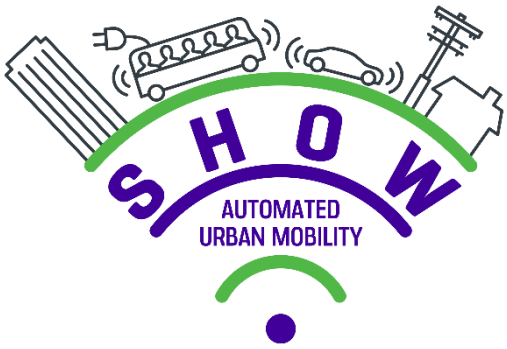

SHared automation Operating models for Worldwide adoption

SHOW

Grant Agreement Number: 875530

D9.4: Users engagement and co-creation initiatives

This report is part of a project that has received funding by the European Union's Horizon 2020 research and innovation programme under Grant Agreement number 875530

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Executive Summary

In order to design and develop sustainable and successful AV services, the needs and requirements of both end-users and stakeholders involved in the (AV) transport and mobility ecosystem need to be considered. The overall objective of A9.3 *Users engagement and co-creation initiatives*, as a horizontal task within SHOW, was to support the SHOW Demonstration sites in reaching out to end-users and other stakeholders and to steer and monitor their engagement plans and efforts.

A guidance document – *Framework and guidelines for a successful stakeholder engagement process* – was developed by EPF to support the SHOW sites in working out a customized engagement strategy and plan, adapted to the local context, covering the following main topics:

- Identifying the stakeholders and end-users
- Communication channels and tools
- How to engage stakeholders and end-users
- Incentivization and nudging strategies
- User acceptance surveys (guidance on recruiting participants).

The current Deliverable provides a broad overview of the wide range of engagement activities that have been planned and conducted at the SHOW Demonstration sites.

In addition, the Deliverable delves into the methodology and results of the Ideathons and Hackathons that were organised as part of SHOW A9.3. These events were conceived as dedicated co-creation activities, aiming to recognize gaps and collect solution-oriented ideas to improve the services proposed by SHOW. Furthermore, and worth a special mention, the Austrian Mega site introduced the novel concept of 'Supertesters': an innovative approach to gather qualitative feedback from end-users, allowing to compare outcomes across different sites.

As such, the following dedicated events took place within the context of A9.3 and are described in more detail in this Deliverable:

- Ideathons:
  - Online Ideathon (15.01.2021)
  - Ideathon with USF students in Brussels (12-13.03.2023)
  - Ideathon in Carinthia (05.07.23)
- Hackathons:
  - Pre-Hackathon workshop at Hamburg ITS congress (12.10.2021)
  - Hackathon Thessaloniki (21-23.03.2022)
  - Swedish duo-Hackathon in Linköping – Gothenburg (*cancelled*)
  - Open Summer of Code in Brussels (01-25.07.2024)
- Supertesters events:
  - Graz (30.06.2023)
  - Pörtschach (28.07.2023)
  - Salzburg (*cancelled*).

The Deliverable is structured into eight sections. The first chapter offers a general introduction in terms of context, objectives, and scope. The second chapter describes the overall methodology, while the third chapter focuses on the framework and guidelines that aimed to support the SHOW sites with their engagement activities. The fourth chapter then gives an overview of the main activities conducted, per site. The subsequent chapters describe the process and outcomes of the Ideathons (chapter 5) and Hackathons (chapter 6). Chapter 7 is dedicated to the novel 'Supertesters' approach. The final chapter (chapter 8) contains conclusions and lessons learned.

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0.4	31.07.2024	All SHOW sites contacted for final updates & reviews of their engagement strategies	Delphine Grandsart & Kathryn Bulanowski, EPF
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2.0	16.10.2024	Final version sent for submission to the EC	Delphine Grandsart, EPF

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Abbreviations List

Abbreviation	Definition
5T	Tecnologie, Telematiche, Trasporti, Traffico, Torino
A	Activity
ADEME	Agence de l'environnement et de la maîtrise de l'énergie
AEDIVE	Asociación Empresarial para el Desarrollo e Impulso de la Movilidad Eléctrica
AEVAC	Asociación Española del Vehículo Autónomo
AI	Artificial Intelligence
AIT	Agence de l'Innovation pour les Transports
AIT	Austrian Institute of Technology
AMWE	Autonomy Mobility World Expo
AR	Augmented Reality
ATUC	Asociación de Empresas Gestoras de los Transportes Urbanos Colectivos
AV	Automated Vehicle
B2C	Business to Consumer
BA	Bachelor of Arts
BACSI	Base Aérea Conectada Sostenible Inteligente
BMK	Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
BPI	French public Bank of investments
BRT	Bus Rapid Transit
BSM	Bahnen der Stadt Monheim GmbH
BUGA	Bundesgartenschau (Federal Garden Show)
CCAM	Connected and Cooperative Autonomous Mobility
CCAV	Connected and Cooperative Autonomous Vehicles
CDTI	Spanish Centre for the Development of Industrial Technology
CDV	Centrum dopravního výzkumu (Transport Research Centre)
CERTH/ HIT	Centre for Research & Technology Hellas/ Hellenic Institute of Transport
C-ITS	Cooperative Intelligent Transport Systems
CIVA	Communauté d'Intérêt dédiée au Véhicule Automatisé
CSUM	Conference on Sustainable Mobility
CUAS	Carinthia University of Applied Sciences
D	Deliverable
DG	Directorate General
DGITM	French Ministry of Infrastructure, Transport and Mobility
DGT	Directorate-General for Traffic in Spain
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V.
DPO	Data Protection Officer
DREETS	Directions régionales de l'économie, de l'emploi, du travail et des solidarités
DRT	Demand Responsive Transport
EC	European Commission
EIT	European Institute of Innovation & Technology
EMT	Empresa Municipal de Transportes de Madrid
EPF	European Passengers' Federation
ERT	Ellinikí Radiofonía Tileórasi (Greek Radio and Television)
EU	European Union
EUCAD	European Conference on Connected and Automated Driving

Abbreviation	Definition
EUMO	European Mobility Expo
EV	Electric Vehicle
fahma	Fahrzeugmanagement Region Frankfurt RheinMain GmbH
FEV	FeelEVolution
FZI	Forschungszentrum Informatik
Gama	Gaussin Macnica Mobility
GDPR	General Data Protection Regulation
GPS	Global Positioning System
GTT	Gruppo Torinese Trasporti
HD	High Definition
HMI	Human Machine Interface
IA	Intelligence Artificielle
IAM	Institut für Technologie und Alternative Mobilität
IAP2	International Association of Public Participation
ICCS	Institute of Communication and Computer Systems
ICTR	International Conference on Transportation Research
ID	Identification
IED	Istituto Europeo di Design (European Institute of Design)
IEEE	Institute of Electrical and Electronics Engineers
IESTA	Institute for advanced Energy Systems & Transport Applications
INNN	Salon de l'innovation numérique, de l'insurtech et du risque
INSIA	University Automotive Research Institute
IÖB	Innovationsfördernde Öffentliche Beschaffung (Public Procurement promoting Innovation)
IoT	Internet of Things
ISO	Independent Organisation for Standardisation
IT	Information Technology
ITER	Istituzione Torinese per una Educazione Responsabile
ITS	Intelligent Transport System
IURC	International Urban and Regional Cooperation Programme
KIT	Karlsruhe Institute of Technology
KMG	Klagenfurter Mobilitätsgesellschaft
KoTAM	Koordinierung der Testfelder Autonome Mobilität
KPI	Key Performance Indicator
LaaS	Logistics as a Service
LAB	Leipziger Aus- und Weiterbildungsbetriebe GmbH
LVB	Leipziger Verkehrsbetriebe
MaaS	Mobility as a Service
MAMCA	Multi-Actor Multi-Criteria Analysis
MAUTO	National Automobile Museum of Turin
MUNV	Ministerium für Umwelt, Naturschutz und Verkehr
ÖBB	Österreichische Bundesbahnen
OCC	Operations Control Centre
OEM	Original Equipment Manufacturer
OSoC	Open Summer of Code
PM	Particulate Matter
POI	Point of Interest
PRM	Person with Reduced Mobility
PT	Public Transport
PTA	Public Transport Authority
PTO	Public Transport Operator
Q&A	Questions and Answers

Abbreviation	Definition
R&D	Research and Development
RISE	Research Institutes of Sweden AB
rms	Rhein-Main-Verkehrsverbund Servicegesellschaft mbH
RMV	Rhein-Main-Verkehrsverbund
RVK	Regionalverkehr Köln
SAM	Servicio de Ayuda a la Movilidad (Mobility Assistance Service)
SDG	Sustainable Development Goal
SEK	Swedish krona currency
SFMOMA	San Francisco Museum Of Modern Art
SME	Small and Medium-sized Enterprise
SPaT	Signal Phase & Timing (SPaT) prediction
SRFG	Salzburg Research Forschungsgesellschaft mbH
STOAG	Stadtwerke Oberhausen GmbH
SUMP	Sustainable Urban Mobility Plan
SURAAA	Smart Urban Region Austria Alps Adriatic
SVMS	Signature Vertical & Mobility Solutions
SWOT	Strengths, Weaknesses, Opportunities and Threats
TC	Technical Committee
TFLA	Transport de Fret et de Logistique Automatisé (Autonomous Freight and Logistics Transportation)
TM	Traffic Management
TNO	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek
TRK	TechnologieRegion Karlsruhe GmbH
TTS Italia	Telematica Trasporti e Sicurezza Italia
UC	Use Case
UGAP	Union des groupements d'achats publics
UITP	International Association of Public Transport
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIGE	University of Genoa
US	United States of America
USF	University of San Francisco
UTAD	Ústav techniky a automobilové dopravy (Institute of Technology and Automotive Transport)
UX	User Experience
V2X	Vehicle to Everything
VBK	Verkehrsbetriebe Karslruhe GmbH
VDV	Verband Deutscher Verkehrsunternehmen
VEC	Vulnerable to Exclusion Citizen
VGF	Verkehrsgesellschaft Frankfurt am Main
VRR	Verkehrsverbund Rhein-Ruhr
VRU	Vulnerable Road User
VTI	Swedish National Road and Transport Research Institute
VTT	Technical Research Centre of Finland Ltd
VUT	Vysoké učení technické v Brně (Brno University of Technology)
WP	Work Package
Y4PT	Youth for Public Transport

1 Introduction

1.1 Context and objectives

User-centred design is vital for developing customized mobility solutions with enhanced chances for success.[1] End-users can give excellent input to validate and/ or steer the results of research and development. Basically, a user-centred approach can help to (i) foster adoption and acceptance of (new) mobility services, (ii) make sure that these are inclusive and accessible to all – considering the needs of persons with reduced mobility and other vulnerable to exclusion groups –, and (iii) improve the overall travel experience. When users are involved in the design or development of a good/ service, the end value is enhanced because they can customize the product according to their needs. It leads to greater customer satisfaction and increases attitudinal loyalty towards service/ product providers, perceived customer value and chances of positive market uptake.

In order to design and develop sustainable and successful AV services – or (transport) services in general –, not only end-user needs but also requirements from the different other stakeholders involved in the (AV) transport and mobility ecosystem need to be considered. Within SHOW, a large number of activities have been planned and conducted with a diversity of stakeholders: interviews, surveys, focus groups, workshops, Demo Board and stakeholder forum meetings, etc. Objectives of such stakeholder activities were to:

- Build a good relationship with stakeholders, get to know them;
- Raise awareness and understanding about the SHOW project and its AV demonstrations;
- Activate stakeholders' networks to disseminate SHOW objectives and results;
- Gain insights into priorities and needs of the different stakeholders;
- Identify Strengths, Weaknesses, Opportunities and Threats (SWOT analysis) for SHOW;
- Use the knowledge of stakeholders to improve project outcomes;
- Monitor and evaluate the quality of the project activities and results.

The overall objective of A9.3 *Users engagement and co-creation initiatives*, as a horizontal task within SHOW, was to support the SHOW pilot sites in reaching out to end-users and other stakeholders and to guide and monitor their engagement plans and efforts.

As part of A9.3, Ideathons and Hackathons were organized, conceived as co-creation events, aiming to recognize gaps and collect solution-oriented ideas to improve the services proposed by SHOW. In addition, to support SHOW pilot sites in developing a customized engagement strategy and plan, EPF provided a *Framework and guidelines for a successful stakeholder engagement process*, held training sessions and regularly checked in with the sites to discuss progress and offer support where needed, including advice on how to recruit participants for the user acceptance surveys and how to develop incentivisation and nudging strategies. Applying a competition mechanism, a 'Community Engagement Award' was introduced, to reward the site that achieved the broadest engagement of travellers and stakeholders.

[1] See also Grandsart, D. et al., Citizen and Stakeholder Engagement in the Development and Deployment of Automated Mobility Services, as Exemplified in the SHOW Project. In: E. G. Nathanail et al. (Eds.): CSUM 2022, 2023. https://doi.org/10.1007/978-3-031-23721-8_39

1.2 Purpose and structure of the document

The purpose of this Deliverable is to give an overview of the users engagement and co-creation activities carried out within SHOW. It is structured into eight sections. This first chapter offers a general introduction in terms of context, objectives, and overall scope of D9.4. The second chapter describes the overall methodology behind A9.3, while the third chapter focuses on the framework and guidelines created by EPF that aimed to support the SHOW pilots with their engagement activities. The fourth chapter then gives an overview of the main activities conducted per SHOW site. The subsequent chapters describe the process and outcomes of the Ideathons (chapter 5) and Hackathons (chapter 6) organized as part of SHOW. A separate chapter (chapter 7) is dedicated to the novel 'Supertesters' approach applied at the Austrian Mega site. The final chapter (chapter 8) contains conclusions and lessons learned.

1.3 Interrelations with other SHOW WPs and activities

The main interrelations between A9.3 and other SHOW Work Packages and Activities are shown in Figure 1.

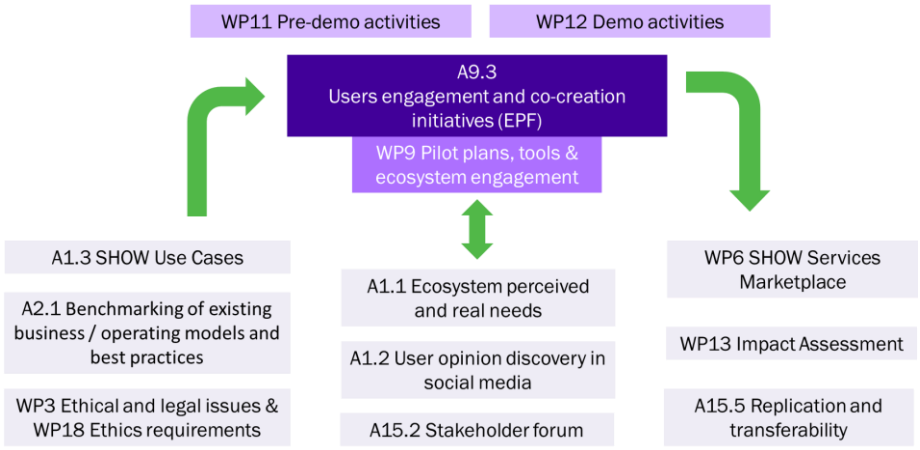


Figure 1 - A9.3 interrelation with other SHOW WPs and tasks

A9.3 within SHOW deals with users engagement and co-creation activities and focused as such on the SHOW pre-demo (WP11) and demo (WP12) activities. SHOW Use Cases (A1.3) formed the basis for the SHOW pilot and demonstration activities and as such were also in focus of the users engagement and co-creation activities. Development of incentivisation or nudging strategies was aligned with A2.1 which included desk research on this topic. Ethical and privacy issues, including informed consent mechanisms, are covered in WP3 and WP18.

The A9.3 *Framework and guidelines for a successful stakeholder engagement process* meant to, amongst others, support the recruitment of participants for the online surveys and interviews in the context of A1.1 (*Ecosystem perceived and real needs*) dealing with user acceptance of the SHOW proposed solutions, in conjunction with A13.5 (*User experience, awareness and acceptance impact assessment*). Other stakeholder engagement activities in SHOW were not directly within the scope of A9.3 (i.e. concertation, twinning, Advisory Board, Demo Board and stakeholder forum events, and any other activities such as interviews, focus groups, workshops etc. not directly related to the demonstration activities). Nevertheless, for these, pilot sites could also benefit from the A9.3 guidelines for stakeholder engagement.

Selected outcomes of the A9.3 co-creation activities were included in WP6 Services Marketplace, while overall, end-user and stakeholder engagement feedback fed into WP9, WP13 (Impact Assessment) and WP15 (A15.5: *Replication and transferability*).

2 General approach and methodology

The overall objective of A9.3, as a horizontal task within SHOW, was to support the SHOW pilot sites in reaching out to end-users and other stakeholders and to guide and monitor their engagement plans and efforts. As part of A9.3, dedicated co-creation activities were also organized, to recognize gaps and collect solution-oriented ideas to improve the services proposed by SHOW.

On 15 June 2021, as part of the SHOW Partner Board meeting, EPF and Eurocities jointly organised an **online brainstorm session** on user engagement strategies, using Mural. Highlighting different scenarios – aligned with SHOW Use Cases, see Figure 2 –, the session focused on three questions:

- Which end-users and stakeholders can you think of for the different types of Demo sites below?
- Which channels, tools, messages and intermediaries could you use for communication and engagement?
- Which incentives can you think of to encourage people to make use of the SHOW CCAV services?

Figure 2 - Different contexts for AV deployment in SHOW

The outcomes of the Mural exercise are provided in the Annex, and fed into the ***Framework and guidelines for a successful stakeholder engagement process***, a guidance document developed by EPF to support the SHOW Demonstration sites in working out a customized engagement strategy and plan, adapted to the local context. The *Framework and Guidelines* document covers the following main topics:

- Identifying the stakeholders and end-users
- Communication channels and tools
- How to engage stakeholders and end-users
- Incentivization and nudging strategies
- User acceptance surveys (guidance on recruiting participants).

Chapter 3 of this Deliverable provides a summary of the content of the Framework and guidelines document (included already in SHOW D9.2 *Pilot experimental plans, KPIs definition & impact assessment framework for pre-demo evaluation*) on each of the above topics, while chapter 4 then zooms in on the main activities conducted by SHOW pilot sites as part of their engagement strategies.

Throughout the duration of SHOW, regular **check-ins with the SHOW pilots** were scheduled by EPF to discuss progress – engagement strategies were conceived as 'living documents', to be updated as the project progressed –, and offer additional advice where needed. In addition to these bilateral follow-up calls, user and stakeholder engagement was added as an agenda item to the **Demo Board meetings**.

Furthermore, broader **training sessions/ webinars** on user engagement were also organised, notably:

- On 14.09.22, SHOW and Ride2Autonomy organised a joint webinar 'CCAM user acceptance and user engagement', bringing an overview of factors affecting user acceptance (Henriette Cornet, UITP) and strategies for engaging citizens and stakeholders in CCAM projects (Delphine Grandsart, EPF), followed by three SHOW pilot sites – Carinthia, Brno and Linköping – highlighting best practices: experiences, plans, and lessons learned.[2]
- At the 10th SHOW Demo Board meeting in Madrid (18.10.22), a dedicated EPF session on user engagement was included in the programme, offering information on a wide variety of engagement activities (focus group, citizen dialogue, Ideathon/ co-creation workshop, Hackathon, field test, citizen participation platform, competition, demo events), inviting Demo sites to pick at least one of these. The slides of the session are provided in the Annex.
- On 24.05.24, Eurocities organised a webinar on 'stakeholder engagement' for SHOW Follower sites, in which EPF highlighted decisive success factors, followed by SHOW site Carinthia showcasing its comprehensive approach to stakeholder engagement. The slides of the session are provided in the Annex.

As mentioned, dedicated co-creation activities – **Ideathons and Hackathons** – were also organised as part of A9.3, with the support of SHOW partners EPF and ERTICO. In addition, the Austrian Mega site introduced the novel concept of **'Supertesters'** as an innovative methodology to gather qualitative feedback from end-users, allowing also to compare outcomes for the three Austrian sites Graz, Pörtschach and Salzburg. Variants of the 'Supertesters' approach were applied in Linköping and Turin.

To summarise, the following events took place within the context of A9.3's co-creation activities and are described in more detail in this Deliverable:

- Ideathons:
  - Online Ideathon (15.01.2021)
  - Ideathon with USF students in Brussels (12-13.03.2023)
  - Ideathon in Carinthia (05.07.23)
- Hackathons:
  - Pre-Hackathon workshop at Hamburg ITS congress (12.10.2021)
  - Hackathon Thessaloniki (21-23.03.2022)
  - Swedish duo-Hackathon in Linköping – Gothenburg (*cancelled*)
  - Open Summer of Code in Brussels (01-25.07.2024)
- Supertesters events:
  - Graz (30.06.2023)
  - Pörtschach (28.07.2023)
  - Salzburg (*cancelled*).

Chapters 5, 6 and 7 discuss the methodology and outcomes of the Ideathons, Hackathons and 'Supertesters' events in more detail.

[2] https://summalab.nl/show-ride2autonomy-webinar-gained-perspectives-on-user-engagement-and-public-acceptance-of-connected-and-cooperative-automated-mobility/

3 Customized engagement strategies

To support the SHOW pilot sites in developing their own customized engagement strategy and plan, adapted to the local context, EPF provided a *Framework and guidelines for a successful stakeholder engagement process*, accompanied by a template, to be completed by each pilot responsible and to serve as a guidance document for follow-up on all pilots' engagement activities.

The *Framework and Guidelines* document covers the following main topics:

- Identifying the stakeholders and end-users
- Communication channels and tools
- How to engage stakeholders and end-users
- Incentivization and nudging strategies
- User acceptance surveys (guidance on recruiting participants).

Chapter 3 of this Deliverable provides a summary of the content of the Framework and guidelines document (included already in SHOW D9.2 *Pilot experimental plans, KPIs definition & impact assessment framework for pre-demo evaluation*) on each of the above topics, while the next chapter (Chapter 4) provides an overview of the main activities conducted by SHOW Demo sites as part of their engagement strategies.

3.1 Identifying the stakeholders and end-users

The overall objective of A9.3, as a horizontal task within SHOW, is to support the SHOW Demonstration sites in reaching out to end-users and other stakeholders and to guide and monitor their engagement plans and efforts. The first step in this process is identifying who the end-users and stakeholders are. A stakeholder can be defined as any individual, group or organization that is impacted by the outcome of the project. Stakeholders are hence: those who may become (potential) users or partners; those on whom the project outcomes can have a positive or negative impact; and those who could contribute to better solutions with their knowledge or experience.

SHOW D1.1 (*Ecosystem actors needs, wants & priorities & user experience exploration tools*) divides the SHOW ecosystem stakeholders into six main categories:

- Original equipment manufacturers (OEMs) and transport/ mobility operators;
- Tier 1 suppliers, telecom operators, technology providers, services companies;
- Research & academia;
- Passengers and other road users, including those vulnerable to exclusion (VEC);
- Umbrella associations/ non-profit organisations;
- Authorities (cities, municipalities, ministries) and road operators.

Which stakeholders and end-user groups are important, depends on the context. Different contexts for AV deployment in SHOW are shown in Figure 2. As part of an online brainstorm session (see above) on 15. June 2021, SHOW sites thought further about which end-users and stakeholders would be relevant, in different scenarios (see Annex for detailed results).

D9.2 *Pilot experimental plans, KPIs definition & impact assessment framework for pre-demo evaluation* and D9.3 *Pilot experimental plans, KPIs definition & impact assessment framework for final demonstration round* contain a brief description of each pilot and an overview of stakeholders and end-users targeted, as shown in Table 1 and Table 2. Starting from the general inventory of relevant stakeholders and end-user groups, per site, the next important step is to identify good representatives for

each of these. The SHOW local Demo Boards are a good place to start from. Are all relevant stakeholders involved there? Are there any important ones missing (including representatives of the targeted end-user groups)? We also need to consider intermediaries that can help communicate about and promote the SHOW services.

