing them of physical restrictions, we will allow them to focus on their ultimate goal: safe and independent driving.

The design team faced a number of challenges specific to our target group, including physical restrictions such as stiffening joints, restricted reach, impaired eyesight, and haptic limitations. Although the mature generation in 2015 will be more apt to accept new technologies than their counterparts of today, slow learning curves will still be a hurdle. Therefore, rather than considering how much technology might be viable for the matures, we instead considered how much was actually necessary. Our belief is that technology should be accessible and enabling, not distracting.

We sought to ease our subjects' transition to an unfamiliar automotive environment by forging a dynamic bond between their car and their living space. This connection will create a comfort zone that goes beyond merely facilitating ingress and egress, or loading and unloading groceries, even for those with limited physical abilities. It will create a soothing mindset that is essential for successful driving.



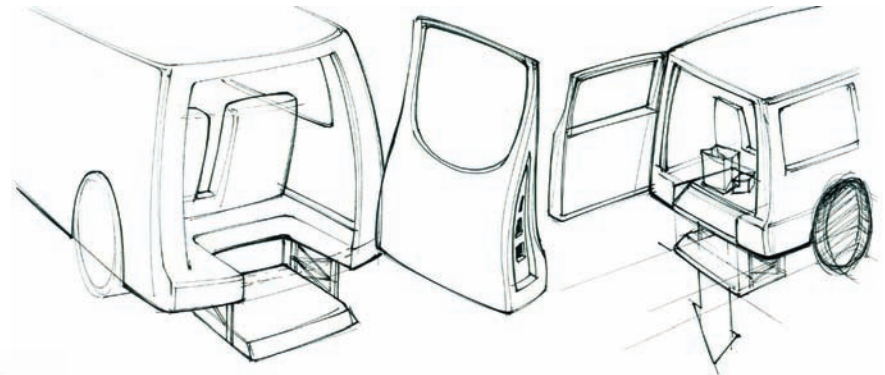


KEY ATTRIBUTES WORDS

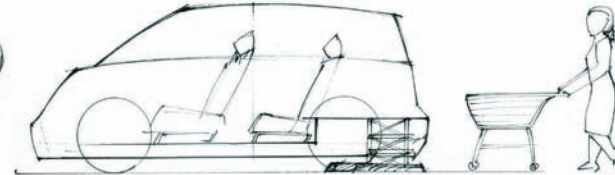
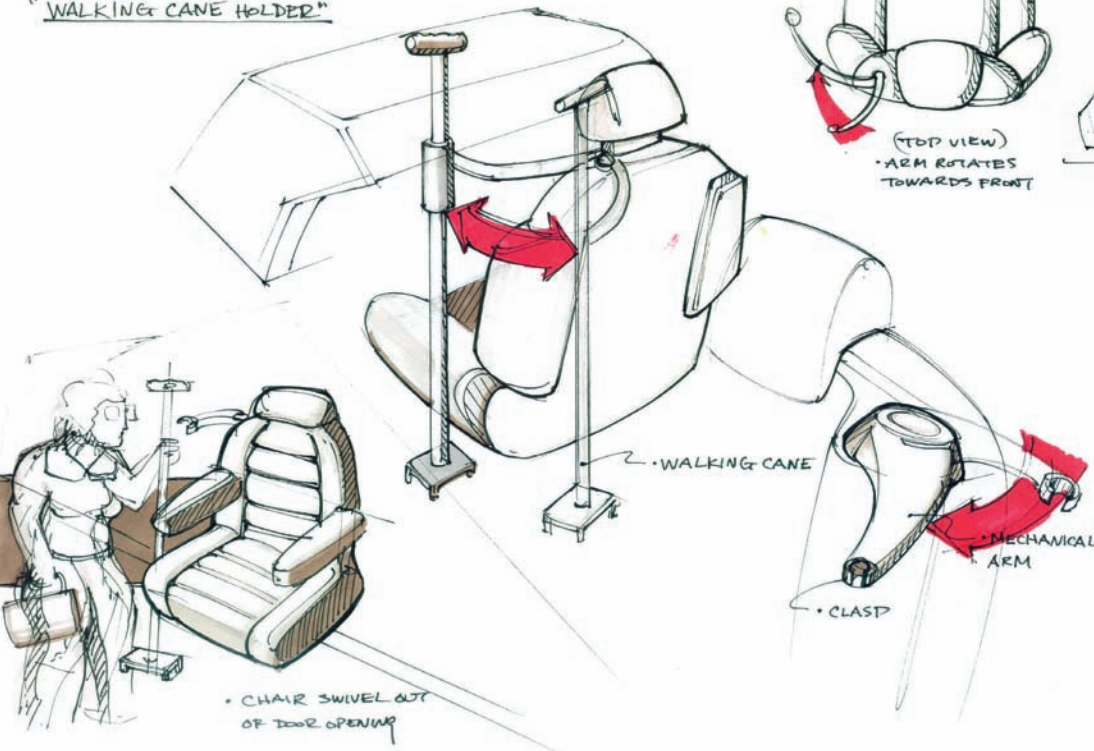
Enabling
Independence
Agility
Safety
Familiarity

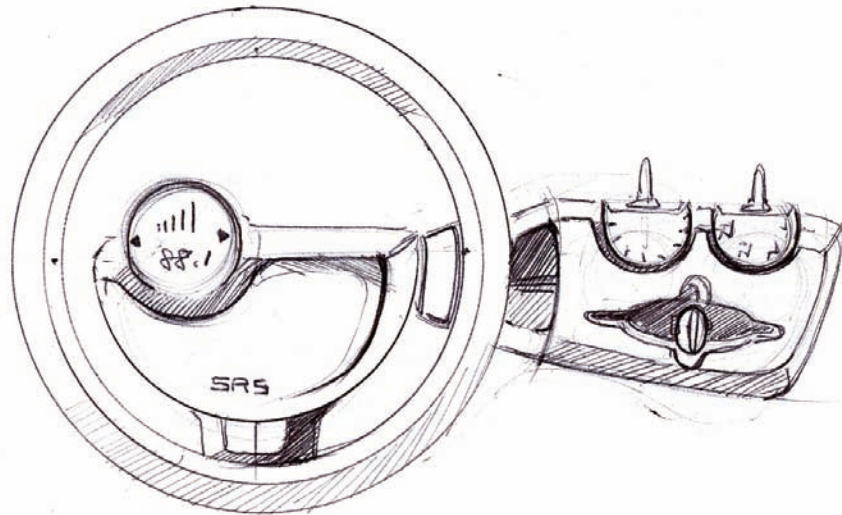
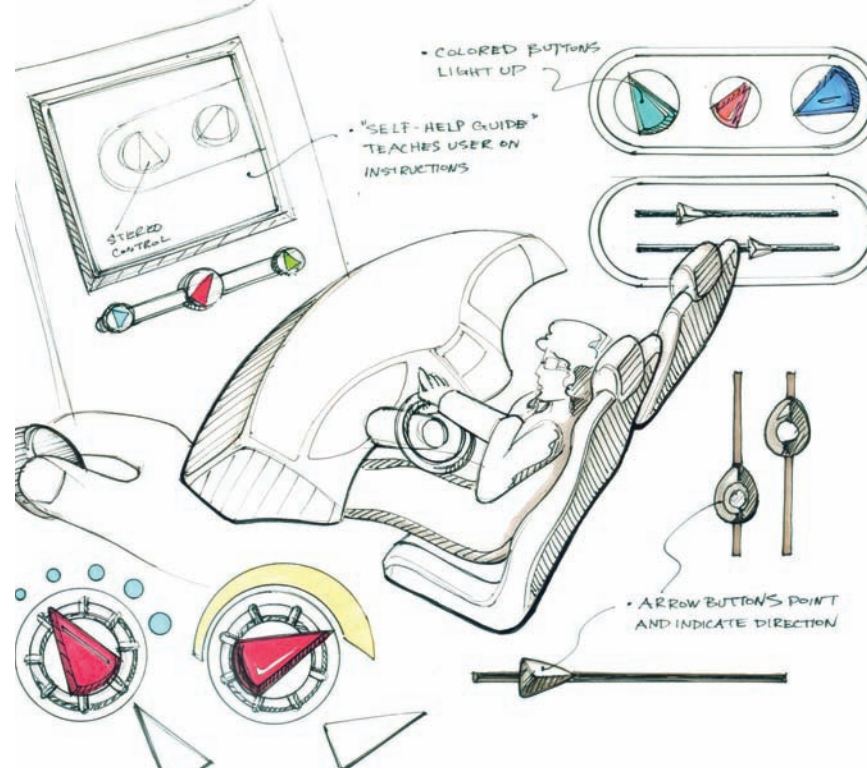
We designed a comfortable, intuitive interior that promotes the confidence necessary for our target group to safely operate the vehicle. Cluttered and scarcely lit instrument panels are simplified, and visual restrictions due to low seating and high dashboards are ameliorated or eliminated. Still, a mature person doesn't want to—and shouldn't have to—simply drive an “old person's car.” Our group was thus challenged to address the mature generation's needs in a style that generates not just confidence and ease, but also joy.

