D2.2 End-user requirements (vehicle)

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Deliverable information sheet

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Executive summary

Project summary

Shift2Zero, Shifting to zero-emission logistics through right-sized, mission-focused, N1 e-LCVs

Current market dynamics in EU reveal a gap between supply - existing N1 vehicles, and demand - evolving needs of urban logistics and climate targets. In 2023, 1.2M new LCV registrations were diesel-powered, and only 108,200 battery electric. Last-mile logistics, the least efficient and most complex part of the supply chain, presents significant opportunities for improvements at vehicle and operations levels. Dynamic requirements and increasing environmental impact require innovative solutions from the automotive industry, both from high volume OEMs and new entrants. S2Z aims to capitalize on the benefits of both vehicle platforms in the N1 segment - represented by IVECO's eDaily multipurpose platform, and Alke's ATX design-for-purpose platform - ultimately contributing to "Shifting to zero-emission logistics through right-sized, mission-focused, N1 e-LCVs".

To achieve this vision, S2Z proposes a 4-step user- and mission-centric design approach placing end-users and their needs at the core of all project activities. To this end, S2Z involves 5 LSPs & mobility operators as partners: Gruber, DHL, Diakinisis, Clem, DPD. As a result, S2Z will co-develop and shape at least 6 novel N1 concepts with enhanced and safe functionalities leading to tighter market fit, particularly in the segments of e-commerce, returns and cold deliveries.

Innovative concepts, from modular cargo bodies to vehicle control strategies with optimized tyres & brakes, as well as dual transport of people & freight, will be physically prototyped and tested in real-life operations in 6 pilot sites (Belgium, Greece, Italy, 2 in Norway, Poland).

S2Z brings a multidisciplinary consortium of 30 partners from 10 countries to cover the complete automotive and logistics value chains, complemented by policymakers to effectively ensure route to market: overcoming barriers for the adoption of S2Z eLCVs, reducing operational costs and environmental impact in scalable urban & sub-urban operations.

D2.2 Executive summary

Deliverable 2.2 was developed from the beginning of the Shift2Zero project, starting in project month one, and documents the results of Task 2.2 (User-specific needs for conceptual design guidelines) up to project month nine. The purpose of this deliverable is to gain an understanding of the current challenges of existing electric light commercial vehicles (eLCVs) and to derive user needs at vehicle level for future innovations. These insights are essential for Task 2.5, where user-centred requirements for the innovations to be developed within Shift2Zero will be defined. In turn, these requirements form the foundation for further innovation development within WP 3 and ensure that the innovations address real user needs and deliver tangible value.

To capture user needs, a user-centred, two-stage workshop approach was applied. In this process, application scenarios were systematically derived based on the everyday contexts of users. These scenarios originated, among others, from the use case descriptions gathered in Task 2.1, which describe how project partners intend to employ Shift2Zero innovations to optimize their current workflows. In addition, problems with existing eLCVs were identified through an internet review and discussions with fleet managers from the partner companies DHL Express, DPD, Diakinisis, and Gruber Logistics. Particular attention was also given to situations in which Shift2Zero innovations are expected to create added value.

The identified application scenarios included, for example, loading and unloading processes, delivery stops, the use of swap boxes, geofencing, dynamically optimized cargo space, multi-temperature cargo bodies, infrared heating systems and energy management strategies.

These scenarios were visually prepared by a designer and transformed into a presentation format for use in the workshops. Based on this preparation, workshops with the partner companies DHL Express, DPD, Diakinisis, and Gruber Logistics, as well as interviews with car-sharing users, were conducted. The participants, primarily drivers and fleet managers, shared their experiences, challenges, and improvement ideas regarding the application scenarios. These statements were subsequently abstracted into solution-neutral user needs by experts.

Through systematic documentation, categorization, and prioritization of participant contributions, 270 relevant user needs were derived from 337 recorded statements. These needs were formulated using the established template “As a [role], I [desire/goal], so that [reason]” and compiled into a structured table to ensure a clear, solution-neutral, and user-centred representation.

It is particularly important to note that users consider the swap box and geofencing system to be particularly useful, but only under a variety of conditions. Therefore, the constraints, such as the use of strategically positioned micro-hubs and cooperation with local municipalities, must also be taken into account when designing and implementing the innovations.
Intelligent software has very often been named as another essential component for the success of the innovations in Shift2Zero. For this reason, an additional 98 software-related requirements have been identified.

The identified user needs now serve as the foundation for the next steps in the Shift2Zero project: deriving technical requirements (Task 2.5) and implementing them into innovative vehicle concepts (WP3). In the long term, the results will ensure that the developed innovations for eLCVs are both user-friendly and market-ready, while effectively addressing the specific needs of logistics and car-sharing practice.

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Terminology and Acronyms

D	*Deliverable*
EC	*European Commission*
(e)LCV	*(electric) Light Commercial Vehicle*
EU	*European Union*
IKA	*Institute for Automotive Engineering*
N1	*Vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes*
RWTH	*Rheinisch-Westfälische Technische Hochschule Aachen*
S2Z	*Shift2Zero*
V2G	*Vehicle-to-Grid*
V2L	*Vehicle-to-Load*
WP	*Work Package*
ZEZ	*Zero Emission Zone*

1. Introduction

The market success of a product largely depends on the extent to which current and future user and customer needs are identified and integrated into the product development process. User-centred development approaches have proven effective in practice in significantly improving the usability, acceptance, and marketability of products. Various studies show that the early involvement of end users has a particularly positive influence on the success and user-friendliness of products [1,2,3].

In this context, the systematic identification and consideration of user needs is a key element of modern product development processes, especially in the case of sustainable and technologically innovative products. Within the EU research project Shift2Zero, this aspect is addressed in Task 2.2 and documented in the form of the present deliverable D2.2.

1.1 Objectives of the deliverable

The aim of this deliverable D2.2 is to identify and analyse user-specific needs for electric light commercial vehicles (eLCVs) and to provide a basis for the subsequent development steps. The focus of the analysed needs is on users who are in regular physical contact with the vehicle. The insights gained serve as input for Task 2.5, in which user and technical requirements are derived. These will subsequently be used for technical product development in WP3. In addition, the analysed needs will be compiled in order to derive general evaluation criteria and design guidelines in Task 3.1, which are crucial for the success of a vehicle concept or innovation in logistics.

1.2 Structure of the deliverable

The structure of this deliverable is designed to guide the reader from the theoretical background to the practical application and future relevance of the results. Chapter 2 outlines the theoretical foundations and the methodological approach for identifying user needs. Chapter 3 describes how this approach was implemented in practice, including the preparation, execution and analysis of the workshops conducted in collaboration with the project partners. Finally, Chapter 4 summarises the content developed and provides an outlook on how the user needs will be used in further project work within Shift2Zero for the development of the innovations.

[1] Kujala, Sari. (2003). User involvement: A review of the benefits and challenges. Behaviour & IT. 22. 1-16. 10.1080/01449290301782.
2 ISO 9241-210:2019. Ergonomics of human-system interaction – Part 210: Human-centred design for interactive systems.
3 Norman, Don. (2013). The Design of Everyday Things. Revised and Expanded Edition. Basic Books.

2. Methodological approach

Identifying user needs is often a complex task. Users are not always fully aware of their own needs[4] or may struggle to articulate them clearly. Cognitive biases such as technical solution fixedness can make it particularly difficult for users to develop creative problem-solving strategies that go beyond familiar patterns. As a result, user surveys frequently lead to suggestions for specific technical solutions rather than revealing the underlying needs. This limits the user's ability to serve as a direct source for radical innovation and constrains their contribution to creative processes[5].

Despite these challenges, the systematic identification of user needs remains essential, as it provides a critical foundation for user-centred design and product development. For this reason, the present work applies a user-centred method to capture user needs. The approach involves collecting user input during workshops based on selected application scenarios. These scenarios are grounded in everyday contexts familiar to the participants, which facilitates more accurate and concrete expressions of their needs.

The user statements gathered during the workshops are subsequently interpreted by domain experts, who abstract them into underlying, solution-neutral user needs. This process helps to bypass cognitive biases and ensures that the resulting needs are not limited by pre-existing assumptions or specific technologies. As a result, the method enables a deeper understanding of user needs, which can be incorporated into the development of future innovations. The detailed procedure for determining user needs is shown in Figure 1.

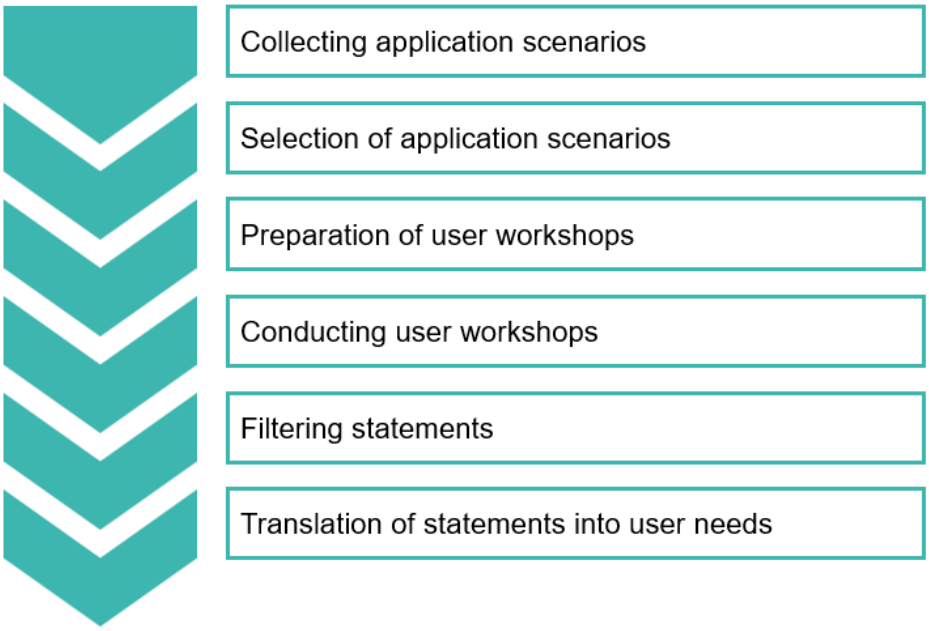


Figure 1. Methodological approach for collecting user needs on vehicle level in Shift2Zero

[4] Ulwick, A. W. (2005). What customers want. Using outcome-driven innovation to create breakthrough products and services.
[5] Adamson, R. E. (1952). Functional fixedness as related to problem solving: a repetition of three experiments.

The approach begins with the systematic derivation of application scenarios in which improvements are expected through the implementation of Shift2Zero innovations. Subsequently, the most relevant scenarios are selected in order to define a focused set for discussion during the workshop. Once these application scenarios have been identified, the workshop must be prepared. This preparation includes the development of workshop materials such as the presentation and workshop guide, as well as the organization and the invitation of participants.

After successful preparation, the workshops are conducted. During the sessions, participants' verbal contributions are recorded. In parallel, concrete product ideas are visualised by a designer through live sketching. Participants are also provided with drawing materials so they can visually express their own ideas.

Following the workshop, the statements collected from participants are systematically documented and categorized to improve clarity and structure. This allows the identification and filtering of content that is most relevant for the further development of innovations. Finally, statements that refer to the innovations to be developed within Shift2Zero are translated into user needs. This step requires an abstraction of the original input, as the statements are often formulated as technical solution ideas. The goal is to derive solution-neutral user requirements that can guide a user-oriented innovation process.

3. Application of the approach and results

To gather user needs related to the Shift2Zero innovations from individuals who are in direct physical contact with the innovations, the approach described in Chapter 2 was applied. In collaboration with project partners DHL Express, DPD, Diakinisis, and Gruber Logistics, workshops and interviews were conducted with experienced courier drivers and fleet managers. The collection of user needs for car-sharing scenarios was carried out through interviews with users of shared transport vans, conducted at the RWTH Aachen University. The following section outlines the step-by-step process used to identify and document user needs for the development of the Shift2Zero innovations.

3.1 Collecting application scenarios

The derivation and collection of application scenarios used for conducting the workshops and interviews were based on three sources, as illustrated in Figure 2.

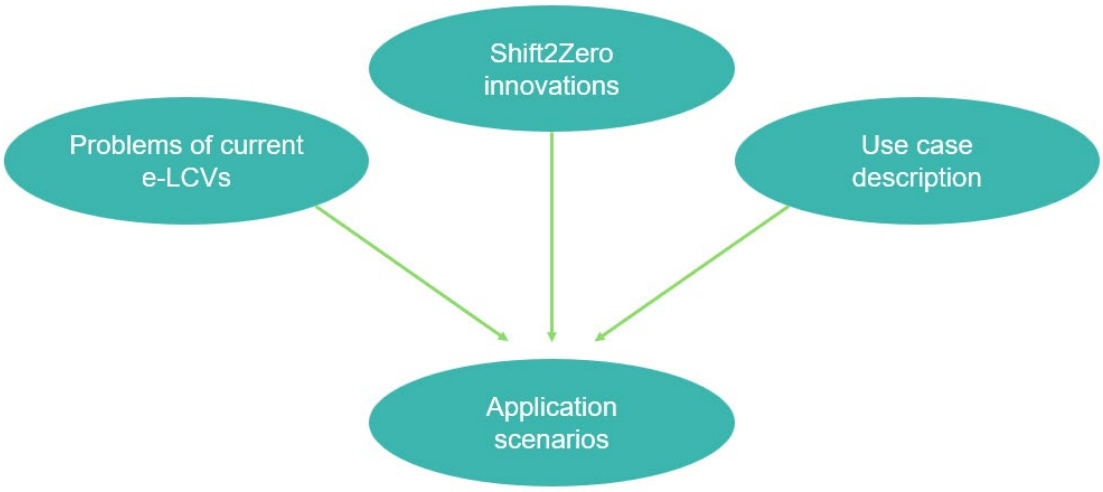


Figure 2. Derivation of application scenarios

This includes an analysis of the current electric light commercial vehicle (e-LCV) market, and the identification of existing challenges related to e-LCVs based on comprehensive internet-based research. This perspective is complemented by the practical experience of logistics experts from DHL Express, DPD, Diakinisis, and Gruber Logistics. These companies already use electric commercial vehicles in daily operations and therefore provide first-hand insights into current critical application scenarios.

In addition, particular attention is given to the derivation of scenarios in which the innovations targeted within the Shift2Zero project (see Figure 3) are expected to offer improvements over the current state of the art. This targeted approach ensures that user statements are collected specifically within application scenarios that are most relevant for identifying user needs in the context of Shift2Zero innovations.

Figure 3. Innovations to be developed in the Shift2Zero project

The Shift2Zero developments include the following innovations:

A **modular swappable concept** featuring a swappable cargo unit (swap box) designed to facilitate efficient transshipment processes. The standardized, lightweight swap box is both removable and foldable, simplifying return logistics and minimizing empty transport volume. It enables smooth transfer across different vehicle types, allowing vans to seamlessly interface with or support trucks, mopeds, and cargo bikes.

Holistic energy management and control strategies for braking systems, tyres, and the powertrain to enhance overall efficiency and minimize environmental impact (e.g. particle emissions), while also enabling bi-directional charging through V2G and V2L technologies.

Cargo-body with **multiple temperature zones**. A cargo body with a sliding wall that allows the size of the temperature zones to be adjusted for different needs.

Thermal comfort and safe ergonomics. Infrared heating panels ensure driver comfort while improving overall energy efficiency. By reducing energy consumption for cabin heating, they help extend vehicle range and make additional energy available for refrigeration in cold-chain deliveries. Ergonomic design features outside the vehicle enhance both driver and pedestrian safety during operation.

Dynamically optimized space for goods and passengers. A movable protective partition separates the cargo area from the passenger space, enabling quick reconfiguration of the vehicle for different use cases. This allows flexible adaptation between transporting goods, people, or a combination of both.

Geofencing strategies for safer and more efficient urban operations. Includes scenarios such as automatic speed limitation to access pedestrian zones, data sharing for improved coordination, and the booking of loading or transshipment areas all aimed at promoting safe driving behaviour and streamlined logistics in dense urban environments.

The application scenarios are additionally informed by the use case descriptions completed by the project partners as part of task 2.1. In these descriptions, DHL Express, DPD, Diakinisis, Gruber Logistics, and Clem outlined which Shift2Zero innovations they intend to test during the later real-life demonstration Phase (WP6). Moreover, the documents detail the specific operational scenarios and activities currently in place, as well as those planned in the future in conjunction with the respective innovations. This information is also incorporated into the application scenarios to be investigated and ensures that not only user-centred needs for the innovations are identified, but that these also correspond to the planned pilot activities.

Based on the insights from these three sources, the following application scenarios were compiled, which served as the basis for the needs assessments conducted during the workshops and interviews:

- Loading & unloading the vehicle
- Entering & leaving the vehicle
- Stop for delivery
- Cold working days
- General improvement of the vehicle
- Using a swap box
- Using infrared heating
- Using geofencing
- Using dynamically optimized space
- Improved energy control strategies
- Using a multi-temperature cargo body

3.2 Selecting application scenarios

After the application scenarios were compiled based on the three identified sources, the next step involves selecting the relevant scenarios for workshops and interviews with project partners. Within the framework of Task 3.1, collaboration took place with the consortium partners DHL Express, DPD, Diakinisis and Gruber Logistics to ensure optimal alignment with their current operations and areas of expertise.

For instance, DHL Express operates exclusively parcel logistics in Oslo without handling temperature-sensitive goods. As a result, the refrigerated goods scenario was excluded from the workshop at this location. Similarly, the inclusion of cold-weather operations in Athens was deemed unsuitable, as such conditions occur infrequently and with lower severity compared to the other locations[6]. Therefore, to derive meaningful user needs regarding the heating system, alternative locations were prioritized.

One additional exception applies to the scenario “using dynamically optimized space,” which was investigated by the RWTH Aachen University through interviews with users of car-sharing commercial vehicles. This deviation is due to the fact that none of the logistics partners have relevant use cases in which cargo space needs to be reduced in favour of transporting additional passengers.

With the exception of these specific cases, all other application scenarios were addressed across the logistics partners.

[6] https://meteostat.net/

A detailed overview of the application scenarios covered across the project partners is provided in Table 1.

	DHL Express	dpd	DIAKINISIS Logistics Services	GRUBER LOGISTICS	ika RWTH AACHEN UNIVERSITY
Loading & unloading the vehicle	X	X	X	X	X
Entering & leaving the vehicle	X	X	X	X	X
Stop for delivery	X	X	X	X	
Cold working days	X	X		X	
General improvement of the vehicle	X	X	X	X	X
Using a swapbox	X	X	X	X	
Using infrared heating	X	X		X	
Using geofencing	X	X	X	X	
Using dynamically optimized space					X
Improved energy control strategies	X	X	X	X	
Using a multi-temperature cargo body		X	X	X	

Table 1. Overview of the application scenarios used for the workshops and interviews

3.3 Preparation of user workshops

After the application scenarios for the respective workshops have been selected, the next step is the preparation of the user workshops. This includes the elaboration of the Workshop Guide. The Workshop Guide serves as a structured manual supporting the planning, execution, and follow-up of the workshop. It ensures that the format is easily reproducible or transferable. The guide contains all necessary information as well as a fully formulated script, enabling the moderator to conduct the workshop in a targeted and efficient manner. A complete version of the Workshop Guide can be found in Annex 1.

The workshop begins with an introduction by the moderator and the attending transportation designer, followed by a presentation of the Shift2Zero project. In this context, the overall objectives of the workshop and the role of the participants are explained, highlighting the opportunity to contribute their expertise and actively shape the future of delivery vehicles. Afterwards, participants introduce themselves, outlining their current professional position as well as the vehicle used and the delivery area covered. Subsequently, the agenda and timeline of the workshop are presented.

The workshop is structured into two main phases (see Figure 4). In the first phase, the general application scenarios are addressed. After a break, the second phase focuses on the discussion of the Shift2Zero-specific innovations.

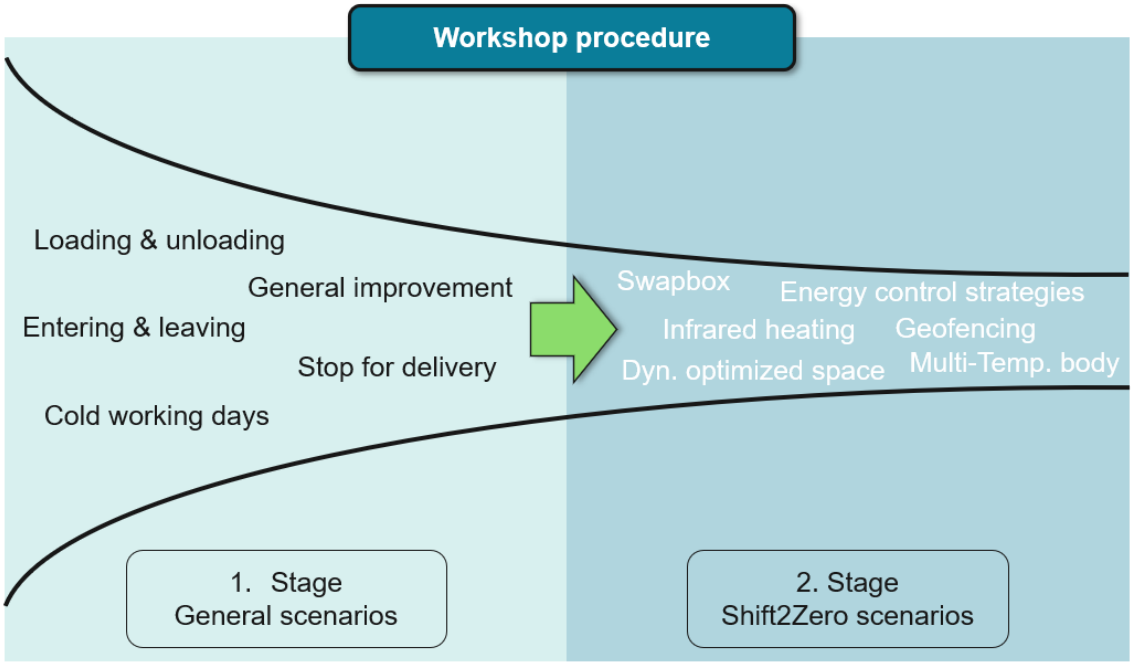


Figure 4. Division of the workshop according to application scenarios

This two-step structure is designed to gradually shift the focus from general application scenarios toward the specific application scenarios of Shift2Zero. In doing so, the workshop captures both general user needs, which may not be directly related to the Shift2Zero innovations but could potentially be addressed by them, as well as those needs that are directly linked to the innovations themselves. Furthermore, this stepwise concretization helps to avoid influencing participants prematurely and prevents any inhibition of creativity.

Throughout the workshop, the application scenarios are presented in the slides (see Annex 2) using visualizations to ensure an appealing and intuitive representation. The purpose of these illustrations is to enable participants to better immerse themselves in the scenarios and to enhance their understanding of the Shift2Zero innovations. These sketches were prepared in advance by a designer specifically for the workshop presentation. An example of such a visualization is shown in Figure 5, illustrating the geofencing scenario for granting access rights to pedestrian zones.

Figure 5. Visualisation of a geofencing application scenario in the workshop

Within each stage, every scenario is first introduced by the moderator. Following this introduction, participants are invited to share their experiences related to the scenario. Particular emphasis is placed on identifying which aspects are perceived as especially positive and which as negative by the participants. In addition, participants are encouraged to propose improvement ideas that could better address their needs.