Table 1 - Overview of stakeholders at different pilot sites

Cities	Passenger mobility stakeholders						Logistics stakeholders		
	Vehicle users	Public interest groups and associations	Decision-making authorities or regulators	Operators	Mobility service providers	Industry	Senders	Receivers	Delivery service providers
Les Mureaux	x	-	-	x	-	x	-	-	-
Crest Val de Drome	x	x	x	x	x	x	x	x	
Escrennes	x	-	-	x	x	x	-	-	-
Madrid - Villaverde	x	-	x	x	x	x	-	-	-
Madrid- Carabanchel	x	-	-	x	x	x	-	-	-
Graz	x	-	x	x	-	x	-	-	-
Salzburg	x	-	x	x	-	-	-	-	-
Carinthia	x	x	x	x	-	x	-	-	-
Karlsruhe	x		-	x	x	-			-
Monheim	x	x	x	x	x		-	-	-
Frankfurt	x	x	x	x	x				
Linköping	x	-	x	x	x	-	-	-	-
Gothenburg	x		x	X	x	x	-	-	-
Tampere	x	x	x	x	x	x	-	-	-
Turin	x	-	x	x	x	x	-	-	-
Trikala	x	-	x	x	-	-	x	x	x
Brno	x	-	x	x	x	-	-	-	-

Table 2 - Overview of targeted end-users at different pilot sites

Mega site/ Satellites	City	Passengers								
		Commuters	Residents	Students	Children/ young adults	Elderly	Tourist/ Visitor	Hospital visitors	VRU	PRM
France	Les Mureaux	x	-	-	-	-	x	-	X	X
	Crest Val de Drome	x	x	x	-	x	-	-	x	x
	Escrennes	x	-	-	-	-	-	-		x
Spain	Madrid - Villaverde	x	-	-	-	-	-	-	x	
	Madrid - Carabanchel	-	-	-	-	-	-	-	x	-
Austria	Graz	x	x	x	x	x	x		x	
	Salzburg	x	x	x	-	x	x	-	-	-
	Carinthia	x	x	x	-	x	x	-	x	x
Germany	Karlsruhe	x	x	x	-	-	-	-	-	-
	Monheim	-	x	-	x	x	x	-	x	x
	Frankfurt/ Aachen	-	x	-	-	x	x	-	-	-
Sweden	Linköping	x	x	x	x	x	-	-	-	x
	Gothenburg	x	-	x	-	-	x	-	x	-
Finland	Tampere	x*	x	x	x	x	x	-	x	x
Italy	Turin		x	x	-	x	-	x	x	x
Greece	Trikala	x	x	x	-	x	x	-	x	-
Czech Republic	Brno	x	-	x	x	x	x	-	-	***

Taking into account the above, it is relevant to note that several sites organised dedicated engagement activities targeted at specific user groups, for example children (Carinthia, Linköping, …) or persons with reduced mobility (Tampere, Turin, …).

3.2 Communication channels and tools

After having identified relevant stakeholder and end-user groups, we need to make sure they are aware of what we are doing in SHOW and inform them about our services. The list of possible communication channels & tools to use for reaching out to stakeholders and end-users is quite long and diverse. The choice of optimal channels & tools depends on the target groups addressed and on the local situation in each pilot. Some examples are presented below.

- **Printed materials**: leaflets, posters, stickers, etc. can be distributed e.g. at the city hall, in theatres, libraries, bars, shops, restaurants, hospitals, schools etc.
- **Press**: press releases, press conferences, interviews, etc. can lead to exposure in (local) newspapers, magazines, radio, television etc.
- **Videos** are a really attractive means of promoting the SHOW services. Pilot sites are recommended to record video materials for further dissemination.
- **Social media**: posts can be shared by SHOW partners and relevant intermediaries; paid Facebook advertisements can be an additional option.
- For reaching out to **professional** stakeholders, LinkedIn is a good medium; in addition SHOW partners can each leverage their professional networks.
- **Advertising**: on social media, other web pages, newspapers and magazines, at public transport stops and stations, on billboards in the street, etc.
- Cooperation with the **Public Transport (PT)** operator: the service can be promoted on buses, trams, metros, in stations, etc.
- Promote and integrate the SHOW service in **apps & booking sites** people use to look up information, buy PT tickets, book a hospital appointment, etc.
- Cooperation with **local & regional authorities** and using their relevant communication channels (e.g. city magazine, newsletters, city website etc.)
- **Information screens** featuring information about the SHOW services, e.g. at the city hall, library, reception or lobby of businesses, hotels, hospitals, etc.
- Participation in **events**, big and small (e.g. fairs, exhibitions, workshops – also local events like markets or local festivities), providing e.g. information stands
- **Letters and calls**: in collaboration with local authorities, it could be considered to reach out to individual citizens by sending them a letter, phoning them, etc.
- Respecting GDPR rules, **e-mailing** can be done by organisations in direct contact with potential end-users, e.g. universities (staff and/ or students), schools (pupils & their parents), enterprises (employees), organisations representing PRM or elderly people (their members).
- If possible, specific **marketing** events and campaigns can be devised in collaboration with a professional agency.
- **Educational campaigns** at city halls, schools, universities, tourist centres, etc. using materials like information leaflets, webinars, videos, infographics, etc.
- **Targeted** communication (different messages & tools for different target groups) and **accessible** information (also understandable by persons with a disability and people with low education) is necessary to reach a wide audience, including vulnerable groups.

In general, after identifying the target groups per pilot, we need to actively connect to them through existing organisations, (social media) communities and platforms. Especially during the final public and demonstration phase, efforts are needed to expand the existing reach, counting also on relevant intermediaries to help spread the news, inform a broad audience about the SHOW pilots and recruit participants for both the SHOW services and the accompanying user acceptance surveys. Depending on the specific user groups that are targeted, other intermediaries will be relevant, for example student associations, schools, tourist associations, local businesses (delivery use case), organisations representing people with a disability etc.

3.3 How to engage stakeholders and end-users?

In addition to communicating about the SHOW services, we also wanted to involve end-users and stakeholders in a more intensive way, asking their input and feedback on the proposed services and gathering ideas on how to improve them.

The different levels of citizen engagement/ public participation are shown in the picture below, based on the categorisation by the International Association of Public Participation (IAP2):

1. *Informing*: to provide balanced and objective information in a timely manner;
2. *Consultation*: to obtain feedback on analysis, issues, alternatives and decisions;
3. *Involvement*: to work with the public to make sure that their concerns and aspirations are considered and understood;
4. *Collaboration*: to partner with the public in each aspect of the decision-making;
5. *Empowerment*: to place final decision-making in the hands of the public.

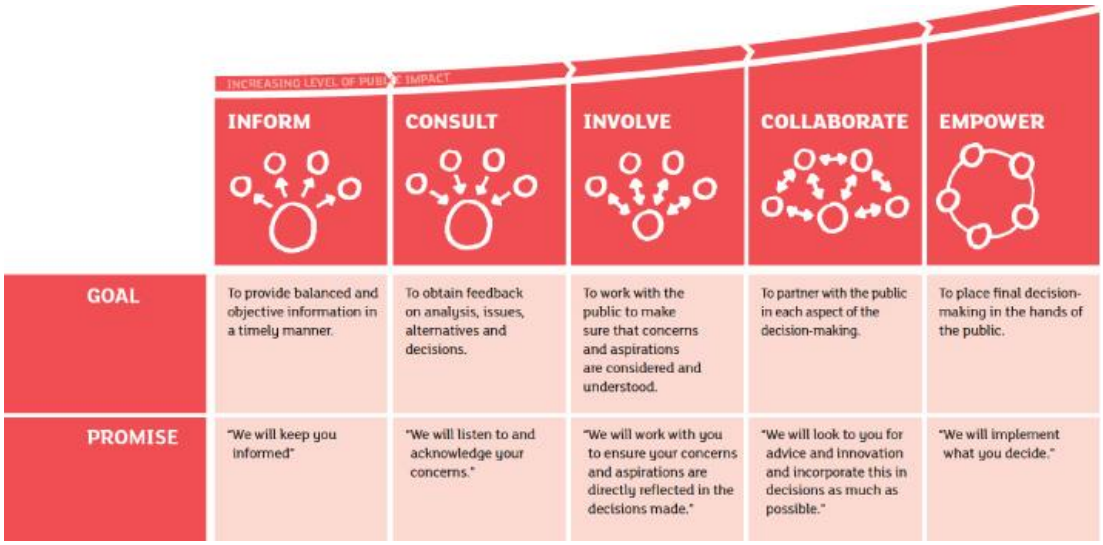


Figure 3 - Levels of participation © International Association for Public Participation (Source: Place Speak)

There are many ways of engaging citizens, reflecting different levels of engagement. Some examples are presented below. The choice for specific activities depends on the target groups, the local situation, and the desired level of public participation (in SHOW, mainly consulting – through the user acceptance surveys, and involvement/ collaboration – through the user engagement and co-creation activities):

- **Co-creation workshop/ 'Ideathon'**: Co-creation or co-design workshops are an interactive type of workshops, focusing on gathering new innovative ideas from a diverse group of participants who are invited to think out of the box, using creative methodologies. Many subtypes are possible, e.g. World Cafés, Serious Play games, modelling, mind mapping, …
- **Hackathon**: A Hackathon is a multi-day workshop during which attendees form multidisciplinary teams that together, in a spirit of positive competition, develop prototype solutions for a specific problem. Originally, Hackathons referred to developing software only, nowadays they can also refer to non-IT events. Outcomes can be software, prototypes, pitches, business models, demos, …
- **Crowdsourcing campaign**: Crowdsourcing means 'outsourcing work to the crowd', typically using the internet. It can be used for different purposes: to gather data, develop new content, raise funds, generate innovative ideas etc.

- **Citizen dialogue**: Citizen dialogues are large-scale debates with citizens on a specific topic. Missions Publiques organized a series of citizen debates on the future of driverless mobility.
- **Citizen participation platform**: Digital platforms for citizen participation such as the open source one Decidim allows organisations to set up participatory processes with numerous functions: participatory budget, debate, contribution space, questionnaires/ forms etc.
- **Focus group**: A focus group can be defined as a 'group interview involving a small number of demographically similar people or participants who have other common traits/ experience' (Wikipedia). They are an important tool for obtaining feedback on new products/ services.
- **Interview survey**: A survey or interview can be used to ask specific questions to a group of either stakeholders or end-users. A uniform set of questions enables to compile feedback and results to draw relevant conclusions.

The EIT Urban Mobility project Decidium identified the following key success factors for citizen engagement, which are relevant to take into account:

1- Simple and accessible language
2- Clear communication supported on visual elements
3- Tailor the communication technique to the expected audience
4- Keep the message short and interesting
5- Direct contact in person with citizens
6- Institution taking the lead should assure a long-term perspective
7- Participation should be transparent and accessible to all target citizens
8- Participants should have a clear understanding that they can really influence
9- Administrative and political barriers must be anticipated and mitigated
10- Avoid presenting closed solutions design by experts only
11- Defer in time the integration of experts' ideas so that stakeholders keep their sense of ownership
12- Stakeholders must be involved in all steps of the process, albeit with different levels of engagement
13- End users must be involved to ensure sense of ownership commitment with the final product
14- Users should be informed about possible threats, negative consequences and how to overcome them in every step of the process
15- Gamification and positive rewards help boosting participation
16- Participation must be as wide and diverse as possible, avoid excessive presence of some segments
17- Promote the utilisation of participation portals and apps.[3]

At all SHOW pilot sites, various engagement activities with stakeholders and citizens have been planned and executed. Common to all sites, user acceptance surveys and interviews with stakeholders were conducted (reported in SHOW D13.6) as well as MAMCA (Multi-Actor Multi-Criteria Analysis) workshops (reported in SHOW D13.5). In addition to these, SHOW sites were invited to choose at least one additional engagement activity (see also Annex). Ideathons (chapter 5), Hackathons (chapter 6) and 'Supertesters' (chapter 7) are discussed further on in this Deliverable, while a general overview of main engagement activities per pilot site is given in chapter 4.

[3] Decidium Deliverable WP2 (September 2020) *Best practices in citizen engagement for urban mobility*

3.4 Incentivisation and nudging strategies

How to encourage people to use/ try out the SHOW services? The answer to this question will depend on the user groups targeted and the specific local context in each pilot. However, in general, it is important to: make the service easy and attractive to use, offer help for first use, and make it clear what the benefits are:

- **People need to know that the service exists**: promote and advertise the service, communicate about it in different ways to target users (see above).
- Offering the service **free of charge** and/ or **integrating it into existing public transport** can take away initial barriers for people to try out the service.
- **Not knowing how the service works** and **not being sure it is safe**, can be additional barriers: information leaflets, tutorial films, info screens, etc. can help.

Human assistance is important to consider, especially for first use: either by a staff members or volunteers, provided permanently or at 'open days'/ try-out sessions.

Other **incentives** could be thought of, to **make the experience overall nicer and more rewarding**. Such small rewards could be:

- Incentives packages, in collaboration with local businesses, e.g. free vouchers for a coffee, a T-shirt of SHOW, stickers, free gadgets, …
- A competition element, e.g. a lottery, a drawing contest for children, picking a name for the shuttles, a diploma for children having used the service, …
- A nicer experience, e.g. with music on board, a photo booth, …

Overall, when communicating about or promoting the service, we need to **make it very clear what the advantages are**: SHOW AV services can have a positive impact on inclusion/ accessibility, environment, congestion and liveability in cities, etc. And in general, for people to use the service, we need to make sure it is **affordable, comfortable, fast, reliable, safe and easy to use**.

3.5 User acceptance surveys

As part of A1.1 *Ecosystem perceived and real needs*, a number of online user acceptance surveys and interviews were foreseen, to be realised at all SHOW sites. To support the sites in recruiting participants for these activities, the *Framework and Guidelines for a successful stakeholder engagement process* included some advice and ideas, which are summarised below.

How to recruit participants for the (long) a priori user acceptance surveys?

The a priori user acceptance surveys were targeted at a broader audience, and hence required wider dissemination. Different methods were suggested to recruit participants:

- **QR codes and web link** – Set up displays with a simple web link and a QR code to scan to answer the survey online;
- **Stakeholders in the pilot sites' ecosystem** – Send an e-mail to employees and distribute survey link to personal networks via newsletter, website etc.;
- **Social networks** – Link to the online survey on the websites & via the social networks of the various stakeholders in the demo site's ecosystem;
- **Posters and flyers** – Display posters and distribute flyers near high-traffic areas (PT, shopping centres, universities, companies, etc.) or in mailboxes;
- **Interviewers with tablets** – Mobilise interviewers to recruit participants directly in high-traffic areas or close to the site of the new service;

- **Local associations or users' committees** – Approach local associations or users' committees to mobilise their members;
- **Local authorities** – Ask local authorities to communicate about the new service, for example in a local newspaper/ newsletter or on their website;
- **Information day for users in the neighbourhood** – Organise an event to inform citizens about the service, inviting them also to complete the survey;
- **Specific agency of panel recruitment** – Use the services of a specific agency to recruit a large sample quickly, foreseeing incentives to motivate people.

For the a priori surveys, as a big audience needed to be reached out, **also people from outside the SHOW pilot sites** could participate. For this, all SHOW partners could make use of their social media channels and leverage their networks.

How to recruit participants for the (a posteriori) user acceptance surveys & 1-question satisfaction surveys?

In the pilot phase, the recruitment of participants for the planned surveys ran in parallel with the recruitment of participants for the SHOW service in general. Unlike the long a priori surveys in the pre-demo phase, on site questionnaires during the pilote phase were shorter and could be filled in directly also while on-board. Depending on the configuration of each site and the available means to each partner, different tools could allow to collect the data, considering that in any case those surveys have been developed in SHOW in digital format and translated in local languages, using the Netigate tool (with different links per pilot site):

- **A paper form to distribute to passengers** – In addition to the ecological impact, the major drawback will depend on the means used to collect the filled questionnaires and the processing time of the data.
- **'Satisfaction-type' response terminals inside vehicles or at stops** – The cost of this equipment must be considered, as well as the possibility of asking more than 1 or 2 question(s) and the safety of such a device on board. Moreover, only one person can use this type of device, others waiting their turn (risk of loss of participants).
- **Survey tablets (guerilla test)** – This is a good means to collect answers to a complete questionnaire, but this method requires the presence of one or more interviewers. It is also interesting to collect additional qualitative data.
- **QR Codes and web link** – Each Pilot site manager in contact with stakeholders could set up displays with a simple web link and a QR code to scan to answer the survey online either directly during the journey or when people are at home.

For the a posteriori user acceptance survey:

- If the population is recruited to test the services, the questionnaire should be included in the procedure;
- If the service is open to all people:
    - A specific poster should be put in the demonstration site environment;
    - On-board staff should inform the users that a questionnaire is available;
    - In or near the services, questionnaires should be available in the form of paper/ pencil with a drop box;
    - Staff members could ask users to participate via tablets or paper/ pencil at the exit of the service.

For the 1-question satisfaction survey:

- It is possible to have an agent on board who asks users directly at the exit of the service and/ or a tablet/ stick etc. available inside the vehicle for users to answer or paper/ pencil with a drop box for people to evaluate the service;

- For real-life use testing we can apply contextual methods (i.e. Guerilla interviewing), and administer primarily close-ended, easy question items via feedback pods (e.g. via emoticons) installed at selected hubs and in vehicles.

As the participation would be more spontaneous, before the end of the campaign, pilot partners would have to follow up on the response quota and put in place incentive measures for less represented groups, considering gender but also age and passengers' categories to obtain the most balanced quota possible. Significant work must be done in partnership with the stakeholders concerned.

How to recruit participants for the stakeholder surveys?

- A contact list compiled and validated by each pilot site manager;
- A specific communication needs to be drawn up, making sure that stakeholders understand the purpose and feel encouraged to participate;
- In case of focus groups, their constitution must be balanced and organised to ensure constructive exchange of thoughts and perspectives.

For the stakeholder interviews, SHOW partners could mobilise their own network which should be sufficient to gather enough responses. For on-site measurements, individual interviews on site are also possible (e.g. in the vehicle or descending from it).

Figure 4 - Promotion of the (a priori) acceptance survey in Turin

Figure 5 - Promotion of the user acceptance survey in Carinthia

4 Overview of engagement activities per site

In the following chapter, an overview is given of the main communication & engagement activities conducted by each SHOW pilot site. The Ideathons, Hackathons, and Supertesters events are discussed separately (chapters 5, 6 and 7).

4.1 German Mega site

The German Mega site covers three sites: Monheim, Karlsruhe, and Frankfurt. Each site conducted various engagement activities, as summarized below. In addition, DLR's modular U-Shift vehicle was showcased in Mannheim at the Federal Garden Show, a pilot activity that was administratively connected to Karlsruhe.

4.1.1 Monheim

The pilot in a nutshell:

- AVs fully integrated into public transport
- Target passengers: residents and tourists
- Local ecosystem: Bahnen der Stadt Monheim GmbH (BSM), DLR (Deutsches Zentrum für Luft- und Raumfahrt e.V.), EasyMile, T-Systems International GmbH (SHOW partners) and the city of Monheim am Rhein (external partner)

Main communication & dissemination channels and tools deployed in Monheim:

- Printed materials: roll-ups, flyers, posters, stickers (in shuttles and in the service centre)
- Press: press event to kick-start the operation in the presence of the mayor of Monheim and the transport minister of Nord-Rhine-Westphalia (19.02.2020); press releases to announce a competition to name the shuttles (24.06.2020) and the outcomes of the competition (04.09.2020); press event and articles accompanying the demonstration at Zollverein Essen (10.2023, see below)
- Videos: video available on YouTube here
- Website and social media: BSM website, LinkedIn, Facebook and Instagram
- Letters, calls, e-mails: city of Monheim newsletter to customers of PT

Main engagement activities planned/ conducted in Monheim:

- A **name-giving competition**, launched in June 2020, was quite successful with more than 270 participants. From now on, the AV fleet will be called 'Die Altstadtstromer' and the shuttles Rheinbogen, Doll Eck, Kradepohl, Schelmenturm and Alter Markt. Winners received a 1-year public transport subscription (see Figure 6). Also shopping vouchers and books could be won.

Figure 6 - Monheim - Winners name-giving competition (photo Birte Hauke)

- On the city of Monheim's **Ideenforum** (here), residents can share their ideas for the future of the city. While this platform does not focus specifically on (automated) mobility, some ideas have been put forward that are linked to AVs.
- 27.03.2022: **Spring Festival Monheim**: Information stand at the festival, raising awareness among end-users/ residents, possibility to ask questions about the AV
- 22.05.2022: **Children's Day**: Children could draw on a bus (not the shuttle, a big one) which was prepared with white foil so that the children could be creative. This bus with all the drawings on it is still in use. The children could also 'hop' into a shuttle to see how it looks from inside.
- 17.08.2022: **Verkehrsverbund Rhein-Ruhr (VRR) forum** with partners of the regional transport association, featuring a tour with the shuttle and a discussion afterwards. CEO Frank Niggemeier-Oliva and head of product development Axel Bergweiler provided an update on the status of the shuttles which are fully integrated into public transport. They also outlined the participation of Bahnen der Stadt Monheim in projects like SHOW.
- 18.09.2022: **125 years celebration of STOAG**, the public transport provider in Oberhausen. Shuttles – with SHOW logos – were showcased and drove on STOAG premises and information was provided to residents/ visitors.
- 12.11.2022: **Visit of Japanese delegates of the Cool4 project** in Monheim, to exchange experiences with AVs
- 17-18.06.2023: **Monheim City Festival**: Shuttles and bicycles were on display, along with a stand with flyers and other goodies for participants. This was an opportunity to exchange information, gather feedback and answer questions.
- 03.06-02.07.2023: **Monheim Triennale Art Festival**: The service of the vehicles was fully incorporated as one of the main acts of this art festival in Monheim. Sound installations were foreseen in 4 different AVs. Participants had the opportunity to ride along in the shuttles while the sound was playing.
- 23-29.10.2023: **Showcase week at Zollverein Coal Mine Industrial Complex** (UNESCO World Heritage site):

Figure 7 - Monheim - Showcasing the shuttles at Zollverein, Essen

Bahnen der Stadt Monheim and the Zollverein Foundation organised an exciting event to test SHOW shuttles. From 23 to 29 October 2023, two AVs operated on the historical grounds of the Zollverein colliery in Essen, Germany. Visitors could travel along for free on a 2,2 km route between 11AM and 5PM.

The event was a huge success – 1.171 passengers were transported – and made the news[4] (see also Figure 7).

- 23.11.2023: **Visit of SHOW Follower site Gdansk** to Monheim
- 26.04.2024: **Accompanying Research on Automated Minibuses in Monheim am Rhein: Report on Results**[5], conducted by KIT (Karlsruhe Institute of Technology) published (see Figure 8); a publication event was organized with different stakeholders: Bahnen der Stadt Monheim, Stadt Monheim, KIT, TÜV Rheinland, Bezirksregierung Düsseldorf & Ministerium für Umwelt, Naturschutz und Verkehr des Landes Nordrhein-Westfalen (MUNV).

Figure 8 - Monheim - Accompanying KIT research

Incentivisation and nudging:

- Improved end-to-end transport services
- Optimized AV experience in terms of speed, comfort, and safety
- Service fully integrated into public transport (timetables and ticketing)
- Operates with a 10-minutes interval from 7AM to 11PM, 7 days per week.
- Connection with other buses at the central bus station
- Free of charge for Monheim residents ('Monheim Pass')
- Standard public transport rate applies for other passengers.
- Safety operator present on board

Anja Holdermüller, Project Manager at Bahnen Monheim: ***"****Our service is advancing transport as we have a connection from our central bus station to our old town (big buses could not drive in the narrow streets there). Especially older people and mobility impaired people are grateful for this service. Car drivers don't like the service too much as the shuttles are not fast and they feel that they are slowed down. But I think the majority of Monheim residents appreciate this service as it also brings tourists to Monheim and makes the town visible throughout entire Germany and beyond."*

[4] https://www.radioessen.de/artikel/zeche-zollverein-in-essen-autonome-busse-bringen-besucher-von-a-nach-b-1802334.html; https://www1.wdr.de/nachrichten/ruhrgebiet/autonome-busse-zeche-zollverein-100.html; https://www.waz.de/staedte/essen/mobilitaet-von-morgen-e-busse-auf-zollverein-fahren-autonom-id239869669.html

[5] https://publikationen.bibliothek.kit.edu/1000170289, DOI: 10.5445/IR/1000170289

4.1.2 Karlsruhe

The pilot in a nutshell:

- AVs are breaking free from the virtual rail
- Target passengers: residents and tourists
- Local ecosystem: FZI Research Centre for Information Technology, DLR (Deutsches Zentrum für Luft- und Raumfahrt e.V.) (SHOW partners) and VBK (Verkehrsbetriebe Karslruhe GmbH), city of Karlsruhe (external partners)

Main communication & dissemination channels and tools deployed in Karlsruhe:

Figure 9 - Karlsruhe - Flyer

- Printed materials: poster and flyers (see Figure 9)
- Press: press release at the start (13.12.2022), press release to announce the on-demand functionality (27.01.2023), press conference to kick-off the new test phase in Weiherfeld-Dammerstock (10.02.2023)[6], videos and interview with Wirtschaftszeitung aktiv (20.07.2023)
- Videos: videos are available on YouTube here and here
- Website and social media: website FZI, Twitter/ X, LinkedIn

[6] See https://www.ka-news.de/region/karlsruhe/erneute-versuchskaninchen-neue-testreihe-fuer-autonome-shuttles-in-dammerstock-art-2912282 and https://www.baden-tv.com/mediathek/video/autonome-shuttles/

Main engagement activities planned/ conducted in Karlsruhe:

- The FZI has a high visibility in Karlsruhe and surroundings as established research institution with high connectivity to other research and public partners, such as KIT (Karlsruhe Institute of Technology). SHOW engagement has been integrated into regular activities with stakeholders and actively promoted the possibility to interact with operators and developers of the SHOW project.
- Each year the FZI promotes all its activities in its **Open House events** (https://www.fzi.de/veranstaltungen/fzi-open-house/), which are accessible to everyone. Visitors comprise students, professionals and interested citizens. During these events, the SHOW project was also presented and the services were advertised (16.02.2023 and 08.02.2024).
- 10-12.05.2022: **IT-TRANS Conference** (Figure 10) held in Karlsruhe, with the official kick-off of real-life SHOW demonstrations on 11.05:

Figure 10 - Karlsruhe - IT-TRANS 2022 © Messe Karlsruhe

Between 12:00-14:00, visitors could experience the future of automated last mile mobility in a combined technical visit of the three projects EVA-Shuttle, Test Area Autonomous Driving Baden-Württemberg and SHOW. The demo launch was met with high interest: at the UITP booth, Dr Florian Kuhnt, FZI Senior Expert for Autonomous Driving, together with SHOW Coordinator Dr Henriette Cornet and UITP Secretary General Mohamed Mezghani, presented the project to Baden-Württemberg's Transport Minister Winfried Hermann, as well as to Karlsruhe mayor Dr Frank Mentrup, TRK Managing Director Jochen Ehlgötz and UITP President Khalid Alhogail. Of course, conference visitors had the opportunity to try out the shuttle. SHOW also took a central stage in the Conference sessions. At the Parallel Session 'Automated shared mobility: Getting our cities ready', the SHOW project was dubbed as frontrunner on automated mobility. Speakers included Dr Alexander Viehl (FZI), Tanja Wiesenthal (ioki) and Dr Henriette Cornet (UITP).