BY FREEING THEM OF PHYSICAL RESTRICTIONS, WE WILL ALLOW THEM TO FOCUS ON THEIR ULTIMATE GOAL: SAFE AND INDEPENDENT DRIVING.



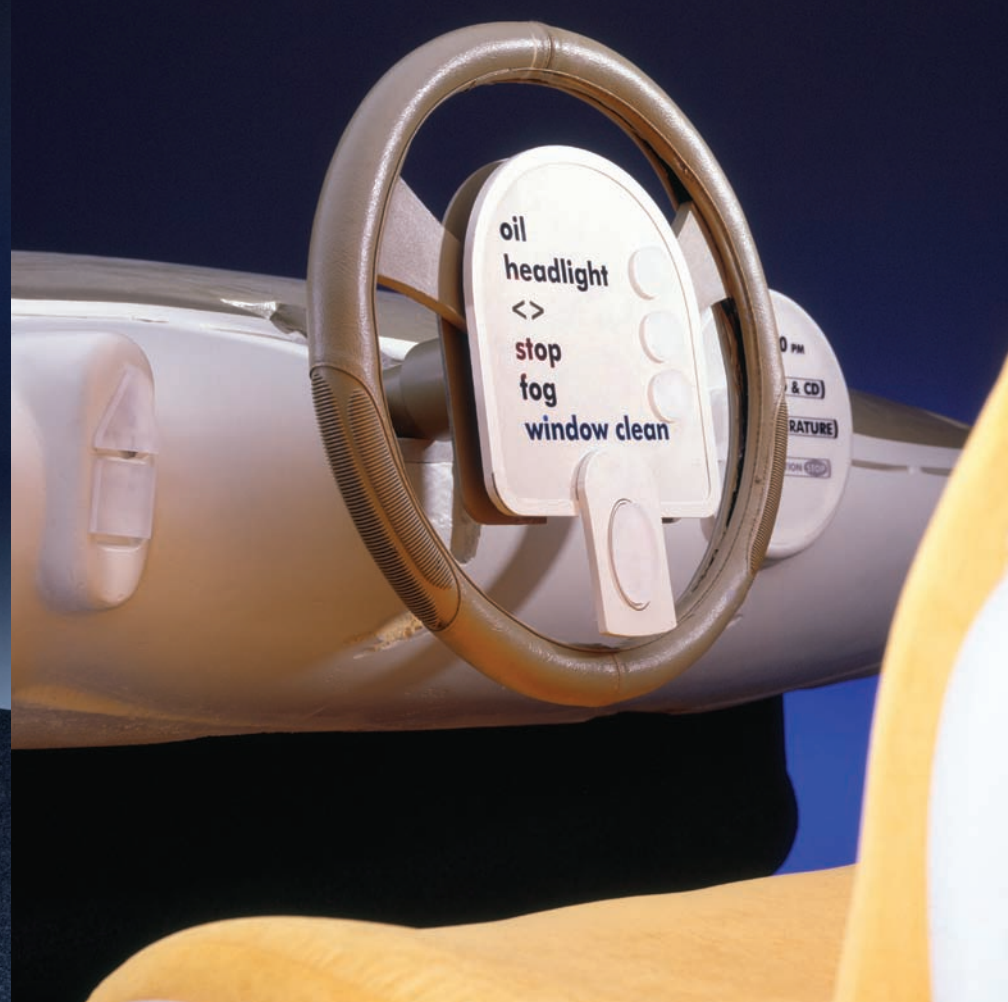
"WALKING CANE HOLDER"





PROBLEM SOLVING

Our group used research and interviews to determine and understand the target group's particular problems and physical restrictions. Mock-ups subsequently helped us verify ideation concepts on a full scale and communicate ideas to outside gerontology experts. After an extensive ideation phase, several specific problem solutions were selected for a final development phase.



DESIGN INNOVATIONS

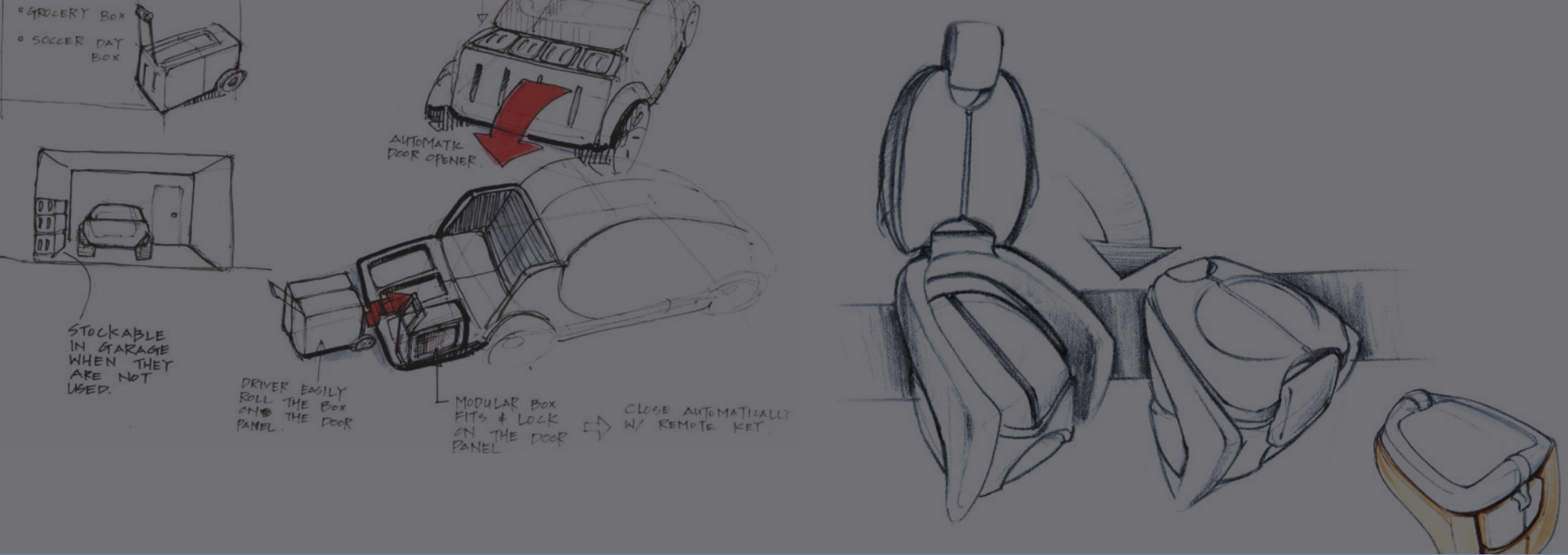
- Automatic telescoping/tilting seat for low-stress ingress/egress.
- Stimulite® foam seat with "smart technology" for enhanced comfort.
- Oversized, simplified instrument interface.



0 20 40 60 80 100 120

oil
headlight
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REDEFINING THE RELATIONSHIP BETWEEN MOTHER AND DAUGHTER.