The workshop format is intentionally designed not as a one-to-one dialogue between the moderator and individual participants, but rather as a group discussion among participants, with the moderator providing targeted impulses. This setup fosters a more in-depth engagement with the scenarios and allows participants to gain new perspectives and discussion points through exchanges with their peers. Moreover, by jointly generating ideas, participants are able to enhance creativity and improve the overall quality of results.

To make it easier for participants to express their thoughts and to facilitate more dynamic discussions, blank illustrations of relevant vehicle views and innovations were prepared in advance of the workshop to sketch on (see Figure 6).

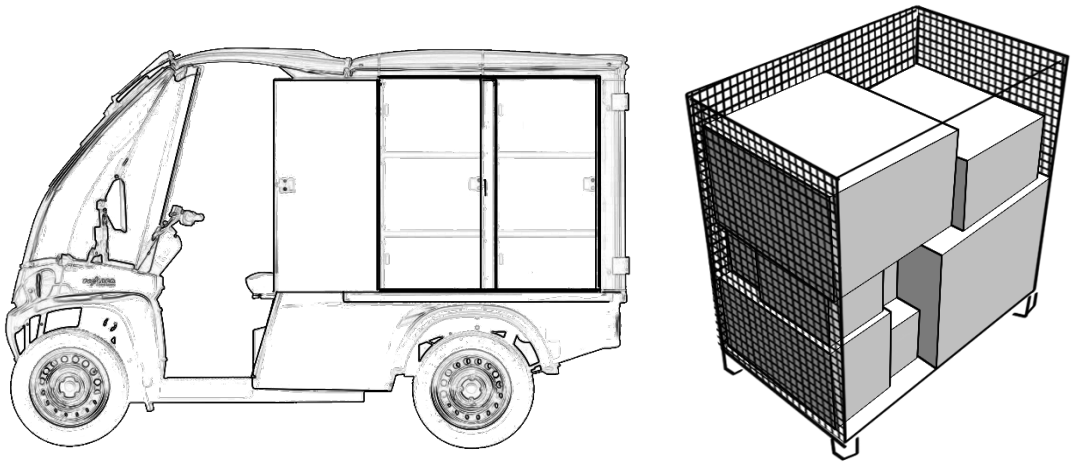


Figure 6. Blank sketch for the cargo area (left), blank sketch for the swap box (right)

After the final scenario of the second stage has been discussed, the workshop concludes with how the results generated during the workshop will be integrated into the further course of the project and how they will ultimately contribute to the development of improved logistics vehicles.

As part of the workshop preparation, it is also necessary to select and invite the participants. Particular emphasis is placed on involving users who are in daily contact with delivery vehicles, namely courier drivers. In addition, the instructors of the courier drivers are also considered, since many of them have previously worked as couriers themselves and in their current role supervise a large number of drivers. This provides them with a broad overview of user needs.

For each workshop a target number of four to eight participants is defined. Depending on the selected application scenarios, both parcel couriers and cold-chain drivers should be included. In practice, drivers are often divided into these two groups, with some focusing exclusively on parcel transport and others on refrigerated transport. For the workshops however a mix of both groups is desirable in order to ensure that perspectives from both operational contexts are captured.

In line with these requirements, the logistics partners internally managed the selection and invitation process for the workshop participants

3.4 Conducting user workshops

In total, seven workshops and an additional eleven interviews with 51 participants were carried out at the sites of DHL Express in Oslo, DPD in Wroclaw, Diakinisis in Athens, Gruber Logistics in Bologna, and the RWTH Aachen University.

During both the workshops and interviews, care was taken to ensure that they were conducted in a language familiar to the participants so that the expression of ideas would not be hindered by language barriers. Accordingly, the moderators were selected based on their ability to communicate in the respective workshop language. The workshops in

Oslo were held in English, in Wrocław in Polish, in Athens in Greek, and in Bologna in English.

Each workshop group consisted of a minimum of four and a maximum of eight participants. This group size was chosen as it creates a comfortable atmosphere for discussion while ensuring that all participants can actively contribute. Attention was also given to balancing speaking time among the participants so that everyone had the opportunity to share their views.

With the participants' consent, each workshop was audio recorded to support thorough evaluation and to ensure that no contributions were lost. In addition, a transportation designer was continuously present to visually document the improvement ideas articulated by the participants. An example of such a sketch is shown in Figure 7.

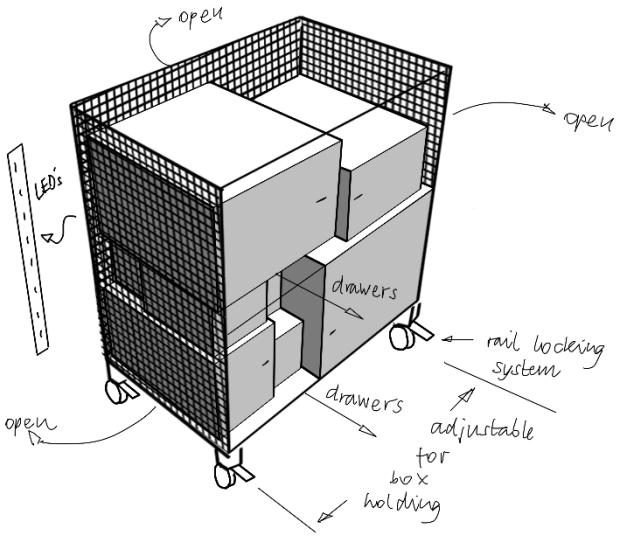


Figure 7. Sketch by the designer from the Diakinisis workshop

In addition to the sketches created by the designer, many participants themselves produced drawings on the blank sheets provided during the discussions. These sketches helped to visualize their ideas and supported the exchange of perspectives within the workshop groups. An example of a participant's sketch from the DHL Express workshop is shown in Figure 8.

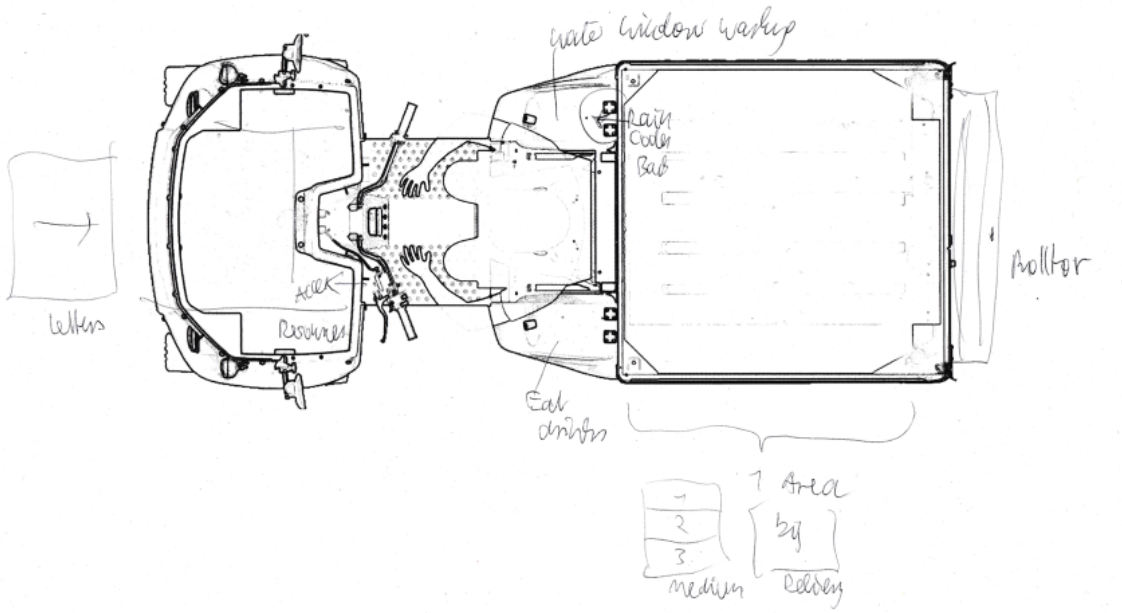


Figure 8. Sketch by a participant of the DHL Express workshop

These sketches are also utilized in the subsequent processing and analysis of the workshop to ensure that the insights conveyed through the drawings are taken into account.

3.5 Sorting and filtering statements

Following the completion of the workshops and interviews, the statements made by participants are structured and analysed. The sources for this documentation include the audio recordings of the workshops, on-site notes, the sketches produced by the designer, and the drawings created by the participants.

For enhanced clarity and organization, all statements are compiled into a comprehensive table. The table includes a categorization of statements (see Table 2), which facilitates a structured subdivision and overview of the collected insights.

No.	Statement	Classification	Role	Innovation	Priority	User need
1	…	Problem, Fact, Idea, Improvement	Driver, Supervisor of driver, Fleetmanager, Customer	Swap Box, Infrared heating, Energy management, Multi-temperature cargo body, Dynamically optimized space, Geofencing, Software, Not specified	+, =, -	…

Table 2. Categories for sorting the statements

Each statement in the table is assigned a unique sequential number to ensure unambiguous identification. This is followed by the statement itself, as expressed by the participants. Subsequently, each statement is classified into one of four categories: Problem, Fact, Idea, and Improvement. The categories are defined as follows:

- Problem: Statements that highlight difficulties, challenges, or negative experiences. These entries address existing deficiencies, inadequacies, or obstacles within the examined context.
- Fact: Neutral, descriptive statements that report observations or factual information without implying judgment or proposing solutions.
- Idea: Suggestions or thoughts indicating new approaches, possibilities, or alternative methods. These statements are often hypothetical or creative in nature.
- Improvement: Concrete proposals aimed at enhancing existing structures, processes, or systems. Unlike the Idea category, these statements generally have a practical and directly implementable focus.

Subsequently, the role from which each statement was made was recorded. The roles are categorized as Driver, Supervisor of Driver, Fleet Manager, and Customer. Following this, the specific Shift2Zero innovations to which the statement relates are indicated. In addition to the six core innovations—Swap Box, Infrared Heating, Energy Management, Multi-Temperature Cargo Body, Dynamically Optimized Space, and Geofencing—Software is included as an additional innovation. This inclusion reflects that many statements pertain to software in relation to the innovations. For easier utilization of these needs in subsequent work within WP5, an additional subdivision is applied. Statements that do not directly pertain to any of the innovations are classified under the category “Not Specified.”

Furthermore, each statement is assigned a priority level during the analysis to indicate its relevance to the Shift2Zero project. Statements considered particularly critical to the project are classified as High Priority, indicating they should receive special attention. Statements deemed relevant but not critical are assigned Normal Priority. Statements

with no relevance to Shift2Zero receive Low Priority. In some cases, statements arose during discussions that cannot be used for the development of the Shift2Zero innovations, for example, when they pertain to other vehicle functions. These statements are not further converted into user needs.

Finally, the underlying user need derived from each statement is documented in the last column. The process of deriving user needs from statements is described in detail in Chapter 3.6. An example of the documentation of a statement is presented in Table 3, and a complete list of user statements with the corresponding user needs is provided in Annex 3.

No.	Statement	Classification	Role	Innovation	Priority	User need
1	Customers change their delivery addresses at very short notice, sometimes as late as the morning of delivery. Therefore, we check again in the morning to ensure that the parcels are sorted for the correct route.	Problem	Driver	Swap box, Software	=	As a courier, I need a system that can respond flexibly to changes in delivery addresses in the morning so that the parcel can be delivered efficiently on the correct route.

Table 3. Example of a documented user statement

3.6 Translation of statements into user needs

The statements articulated during the discussions rarely represent explicitly expressed user needs. More frequently, participants communicated problems or concrete improvement ideas. Consequently, these statements are often symptomatic rather than causal. For this reason, the next step involves interpreting each statement in relation to the contextual and functional user needs. This step is crucial because user needs are solution-neutral and therefore more universal, stable, and independent of specific technologies compared to concrete statements. Direct implementation of user requests often results in incremental improvements rather than truly innovative solutions. By addressing the underlying needs behind the expressed requests, product developers can unlock new and more creative solution spaces[7].

A structured approach is applied when translating user statements from the workshops into user needs to ensure a consistent and reproducible procedure. Each statement is first abstracted and then reformulated into a user need following a standardized sentence template. This template is based on the established methodology proposed by Mike Cohn for deriving user needs within the contexts of agile development, user experience, and design thinking[8]. The template aims to capture user needs from a user-centered rather than a technical perspective. It serves to document the needs of users clearly,

[7] Ulwick, A. W. (2005). What Customers Want: Using Outcome-Driven Innovation to Create Breakthrough Products and Services.
[8] Cohn, M. (2004). User Stories Applied: For Agile Software Development.

comprehensibly, and within a business context. The sentence template is divided into three components (see Figure 9).

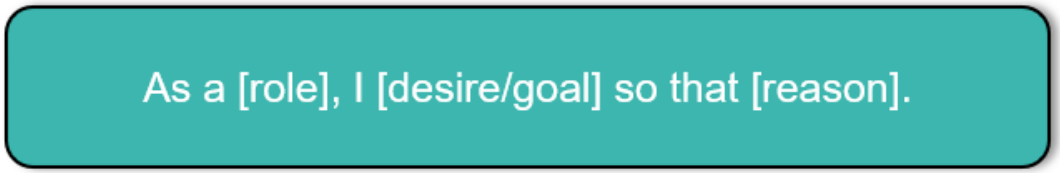


Figure 9. Sentence template for user needs

1. As a [role]

The first component defines a specific user role, such as “as a Driver” or “as a Fleet Manager.” This establishes clarity regarding which user the respective need pertains to.

2. I [desire/goal]

The second component describes the specific requirements of the user role. The original statement is abstracted and consolidated into a solution-neutral user requirement.

3. So that [benefit]

The final component specifies the expected benefit or purpose of the action. This aspect is particularly important as it establishes a value orientation, indicating why the function is significant for the user or the organization.

Using this structured approach, all 270 statements identified as relevant for Shift2Zero from the user workshops and interviews were analysed and translated into user needs. Table 4 provides an overview of which statements and user needs can be assigned to the innovations.

Innovation	Statements	User needs
Swap box	128	124
Thermal comfort and ergonomics	29	28
Holistic Energy Management	36	34
Multi-Temperature Cargo Body	17	16
Dynamically optimised space	18	18
Geofencing	42	42
Novel algorithms and software	98	97
Not specified	61	0

Table 4. Overview of statements and user needs per innovation

During the analysis, the category “Novel algorithms and software” was added in addition to the six core innovations, as a substantial number of statements and user needs referred to this aspect. Users perceived well-designed software as a key enabler for the effective deployment of the innovations. Through the structured distinction of this category from the others, the findings can be explicitly leveraged for software development within WP5.

Furthermore, users highlighted the particular relevance of the swap box and the geofencing system, both of which were regarded as highly valuable. However, their effectiveness is contingent upon certain structural conditions. For the swap box, this includes the availability of strategically positioned micro-hubs, while the successful application of geofencing requires close collaboration with local municipalities. Consequently, these structural prerequisites must be carefully taken into account during the development and implementation of the respective innovations.

The complete list of user statements with the corresponding user needs is provided in Annex 3.

4. Conclusion and outlook

The systematic collection of user needs conducted within Deliverable 2.2 represents a crucial foundation for the user-centered development of innovations for electric light commercial vehicles (eLCVs) in the Shift2Zero project. By combining practice-oriented workshops with in-depth interviews involving drivers, fleet managers, and car-sharing users, a total of seven workshops and eleven interviews were carried out across multiple sites, including DHL Express in Oslo, DPD in Wrocław, Diakinisis in Athens, Gruber Logistics in Bologna, and the RWTH Aachen University.

In total, 337 individual statements were documented. After thorough analysis and abstraction, these statements were translated into 270 solution-neutral user needs. The identified needs cover a wide range of everyday logistics situations such as loading and unloading processes, vehicle access, energy management, as well as specific Shift2Zero applications including multi-temperature cargo bodies, geofencing functions, dynamically optimised space and the use of swap boxes.

The results highlight not only the current challenges faced by existing eLCVs but also specific opportunities where future Shift2Zero innovations can provide added value. The structured documentation in the format “As a [role], I [desire/goal], so that [reason].” ensures that the identified user needs are expressed clearly and in a solution-neutral manner. This approach guarantees direct usability of the results for the subsequent phases of the project.

In the next step, the findings will be integrated into Task 2.5 where the identified user needs will be translated into concrete technical requirements. These requirements will form the basis for the design and development of innovative vehicle solutions within WP3. In the long term, this approach will help ensure that the eLCV innovations developed within Shift2Zero are not only technologically advanced but also practical, user-friendly and market orientated.

Annex 1. Workshop Guide (using the example DHL Express)

Start:

Hello and welcome to today's workshop here at DHL. I'm really looking forward to spending the day with you today and working together to shape the next generation of delivery vehicles.

Logistics in Europe will change a lot in the future. Currently, diesel vehicles are still the most widely used delivery vehicles in urban logistics in Europe. Although there are already some great leaders in this field in Norway. But especially as urban logistics continues to grow throughout Europe, there is an urgent need for zero-emission solutions across the board. However, this transition to light commercial vehicles with electric drives is currently only progressing slowly in the EU, as there is a lack of efficient, customised solutions that offer real added value.

We would therefore like to hold this workshop with you, as experts in this field, to benefit from your experience and develop new ideas together.

2. Slide

My name is Lukas and I am very happy to be organising this workshop today with my colleague Gabriel. A little bit about myself: I work as a research associate for the Institute of Automotive Engineering based in Aachen Germany. I am part of the Vehicle Concepts department where I have the great opportunity to help shape and realise the future of vehicles. We contribute to solving current and future challenges both in public projects and in cooperation with automobile manufacturers and suppliers.

With me is also my colleague Gabriel...

My name is Gabriel and I´m delighted to be able to participate in today´s workshop. I work as a Transportation Designer for the Institute of Automotive Engineering based in Aachen Germany. I am also part of the Vehicle Concepts department and have the great opportunity to help shape the future of vehicles in the field of exterior and interior design - from the first sketch on a white sheet of paper to the finish of drivable prototypes.

3. Slide

We are currently working on the publicly funded EU project Shift2Zero together with 30 partners from 10 EU countries. The project goal is shifting to zero-emission logistics with right-sized, mission-focused, eLCVs. This means electric vehicles for transporting goods with a total mass of up to 3.5 tonnes. We not only consider parcel deliveries, but also cold transport and car sharing. All these areas will be covered in the project.

To achieve this project goal, we will develop innovations that will then be tested by the logistics providers in the project. On the map you can see an overview of the logistics partners we are working with and the logistics sectors for which we are developing the vehicle.

4. Slide

The aim of today's workshop is to understand your delivery vehicle needs. We would like to know what the perfect delivery vehicle looks like for you. Then we want to use these ideas to implement them in a later prototype, which will then be tested here in 2 years.

So today you have the opportunity to tell us your problems and ideas and together with us describe the perfect delivery vehicle that we then want to realise.

5. Slide

To get to know you a little better, I would like to suggest that you briefly introduce yourselves. It would be interesting for us to know what operating position you currently have at DHL Express, how many years of work experience you have, what your current work vehicle is and in which area you currently deliver?

Participants introduce themselves

Thank you very much for your introduction.

6. Slide

I would now like to outline today's programme. We have already left the first item on the agenda behind us and will now move on to the first stage of the workshop. The first stage is about understanding your needs in certain situations. I'll explain how this works in detail later. The first stage will last until midday today, so you'll have a break between 11.30am and 1pm. Gabriel and I will also need this break to prepare your points for the second stage of the workshop.

The second stage will then start at 1 pm. In the second stage, I will present innovations that have been developed within our project. Our aim here is to understand what feedback you would have on these innovations if they existed. It is particularly interesting for us to know what problems you see and what ideas arise as to how these innovations could be implemented from your point of view. We have also planned time to further develop your innovation ideas.

In order to best analyse the results of this workshop afterwards for the Shift2Zero project, we would need to record what was said during the workshop. Your comments and ideas will be analysed by us afterwards and used anonymously for the project. It will not be possible to draw any conclusions about you personally. Does anyone disagree with the audio recording?

We would also like to take pictures to document the project and share them on social media. Is it okay that we take pictures of the workshop? No names will be published.

Thank you, then I would start the audio recording now.

Start audio recording

7. Slide

Let's start with the first stage of the workshop. This workshop is designed in such a way that we will present you with different everyday situations.

8. Slide

Your first task is then to consider whether there are things that currently work very well in these situations. We would then like to continue to take these things into account in the prototypes. We are also interested in finding out where there are problems or whether you have any ideas for improvements. The entire workshop is intended to be more of an open discussion, so it is intended that everyone discusses together. You can also think freely at first, so there is no right or wrong. You are also welcome to come up with crazy ideas without having to consider technical feasibility or costs. In the end, we are responsible for making your ideas realisable.

Are there any questions before we start with the first example?

If yes... answer questions

If no... I think the best way to understand it is to start with the first example.

However, you are welcome to interrupt at any time if something is unclear and we can clarify the question.

Let's start with the first scenario.

9. Slide

This describes the loading and unloading of parcels at the vehicle. Loading and unloading means both the initial loading in the morning before the tour, but also during delivery on the route and unloading after the tour. Let's start with the points that work really well.

What things do you find especially annoying?

Do you have any ideas for improvement?

To help if no ideas are forthcoming:

What about safety in the loading space?

Is there a need for ergonomic adjustments?

Are there optimisations to improve the design of the cargo area?

Do you need technical aids to make your work easier? And when – which aids?

Are there any improvements regarding the door?

Is it annoying to always have to open and close the door?

Do you need weather protection - or other measures to increase comfort?

Let's move on to the second scenario.

10. Slide

This describes getting in and out of the vehicle.

Positive, Negative, Improvement

As an aid if no ideas are forthcoming:

Is there anything you would like to see for safety when getting in and out of the vehicle?

Optimisation ideas for faster access to the vehicle?

Ergonomics when getting in and out?

Increased efficiency?

lower entry height, wider door opening, automatic door opening?

11. Slide

Next, let's look at the scenario on cold working days.

Positive, Negative, Improvement

Do you use the heating in winter?

How do you use the vehicle heating in winter?

Do you stay in the vehicle during breaks?

To help if no ideas are forthcoming:

Thermal protection in the vehicle?

Is the lighting inside and outside the vehicle good?

What kind of lighting would you like on the vehicle, both inside and out?

Is the heating system good?

Problems with wet shoes, slippery?

Do you have wet clothes?

Do you have hot drinks with you in winter?

Where do you store you hot drinks etc.?

12. Slide

Next, we look at the parking scenario to deliver the parcels.

Where do you normally park your vehicle?

Positive, Negative, Improvement

To help you if you don't have any ideas:

Are there improvements that enable time efficiency during delivery?

Do you have problems finding a parking space?

Do you have problems parking your vehicle?

Where do you normally park your vehicle?

13. Slide

Finally, we would like to know if there are any other situations that the vehicles do particularly well. Or that you think could be improved. Do you have any other ideas for improving the vehicles?

Vehicle interior?

Heavy consignments?

Range planning?

Automation of processes?

We have now reached the end of the first workshop stage. Thank you very much for all your comments, we can already do a lot with them. Thank you also for the great ideas. We will now take a break, which we will use to collect the ideas. After the break, we will continue with the second stage of the workshop. See you back here at 1pm. See you later!

