

Reflection Report – Design Workshop I. WS23/24

“Mert and me - together on the road”

A design process for the biking jacket of the future

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Abstract

In this comprehensive design report, our journey unfolds as we envision Munich in 2035, grappling with climate change, transportation shifts, and technological innovations. We delve into the future of cycling, addressing challenges through problem framing, user interviews, and insightful clustering. Our user-centric approach defines a diverse user group, emphasizing safety and comfort for everyday cyclists. Through a wide-ranging ideation process, we consolidated four initial frontrunner ideas into a single product - a futuristic biking jacket. Further elaboration of the product concept led to sketching and prototyping, resulting in the development of a sustainable, user-friendly final product named "Mert." With a commitment to innovation, safety, and sustainability, Mert aims to be the trusted companion for Munich's cyclists.



Keywords

Urban Mobility, Cycling, Climate Change, Design Process, Prototyping

Vision – What is the future about?

Embarking on our journey into the design process, we had to envision what Munich might look like in 2035. We needed to identify the topics and conditions that would shape the society of the future. Consequently, we selected key subjects from the present day, such as climate change, transportation shift, and technological innovations, and projected them into a future scenario where they take the center stage in the daily lives of Munich's citizens. Coming up with ideas and brainstorming about the future way

of cycling was easy for our group. The challenge was rather to systematically put our thoughts down. The following vision covers these ideas and insights.

Vision

“The population of Munich has surged to over 5 million people, making the city larger than ever. Technology now plays a crucial role in every aspect of the city and its citizens' lives. Climate change stands out as the most significant concern, capturing society's attention with a strong focus on environmental issues. The prevailing mode of

transportation is the bicycle, with cars nearly disappearing from the streets to make way for an advanced cycling infrastructure. However, a new challenge arises with an increase in accidents involving cyclists, particularly during colder periods with significant traffic jams. City navigation has evolved with the widespread adoption of intelligent routing and navigation systems. Bicycles became the new lifestyle object, prompting people to seek ways to personalize and enhance their biking experience.”



Figure 1: AI generated image of our vision [DALL-E]

Framings

To gain a deeper understanding of the challenges faced by the citizens of Munich in 2035, we attempted to frame the issues present in the vision into four problem spaces.

Framing 1: Temperature

“Most cycling accidents happen during huge traffic jams at colder times of the day because the high temperatures force people to stay longer inside during daytime.”

Framing 2: Different Types of Cyclists

“During traffic jams, a lot of different types of cyclists are on their way causing a lot of problems between sporty people, parents with kids, and commuters.”

Framing 3: Technology Dependence

“The reliance on technology for navigation is a key factor in cyclists being unaware of their environment. Furthermore, there are certain risks in regards of personal autonomy and privacy rising from the huge dependence.”

Framing 4: City Infrastructure

“The infrastructure of the city was transformed from cars to bikes. Nevertheless, the infrastructure lacks certain ways to be both efficient and safe, resulting in more accidents.”

Interviews – What do people think?

To gather more information about the product or service we intend to design, we conducted four user interviews. Accordingly, we created an interview guide that starts with general questions about cycling preferences, aiming to ease participants into the conversation and gather initial insights into their biking habits. Subsequently, we introduced our vision and asked them to empathize with this future scenario. Following that, we posed three questions for each of our identified problem framings, seeking deeper insights into participants' perspectives on these issues and their potential approaches to addressing them. Additionally, we encouraged all interviewees to think creatively and brainstorm ideas to combat the anticipated traffic jams in the future.

Insights

We conducted three interviews with random individuals in a café in Munich and one interview later with someone working in the cycling industry at a startup. Initiating the conversation and inviting them to participate proved challenging. However, once they agreed, we made concerted efforts to ensure they felt comfortable. A common difficulty for all participants was thinking outside the box and immersing themselves in our vision. To address this, we reassured them that they could suggest very unconventional ideas. This approach yielded valuable insights into possible solution spaces since our interviewees had to combine our vision with their ideas for future biking. Surprisingly, individuals outside the industry provided better interview insights due to their fresh, outsider perspective. One key takeaway for us was that extreme temperatures emerge as the most significant concern for our interviewees. Another revelation was that while people express interest in using protective gear, they often find it lacking in terms of comfort and coolness. On the contrary, issues related to privacy or technological dependence were not perceived as problems.