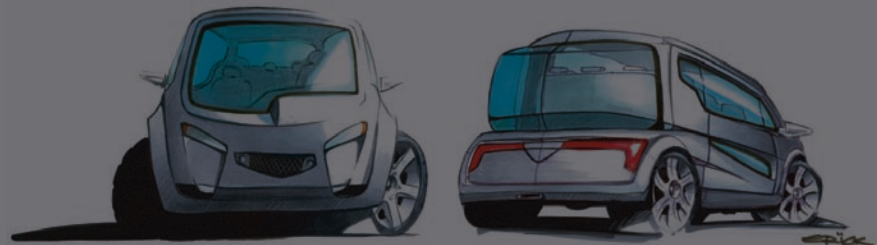
DREAMSCAPE

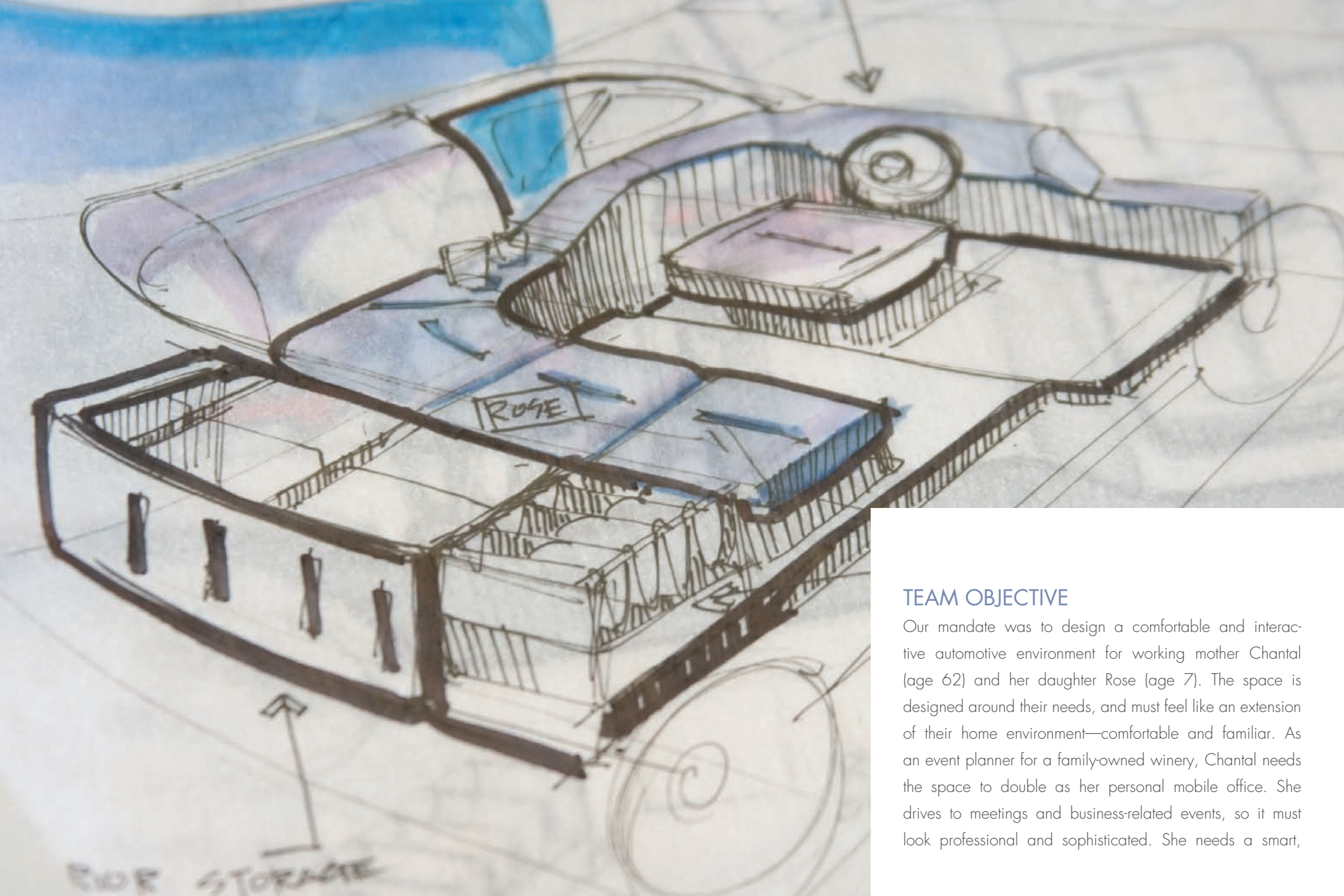
Wakako Takagi 6th term, Transportation Design

Erick Solorzano 6th term, Transportation Design

Chris Favela 5th term, Product Design

Eden Parrish 7th term, Graphic Design





TEAM OBJECTIVE

Our mandate was to design a comfortable and interactive automotive environment for working mother Chantal (age 62) and her daughter Rose (age 7). The space is designed around their needs, and must feel like an extension of their home environment—comfortable and familiar. As an event planner for a family-owned winery, Chantal needs the space to double as her personal mobile office. She drives to meetings and business-related events, so it must look professional and sophisticated. She needs a smart,



KEY ATTRIBUTES WORDS

Interactive

Adaptability

Assured Safety

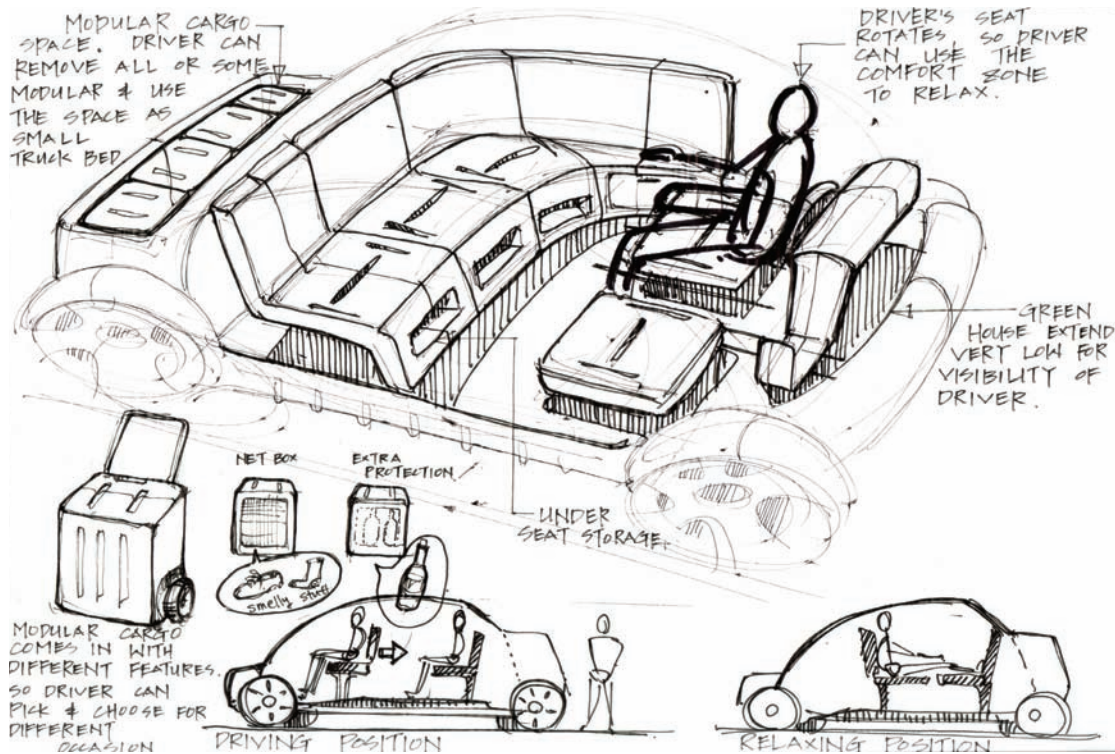
Mobile Cargo

Sophisticated Comfort



interactive communication system to operate her business from the car, and she needs cargo space for hauling. In her role as a mother, she is responsible for taking Rose to school and to after-school activities, shopping for the family, running various errands, and car-pooling other children. Most importantly, she wants the automotive environment to promote spending quality time with Rose. In the car, Rose needs her personal space to function as her room and playground, where she can do her homework, read, listen to music, watch TV, and talk to and email her friends. Considering all these needs, the space must be able to easily shift from traveling space to office space to playground to lounge space.





WE SOUGHT TO UNDERSTAND THE NEEDS OF AN OLDER MOTHER WHO MAY HAVE PHYSICAL, HEARING, AND/OR VISION PROBLEMS NOW OR IN THE NEAR FUTURE.