Break

14.Slide

I think we're complete again. We can now start the second phase of the workshop.

15.Slide

In this stage, we would like to present specific innovations that have emerged from the Shift2Zero project, but which you also mentioned in the first phase. After we have presented the innovations to you, we would like to know what you think of them. We are particularly interested in what potential problems you see and what adjustments would be necessary? The ideas are currently still in a very rough concept, so we could really do with some critical input.

16. Slide

The first innovation is called the swap box. This box is intended to have a standardised design so that it can be used variably in different vehicles. The box itself is foldable so that it can be transported in a space-saving manner when it is empty. The idea is that this box makes it possible to load vehicles very quickly. This means that the boxes would be packed with parcels in advance and would then only need to be loaded into the vehicles. This would allow the vehicle to be loaded very quickly, particularly in the case of vehicles where a complete daily route of parcels does not fit. The boxes could also be distributed in small micro-hubs in the city so that the vehicles would not have to drive back to the large city hub.

What do you think of this system?

Positive, Negative, Improvement

Do you have any concerns or ideas about what else should be considered?

Should be foldable or not?

Do you have any other ideas about what else would be practical with such a box?

How should this box be designed so that it is practical for you?

17.Slide

The next innovation involves an infrared heating system. This system works differently to conventional heating systems - not with hot air, but with electromagnetic waves. This radiation heats the person directly, which means that heating is much faster, more targeted and more efficient.

What do you think of such a system?

Positive, Negative, Improvement

What settings would you like to have for the heating?

In which areas of the body is heating particularly important to you?

What should you be able to adjust on the heating?

Where should you be able to adjust the heating?

18.Slide

Another innovation in our project is geofencing. With this system, it should be possible to enter previously prohibited areas during certain time windows. This would particularly affect the city centre. The speed of the vehicle is reduced in the authorised areas so that safety is guaranteed, and a permit can be issued.

What is your opinion on this innovation?

Positive, Negative, Improvement

Would it help you?

How should entering such a zone be indicated in the vehicle?

Do you see any problems with this?

19.Slide

There is also the idea of automatically booking certain loading zones based on the position of the vehicle. These zones would then be reserved and could be used without having to search for a parking space.

What do you think of this?

Positive, Negative, Improvement

Do you have any other ideas, such as which location-based functions or innovations would be helpful?

20.Slide

There are also plans to develop an improved energy management system as part of the project. An Eco mode will feature a different acceleration profile and increased recuperation to save energy and reduce brake particle emissions.

Do you have concerns about the vehicle's range? Have you ever had any problems with this?

Is the current acceleration enough for you?

There are also plans to integrate an efficiency feature. This will show how much energy is consumed through acceleration and how much energy flows back through recuperation.

Tips are also given on how to accelerate and brake most efficiently.

Would it be attractive to see how to drive in the most efficient and sustainable way?

It is also being considered to limit the maximum speed in certain areas in order to drive more efficiently. What do you think about this?

Do you have concerns about getting fines, for breaking the speed limit?

Further scenarios and innovations that emerged from the first part of the workshop will be supplemented and developed in more detail here.

That was the last scenario.

Do you have any general remarks or further comments?

22.Slide

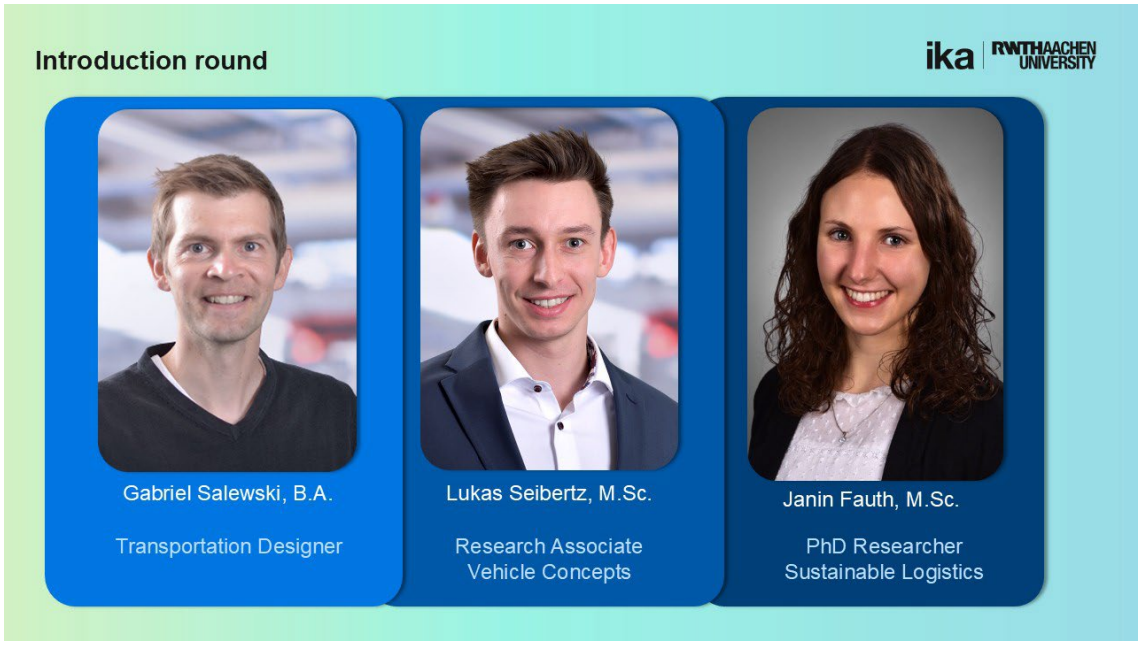
This brings us to the end of the workshop. I would like to thank you once again for your support and input.

I hope you also had some fun supporting us in the development of future delivery vehicles and making your own contribution.

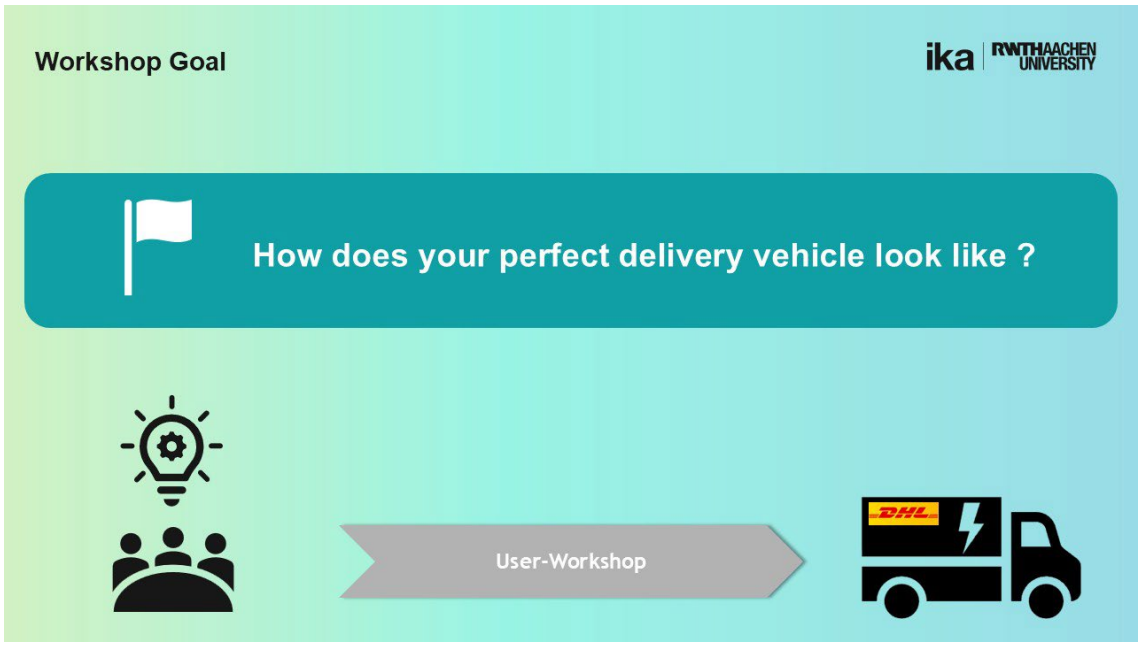
I'm really looking forward to when the first prototypes are ready in two years' time and can be tested by you. Until then, you are also welcome to continue following the Shift2Zero project via the website and social media.

Then we are done with the workshop. I wish you all the best and a great evening! Thank you very much!

Annex 2. Workshop presentation (using the example DHL Express)

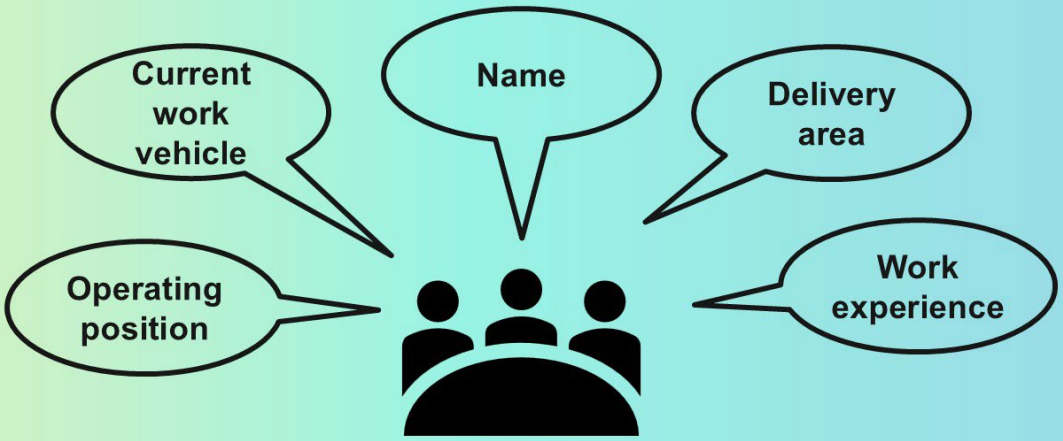



Project presentation
ika | RWTH AACHEN UNIVERSITY
SHIFT2ZERO
Co-funded by the European Union
Shifting to zero-emission logistics with Right-sized, mission-focused, N1 eLCVs
Vehicle concepts piloted in real-life operations with 5 end users
Norwegian Macro Case
B2B & B2C Express e-commerce
DHL
Wroclaw
Fresh food, return logistics & out of home solutions
dpd
Brussels
Shared & affordable eLCV operations
Clem
Bologna
HORECA B2B e-commerce
Thessaloniki
3PL Retail and Pharma
DIAKINISIS


Workshop Goal
ika | RWTH AACHEN UNIVERSITY
How does your perfect delivery vehicle look like ?
User-Workshop
DHL

Introduction Round

DHL Express



Agenda

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08:30 – 09:00	Welcome & start
09:00 – 11:30	Workshop Stage 1 (Identify Needs)
11:30 – 13:00	Break
13:00 – 16:00	Workshop Stage 2 (Covering Needs)


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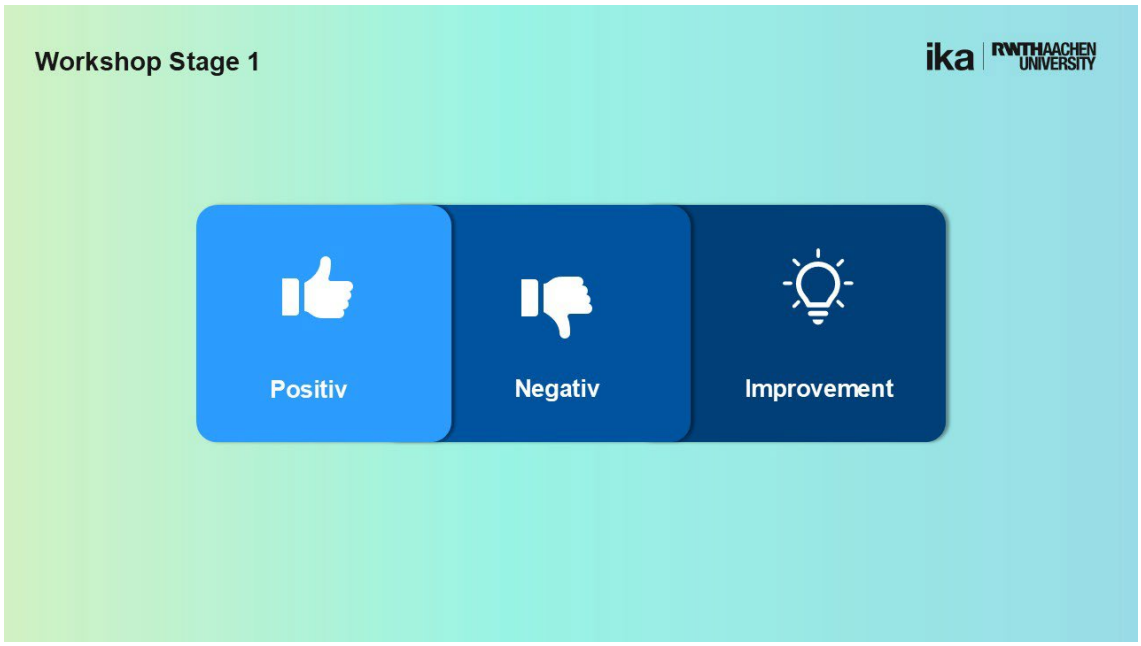
Workshop Stage 1


Workshop Stage 1
ika RWTH AACHEN UNIVERSITY
Positiv
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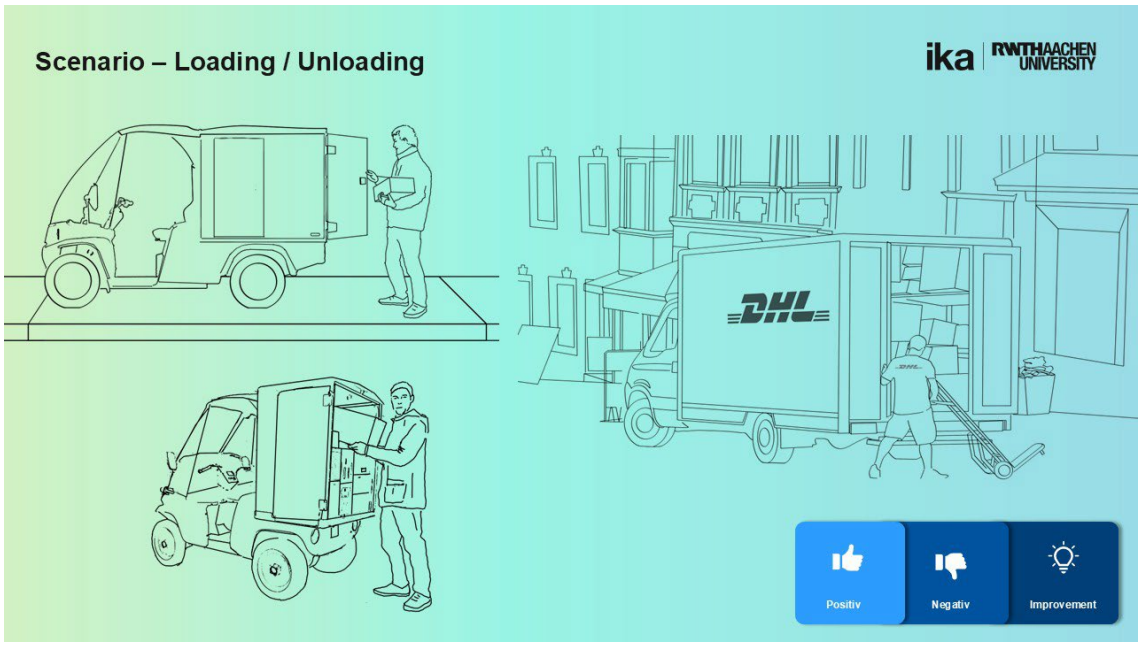
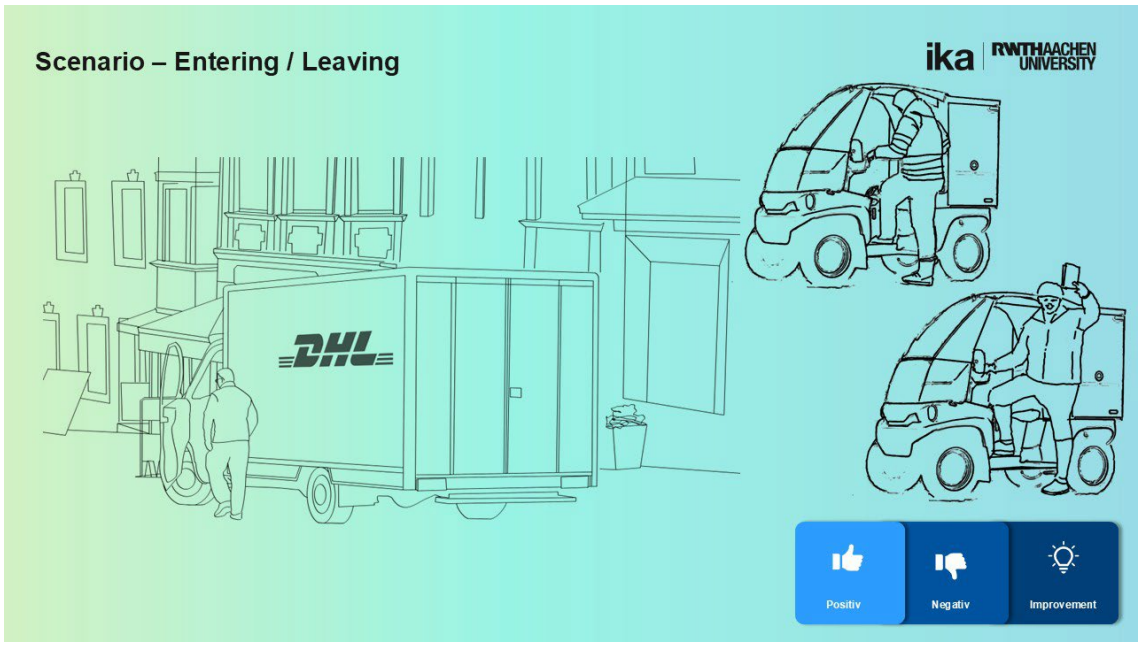
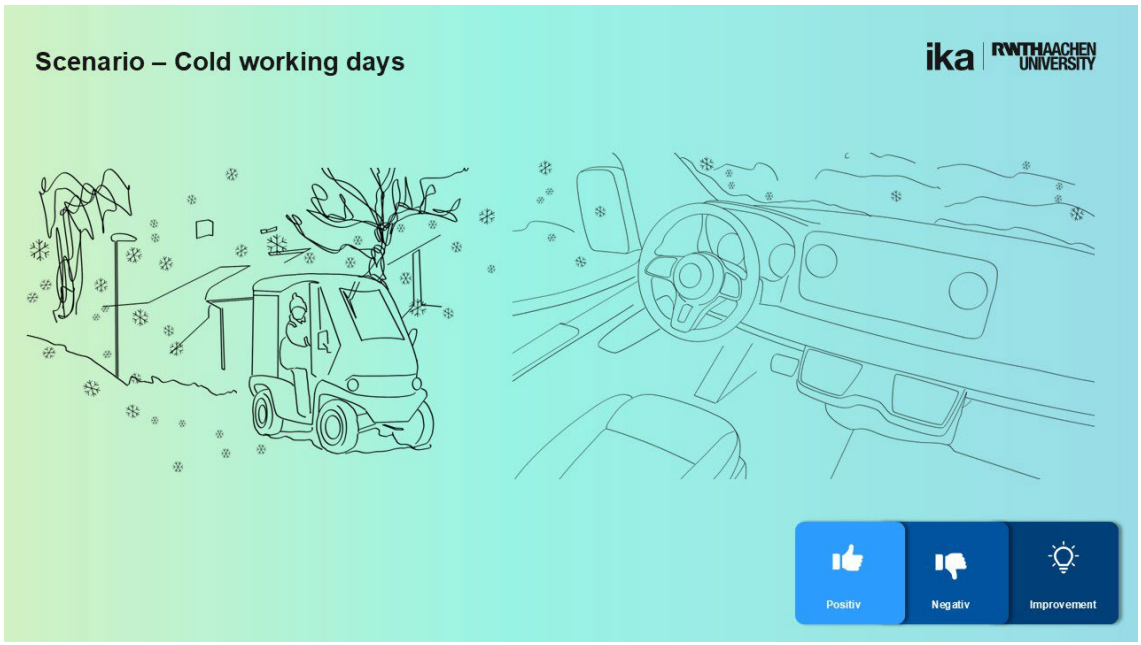
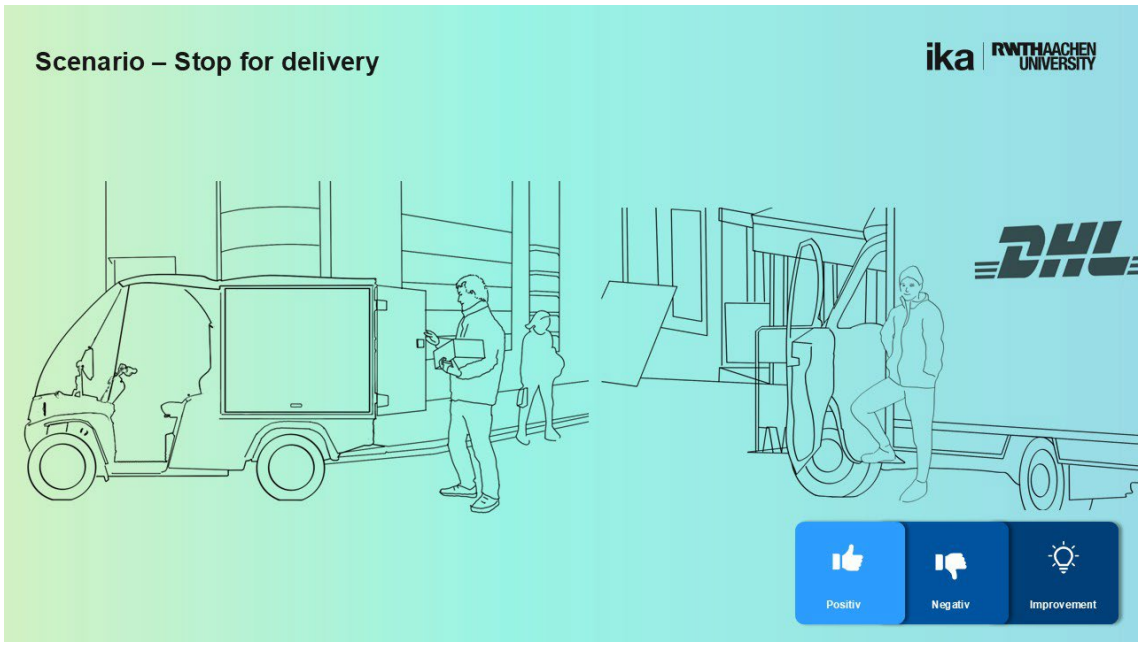
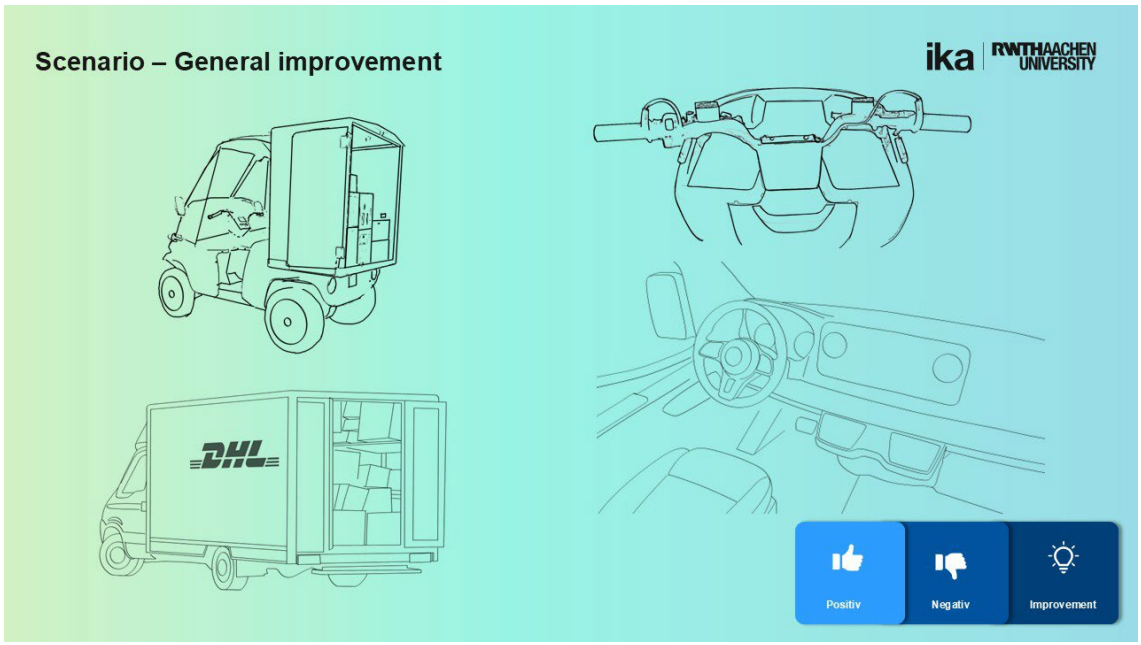
Improvement