- 10.02.2023: **Press conference with test rides** hosted by VBK and FZI (Figure 11) in the presence of the mayor of Karlsruhe Dr Frank Mentrup, Wolfgang Weiß from VBK, chairman of the citizens' association Joachim Hornuff and FZI board member Prof J. Marius Zöllner. Mayor Dr Mentrup took this opportunity to emphasise that the shuttles could be an important future opportunity for participation, especially for people who are dependent on public transport.

Figure 11 - Karlsruhe - Press conference

- 28.02-02.03.2023: **UITP training on automated mobility** in Karlsruhe, with trainers from EMT and FZI
- 21.03.2023: **Q&A session with presentation in the target area**: two researchers and project managers from FZI talked with local residents (around 20 participants) about: What did the field trial in 2021 bring to our neighborhood, and what comes next? Is autonomous driving in public transportation a distant future, or will it arrive soon? How fast and risky can the vehicle drive, and how can accidents be avoided?
- 25-27.04.2023: **Presentation of the shuttle at the KIT** in front of the canteen
- 12.05.2023: **Presentation of the FZI shuttle to students** from the University of Applied Sciences Karlsruhe (around 10 students/ scientists)
- 12.05.2023: **EUCAD**: presentation of Cargo-Cage for the EasyMile shuttle
- 24.05.2023: Presentation of the FZI shuttle at the event **Wissenswoche Mobilität**, organised by the city of Karlsruhe, aimed at residents and people interested in science (around 150 participants)
- 14.06.2023: Presentation at the final event of the **KoTAM project** (Koordinierung der Testfelder Autonome Mobilität in Deutschland)
- 26-28.06.2023: **Study for user experience** with research scientists and students working on a bachelor thesis (30 participants)
- 05.07.2023: Demonstration and test rides at the FZI event **Tacheles** (https://www.tacheles-avf.de/), attended by 150 people from industry, research and legislation
- 27.07.2023 and 14.08.2023: **Demonstration and test rides** using FZI shuttles, with local politicians (around 15 and 30 participants respectively)
- 20.09.2023: DLR and partner organisations from municipalities, industry, research (about 30 participants) took **test rides with the U-Shift vehicle** and exchanged about potential use cases for autonomous driving.
- 30.10.2023: Demonstration for **Rotary Club Karlsruhe** (30 participants)
- 13-16.11.2023: **Demo Week event** (Figure 12), welcoming a diverse audience of professional engineering experts, engaged stakeholders from the Karlsruhe technology region, and students from various universities. This encounter served as a platform for knowledge exchange and the exploration of research and career opportunities in the field of automated driving. Participants had the opportunity to try out the DLR and FZI vehicles and received explanations of

advanced functionalities such as platooning, automated capsule exchanging, and autonomous driving without a virtual rail. The Demo Week proved to be a triumph, gathering positive feedback from the diverse participants.

Figure 12 - Karlsruhe - German Demo Week

- 01.03.2024: **Visit of Volker Wissing** (German Federal minister of Digital and Transport) at FZI (Figure 13): accomplishments and capabilities of the shuttles presented, leading to increased visibility of the project in the federal ministry

Figure 13 - Karlsruhe - Visit from minister Wissing

- 14-16.05.2024: **IT-TRANS Conference** held in Karlsruhe: demonstration with indoor experience including car2x communication. The FZI shuttle transported IT-TRANS attendees between two intelligent stops, performing complex driving manoeuvres such as swerving and turning.
- 26.08.2024: **Visit of Winfried Hermann** (Minister of Transport of Baden-Württemberg) at FZI: accomplishments and capabilities of the shuttles presented, leading to increased visibility of the project in the ministry.

- April to October 2023: DLR's modular **U-Shift vehicle** showcased at the **Federal Garden Show (BUGA) in Mannheim** (Figure 14), as part of an accompanying exhibition, offering visitors a glimpse into the possibilities of emission-free, automated, safe, and quiet transportation. The U-Shift concept stands out for its exceptional flexibility. Its modular design allows for easy replacement of capsules, enabling the vehicle to seamlessly transition between transporting people and goods, or even providing additional services. This versatility makes the U-Shift an adaptable solution for various urban needs. The U-Shift prototype has covered an impressive 2.800 kilometres during its operation, attracting around 85.000 visitors to the DLR SHOW booth. Nearly 10.000 people took advantage of the opportunity to experience the U-Shift firsthand through test drives. Throughout the pilot period at the garden show the DLR personnel engaged with users and various stakeholders on numerous occasions, gathering valuable feedback.

Figure 14 - U-Shift demonstration at BUGA

Incentivisation and nudging:

- Since it is a local community, high impact due to the visibility of the shuttles
- Covers the first/ last mile to complement public transport.
- Optimized AV experience in terms of speed, comfort, and safety
- Cargo use case as last mile package delivery
- Operates on-demand via an app.
- Free of charge for all passengers
- Safety operator on board

4.1.3 Frankfurt

The pilot in a nutshell:

- Automated on-demand service as a first/ last mile feeder
- Target passengers: residents of the neighbourhood (Frankfurt), students and FEV colleagues (Aachen)
- Local ecosystem: rms (Rhein-Main-Verkehrsverbund Servicegesellschaft mbH), EasyMile, FEV Europe GmbH, ioki GmbH, T-Systems International GmbH, traffiQ (SHOW partners) and RMV (Rhein-Main-Verkehrsverbund), VGF (Verkehrsgesellschaft Frankfurt am Main), fahma (Fahrzeugmanagement Region Frankfurt RheinMain GmbH) (external partners)

Main communication & dissemination channels and tools deployed in Frankfurt:

- Printed materials: leaflets in the shuttle and at POIs, posters in different metro stations in Frankfurt and along the track, floor stickers, flyers distributed to residents (Figure 16, Figure 17, Figure 18)
- Press: press conference on 18 November 2022 (Figure 15) to announce the start of the public operation with representatives of traffiQ, VGF, RMV and the Mobility and Health Department of the city of Frankfurt, accompanied by a press release; press conference and press release to announce the end of operations (20.10.2023); article in the local housing association's tenant newspaper
- Videos: video available on YouTube here, a short clip with the main information was shown in some metro stations in the city of Frankfurt
- Website and social media: website https://www.probefahrt-zukunft.de/ and Instagram channel for the whole autonomous project in the Rhine-Main area with frequent content updates (@rmv_easy), LinkedIn posts for special announcements (rms GmbH, ioki)
- Letters, calls, e-mails: prior to the first demonstrations, residents were informed via a short flyer in their mailboxes.

Figure 15 - Frankfurt - Press conference © RMV/ Christof Mattes

Figure 16 - Frankfurt - Flyer (front side)

Figure 17 - Frankfurt - Flyer (back side)

Figure 18 - Frankfurt - Information for residents

Main engagement activities planned/ conducted in Frankfurt:

- 14.10.2022: **Information event** for residents
- 18.11.2022: **Press event** followed by an **information session** for residents, who were very interested and gave mostly positive feedback
- 18.01.2023: **MAMCA workshop** with all German SHOW sites
- 02.03.2023: Engagement event targeted at **elderly citizens** (ca. 15 participants, mainly from the elderly residence close by), to exchange on the operation and answer questions, with test rides. The event focused on the use of the shuttle, especially the booking process, and was supported by the district management and the pensioners' residence in the neighbourhood. Participants gave input for a more senior-friendly service.
- 05.05.2023: Visit of **Japanese delegation** from ITS Japan and University of Tokyo, to exchange experiences on autonomous driving, past and future activities, followed by a visit to the test site and the live operation. The focus of the discussions was on future concepts for autonomous shuttles and the state of the technology.
- 06.06.2023: Presentation at **UITP Summit**, exchange with other AV projects
- June-July 2023: **Trial day with kindergarten** by RMV
- June-July 2023: **Online competition** with a riddle: "*How do you get from Frankfurt's Riederwald to the Märchenwald? Help us to find the stops behind the terms Zwergenwald and Turm Drachenstein by 22 July 2023 and, with a little luck, win a new iPhone 14. The digital voice assistant in the EasyShuttle will help you solve the puzzle*" – advertised through posters and flyers (see Figure 19), incentivizing people to try out the shuttle
- 19.09.2023: Visit of **South American Delegation** from Colombia, Brazil and Peru, to exchange about new mobility topics in Europe and South America
- 20.10.2023: **Press conference** for the end of operations

Figure 19 - Frankfurt - EASY-Rätsel

Incentivisation and nudging:

- Expansion of public transport services
- Shuttles acting as a first/ last mile feeder to stops of two different metro lines
- Connection to different POIs: supermarket, pharmacy, church, sports club, bank, etc.
- Service operating from Monday to Saturday, 8AM to 3PM
- Accessibility of the shuttles, with wheelchair-friendly stops
- Free of charge
- Safety driver on board
- Booking via on-demand application (ad-hoc or in advance)

4.2 Swedish Mega site

The Swedish Mega site covers two sites: Gothenburg and Linköping. Each site conducted various engagement activities, as summarized below. In addition, a joint Hackathon was planned, but unfortunately this event had to be cancelled due to insufficient response from participants (see also chapter 6.4).

4.2.1 Gothenburg

The pilot in a nutshell:

- Digital and physical connected mobility for public transport hub and campus mobility
- Target passengers: people studying or working at the campus area or any interested passenger, from commuters to passers-by
- Local ecosystem: Keolis, Ericsson AB, RISE (Research Institutes of Sweden AB), Navya (SHOW partners) and AutoFleet, Drive Sweden (external partners)

Main communication & dissemination channels and tools deployed in Gothenburg:

- Printed materials: posters at shuttle stops (see Figure 20), flyers in the shuttles and at the campus with information and a link to the surveys (Figure 21)
- Press: press releases to announce the pre-demo (January 2021), before start of demo in autumn 2022 and after the Christmas break in 2023; invitation for elderly focus groups to test the shuttles on 27.02.23 announced in the Gothenburg City Calender (see Figure 22)
- Videos: video available on YouTube here (pre-demo)
- Website and social media: channels of Chalmers, RISE and the PTA were used (LinkedIn, Facebook, for an example see Figure 23)
- Letters, calls, e-mails: e-mails were sent to potential Hackathon participants (via Chalmers student union and relevant faculties).

Figure 20 - Gothenburg - Shuttle stop with information (photo C. Sobiech)

Pilottester med självkörande minibussar på Chalmers.

På Chalmersområdet testas nu självkörande minibussar med plats för 11 sittande passagerare – linje 68. Linjen kommer att trafikera området fram till sommaren 2023. Du står just nu vid en av de nya hållplatserna på denna linje. Välkommen att åka med!

Testet sker inom EU-projektet SHOW i syfte att testa mikromobilitet i områden där kollektivtrafik inte finns. Den självkörande linjen ansluter till Chalmersplatsen och dess hållplats med buss och spårvagn.

För att utvärdera mobilitet i framtida städer kommer också tester utföras med fraktrobotar och de självkörande minibussarna i interaktion. Tanken är att visa hur mobiliteten i en framtida smart stad kan fungera.

Testerna finansieras av EU-projektet SHOW. Projekten Samordnande Autonoma Transporter (SAT) samt EVOLVE står för interaktionen med fraktrobotar och finansieras av Vinnova via Drive Sweden.

Medverka och dela med dig vad du tycker om den självkörande linjen:

Svara på enkäten
(tar 5–10 min)

Figure 21 - Gothenburg - Flyers

Göteborgs Stad

Kalendarium för Göteborgs Stad

Tillbaka till kalendariet

Framtiden är nu - självkörande skyttlar på Chalmers Campus Johanneberg

Bild: RISE

Datum:
Måndag 27 februari

Tid:
12:30–14:30

Kostnad:
Gratis

Självkörande fordon, hur fungerar det egentligen?
I februari gör vi en utflykt till Chalmers Campus Johanneberg för att få lyssna på hur det går för projektet med självkörande skyttlar där bland annat Chalmers, Keolis och forskningsinstitutet RISE samarbetar. Vi får möjlighet att åka med skyttlarna och dela med oss av våra tankar kring upplevelsen, vi får också bidra till projektets utveckling genom att besvara några enkla frågor i en enkät på plats.

Figure 22 - Gothenburg - Press invite to elderly focus groups

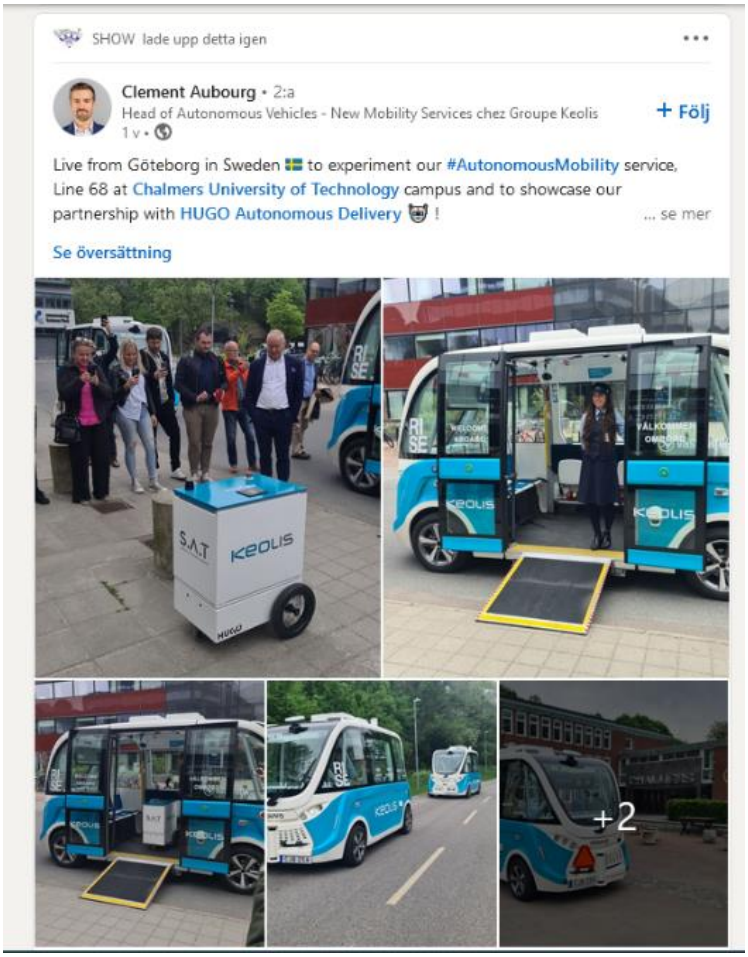


Figure 23 - Gothenburg - Social media article on a demonstration event in May 2023 (posted by Clement Aubourg, Keolis)

Main engagement activities planned/ conducted in Gothenburg:

- 03.10.2022: Visit by the **technology university of Buenos Aires** running the shuttles and supporting them with experience for their start-up of AVs
- Winter 2022 – Spring 2023: **Interviewers** with tablets at campus
- February 2023: Focus groups and visit from a group of **elderly people**
- February 2023: Focus groups and visit from a group of **students**

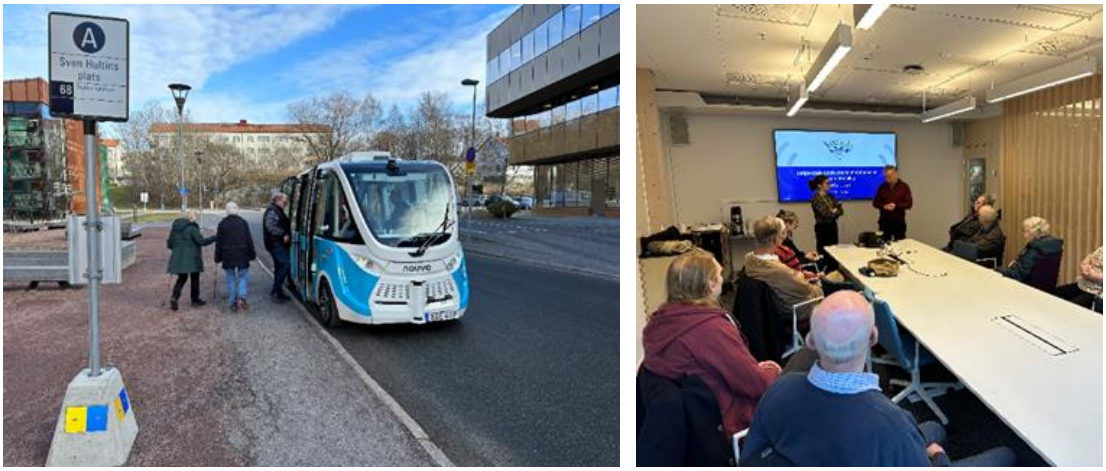


Figure 24 - Gothenburg - Focus group and visit of a group of elderly people (photo T. Skoglund)

- 22.03.2023: **MAMCA workshop** with 10 stakeholders (from Keolis, Framtiden real estate company and the School of Business, Economics and Law Gothenburg), providing feedback on demo service (see Figure 25, Figure 26)

Figure 25 - Gothenburg - MAMCA workshop invitation

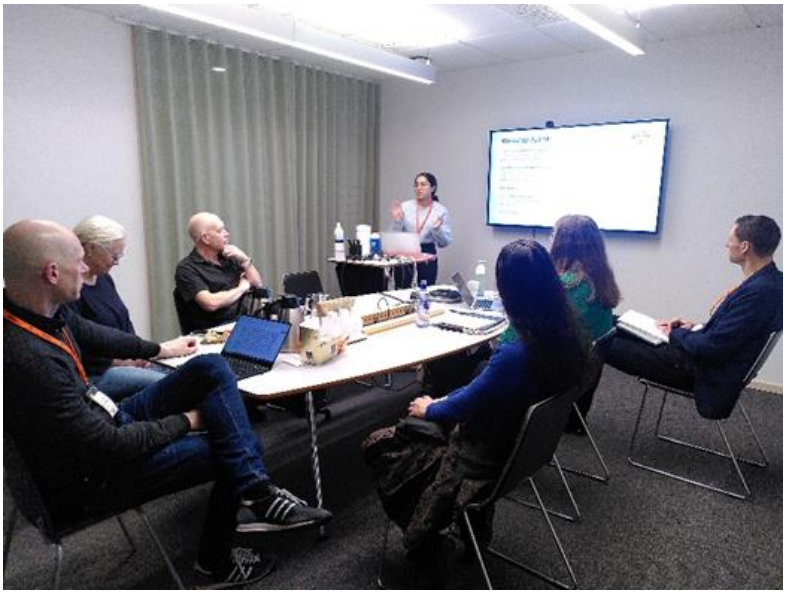


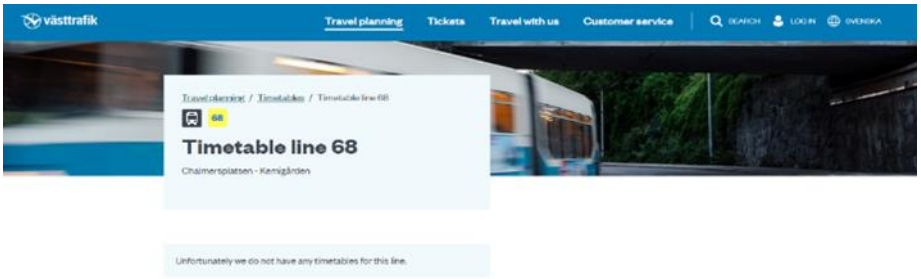
Figure 26 - Gothenburg - MAMCA workshop participants

- 23.05.2023: **Public test of Arma AV and Hugo freight robot** (replacing third Navya vehicle initially expected): demonstration and presentation of results for shuttle-robot interaction (see Figure 23)
- 08.06.2023: Visit by the **University of Tokyo** (Cool4 project) for exchange of experience and to discuss lessons learned from the SHOW demonstration in Gothenburg, Japanese Cool4 aims and objectives, Drive Sweden related projects and roadmap on how to deploy autonomous mobility solutions into city environments (Figure 27)
- June 2023: **Webinar** discussing findings and deliveries with researchers and stakeholders
- 21.10.2023: Exchange of experience between Gothenburg and **Helmond** (online)
- A joint **Hackathon** with Linköping was planned but cancelled as too few participants registered.

Figure 27 - Gothenburg - Visit of Cool4 project delegation (photo C. Sobiech)

Incentivisation and nudging:

- Service integrated in public transport as line 68 (see Figure 28)
- Connects a major public transport hub with the campus area and a rather remote Science Park.
- Steeper parts of the campus area are easier to reach with the service.
- Passengers can follow trips on the PTA app called ToGo.
- No prior booking/ ride on the spot
- Service free of charge
- Safety operator on board, informing and welcoming passengers
- In the pre-demo phase, participants could win a gift card.
- Interesting new technology creates curiosity.



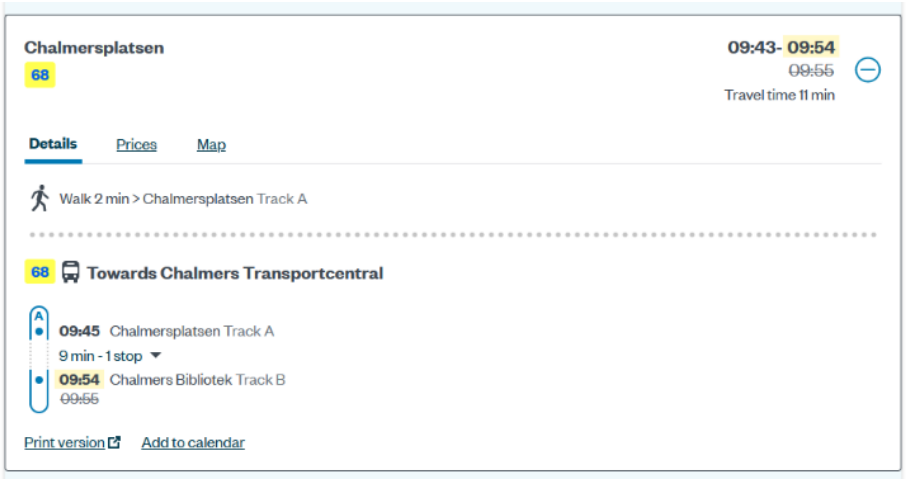


Figure 28 - Gothenburg - Shuttle service integrated in Västtraffik PT application ToGo

4.2.2 Linköping

The pilot in a nutshell:

- Automated electrified shuttles as an integrated part of the future sustainable cities
- Target passengers: students/ employees at the University, children at the school, elderly at the retirement home
- Local ecosystem: VTI (Swedish National Road and Transport Research Institute), Transdev, RISE (Research Institutes of Sweden AB), Combitech (SHOW partners)

Main communication & dissemination channels and tools deployed in Linköping:

- Printed materials: flyers and posters (see Figure 29)

Figure 29 - Linköping - Flyers and posters

- Press: several press releases and press events, a.o. a kick-off event with speeches, balloons, and test rides (10.03.2020, 17.09.2021), a press release to announce one year of operations (26.03.2021, link on Transdev website), radio interviews when the third vehicle was put in operation, press event to announce new on-demand solutions as a result of SHOW (13.09.2024, link on VTI's website, followed by media attention on different channels), and more

Figure 30 - Linköping - Kick-off event Vallastaden

- Videos: several videos were produced: a shorter one, available on YouTube here, a longer one to engage the Demo Board, available on YouTube here, and several more on https://ridethefuture.se/filmer/, including videos on how to help smooth and safe AV operation as a pedestrian or cyclist.
- Website and social media: a dedicated website was created https://ridethefuture.se/, partners' channels were also used.
- Other: information was put on monitors at the University, big roll-outs were put on campus in the fall of 2022 (Figure 31).

Figure 31 - Linköping - Campus

Main engagement activities planned/ conducted in Linköping:

Kick-off events with the press and the general public

- Kick-off at the University Campus Valla (10.03.2020)
- Kick-off for the second part in Vallastaden (17.09.2021), including a name-giving contest for the shuttles
- Celebrating the 10.000th passenger (February 2023) (Figure 32)
- Announcing on-demand solutions as a result of SHOW (13.09.2024)

Figure 32 - Linköping - Celebrating the 10.000th passenger

Engagement with children

- Visits to the school, bringing the shuttles to the school yard
- On board tours with children to get their views
- Focus group discussions
- Children were invited to name one of the shuttles
- Drawing competition (Figure 34)

Amongst others, a user engagement activity with children in the backyard of the school in Vallastaden took place on 03.12.2021 (Figure 33): In total around 50 children visited the bus, being served Christmas must, ginger cakes and glywine (without alcohol).