Clustering

After the interviews, we collected the most valuable insights from our notes and aligned them to the identified problem areas. Subsequently, we thought about potential solution spaces that could arise from these insights and organized our notes accordingly through clustering.



Figure 2: Notes from our interviews

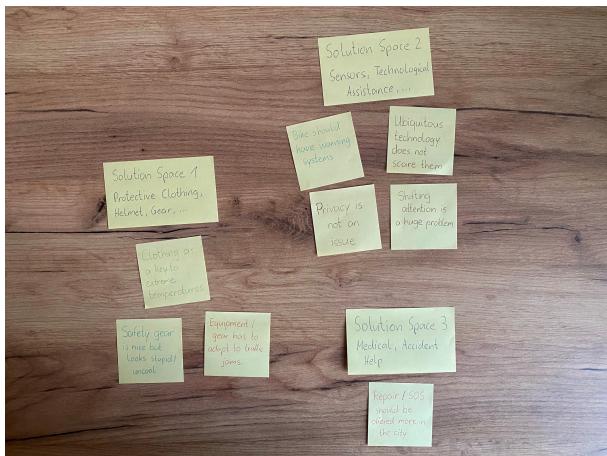


Figure 3: Clustering for possible solution spaces

User Group – Who is our customer?

Considering these insights, we defined our user group and identified the needs that our product or service must address to be appealing to them. The challenge here was to synthesize all the information we had gathered earlier and draw meaningful conclusions from it. To achieve this, we utilized our clustered insights to derive user needs and applied them to identify our user group.

User Group

The user group for this project includes everyday individuals, spanning commuters, families, and sporty cyclists. Our solution aims to be accessible and relevant to everyone, with a low barrier to entry due to the diverse range of users. Furthermore, the user should be able to use our solution without much effort. We do not create specialized and expert equipment. Our solution does not serve special interests since it should be used by general society. The three pillars we prioritize for our users are intuitiveness, accessibility, and effectiveness. These aspects are crucial to ensure the safety of Munich's streets and address the challenges faced by its citizens in 2035.

User Need

Safety is a crucial feeling, as it forms the foundation of human well-being, providing a fundamental sense of security and stability. This drive for assurance underscores our instinct to create an environment where individuals can confidently navigate life's uncertainties and thrive. However, the cycling experience in our future scenario lacks this essential sense of safety, making it uncomfortable and potentially dangerous. Since cycling is integral to most people's lives, there's a need for improved security while biking. Another need comes from the discomfort caused by extreme temperatures making cycling a challenging endeavor. Cyclists should have something to adapt to temperatures and be independent of current weather conditions. Furthermore, the traffic conjunctions at colder times could be tackled if people have the option to drive through heat in a more comfortable way.

Relevance

In a society where cycling is the most important means of transportation, the safety of cyclists is crucial. Given climate change and the increasing dependence on eco-friendly transportation, solutions must be found to reduce the rising number of accidents and to make urban mobility more efficient. In addition, the cycling experience must be improved to meet people's expectations. This is not only important for the health and safety of citizens but also for maintaining Munich's position as a leading, sustainable, and technologically advanced city.

Ideation – What is our solution?

Building upon the insights gathered from problem framings, user interviews and need identification, this stage catalyzes the effort to explore a multitude of possibilities and generate ideas that address the identified challenges. The following products have been chosen as our frontrunner ideas. These solutions are the ones we will consider during our ideation process.

Front Runner Ideas

Super Jacket

The jacket provides accident protection through new materials that harden when you have an accident. Air condition and heating allow the user to withstand extreme temperatures with controls reachable on the sleeve. It has a fashionable look that can be designed individually by the customer on the shop website.

Super Helmet with Navigation

The helmet is lightweight and modern looking. Before an accident occurs, the super helmet inflates like an airbag around the head and neck to give safety. It has an AR vision on the front that helps with navigation through directions and a mini map. It also sends warnings in dangerous situation.

Advanced Bike Sensor-System

The sensors are add-on gadgets that can be mounted to the user's bikes. They give warnings when someone enters the personal space or passes the user, using audio cues with direction information of the direction. They work individually or together as a set.