Scenario – Loading / Unloading
ika RWTH AACHEN UNIVERSITY
DHL
Positiv
Negativ
Improvement


Scenario – Entering / Leaving
ika RWTH AACHEN UNIVERSITY
DHL
Positiv
Negativ
Improvement


Scenario – Cold working days
ika RWTH AACHEN UNIVERSITY
Positiv
Negativ
Improvement


Scenario – Stop for delivery
ika RWTH AACHEN UNIVERSITY
DHL
Positiv
Negativ
Improvement


Scenario – General improvement
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DHL
Positiv
Negativ
Improvement


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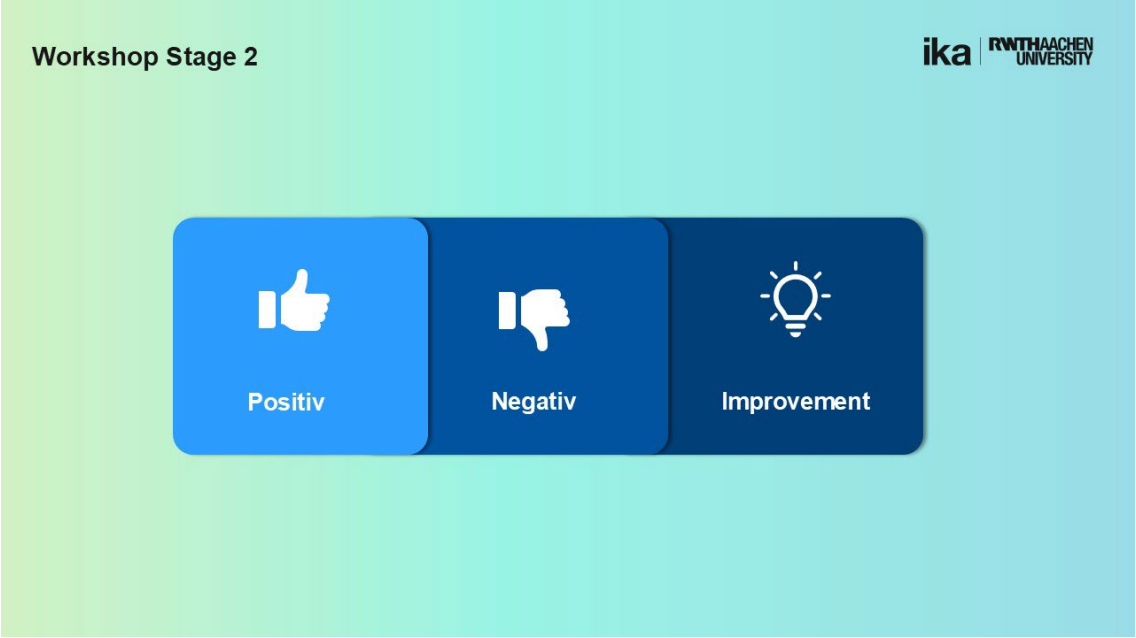
Workshop Stage 2


Workshop Stage 2
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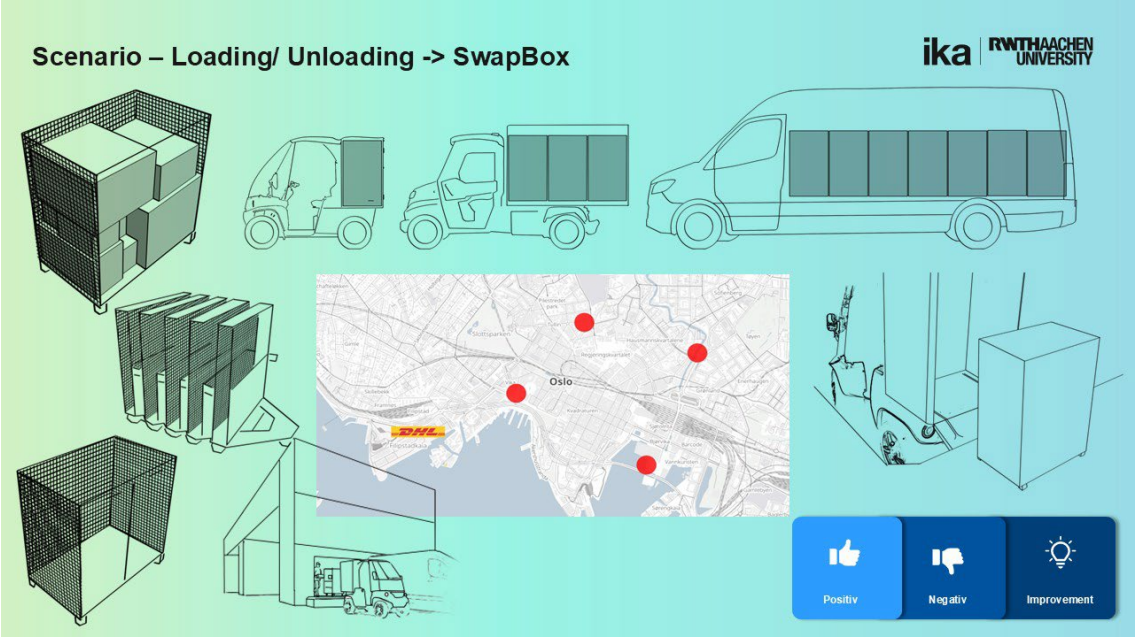
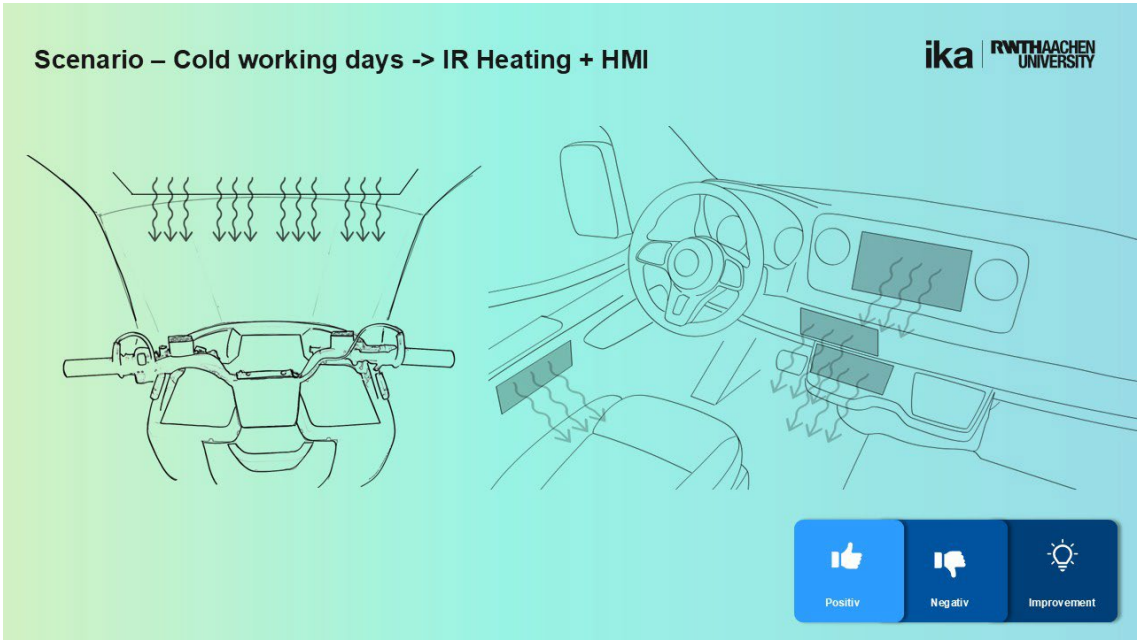
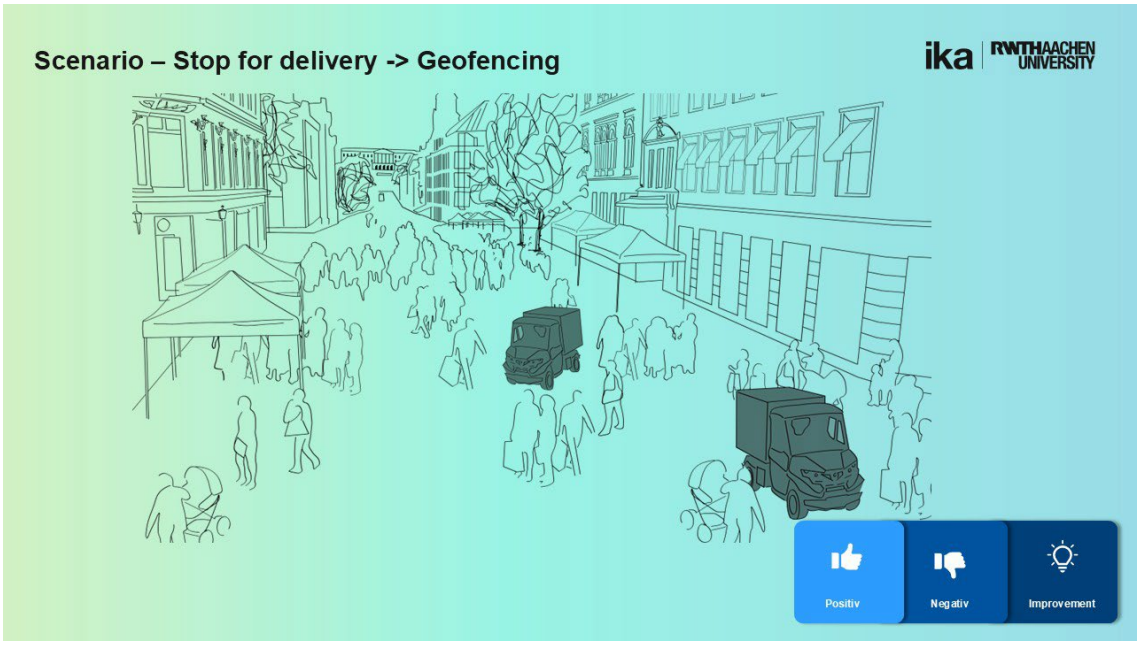
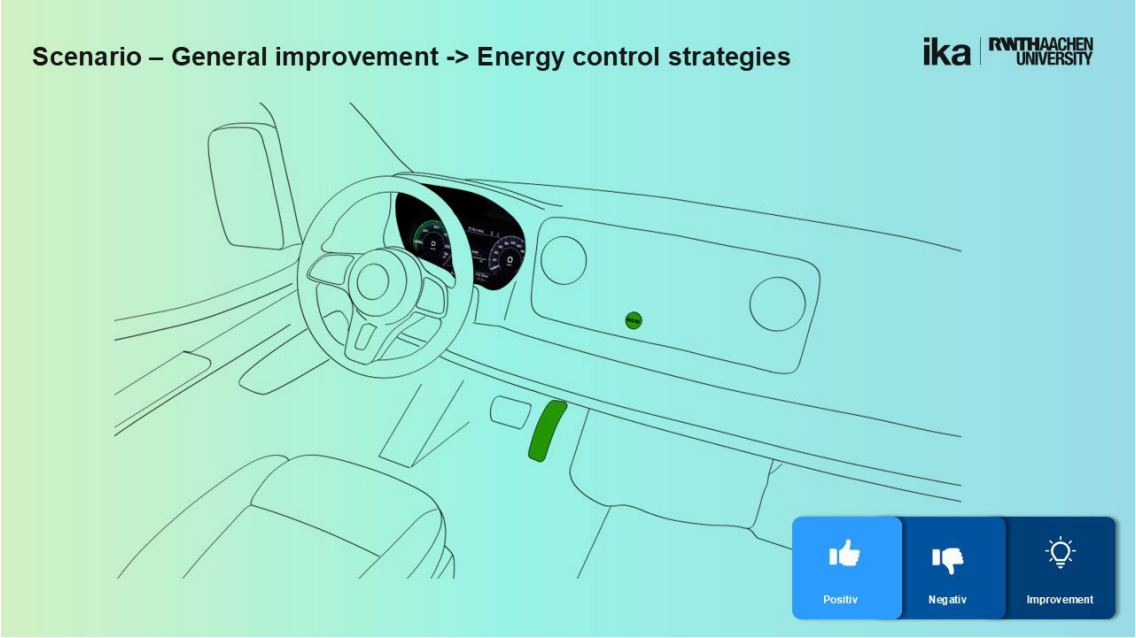

Scenario – Loading/ Unloading -> SwapBox
ika | RWTH AACHEN UNIVERSITY
Oslo
DHL
Positiv
Negativ
Improvement


Scenario – Cold working days -> IR Heating + HMI
ika | RWTH AACHEN UNIVERSITY
Positiv
Negativ
Improvement


Scenario – Stop for delivery -> Geofencing
ika | RWTH AACHEN UNIVERSITY
Positiv
Negativ
Improvement


Scenario – Stop for delivery -> Geofencing
ika RWTH AACHEN UNIVERSITY
Positiv
Negativ
Improvement


Scenario – General improvement -> Energy control strategies
ika RWTH AACHEN UNIVERSITY
Positiv
Negativ
Improvement

Scenario – placeholder

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Next steps – Shift2Zero

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User Survey on e-LCV Preferences

- **15-minute survey** will launch in **mid-June** to collect input from **drivers and fleet managers**
- Topics include **vehicle features** (price, battery range, comfort, modularity, technology)
- **Participation** can be on-site or via **link/QR code**

All input will feed into the **user requirements** that directly inform the **technical design** of innovative e-LCVs in Shift2Zero.


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Thank You!
Vehicle concepts piloted in real-life operations with 5 end users
Norwegian Macro Case
B2B & B2C Express e-commerce
Brussels
Shared & affordable eLCV operations
Clem
Bologna
HORECA B2B e-commerce
Wroclaw
Fresh food, return logistics & out of home solutions
dpd
Thessaloniki
3PL Retail and Pharma
DIAKINISIS

Annex 3. Workshop evaluation with statements and user needs: Swap box

No.	Statement	Classification	Level	Role	Priority	User need
1	Customers change their delivery addresses at very short notice, sometimes as late as the morning of delivery. Therefore, we check again in the morning to ensure that the parcels are sorted for the correct route.	Problem	System	Driver	=	As a courier, I need a system that can respond flexibly to changes in delivery addresses in the morning so that the parcel can be delivered efficiently on the correct route.
2	It is very important to know where each parcel is so that you can quickly find the right box at the destination address.	Fact	System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
3	The packages are sorted by the driver in the cargo area based on their route.	Fact	System	Driver	=	As a courier, I need to know where each parcel is located in the cargo area so that I have an overview.
4	An app, circuit for teams, is now used to plan the route. The generated route is then used to sort the parcels in the vehicle according to the order of delivery.	Fact	System	Driver	=	As a courier, I need a software application that helps me plan my route and optimally load the vehicle so that I can deliver all parcels as efficiently as possible.
6	As a beginner, or if you are new to a delivery area, an app that gives you a suggestion for the delivery route after you have scanned the parcels is very helpful. Both for the route and for loading.	Improvment	System	Driver	=	As a courier, I would like to have support with route planning and the arrangement of parcels in the cargo area so that I can work more efficiently.
8	For the Paxster, I divide the route into three parts and sort the parcels into the three compartments accordingly. The first parcels at the top and the last parcels at the bottom.	Fact	Vehicle	Driver	+	As a courier, I would like to be able to separate the parcels in the cargo area so that they do not get mixed up.
9	Pick-ups are placed on the top level, returns are placed on the floor. So at the end of the day I know that when all the parcels have been delivered, only the pick-ups remain at the top and the returns on the bottom shelf.	Fact	Vehicle	Driver	=	As a courier, I need different areas in the cargo space to separate parcels for deliveries, pick-ups and returns so that I can easily tell them apart.
10	Shelving is very important so that the parcels don't get mixed up.	Fact	Vehicle	Driver	+	As a courier, I would like to be able to separate the parcels in the cargo area so that they do not get mixed up.
12	It is very important to find the right parcels quickly at the delivery location so that no time is lost.	Fact	Vehicle	Driver	+	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
13	We had a problem with wine bottles that broke because they tipped over the shelf. A secure shelf for fragile goods would therefore be useful.	Improvment	Vehicle	Driver	=	As a courier, I need secure storage space for my goods so that they can be delivered without damage.
18	The addresses and barcodes of the parcels must always be visible so that the correct parcel can be identified quickly.	Fact	Vehicle	Driver	+	As a courier, I need to be able to see the barcode and address on the parcels stored in the storage space so that I can check that I have the correct parcel.

20	Carried parcels must be put down in order to lock or unlock the loading compartment with the key.	Problem	Vehicle	Driver	=	As a courier, I need a feature that allows me to open and close the cargo area without using my hands, so that I can work faster and more flexibly.
21	Small fences at the edge of the shelves would be useful to prevent parcels from falling out.	Idea	Vehicle	Driver	=	As a courier, my packages must be secured so that they do not fall out when the cargo area is opened while the vehicle is parked at an angle, so that I can also use these parking spaces.
22	Sliding shelf dividers would be useful to separate the parcels more flexibly and hold them in position.	Idea	Vehicle	Driver	=	As a courier, I would like to be able to separate the parcels in the cargo area so that they do not get mixed up.
23	Foldable shelves are very helpful, as parcels often come in very different sizes.	Fact	Vehicle	Driver	=	As a courier, I need to be able to organise the cargo space flexibly so that I can transport packages of different sizes, which sometimes need to be picked-up at short notice.
26	Automatic doors would be too slow and couldn't keep up with my speed.	Problem	Vehicle	Driver	-	
27	The doors to the storage room should unlock automatically as soon as the driver stands next to them, so that I don't have to unlock them with a key.	Improvment	Vehicle	Driver	=	As a courier, I need a system that automatically unlocks the vehicle and cargo area when I approach and locks it again when I walk away, so that I don't have to do this manually and can save time.
28	The packages must be securely stored in the storage space so that it is not possible to steal them.	Fact	Vehicle	Driver	=	As a courier, I have to make sure that the cargo is safely stored in the storage space so that it cannot be stolen.
30	A roller door is preferable for the rear of the vehicle as it requires less space when opening. It also means that two doors do not have to be opened on the left and right. There is also no problem of doors unintentionally damaging the surroundings or not latching properly. But there should be a way to close the door with your hands full (carrying packages).	Improvment	Vehicle	Driver	+	As a courier, I need access to the cargo area without taking up extra space on the road by opening the doors, so that I am not restricted when parking and do not accidentally damage the surrounding area with the door.
44	Drawers would help to make it easier to reach parcels that are placed further inside the Paxster. The drawers could also be pulled out in both directions so that there is no need to walk around the vehicle.	Improvment	Vehicle	Driver	=	As a courier, I need access to the parcels in the storage space from both sides of the vehicle so that I can flexibly reach the parcels in the middle from either the left or right.
49	The items in the swap box should already be sorted by address in the order of the delivery route when the swap box is loaded into the vehicle, so that the parcels can be easily found at the correct address.	Idea	Vehicle, System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
50	There should be guidance for sorting staff to ensure that the swap box is packed in the best possible way for drivers during delivery.	Improvment	Vehicle, System	Sorter	=	As a courier, I need help pre-sorting parcels in the best possible way for the driver so that they can deliver them quickly.

51	The swap box should also have flexible shelves to separate the packages from each other.	Improvment	Vehicle	Driver	=	As a courier, I would like to be able to separate the parcels in the cargo area so that they do not get mixed up.
52	It should be possible to exchange swap boxes both on fixed infrastructure and between vehicles.	Idea	Vehicle, System	Driver	=	As a courier, I need to be able to quickly transfer parcels between different vehicles and fixed infrastructure so that I can work more efficiently.
53	It should also be possible to swap swap boxes between different vehicle heights, as different vehicles are used.	Idea	Vehicle	Driver	=	As a courier, I need to be able to quickly transfer parcels between different vehicles and fixed infrastructure so that I can work more efficiently.
54	The swap box should be easy to use so that you can make a change on your own.	Idea	Vehicle	Driver	=	As a courier, I have to be able to do my job without assistance, as I am usually on the road alone.
55	Spontaneous pick-ups from customers are often added, for which space would also have to be provided.	Problem	Vehicle	Driver	=	As a courier, I need sufficient space in the cargo area to carry out spontaneous pick-ups requested by customers so that this service can continue to be offered.
56	The idea to be able to fill up from another space is good. The swap box would work best if you had more micro-hubs spread around the city where you could swap the swap boxes from empty to full without having to make the long journey back to the hub.	Fact	System	Driver	+	As a courier, I want to avoid having to constantly drive to the city hub to reload, so that I can avoid this extra trip.
57	Routes and the loading of the swap box must be planned with traffic in mind, otherwise you will get stuck in a traffic jam.	Problem	System	Driver	=	As a courier, I need help taking traffic conditions into account so that I can use the fastest route.
58	Shelves or drawers in the swap box would be helpful for quickly finding and accessing the packages.	Idea	Vehicle, System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste time doing so.
65	The swap box must be very durable and stabel so that it does not break.	Fact	Vehicle	Driver	=	As a courier, I need durable and stable equipment so that I can work quickly and reliably.
66	The swap box could be foldable to save space when transporting empty boxes.	Idea	Vehicle	Driver	=	As a courier, I need space-saving equipment so that the cargo space can be used efficiently.
67	The Swap Box must not hit the vehicle or damage it in any other way while driving, for example.	Problem	Vehicle	Fleetmanager	=	As a fleet manager, I want to ensure that the equipment does not damage the vehicle during use so that there are no breakdowns.
68	The swap box must be secured while driving. This securing mechanism must be quick and easy to attach and remove.	Problem	Vehicle	Driver	=	As a courier, I want the equipment to be easy to use so that it doesn't interfere with my work processes.
69	The swap box should be as light as possible so that it can be moved by one person.	Fact	Vehicle	Driver	+	As a courier, I want lightweight equipment so that my physical strain is as low as possible.