Figure 33 - Linköping - Visit to the school in Vallastaden

Figure 34 - Linköping - Drawing contest for children

Figure 35 - Linköping - Study visit from school kids (intermediate level)

Engagement with students, including ‘Supertesters’

- Several events for students, serving ‘fika’ and making it possible to ride and discuss with shuttle operators and researchers (28-29.04.2022 and 14.02.2023)
- Recruitment of 10 ‘Supertesters’ who signed a contract to receive an incentive (100€) to ride the shuttles 10 times and to answer all surveys needed, and to participate in focus groups (Figure 36, Figure 37)
- Demonstrating engagement with the AV shuttles, a group of students arranged a treasure hunt at Linköping University. They had put their logos (the treasure) on the shuttles and all involved (49) had to chase them.
- A joint Hackathon with Gothenburg was planned but cancelled as too few participants registered.

Figure 36 - Linköping - Engaging Supertesters

Figure 37 - Linköping - Flyer Supertesters

Engagement with elderly people

- Visits to the retirement home and informing about the AV initiative
- Interviews with the elderly and their relatives to get their view on the bus stops
- The elderly were invited to name one of the shuttles.
- The bus driver supports the elderly by inviting them to a ride to shop and pick them up at an arranged time for the return. This has been much appreciated by the retirement home.

Engagement with PRM (Persons with Reduced Mobility) and blind people

- Test rides with people with disabilities (September 2020)
- Test rides with blind people (September 2020)

Figure 38 - Linköping - Test rides with PRM and blind people

Other activities

- Stakeholder events and meetings, e.g. a national AV network workshop (04.2022), a visit by the network of 9 municipalities aiming to share experiences and set the ground for future collaboration (19.09.2023), visit by the Swedish Transport Administration (18.10.2023), visit by regional politicians (11.2023)
- Visits by delegations from abroad, such as the French embassy and county governor (12.05.2022), Estonian representatives from the Environmental Investment Centre and Estonian cities and municipalities (15.09.2022, see here), Japan's Cool4 initiative (ITS Japan, University of Tokyo, 06.06.2023)
- MAMCA workshop with stakeholders (25.03.2022) (Figure 41)
- Participating in events, bringing the bus to potential users and letting them try it, for example at the inland fair in Dorotea, a sustainable society (30.09-01.10.2022), Linköping City Festival (08.2023), Mjärdevi by Night (10.2023)

Figure 39 - Linköping - Visit French embassy (left) and Estonian delegation (right)

Figure 40 - Linköping - Shuttle at Dorotea fair

Figure 41 - Linköping - MAMCA workshop

Incentivisation and nudging:

- First/ last mile solution linking to a public transport trunk line
- Increased independent mobility of children and elderly
- Makes travelling to and from the University less car dependent.
- Service free of charge
- Safety operator on board
- No prior booking/ ride on the spot
- The service is frequent, the design of shuttles and stops is attractive.
- Supertesters received 100€ and elderly and blind people received 30€ for their efforts; the 10,000th rider received a voucher for free public transportation; fika was served to children and students trying out the shuttles.
- A map was created where users can see the shuttle and public transport in real-time, and also book a trip (Figure 42).

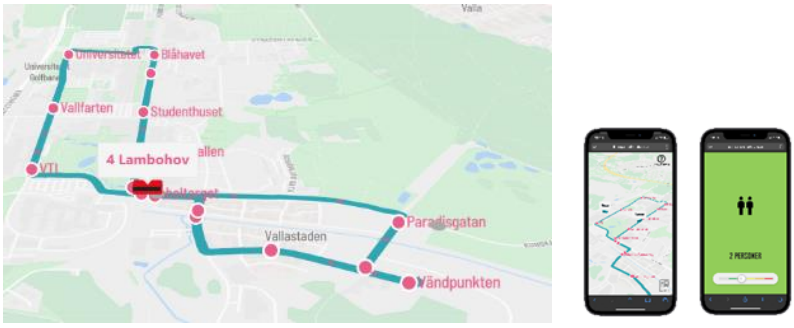


Figure 42 - Linköping - Map and app to book shuttles

4.3 French Mega site

The French Mega site covers three sites: Crest Val de Drôme, Escrennes and Les Mureaux.

4.3.1 Crest Val de Drôme

The pilot in a nutshell:

- Automated mobility as a new service of public transport
- Target passengers: any interested passenger, from commuters to passers-by
- Local ecosystem: beti, Navya (SHOW partners) and Movin'on LAB, SVMS (Signature Vertical & Mobility Solutions), Biovallée, TwinswHeel (external partners)

Figure 43 - Crest - Fleet of beti vehicles used in the SHOW project

Main communication & dissemination channels and tools deployed in Crest:

- Printed materials: project presentation flyer
- Press: 12 press articles were published in the local and regional press (see Figure 44 for an example)
- Videos: several videos shared on social media (LinkedIn)
- Website and social media: www.navette-autonome.fr; 2 main LinkedIn accounts used to relay texts, photos and videos: Beti and Benjamin Beaudet
- Letters, calls, e-mails: more than 300 interactions to present the project and to invite people to come discover the AV operations at the French Mega site

Figure 44 - Crest - Press article in Le Dauphiné (23.03.2024)

Main engagement activities planned/ conducted in Crest:

- 2023 and 2024: **organized or participated in 37 activities** to present the project to local users as well as local, regional and national elected officials, allowing to reach >500 people in addition to those who used the AV services.
- Experts' contribution, on the basis of the experiences acquired within the framework of the project, to 57 French working group meetings allowing, within the framework of **France Véhicule Autonome**, to advance French regulations. France Véhicule Autonome brings together private stakeholders and French public administrations concerned with autonomous mobility. Organized into 7 **thematic working groups** that meet once a month, feedback from current driving experiences is addressed. Beti systematically used its work as part of the SHOW project to feed into these meetings and contribute to collective decision-making within the framework of future French regulations. In 2023 and 2024, there was a lot of talk about remote hypervision of vehicles, the strong point of beti's offering.

Figure 45 - Crest - Franco-Swiss meeting on security issues on board an automated shuttle

- 07.02.2023 : **Forum AIT** ("forum national de l'innovation dans les transports", organised by AIT, link) in Paris, SHOW shuttle and project presentation

Figure 46 - Crest - M. Clement Beaune, former French Transport Minister & M. Jean-Marc Zulesi, former deputy and head of France Mobilités institution

- 27.04.2023: **CIVA – Atelier sur les expérimentations en France de navettes automatisées** – Organized by the automous vehicle interest community, this workshop presented the SHOW project and its expectations to around thirty online participants.
- 25.05.2023: **CIVA – Conseil d'Orientation** – Presentation of the project to the founding members of the community of interest: Macif, Michelin, Orange, Vinci, Kantar, Maif, Association des maires ruraux de France
- 31.05.2023: **Movin'on Leadership Day** in Brussels – Presentation of the project as part of Michelin's European event on sustainable mobility
- 22.06.2023: **UGAP Day** – Presentation of the project to the local authorities' purchasing centre as an example of what we can do in terms of automated mobility
- 21.07.2023: **DREETS appointment** – Presentation Regional Directorate for the Economy, Employment, Work and Solidarity
- 27.07.2023: **Internal Event Bertolami** – Internal presentation of the project and the fleet of vehicles
- 19.09.2023: **European Mobility Week** – Public presentation of the project and the fleet of vehicles at beti headquarters
- 28.09.2023: **Conseil Municipal de la ville de Crest** - Local presentation of the project and the fleet of vehicles at beti headquarters
- 05.10.2023: **BIG Bpifrance** (Europe's largest business gathering, link) – Intervention on the deployment of automated vehicles in France illustrated by the SHOW project
- 10.10.2023: **INNN event in Niort** (link) – Insurtech event with intervention through the SHOW project on the impacts that autonomous mobility will have on the world of insurance
- 17.10.2023: **Rencontres Nationales du Transport Public** – Public presentation of the project and the fleet of vehicles
- 26.10.2023: **Salon des maires et des collectivités locales de la Drôme** – Public presentation of the project
- 21.11.2023: **Salon des maires et des collectivités locales de Paris** – Public presentation of the project
- 14.12.2023: **Accélérateur du Transport pour la bpi** – Public presentation of the project to the French Investment Bank
- 19.12.2023: **Michelin appointment** – Private presentation of the project
- 18.01.2024: **Conseil Communautaire du Val de Drôme** – Public presentation of the project
- 13.02.2024: **GT2 PAN NOMAD ARCHAMPS** – Public presentation of the project
- 21.03.2024: **Salon Autonomy** – Public presentation of the project
- 27.03.2024: **GT Ecole d'hypervision à Archamps** – Specific presentation of the project around human resources
- 08.04.2024: **Macif internal meeting** – Specific presentation of the project around insurance theme
- 22.05.2024: **Region Grand Est Meeting** – Public presentation of the project
- 31.05.2024: **Autonomous Mobility Day Conference** organised in Crest, by SHOW in cooperation with beti (link). It was a successful event resulting in various posts on social media. The conference brought together round 50 key players in CCAM operations from France and across Europe for a day of knowledge-sharing and learning. Attendants got the opportunity to network with industry leaders, learn from successful CCAM deployments and discover best practices for integrating CCAM in the public transport network. They could also experience the AV services in SHOW site Crest first hand. As demonstrated in

Crest, AVs can offer significant added value by addressing mobility gaps in regions underserved by public transport, where cars are the primary means of transportation. AV shuttles are flexible, adaptive, and increasingly reliable, making them an ideal solution for providing mobility services especially in these rural areas. The agenda (Table 3) and pictures of the event are included below.

Figure 47 - Crest - Autonomous Mobility Day announcement

Figure 48 - Crest - Autonomous Mobility Day

Table 3 - Crest - Autonomous Mobility Day agenda

Thursday, 30 May 2024	
07.00- 08:00	**Networking reception & wine tasting** *Maison des Vins, 2 rue de la République, 07130 Saint-Péray* *A shuttle bus will depart the Ibis Valence Sud Hotel (355 Av. de Provence, 26000 Valence) at 7pm. The meeting point is at the hotel*

	reception. A return bus transfer to the hotel will depart the venue at approx. 11pm.
Friday, 31 May 2024	
08.00- 09.00	**Bus transfer: Valence to Crest** *The shuttle bus will depart from the Ibis Valence Sud Hotel (355 Av. de Provence, 26000 Valence). The meeting point is the hotel reception.*
09.00- 09:30	**Welcome coffee, opening & welcome remarks** *Biovallée – Campus Ecosite du Val de Drôme, Place Michel Paulus, 26400 Eurre*
09:30- 10:45	**Roundtable discussion: The role of CCAM in public transport** *What role can CCAM play in the future public transport sector, and how disruptive will it be? What services can users expect to see, and what impact might it have in urban environments? What time frame is a realistic horizon for these changes to occur?* Speakers: • César Omar Chacón Fernández, EMT Madrid • Clémentine Barbier, Keolis • Nicolas Marescaux, Macif • Edgar Contier-Zanelato, Transdev
10:45- 11:15	**Coffee break**
11:15- 12:30	**Roundtable discussion: Getting CCAM on the road – technical & regulatory challenges** *What barriers do stakeholders face in deploying AV services? At what level do these exist – from vehicle technology, to national or European regulation? What can be done to remove those barriers and what actions are required from policymakers, OEMs and public transport operators?* Speakers: • Pierre Chehwan, beti • Clémentine Barbier, Keolis • Jean-Claude Bailly, Gama • Dominik Schallauer, AustriaTech
12:30- 13:45	**Lunch break**
13:45- 14:30	**Closing session** *Participants will be invited to share their conclusions from the roundtable discussions and future plans for CCAM operations*
14:30- 16:00	**Experience of pilot site operations** *Participants will have the chance to experience the AV service in operation at Crest*
16:00- 16:45	**Bus transfer: Crest to Valence** *The shuttle bus will depart the conference venue in Crest and will make 3 stops in Valence:* • *Hotel Ibis Valence Sud 4:45pm* • *Valence train station (local) 5:10pm* • *Valence TGV station (high-speed) 5:35pm*

- 03.06.2024: **EDUCTOUR** – Locals officials of Crest
- 05.06.2024: **EDUCTOUR** – Locals officials of Region Auvergne Rhône Alpes
- 10.06.2024: **EDUCTOUR** – Locals Officials of Drôme

- 11.06.2024: **EDUCTOUR** – Private partners
- 13.06.2024: **EDUCTOUR** – Private partners
- 21.06.2024: **EG Macif à Tours** – Public presentation of the project
- 27.06.2024: **EDUCTOUR** – Private partners
- 28.06.2024: **EDUCTOUR** – Private partners
- 09.07.2024: **EDUCTOUR** – Locals officials of Crest
- 06.09.2024: **EDUCTOUR** – Locals of Crest
- 10.09.2024: **EDUCTOUR** – Private partners
- 16.09.2024: **European Mobility Week** – Public demonstration
- 17.09.2024: **EDUCTOUR** – Locals officials of Val de Drôme

Figure 49 - Crest - Visit Jean Serret (Communauté de Communes de Val de Drôme)

- 23.09.2024 : **EDUCTOUR** – Private partners
- 24.09.2024 : **EDUCTOUR** – Private partners
- 25.09.2024: **AlleluIA** event at Ecosite, Val de Drôme: Event dedicated to Artificial Intelligence where guests were invited to visit the delivery robot of Twinswheel and to experience the shuttles that are stopping at the site
- (after end of project) 03.10.2024: **EUMO** (European Mobility Expo) Strasbourg

Figure 50 - Crest - M. François Durovray, current French Transport Minister at EUMO

- (after end of the project) **Movin'on SUMMIT** with the Evo shuttle, presentation in front of French minister. A video report on Euronews and on France3 Région are planned.

Incentivization and nudging:

- New public transport service to fill a gap, as an alternative to the car
- Service free of charge
- Safety driver on board
- Passengers can notify their final destination to the safety driver

4.3.2 Escrennes FM Logistic

The pilot in a nutshell:

- Fully driverless services at logistics site, hypervision located 400 km away
- Target passengers: employees
- Local ecosystem: beti, EasyMile (SHOW partners) and Macif (external partner)

Figure 51 - Escrennes - SHOW shuttles operating at FM Logistic site

Main communication & dissemination channels and tools deployed in Escrennes:

- Press: 8 press articles were published in the local and regional press (see Figure 52 for an example)

FM Logistic teste des navettes autonomes sur son site d'Escrennes

NewsLetter | FM Logistic teste des navettes autonomes sur son site d'Escrennes | publié le : 05.09.2024

Sommaire 4030

LE GROUPE ROCHER CHOISIT WINDDLE POUR AMÉLIORER SA RELATION FOURNISSEURS

QUASI 19% DE CROISSANCE POUR ID LOGISTICS AU 1ER SEMESTRE

BIENTÔT DE NOUVEAUX STAGIAIRES LYCÉENS DANS L'ENTREPÔT ÉCOLE DE L'ADN

FM LOGISTIC TESTE DES NAVETTES AUTONOMES SUR SON SITE D'ESCRENNES

UN DIRECTEUR DES OPÉRATIONS CHEZ INTERROLL

MAXEDA OPTIMISE SA PLANIFICATION AVEC BLUE YONDER

Sur son site logistique d'Escrennes (à 40 km d'Orléans), spécialisé dans la cosmétique et le luxe, FM Logistic a lancé depuis juin un projet pilote de 5 mois portant sur des navettes automatisées, en partenariat avec Beti, une spin off de l'autocariste et voyagiste Bertolami. Deux engins autonomes, sans opérateurs à bord, circulent au sein du site de 90.000 m² (qui compte trois bâtiments principaux) pour véhiculer le personnel d'un bout à l'autre de la plateforme. Chaque navette, qui dispose d'une dizaine de places assises, parcourt ainsi 40 km, et transporte une centaine de collaborateurs au quotidien. Selon les deux partenaires, il s'agit d'une première dans l'Hexagone en matière de mobilité totalement automatisée. Ce pilote s'intègre dans le programme européen de grande Show (SHared automation Operating models for Worldwide adoption), co-financé par la commission européenne. **JLR**

Figure 52 - Escrennes - Article in Supply Chain Magazine

- Videos: several videos available on YouTube here and here
- Website and social media: www.navette-autonome.fr
- Letters, calls, e-mails: more than 120 interactions to present the project and the opportunity to discover L4 autonomous shuttle

Main engagement activities planned/ conducted in Escrennes:

- **Organized or participated in 18 activities** to present the project to logistics professionals as well as local, regional and national elected officials, allowing to reach >250 people in France and Belgium.
- 08.04.2024: **Macif internal meeting**: Specific presentation of the project around insurance theme
- 23.05.2024: **TFLA meeting**: Public presentation of the project
- 06.06.2024: **EDUCTOUR**: Private Partner
- 18.07.2024: **EDUCTOUR**: General Management FM Logistic
- 24.07.2024: **EDUCTOUR**: Locals officials
- 30.07.2024: **EDUCTOUR**: General Management Bertolami
- 06.09.2024: **EDUCTOUR**: Private Partner
- 12.09.2024: **EDUCTOUR**: Private Partner
- 13.09.2024: **EDUCTOUR**: Private Partner
- 20.09.2024: **100% Mobilité, 100% IA** (link)
- (after end of the project) 05.10.2024: **FM Logistic Family Day** (Figure 53)

Figure 53 - Escrennes - FM Logistic Family Day

- (after end of the project) 08.10.2024: **Major event with DGITM** (French Ministry of Infrastructure, Transport and Mobility) **and main beti partners** (Macif, Orange, Vinci), with the presence of Mme Anne-Marie Idrac, former French minister and 'Haute Responsable pour la stratégie nationale de développement des véhicules autonomes' (High Representative for the national strategy of Autonomous Vehicles development in France). Local and mobility dedicated press representatives will be attending.

Incentivization and nudging:

- New employees transport service to fill a gap on logistic platform, as an alternative to the bicycle, one shared car and walking
- Service from 11AM till 10:30PM, 5 days a week
- Regular service
- Fully driverless operation (hypervision 400 km away)

4.3.3 Les Mureaux

The pilot in a nutshell:

- Piloting the vision – shared automation without on-board operator
- Target passengers: employees and visitors
- Local ecosystem: Transdev, EasyMile, Institut Vedecom (SHOW partners), ArianeGroup, Département Yvelines (external partners)

Main communication & dissemination channels and tools deployed in Les Mureaux:

- Press: a press release was issued on 15.12.2022, articles published in 2023.
- Videos: a series of videos was issued for Navetty in November 2023:
  - Episode 1: A collaborative and ambitious project
  - Episode 2: Des navettes automatisées et securisées
  - Episode 3: Le rôle clé de la supervision
  - Episode 4: A response to users' mobility needs
- Website and social media: several posts were posted on LinkedIn about different achievements of the project from October 2023 to January 2024:
  - 🚗 [MINI-SÉRIE] NAVETTY: Tous les épisodes maintenant disponibles en français et en anglais!
  - 🚗 NAVETTY: Découvrez, en exclusivité, la vidéo des navettes sur route ouverte!
  - Nouvelle avancée du projet Navetty: la presse en parle!

  The KPIs on these posts were quite strong: the average engagement rate is 11,2%, which is an excellent rate (above 5%). The click rate is also very promising, with an average of 10,6%, which shows us that the targeted audience largely interacted with the content.

Figure 54 - Les Mureaux - Shuttles operating

Main engagement activities planned/ conducted in Les Mureaux:

- March to June 2021: **Interviews and online surveys** of employees to assess their needs and their *a priori* acceptance
- March to May 2022: Paper **surveys** of employees to assess their acceptance
- March 2023: **Private internal event** with value chain stakeholders, aimed at service optimisation
- 04-07.06.2023: participation in **UITP Barcelona event** to give SHOW project some visibility

- 15.06.2023: **French administration visit** with DGITM, ADEME, Departement Yvelines, EasyMile, Vedecom, Transdev and ArianeGroup to discuss the regulatory framework and lobby for additional subsidies for private site projects
- 22.06.2023: event organised during the **Next Move mobility cluster event** with Transdev and Ariane Group, giving SHOW visibility
- 18.09.2023: **Airbus visit**: Airbus, Transdev Occitanie and Transdev Group directors discussed potential future AV project at Airbus Blagnac site.
- 28.09.2023: **Site visit in Les Mureaux** with three members of the Board (Admin Graeter, Chair, BMW; Christian Scharnhorst, Vice-Chair, Bosch; Serge van Dam, Vice-Chair, Rijkswaterstaat), the two leaders of the CCAM Partnership Cluster 1: Large-Scale Demonstrations (Mats Rosenquist, Volvo Group; Henriette Cornet, UITP), delegate members of the partnership (Francoise Guaspare, Ile-de-France Mobilités; Marzena Jougounoux, Head of Office of CCAM association), EC (Philippe Froissard, Head of Unit, DG Research and Innovation; Suzanna Kraak, Policy Officer), including: Demonstration of the 3 EasyMile fully driverless shuttles of Navetty project; visit to the Ariane 6 facilities; visit to the Navetty OCC
- October to November 2023: **Study of real users** of the automated shuttle on open roads with a paper questionnaire to evaluate their user experience
- 01.02.2024: **End of the project event**, open to project partners (Yvelines Department, EasyMile, Transdev, ArianeGroup, VEDECOM). Program:
    - 08:45: Welcome and coffee
    - 09:00: Presentation of results
    - 10:30: Coffee break and group photo
    - 11:15: Round table
    - 12:00: Lunch
    - 13:30: Closing of the event

Figure 55 - Les Mureaux - Final event group picture

Figure 56 - Les Mureaux - Final event

Incentivisation and nudging:

- Service from 08:00AM till 06:30PM, 5 days a week
- Regular service or on-demand, three different routes depending on mobility needs
- Fully driverless operation

Figure 57 - Les Mureaux - Navetty app

4.4 Spanish Mega site

The Spanish Mega site covers two scenarios in Madrid: Carabanchel (automated bus depot) and Villaverde (open traffic public transport service). While for the Villaverde case, all preparatory work and tests (pre-demo) have been conducted, due to the lack of permit, the pilot phase could not be accomplished, except for the public service provided in the following two events:

- BACSI Albacete (18-19. October 2023, 400 passengers)
- European Mobility Week 2024 (22. September 2024, 280 passengers).

Therefore, engagement activities in Madrid focused on informing professional audiences rather than end-users, plus EMT personnel and visitors (Carabanchel).

4.4.1 Madrid – Carabanchel

The pilot in a nutshell:

- Automated bus depot
- Target passengers: EMT employees and visitors
- Local ecosystem: EMT Madrid, Indra Sistemas S.A., Irizar e-mobility, Fundación Tecnalia Research & Innovation (SHOW partners) plus the cooperation of Universidad Carlos III and INSIA (Polytechnic University of Madrid)

Main communication & dissemination channels and tools deployed in Carabanchel:

- Promotion of pre-demo (Carabanchel) internally and media in Feb ’22

Main engagement activities planned/ conducted in Carabanchel:

- A meeting was organised during the pre-demo phase (late November 2021) with **EMT employees**, who are the end users of this scenario (mainly drivers, mechanics, admin staff and VRU within the bus depot). The meeting had an informative character but also gathered feedback about challenges and fostered internal engagement.

Figure 58 - Madrid - Trainings for EMT employees and Gema, one of the female safety drivers, in front of an autonomous Gulliver microbus

- This activity was linked with the **trainings** provided in January 2022 and November 2022 (Figure 58). Theoretical sessions covered concepts of Autonomous Driving, in general and in particular to SHOW scenarios. The aim was to present the technology to both workshop personnel and drivers. Practical sessions covered the specifics of each AV, presenting all three models that participate in the UCs: Twizzy, Gulliver and i2eBus.
- March 2022: Informative session with external stakeholders – context and project details. Among the attendants: Spanish National Traffic Authority, DGT, AEDIVE (Spanish Association of electrification of Mobility) and AEVAC (Spanish Association for Autonomous Vehicles).
- In May 2022, a face to face meeting took place with the **Municipality Innovation Directorate** and local partners at Carabanchel bus depot, to fully inform about the achievements and testing plans (Figure 59).

Figure 59 - Madrid - Meeting with Innovation Directorate

- 18-19.10.2022: **SHOW Demo Board meeting and pan-European workshop** with site visit to the Carabanchel bus depot (Figure 60). The workshop started with a series of keynote speeches from high-level representatives from EMT, the city of Madrid and the European Commission, followed by a deeper look into SHOW insights from the real-life demonstrations that have started in numerous cities in Europe. Guest speakers from sister projects in the EU and US also shared their findings from their AV pilot activities. As part of the workshop, participants had the unique occasion to visit the automated bus pilot at Carabanchel.

Figure 60 - Madrid - Announcement pan-European workshop

- 01.03.2023: EMT participation in the **UITP Academy** in-person training programme on automated mobility in Karlsruhe
- 11.04.2023: The EMT operations centre in Carabanchel hosted a **MAMCA workshop** with Spanish SHOW partners (EMT, Tecnalia, Irizar, Indra) to evaluate the different scenarios of autonomous vehicles (Figure 61).