Advanced First Aid-Kit

The advanced first aid kit system can help users to treat wounds in emergency situations. It has an inside display for instructions and starts flashing to attract the attention of other passers-by and road users.

Personas

As we focus on the everyday cyclist, obtaining additional information regarding their preferences and behavior is essential for our ideation process. Our user group exhibits significant heterogeneity, making

it challenging to summarize them. Consequently, we have employed a variety of different personas, each representing a diverse segment within the user group. These personas complement the individuals we have previously interviewed, who were predominantly young.

Anna, 25, Student and Environmental Activist

Anna is passionately dedicated to environmental causes and uses the bicycle as her primary mode of transportation. She appreciates the ability to express her personal style through modular elements and interchangeable design features. Since she is a student, her budget on new products is not too high.

Justus, 49, Finance Consultant

Justus commutes to work daily by bicycle. Since he has a lot of client contact, he doesn't want to look sweaty at work after commuting. The clothing he buys, needs to fit to his business occasions. He has a high budget and wants some luxury from his products.

Lena, 36, Urban Mom

Lena uses her bicycle to stay flexible. The products she buys need to complement her urban lifestyle, providing not only protection but also customizable elements for an individual look. Since she is a mom, she must go shopping for her child frequently and carry many things on her bike.

Xaver, 63, Retired Software Developer

Xaver is a technology enthusiast who relies heavily on intelligent systems for navigation and efficiency. As an elderly man, the heat in the summer makes biking through the city very difficult. The interaction with products is limited because of his hand disability.

Empathy Map

The empathy map showcases what drives these personas from the inside and outside. It has four categories that describe the various factors that set their willingness, actions as well as goals. The results once again highlighted the profound integration of cycling into the lives of future citizens. The key takeaways for us were the imperative focus on accessibility in terms of product usage, ensuring simplicity, and fostering expressiveness.



Figure 4: Empathy Map

Categorization

We further conducted a comprehensive analysis of our frontrunners, evaluating their impact on the user and their feasibility to use. To visualize this assessment, we established a coordinate system, with metrics ranging from low to high on the axes.

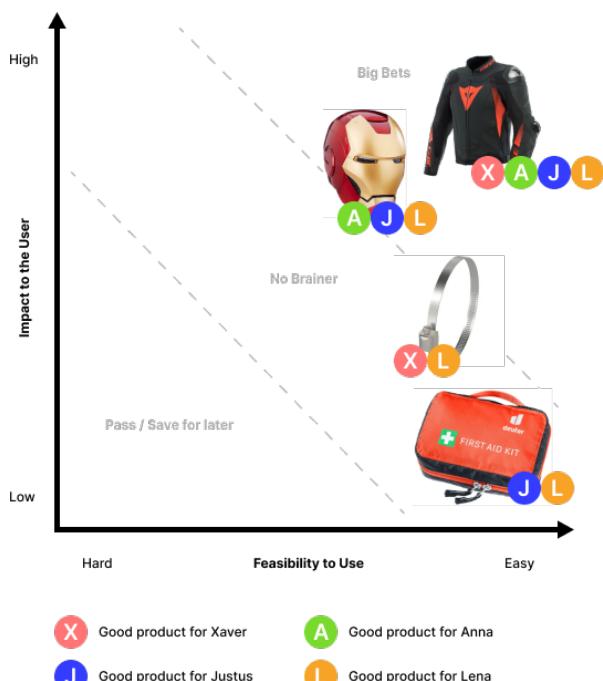


Figure 5: Categorization of ideas

We also considered which personas would benefit the most from each solution, incorporating this aspect into our coordinate system. The resulting placement of the objects categorizes them into three spaces. "Big Bets" represent substantial ideas that would greatly benefit our users. "No-Brainers" are ideas with significant potential for success. Solutions categorized as "Pass / Save for Later" are unsuitable for immediate implementation. This systematic approach facilitated the consolidation of ideas, allowing us to focus our attention on the Super Jacket and Super Helmet.

Evaluation

Our earlier user research has already narrowed down our frontrunner ideas to the Super Jacket and Super Helmet. To gain additional insights into how these ideas align with the challenges and conditions outlined in the vision, we evaluated each of them across the categories of road safety, practicability, climate control, and aesthetics, aiming to ascertain if we would obtain consistent results. This evaluation yielded a score for each product in each category, and a final score based on all the individual scores.