70	If something breaks on the swap box, it should be easy to replace and exchange. And the spare parts must be available quickly.	Fact	Vehicle	Fleetmanager	=	As a fleet manager, I need a reliable maintenance and spare parts service so that long downtimes can be avoided.
71	The micro-hubs, where the swap boxes are stored, must be placed in very good locations so that time can be saved. Perhaps also calculated using software.	Idea	System	Driver	=	As a courier, I want to minimise my driving time so that I can work more effectively.
72	There should be an assistant for loading the swap box so that it is loaded perfectly in line with the route.	Idea	System	Driver	=	As a courier, I want the parcels to be sorted in line with the route so that I can quickly reach them at the delivery address.
73	A MircoHub, where the pick-ups could also be handed in and the swap boxes exchanged, would be very helpful.	Idea	System, Vehicle	Driver	=	As a courier, I would like to have access to a MicroHub so that I can hand in pick-ups and exchange swap boxes more efficiently.
74	The combination of swap box and micro-hubs allows large parcels to be delivered more efficiently in a smaller vehicle (Paxster), as parcels can be loaded again so quickly. This means that vans can be replaced by smaller vehicles.	Fact	System, Vehicle	Driver	=	As a courier, I would like to use a swap box and MicroHub system so that I can deliver large parcels with a smaller, more efficient vehicle.
75	It would be helpful to have a trolly for larger, heavier parcels. This could be stored under the vehicle.	Fact	System, Vehicle	Driver	-	
91	Sorting parcels is a key aspect that takes a lot of time and is very difficult for new employees, as a lot of information has to be processed.	Problem	System	external Serviceprovider	=	As an external service provider, I would like support with parcel sorting so that I can reduce training time for new employees and increase efficiency.
92	It is very difficult to quickly find the right parcels if they have been sorted by someone else in the vehicle. Therefore, there should be a system that helps the driver find the parcels reliably and quickly at the delivery location.	Improvment	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like a system that helps drivers find parcels quickly so that I can avoid delays due to incorrect in-vehicle sorting.
93	A digital space with a digital map for each package in the vehicle would enable more efficient and space-saving loading and faster unloading of the correct packages.	Idea	Vehicle, System	external Serviceprovider	=	As an external service provider, I need to stow packages optimally in the vehicle and find them quickly so that I can optimise space in the vehicle and speed up loading and unloading.
94	A variable subdivision of the swap box with additional intermediate shelves or drawers would be helpful so that packages can be stored separately from each other and are accessible at any time if the route changes.	Idea	Vehicle	external Serviceprovider	=	As an external service provider, I would like variable shelving so that I can reorganize parcels easily if route changes occur.
99	Ultimately, every system must be cost-effective, which means that a more expensive system must be able to demonstrate that it saves money in one area.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like new systems to be cost-effective so that I can ensure a return on investment in operations.
100	I am willing to spend more money on equipment if it is stable, reliable and works well.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider , I would like durable and reliable equipment so that I can avoid interruptions in service and increase uptime.

102	It should be possible to access the swap box without a key so that it does not have to be taken out separately. However, it should be locked in the vehicle, so a keyless go system would be useful.	Fact	Vehicle	external Serviceprovider	=	As an external service provider, I would like to access the packages without a physical key so that I can save time and simplify the workflow.
103	The cargo area should lock automatically when the driver walks away from the vehicle with the key. This should also be signalled so that the driver can check that the vehicle is locked. As soon as the driver returns to the vehicle, it should be unlocked immediately.	Idea	Vehicle	external Serviceprovider	=	As an external service provider, I would like the vehicle to lock automatically when I walk away so that I can ensure cargo safety without manual checks.
109	If the data (delivery location, dimensions, delivery time window) for each package is available, it would be possible to generate a 3D optimisation of the storage space for each route.	Idea	System	external Serviceprovider	=	As an external service provider, I want a system that ensures optimal loading so that the vehicle is used to its full capacity.
111	Based on the delivery location, size and weight of the parcel, optimal distribution across vehicles and swap boxes could be achieved.	Idea	Vehicle, System	external Serviceprovider	=	As an external service provider, I want parcels to be distributed optimally among vehicles so that routes become more efficient.
112	It could become a problem that cities do not allow many of these microhubs, which are necessary so that drivers do not have to return to the hub to exchange the swap boxes.	Problem	System	external Serviceprovider	=	As an external service provider, I don't want to have to constantly drive back to the hub to reload packages so that I don't lose any time.
113	The system with the swap box in combination with MicroHubs also offers the advantage that routes can be split up and another driver could flexibly take over the route.	Fact	Vehicle, System	external Serviceprovider	=	As a service provider, I would like to be able to spontaneously split parts of a route between different drivers so that we can be more flexible.
115	The people who sort the parcels at the facility do not have the expertise to load the swap box for the driver themselves in a way that adds value. Therefore, support from software is needed to indicate where each parcel should be placed. Then it's just like a Tetris game for them, where they have to recreate what's on the screen.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I want software that shows how to load parcels so that it is easier for sorting staff.
117	It would also be possible to exchange the swap boxes directly via a box van. This would make you less flexible in terms of meeting times, but you wouldn't need a MicroHub.	Idea	Vehicle, System	external Serviceprovider	=	As a service provider, I want to be able to exchange parcels directly and quickly between delivery vehicles so that I can work quickly and spontaneously.
118	The swap box should have compartments with shelves and drawers so that the parcels can be sorted. In particular, a division between delivery and returns must be made.	Fact	Vehicle	Driver	=	As a courier, I would like the swap box to have diffrent areas so that I can easily separate deliveries and returns.
119	The MicroHub and swap box save a lot of time, as there is no need to drive back to the hub, thereby reducing the distance travelled. This also takes a lot of mental strain off the driver, as they know that a ready-made box is waiting for them at the MicroHub and they can drop off the returns and pick-ups there without having to drive back because someone else is picking them up.	Fact	Vehicle	Driver	=	As a courier, I don't want to have to drive back to the hub to reload so that I can save time.

137	Foldable, ergonomic shelving enables better parcel organization. Customization is common among drivers to separate pick-ups and deliveries.	Improvment	Vehicle	Supervisor of Driver	+	As a Supervisor of Driver, I would like flexible, ergonomic shelving in delivery vehicles so that I can support better parcel organization and reduce driver stress.
138	Tracking and in-vehicle organization systems (e.g. parcel compartment mapping, smart screens) would reduce delivery errors and support stress-free pick-ups.	Idea	Vehicle	Supervisor of Driver	+	As a Supervisor of Driver, I would like tools to track and organize parcels inside the vehicle so that I can reduce delivery errors and support drivers with pick-ups.
141	Pick-ups remain a major unpredictable challenge, with poor integration into route planning and insufficient in-vehicle space planning.	Problem	System	Supervisor of Driver	=	As a Supervisor of Driver, I would like better integration of pick-up logistics into route and space planning so that I can manage unpredictability and vehicle organization.
144	Swap box innovation is a potential gamechanger — if they are pre-sorted, foldable, lightweight, and equipped with scanners or sensors to support route planning and pickup handling.	Idea	System, Vehicle	Fleetmanager	=	As a fleet manager, I want boxes for parcels that support smart processing and efficient logistics, so that route planning is improved and delivery costs are reduced.
145	Microhub success depends on placement: they must be in outer zip zones (not inner rings), support quick access, and allow for returns and express services. Poor placement creates inefficiencies due to traffic and detours.	Idea	System	Fleetmanager	=	As a fleet manager, I would like MicroHubs to be placed in strategic locations, so that I can reduce delivery inefficiencies and avoid traffic delays.
148	Full internal capacity is underutilized, and total height is near legal limits (1.92 m of 2.20 m). This opens room for design optimization.	Improvment	Vehicle	Fleetmanager	-	
149	Cultural/local delivery context matters: In affluent areas, deliveries are more likely to be received due to au-pairs or recipients being home. This could inform dynamic routing or staffing.	Fact	System	Fleetmanager	=	As a fleet manager, I would like delivery operations to reflect local social and cultural contexts so that I can plan routes and staff dynamically and more effectively.
150	Swap boxes must fit into Vehicles of various sizes.	Fact	Vehicle, System	Fleetmanager	=	As a fleet manager, I want my equipment to be compatible with different vehicle sizes and types so that I can use it across my entire fleet.
151	I would like to be able to open and close the parcel compartment hands-free. A roller door at the rear that opens automatically when I hold my hand near the transmitter or give voice commands would be useful.	Improvment	Vehicle, Fleet	Driver	=	As a driver, I want to be able to open and close the luggage compartment around the rear area and on the sides hands-free so that I don't have to put down packages and can therefore work faster.
152	Two sliding doors are required at the front, as there are many railings along the road in Athens. This is much safer in view of passing bicycles, scooters or gusts of wind.	Idea	Vehicle	Driver	=	As a driver, I want the space required to open the doors to be as small as possible so that I can be more flexible when parking in tight spaces and opening the doors is safer for pedestrians.
153	For more effective loading, I need shelves – large ones at the bottom, small ones at the top, a net at the front, and the bottom shelf should be height-adjustable.	Idea	Vehicle	Driver	=	As a driver, I need versatile and flexible storage compartments so that I can handle different package sizes.

154	Packages may shift during braking or fall off. Packages must be secured during transport.	Fact	Vehicle	Driver	=	As a driver, I need to be able to rely on parcels not slipping around during the drive so that they can be transported safely.
155	For different goods, I need multiple temperature zones: chambers with +18°C for chocolate, +2°C for medicine and cheese, and -18°C for ice cream, plus space for a cooling unit. The partition walls should be movable.	Idea	Vehicle	Driver	=	As a driver, I would like to have a cargo area with different cooling zones that can be adjusted in size so that I can deliver goods more flexibly.
157	For easy handling when loading the swap box, rails in the truck and wheels on the swap box are required to enable easy pushing.	Idea	Vehicle	Driver	=	As a driver, I need equipment that can be moved without much effort so that I can save energy and strength.
158	For loading, I would like the swap box to have shelves of different sizes, drawers for narrow packages and automatic opening from one side of the box.	Idea	Vehicle, Fleet	Driver	=	As a driver, I want to have different storage options for different parcels so that I can store them optimally according to their different sizes and weights.
164	Loading processes are often difficult, unreliable and inefficient: packages are left behind, volumes are incorrectly calculated, and returns are confusing.	Fact	Vehicle, System	Driver	=	As a driver, I would like to have support in loading the vehicle optimally so that the space is filled to capacity and recordings are taken into account
165	When fully loaded, the cargo area becomes confusing – packages are difficult to find.	Problem	Vehicle, Fleet	Driver	=	As a driver, I would like to have support in finding the right parcel quickly and reliably at the delivery location.
166	RFID (Radio-Frequency Identification), sensors and digital tools enable increased efficiency in terms of packing volume, parcel tracking and automatic door opening.	Idea	Vehicle, Fleet, System	Driver	=	As a driver, I want digital innovations so that parcel volume efficiency can be improved, parcel tracking can be offered to customers, and doors can be opened automatically at the customer's premises when I arrive.
167	Packages are not sorted according to delivery order, which leads to loss of time.	Problem	Vehicle, System	Driver	=	As a driver, I want the parcels to be sorted according to the delivery order of the route so that I can save time.
168	There is no flexible adjustment of the load in case of short-term changes.	Fact	Vehicle, System	Driver	=	As a courier, I need a system that can respond flexibly to changes in delivery so that parcels can be delivered efficiently.
169	The cargo space is often too small or not optimally organized.	Fact	Vehicle	Driver	=	As a driver, I want a well-organised cargo area so that I can transport as many goods as possible.
172	There is a desire for automatic sorting and digital loading systems.	Idea	Vehicle, System	Driver	=	As a driver, I want the parcels to be sorted and loaded optimally for the route so that I can save time.
175	There is a need for digital matching between tour plan, vehicle and actual load.	Idea	System	Driver	=	As a driver, I would like to have digital coordination between the tour plan, vehicle and actual load so that the planned load matches the actual load.

176	Packages are often loaded into the vehicle unsystematically, without any discernible order.	Problem	Vehicle, System	Driver	=	As a driver, I want the parcels to be loaded systematically in the optimal order for the route so that I don't have to rearrange all the parcels at the delivery location and can quickly find the right ones.
177	Sorting by the warehouse is only partial or incomplete. Drivers have to manually pre-sort their deliveries to work efficiently. This takes up additional time.	Fact	Vehicle, System	Driver	=	As a driver, I need a system that ensures complete and error-free sorting of parcels so that deliveries do not have to be manually checked and re-sorted.
178	There is a need for digital tracking of parcel locations in the vehicle – a desire for a "parcel navigation system."	Idea	Vehicle	Driver	=	As a driver, I want help to quickly locate the right parcels in the loading compartment at the delivery location so that I don't lose any time.
180	The door systems on the vehicle's cargo area are impractical; they open too wide and block traffic.	Problem	Vehicle	Driver	=	As a driver, I need doors that take up as little space as possible outside when opened so that they do not obstruct traffic or my workflow.
181	There's no central app or software that combines route planning, delivery windows, and parcel tracking. Automatic route optimization is needed, including live traffic, parcel weight, and destination availability. Suggestion: RFID or QR code tracking for automatic parcel identification.	Idea	Vehicle, System	Driver	=	As a driver, I need a software environment that combines route planning, delivery windows and shipment tracking so that I have a quick overview of automatic route optimisation, the weight of shipments (to know whether I need a trolley) and the availability of destinations.
182	Missing information about parcel volume or weight complicates planning and loading. Software and information for each parcel must be available.	Idea	Vehicle, System	Driver	=	As a driver, I want the software to have reliable information about the parcels so that it can function without errors.
183	Confusing loading space structure: Packages are difficult to reach or have to be rearranged several times	Problem	Vehicle	Driver	=	As a driver, I need a clearly structured cargo area so that I can easily reach the parcels without having to move them around multiple times.
184	There is a desire for automatic recording and sorting of packages in the warehouse.	Improvment	Vehicle, System	Driver	=	As a driver, I would like the parcels to be sorted and recorded in advance at the warehouse so that they only need to be loaded onto the vehicle.
185	Cargo area doors are too heavy and too large, creating a hindrance in city traffic. There's a desire for automatic door opening, e.g., via an app or the push of a button.	Idea	Vehicle	Driver	=	As a driver, I would like to have assistance opening the doors so that it is not so physically demanding.
186	There is no central app or platform that summarises all information (tours, packages, access, parking zones, etc.).	Idea	System	Driver	=	As a driver, I want a central platform that bundles all information (tours, packages, access, parking zones, etc.) on one device so that I only have to use one device.

188	There's a desire for live tracking of packages—both in the vehicle and during delivery. The idea: RFID- or QR code-based recognition directly during loading.	Idea	Vehicle, System	Driver	=	As a driver, I want reliable live tracking of parcels so that I always know where a parcel is (at the hub, at the customer's premises, in the vehicle, etc.).
190	It would be great if we could open the swap boxes from all the sides.	Idea	Vehicle	Driver	=	As a driver, I need easy access to the parcels in the vehicle's cargo area so that I don't have to rearrange them at the delivery location.
196	If the truck had the ability to open not only the back also the side doors on both sides, you can remove swap boxes and have flexible access to rolling them up.	Improvment	Vehicle	Driver	=	As a driver, I want flexible access to the storage space from all sides so that I don't have to worry about it when parking.
199	If there are ice creams, it should be Minus 20 °C. If there are cheese, 0 to 4 °C. If there are medicines, 2 to 8 °C. If there is chocolate, 14 to 18 °C. So maybe this could be also saved on or based on the swap box. You can put it in and it automatically knows which temperature is best. We'll set it up. You have to set based on the product. But when you track everything, when you have such a swap box for example, you put it just in and then the temperature will automatically be on the correct temperature because the system knows what comes inside.	Idea	Vehicle	Driver	=	As a driver, I would like the temperature cargo body to automatically set the correct temperature for the goods being transported so that I don't waste time adjusting it.
201	To open the swap box, you need proximity sensors.They measure your position. A lock closes and opens. This makes loading easier.	Idea	Vehicle	Driver	=	As a driver, I want the cargo body to unlock automatically when I approach and lock automatically when I move away, so that no time is lost and the goods are protected.
202	There could be many ball-rollers in the cargo area floor of the van that can be lowered to prevent the contents from shifting. Swap boxes could be moved around in them. The boxes would not need rollers.	Idea	Vehicle	Driver	=	As a driver, I want to be able to move packages into the cargo area quickly and with minimal effort, saving me time and energy.
203	If a van breaks down, the swap boxes should be able to be easily transferred from one van to another.	Fact	Vehicle, Fleet	Driver	=	As a driver, I want it to be possible to quickly transfer the entire contents of the cargo area to another vehicle so that not so much time is lost if one vehicle breaks down.
204	When we stack the swap boxes, they may be left outside for a while.There could be $1,000 or more in the box. This requires security measures for the box. Tracking and monitoring software is needed here.	Problem	Vehicle, System	Driver	=	As a driver, it is important that the contents of the swap boxes are well secured so that they cannot be stolen.
215	Unloading in Ferrara often requires walking over cobblestones, which makes trolleys more useful than pallets.	Fact	Vehicle	Driver	=	As a courier, I want to use equipment that is easy to handle on different surfaces, such as cobblestones, so that I can transport goods efficiently.
216	Side doors would be convenient for faster and easier access to cargo.	Improvement	Vehicle	Driver	=	As a courier, I want to be able to access the cargo from all sides so that I am not restricted to one side.

218	Greater cargo capacity is important.	Fact	Vehicle	Driver	=	As a courier, I want the vehicle to be loaded optimally so that I can take as many deliveries as possible and reduce the number of trips I have to make.
227	Swap boxes could be useful in Ferrara if micro-depots are placed in accessible locations near the city center.	Idea	System	Driver	=	As a courier, I would like strategically placed transfer points so that I don't have to drive so far to reload parcels.
229	Swap boxes that open from three sides are considered highly practical for loading and unloading.	Improvement	Vehicle	Driver	=	As a courier, I want to have access to the parcels in the cargo hold from all sides so that I can be more flexible.
230	Swap boxes reduce time lost by eliminating the need to return to a central depot for reloading.	Idea	System	Driver	=	As a courier, I want to avoid returning to the depot for loading so that I can save time and complete more deliveries.
231	The success of swap boxes depends heavily on the accessibility and location of micro-hubs.	Problem	System	Driver	=	As a courier, I want micro-hubs to be located in easily accessible areas to avoid delays and double parking.
232	Foldable swap boxes that adapt to vehicle size are considered especially useful in historic city centers.	Improvement	Vehicle	Driver	=	As a courier, I want equipment that can be adapted to different vehicles so that it is always optimally suited..
233	Swap boxes must be rigid and secured with lock systems to prevent theft and vandalism.	Improvement	Vehicle	Driver	=	As a courier, I want the cargo to be protected from theft and tampering so that I don't have to worry.
240	Automatic doors with sensors could improve safety and ease of access in narrow urban spaces.	Idea	Vehicle	Driver	=	As a courier, I want to make opening the doors to the cargo area safe for pedestrians in order to prevent accidents.
255	Side doors only on one side make unloading difficult in tight spaces.	Problem	Vehicle	Driver	=	As a courier, I would like to have access to the parcel compartment from both sides and from the rear so that I can be more flexible in my daily work.
257	LED lighting is essential inside the vehicle for efficient nighttime deliveries.	Improvment	Vehicle	Driver	=	As a courier, I want strong interior lighting so that I can find parcels quickly even in the dark.
258	Shelves can help organize packages but may limit space for large deliveries.	Idea	Vehicle	Driver	=	As a courier, I want to have a flexible cargo area so that I have space for lots of small parcels and large items.
259	Heavy packages require carts and proper lifting training to avoid injury.	Problem	Vehicle	Driver	=	As a courier, I want to reduce my physical strain so that my health is protected.
260	Automatic doors or smart opening systems could help speed and safety in delivery processes.	Idea	Vehicle	Driver	=	As a courier, I want quick and safe access to the cargo area when unloading so that I can save time and be safe during delivery.
262	Couriers want improved package organization and assistance for identifying parcels faster.	Improvement	Vehicle	Driver	+	As a courier, I want help identifying where parcels are stored so that I don't waste time searching for them.

263	Vehicles should have compartments to separate special deliveries like Allegro collections.	Improvement	Vehicle	Driver	=	As a courier, I would like to keep special parcels separate so that they can be handled with extra care.
271	Integrated keyless systems improve safety by locking doors automatically after the driver leaves.	Idea	Vehicle	Driver	+	As a courier, I want the vehicle and cargo area to lock when I walk away and unlock when I approach with a parcel, so I don't have to think about it and can get there faster.
273	Finding packages is difficult due to lack of consistent internal organization.	Problem	Vehicle	Driver	=	As a courier, I want to get support in finding the right parcels at the delivery location so that I can work faster.
274	Vehicle should support sorting packages by delivery zone (A, B, C, D) with light or signal indicators.	Idea	Vehicle	Driver	=	As a courier, I would like the parcels to be sorted along the route so that I don't have to move them around.
275	Young or inexperienced couriers need more vehicle guidance for organizing the cargo.	Fact	Fleet	Driver	=	As a courier, I would like the new courier to be supported by innovations that can be learned quickly so that they feel confident.
276	Movement of packages during transport causes inefficiencies and confusion.	Problem	Vehicle	Driver	=	As a courier, I want the parcels to be secured during transport so that they do not damage each other or get mixed up.
279	Backside access to packages directly from the cabin could improve last-stop efficiency.	Idea	Vehicle	Driver	=	As a courier, I want to access the last parcels from the cabin so that I can finish my route faster.
291	I would like to receive a notification if I have forgotten to lock the doors.	Idea	Vehicle	Driver	=	As a courier, I want a system that automatically locks the doors so that I don't forget to do it.
301	The loading height is too high, making it difficult to get in and load and unload parcels.	Problem	Vehicle	Driver	=	As a courier, I need low or easy access to the parcels so that I can load and unload them safely and reduce my physical strain.
302	It would be nice to be able to load the container using a pneumatic suspesion.	Idea	Vehicle	Driver	=	As a courier, I want my work to be done quickly and without great physical effort so that I can stay healthy in the long term.
303	When cars stand next to each other the rear doors often collide.	Problem	Vehicle	Driver	=	As a courier, I always want to have access to the cargo area without colliding with objects in the way, so that I don't damage anything around me.
304	When the vehicle is very full it should still be easy to close the door without packages blocking the door.	Problem	Vehicle	Driver	=	As a courier, I want to be able to close the doors in the cargo area without parcels blocking them, so that I don't lose any time.
307	It is annoying when parcels get caught on rough edges in the cargo area.	Problem	Vehicle	Driver	=	As a courier, I want the parcels to be loaded and unloaded without tilting so that I can work quickly.
317	When the driver is wearing gloves in the winter he might have problems to operate touch buttons.	Problem	Vehicle	Driver	=	As a courier, I want to be able to operate everything with gloves on in winter so that my hands stay warm.