PROBLEM SOLVING

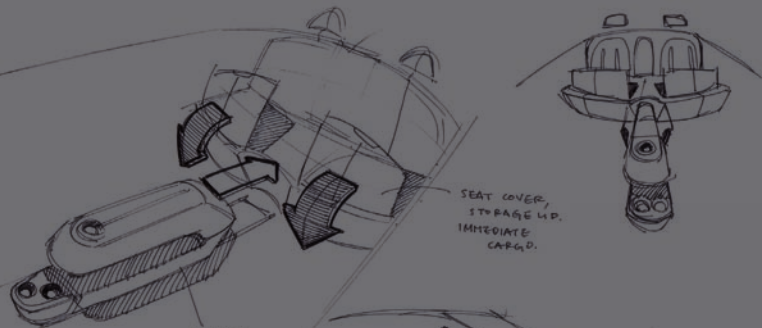
We sought to understand the needs of an older mother who may have physical, hearing, and/or vision problems now or in the near future. Initial concepts were set up and studied to see whether a woman of 62 could possibly maneuver throughout the interior of the car without distress, and to learn how a younger child can feel safe and secure and also have her own space and freedom. Through research and problem solving, we were able to design a concept that would address these needs as well as those of other end users.



DESIGN INNOVATIONS

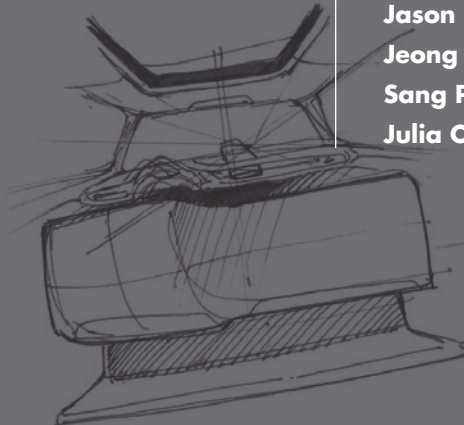
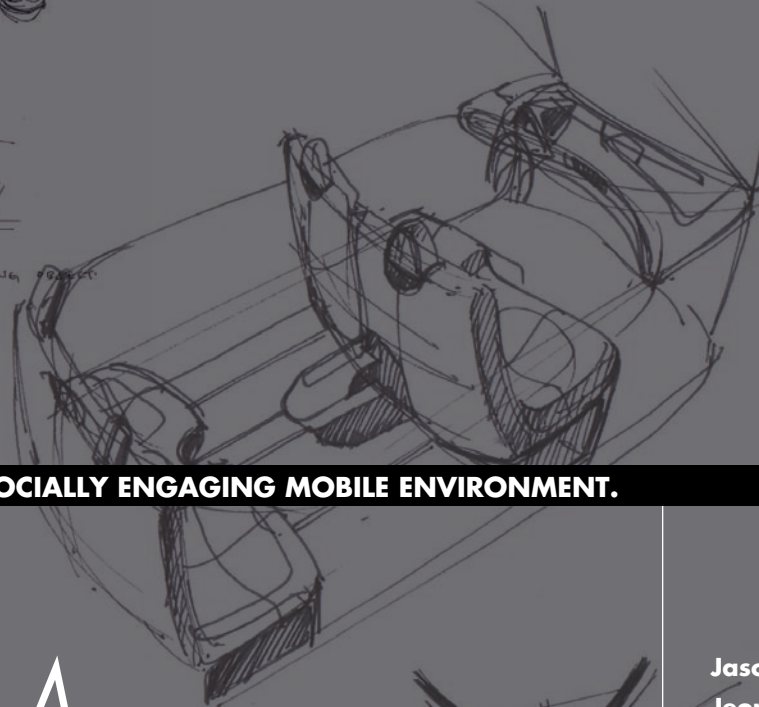
- Extended windshield for child-passenger view.
- Wrap-around rear seating.
- Flexible storage and seating configurations.





CENTER CONSOLE SLIDES BACK.

CONNECTS TO TRUNK TO PROVIDE EXTRA ROOM FOR LONG PROJECT!



DEVELOP A SOLUTION FOR A SOCIALLY ENGAGING MOBILE ENVIRONMENT.

K-TEAM

Jason Lee 6th term, Transportation Design
Jeong Choi 6th term, Transportation Design
Sang Park 6th term, Transportation Design
Julia Chang 6th term, Product Design



TEAM OBJECTIVE

Our goal was to pursue solutions for enhancing the driving experience via the creation of a social automotive environment. Our target demographic is embodied by Isaac (age 56) and Elizabeth (51), a second-generation Baby Boomer couple who opted for early retirement after raising their kids.



KEY ATTRIBUTES WORDS

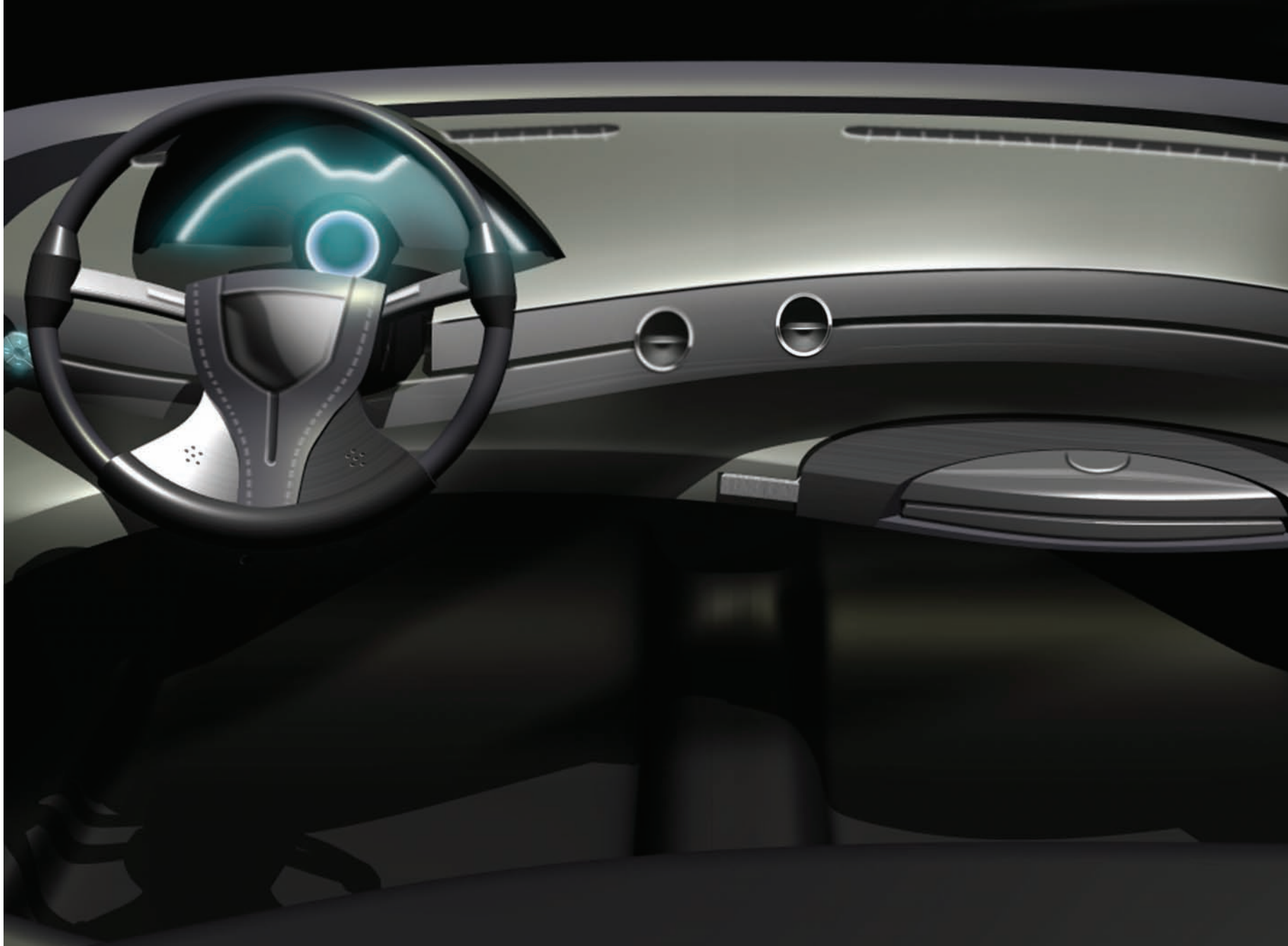
Reconfigure

Renew

Reconnect

Residing in an affluent retirement community, our couple is socially active, involved in local affairs, and focused on maintaining a simple, relaxed, and stress-free lifestyle.