Criteria	1 - No Implication	2 - Not Useful	3 - Neutral	4 - Useful	5 - Very Useful
Road Safety					
Super Jacket					x
Safety Tech Helmet					x
Advanced Bike Sensor-System			x		
First-Aid-Kit				x	
Practicability					
Super Jacket				x	
Safety Tech Helmet					x
Advanced Bike Sensor-System		x			
First-Aid-Kit			x		
Climate Guard					
Super Jacket					x
Safety Tech Helmet		x			
Advanced Bike Sensor-System	x				
First-Aid-Kit	x				
Aesthetics					
Super Jacket					x
Safety Tech Helmet			x		
Advanced Bike Sensor-System		x			
First-Aid-Kit			x		
#	Super Jacket	Safety Tech Helmet	Advanced Bike Sensor-System	First-Aid-Kit	
Average	4,75	4,25	2,75	3,25	

Figure 6: Evaluation table

The evaluation further confirmed that the jacket and helmet are our top ideas. Given the positive reception of the jacket in all our user research, we have decided to proceed with developing this idea further into the sketching and prototyping phase.

Sketching – How does it look?

After our comprehensive user research, we chose the Super Jacket as our product. While we had a rough description of the features this jacket would have and the user needs it would fulfil, we lacked a concrete vision of its appearance and interaction. To address this, we created multiple sketches to develop a clearer picture. The initial sketches were quite basic, focusing on specific elements like buttons and screens committed on functionalities like the heating and cooling system as well as a navigation on the display. We presented these sketches to a small group of fellow students. A key takeaway from their feedback was that the interaction should not be too reliant on digital screen elements but rather based on a minimal number of buttons. Taking this feedback into account, we created our final sketches, incorporating this interaction style into a full jacket design. We used these sketches to shape our idea of the jacket and as blueprints of how a prototype could look like.

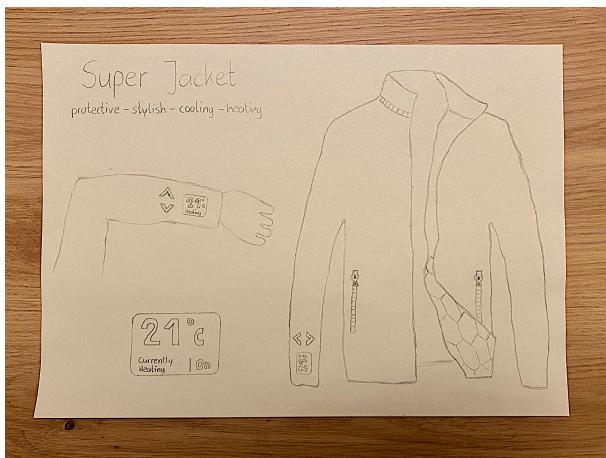


Figure 7: Key sketch showing jacket with controls



Figure 8: Key sketch showing possible navigation

Prototyping – How does it work?

All preceding steps provided us with a comprehensive understanding of how the prototype might take form and function. The task here was the combination of all insights as well as designing in alignment with the pillars of intuitiveness, accessibility, and effectiveness that we had earlier established for our user group.

First Steps

The initial prototype we constructed featured an on/off button, controls for temperature adjustment, and a screen displaying information such as the current jacket temperature. The interactions were chosen with caution to maintain the intuitiveness emphasized in the feedback received during our sketching phase. In a subsequent iteration, we enhanced simplicity by replacing the on/off button with sensors that activate the jacket automatically upon wearing. We presented this implementation to fellow students which were in favor of the approach. Moreover, numerous proposals for button placement were mentioned, leading to the concept of incorporating multiple magnetic spaces on the jacket. The controls themselves also feature a magnetic component, facilitating easy swapping or relocation, further enhancing accessibility and expressiveness.