Annex 3. Workshop evaluation with statements and user needs: IR Heating + HMI

No.	Statement	Classification	Level	Role	Priority	User need
31	More heat for the feet and back would be very welcome in the open Paxster.	Fact	Vehicle	Driver	=	As a courier, I need to keep my feet warm because they quickly get cold when walking in the snow, so that I feel comfortable.
32	The vehicle's range must be sufficient for an entire working day with heating, even in winter, without having to recharge in between.	Fact	Vehicle	Driver	+	As a courier, I want the vehicle's range to be sufficient for a full working day, even in winter when the heating is in use, so that it does not need to be recharged.
34	A heated steering wheel is preferred for cold working days.	Fact	Vehicle	Driver	=	As a courier, I want to keep my hands warm because I often feel cold there, so that I feel comfortable.
35	Due to temperature fluctuations in winter, it can happen that it rains and this rain freezes on the windscreen. Therefore, the windscreen should be fully heated.	Improvment	Vehicle	Driver	+	As a courier, I need a clear view through the windscreen at all times so that I can drive safely.
36	In the Ford van, the ice that forms when the heating is turned off during a delivery stop must be removed with the windscreen wipers in order to be able to see again.	Problem	Vehicle	Driver	+	As a courier, I need a clear view through the windscreen at all times so that I can drive safely.
37	If the vehicle is parked and locked, the heating system should still continue to run so that the windows remain clear and the interior remains heated.	Improvment	Vehicle	Driver	+	As a courier, I want the interior of the vehicle to remain at a constant temperature throughout the working day, even when the vehicle is parked, so that I feel comfortable.
76	Do I have to worry about my health with an infrared heater?	Problem	System, Vehicle	Driver	=	As a courier, I would like to be informed about infrared heating technology so that I can use it without any concerns.
77	The most important thing is to heat the core body and the feet.	Problem	Vehicle	Driver	=	As a courier, I want the heating to focus on my core body and feet so that I can stay warm
78	If it consumes less power and heats me up more efficiently, giving me more driving range, it's a good thing in the van.	Fact	Vehicle	Driver	=	As a courier, I don't want to have to worry in winter about whether I can turn on the heating due to reduced range, so that I can stay warm and worry-free.
79	The heating setting should also be within the driver's natural working range so that it can be adjusted without distraction while driving.	Fact	Vehicle	Driver	=	As a courier, I would like heating controls to be easily reachable while driving so that I can adjust them safely without distraction.
99	Ultimately, every system must be cost-effective, which means that a more expensive system must be able to demonstrate that it saves money in one area.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like new systems to be cost-effective so that I can ensure a return on investment in operations.
100	I am willing to spend more money on equipment if it is stable, reliable and works well.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider , I would like durable and reliable equipment so that I can avoid interruptions in service and increase uptime.

104	It is better to keep your face warm in winter, as it gets very cold very quickly when it is windy.	Problem	Vehicle	external Serviceprovider	=	As an external service provider for , I would like heating solutions that keep the face warm so that I can maintain comfort in windy winter conditions.
107	In winter, the range decreases, so the heating is not used in older vehicles (Crafter) with a short range in order to make it through the day.	Problem	Vehicle	external Serviceprovider	=	As an external service provider, I would like efficient heating systems in winter so that I can avoid sacrificing vehicle range for comfort.
108	The temperature inside the vehicle cannot be kept constant due to repeated starting and stopping of the vehicle.	Problem	Vehicle	external Serviceprovider	=	As an external service provider for , I would like constant cabin temperature despite frequent stops so that I can maintain comfort throughout the route.
120	I have colleagues who got sick in winter because they were too cold at work. Even with very good clothing, there are days when it is -20 degrees cold, and you can easily get sick.	Fact	Vehicle	Driver	=	As a courier, I would like better heating solutions in winter so that I can stay healthy even in extremely cold conditions.
121	Since we need to have our hands free for the scanner, we do not wear gloves. Therefore, it is important to keep our hands warm.	Fact	Vehicle	Driver	=	As a courier, I would like a way to keep my hands warm and use touch so that I can continue scanning parcels efficiently.
122	Because you only have a very short time to stay in the vehicle between stops, your body has to warm up again very quickly.	Fact	Vehicle	Driver	=	As a courier, I would like the vehicle to warm me up quickly so that I can stay comfortable throughout the day.
123	The infrared heating system must not consume too much energy so that the vehicle's range is sufficient for a working day.	Fact	Vehicle	Driver	=	As a courier, I would like to have enought energy so that the vehicle's range lasts for a full workday with all features.
124	Feet in particular get wet and cold very quickly in winter due to the snow, so it would be very helpful if the infrared panels could also warm them up. Not only in terms of comfort but especially in terms of health.	Fact	Vehicle	Driver	=	As a courier, I would like the infrared panels to warm my feet so that I stay healthy and comfortable in any siutuation.
125	The heating controls should be installed within the driver's reach and should be easy to operate without distracting the driver while driving. It should be possible to adjust the intensity individually.	Fact	Vehicle	Driver	=	As a courier, I would like easily reachable and adjustable heating controls so that I can stay focused on driving while maintaining comfort.
136	Heating systems must balance comfort and battery efficiency. Current models lose significant range when heating is used in winter — highlighting a need for dedicated heating solutions or thermal management innovation.	Fact	Vehicle	Supervisor of Driver	+	As a Supervisor of Driver, I would like heating systems that maintain driver comfort without compromising vehicle range so that I can ensure operational efficiency in winter.
142	IR heating and insulation upgrades are essential. Paxsters lack side protection, and drivers report wind and cold exposure — especially to the face and hands.	Improvment	Vehicle	Driver	+	As a courier, I would like to be protected from wind and cold so that I can stay comfortable and healthy during my shift.

205	Delivery drivers want a comprehensive energy management system that allows them to leave the air conditioning and heating in the cab switched on even when the vehicle is left unattended for a short time during delivery and the engine is switched off. The vehicle should be equipped with a second battery to maintain the temperature in the interior and avoid large temperature fluctuations and thus high energy consumption. This requires software that recognises when the vehicle is in distribution mode with short stops or when it is parked.	Improvment	Vehicle	Driver	=	As a driver, I want the temperature in the vehicle to be kept constant throughout the day, even when the vehicle is parked for a delivery, so that I feel comfortable and don't get sick.
280	It would be nice to have the opportunity to preheat the vehicle over the phone.	Idea	Vehicle	Driver	=	As a courier, I would like to be provided with heat immediately at the start of the route so that I do not feel cold at the beginning.
288	Having a place to keep hot drinks warm would improve comfort during cold days.	Improvement	Vehicle	Driver	=	As a courier, I want to keep my drinks hot during longer rides.
308	Drivers ofton have to reduce the heating because of smal battery capacity.	Problem	Vehicle	Driver	=	As a courier, I don't want to have to turn off the heating in winter because of low battery range, so that I don't get cold.
313	I want to be able to check the Zebra i.e. while stopping in a parking lot.	Fact	Vehicle	Driver	-	
317	When the driver is wearing gloves in the winter he might have problems to operate touch buttons.	Problem	Vehicle	Driver	=	As a courier, I want to be able to operate everything with gloves on in winter so that my hands stay warm.

Annex 3. Workshop evaluation with statements and user needs: Holistic Energy Management

No.	Statement	Classification	Level	Role	Priority	User need
32	The vehicle's range must be sufficient for an entire working day with heating, even in winter, without having to recharge in between.	Fact	Vehicle	Driver	+	As a courier, I want the vehicle's range to be sufficient for a full working day, even in winter when the heating is in use, so that it does not need to be recharged.
33	The vehicles should be able to charge each other so that if one vehicle breaks down, the other vehicle can be charged for a short time (e.g. 5 minutes) so that it can be moved off the road. This access to bypass the battery should be very simple, preferably via the charging connection.	Improvment	Vehicle	Driver	=	As a courier, I would like to be able to charge my colleague's car via my vehicle in an emergency so that a tow truck does not have to be called.
37	If the vehicle is parked and locked, the heating system should still continue to run so that the windows remain clear and the interior remains heated.	Improvment	Vehicle	Driver	+	As a courier, I want the interior of the vehicle to remain at a constant temperature throughout the working day, even when the vehicle is parked, so that I feel comfortable.
38	On the Paxster, the warning lights should continue to flash even when the vehicle is parked and locked.	Improvment	Vehicle	Driver	-	
46	Wireless charging for the vehicles would be nice so that you don't have to plug them in at the end of the day.	Idea	Vehicle	Driver	-	
48	It should be displayed when recuperation is taking place. There is currently no sense of how much energy is being recovered.	Fact	Vehicle	Driver	=	As a courier, I want it to be displayed as soon as my vehicle is recuperated and how strong it is, so that I can get a better feel for it.
86	The energy-saving modes should only be a recommendation and should not be forced upon you. Because sometimes you have to do your job and don't have time to save energy.	Problem	Vehicle	Driver	=	As a courier, I would like energy-saving modes to be surpassed so that I can prioritize completing my tasks efficiently when needed.
87	Energy-saving features should be applied automatically so that the driver does not have to think about them	Fact	Vehicle	Driver	=	As a courier, I would like energy-saving features to be automated so that I don't have to manually manage them while working.
88	It should be shown when recuperation takes place and how energy is recovered in order to gain an understanding of this.	Fact	Vehicle	Driver	=	As a courier, I would like to see when and how energy recuperation happens so that I can better understand my vehicle's energy efficiency.
89	It should be shown how activating the heating, for example, has a direct effect on the range of the vehicle.	Fact	Vehicle	Driver	=	As a courier, I would like to see how heating affects vehicle range so that I can make decisions about energy usage on my own.
90	A pressure indicator or an indicator when the tyre pressure needs to be adjusted would be very helpful. Sometimes the tyre slowly loses air and then you don't notice until you have a flat tyre.	Fact	Vehicle	Driver	=	As a courier, I would like a tyre pressure indicator so that I can detect air loss early and avoid flat tyres.
99	Ultimately, every system must be cost-effective, which means that a more expensive system must be able to demonstrate that it saves money in one area.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like new systems to be cost-effective so that I can ensure a return on investment in operations.

100	I am willing to spend more money on equipment if it is stable, reliable and works well.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider , I would like durable and reliable equipment so that I can avoid interruptions in service and increase uptime.
106	At a logistic provider, recharging during the day is not practised. Therefore, the battery must be sufficient for an entire day.	Problem	Vehicle	external Serviceprovider	=	As an external service provider, I would like battery capacity to last the entire workday so that I can avoid mid-day charging interruptions.
107	In winter, the range decreases, so the heating is not used in older vehicles (Crafter) with a short range in order to make it through the day.	Problem	Vehicle	external Serviceprovider	=	As an external service provider, I would like efficient heating systems in winter so that I can avoid sacrificing vehicle range for comfort.
108	The temperature inside the vehicle cannot be kept constant due to repeated starting and stopping of the vehicle.	Problem	Vehicle	external Serviceprovider	=	As an external service provider for , I would like constant cabin temperature despite frequent stops so that I can maintain comfort throughout the route.
131	Saving energy and reducing emissions is important, but it should not interfere with our daily work. Drivers should be educated on how to save energy and reduce emissions, but it should not be forced upon us because we have to do our job.	Fact	Vehicle, System	Driver	=	As a courier, I would like to balance sustainability with work performance so that I can complete my tasks effectively.
132	Work is usually very stressful, so I don't have much time to look at advice on eco-driving. Perhaps a little competition between drivers on eco-driving would be interesting.	Idea	Vehicle, System	Driver	=	As a courier, I want to implement sustainable driving habits in a way that fits in with my busy everyday life, so that I don't have any major restrictions.
136	Heating systems must balance comfort and battery efficiency. Current models lose significant range when heating is used in winter — highlighting a need for dedicated heating solutions or thermal management innovation.	Fact	Vehicle	Supervisor of Driver	+	As a Supervisor of Driver, I would like heating systems that maintain driver comfort without compromising vehicle range so that I can ensure operational efficiency in winter.
139	Battery range drops with stop-and-go driving. Drivers suggest regenerative braking and energy management modes tailored for city use.	Idea	Vehicle	Driver	=	As a courier, I would like to maintain sufficient vehicle range throughout the day so that drivers can complete all deliveries without delays.
146	Smart features like geofencing-based speed control (e.g. 10–15 km/h in pedestrian zones) make Paxsters ideal for city logistics — especially when paired with microhubs.	Fact	System, Vehicle	Fleetmanager	=	As a fleet manager, I would like smart driving functions like speed control in pedestrian zones so that I can ensure safe and legal operation in cities.
160	The electric vehicle should sound an alarm in good time when the return journey to the charging station is no longer possible (point of no return).	Idea	Vehicle	Driver	=	As a driver, I would like to receive an early warning signal if it is no longer possible to return to the home charging station (point of no return) so that I don't get stranded.
161	The vehicle battery should be able to transfer part of its charge to other vehicles when necessary. This option would enable faster assistance for another vehicle in the fleet if it runs out of battery power.	Idea	Vehicle	Driver	=	As a driver, I would like to have the option of charging my vehicle directly on site from another electric vehicle, thereby saving waiting times for assistance and costs.

162	An HMI display would be helpful (smart car) to provide detailed information, such as the battery's overnight charge status, tire pressure and regenerative braking. This monitoring would help reduce the vehicle's energy consumption and minimize brake particulate emissions.	Idea	Vehicle	Driver	=	As a driver, I want to be informed about the condition of the vehicle and receive assistance in reducing energy consumption and emissions so that I can contribute to a more sustainable environment.
191	For me, the most important thing is the map software (navigation). It is not targeted for logistics. It is targeted only for simple drivers. The GPS system needs to provide us with the most ecological route in order to save the battery.	Improvment	Vehicle	Driver	=	As a driver, I need route planning software that is optimised for logistics and electric vehicles so that the most efficient delivery route can be calculated.
192	The software is what we're missing at the moment. It's not designed for logistics. We don't have a good software to use Google Maps. But that way we could have the HQ and if we have enough kilometers to return to points of interest like delivery points.	Fact	System	Driver	=	As a driver, I need route planning that takes the vehicle's range into account so that I don't have to recharge while I'm working.
193	Reports for energy management systems are very good for me as a driver. But these reports shouldn't be visible to the management team.	Fact	Vehicle, System	Driver	=	As a driver, I would like to receive recommendations on how to use the vehicle more efficiently, but these should not be passed on to management so that I can help reduce emissions and energy consumption.
198	An integrated efficiency function that not only displays energy consumption during acceleration or braking would be helpful. It would also be helpful to provide advice on how to drive most efficiently and sustainably in real time.	Improvment	Vehicle	Driver	=	As a driver, I want to have an overview of my energy consumption in the vehicle and reduce it with advice so that I can drive as efficiently and sustainably as possible.
210	Battery technology needs to become more advanced. A battery must be able to be charged in 30 seconds and last for 50 hours. This requires electric motors with very low consumption. A power grid is needed for this, which could supply all electric vehicles.	Improvment	Vehicle	Driver	=	As a driver, I would like to see vehicles equipped with better technologies and longer ranges so that electric vehicles can also be used for longer routes.
242	Ecomode may not offer significant benefit in city centers due to frequent stop-and-go traffic.	Problem	Vehicle	Driver	+	As a courier in urban areas, I want a driving mode that is suitable for short journeys at low speeds with frequent stops, so that as little energy as possible is consumed.
251	Electric infrared heating focused on the seat and back would improve comfort on cold days.	Improvment	Vehicle	Driver	=	As a courier, I would like targeted heating in the seat and back area to keep me warm on cold mornings.
257	LED lighting is essential inside the vehicle for efficient nighttime deliveries.	Improvment	Vehicle	Driver	=	As a courier, I want strong interior lighting so that I can find parcels quickly even in the dark.
297	Sometimes the charging process of the battery cancels suddenly.	Problem	Vehicle	Driver	=	As a courier, I want to be sure that the battery is fully charged the next morning so that I don't have to recharge it again in the morning.
298	The vehicle should use the same batteries as a the e-bikes to be able so swap between them.	Idea	Vehicle	Driver	=	As a courier, I would like to be able to provide my colleagues with charged e-bike batteries so that they do not have to return to the hub.

308	Drivers ofton have to reduce the heating because of smal battery capacity.	Problem	Vehicle	Driver	=	As a courier, I don't want to have to turn off the heating in winter because of low battery range, so that I don't get cold.
316	Sometimes charging is interrupted overnight, meaning that the vehicle is not charged in the morning.	Problem	Vehicle	Driver	=	As a courier, it is important that I can rely on the vehicle being charged in the morning so that I don't have to spend time recharging it.

Multi-Temperature Cargo Body

No.	Statement	Classification	Level	Role	Priority	User need
155	For different goods, I need multiple temperature zones: chambers with +18°C for chocolate, +2°C for medicine and cheese, and -18°C for ice cream, plus space for a cooling unit. The partition walls should be movable.	Idea	Vehicle	Driver	=	As a driver, I would like to have a cargo area with different cooling zones that can be adjusted in size so that I can deliver goods more flexibly.
194	The temperature difference between the cold chamber and the outside temperature is enormous for transporting frozen products. Opening a large door increases the temperature throughout the entire cold chamber. Therefore, there are many small doors, and only the one necessary is opened.	Idea	Vehicle	Driver	=	As a driver, you want to ensure that the temperature in the cargo body does not drop too much when removing the goods, so that the customer is guaranteed an unbroken cold chain.
199	If there are ice creams, it should be Minus 20 °C. If there are cheese, 0 to 4 °C. If there are medicines, 2 to 8 °C. If there is chocolate, 14 to 18 °C. So maybe this could be also saved on or based on the swap box. You can put it in and it automatically knows which temperature is best. We'll set it up. You have to set based on the product. But when you track everything, when you have such a swap box for example, you put it just in and then the temperature will automatically be on the correct temperature because the system knows what comes inside.	Idea	Vehicle	Driver	=	As a driver, I would like the temperature cargo body to automatically set the correct temperature for the goods being transported so that I don't waste time adjusting it.
234	Multi-temperature cargo bodies are not currently useful but may become relevant for frozen goods like ice cream.	Fact	Vehicle	Driver	-	
235	Drivers prefer to manually adjust temperature zones and mobile walls rather than using automation.	Improvement	Vehicle	Driver	=	As a courier, I want to adjust temperature zones manually so that I'm not dependent on potentially faulty systems.
240	Automatic doors with sensors could improve safety and ease of access in narrow urban spaces.	Idea	Vehicle	Driver	=	As a courier, I want to make opening the doors to the cargo area safe for pedestrians in order to prevent accidents.
244	Having a fridge in the cabin for cold drinks would improve comfort during hot days.	Improvement	Vehicle	Driver	=	As a courier, I want to keep drinks cool in my vehicle so that I can drink enough cold fluids on hot summer days.
249	Temperature-controlled systems are not currently necessary, but preset temperature management from the warehouse may be useful in the future.	Idea	System	Driver	+	As a courier, I would like the temperature settings to be managed automatically to reduce the workload in the vehicle.
250	Partition walls inside the trailer should be manually adjustable.	Improvment	Vehicle	Driver	=	As a courier, I want to be able to quickly and manually adjust the layout of the cargo zones according to delivery requirements so that I can be flexible.
259	Heavy packages require carts and proper lifting training to avoid injury.	Problem	Vehicle	Driver	=	As a courier, I want to reduce my physical strain so that my health is protected.

271	Integrated keyless systems improve safety by locking doors automatically after the driver leaves.	Idea	Vehicle	Driver	+	As a courier, I want the vehicle and cargo area to lock when I walk away and unlock when I approach with a parcel, so I don't have to think about it and can get there faster.
275	Young or inexperienced couriers need more vehicle guidance for organizing the cargo.	Fact	Fleet	Driver	=	As a courier, I would like the new courier to be supported by innovations that can be learned quickly so that they feel confident.
291	I would like to receive a notification if I have forgotten to lock the doors.	Idea	Vehicle	Driver	=	As a courier, I want a system that automatically locks the doors so that I don't forget to do it.
296	The vehicle should know the optimal for the parcels and adjust the temperature.	Idea	Vehicle	Driver	=	As a courier, I would like the temperatures in the various loading areas to be adjusted automatically according to the goods so that I don't have to deal with it.
301	The loading height is too high, making it difficult to get in and load and unload parcels.	Problem	Vehicle	Driver	=	As a courier, I need low or easy access to the parcels so that I can load and unload them safely and reduce my physical strain.
303	When cars stand next to each other the rear doors often collide.	Problem	Vehicle	Driver	=	As a courier, I always want to have access to the cargo area without colliding with objects in the way, so that I don't damage anything around me.
317	When the driver is wearing gloves in the winter he might have problems to operate touch buttons.	Problem	Vehicle	Driver	=	As a courier, I want to be able to operate everything with gloves on in winter so that my hands stay warm.

Dynamically optimised space

No.	Statement	Classification	Level	Role	Priority	User need
320	Foldable rear bench might take up a lot of space of the cargo area; if the folded bench need to much space the concept does not meet the requirements in the daily life.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want to have as much space for luggage as possible when I'm not using the back seat, so that there is no significant disadvantage compared to a conventional cargo body.
321	Cargo has to be separated from the passengers so that for example in case of emergency braking passengers are safe from loose objects.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want passengers to be protected from loose loads in all situations to ensure safety.
322	To secure the load, it must be possible to prevent it from slipping; the devices used for this purpose should be flexible in terms of their position and mechanism (e.g. by means of straps and belts or bars).	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want to be able to secure my load in the so that it does not get damaged or mixed up during the ride.
323	Moving loads can cause dents and scratches in side panels; wooden paneling in existing vans prevents such damage.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want the walls of the cargo area to be protected from dents and scratches caused by moving cargo.
324	It would be nice to have the rear seats already in the right position depending on wether I booked for cargo or people transport.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I don't want to spend time converting the van from a passenger to a cargo configuration and vice versa so that I can drive off immediately after booking.
325	Mechanism for moving the rear bench has to be easy to handle; a single person has to be able to handle it and also small and less strong people should be able to do it.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want to be able to convert the vehicle from one configuration to another on my own and without much effort, so that I don't have to rely on help.
326	Rear seat should have an adequate seating comfort even if they are designed to take up as little space as possible.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want the rear seats to offer sufficient space and comfort for adults so that they feel comfortable on regular trips.
327	Passengers should be able to enter the rear bench from both sides.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I would like the rear seats to be accessible from both sides so that passengers can get in flexibly.
328	All surfaces should be easy to clean.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want the vehicle to be easy to clean so that dirt cannot accumulate.
329	Passengers in the rear should have windows or screens on the side, so that they don't feel like sitting in a box.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I would like side windows in the second row of seats so that passengers don't feel so cramped.
330	The side panels should be robust; even if objects hit the side they should be damaged; especially side windows should be protected while cargo transport.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I don't want to have to worry about cargo damaging the rear side windows, so that I can load everything in there too.