Figure 61 - Madrid - MAMCA workshop with Carabanchel bus depot site visit

- 19.09.2023: Visit of **CDTI delegation** (Spanish Centre for the Development of Industrial Technology) to EMT Carabanchel bus depot to learn about the SHOW initiatives in Madrid and the automated buses, with 9 participants from CDTI and INSIA (University Institute for Automative Research), to explore further opportunities for automation of buses
- 19.08.2024: **Follower sites' session** on 'automated bus depot' (online), with participation of Kadikoy, Braga, Sarajevo, Helmond and Groningen
- Around 20 school visits during the 4 years of the project (ca. 430 people)

Figure 62 - Carabanchel - School visit to Carabanchel bus depot in 2022, getting off the SHOW automated Gulliver microbus, with one of the EMT SAM members (faces covered for privacy and legal reasons)

4.4.2 Madrid – Villaverde

The pilot in a nutshell:

- Urban open traffic
- Target passengers: commuters and passers-by
- Local ecosystem: EMT Madrid, Indra Sistemas S.A., Irizar e-mobility, Fundación Tecnalia Research & Innovation (SHOW partners)

Main communication & dissemination channels and tools deployed in Villaverde:

Due to the lack of permit, the demo phase in Villaverde could not be accomplished. Thus, the following actions were *planned, but not executed*:

- Printed materials: posters informing about the service, placed at the bus stops (as the publicity is managed by EMT)
- Press: press release to communicate the launch of the service
- Videos: a video was planned to be recorded.
- Website and social media: the launch of the service was planned to be communicated through the social media of all partners involved.

Main engagement activities planned/ conducted in Villaverde:

- A meeting was organised during the pre-demo phase, addressing the companies settled at La Nave (municipal innovation hub), both informative and to gather feedback and solving any question that may arise. A meeting in May 2022 was also held with the public authorities.
- The only piloting in the same conditions as planned in Villaverde, occurred on 18-19. October 2023 (BACSI event) and Sunday September 22nd 2024 under the framework of the European Mobility Week and the Car-free Day, in which the Gulliver microbus operated with real passengers and public in a set itinerary in one of the main avenues of the city (Paseo de Recoletos), as announced in an EMT press release. During this event, 280 people had the opportunity to ride on two automated vehicles: EMT Madrid automated Gulliver microbus, and 'ShuttleByCTAG'. Passengers received extensive explanations and information about both vehicles and the service.

Incentivisation and nudging:

Due to the lack of permit, the open traffic pilot phase in Villaverde could not be accomplished. Thus, the following actions were *planned, but not executed*:

- It was foreseen to include information on buses and bus stops in the area, and the service would have been included in the EMT app, as any other service.
- SAM service (Servicio de Ayuda a la Movilidad, or Mobility Assistance Service) – a group of professionals prepared to provide any sort of on-site information about any issue that may occur – was planned to be operational during the whole testing phases and interact with users. This SAM service operated during the service provided last 22nd September, informing passengers and public.
- The service would be provided free of charge.
- The service initially would connect a mobility hub (Villaverde Bajo Cruce intermodal hub) with the Madrid Innovation Hub, where there is no public transport. Later on, the service was changed to provide public transport service to the Islazul Mall (see D12.6 for more information).
- The autonomous service would enhance the innovation environment in the pilot area, as the plan was to turn it into a regulatory Sandbox for mobility.

4.4.3 Overarching activities

- 29.09.2022: **ATUC event** (Spanish PTO association), organized by EMT
- 01.12.2022: SHOW Madrid Mega site presented at the **POLIS conference**, where EMT won the POLIS 2022 award
- 07-10.03.2023: EMT Madrid presented SHOW at the **Madrid and Florence delegation visit to Australia** with representatives of Melbourne and Australian governments under the framework of an exchange mission of the IURC (EU-funded International Urban and Regional Cooperation programme).

- May 2023: **ITS Congress Lisbon**: Presentation of SHOW UC 1.7 by EMT, 'Best session award' (LinkedIn post)
- 04-07.06.2023: Madrid Mega site presentation by EMT during **UITP Global Summit** in Barcelona (LinkedIn post)
- 06-08.09.2023: Site visit of the EU-funded **SOLUTIONS Plus** project to Madrid, with 26 participants from Quito, Montevideo, Kigali, Kathmandu, Berlin: Though it was not the purpose of the visit, they could test the automated buses.
- 04-06.10.2023: **Urban Mobility Days** in Sevilla, SHOW presented in a booth
- 11.10.2023: **Digital Mobility Solutions Conference** (Busworld Brussels), EMT presented 'Digitally enhanced Driving' including SHOW.
- 18-19.10.2023: Two EMT automated microbuses Gulliver participated in the **BACSI event of the Spanish Army in Albacete** (link), providing automated shuttle services to visitors, including the Spanish Ministry of Defence, Ms. Margarita Robles. 400 passengers used the two SHOW Gulliver microbuses to move around the Army base. Outcome: visibility of SHOW and military sector opportunity for automation of buses.
- 20-21.03.2024: presentation of SHOW (Madrid pilot) at **AMWE** (Autonomy Mobility World Expo) in Paris
- 14.05.2024: **IT-TRANS Karlsruhe**: presenting EMT activities related to CCAM (SHOW and AUGMENTED projects)
- 31.05.2024: **Autonomous Mobility Day** conference in Crest: EMT presented its experience on CCAM from SHOW.
- 19-20.06.2024: **MOVE 2024** London: EMT presented its CCAM initiatives.
- 20.09.2024: **ITS World Congress** Dubai: EMT presented its CCAM initiatives.
- 22.09.2024: Public demo service during the **European Mobility Week**

Figure 63 - Madrid - Both automated Guliver microbuses at the BACSI event

Figure 64 - Madrid - European Mobility Week service

4.5 Austrian Mega site

The Austrian Mega site covers three sites: Carinthia, Salzburg, and Graz. Each site conducted various engagement activities, as summarized below. In addition, several joint events were organized at national level, involving all three Austrian sites: an online kick-off event, a MAMCA workshop, 'Supertesters' events and a final event.

4.5.1 Carinthia

The pilot in a nutshell:

- Automated shuttles for passenger and cargo transport in a complex traffic environment
- Target passengers: tourists, commuters, residents
- Local ecosystem: PDCP and SURAAA (Smart Urban Region Austria Alps Adriatic), Navya, AIT (Austrian Institute of Technology), ioki, AustriaTech, Yunex Traffic Austria GmbH (SHOW partners) and IAM (Institut für Technologie und Alternative Mobilität) (external partner)

Main communication channels and tools deployed in Carinthia:

- Printed materials: information sheets in shuttle, at bus stops, tourist information and hotels, stickers in shuttle
- Press:
    - press event to launch the demonstrations (01.10.2021), in the presence of Mr. Hahn (Austrian EU Commissioner), followed by several articles in papers and on local TV[7] (Figure 65); launch event (12.07.2024) to announce the first on-demand bookable fleet of automated vehicles in Austria (Figure 66)[8];
    - press articles a.o. on Kärntner Mobilitätstag[9] (19.09.2022), SURAAA winning an innovation award (13.12.2022)[10], the Ideathon (05.07.2023)[11], inviting elderly people to come and test out the shuttle, annual articles in the Pörtschacher monthly newspaper informing the community about the start of the shuttle test site service, articles in the Klagenfurter monthly newspaper informing the community about the start of the new shuttle test site in Klagenfurt West (Figure 67 - Carinthia - Newspaper article to inform about the new test site in KlagenfurtFigure 67)
- Videos: video available on YouTube here, several more short videos on SURAAA Instagram and Facebook
- Website and social media: Facebook, Instagram, LinkedIn and YouTube
- Information screens: at SURAAA offices
- Letters, calls, e-mails: personal calls to invite senior citizens to a field study, personal calls and letters to invite stakeholders to the MAMCA workshop and Ideathon, all events promoted via targeted e-mails and personal calls 8-6

[7] https://www.ots.at/presseaussendung/OTS_20211001_OTS0230/kaernten-ist-innovationslabor-fuer-mobilitaet-der-zukunft; https://kaernten.orf.at/stories/3124043/
[8] https://www.kaerntner-wirtschaft.at/wp-content/uploads/2024/07/kw14.pdf
[9] https://www.advantage.at/artikel/poertschach-als-drehscheibe-fuer-die-mobilitaet-der-zukunft
[10] https://www.advantage.at/artikel/suraaa-ueberzeugte-beim-ioeb-mobilitaetscall
[11] https://archiv.5min.at/202307681613/ideathon-2023-ideenwettbewerb-fuer-mobilitaet-der-zukunft/; https://www.advantage.at/artikel/ideenwettbewerb-zur-mobilitaet-der-zukunft; https://www.krone.at/3045273

weeks prior to the event, joint newsletter with see: PORT, an innovation room, every 2nd week

Figure 65 - Carinthia - Press event to launch demonstrations in Pörtschach

Figure 66 - Carinthia - Press event to launch the first automated fleet in Austria

Figure 67 - Carinthia - Newspaper article to inform about the new test site in Klagenfurt

Main engagement activities planned/ conducted in Carinthia:

Recognising the great work done, Carinthia received the SHOW 'Demo Site of the Month – Community Engagement Award' (Figure 68).

Figure 68 - Carinthia - SHOW Community Engagement Award

SURAAA engaged the community through a variety of events aimed at familiarizing the public with the SHOW project and autonomous transport technology, amongst others workshops and meetings with experts, stakeholders and citizens, partners, press and public events, public showcases and demos, competitions, delegation visits, and presentations at fairs. There were special events for children, students, seniors, administration, economy and people with disabilities. Notably, the project has been showcased extensively, providing plenty of opportunities for people to interact with the autonomous shuttle first hand, ask questions, and experience rides. An overview is presented below. The Ideathon and Supertesters event are discussed separately (Chapter 5 & Chapter 7).

Kick-off events with the press and the general public

- On 01.10.2021, EU Commissioner Hahn and Landesrat Sebastian Schuschnig **officially launched** the SHOW project operations in Pörtschach (Figure 65).
- Public opening of the test track for the shuttle in Klagenfurt West (01.07.2024)
- On 12.07.2024, the European Commissioner for Budget and Administration Johannes Hahn, Deputy Governor of Carinthia Martin Gruber, Provincial Councilor Sebastian Schuschnig und Albert Kreiner from the Regional Government in Carinthia together with project manager Walter Prutej, gave the signal for the **start of the first autonomous fleet operation in Austria**. Around 60 people joined the delegation and after a presentation and Q&A, the new track in Klagenfurt West was visited including a test ride in the shuttle.

Kids.DAYS with children

- 05.07.2022: Visit of the technical school for social professions of the Carinthian Caritas Association in Pörtschach, 11 students and 3 teachers participating
- 07.08.2023: Kids.DAY in Pörtschach with around 50 children and 5 supervisors from the Seekids group: Kids were shown the shuttle, could take a ride, draw pictures of it, and the SURAAA team answered their questions.
- 07.05.2024: Kids.DAY with 28 kids from the Pörtschacher Volksschule, aged between 6 and 10: short presentation of the shuttle, a quiz, drawing and craftwork and, of course, a ride in the shuttle
- 03.07.2024: Visit from Polytechnical School Klagenfurt
- 06.08.2024: Kids.DAY at Lakeside Park: 18 enthusiastic children (aged 8-10) and two supervisors from the Educational Summer Lab learnt all about the mobility of the future: While one group was taking a ride on the shuttle, other groups were busy with a ball game, answering questions about the usage of the shuttle and finding a name for the autonomous shuttle. The kids were rewarded with gummi bears and shuttle stickers after completing each task.
- 27.08.2024: Kids.DAY with 9 University group kids at Lakeside Park aged 2 to 4, and 2 supervisors: welcome, brief and basic explanation of the shuttle and, of course, a ride. The children were divided in 2 groups, while one group was on the shuttle, the other was kept busy with stickers and colouring.
- 17.09.2024: Kids.DAY with 24 Trinity School kids between 8 and 10 and 2 supervisors: welcome, short presentation of the shuttle followed by a ride. The kids were divided into 2 groups and while one group was on the shuttle, the other group was kept busy with stickers and colouring and a questionnaire.
- 18.09.2024: Kids.DAY with 31 kids from the Sunshine Kindergarten in Klagenfurt: after a Q&A session, the kids were taken for rides in groups. In the meantime, the other groups were kept busy with games, a questionnaire, stickers and an introduction to the SMART Mobil app to call the shuttle.

Figure 69 - Carinthia - Kids.DAY (07.05.2024)

Figure 70 - Carinthia - Kids.DAY (06.08.2024)

Other end-user engagement events

- During the pre-demonstration, field tests were conducted with students (19.10.2021) and senior citizens (20.10.2021).
- Field tests with people with a disability were also conducted (20.10.2022).
- Ideathon (05.07.2023) – see chapter 5
- 'Supertesters' event (28.07.2023) – see chapter 7

Figure 71 - Carinthia - Field test with people with a disability

- 28 students from the University of Applied Sciences (CUAS) took part as test passengers on the new track in Klagenfurt West (27.06 and 03.07.2024). They were excited to see the automated shuttle in action and engaged in questions and a discussion with the SURAAA Team. Their interest and engagement was outstanding.
- Testing the new on-demand app (13.09.2024) at the Klagenfurt University campus with six testers (Figure 72). The presentation was followed by a joint ride. Three participants were then dropped off at different stops at the same time and had the task of using the on-demand app to book a shuttle to return to the starting point. During the waiting times, participants filled out a survey about their experiences. The event ended with an intensive group discussion. The contribution of one participant without a phone was particularly valuable, as he provided valuable suggestions on how to deal with such a situation. The shuttle provided a culinary surprise: it transported pizza from the university pizzeria, located on the test route, near the event. As a thank you, all participants received a €50 gift voucher.

Figure 72 - Carinthia - Testing the new on-demand app

- 2-day fire brigade visit (20 & 22.08.2024, Figure 73): The shuttle was inspected, a technical briefing was given and information was provided on how to extinguish the shuttle in the event of a fire. 25 people attended the training.
- Police visit (11.09.2024) in Klagenfurt: An in-depth lecture, including security details of the shuttle and rescue plan, was held by the Managing Director Walter Prutej, followed by a questionnaire and shuttle manual for the

policemen. The information day ended with an extended test drive and further details on the shuttle in its operating area.

Figure 73 - Carinthia - Fire brigade training

Participation in public fairs and events

- MotionExpo in Graz (11-13.03.2022, 08-10.03.2024, Figure 75): presentation platform for new car models as well as new mobility technologies. Many visitors came to the SURAAA booth and the shuttle was very well received.
- Auto & Bike Messe Klagenfurt (01-03.04.2022, 31.03-02.04.2023, 05-07.04.2024): large fair with over 450 exhibitioners and around 50.000 visitors yearly, where the AV shuttle was showcased
- Lange Nacht der Forschung (20.05.2022, 24.05.2024): the largest event for science and research in the German-speaking world. For one evening every two years, innovative findings and ground-breaking technologies are made accessible to a wide audience throughout Austria. Information material was handed out and visitors were able to obtain detailed information about the shuttle from SURAAA employees and inspect it. The SURAAA team also offered its own children's programme, which included handicrafts, painting, games, face painting and information about automated driving (Figure 76).
- IÖB event Automated mobility – practice and future (15-16.09.2022) in Pörtschach
- Europe Days at the Alpen-Adria University Klagenfurt (19.10.2022, 17.10.2023): SURAAA presented its ongoing EU projects.
- Award ceremony for the IÖB Mobility Call 2022 (28.11.2022) in Vienna with SURAAA as the winner in the Mobility and Logistics Management category
- Nutzen.leben Messe in Linz (27.04.2023): fair also open to the public, focusing on the topic of security, with SURAAA present jointly with IÖB

Figure 74 - Carinthia - Public events representation

Figure 75 - Carinthia - MotionExpo Graz 2024

Figure 76 - Carinthia - Lange Nacht der Forschung 2024

Events for policy makers and professional stakeholders

- Visit from Leaderregion Triestingtal (05.11.2021) in Pörtschach
- Senate of Economics event (28.04.2022): 50 participants took part in the SME roadshow Regionality, Sustainability & Digitalization in Pörtschach
- Städtetag in Villach (01-03.06.2022): gathering of Austrian city mayors with the Austrian president (Figure 77)
- Kommunalmesse Wels (29-30.06.2022): trade fair for technical equipment for local authorities, with a SURAAA workshop on automated driving
- Event with 80 female mayors and the Austrian Federal Minister for Women, Family, Integration and Media (04.07.2022) with a presentation on automated driving and test rides
- Public visit of EU Member of Parliament Barbara Thaler and representatives of the Kärnten government (22.07.2022)
- Mobilitätstage (15.09.2022, 14.09.2023, 19.09.2024) organized by the Chamber of Commerce of Carinthia, with exciting presentations and demonstrations, a.o. by SURAAA (link)
- SHOW Austrian Mega site meeting (04.10.2022) in Pörtschach
- Shuttle test drive with Green Economy (07.10.2022) in Pörtschach
- Nationales Forum Klimaneutrale Mobilität (11.11.2022): SURAAA nominated as best-practice example and presented at the BMK in the implementation process of the Mobility Master Plan 2030 (Figure 77)

Figure 77 - Carinthia - Städtetag Villach (left) & Nationales Forum Klimaneutrale Mobilität (right)

- Visit from politicians of Rheinland-Pfalz (21-22.11.2022) in Pörtschach
- FREDA Zukunftskongress (28.01.2023)
- VDV-Congress on Future Autonomous Driving (27.-28.03.2023)
- Lecture on mobility of the future to delegates from the State of Carinthia, Department 9 – Roads and Bridges (30.03.2023)
- Trilateral Conference Cross-border Testing of Automated Driving (20.04.2023)
- Start(up) Friday – the AI Revolution (21.04.2023): start-ups networking event
- Ecovation Special Event (26.04.2023): decision-makers and procurers from all over Austria exchanged ideas on the topic of procurement.
- Austrian Tourism Day (02.05.2023)
- MAMCA workshop (12.05.2023) – see below 4.5.4**Error! Reference source not found.**
- Idea Contest '90 Seconds' participation pitch smart:MOBIL (05.06.2023) in the Lakeside Park: awarded second place in the 'Green Future' category
- Kommunalmesse Innsbruck (21-22.06.2023): trade fair for technical equipment for local authorities

- Visit from representatives of Regionalverkehr Köln (RVK), mobility experts from the state of Carinthia, the city of Klagenfurt and the local transport companies discussing collaboration concerning future mobility solutions (16-17.08.2023)
- Women's business event (14.05.2024)
- Local business community event (22.05.2024)
- Business event Lakeside Park Klagenfurt (04.06.2024)
- LOC.ID workshop (05.06.2024)
- Ginevra project delegation (14.06.2024): 18 people from Italy, Germany, Hungary, Croatia, Slovenia and Austria visited Pörtschach, with the aim to test and possibly implement automated shuttles in their respective countries.
- Workshop Allianz automatisierte Mobilität Österreich in Pörtschach (22.07.2024)
- Visit from the Carinthia government (21.08.2024), presenting the new route in Lakeside Park, followed by a test ride

Participation in SHOW online events and other online events

- SHOW Webinar CCAM (14.09.2022): user acceptance and user engagement
- Webinar exchange at project level with demo sites in the US on the topic of accessibility of AV Services (30.11.2022)
- Beginning of February 2023: Pitch Online Event 'IÖB mobility solutions for a climate-friendly future – get to know innovative products' where SURAAA presented its autonomous first/ last mile solution
- Invite by the French Ministry of Transport to present a case study at a webinar entitled 'Development of automated and connected road mobility: Exchange of experiences between European and French local authorities' (22.06.2023)
- Webinar on Replication and Transferability, Carinthia and Venice (08.11.2023)

Incentivisation and nudging:

- The service is free of charge.
- Service is online bookable and operates from 10AM to 4PM, 5 days a week.
- The service is integrated in the public transport booking system.
- An operator is on board and can answer any questions.
- A lot of activities were conducted to inform people about the service and let them experience it.

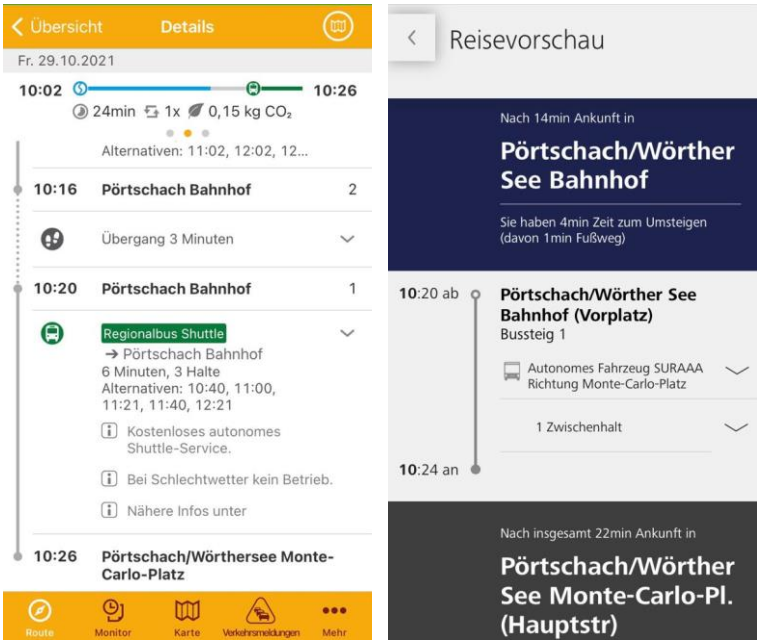


Figure 78 - Carinthia - Integration in public transport apps, ÖBB Scotty, GoHappy ticketing Verkehrsverbund Kärnten GmbH

4.5.2 Salzburg

The pilot in a nutshell:

- Automated passenger transport service on the first/ last mile in a peri-urban area
- Target passengers: commuters tourists, locals, anybody interested in automated mobility
- Local ecosystem: AustriaTech, Salzburg Research, Kapsch TrafficCom (SHOW partners) and Digitrans, Salzburg Verkehr (Salzburg Transport Authority), Federal State of Salzburg, Municipality of Koppl (external partners)

Figure 79 - Salzburg - SHOW Digibus2.0 HEAT shuttle (left) and SHOW Digibus2.0 Digitrans eVAN (right) in Koppl

Main communication channels and tools deployed in Salzburg:

Figure 80 - Salzburg - SHOW Digibus® 2.0 poster

- Printed materials: poster (see Figure 80)
- Press: article in the local newspaper Salzburger Nachrichten: “Neuer Test mit selbstfahrendem Bus in Koppl startet im Frühling” (16.01.2023), community newsletter of Koppl
- Website and social media: Salzburg Research home page (several posts), SHOW site (Digibus® 2.0: Revolutionary Electric Shuttle with Advanced Sensors and Modular Design), dedicated website on the Salzburg pilot https://www.digibus.at, several Facebook and LinkedIn posts to inform about the SHOW project and the pilot, and to recruit participants for the acceptance surveys

Main engagement activities planned/ conducted in Salzburg:

- Salzburg participated in the **Austrian Mega site joint events** (see below): online kick-off event, MAMCA workshop, final event.
- 20.06.2023: **Site visit by Michael Nikowitz**, Coordinator Automated Driving at the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and technology (BMK), together with AustriaTech as the contact point and facilitator of the testing permit for automated mobility in Austria. Live demonstration of the use cases, scenarios and automated vehicle on the pilot track as well as an exchange on the process of applying for the test permit, the cooperation between SRFG, BMK and AustriaTech, experiences during the pilot, planned dissemination as well as possible further activities relating to the demonstration of automated mobility.
- 22.06.2023: Participation and case presentation in a webinar **‘Development of automated and connected road mobility: Exchange of experiences**

between European and French local authorities' upon invitation by the French Ministry of transport

Due to the involvement of the SHOW Digibus® 2.0 Digitrans eVAN in an accident on the 2nd of August 2023 and the consecutive revocation of the test permit, a number of planned engagement activities had to be cancelled as operations could not continue:

- **Live demo event**, targeted at media representatives, to present the SHOW project and the Salzburg pilot site: scenarios, use cases, pilot track, responsibilities of the safety driver, ... coupled with test rides and informing about the public test days (planned for summer/ autumn 2023)
- **Monthly public test days**, targeted at the general public and especially local residents, to be coupled with local (music, literary or traditional) events, raising awareness and informing about the project, the scenarios, the vehicle, the pilot track, etc. (planned for August – November 2023)
- **Supertesters event** in Koppl (planned for 25. August 2023 as part of the Austrian Mega site overarching 'Supertesters' concept).