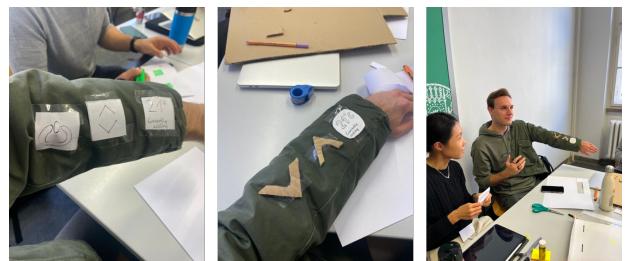


Figure 8: First prototyping including presentation

Key Prototype

For our key prototype, we reused an old jacket. At first, we incorporated bubble wrap into the jacket to provide testers with a tactile sense of how a soft material that hardens upon impact could look and feel like. Subsequently, we meticulously cut out spaces all over the jacket to embed magnetic components, utilizing a magnetic band for the desired behavior. Following this, we cut out controls, affixed magnetic

tape to them, and strategically placed them on some of the magnetic spaces. To enhance the user experience, we utilized the back part of flashlights for the controls, providing haptic feedback upon clicking. For the display, we utilized a special type of foil where we could insert various paper prototypes of screens. Upon showcasing this prototype to users, we received feedback that the navigation component didn't significantly contribute to the product, as there were already numerous effective solutions available. Consequently, we decided to remove this feature from our list of functionalities. Additionally, we opted for a dial as the control for temperature adjustment. With these changes, we believe we have made significant improvements in terms of accessibility and simplicity.

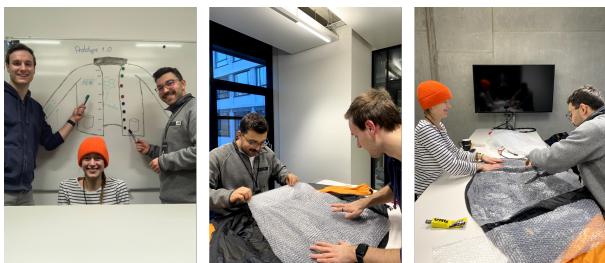


Figure 9: Development of the key prototype

Final Concept

The Super Jacket is a lightweight piece of cloth that allows for personalized styling based on individual imagination. When ordering, customers can choose from various predesigned versions or opt for customization, designing the jacket themselves and even sharing their creations with others. The jacket features a protective interior material that is soft under normal conditions but can harden in the event of a fall, providing additional security in accidents. The heating and cooling functionality is inspired by nature, using the bionic effect observed in animals such as polar bears. The jacket incorporates special layers capable of refracting light, which is then trapped as warm air within small cavities. This effect can also be reversed to achieve a cooling effect. These features are accessible through a dial that can be magnetically placed at multiple locations on the jacket. Additionally, a small screen displays real-time information regarding the temperature of the jacket. To activate these features, the user must do nothing more than simply put on the jacket, as sensors detect the wearer automatically.

Circular Design – Is it sustainable?

To address the environmental challenges of the future, we have developed a sustainability concept for the jacket. All controls and the screen are magnetically attached, allowing for easy replacement in case of dysfunction without the need to replace the entire jacket. The jacket's design is inclusive, accommodating both left and right-handed individuals, as well as those with disabilities, due to the flexible placement of controls. Ensuring the longevity of the digital components, we guarantee a minimum of fifteen years of software updates. This commitment provides users with new functionalities, fixes, and security updates over an extended period, ultimately enhancing the product's resell value. Additionally, we offer a fifteen-year warranty for free jacket repairs, covering damage, as well as software or hardware defects. This comprehensive approach aligns with our commitment to sustainability and user satisfaction.

Branding – Why should you want it?

Our product is named "Mert," symbolizing a friend, companion, and assistant. The brand colors, red and blue, reflect the dual functionality of heating and cooling. The brand is characterized by reliability, safety, sustainability, innovation, awareness, style, uniqueness, individuality, and fun. Our slogan, "Mert and me - together on the road," aims to reinforce the concept of Mert as your daily companion on your bike. The brand principles resonate with our features, emphasizing "Mert keeps me safe," "Mert keeps me warm," and "Mert keeps me cool."

Conclusion

Our project has been a journey of constant iteration and refinement. Navigating through multiple stages of the design process, we learned the importance of valuable feedback and user-centric ideation. While the development of innovative ideas is quite challenging, our team approached this with creativity mixed with a dash of fun, making the work on the project delightful. During multiple phases we encountered insights that forced us to reassess and prioritize features, shaping Mert into the true companion for all cyclists in Munich 2035.