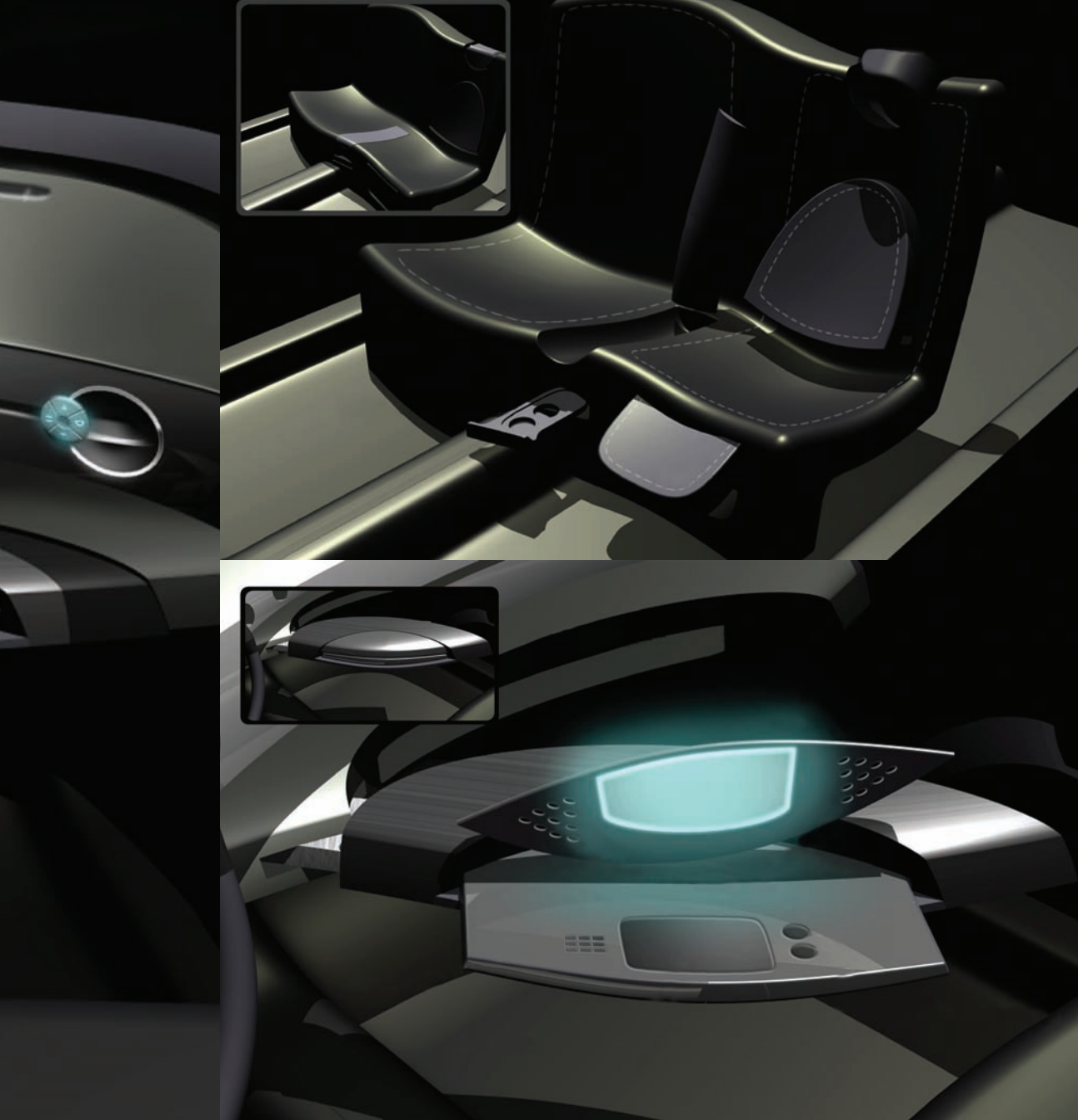
In order to meet the transportation needs of our end users, we sought to create an interior layout that reconfigures for the needs of any driving situation; solo or multi-passenger voyages of short, medium, or long-distance travel. Space utilization needed to be efficient, with features that were accessible and easy to use. Comfort was a priority in our design, as was also promoting social engagement and a sense of excitement and freedom.

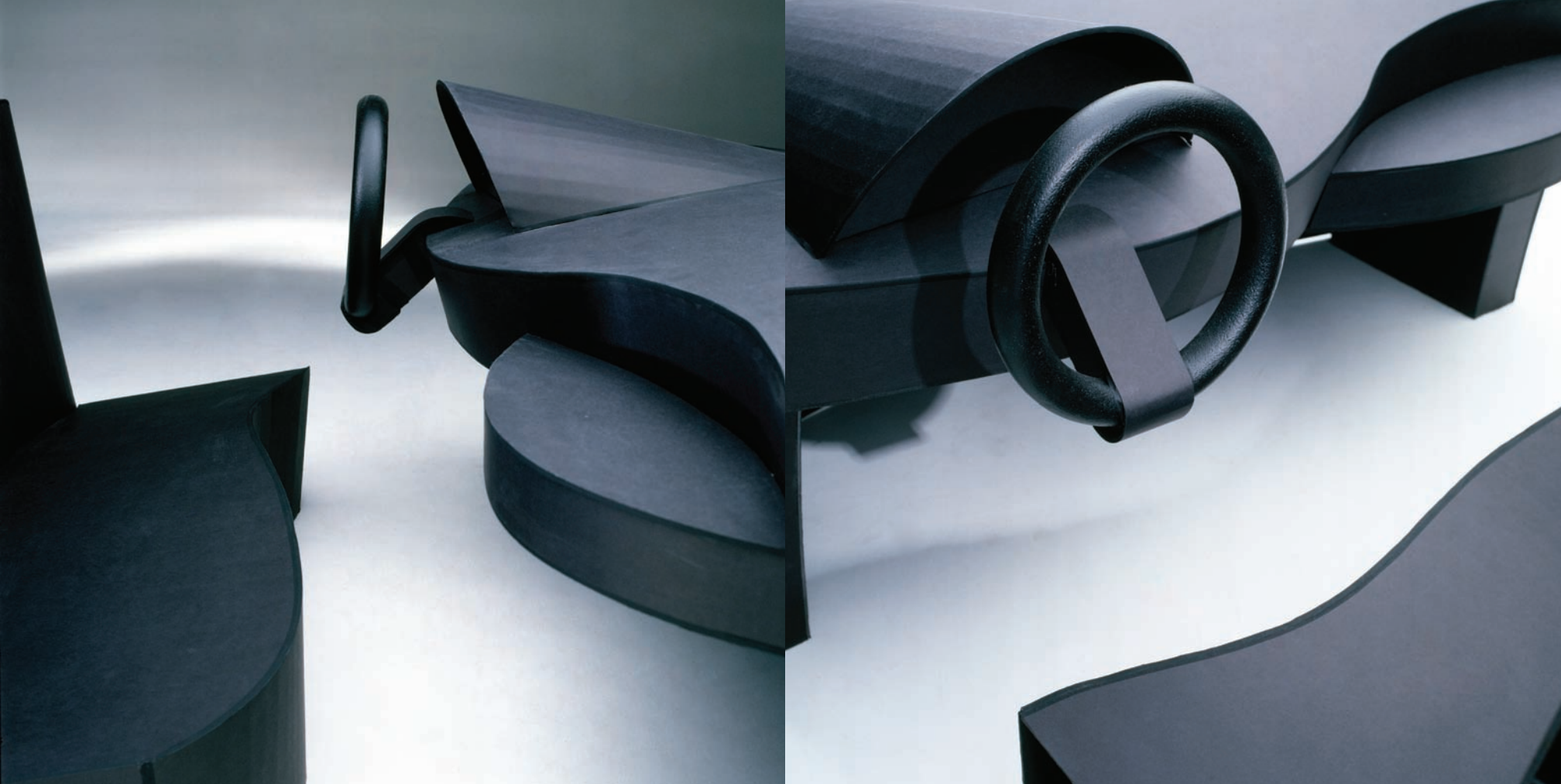


“WELLNESS” ISSUES ALSO CAME INTO PLAY, ADDRESSING COMFORT, HEALTH, MOOD, AND ATMOSPHERE.