Incentivisation and nudging:

- First/ last mile feeder service complementing public transport, 5 days/ week, shortening the cycle time from 1 hour to 30 minutes
- Connection to an intermodal mobility hub located on a major road, enabling seamless connections to and from Salzburg, with timetables synchronized with the arrival and departure of public buses
- Usage free of charge
- Human assistance by safety operator, as obliged under Austrian law
- Potential users informed through various channels about the service
- Integration of the automated service into the public transportation app of the Salzburg Transport Authority

4.5.3 Graz

The pilot in a nutshell:

- Automated mobility as a complement of public transport
- Target passengers: any interested passenger, from commuters to passers-by
- Local ecosystem: AustriaTech, Virtual Vehicle, IESTA, AVL List GmbH, Yunex Traffic Austria GmbH (SHOW partners)

Main communication channels and tools deployed in Graz:

- Printed materials: posters and flags at vehicle stops, stickers on vehicles (see Figure 81)
- Press: several publications in local magazines (Kleine Zeitung, der Grazer, Wirtschaft, Wiener Zeitung, see Figure 82 for an example)
- Videos: a video was recorded, showing the operation of the vehicle, available on YouTube
- Website and social media: Facebook and LinkedIn posts the week before the public test drives and for all other events, like the Supertesters event
- Information screens: announcement of test drives in buses & trams in Graz
- Letters, calls, e-mails: announcement of public pilot by word of mouth, asking to bring friends and family
- Other: scientific publications to disseminate technical approach

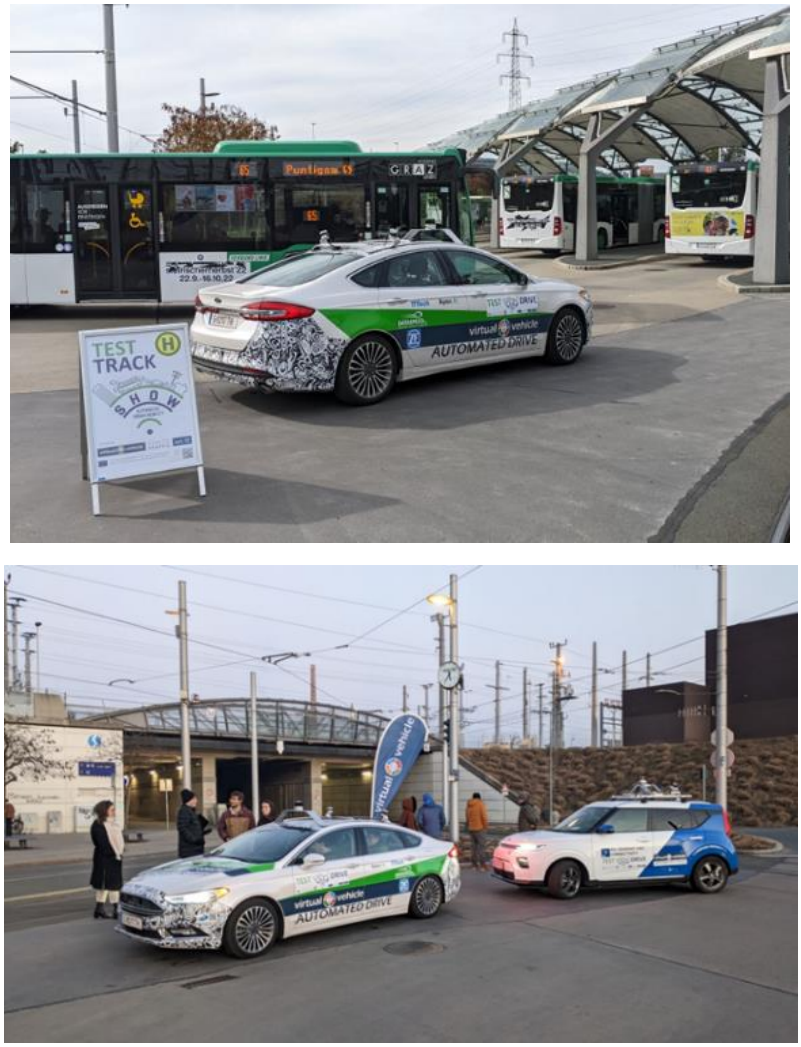


Figure 81 - Graz - Automated vehicle stop

Der lange Weg zum autonomen Fahren

In Graz wird an einem Fahrzeug.

Graz. Fahren ohne Fahrer. Was derzeit nach wie vor nach Zukunftsmusik klingt, könnte – zumindest rechtlich – in manchen Ländern der Welt bald Realität werden. Während der Rechtsrahmen für vollautomatisierte Fahrsysteme (Stufe 4) zunehmend Gestalt annimmt, erweist sich die Praxis aber als schwieriger als von den Unternehmen erhofft. Am weitesten ist bisher der deutsche Hersteller Mercedes, der ein Produkt in der Stufe 3 (hochautomatisiertes Fahren) von 5 anbietet. Stufe 4 wird aktuell in Graz getestet. Ganz ohne Fahrer geht es auch dort nicht, wie ein Besuch der „Wiener Zeitung" zeigt.

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Figure 82 - Graz - Article in Wiener Zeitung (07.03.2023)

Main engagement activities planned/ conducted in Graz:

- Graz participated in the **Austrian Mega site joint events** (see below): online kick-off event, MAMCA workshop, Supertesters event, final event.
- **Several stakeholder events**: on site demonstration, opportunity to ride along and experience the pilot, with Holding Graz (17.10.2022), representatives of pilot site Klagenfurt, representatives of the Austrian ministry and contact point for automated mobility AustriaTech (10.11.2022), Graz Road department (23.11.2022)
- 10-12.03.2023: Public event **MotionExpo 2023**: vehicles on display, opportunity to pre-book test drives in the following week
- **Pre-defined test driving days**, whereby the general public could go and experience the automated vehicles and spontaneous passengers of public transport could change to the service: 07-11.11.2022, 13-17.02.2023, 13-17.03.2023, 12-16.06.2023, 02-06.10.2023
- 28-30.08.2023: Participation in **European Forum Alpbach**: showcasing the vehicle on a closed track to very important people including EU politicians

Incentivisation and nudging:

- Service free of charge
- Assistance (safety driver) available to explain the service and objectives
- Main motivation: to experience automated driving, be part of a progressive experiment
- People who expressed interest are informed about upcoming try-out events.

4.5.4 Activities at Mega site level

For the SUPERTESTERS events, see chapter 7.

On 14.10.2022, AustriaTech organised an **online kick-off event**, aiming to share with a broader audience the real-life demonstrations at the three Austrian sites in SHOW. Besides presentations, also 'live' rides were foreseen. More than 100 participants from all over the world, including Australia and China, attended the event.

Figure 83 - Austria - Kick-off event

On 12.05.2023, around 40 stakeholders from all three Austrian SHOW pilot sites gathered for a **MAMCA (Multi-Actor Multi-Criteria Analysis) workshop** in Pörtschach. In small groups, based on a business-as-usual scenario, four different scenarios of automated mobility services were evaluated, in terms of negative and positive impacts on road safety, traffic efficiency, energy efficiency, environmental impact, societal impact, employment, social equity and user acceptance:

- Driverless shuttle for the first/ last mile
- Door-to-door delivery of persons and goods
- Mass transit AV services
- Shared Robotaxis.

Figure 84 - Austria - MAMCA workshop (photos SURAAA)

On 23.07.2024, the Austrian Mega site organised a **final event** in Pörtschach. The event began with a project overview by John McSweeney (UITP), SHOW project coordinator, who highlighted the objectives and achievements of the SHOW project, setting the stage for an in-depth discussion on the lessons learned from the Austrian pilot sites and the road ahead for CCAM Services in Europe.

A first round table focused on lessons learned from the Austrian pilot sites. Pilot sites presented the challenges they encountered during deployment – such as the importance of HD maps for accurate navigation, public road deployment, limited availability of real-time traffic data and balance between traffic efficiency and safety in simulations. Pilots also shared their mid-term visions for the future.

A second round table covered the necessary steps for CCAM advancement, such as integration into Sustainable Urban Mobility Plans (SUMP), leveraging existing infrastructure, building capacity across the sector. Comparing the European approach to that of the United States and China, participants stressed the importance of efficient business models, service designs, and harmonized regulation. The use of simulation tools and resource efficiency were also seen as crucial.

In the afternoon, participants could experience the autonomous shuttles in Klagenfurt firsthand, as well as trying out the on-demand ioki app for booking services. The shuttles navigated intersections, left turns, and took roundabouts without operator intervention, leaving attendees impressed by the advanced state of CCAM technology.

Figure 85 - Austria - Final event

4.6 Finland: Tampere

The pilot in a nutshell:

- Automated feeder transport services to light rail/ tramline
- Target passengers: any interested passenger, from commuters to passers-by, also users with special needs
- Local ecosystem: Sitowise, Sensible 4, city of Tampere, VTT (SHOW partners) and Remoted (external partner)

Main communication & dissemination channels and tools deployed in Tampere:

- Printed materials: stickers (Figure 86), flyers (Figure 87), printed instructions at stops, in and outside the bus
- Press: several press releases have been issued in spring 2021, early 2022 and early 2023, informing about upcoming pilot services. Also, launch and media events were held before all pilot phases, with high-level decision makers in Finland underlining the importance of and need for the automated services. These actions resulted in a lot of media attention, both in national media (for example, Aamulehti – the main newspaper in Tampere, YLE news – Finland's national broadcasting company, Iltasanomat – Finland's biggest evening newspaper and online news channel) and internationally.[12]
- Videos: several videos available on YouTube here
- Website and social media: website of Tampere City Transport/ Nysse, Business Tampere, Twitter/ X and LinkedIn
- Letters, calls, e-mails: several hundreds of mails have been sent via ITS Factory Network and ITS Finland to all main stakeholders, raising awareness of the pilot in Tampere and the user acceptance surveys.

Figure 86 - Tampere - Stickers on the shuttles

[12] Some examples: interview with on national YLE news (21.12.2021) informing about planned piloting activities; interview Hervannan Sanomat (pp.2-3), introducing the pilot to local citizens (05.01.2022); press releases by Sensible 4 in English: Autonomous last mile pilot will support Tampere tram line at the end of the year (18.03.2021); Mid-winter self-driving pilot in a busy Finnish campus suburb (20.10.2021); Self-driving service trial started in freezing cold Finnish winter (25.01.2022); Self-Driving Pilot in Finland a Success Despite Extreme Weather Conditions (03.05.2022)

Figure 87 - Tampere - Flyer

Main engagement activities planned/ conducted in Tampere:

The Tampere site has been working together with the **Accessibility Working Group** representing various special users' interests, such as deaf, blind and physically disabled people. They were very motivated and willing to test & use the SHOW services.

- 04.11.2021: Presenting the project to the Accessibility Working Group and discussions on pre-demo and piloting activities
- 12.01.2022: Pre-demo event with the Accessibility Working Group: announcement of the new service and feedback collection
- 17.01.2022: Feedback report of the Accessibility Working Group with suggestions and requirements related to automated transport services

The Accessibility Working Group participants answered the following questions:

- Before test ride
  - Do you use public transport or do you prefer a private car?
  - Have you used an automated vehicle service before?
  - If you have, where did you use the service?
  - What kind of experience do you anticipate?

    - Are you scared or worried to use an automated vehicle?
    - If Yes, what worries you?
- After the test ride
    - Did the ride meet your expectations?
    - How did the ride make you feel?
    - How would you describe the experience?
    - What did you miss?
    - Was something unpleasant?
    - Was there a situation, where you would have liked more information?
    - If, Yes, what kind of a situation it was?

The feedback from the Tampere Accessibility Working Group members was not as good. They really liked the service, but, as was known in advance, the vehicles used are not yet accessible enough. Based on the feedback the service and vehicles will be further developed and/ or new kinds of vehicles will be used. The main messages were:

- Easy access, low floors and ramps are needed in the vehicles.
- Proper lighting & interior with light colors are essential for visually impaired users.
- Also, vocal information for the visually impaired users is important (arrival to stops, etc.).
- For hearing impaired people good signs are needed inside the vehicles.
- Enough space for wheelchair and walking aids, etc. is important.
- It is also important that the wheelchair users could see outside from the bus windows (they are sitting rather low), and therefore big windows are also needed.
- Smoothness of driving is essential (no fast movements or sudden braking) for people with impaired mobility using for instance walking sticks.
- The vehicles do not have to be fancy and luxurious, but practical and easy to use.
- The service as such is, however, very welcome and should be deployed.

The Tampere site has also worked together with **NysseLab**, a test laboratory of the city of Tampere and Tampere city transport. NysseLab undertakes events, studies, surveys for targeted users such as PT users, car users, users with special needs etc.

- 10.11.2021: Presenting the project to the NysseLab and discussions on pre-demo and piloting activities
- 21.12.2021: Pre-demo event with NysseLab: announcement of the new service and feedback collection

The NysseLab test users gave very good feedback (grade 84,7/100).

Launch & media events were organised before each pilot phase. Before and during the pilots, interviews were conducted with end-users of the services. There were also many demonstrations and presentations at events, targeting both end-users and professional audiences:

- 30.09.2021: ITS World Congress Hamburg: presentation Use of 5G in SHOW – Tampere Satellite Pilot Site
- 11.01.2022: Launch and media event related to phase 1 in Hervanta, Tampere, with high-profile speakers and a lot of publicity in national media (TV, radio, newspapers)
- 03.02.2022: Smart public transport event
- 09.03.2022: Presentation of the Tampere plans to the mayor of Tampere, receiving positive feedback

- 17.03.2022: Public demonstration event for targeted experts and key stakeholders (around 30 participants). The city of Tampere, Sitowise, Sensible 4 and VTT were present at the Hervanta testbed, from 11:00 to 13:00, to present SHOW's objectives and discuss the future of automated transport as an integrated part of the future public transport in Tampere. The event was supported and enabled by Business Tampere. Visitors could get insights into the SHOW project's activities and achievements so far. Sensible 4 vehicles were at hand to help demonstrate the concept of digital twins in action and experience great innovation in automated public transport, particularly for feeder services in Tampere. Earlier, also the mayor of Tampere, Ms Anna-Kaisa Ikonen, had tested the pilot 1 service and proclaimed that her ride in a robotic car in Hervanta was "*a steady ride and a great demonstration of the power of cooperation and technology*".
- 30.05.2022: ITS Europe Toulouse: presenting Tampere pilots and SHOW
- 14-15.06.2022: Tampere Smart City Week: presenting SHOW to high-level decision-makers
- Private test rides planned for Henna Virkkunen, Member of European Parliament (14.06.2022) and Timo Harakka, Finnish Minister of Transport and Communications, joined by Aleksi Jäntti, Deputy Mayor of the city of Tampere (16.06.2022)
- 16.06.2022: Presentation of the Tampere pilot phase 2 service to the Minister of Transport, receiving positive feedback
- 20.09.2022: ITS World Congress Los Angeles: presentation development of Integrated Mobility Services in Tampere, Finland – Automated Feeder Transport Pilot
- 03-07.10.2022: SHOW project presented in the ISO TC204 Plenary Meeting
- 30.11.2022: International IcoMaaS conference in Tampere, presenting Finnish SHOW activities
- 19.01.2023: Pilot phase 3 launch and media event in Hervanta, with high-profile speakers and a lot of publicity in national media (TV, radio, newspapers)
- 17.03.2023: MAMCA workshop in Tampere, with around 30 participants from six stakeholder groups (vehicle users, authorities/ regulators, PTOs, mobility service providers, public interest groups, R&D)
- 25.05.2023: ITS Europe Congress in Lisbon
- 05.06.2023: Delegation from Germany, Austria and the Netherlands visiting Tampere, presenting SHOW
- 04-07.06.2023: UITP Global Public Transport Summit, Barcelona
- 06-07.06.2023: Tampere Smart City Expo & Conference: Sitowise presenting the Finnish pilot site
- 14-15.09.2023: Pilot phase 4 launch and media event during the national Paikallisliikennepäivät (Local Transport Days) in Lahti with a lot of publicity and hundreds of participants
- 25-29.09.2023: presenting SHOW and Finnish experiences, lessons learned and future suggestions in UNECE WP.1 (Global Forum for Road Traffic Safety), in Geneva, Switzerland
- 10.10.2023: presenting the SHOW-project at 'Transport Innovations and Future Solutions in Cities' event arranged by the Business Finland's Decarbonised Cities programme
- 18.11.2023: Santa Claus arrived with automated EasyMile shuttle to open the Christmas Market in Lahti[13] (Figure 88)

[13] https://areena.yle.fi/1-67244679

- 23.02.2024: SHOW Policy Support Tool and SUMP assessment workshop
- 11.06.2024: Dissemination action during Imagine Metaverse 2024 Tampere
- 26.09.2024: SHOW final event in Tampere: official end of the project (Figure 89): The SHOW Final Event offered a full-day conference programme – with keynote speeches, an overview of SHOW's challenges and achievements, results pitches (Technology, Public Transport, Horizontal Issues), panel discussions (Moving from testing to full deployment, The future of CCAM: What we expect & what we need), recommendations for cities & PTOs, Replication & Transferability (full programme here) – followed by a networking reception. There were also ample opportunities to experience the AV operations at the local pilot site.

Figure 88 - Tampere - Santa Claus visiting Lahti

Figure 89 - Tampere - Announcing SHOW final event

Incentivisation and nudging:

- Service free of charge
- Safety driver on board
- No prior booking
- Service seamlessly integrated with the existing public transport
- Feeder services to the light rail/ tram
- Service provides an additional means to travel to schools, hobbies, day care, doctor, shops, other services etc., especially in adverse weather.
- Focus on accessibility for elderly people and users with special needs

4.7 Czech Republic: Brno

The pilot in a nutshell:

- Automated shuttle and Robotaxi services augmented with teleoperation
- Target passengers: any interested passenger, from commuters to passers-by
- Local ecosystem: CDV (Transport Research Centre), Artin spol s.r.o, city of Brno (SHOW partners) and Roboauto, Technotrade (external partners)

Main communication & dissemination channels and tools deployed in Brno:

- Printed materials: flyers and infographics placed inside the vehicles
- Press: press releases and press events to launch the demo (14.03.2022 and 20.09.2022), reproduced by media (TV, radio, online, printed); interview on national television 'Weekend Breakfast' (11.02.2024, link); several more articles in Czech media[14]
- Videos: video available on YouTube here
- Website and social media: CDV website, LinkedIn and Facebook, also channels of partners used

Main engagement activities planned/ conducted in Brno:

Press events

- 14.03.2022: Press conference introducing the SHOW project by the Czech Minister of Transport, the Demo site leader, the director of CDV, the director of ARTIN, and the city of Brno's representative for transportation; the autonomous shuttle was presented and rides were offered to the representatives of the media (Figure 90, Figure 91).

Figure 90 - Brno - Press conference (14.03.2022) Left to right: City of Brno representative, director CDV, director ARTIN, Demo site leader, Minister of Transport

[14] Some examples: https://www.idnes.cz/brno/zpravy/autonomni-vuz-minibus-brno-pilotni-testovani-autobus-doprava.A220314_145003_brno-zpravy_mos1; https://tn.nova.cz/auto/clanek/457059-v-brne-se-bude-testovat-prvni-autonomni-minibus-rovnou-zacne-vozit-cestujici; https://www.cdv.cz/tisk/v-brne-se-bude-testovat-prvni-autonomni-minibus/; https://www.mmspektrum.com/clanek/autonomni-doprava-v-arealu-brnenskeho-vystaviste-fungovala

Figure 91 - Brno - Press conference (14.03.2022) "We are testing the first autonomous shuttle in the Czech Republic"

- 20.09.2022: Another press conference was held at Urban Mobility Days in Brno, to officially launch the public demonstration activities in the presence of the European Commission.

In addition to regular operations, Brno **operated its vehicles during exhibitions**, to create more wide exposure to a varied audience, interact directly with the public and find out their impressions firsthand. Services at such fairs included:

- 20-22.09.2022: Urban Mobility Days, URBIS Smart City Fair and Future Mobility Fair in Brno (in total 8.000 visitors): the demo was officially launched and all visitors had the opportunity to test the AV.
- 03-07.10.2022: International Engineering Fair in Brno (in total 55.000 visitors)
- 26-27.11.2022: International Sales Exhibition of Minerals, Fossils, Jewels and Natural Products (in total 8.764 visitors)
- 09-18.12.2022: Christmas Markets (in total 12.000 visitors)

Figure 92 - Brno - Urban Mobility Days 2022 (left) & International Engineering Fair 2022 (right)

- 07-09.02.2023: Fair for food industry and gastronomy (in total 6.500 visitors)
- 24-27.05.2023: PYROS International Fair of Fire Fighting Equipment and Services (14.000 visitors)
- 02-03.06.2023: Frank Klepacki and The Tiberian Sons concert
- 02-06.10.2023: XXVII PIARC World Road Congress (9.300 visitors)
- 10-13.10.2023: International Engineering Fair in Brno (in total 60.000 visitors)
- 08-17.12.2023: Christmas markets (32.327 visitors)
- 29.02-03.03.2024: Motosalon (71.000 visitors)
- 19-21.03.2024: Ampér (25.000 visitors)
- 07-11.04.2024: Techagro (64.678 visitors)
- 24-27.04.2024: Construction fair (17.000 visitors)
- 04-06.06.2024: Future Mobility and URBIS Smart City Fair (3.750 visitors)

Participation in **(international) conferences, industry & research events**

- 03-04.05.2023: EUCAD Brussels
- 09.05.2023: Brno AI meeting at creative Hub called KUMST, to coordinate events organised within Brno (one of the following events planned was an Ideathon concerning automated transport with focus on AI)
- 02-06.10.2023: demonstration & presentation of remote control centre at PIARC World Road Congress
- 11.10.2023: Brno AI days meet-up with keynotes of Czech SHOW partners followed by discussion (link, see also below)
- 14.10.2023: Brno AI meet-up days (for researchers, students, industry, general public) with demonstration of AV shuttle
- 26.10.2023: Ansys conference in Brno: keynote speech (link)
- 01.11.2023: MobilitySympo in Prague: keynote speech (link)
- 08.11.2023: MendelNet Conference in Brno: keynote speech (link)
- 01-05.06.2024: IEEE Intelligent Vehicles Symposium in Korea (link)

Brno also hosted several **visits of international delegations** from Japan (Cool4 project, 18.11.2022), Albania (23.11.2022 and 10.05.2023), Serbia (10.05.2023), the US (26.05.2023) and Croatia University of Zagreb (12.06.2023) (Figure 93, Figure 94).

Figure 93 - Brno - Japanese delegation (18.11.2022)

Figure 94 - Brno - Albanian delegation (23.11.2022) with mayors of Albanian cities

Other end-user and stakeholder engagement activities:

- **Stakeholder forum** meetings (17.03.2023 and 20.05.2024) to present and discuss Brno site (operation settings, routes, citizens engagement, future operation after end of the project, benefits, risks etc.) with about ten stakeholders (ministry of transport, Brno city representative, developers, industry, public interest group and associations, operators etc.).
- As a research centre, CDV organized special **events for local students**. Several college students group visits were done in 2022 and 2023. Once a year during the winter semester, UTAD students visited the Transport Research Centre in Brno, where they were introduced to CCAM, remote driving, AI concept and the demonstrations within the SHOW project (link).
- **Scientists' night** at UTAD offered both students and the general public an opportunity to see automated vehicles – including the unique Roboauto concept – in action (link, 30.09.2022 and 06.10.2023).
- 09.05.2023: Presentation to local university (VUT) and industry by CDV, VUT
- 12.06.2023: Presentations for high school and university students from Zagreb; introducing the delegation to the state-of-the-art in remote access and events to raise awareness of this technology among the professional community
- 21.06.2023: Primary school excursion including rides (17 passengers)
- 22.02.2024: **MAMCA workshop** involving a presentation of the project, AV fleet and supervision centre

Figure 95 - Brno - Engagement with students (16.11.2022)

Focus groups/ round tables:

- Three focus groups were held during September 2022. One focus group included just a bus and truck drivers to see their point of view on automation, their experiences and opinions. The other two groups were much more diverse in their composition and included citizens, traffic psychologists, researchers, developers, army representatives, policy makers and others.

- Further focus groups were held with children (elementary school level) and professionals in the field of automated mobility. Considering the results of these sessions[15], children were overall surprisingly very tech-optimistic, with girls slightly less enthusiastic than boys, and kids from wealthier families talking about autonomous mobility as something that's already a reality; experts were in general supportive of demonstration projects like SHOW, but advised to be cautious about the public's impression because of low speed and use cases perceived as awkward or artificial.

Figure 96 - Brno - Focus group

As part of the AI Days 2023 – Artificial Intelligence in Traffic: The Future is Now event – in Brno, CDV and Yunex Traffic organised a meet-up on 11.10.2023 (announced on the website of CDV, website of Yunex and website of UTAD).

60 people participated in the event: 20 students (mainly from Brno universities) and 40 professionals with diverse backgrounds: IT (9), entrepreneur (3), industry (7), marketing (1), construction (1), public administration (2), retired (2) (rest: undetermined) – a pretty diverse group in terms of age and professional orientation.

The event lasted three hours (from 3 to 6 PM) and took place at Yunex Traffic in Brno. The event kicked off with keynote speeches:

- Matěj Dusík (DevOps manager Yunex traffic): *How Advanced Perception Improves Road Safety*
- Tomáš Gavenda (Head Product Owner Yunex traffic): *Green within reach: AI and prediction of traffic signal changes at intersections using SPaT prediction*
- Štěpán Křehlík (Research fellow CDV): *Introduction of the SHOW project and its importance for autonomous technologies*
- Radek Pazderka (Developer at Roboauto s.r.o.): *What AI brings to autonomous driving*.

Then, a guided discussion took place between all participants on following topics:

- How can AV services be effectively implemented in public transport?
- How to develop services/ solutions that better meet the needs of specific user groups?
- How can acceptance/ awareness about CCAM be increased?

[15] Presented during a joint webinar of SHOW and Ride2Autonomy projects, available here

Figure 97 - Brno - AI meet-up (11.10.2023)

After the discussion, the participants had the opportunity to see and take a ride with the AV shuttle and to fill in the user acceptance survey. After that they visited the Yunex traffic laboratories. The event concluded with a small reception to network and have some more discussions. Main outcomes of the discussions are summarised below.