331	The passengers in the rear should have an adequate ventilation an AC.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want to have a pleasant temperature and humidity in the second row of seats so that passengers can travel comfortably.
332	Side windows in the rear should be openable.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I would like the rear side windows to be able to be opened so that air can be exchanged quickly.
333	Vehicle should offer an adequate comfort regarding noises and vibrations on the rear seats.	Idea	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I expect a reasonable level of comfort, especially in terms of noise and vibration in the vehicle, so that I can drive comfortably for longer distances in both the front and rear seats.
334	In existing car sharing offers I am not allowed to carry my dog. I wish there would be the oppurtunity to carry it as well.	Problem	System	Car-Sharing Driver	=	As a car-sharing driver, I would like to be able to take my dog with me so that he can also travel in the vehicle.
335	Sometimes I want to carry long objects (2.5-3m); I want to be able to carry them in a vehicle.	Problem	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I would like to be able to open the partition at the front so that I can transport very long items.
336	Often in vans rear visibily is very limited; especially when it has no inside mirror and cameras are often less intuitive then a mirror; especially when I am not that familiar with the vehicle; a solution with a camera has to be easy to use.	Problem	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I want to have good all-round visibility from the vehicle so that I can park easily and drive safely in traffic.
337	It would be nice to have a mechanism of lashing straps, that allows the user to lash down objects very easily with the mechanism of a seatbelt. In detail there could be a spring mechanism thats puts tension on the belt so that the user doesn't have to loosen and tighten the belt completely every time. Such mechanism are already available as an aftermarket solution for securing of rather small cargo.	Improvment	Vehicle	Car-Sharing Driver	=	As a car-sharing driver, I need to be able to secure goods in the boot so that I don't have to bring extra straps with me.

Geofencing

No.	Statement	Classification	Level	Role	Priority	User need
17	With the van, it is very difficult to find parking spaces directly in front of the destination, which means you have to walk a long distance, which takes a lot of time.	Fact	Vehicle	Driver	+	As a courier, I want to be able to find a parking space more reliably at the delivery location so that it doesn't cost me time and nerves.
40	In pedestrian zones, the maximum speed should be automatically regulated to prevent couriers from accidentally driving too fast.	Improvment	Vehicle	Driver	+	As a courier, I would like my vehicle to automatically adhere to the speed limit in pedestrian zones so that I do not forget to do so when under stress.
42	For pedestrian zones, a quiet horn would be nice to draw attention to yourself in a friendly manner and give you space to drive.	Improvment	Vehicle	Driver	=	As a courier, when I have the option of driving in pedestrian zones via geofencing, I need to be able to draw attention to my vehicle in a friendly manner so that pedestrians make way.
45	With the van, it depends on the delivery areas and the time of day how difficult it is to find a parking space. Sometimes it is difficult to find a parking space.	Fact	Vehicle	Driver	+	As a courier, I need help finding a parking space reliably so that I don't waste so much time looking for a parking space and don't have to park illegally.
80	Geofencing areas where the speed is reduced to, say, 20 km/h like an e-bike means more safety for the public and also for us.	Fact	Vehicle, System	Driver	=	As a courier, I want my vehicle to limit its speed in areas with speed limits so that both I and the public are safer.
81	With a reduced speed, the vehicle could then perhaps be considered an e-bike and have the same rights in the geofencing zone.	Fact	System	Driver	=	As a courier, I would like my vehicle to be treated like an e-bike in geofencing zones so that I can benefit from the same rights and access.
82	It would often be enough to be allowed to drive into the side streets of pedestrian zones with geofencing.	Fact	System	Driver	=	As a courier, I would like to be allowed to access side streets of pedestrian zones with geofencing so that I can complete deliveries more easily.
83	Entering a geofencing zone and reducing speed must not happen suddenly.	Fact	Vehicle	Driver	=	As a courier, I want automatic speed interventions to be gradual, so that I can adjust safely and avoid sudden braking.
84	There should be a sign that indicates that you are driving in a geofencing zone.	Idea	Vehicle	Driver	=	As a courier, I would like to see a clear indication of geofencing zones in the vehicle so that I know when I am entering such a zone and can prepare myself accordingly.
85	For a reserved parking zone, you have to make sure that it is not being used by someone else's vehicle. Rich people don't care that they have to pay a small fine.	Problem	Vehicle	Driver	=	As a courier, I would like reserved parking zones to be enforced more strictly and structual, so that unauthorized vehicles don’t block my access.
99	Ultimately, every system must be cost-effective, which means that a more expensive system must be able to demonstrate that it saves money in one area.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like new systems to be cost-effective so that I can ensure a return on investment in operations.

105	Pedestrians cannot hear the vehicle because it is very quiet due to its electric drive. Therefore, the vehicle should draw attention to itself in pedestrian zones without being too intrusive.	Problem	Vehicle	Driver	=	As a courier, I want my vehicle to attract the attention of pedestrians in pedestrian zones in a friendly manner so that I can drive unhindered.
126	There may be stickers on the vehicle indicating that it has a geofencing tool installed and is therefore permitted to drive in pedestrian zones, so that security personnel can recognise this.	Fact	Vehicle	Driver	=	As a courier, I would like the vehicle to display geofencing access clearly so that anybody knows I'm authorized to drive in pedestrian zones.
127	Automatic speed reduction in pedestrian zones is also helpful for drivers in case they forget that there is a speed limit there.	Fact	Vehicle	Driver	=	As a courier, I would like the vehicle to reduce speed automatically in pedestrian zones so that I don't accidentally exceed speed limits.
128	Compared to a cargo bike, which can also travel at 20–25 km/h in a pedestrian zone, a vehicle limited to 10 km/h would be safer.	Fact	Vehicle	Driver	=	As a courier, I would like the vehicle speed to be limited depending on the area to ensure safety.
129	As soon as the vehicle enters a pedestrian zone, a city mode should be activated automatically, which limits the speed and possibly activates other useful functions.	Idea	Vehicle	Driver	=	As a courier, I would like support in adapting to different driving environments so that I can focus on my deliveries.
138	Tracking and in-vehicle organization systems (e.g. parcel compartment mapping, smart screens) would reduce delivery errors and support stress-free pick-ups.	Idea	Vehicle	Supervisor of Driver	+	As a Supervisor of Driver, I would like tools to track and organize parcels inside the vehicle so that I can reduce delivery errors and support drivers with pick-ups.
140	Geofencing for parking and zone access can streamline inner-city operations, but requires municipal enforcement and infrastructure to be effective.	Problem	System	Supervisor of Driver	=	As a Supervisor of Driver, I would like geofencing-supported parking and zone access so that I can streamline deliveries in dense urban environments.
146	Smart features like geofencing-based speed control (e.g. 10–15 km/h in pedestrian zones) make Paxsters ideal for city logistics — especially when paired with microhubs.	Fact	System, Vehicle	Fleetmanager	=	As a fleet manager, I would like smart driving functions like speed control in pedestrian zones so that I can ensure safe and legal operation in cities.
170	Parking shortage: Drivers often have to park far away and carry heavy loads.	Problem	Vehicle, System	Driver	=	As a driver, I want a system that allows me to park as close as possible to the delivery address so that I don't have to walk so far with heavy loads.
179	There are no designated parking zones for delivery vehicles. This leads to fines, lost time, and stress. Parking often has to be done far away, requiring long carrying distances and significant physical strain. Suggestion: Reserved geo-zones for delivery vehicles during peak hours.	Idea	Vehicle, System	Driver	=	As a driver, I want to be able to park reliably close to delivery locations so that long transport routes, fines, time loss, stress and considerable physical strain can be reduced.
186	There is no central app or platform that summarises all information (tours, packages, access, parking zones, etc.).	Idea	System	Driver	=	As a driver, I want a central platform that bundles all information (tours, packages, access, parking zones, etc.) on one device so that I only have to use one device.

189	Lack of parking is a major problem. Suggestion: Geofencing-based parking zones, specifically for delivery vehicles in urban areas, to avoid wasted time searching for parking spaces, the risk of fines, and delays.	Idea	Vehicle, System	Driver	=	As a driver, I want to be able to reliably find a legal parking space near the delivery location to avoid wasting time searching for parking, the risk of fines and delays.
195	Electric vehicles should be able to go even further into the pedestrian zone to help the distribution. To be safer the vehicles must have a strong color and Light signals or give a sound where it moves.	Idea	Vehicle	Driver	=	As a driver, I want the vehicle to attract attention in pedestrian zones in a friendly manner so that it is not overlooked.
197	Specific loading zones based on the position of the vehicle could be used without the need to look for a parking position. But there is the issue of the traffic, which is always parked. Stopping has been exhausted.This is number one issue. It needs more than innovation, it need legislation.	Problem	Vehicle, System	Driver	=	As a driver, I need reliable free parking spaces to deliver goods so that I don't waste time looking for parking spaces.
200	When the electric vehicles are moving in GeoFencing zones they need signals. This was an issue in the past because they don't have any noise. This is dangerous. Vehicles need some constant noise. Something more quiet, at least.	Idea	Vehicle	Driver	=	As a driver, I would like the vehicle to draw attention to itself acoustically in a friendly manner so that it is not overlooked by other people.
214	In Ferrara, delivery drivers cannot reserve unloading zones in advance.	Problem	System	Driver	=	As a courier, I want to be able to find available unloading zones easily and reliably so that I can save time and avoid unsafe parking situations.
222	Streets in Ferrara's city center are narrow, making direct delivery access difficult in many locations.	Problem	Vehicle	Driver	=	As a courier, I would like to have support in finding a parking space at each of the delivery locations with short walking distances so that I can work efficiently.
224	Speed limit enforcement tools such as cruise control help avoid unintended speeding fines.	Improvement	Vehicle	Driver	=	As a courier, I want the maximum speed to be automatically limited in accordance with the permitted speed limits in order to avoid fines and distractions.
225	The driver considers geofencing features useful for avoiding restricted areas like ZTLs.	Idea	System	Driver	=	As a courier, I would like to be automatically warned about restricted or controlled areas and prevented from driving into them so that violations can be avoided.
226	The geofencing display should be integrated into the vehicle interface rather than relying on the driver's smartphone.	Improvement	Vehicle	Driver	=	As a courier, I want all information relating to the vehicle to be within my field of vision while driving so that I am not distracted.
236	Drivers support automatic geofencing-based speed limitation in restricted zones like 30 km/h areas.	Idea	System	Driver	=	As a courier, I want the vehicle to automatically adapt to local speed limits so that I can drive safely and legally.
237	The geofencing interface should be integrated into the vehicle rather than used via mobile devices.	Improvement	Vehicle	Driver	=	As a courier, I want geofencing information to be displayed on the vehicle display so that I am not distracted.

238	An app-based system for booking unloading zones is already in place but needs improvement.	Fact	Vehicle, System	Driver	=	As a courier, I want to book unloading zones automatically so that I don't have to spend time doing it and I can't forget.
245	Roadworks like tram installations in Bologna are reducing available loading zones.	Problem	System	Driver	=	As a courier, I would like current construction sites to be automatically taken into account in car park planning so that it is always up to date.
247	In tram-construction areas like Via Ugo Bassi, unloading is very difficult due to lack of space.	Problem	System	Driver	+	As a courier, I want to take up as little space as possible when unloading so that I have as many unloading options as possible.
248	The driver often has to carry goods by foot due to lack of accessible unloading space.	Problem	System	Driver	=	As a courier, I want to park close to the delivery locations so that I can avoid transporting heavy goods over long distances.
252	GPS-based geofencing and alerts inside the vehicle are considered very helpful, not invasive.	Fact	Vehicle	Driver	+	As a courier, I would like to receive automatic, up-to-date notifications about access rules and zone restrictions while driving so that I am informed.
253	The app-based unloading zone reservation system in Bologna works but could be improved with location-based automation.	Idea	System	Driver	+	As a courier, I want unloading areas to be reserved automatically based on my current GPS location so that planning efforts are reduced.
275	Young or inexperienced couriers need more vehicle guidance for organizing the cargo.	Fact	Fleet	Driver	=	As a courier, I would like the new courier to be supported by innovations that can be learned quickly so that they feel confident.
294	The car should look for a parking spot next to the adress given by the dirver.	Improvement	Vehicle	Driver	=	As a courier, I want a system that helps me find a legal parking space near my destination so that I don't have to walk so far.
295	Pedestrians walk in front of the electric vehicle because they can' t hear it.	Problem	Vehicle	Driver	+	As a courier, I want to draw pedestrians' attention to myself in a friendly manner so that they do not run in front of the vehicle.

Novel algorithms and software

No.	Statement	Classification	Level	Role	Priority	User need
1	Customers change their delivery addresses at very short notice, sometimes as late as the morning of delivery. Therefore, we check again in the morning to ensure that the parcels are sorted for the correct route.	Problem	System	Driver	=	As a courier, I need a system that can respond flexibly to changes in delivery addresses in the morning so that the parcel can be delivered efficiently on the correct route.
2	It is very important to know where each parcel is so that you can quickly find the right box at the destination address.	Fact	System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
4	An app, circuit for teams, is now used to plan the route. The generated route is then used to sort the parcels in the vehicle according to the order of delivery.	Fact	System	Driver	=	As a courier, I need a software application that helps me plan my route and optimally load the vehicle so that I can deliver all parcels as efficiently as possible.
5	It is important that route suggestions are not forced on drivers so that they can decide for themselves which route is best for them.	Fact	System	Driver	=	As a courier, I want to receive support with route planning, but ultimately be able to make adjustments myself so that I have control.
6	As a beginner, or if you are new to a delivery area, an app that gives you a suggestion for the delivery route after you have scanned the parcels is very helpful. Both for the route and for loading.	Improvment	System	Driver	=	As a courier, I would like to have support with route planning and the arrangement of parcels in the cargo area so that I can work more efficiently.
12	It is very important to find the right parcels quickly at the delivery location so that no time is lost.	Fact	Vehicle	Driver	+	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
17	With the van, it is very difficult to find parking spaces directly in front of the destination, which means you have to walk a long distance, which takes a lot of time.	Fact	Vehicle	Driver	+	As a courier, I want to be able to find a parking space more reliably at the delivery location so that it doesn't cost me time and nerves.
32	The vehicle's range must be sufficient for an entire working day with heating, even in winter, without having to recharge in between.	Fact	Vehicle	Driver	+	As a courier, I want the vehicle's range to be sufficient for a full working day, even in winter when the heating is in use, so that it does not need to be recharged.
39	A consistent software that displays route guidance on the scanner and on the vehicle screen.	Improvment	Vehicle	Driver	=	As a courier, I need a standardised software application that displays the route both on the display in the car and on the scanner, so that it is as easy as possible for me.
45	With the van, it depends on the delivery areas and the time of day how difficult it is to find a parking space. Sometimes it is difficult to find a parking space.	Fact	Vehicle	Driver	+	As a courier, I need help finding a parking space reliably so that I don't waste so much time looking for a parking space and don't have to park illegally.

47	The size of the vehicle is very important because you need a vehicle that is practical to park and is not too big or too small. It also depends on your route and which parcels you deliver. We have the flexibility to choose the vehicle depending on the route.	Fact	Vehicle	Driver	+	As a courier, I want the distribution of parcels among the vehicles to take into account which vehicle is being used so that the vehicles can be used to their advantage.
49	The items in the swap box should already be sorted by address in the order of the delivery route when the swap box is loaded into the vehicle, so that the parcels can be easily found at the correct address.	Idea	Vehicle, System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste any time.
50	There should be guidance for sorting staff to ensure that the swap box is packed in the best possible way for drivers during delivery.	Improvment	Vehicle, System	Sorter	=	As a courier, I need help pre-sorting parcels in the best possible way for the driver so that they can deliver them quickly.
55	Spontaneous pick-ups from customers are often added, for which space would also have to be provided.	Problem	Vehicle	Driver	=	As a courier, I need sufficient space in the cargo area to carry out spontaneous pick-ups requested by customers so that this service can continue to be offered.
56	The idea to be able to fill up from another space is good. The swap box would work best if you had more micro-hubs spread around the city where you could swap the swap boxes from empty to full without having to make the long journey back to the hub.	Fact	System	Driver	+	As a courier, I want to avoid having to constantly drive to the city hub to reload, so that I can avoid this extra trip.
57	Routes and the loading of the swap box must be planned with traffic in mind, otherwise you will get stuck in a traffic jam.	Problem	System	Driver	=	As a courier, I need help taking traffic conditions into account so that I can use the fastest route.
58	Shelves or drawers in the swap box would be helpful for quickly finding and accessing the packages.	Idea	Vehicle, System	Driver	=	As a courier, I need help finding the right parcel at the delivery address if I haven't sorted the parcels myself, so that I don't waste time doing so.
59	For route planning, it would be helpful if drivers could adjust the order of parcel deliveries themselves. It should not be fixed so that it is not like it used to be with the old route software.	Improvment	System	Driver	=	As a courier, I want to receive support with route planning, but ultimately be able to make adjustments myself so that I have control.
60	The pick-up times and locations for parcels are usually always the same. This should therefore be taken into account when planning routes.	Idea	System	Driver	=	As a courier, I want potential pick-ups to be taken into account when planning routes, as these usually take place at the same time and in the same place, so that my route is as time-efficient as possible.
61	Sometimes a road is blocked or there is a traffic jam, and the system does not know about it. That is why flexibility is needed.	Problem	System	Driver	-	
62	Some parcels must be picked up or delivered before a certain time, which must also be taken into account in route planning.	Problem	System	Driver	=	As a courier, I would like delivery and pick-up time windows to be taken into account when planning routes so that parcels can be delivered and collected on time.

63	It would also be interesting for customers to know when the parcel will arrive. For example, a message saying that the parcel will be delivered within the next 5 stops.	Idea	System	Customer	=	As a customer, I would like to be informed of the approximate time window in which my parcel will be delivered or picked up, so that I don't have to wait at home all day.
64	Sometimes, several new parcel pick-ups are added shortly before the deadline for registering parcel deliveries. In such cases, the software must be flexible enough to create a new route that takes these pick-ups into account.	Fact	System	Driver	=	As a courier, I need help planning my route when new pick-ups come up spontaneously, so that I can work faster.
71	The microhubs, where the swap boxes are stored, must be placed in very good locations so that time can be saved. Perhaps also calculated using software.	Idea	System	Driver	=	As a courier, I want to minimise my driving time so that I can work more effectively.
72	There should be an assistant for loading the swap box so that it is loaded perfectly in line with the route.	Idea	System	Driver	=	As a courier, I want the parcels to be sorted in line with the route so that I can quickly reach them at the delivery address.
73	A MircoHub, where the pick-ups could also be handed in and the swap boxes exchanged, would be very helpful.	Idea	System, Vehicle	Driver	=	As a courier, I would like to have access to a MicroHub so that I can hand in pick-ups and exchange swap boxes more efficiently.
91	Sorting parcels is a key aspect that takes a lot of time and is very difficult for new employees, as a lot of information has to be processed.	Problem	System	external Serviceprovider	=	As an external service provider, I would like support with parcel sorting so that I can reduce training time for new employees and increase efficiency.
92	It is very difficult to quickly find the right parcels if they have been sorted by someone else in the vehicle. Therefore, there should be a system that helps the driver find the parcels reliably and quickly at the delivery location.	Improvment	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like a system that helps drivers find parcels quickly so that I can avoid delays due to incorrect in-vehicle sorting.
93	A digital space with a digital map for each package in the vehicle would enable more efficient and space-saving loading and faster unloading of the correct packages.	Idea	Vehicle, System	external Serviceprovider	=	As an external service provider, I need to stow packages optimally in the vehicle and find them quickly so that I can optimise space in the vehicle and speed up loading and unloading.
95	At the moment, I use two devices, a scanner and a mobile phone. It would be best to have a single system that handles route planning and cargo space management, has the software and can also be connected to the display in the vehicle.	Improvment	Vehicle	Driver	=	As a courier, I would like to use a single system for scanning, route planning, and cargo management, so that I can work more efficiently without switching between devices.
96	The distribution of parcels across routes must be evenly distributed among drivers so that no driver is overloaded. Currently, distribution is based on zip codes and is slightly adjusted among drivers in the morning. It should still be possible to help out your colleague with parcel deliveries.	Fact	System	Driver	=	As a courier, I would like parcel routes to be distributed more evenly so that no one is overloaded and collaboration with colleagues remains possible.

97	An overview with a map showing where the remaining parcels still need to be delivered would be very helpful in keeping an overview. In addition, the time by which the corresponding deliveries must be delivered or picked up should be displayed.	Idea	System	Driver	=	As a courier, I would like a map showing remaining deliveries and deadlines so that I can maintain a clear overview and meet delivery times.
98	There are so many variables for route planning: Where can I drive fast, how do I best get to the site/delivery location, where are there usually a lot of pedestrians, where are there shortcuts, where are there traffic jams, where might a new pick-up suddenly appear? This makes it very difficult for the system to create a good route. A suggestion is therefore good, but ultimately the system should be flexible enough to allow the driver to set the route.	Problem	System	external Serviceprovider	=	As an external service provider, I would like routing systems to be flexible so that I can adjust it.
99	Ultimately, every system must be cost-effective, which means that a more expensive system must be able to demonstrate that it saves money in one area.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like new systems to be cost-effective so that I can ensure a return on investment in operations.
100	I am willing to spend more money on equipment if it is stable, reliable and works well.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider , I would like durable and reliable equipment so that I can avoid interruptions in service and increase uptime.
101	It would be good for customers to know when their parcel will be delivered. Therefore, route planning could also be linked to a notification of the expected arrival time to customers.	Idea	System	external Serviceprovider	=	As an external service provider, I would like delivery time notifications linked to routing so that I can improve customer communication.
109	If the data (delivery location, dimensions, delivery time window) for each package is available, it would be possible to generate a 3D optimisation of the storage space for each route.	Idea	System	external Serviceprovider	=	As an external service provider, I want a system that ensures optimal loading so that the vehicle is used to its full capacity.
110	There is a problem in that many parcels do not have the correct dimensions and weight recorded. This leads to a lot of money being lost, as charges are based on weight and dimensions, and it also makes planning the route/ storage space more difficult. It is therefore necessary to have reliable information in advance.	Problem	System	external Serviceprovider	+	As an external service provider, I would like accurate parcel data in advance so that I can improve billing and loading efficiency.
111	Based on the delivery location, size and weight of the parcel, optimal distribution across vehicles and swap boxes could be achieved.	Idea	Vehicle, System	external Serviceprovider	=	As an external service provider, I want parcels to be distributed optimally among vehicles so that routes become more efficient.
113	The system with the swap box in combination with MicroHubs also offers the advantage that routes can be split up and another driver could flexibly take over the route.	Fact	Vehicle, System	external Serviceprovider	=	As a service provider, I would like to be able to spontaneously split parts of a route between different drivers so that we can be more flexible.
114	Upon arrival at the delivery location, it would be most beneficial for the driver to view the location of the package in the storage area on a screen in combination with a 3D image in order to quickly locate the correct package.	Idea	Vehicle, System	external Serviceprovider	=	As an external service provider, I would like to have an overview of the location of the packages so that I can find them more quickly.