PROBLEM SOLVING

Our approach to this design challenge was informed by an analysis of the varied and potential uses of the environment. We experimented with reconfiguration of seating arrangements, instrument panel, and center console to accommodate for trips of different durations. We also considered potential use of the vehicle while at rest. What we termed “wellness” issues also came into play, addressing comfort, health, mood, and atmosphere.

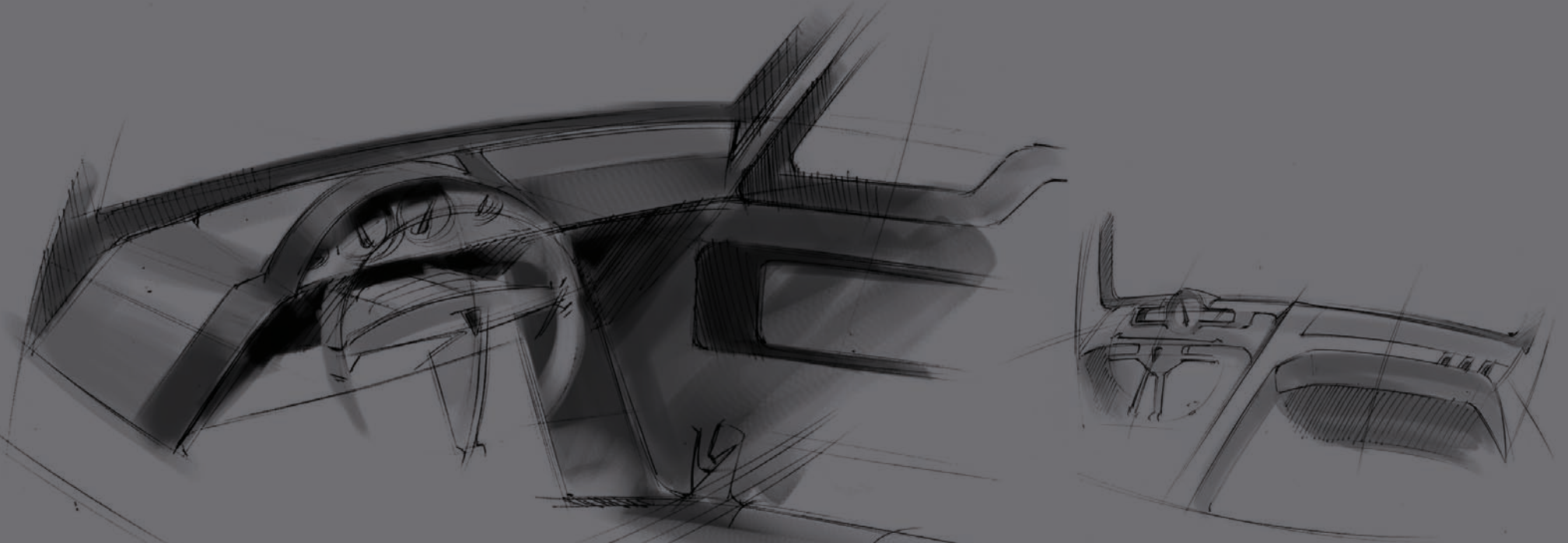




DESIGN INNOVATIONS

- Information Deck interface to involve both front passengers.
- Front bench seat to accentuate “shared space.”
- Flexible interior configuration.





A SEAMLESS AND INTEGRATED VEHICLE CONCEPT FOR AN ACTIVE PARAPLEGIC USER.

MOTUS

T. Jon Mayer 6th term, Transportation Design
John Caswell 6th term, Transportation Design
Eugene Bae 6th term, Product Design
Sonia Spragg 7th term, Environmental Design
Morgan Wise 6th term, Film
Ryan Dickman 6th term, Transportation Design
Mike Reeves 6th term, Transportation Design



TEAM OBJECTIVE

As a team, we were charged with developing a mobility concept for a paraplegic person, with consideration of additional family members. The project focuses on the lifestyle of an active person, and making this vehicle integrate

WE TESTED AND THEN
REFINED THE MAIN PROBLEM
AREAS OF INGRESS/EGRESS,
SPATIAL RELATIONSHIPS, AND
WHEELCHAIR INTEGRATION.

seamlessly into his life. Our end user for this concept vehicle is Terrance Rivers, a 38-year-old active paraplegic who, as a result of a skiing accident, has lost the use of his legs. Despite the accident, he refuses to accept any limitations in his approach to life, and continues his active lifestyle without regret. Terrance is married and has one child, with another on the way. Terrance needs a vehicle that he can integrate seamlessly into his life, and that will support his active lifestyle as well as his professional and family life.





KEY ATTRIBUTES WORDS

Independent

Integrated

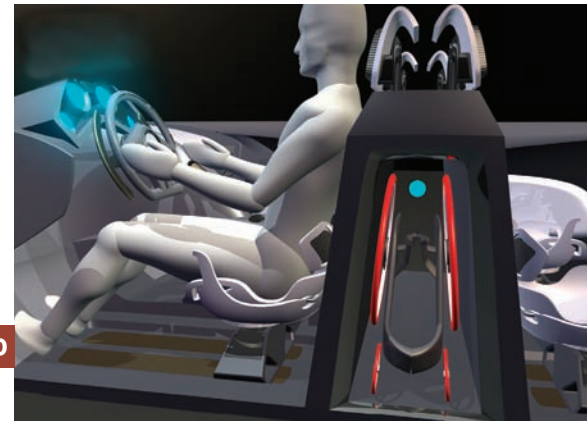
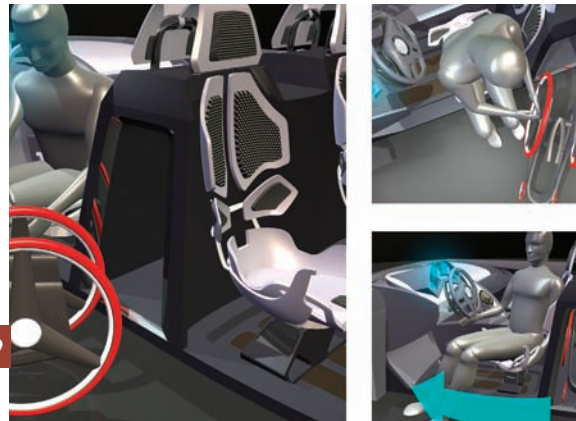
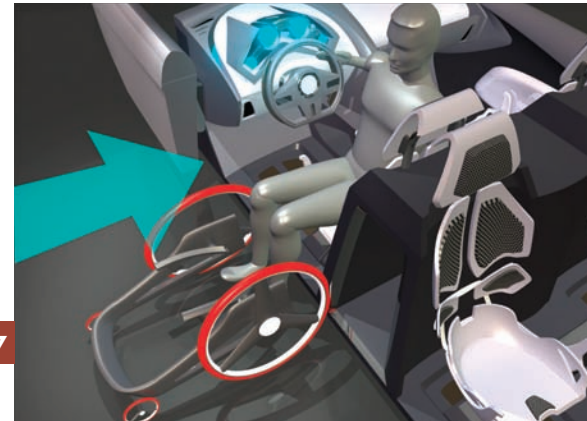
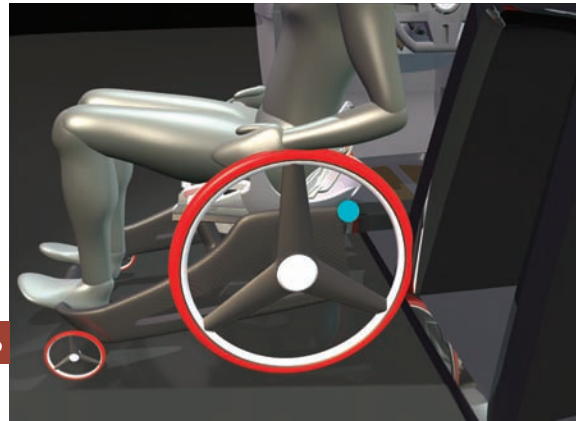
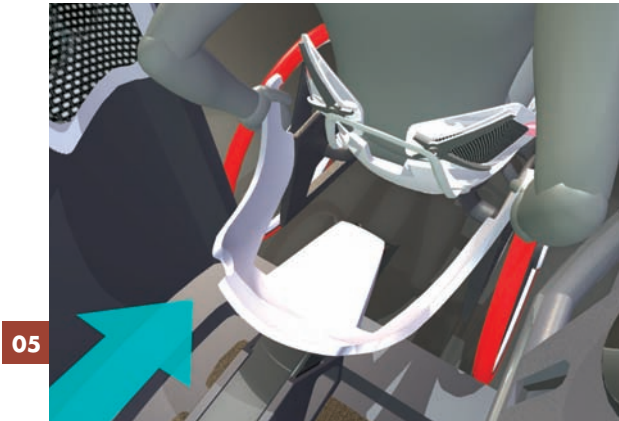
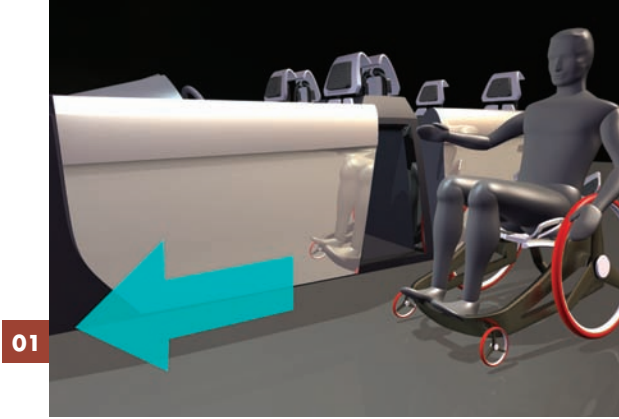
Convenient