Overall, the discussion focused on the need for strategies that combine technological developments with the realities of public transport and the creation of sustainable, safe and efficient mobility systems that serve a wide range of users. Primarily, the discussion developed into **proposals for measures that could ensure that autonomous public transport is truly adapted to the different needs of users** and serves all urban dwellers as efficiently and safely as possible. The common denominator of this discussion was the development of services tailored to specific users. This broke down into several smaller themes that were addressed during the discussion, i.e:

- user needs survey,
- adapting interiors,
- flexible operating models,
- partnership agreements and stakeholder communication.

User Needs Survey: During the discussion, the group directed their thoughts towards user group segmentation. Individual people may have specific needs and requirements for transport services. The question came up how to group individuals into categories and what criteria should be used to form these categories. As such, first suggestions made were to use the classic divisions such as working, senior, disabled, parents with children, and others. In contrast, the view was expressed that placing an individual in a category based on age or physical ability does not necessarily correspond to transport needs and requirements. At this point, the discussion turned more into a brainstorming, with members trying to contribute ideas on how to identify key needs and requirements. The most interesting situation was the moment when the view of travel anxiety figured into the identification of the groups' characteristics. As travel anxiety is not unique, there was debate about the solution to this problem and whether

autonomous transport can eliminate it. The outcome of this debate was that classification according to classical groups does not make sense and it would be desirable to identify needs with a survey on the use of mobile applications and technologies among different age groups and socio-demographic profiles. How can mobile technology contribute to a better provision of autonomous transport services?

Adapting vehicle interiors: This topic zoomed in on designing for universal accessibility: How can the interior of autonomous vehicles be designed so as to be accessible to all? This includes seat ergonomics, easy access and egress, and a wide range of control options for different user groups. There were diametric differences of opinion on control options. Some debaters preferred simple control options, others preferred extensive control menus with absolute control, others had an idea linked to AI that fulfils the passenger's wishes. The common denominator was the argument for a safe and comfortable environment.

Flexible traffic patterns: Here, the aim from the start was to save time when travelling. Suggestions were made on how to dynamically manage traffic based on data availability. For example, demand-driven routing, i.e. automated urban transport instantly searches for the shortest route based on passenger interest. Thus, it does not follow a predefined route, but modifies and updates the route, which allows not only less travel time but also fewer kilometres travelled. This model, which emerged from the discussion, was immediately complemented by navigation applications:

- Creating dedicated mobile apps for passengers that do not only offer information on available autonomous vehicles, but also provide a travel planner, route information and information on current delays.
- Installation of digital information panels at stops and on board of vehicles that provide passengers with up-to-date information on route, arrival, and other relevant data.
- Another interesting proposal pointed to the coordination of transport systems that would be automated. The coordination of multimodal mobility controlled by artificial intelligence was one of the examples addressed. One of the debate participants suggested the subsequent model as a service that automatically manages people's daily routine: when a means of public transport (train or bus) is delayed, the alarm clock automatically adjusts the wake-up time because, due to rush hour, the delayed means of transport arrives at its destination at the same time as the next scheduled service. Most of the other participants in the discussion agreed with the use of this service.

Partnership agreements and stakeholder communication: On this theme, the discussion centred on community involvement: involving user groups in the process of developing and testing autonomous transport solutions, ensuring that their views are taken into account when designing new services. Working together with the non-profit sector and establishing partnerships with non-profit organisations that address the needs of the elderly, disabled or other specific groups can contribute to a better understanding of the needs and wishes of these groups.

<u>Incentivisation and nudging:</u>

- Free of charge
- Safety driver on board
- Shuttles' schedules adjusted to public transport timetables
- No prior booking, ride on the spot
- The main value of the service is its novelty: it is exciting and new.
- The technology park route is 1,5 km and quite hilly, so there the shuttle can be an alternative.

4.8 The Netherlands: Brainport

In accordance with the SHOW project plan, TNO developed the planned functional C-ITS development for traffic lights in WP7 to be used in WP12 demonstration activities. Unfortunately, the planned demo could not take place due to the withdrawal of the bus by VDL and because it was not possible to obtain a permit to drive on the public road due to strict regulations. Several other pilot options were pursued in Belgium and Luxemburg but they did not enter into operation. In the end, a successful demo event was organized in Helmond at the Automotive Campus, using TNO's Carlabs.

The pilot in a nutshell:

- C-ITS for safe intersection crossing of AVs
- Target passengers: campus employees and visitors
- Local ecosystem: TNO (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek) (SHOW partner) and city of Helmond, Brainport region, VDL Bus & Coach (external partners)

Main communication & dissemination channels and tools deployed in Brainport:

- Press: press coverage of demo events (see below)
- Videos: a video is available on YouTube (here)
- Letters, calls, e-mails: used for targeted recruitment of pre-demo participants

Main engagement activities planned/ conducted in Brainport:

- 19.10.2021: **SECREDAS project final event** (link): Automated driving functionalities demonstrator to decision-making authorities and regulators
- 11.11.2021: **TNO user tests**: The developed technology – C-ITS development for traffic lights – has been integrated in the TNO Carlabs and those vehicles equipped with it were validated at Aldenhoven in November 2021 as a pre-demo activity (to be transferred to future PT vehicles). Also, in-depth user tests were carried out and analysed in a study on this functionality, providing valuable feedback on the user perspective for crossing intersections with C-ITS enhanced speed adjustment.
- 20.01.2024: **Demo site event** at the Automotive Campus in Helmond, jointly organized by SHOW and MOVE2CCAM projects. Around 250 people participated, among them a large group of people living in the Brainport region that are employed in the automotive sector (Figure 98, Figure 99).

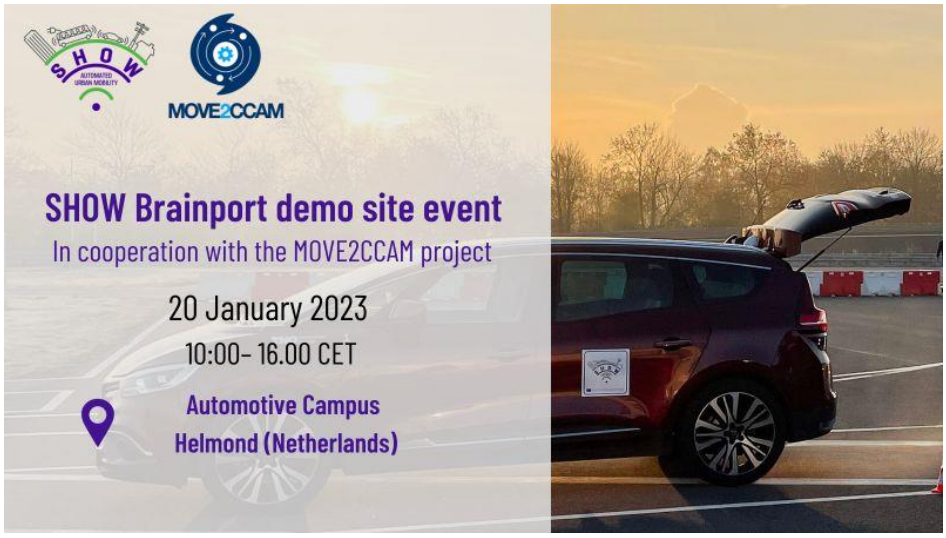

Figure 98 - Brainport - Announcement demo site event *(2023 should be 2024)*



Figure 99 - Brainport - TNO open day (bottom photo by Dit is Helmond)

Between 10:00 and 16:00, visitors could take a ride in a self-driving car and engage with experts on the current state of the art and future innovations in automated mobility. Two routes were set out. The event proved a unique opportunity to watch and experience impressive demonstrations with various demo vehicles: a passenger bus, a shuttle for four to six people, a self-driving cart that delivers parcels and a couple of TNO test cars. Coffee, drinks and soup were also provided.

TNO demonstrated the functionality for safe intersection crossing with C-ITS, developed as part of SHOW, to a wide audience. People were invited to take a seat in a CCAM test vehicle, the system was explained to them and they could experience various traffic light scenarios, with the CCAM vehicle gently stopping when the traffic light was red. The majority of the feedback from the participations was that they felt comfortable and safe, which is a positive assessment of the developed technology. In addition to the test drives, a presentation with more in-depth information was made about the technology and driving strategies that were demonstrated. The event was covered in the Dutch press, via Dit is Helmond and Het Eindhovens Dagblad.

Incentivisation and nudging:

- Service free of charge
- Safety driver on board
- People transport fixed route, scheduled or DRT (depending on demand)

4.9 Italy: Turin

The pilot in a nutshell:

- Automated shuttles for passengers transport on complex urban roads
- Target passengers: any passenger >18 who accepts to take part in the experimentation
- Local ecosystem: LINKS Foundation, GTT (Gruppo Torinese Trasporti), Swarco Italia srl (SHOW partners), MILLA, Padam mobility, 5T srl (Tecnologie, Telematiche, Trasporti, Traffico, Torino), TTS Italia (Telematica Trasporti e Sicurezza) (subcontractors) and Città di Torino, Città della Salute e della Scienza di Torino (City of Health and Science), Reale Group, TIM (Telecom Italia), Gruppo Iren (external partners, supporters)

Main communication & dissemination channels and tools deployed in Turin:

- Printed materials: stickers, posters and billboards at the bus stops, inside the hospital, at local businesses; flyers to be distributed among pedestrians, in businesses along the route, in schools involved, to local residents; bilingual brochure (Figure 100, Figure 101)
- Press: presentation of the shuttles to the press (14.07.2022), resulting in a lot of media attention; joint corporate press release, hospital press office also involved; launch event before the opening of the services to the public
- Videos: video is available on YouTube here (pre-demo)
- Website and social media: website and social media channels of LINKS and partners involved in Turin (Facebook, LinkedIn, Twitter/ X, Instagram)
- Letters, calls, e-mails: e-mail with the support of the general management of the City of Health and Science to involve health care staff and volunteers was prepared and planned, but not diffused since the experimentation didn't enter into operation.
- Other: promotion on GTT traditional buses was planned, but did not start since the experimentation didn't enter into operation.

Figure 100 - Turin - Roll-ups at the presentation event (14.07.2022)

Figure 101 - Turin - Flyer

Main engagement activities planned/ conducted in Turin:

Due to numerous unexpected events related to the Turin pilot (Navya's withdrawal from the consortium, and the subsequent substitution by the MILLA fleet), the authorization process was delayed, and so were the demonstration activities. In September 2024, the ministerial authorization for the MILLA fleet had still not arrived, so operations did not start. In any case, during the planning phase, several engagement activities had been foreseen, as described below.

Turin's engagement plan foresaw the involvement of different categories of people:

- Employees, personnel and visitors of the hospitals located in the target area, with the support of the management of the hospital;
- Students (over 18) of high schools in the target area, and university students of the city of Turin;
- Supertesters (details below), involved thanks to the support of their professors;
- Employees of enterprises interested in taking part in the experimentation;
- Shops and commercial activities;
- Anyone else interested in taking part in the experimentation.

The following activities were foreseen:

- Press event and press release to launch shuttle operations;
- Workshops with Supertesters;
- Contests for the involvement of primary and secondary schools of Turin;
- Workshops with associations of people with disabilities and the elderly in Turin;
- Corporate tours on the shuttles;
- Activities involving hospital staff and visitors;
- MAMCA workshop;
- Replication workshop (i.e. sharing lessons learned with Italian municipalities).

Launch event: On 14. July 2022, SHOW partners presented two driverless 'auTOnomo GTT' shuttles in Turin: the first autonomous public transport pilot in Italy, in the presence of Chiara Foglietta – Turin City Councilor for Transport and Digital and Ecological Transition – and Guido Nicollelo – head of GTT Strategies –, announcing the start of the trials on 26. July *(which were then postponed)* (Figure 102).

Figure 102 - Turin - Launch event (14.07.2022)

Another launch event to kick-start public demonstrations with the new MILLA fleet was foreseen to be held at MAUTO (National Automobile Museum of Turin). An agreement between LINKS and MAUTO has been signed to promote the autonomous transport service to visitors of the museum, close to the authorized circuit. A large amount of people would have been invited, including representatives of the Ministry of Infrastructure and Transport, all partners/ subcontractors/ supporters, the SHOW Project Officer, the mayor of Turin, the deputy mayor in charge of mobility, the President of the Piedmont Region, … The event would have been divided in two parts: an 'indoor' presentation of Turin SHOW experimentation, followed by an 'outdoor' test ride. The event did not take place as demonstrations could not start.

Workshops with Supertesters: 30 university students from different academic backgrounds were recruited as 'Supertesters' with the support of their professors. These Supertesters were expected to use the autonomous shuttle service for at least 20 trips per month. This regular use was designed to test the shuttles and investigate areas of improvement, from route efficiency to customer interaction. In parallel, the Supertesters would participate in monthly workshops, to voice their experiences and collaborate on developmental strategies. These sessions aimed to harness the testers' firsthand insights to foster improvements and innovate future services. This initiative not only stood to refine the autonomous shuttle offerings, but also to enrich the students' educational journey by integrating their academic pursuits with practical, real-world applications. As a sign of appreciation, Supertasters would receive Amazon coupons, to encourage their ongoing feedback and support. LINKS has prepared, with the support of a legal team and of the DPO, all the rewarding strategy mechanisms. But, since the experimentation did not start, Supertesters' activities did not either.

Contests for the involvement of primary and secondary schools of Turin: Two contests have been disseminated with the support of ITER (Istituzione Torinese per una Educazione Responsabile, an institution of the city of Turin that enables the communication with the schools of the municipality):

- for primary schools: Draw your own shuttle. Some illustrations received would have been displayed inside the test shuttles indicating the class and school; no reference would be made to individual children. The most appreciated illustrations would remain on display for the duration of the experiment.
- for secondary schools: Give a name to the two autonomous shuttles. All the proposed names would have been part of the shortlist of proposals that, together with those deriving from the project local partners, would have participated in the final selection.

The winner of the primary school contest Draw your own shuttle was class 3A of the Istituto Comprensivo Sandro Pertini in Turin, with the illustration below (Figure 103). The second contest, for secondary schools, has been diffused but feedback from schools hasn't been received in time.

Figure 103 - Turin - Winner of the drawing contest

Workshops with associations of people with disabilities and the elderly in Turin: In collaboration with the Disability Manager of GTT, LINKS Foundation organized a series of workshops that brought together representatives from various disability associations. The objective and outcomes can be summarized as follows:

- 24.05.2024: initial meeting with spokespersons from associations of people with disabilities and elderly people, aiming to identify current mobility needs – emphasizing safety, autonomy, and effective communication – , which would serve as a basis for finding solutions
- 31.05.2024: second meeting with spokespersons from associations of people with disabilities and elderly people (around 14 participants), focusing on suggestions to include in guidelines for an accessible and user-friendly urban mobility in the future. Main topics that came up in the discussion were onboard assistance personnel, accessibility and usability of infrastructure (vehicles, stops), importance of co-designing solutions and dialogue.
- 04.06.2024: workshop with a group of Turin citizens aged over 64. Participants highlighted the importance of reliability, safety, and accessibility. They emphasized the need to increase metro and tram lines, introduce autonomous vehicles, and better regulate shared vehicles. There was a strong desire for education and awareness on sustainable mobility, with the goal of making the city more accessible and livable for everyone.
- 11.06.2024: workshop with a group of 5 people with various sensory impairments (visual and/ or auditive, four men and one woman). The meeting underscored the importance of accessibility, clear communication, and human interaction for sensory-impaired users in public transportation. Participants emphasized the need for better signage, consistent interior layouts of vehicles,

and involvement in planning. The future of mobility includes a strong interest in autonomous vehicles, with preferences for both individual and collective use, provided that infrastructure and safety measures are in place.

- 27.06.2024: final meeting with all the associations and citizens (18 people), presenting to all the key outcomes of the meetings held so far, and proposing solutions, such as: education campaigns on the road code and use of mobility apps for people with disabilities, adjustment of bus shelters, ramps at each stop, increased door closing time, and integrated multisensory communication. Since the AV service had not started, volunteers could not test the shuttles, which was originally planned in order to collect further feedback.
- 16-17.09.2024: focus groups for GTT personnel in anticipation of their participation in future CCAM experiments to be conducted in Turin area

Figure 104 - Turin - Workshop with elderly citizens (31.05.2024)

Corporate tours on the shuttles were considered by the site coordinator, who has been contacted by several companies willing to take part in the experimentation. Since the experimentation did not begin, the involvement of companies was limited to recording their contact information.

Activities involving hospital staff and visitors: Within the agreement between Fondazione LINKS and Città della Salute e della Scienza of Turin, promotion of the use of AV services to the hospitals' employees had been granted. The AV service hours (Monday to Saturday from 2:00PM to 5:30PM) had been tailored to align with the staff shift changes at the hospital premises, effectively covering the shift change of the employees at 3:00PM. The proposed collaborative actions included:

- Digital integration: direct link or QR code on the Città della Salute e della Scienza website that redirects to the shuttle service app download page; additionally, the facility would host detailed information about the project on its website to inform and encourage participation among visitors and staff.
- Promotional campaigns: distribution of flyers, placement of posters in high-traffic areas such as waiting rooms and corridors, use of the institution's social media, showing promotional videos on screens throughout the facilities.
- Direct employee engagement: through the internal mailing list, intranet, and other internal communication channels, all employees, whether clinical or non-clinical, would be directly informed and encouraged to participate.
- Participation in the MAMCA workshop.

Dissemination among professional audiences, including research and academia a.o. through publication of papers and participation in conferences, such as:

- 09.2021: 10th International Congress on Transportation Research (ICTR 2021), presenting the paper 'Drivers and barriers to autonomous mobility: lessons learned from an Italian pilot experiment'
- 30.05-01.06.2022: 14th ITS European Congress in Toulouse, presenting the paper 'TM2.0 evolution towards multimodality: Turin SHOW Pilot'
- 11.2022: SHOW represented at Turin Biennale Tecnologia
- 19.04.2023: presentation of SHOW at the event Smart & Green Mobility: Turin meets Leipzig organized by LINKS Foundation. LINKS hosted representatives of the Leipziger Aus- und Weiterbildungsbetriebe (LAB) active in the vocational training of apprentices and new employees of the Leipzig local transport company (LVB). About 20 people joined the meeting, coming from LAB (Leipzig), the city of Turin, GTT, 5T, and Politecnico di Torino.
- 22.05.2023: 15th ITS European Congress in Lisbon, presenting the paper 'The use of dynamic lane reservation for autonomous shuttles in urban traffic'
- 01.12.2023: Visit of Councilor Chiara Foglietta
- 26.01.2024: Visit of Uni3 Nichelino
- 21.03.2024: Visit of (about 30) students of IED (European Institute of Design)

Incentivisation and nudging:

- Connected to metro station
- Free of charge
- Safety driver on board
- Comprehensive publicity campaigns were planned to raise awareness and highlight the benefits of the service, its availability, and how to use it.
- Opportunity to experience experimental cutting-edge technology firsthand
- User experience prioritised by ensuring a convenient, reliable and easy to use service
- Incentives and rewards offered to Supertesters (see above)

4.10 Greece: Trikala

The pilot in a nutshell:

- On-demand automated mobility as a complement of public transport in suburban areas and delivery services in pedestrian areas
- Target passengers: employees of the municipality and e-Trikala, students of the university and military school, people living in the villages Flamouli and Karyes; elderly people and families
- Local ecosystem: ICCS (Institute of Communication and Computer Systems), CERTH/ HIT (Hellenic Institute of Transport), University of Genoa, e-Trikala (SHOW partners) and SuburVAN, Yape, city of Trikala, Vodafone (external partners)

Main communication & dissemination channels and tools deployed in Trikala:

- Printed materials: leaflets, posters and banners
- Press: several press releases and press events were done; national media attention for the passenger pilot launch (21.04.2023) on ERT (video here), Athens Macedonian news agency (video here), the Greek magazine 4 troxoi (article here) and epixeiro.gr (article here); broad international, European and national media/ press covering the Christmas activities, such as on Insurancedaily.gr (article here) and amna.gr (article here) plus an interview with the chief executive of e-Trikala (video here); article announcing Trikala operations in general on ethnos.gr (article here) and ot.gr (article here), article announcing Trikala's final event (here)
- Videos: video is available on YouTube showing the autonomous SuburVAN vehicle (here) and the Yape delivery robots (here). A new video with the SuburVAN vehicles has been released here.
- Website and social media: website and social media of e-Trikala, Municipality of Trikala; mentioning of SHOW in Ertico's newsletter, ICCS newsletter; E-trikala has multiple social media accounts: LinkedIn , Facebook, Twitter/ X
- Letters, calls, e-mails: targeted recruitment of pre-demo users, e-mailing to University of Sports Science to inform the students, e-mails to stakeholders

Main engagement activities planned/ conducted in Trikala:

- 29.11.2022: 4-hour workshop with **high school students** (around 30 people) at the GiSeMi HUB of the city of Trikala, aiming to raise awareness of CCAM among youth and to discuss opportunities and challenges

Figure 105 - Trikala - Workshop with students (left) and launch logistics pilot (right)

- 08.12.2022: **Launch of the logistics pilot** at the GiseMi HUB of the city of Trikala, with around 30 participants, representing different stakeholders from the local ecosystem. In particular, personnel from different departments of e-

Trikala were present, public employees from the Municipality of Trikala, political advisors to the mayor, as well as staff from the Smart Trikala Team. In addition, the academic actors (ICCS) were involved as pilot leaders as well as various actors from the industrial sector including automobile manufacturers (SuburVAN, Yape), automotive suppliers (University of Genoa) and ITS solutions (Space Hellas SA).

- 09.12.2022-05.01.2023: The Yape droids were showcased during Trikala's **Christmas festival 'Mill of Elves'**, visited by more than 1.000.000 people (tourists, children, families). In Trikala's Thematic Christmas Park, Yapes collected children's Christmas letters from the Elf Post Office and delivered them to Santa's house. A dedicated wooden path was constructed specially for the Yapes to reach Santa's house. This has increased the publicity and visibility of the project.

Figure 106 - Trikala - Delivery of Christmas letters in Trikala

- 09.12.2022-05.01.2023: Presentation of **history of automated mobility** and showcasing the different automated vehicles at the **'Mill of Elves' festival**. A banner (see Figure 107), placed at the entrance of the festival, informed visitors (1.000.000 attended the festival) about the history of CCAM in the EU context, adding the results of SHOW at the end.

Figure 107 - Trikala - Banner of automated mobility history

- The second use case focused on **delivery of items from the Town Hall to local retailers** for daily refilling. Yapes collected coffee residuals from coffee shops in the area, and afterwards the service continued with the delivery of newspapers (both to/ from the control room). Thus, the pilot could collect first-hand experiences in order to implement relevant changes for a smooth user experience, with the aim of future commercial deployment.
- To showcase the great achievements of Trikala, it was awarded the 'Delivery Robot Excellence Award' within the SHOW project.

Figure 108 - Trikala - Yapes serving local businesses

- 21.04.2023: **Launch event for the passenger use case** (announced on Trikala's website here), in the context of a larger Conference organised by the Municipality entitled Trikala 2030 aiming to foster climate neutrality in the city of Trikala by 2030. A great number of stakeholders (around 400) from the research, transportation, industrial sector and political scene participated in the event. Representatives from e-Trikala, the Municipality of Trikala, CERTH, ICCS, UNIGE and all stakeholders presented above were present in the event. Citizens groups participated as well as elderly people, youth, University students and civil society.

Figure 109 - Trikala - Launch passenger use case (21.04.2023)

- 09.09.2024: **Final SHOW event in Trikala and replication roundtable for the pilot in the city of Trikala** (announced on Trikala's website). A great number of stakeholders (around 70) from the research, transportation, industrial sector and political scene participated in the event. Representatives from e-Trikala, the Municipality of Trikala, CERTH, ICCS, Taxi Association, Region of Thessaly, City of Veria, Dimokritus University of Thrace, Youth Council from the city of Trikala, SuburVAN and additional local stakeholders presented above were present. Citizens groups participated as well as elderly people, youth, University students as well as the civil society.

Other engagement activities worth mentioning:

- Trikala's **living lab** is engaging different social groups actively in ongoing research projects such as SHOW, which is happening on a continuous basis.
- Consultations with the **Ministry of Transport and Networks** have taken place during the whole lifecycle of SHOW project. These consultations were informal discussions with the Ministry of Transport on the progress of CCAM and the legislation in the European context.