115	The people who sort the parcels at the facility do not have the expertise to load the swap box for the driver themselves in a way that adds value. Therefore, support from software is needed to indicate where each parcel should be placed. Then it's just like a Tetris game for them, where they have to recreate what's on the screen.	Fact	Vehicle, System	external Serviceprovider	=	As an external service provider, I want software that shows how to load parcels so that it is easier for sorting staff.
133	A map showing all remaining packages displayed on the vehicle's screen would be ideal. A route would be an optional extra, but I prefer to plan the route in my head myself.	Fact	Vehicle, System	Driver	=	As a courier, I would like to have a complete overview of my deliveries so that I can plan my route in the way that works best for me.
140	Geofencing for parking and zone access can streamline inner-city operations, but requires municipal enforcement and infrastructure to be effective.	Problem	System	Supervisor of Driver	=	As a Supervisor of Driver, I would like geofencing-supported parking and zone access so that I can streamline deliveries in dense urban environments.
141	Pick-ups remain a major unpredictable challenge, with poor integration into route planning and insufficient in-vehicle space planning.	Problem	System	Supervisor of Driver	=	As a Supervisor of Driver, I would like better integration of pick-up logistics into route and space planning so that I can manage unpredictability and vehicle organization.
144	Swap box innovation is a potential gamechanger — if they are pre-sorted, foldable, lightweight, and equipped with scanners or sensors to support route planning and pickup handling.	Idea	System, Vehicle	Fleetmanager	=	As a fleet manager, I want boxes for parcels that support smart processing and efficient logistics, so that route planning is improved and delivery costs are reduced.
146	Smart features like geofencing-based speed control (e.g. 10–15 km/h in pedestrian zones) make Paxsters ideal for city logistics — especially when paired with microhubs.	Fact	System, Vehicle	Fleetmanager	=	As a fleet manager, I would like smart driving functions like speed control in pedestrian zones so that I can ensure safe and legal operation in cities.
149	Cultural/local delivery context matters: In affluent areas, deliveries are more likely to be received due to au-pairs or recipients being home. This could inform dynamic routing or staffing.	Fact	System	Fleetmanager	=	As a fleet manager, I would like delivery operations to reflect local social and cultural contexts so that I can plan routes and staff dynamically and more effectively.
156	I need an infotainment system (Android) that shows me the next stop and the route. For this, I need a phone connected to the vehicle and the HMI. Software is required so that the vehicle connects automatically when I board.	Idea	Vehicle	Driver	=	As a driver, I need information about the next stop and the route displayed so that I can find my way more easily.
159	I would like to see improved safety through automatic compliance with the maximum speed limit when driving in pedestrian zones, using GPS tracking and a speed limit of 10–15 km/h.	Improvement	Vehicle	Driver	=	As a driver, I would like to see automatic adjustment of the speed limit in pedestrian zones so that I don't have to pay attention to it.
160	The electric vehicle should sound an alarm in good time when the return journey to the charging station is no longer possible (point of no return).	Idea	Vehicle	Driver	=	As a driver, I would like to receive an early warning signal if it is no longer possible to return to the home charging station (point of no return) so that I don't get stranded.

161	The vehicle battery should be able to transfer part of its charge to other vehicles when necessary. This option would enable faster assistance for another vehicle in the fleet if it runs out of battery power.	Idea	Vehicle	Driver	=	As a driver, I would like to have the option of charging my vehicle directly on site from another electric vehicle, thereby saving waiting times for assistance and costs.
162	An HMI display would be helpful (smart car) to provide detailed information, such as the battery's overnight charge status, tire pressure and regenerative braking. This monitoring would help reduce the vehicle's energy consumption and minimize brake particulate emissions.	Idea	Vehicle	Driver	=	As a driver, I want to be informed about the condition of the vehicle and receive assistance in reducing energy consumption and emissions so that I can contribute to a more sustainable environment.
163	Drivers are annoyed by unreliable or inefficient route planning. GPS is often inaccurate, and the opening hours of delivery addresses are unknown.	Fact	Vehicle, Fleet	Driver	=	As a driver, I need reliable and efficient route planning that also takes into account the opening hours of delivery addresses so that I can save time.
164	Loading processes are often difficult, unreliable and inefficient: packages are left behind, volumes are incorrectly calculated, and returns are confusing.	Fact	Vehicle, System	Driver	=	As a driver, I would like to have support in loading the vehicle optimally so that the space is filled to capacity and recordings are taken into account
166	RFID (Radio-Frequency Identification), sensors and digital tools enable increased efficiency in terms of packing volume, parcel tracking and automatic door opening.	Idea	Vehicle, Fleet, System	Driver	=	As a driver, I want digital innovations so that parcel volume efficiency can be improved, parcel tracking can be offered to customers, and doors can be opened automatically at the customer's premises when I arrive.
167	Packages are not sorted according to delivery order, which leads to loss of time.	Problem	Vehicle, System	Driver	=	As a driver, I want the parcels to be sorted according to the delivery order of the route so that I can save time.
169	The cargo space is often too small or not optimally organized.	Fact	Vehicle	Driver	=	As a driver, I want a well-organised cargo area so that I can transport as many goods as possible.
171	Time is lost due to access controls, for example, in hospitals. For routing purposes, it would be useful to provide a notification to the recipient, such as the need to unlock the door.	Idea	Vehicle, System	Driver	=	As a driver, I would like to have a system that automatically sends a notification to the access controls at the delivery location so that I can enter more quickly.
172	There is a desire for automatic sorting and digital loading systems.	Idea	Vehicle, System	Driver	=	As a driver, I want the parcels to be sorted and loaded optimally for the route so that I can save time.
173	I suggest a scanner or RFID-based allocation systems.	Idea	Vehicle, System	Driver	=	As a driver, I would like to have a system that documents the loading of the cargo area so that it is recorded where each parcel is located.
174	An idea would be an app integration that synchronizes the tour, the loading sequence and package data.	Idea	System	Driver	=	As a driver, I want a software environment that includes the route, loading and unloading, and parcel data so that I can work in one environment.

175	There is a need for digital matching between tour plan, vehicle and actual load.	Idea	System	Driver	=	As a driver, I would like to have digital coordination between the tour plan, vehicle and actual load so that the planned load matches the actual load.
176	Packages are often loaded into the vehicle unsystematically, without any discernible order.	Problem	Vehicle, System	Driver	=	As a driver, I want the parcels to be loaded systematically in the optimal order for the route so that I don't have to rearrange all the parcels at the delivery location and can quickly find the right ones.
177	Sorting by the warehouse is only partial or incomplete. Drivers have to manually pre-sort their deliveries to work efficiently. This takes up additional time.	Fact	Vehicle, System	Driver	=	As a driver, I need a system that ensures complete and error-free sorting of parcels so that deliveries do not have to be manually checked and re-sorted.
178	There is a need for digital tracking of parcel locations in the vehicle – a desire for a "parcel navigation system."	Idea	Vehicle	Driver	=	As a driver, I want help to quickly locate the right parcels in the loading compartment at the delivery location so that I don't lose any time.
181	There's no central app or software that combines route planning, delivery windows, and parcel tracking. Automatic route optimization is needed, including live traffic, parcel weight, and destination availability. Suggestion: RFID or QR code tracking for automatic parcel identification.	Idea	Vehicle, System	Driver	=	As a driver, I need a software environment that combines route planning, delivery windows and shipment tracking so that I have a quick overview of automatic route optimisation, the weight of shipments (to know whether I need a trolley) and the availability of destinations.
182	Missing information about parcel volume or weight complicates planning and loading. Software and information for each parcel must be available.	Idea	Vehicle, System	Driver	=	As a driver, I want the software to have reliable information about the parcels so that it can function without errors.
184	There is a desire for automatic recording and sorting of packages in the warehouse.	Improvment	Vehicle, System	Driver	=	As a driver, I would like the parcels to be sorted and recorded in advance at the warehouse so that they only need to be loaded onto the vehicle.
186	There is no central app or platform that summarises all information (tours, packages, access, parking zones, etc.).	Idea	System	Driver	=	As a driver, I want a central platform that bundles all information (tours, packages, access, parking zones, etc.) on one device so that I only have to use one device.
187	There is a need for automated route planning taking into account package weight, temperature requirements and recipient time windows.	Idea	System	Driver	=	As a driver, I need automated route planning that takes into account the weight of the parcels, temperature requirements and recipients' time slots to ensure efficient delivery.
188	There's a desire for live tracking of packages—both in the vehicle and during delivery. The idea: RFID- or QR code-based recognition directly during loading.	Idea	Vehicle, System	Driver	=	As a driver, I want reliable live tracking of parcels so that I always know where a parcel is (at the hub, at the customer's premises, in the vehicle, etc.).

191	For me, the most important thing is the map software (navigation). It is not targeted for logistics. It is targeted only for simple drivers. The GPS system needs to provide us with the most ecological route in order to save the battery.	Improvment	Vehicle	Driver	=	As a driver, I need route planning software that is optimised for logistics and electric vehicles so that the most efficient delivery route can be calculated.
192	The software is what we're missing at the moment. It's not designed for logistics. We don't have a good software to use Google Maps. But that way we could have the HQ and if we have enough kilometers to return to points of interest like delivery points.	Fact	System	Driver	=	As a driver, I need route planning that takes the vehicle's range into account so that I don't have to recharge while I'm working.
197	Specific loading zones based on the position of the vehicle could be used without the need to look for a parking position. But there is the issue of the traffic, which is always parked. Stopping has been exhausted.This is number one issue. It needs more than innovation, it need legislation.	Problem	Vehicle, System	Driver	=	As a driver, I need reliable free parking spaces to deliver goods so that I don't waste time looking for parking spaces.
199	If there are ice creams, it should be Minus 20 °C. If there are cheese, 0 to 4 °C. If there are medicines, 2 to 8 °C. If there is chocolate, 14 to 18 °C. So maybe this could be also saved on or based on the swap box. You can put it in and it automatically knows which temperature is best. We'll set it up. You have to set based on the product. But when you track everything, when you have such a swap box for example, you put it just in and then the temperature will automatically be on the correct temperature because the system knows what comes inside.	Idea	Vehicle	Driver	=	As a driver, I would like the temperature cargo body to automatically set the correct temperature for the goods being transported so that I don't waste time adjusting it.
201	To open the swap box, you need proximity sensors.They measure your position. A lock closes and opens. This makes loading easier.	Idea	Vehicle	Driver	=	As a driver, I want the cargo body to unlock automatically when I approach and lock automatically when I move away, so that no time is lost and the goods are protected.
205	Delivery drivers want a comprehensive energy management system that allows them to leave the air conditioning and heating in the cab switched on even when the vehicle is left unattended for a short time during delivery and the engine is switched off. The vehicle should be equipped with a second battery to maintain the temperature in the interior and avoid large temperature fluctuations and thus high energy consumption. This requires software that recognises when the vehicle is in distribution mode with short stops or when it is parked.	Improvment	Vehicle	Driver	=	As a driver, I want the temperature in the vehicle to be kept constant throughout the day, even when the vehicle is parked for a delivery, so that I feel comfortable and don't get sick.
209	I imagine that the car has an infotainment system. And we can upload the delivery app to this device, which the driver has to operate. This app tells you, for example, that your next delivery location is this one. And it helps you navigate there. Once you have completed the delivery, you return to the car and press “Done.”	Improvment	System	Driver	=	As a driver, I would like an assisted work system that shows the next steps during a delivery so that no step is forgotten and new employees can be trained more quickly.

213	Often, items are left outside because they cannot be loaded. You then send another truck to pick them up. So it's a question of measurement and data provision. If drivers don't know how to load pickups or bulky items such as advertising displays, or only part of them, that's a problem. Flexibility in the cargo space and information about the dimensions of the goods to be picked up are necessary.	Problem	Vehicle, Fleet	Driver	=	As a driver, I would like the cargo compartment to be flexible so that it can be adapted for picking up large and bulky goods, and this should only be planned at the end of the route so that there is enough space available.
220	The current vehicle interface is outdated and lacks modern navigation integration.	Problem	System	Driver	=	As a courier, I want a modern interface with integrated navigation to improve route planning and efficiency.
222	Streets in Ferrara's city center are narrow, making direct delivery access difficult in many locations.	Problem	Vehicle	Driver	=	As a courier, I would like to have support in finding a parking space at each of the delivery locations with short walking distances so that I can work efficiently.
223	Route planning is done manually by the driver based on experience and delivery times.	Fact	System	Driver	=	As a courier, I would like intelligent route planning based on traffic conditions and delivery times to improve efficiency.
226	The geofencing display should be integrated into the vehicle interface rather than relying on the driver's smartphone.	Improvement	Vehicle	Driver	=	As a courier, I want all information relating to the vehicle to be within my field of vision while driving so that I am not distracted.
238	An app-based system for booking unloading zones is already in place but needs improvement.	Fact	Vehicle, System	Driver	=	As a courier, I want to book unloading zones automatically so that I don't have to spend time doing it and I can't forget.
245	Roadworks like tram installations in Bologna are reducing available loading zones.	Problem	System	Driver	=	As a courier, I would like current construction sites to be automatically taken into account in car park planning so that it is always up to date.
262	Couriers want improved package organization and assistance for identifying parcels faster.	Improvement	Vehicle	Driver	+	As a courier, I want help identifying where parcels are stored so that I don't waste time searching for them.
263	Vehicles should have compartments to separate special deliveries like Allegro collections.	Improvement	Vehicle	Driver	=	As a courier, I would like to keep special parcels separate so that they can be handled with extra care.
266	Central locking system that partially opens doors could improve delivery speed and safety.	Idea	Vehicle	Driver	=	As a courier, I would like to have doors with automatic central locking so that I can save time when unlocking them.
271	Integrated keyless systems improve safety by locking doors automatically after the driver leaves.	Idea	Vehicle	Driver	+	As a courier, I want the vehicle and cargo area to lock when I walk away and unlock when I approach with a parcel, so I don't have to think about it and can get there faster.
273	Finding packages is difficult due to lack of consistent internal organization.	Problem	Vehicle	Driver	=	As a courier, I want to get support in finding the right parcels at the delivery location so that I can work faster.

274	Vehicle should support sorting packages by delivery zone (A, B, C, D) with light or signal indicators.	Idea	Vehicle	Driver	=	As a courier, I would like the parcels to be sorted along the route so that I don't have to move them around.
275	Young or inexperienced couriers need more vehicle guidance for organizing the cargo.	Fact	Fleet	Driver	=	As a courier, I would like the new courier to be supported by innovations that can be learned quickly so that they feel confident.
277	Couriers lose time re-scanning packages during multi-step locker delivery processes.	Problem	System	Driver	=	As a courier, I would like to avoid double scanning so that I can work quickly.
290	It would be nice to hav an app to check the status of the vehicle - for example when you forgot to lock the doors.	Improvement	Vehicle	Driver	=	As a courier, I want to be able to check the status of the vehicle remotely so that I know everything is okay.
291	I would like to receive a notification if I have forgotten to lock the doors.	Idea	Vehicle	Driver	=	As a courier, I want a system that automatically locks the doors so that I don't forget to do it.
314	A big screen with a map is very useful to navigate.	Fact	Vehicle	Driver	=	As a courier, I need an overview of my current route so that I can find my way around more easily.
319	It would be nice to be able to take notes related to the address of the house via the screen.	Idea	Vehicle	Driver	=	As a courier, I would like to make notes in the system about specific delivery addresses (e.g. entrance to the building at the back on the right) so that another courier can find their way around the address more quickly.

Not specified

No.	Statement	Classification	Level	Role	Priority	User need
7	Basically we have the same route every day. That's why I stopped using the app, because I can rearrange the routes much more quickly in my brain.	Fact	System	Driver	-	-
11	There should be an additional box for small parcels so that they do not get mixed up in the vehicle.	Improvment	Vehicle	Driver	-	-
14	The vehicle should lock itself when you move away from the vehicle.	Improvment	Vehicle	Driver	-	-
15	The compartment in the front of the Paxster could be operated from the outside, perhaps also as a drawer, so as not to have to operate in the cramped vehicle interior.	Idea	Vehicle	Driver	-	-
16	With a Paxster it is much easier to find a parking space right in front of the destination and save a lot of time.	Fact	Vehicle	Driver	-	-
19	Low entry and exit heights in the vehicle are strongly favoured as they do not cause so much knee pain.	Fact	Vehicle	Driver	-	-
24	There should be a central place in the vehicle where empty flyers, return labels and plastic bags can be stored and easily exchanged. The stickers should also be stored on a roll, like toilet paper in the front of the car.	Idea	Vehicle	Driver	-	-
25	Having no doors is the best way to get in and out of the vehicle quickly, even in the cold climate in Norway	Fact	Vehicle	Driver	-	-
29	A standard van should have a bulkhead door to allow quick access from the driver's cab to the storage area	Fact	Vehicle	Driver	-	-
41	When reversing, the vehicle should emit a small sound to alert pedestrians.	Improvment	Vehicle	Driver	-	-
43	The vehicle could use the existing cameras to monitor itself while parked and, together with an alarm system, contribute to security.	Improvment	Vehicle	Driver	-	-
116	With the swap box and MicroHubs system, half of the vans around Oslo and sub urbs could be replaced with Paxsters, saving a lot of time.	Fact	Vehicle, System	external Serviceprovider	-	-
130	With the Paxster, I have no problem finding parking spaces because I can park on the sidewalk. The police allow this because they say it is better to park right next to the door so that you can leave quickly, as long as there is enough space for pedestrians and the bike lane is clear.	Fact	Vehicle, System	Driver	=	-

134	With Paxster, I sometimes have the problem in winter that I get stuck in the snow when parking. It should therefore have a little more distance from the ground. Since the new Paxster generation, it is also not possible to push the locked Paxster, as it is blocked.	Fact	Vehicle	Driver	-	-
135	Keyless access and low-entry steps are critical to improve ergonomics and reduce injury risk, particularly with frequent stops and entries (notably in box vans).	Fact	Vehicle	Supervisor of Driver	-	-
143	Handle brake and locking mechanisms are safety-critical for hilly terrain and winter conditions. Absence of a hand brake creates risk when the vehicle is immobilized (e.g. battery depletion).	Improvment	Fleet	Supervisor of Driver	-	-
147	Ergonomic upgrades such as jacket hooks, secure cupholders, raised flooring for traction, and phone mountswould significantly improve comfort.	Improvment	Vehicle	Driver	-	-
152	Two sliding doors are required at the front, as there are many railings along the road in Athens. This is much safer in view of passing bicycles, scooters or gusts of wind.	Idea	Vehicle	Driver	=	-
206	The 360-degree camera would be very helpful for distribution, for easy parking. It is a top view that can be seen on the display.	Idea	Vehicle, Fleet	Driver	-	-
207	The most important thing is the driver's door. When we get into the vehicle, we have to look carefully. A door should not have a large protruding profile when it opens. There is a risk that the door could hit passing cars, motorcycles, or bicycles. Sliding doors would be better.	Improvment	Vehicle, Fleet	Driver	-	-
208	Software offers a lot of potential for improvements that could be made to the vehicle. Improvements that could help increase efficiency during distribution. Due to the vehicle's difficulties, the overall space requirements, and the handling of heavy loads, the optimum has not yet been achieved.	Fact	Vehicle	Driver	-	-
211	The vehicles should be charged via parking spaces or the street from below, not with a plug. In other words, wireless inductive charging. This eliminates problems with plugs or cables lying around in the car or having to be stowed away.	Idea	Vehicle	Driver	-	-
212	In summer, temperatures in Athens exceed 40 degrees Celsius. It would be nice if the interior of the van were already pre-cooled in the morning when starting. In northern countries, there are seat heaters for this purpose; we need cooled seats.	Idea	Vehicle	Driver	-	-
217	Climbing in and out of high vehicle steps is physically demanding without a ladder.	Problem	Vehicle	Driver	-	-

219	Bicycle traffic in Ferrara poses a safety risk when stepping out of the vehicle	Problem	System	Driver	-	-
221	In summer, the vehicle interior gets uncomfortably hot, especially near the seaside.	Problem	Vehicle	Driver	-	-
228	The drivers values simplicity and physical predictability over excessive digitalization.	Fact	Vehicle	Driver	-	-
239	Electric pallet trucks would be helpful for reducing physical effort and increasing speed during loading.	Improvement	Fleet	Driver	-	-
241	Suspension systems that adapt to heavy loads would make delivery vehicles safer and easier to handle.	Idea	Vehicle	Driver	-	-
243	Vehicles that offer better cabin comfort allow drivers to rest briefly between deliveries.	Improvement	Vehicle	Driver	-	-
246	Small electric vehicles like the one from Alke are aesthetically appealing and suitable for city center delivery.	Fact	Fleet	Driver	-	-
254	Adjustable front and rear suspension systems would ease the physical burden during heavy loading and improve vehicle safety.	Idea	Vehicle	Driver	-	-
256	Slippery vehicle floor during rain or snow poses a safety risk.	Problem	Vehicle	Driver	-	-
264	Unused passenger seats could be converted into extra storage space.	Improvement	Vehicle	Driver	-	-
265	Better anti-slip materials are needed in driver cabin floor to prevent slipping.	Improvement	Vehicle	Driver	-	-
267	Magnetic vests or alternative systems could replace repetitive seatbelt fastening during short stops.	Idea	Vehicle	Driver	-	-
268	Adjustable air suspension could help regulate loading level in different terrain conditions.	Idea	Vehicle	Driver	-	-
269	Lower vehicle levels may increase accessibility but can be problematic on uneven terrain.	Problem	Vehicle	Driver	-	-
270	Steering wheel and entry configuration should support quick and ergonomic entry to the cabin.	Improvement	Vehicle	Driver	-	-
272	Built-in carts or secure cart storage should be available to handle heavy packages alone.	Improvement	Vehicle	Driver	-	-
278	Locker systems with built-in scanning reduce the need for handheld scanners.	Problem	System	Driver	-	-
281	Charging cables take up a lot of space.	Problem	Vehicle	Driver	-	-
282	It would be better to a mechanism for storing the charging cable like in a vakuum cleaner.	Idea	Vehicle	Driver	-	-
283	Inductive charging while driving would make charging faster and easier.	Idea	Vehicle	Driver	-	-
284	Charging cables get tangled.	Problem	Vehicle	Driver	-	-
285	Charging cables get damaged and need to get replaced.	Problem	Vehicle	Driver	-	-

286	It would be nice to have a powerbank for emergencies to get to the next charger.	Idea	Vehicle	Driver	-	-
287	While driving in winter conditions snow and melted snow accumulates in the footwell.	Problem	Vehicle	Driver	-	-
292	A 360° camera would be a big a advantage.	Improvement	Vehicle	Driver	-	-
293	There is a high risk of animal crossing.	Problem	Vehicle	Driver	-	-
299	The front windscreen should be heated.	Improvement	Vehicle	Driver	-	-
300	Parking spaces at the postal distribution centre are rare.	Problem	System	Driver	-	-
305	A roll-up door could collide with the packages inside the vehicles in case they are stacked up till the cailing.	Problem	Vehicle	Driver	-	-
306	It's difficult to drive backwards in the dark because often there is not enough light.	Problem	Vehicle	Driver	-	-
309	The driver should be able to preheat the vehicle via an app in the morning.	Improvement	Vehicle	Driver	-	-
310	It is difficult for the driver to remove snow from the roof, because it's quite high	Problem	Vehicle	Driver	-	-
311	Normally the second seat isn't used. In that case this space could als be used for transporting goods.	Idea	Vehicle	Driver	-	-
312	Charging the Zebra with cables is inconvenient.	Problem	Vehicle	Driver	-	-
313	I want to be able to check the Zebra i.e. while stopping in a parking lot.	Fact	Vehicle	Driver	-	-
315	Emergency Braking Assistant and Lane Keeping Assistant support the driver.	Fact	Vehicle	Driver	-	-
318	Especially for less experienced couriers it's sometimes very difficult to house number - particularly when it's dark.	Problem	Vehicle	Driver	-	-