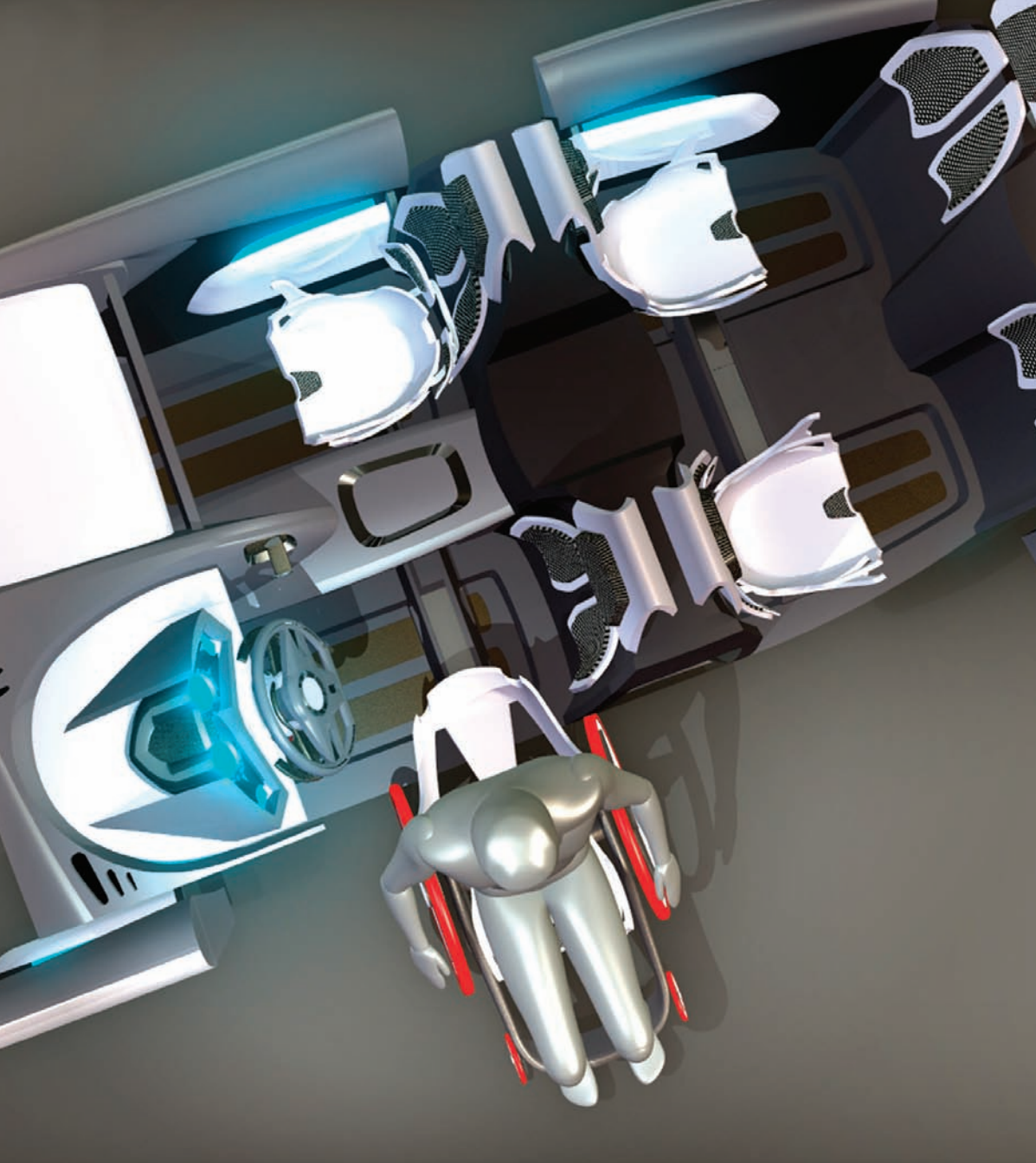
Confident

Constructed

PROBLEM SOLVING

We interviewed an active paraplegic in order to gain knowledge of and insight into the potential end user's lifestyle and needs. Through sketching and discussion, we developed an initial full-size interior mock-up that addressed the concepts and issues discovered through our interview. We tested and then refined the main problem areas of ingress/egress, spatial relationships, and wheelchair integration. Alias was used to further refine and develop the visual design language and mechanisms used in the model.





04

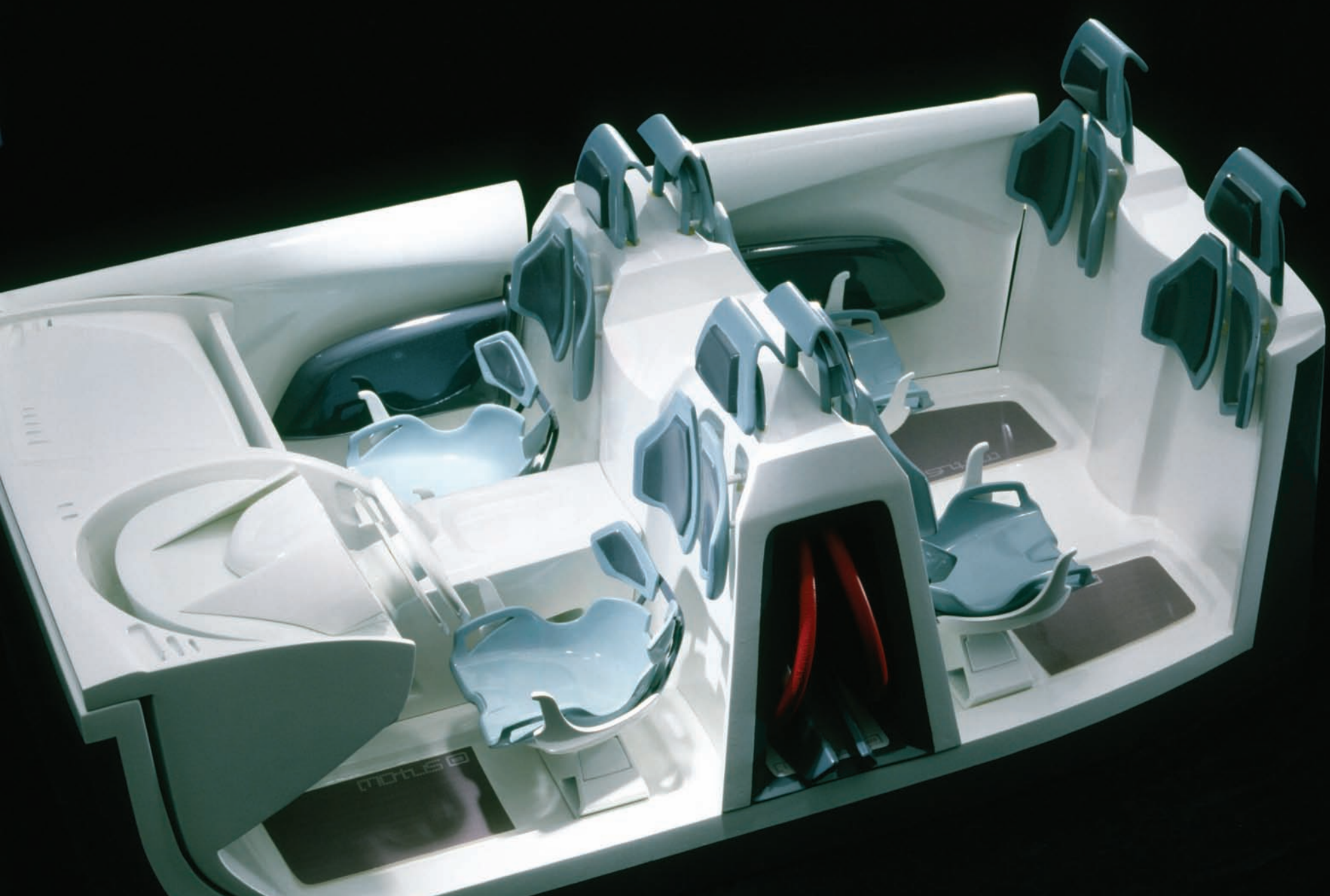
WHEELCHAIR SEAT OPERATION

- 02) The seat harness presents itself automatically when the door is opened.
- 06) The seat harness locks into the wheelchair seat. It is then able to slide into the car.
- 08) The user is able to collapse the lightweight wheelchair frame once in the car.
- 10) Wheels and frame stow in the center cubby.



DESIGN INNOVATIONS

- Automated ingress/egress system, with supplemental vehicle abilities.
- Elegant design of traditionally inelegant materials.
- Integrated wheelchair storage.





MOTUS AQUATIC

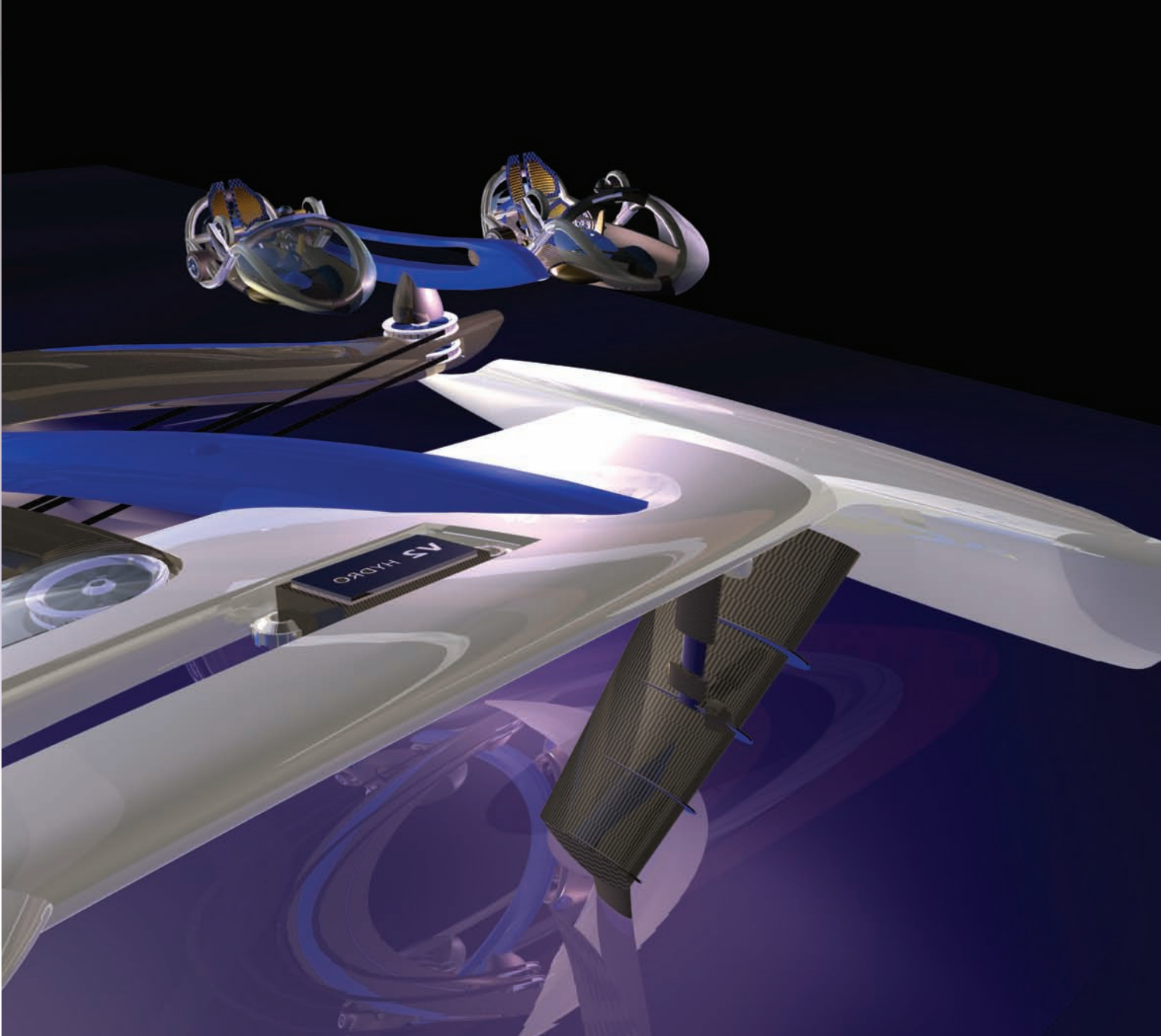
Mike Reeves

6th term, Transportation Design

TAG HEUER SUPER YACHT

Until recently, the physically disabled were seen as ill suited to competition yachting. Even the most advanced boats for these sailors have been little more than clumsy modifications of existing craft designs. As part of the Motus modular system, the Tag Heuer Super Yacht will enable and empower users through a seamlessly integrated design concept that addresses all of the problem areas for the disabled sailor, including ingress/egress and operational challenges. All control systems in the two-person craft—including the winching procedure, the orientation of the winches and the resistance they provide—have been rethought to enable people of varying strengths and states of recuperation to effectively sail the boat.





CONCLUSION

"AS HUMAN MOTIVATION, CONSUMER ATTITUDES, AND CULTURAL PSYCHOLOGY CONTINUE TO PLAY CRITICAL ROLES IN THE COMPLEX RECIPE OF DESIGN, PROJECTS THAT BRING THOSE CONSIDERATIONS TO THE FOREFRONT OFTEN PRODUCE REMARKABLE RESULTS. THIS FUNDED EDUCATIONAL PROJECT PROVIDED A VALUABLE OPPORTUNITY FOR OUR STUDENTS TO BLEND THE TRADITIONAL FOUNDATIONS OF DESIGN WITH SOME OF THE COMPLEX SOCIAL AND PSYCHOLOGICAL INGREDIENTS THAT WILL ENABLE THEM TO BE THE CHANGE AGENTS OF THE FUTURE. WE APPLAUD JOHNSON CONTROLS FOR ENVISIONING SUCH AN IMPORTANT EXPLORATION IN DESIGN, AS WELL AS THE WONDERFULLY CREATIVE STUDENTS WHO DISCOVERED VARIED, EFFICACIOUS AND ELEGANT SOLUTIONS TO THE DESIGN CHALLENGES THAT WERE PRESENTED."

— **NATE YOUNG**

EXECUTIVE VICE PRESIDENT, CHIEF ACADEMIC OFFICER

ART CENTER COLLEGE OF DESIGN