- 03-04.05.2023: Participation in **EUCAD** (Brussels)
- 22-24.05.2023: Participation in **ITS Europe** Congress (Lisbon)
- 25-27.10.2023: Participation in the Conference **Major Cities of Europe**

Figure 110 - Trikala - Final event

Incentivisation and nudging:

Passenger service:

- On-demand passenger transport service in a part of the city that is currently underserved by public transport
- The service is attractive due to the frequency of the routes in this new line proposed as well as the personalized on-demand service and friendly on-line booking system (see Figure 111).
- Safety driver on board for the initial stages (mandatory)
- Free-of-charge service
- Smart traffic lights integration for green wave implementation
- Major POIs defined as bus stops (train station, thematic park, University)

Logistics service:

- Operation in the pedestrian area of the city centre, free of charge
- Delivery of small parcels and goods to local stakeholders via a dedicated customer application

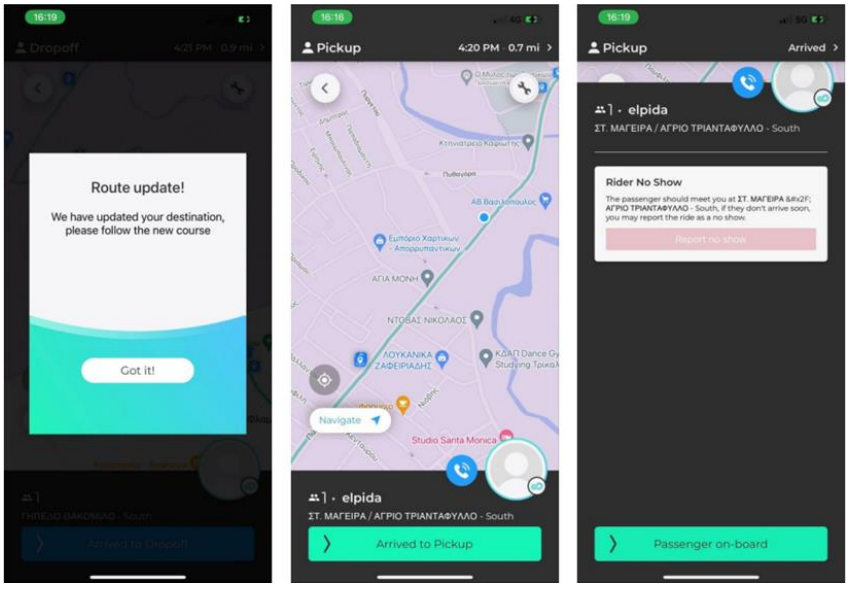

Figure 111 - Trikala - Booking application

5 Ideathons

Ideathons – co-creation workshops with citizens and core stakeholders – are conceived as creative brainstorming sessions focusing on end-user needs. An Ideathon brings people from various backgrounds together to create innovative ideas within a certain period, which can range from a few hours to several days, usually focusing on a specific topic or challenge. Individuals or teams brainstorm, discuss and refine their ideas, before presenting them to a jury or panel of experts. Participants are encouraged to think outside of the box in an environment that stimulates creativity. Ideathons provide a platform for networking, skill building and the development of viable concepts that can be further developed into effective solutions or projects.[16]

In total, three Ideathons were organised in SHOW. The first one took place online (15.01.2021) due to Covid-19 restrictions, the other two were on-site events: one was organised by SHOW partner SURAAA (Carinthia, July ’23), while another was organised by SHOW coordinator UITP and the University of San Francisco (March ’23), with the additional support of EPF on site.

5.1 Online Ideathon (15.01.2021)

On 15. January 2021, the first SHOW Ideathon took place (online, using Microsoft Teams), organized by ERTICO and EPF, with the support of CERTH, UITP and Eurocities. In total, 39 people attended the event. This included both SHOW partners and people from outside the SHOW consortium. A diversity of stakeholder groups was represented (see Figure 112 - Ideathon - Participants per stakeholder group (not including the organizing team) – with special focus on end-user representatives as we wanted to ensure that the solutions developed in SHOW benefit end-users and take into account their needs.

[16] M. Sakiyama, N. Fujii, D. Kokuryo and T. Kaihara, “Visualization of group discussion using correspondence analysis and LDA in Ideathon”, Kobe University, 1-1, Rokkodai-cho, Nada ward, Kobe city, Hyogo prefecture, Japan, 2020, Elsevier B.V.

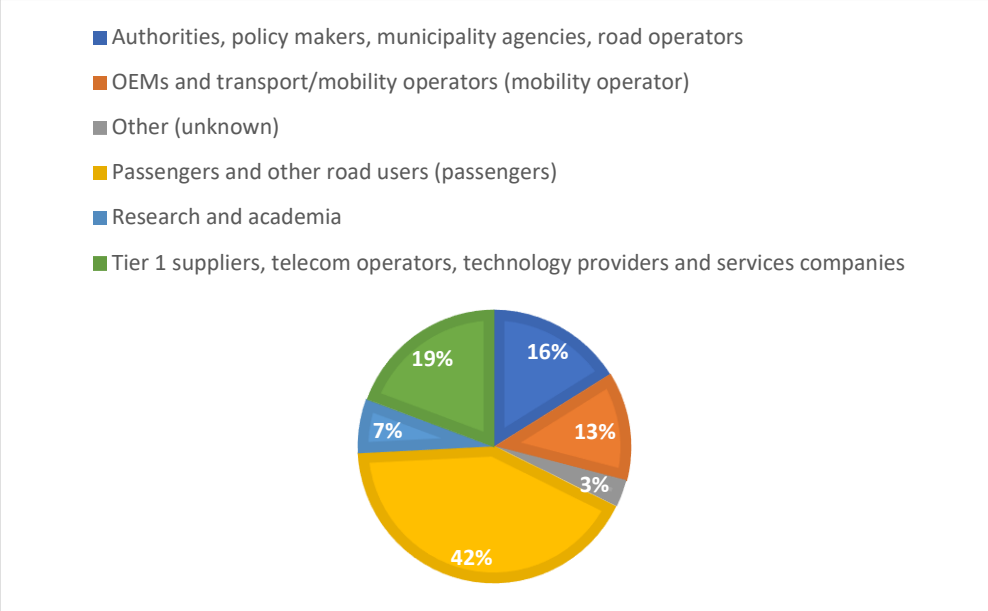

Figure 112 - Ideathon - Participants per stakeholder group (not including the organizing team)

The agenda was as follows:

Time	Agenda item
09:30 - 10:15	Welcome & Introduction to SHOW End-user expectations and needs Today's scenarios and challenges
10:15 - 10:20	Coffee break / find your session
10:20 - 11:15	Parallel sessions – Brainstorming • *Driverless shuttle for first/last mile* • *Door-to-door delivery of persons and goods* • *Mass transit with driverless buses* • *Shared on-demand Robotaxis*
11:15 - 11:30	Coffee break
11:30 - 12:15	Plenum session – Enrichment of ideas
12:15 - 12:30	Conclusions and closing

Figure 113 - Ideathon agenda

After a short introduction to the SHOW project, we launched a few 'warm-up' questions using SLIDO (*What do you think are the main benefits that Automated Vehicles can bring for end-users? & In your opinion, what are the most important user needs to address in order to obtain or improve user acceptance of Automated Vehicles?*).

The results of these polls are presented below.

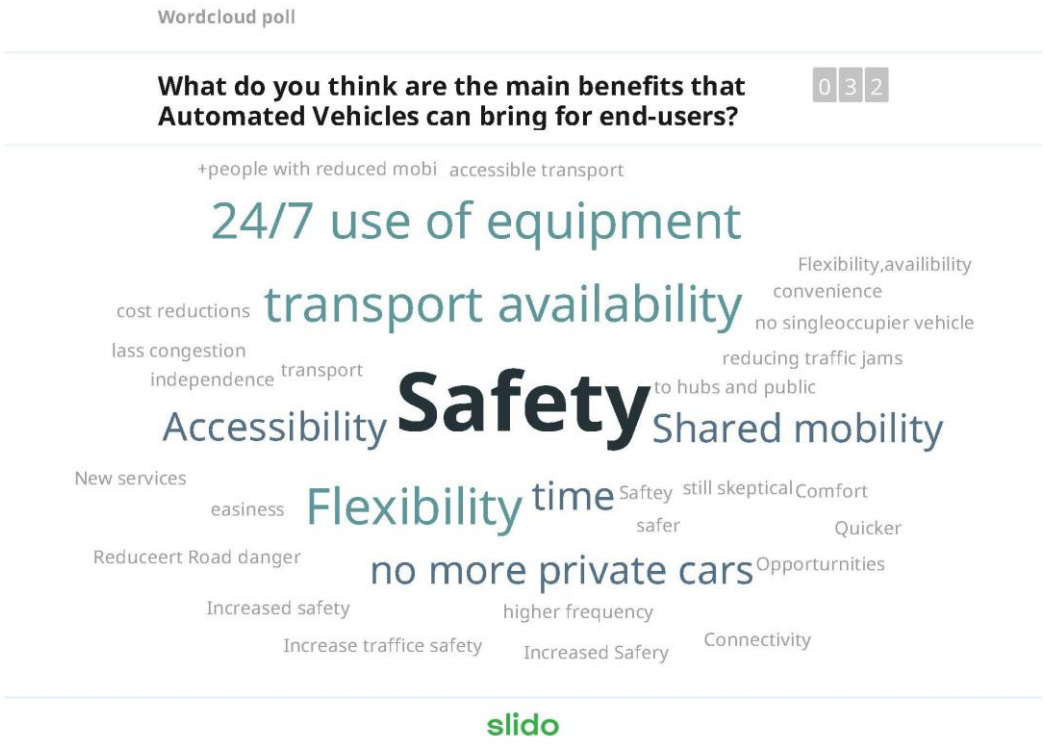

Figure 114 - Poll results 'What do you think are the main benefits that Automated Vehicles can bring for end-users?'

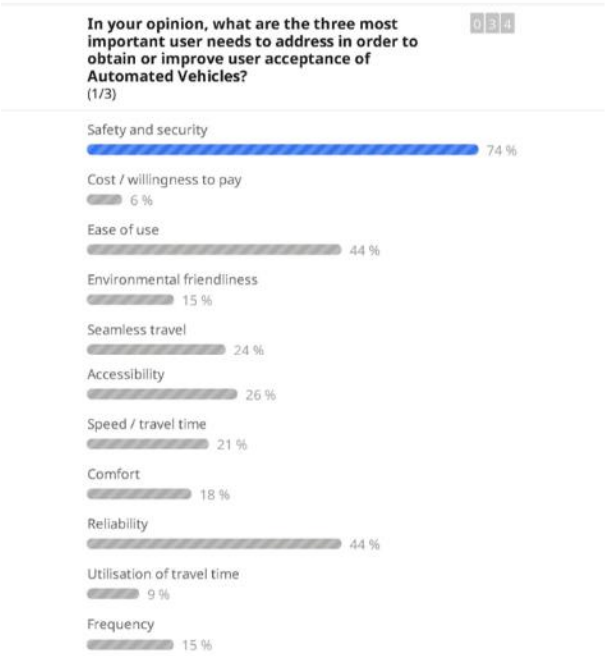

Figure 115 - Poll results 'In your opinion, what are the three most important user needs to address in order to obtain or improve user acceptance of Automated Vehicles?'

Participants were informed about what would be done with their input: The plan was that the best ideas (in terms of potential overall and potential to be deployed further in SHOW) would function as input to successor 'Hackathons' in which we would work on realizing these ideas in practice as prototypes.

Then, we presented four 'scenarios' (cf. below) that would be the topics of the parallel brainstorming sessions, as well as four 'mobility personas' which might help to envision different user profiles when thinking about user needs in the different scenarios.

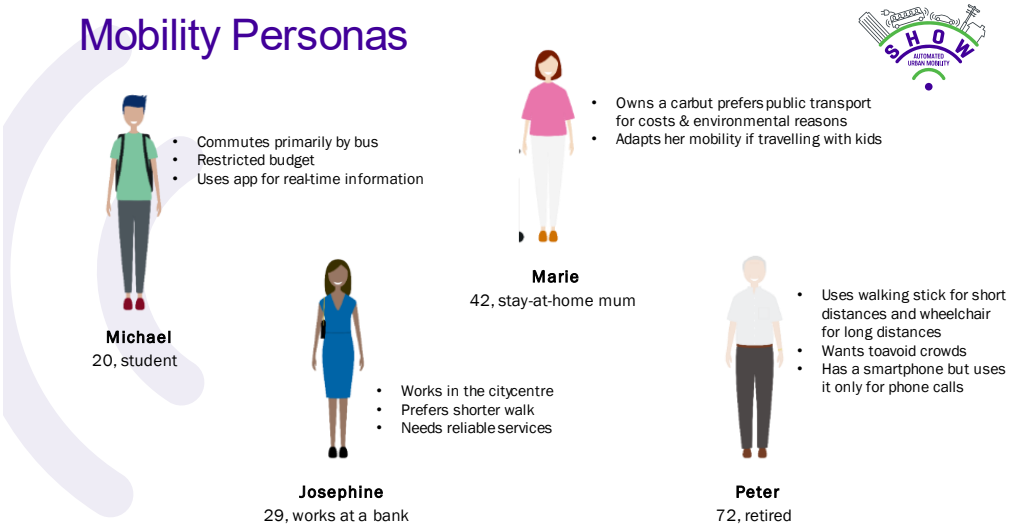

Figure 116 - Mobility personas used in the SHOW Ideathon ('Mobility Personas for Singapore' by Penny Kong is licensed under CC BY-NC-SA 4.0)

After a short break, participants were asked to move to their parallel sessions (to which they had been assigned beforehand to ensure an optimal balance of stakeholder group representatives per session). Four scenarios were discussed:

- Driverless shuttle for first/ last mile (moderated by EPF)
- Door-to-door delivery of persons and goods (moderated by UITP)
- Mass transit with driverless buses (moderated by Eurocities)
- Shared on-demand Robotaxis (moderated by CERTH).

Each break-out session followed the same procedure:

- Tour de table: Participants were asked to briefly introduce themselves
- Wild question: *Imagine your future in 10 to 20 years. What would mobility look like by then?*
- Presentation of the scenario in some more detail
- Considering the scenario from the end-user perspective, in terms of user needs (with special focus on: safety; ease of use; environmental impact; transport equity/ inclusion/ accessibility; speed/ travel time).

After the break-out sessions, all participants moved back to the plenary for the 'enrichment' phase, in which selected ideas from each brainstorm session were discussed in more depth. Some questions for guiding the enrichment were:

- Does the solution take into consideration special needs of users?
- Does the solution imply new forms of interaction between different users or stakeholders?
- Is the solution easy to use for all users?
- Are there any barriers that might prevent the users' acceptance of the solution?
- What potential improvements would you suggest?
- Which other applications would you see?

After the Ideathon, the SHOW team assessed all ideas in terms of i) their impact on user experience and user acceptance; and ii) their feasibility, business potential and potential for SHOW. In the end, we picked three 'killer ideas' to be taken forward.

BREAK-OUT SESSION 1: DRIVERLESS SHUTTLE FOR FIRST/ LAST MILE

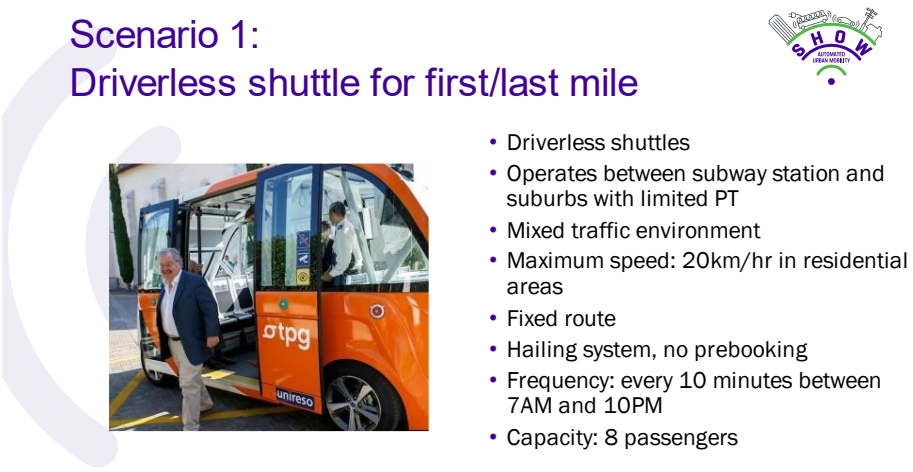

Figure 117 - Scenario 1: Driverless shuttle for first/ last mile

The main topic addressed in this session was (perceived) safety and, related to this, the need for (human) assistance when something goes wrong. People may not feel safe using an AV if there is no one on board to ask for help if needed. Lack of assistance may deter especially elderly people or PRM from using AVs. Something might go wrong, for example: a blind person loses orientation because stops are not correctly announced; due to deviations (e.g. roadworks) the shuttle may stop at another point, ... In such cases, support is needed. So, the question is *HOW can we give people the support that they need?* It was stressed that there should be some not-only-technological communication. Different solutions were proposed.

24/7 surveillance + human assistance

- Cameras on board can monitor 24/7 what's going on; if something is wrong (AI can detect e.g. someone lying on the floor) then a person in the control center can talk to passengers through the on board speakers or send help.
- Cameras can automatically detect people at risk of having issues, e.g. elderly people, and the supervisors can then pay special attention to them.
- It was noted that AI may be 'biased': tests in airports have shown that very short people or people in wheelchairs were not recognized as such because the bots detected only persons with a specific height. AI should also take into account 'non-standard' behavior e.g. taking longer to board than average.
- In addition to remote control, there should be a 'perambulating supervisor' stand-by (e.g. using a motorbike or golf cart) to provide quick assistance if needed. This was considered feasible because shuttles operate in a small area.
- Privacy concerns? GDPR rules must be followed. There seems to be a general acceptance of cameras on buses, so it was not seen as a big barrier.

Pre-order help in advance

- This is the case currently, for example, in railway stations.
- If people order a ride on-demand, at the same time they can request support.
- Pre-ordering help means less flexibility, which is an important disadvantage.

- What if there is an unforeseen problem and no help is pre-ordered?

Call someone e.g. through a button

- For ex. in the Brussels metro, it is possible to call someone when stuck.
- A digital 'person' (AI assistant) could talk people through the process; there could be also a button to call the control center for more serious problems.

Universal design

- Vehicles should be designed in such a way that they are accessible to everyone (to avoid needing support in the first place).
- Stops must be accessible as well, and this is not easy in suburbs and very expensive, while serving a small number of people → feasible?

Tracking a person through an app

- Solutions like this already exist for children (parents can follow them).
- If booked through an app, the app can follow a user & detect if something goes wrong.
- Not everyone would like to be followed though.

Another topic addressed dealt with the question of how to familiarize people with the service and make them confident to use it. Again, several ideas came up.

A tutorial available at the stop or on board

- A short film inside the bus explaining how to use it (similar to the explanation of the emergency procedures on airplanes), i.e. a permanent tutorial
- Such a tutorial should be available in different formats: visual, auditive, a booklet, … to address the needs of different groups (children, elderly, PRM).
- Some groups really need information to create trust, e.g. blind people need to know how they can get the shuttle to stop for them, or wheelchair users need to know how to operate the ramp in order to be able to get on.
- On the other hand, it was noted that the more information you give, the more complicated it seems. Using the service should be intuitive and a minimum of information should be provided. Information should be available but does not need to be everywhere because it could confuse the journey for everyone else.
- Finally, it was stressed that technological solutions should be accessible also to people without smartphone and/ or credit card.

Other ideas to familiarize people with the new service

- A travel coach or buddy (either a professional or a volunteer) can accompany passengers (esp. PRM) in the beginning and help them, answer questions, …
- Having a steward on board for the first demos will help overcome barriers.
- Training can be provided to learn how to use the service.
- Open days could be organized, so people can try out the service.
- To ensure ease of use, good signage is important. For example, if you need to push a stop button then it should be very visible where it is.

Finally, some ideas came up that were related to speed/ travel time.

- Is speed important? There was no consensus on this. On the one hand, yes: people want to move from A to B and (especially in Covid-19 context) don't want to spend much time on a bus. In addition, in order for AVs to contribute to having less cars on the road, they must be faster. And in mixed traffic AVs would cause traffic jams if they are too slow. On the other hand, no: comfort

(no sudden acceleration & braking, waiting to leave until people are seated) is considered more important than actual speed by some.

- PRM would take the shuttle even if it's slow; others might then prefer to walk (free). This has important policy implications, as we don't want a shift away from active mobility.
- Reliability is important – what about people taking more time to board (PRM) which could cause delays? Planning (resilience against unexpected events) is crucial!
- Dedicated lanes would be an option to improve speed.
- Dynamic speed limits depending on traffic flow also came up as a solution.

TWO IDEAS WERE CHOSEN TO MOVE ONWARD TO THE ASSESSMENT PHASE:

- **24/7 SURVEILLANCE + HUMAN ASSISTANCE**
- **TUTORIAL FILM ON BOARD.**

BREAK-OUT SESSION 2: DOOR-TO-DOOR DELIVERY OF PERSONS AND GOODS

Especially during the pandemic, online purchases have increased with more delivery vehicles on the road. Furthermore, door-to-door delivery implies that vehicles park everywhere in the city. This may reduce/ impact the sidewalk space and the traffic. At the same time, it was noted that during the lockdown, people stayed more in their own neighbourhood rather than travel all over the city. They turned towards local shops as well and purchased more local products.

Starting from this situation, **the idea came up for pick-up points in the neighbourhood**. This means that delivery AVs do not come to people's homes, but park in the centre of the neighbourhood (e.g., at the marketplace) on dedicated days for a specific duration. The duration and precise location are communicated to users via an app. Picking up a parcel can thus become an activity that brings people outside their houses, induces walking, enables gathering and socializing in the neighbourhood.

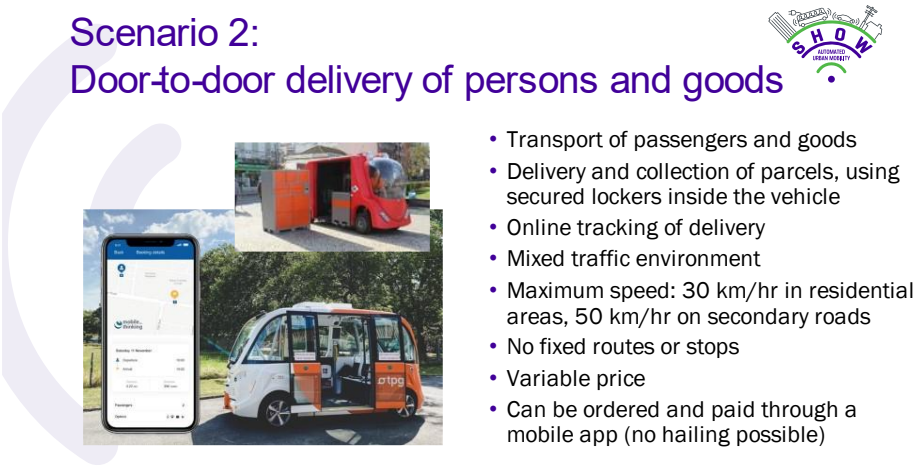

Figure 118 - Scenario 2: Door-to-door delivery of persons and goods

Pros:

- Especially in a pandemic situation, people want to go out, be active (even the elderly who should not be stigmatized) and socialize with the neighbours.

- Lockers on the AVs may enable more privacy rather than having someone coming to your home.
- If the delivery AV is at the marketplace, people could help each other to get the parcels. The human contact stays.
- Estimating arrival time of a delivery AV at the marketplace is more accurate as AVs don't need breaks and are slower than non-automated vehicles.
- Pick-up points would avoid that delivery vehicles are parked everywhere.

Cons:

- Not comfortable when it is raining
- Uncertainties on the time that people need to pick up the parcel, this may create unreliability of the service.

Things to be considered:

- Flexibility should be ensured through the ordering & delivery app (people should be able to choose when to pick up their parcel).
- Consider the time needed for picking up a parcel: How long does it take?
- How to manage no show of people? How long does the vehicle wait?
- Size of the vehicle: What is enough?
- Location of depots
- Timing of delivery: delivery in off-peak hours can cause extra noise when it usually is more quiet, which is not contributing to livability.

Apart from the idea for pick-up points in the neighbourhood, this session yielded some additional ideas as well:

- Some people will still need delivery at home. For users with specific needs, ***smaller AVs or robots could be used for the last mile***, or even as walking aid for people with disabilities.
- The AV ***could be multi-purpose*** and not only provide parcel delivery, but also for example contain a mobile library, a sweet kiosk, coffee machine, … A diversity of personalized services could be offered to cater to everyone's needs.
- The problem with deliveries today is that they are rigid; lack of flexibility lead to frustration. AV deliveries ***could be integrated into MaaS*** and provide a truly customizable and flexible solution that is user-centric and not profit-centric.

THE IDEA OF 'PICK-UP POINTS IN THE NEIGHBOURHOOD' WAS CHOSEN TO MOVE ONWARD TO THE ASSESSMENT PHASE.

BREAK-OUT SESSION 3: MASS TRANSIT WITH DRIVERLESS BUSES

Figure 119 - Scenario 3: Mass transit with driverless buses

The first main topic that was discussed in this session was how 'Mass transit with driverless buses' has the potential to adapt to increase/ decrease in demand in a flexible way.

Being able to adapt public transport capacity to peaks in passenger flow is an important prerequisite for providing reliable and convenient services to users. A sudden increase in demand can be caused by peak hour travel, but also by large-scale events (sports, culture, manifestations) or changing weather conditions. Lack of capacity may also arise when buses are not able to complete a scheduled service on time, due to congestion or technical issues.

Overcrowded buses have a negative impact on the travel experience of existing users, but also deter potential users; in addition, they have an impact on the wider public transport network as boarding takes more time, leading to delays and missed connections for passengers and increased operational costs on the side of the public transport operator.

PTOs prepare for planned peaks in demand by making sure they have surplus capacity in terms of vehicles and by adapting service frequency. This however also requires availability of extra bus drivers, which can be a complicating factor, especially during sudden increases in demand. Mass transit with driverless buses could therefore offer a cost-effective solution, as in theory ***it can provide the required additional capacity at short notice, and with reduced operational costs***.

The quick deployment of additional driverless buses also raises the question if the location, size and facilities of ***bus depots*** need to be reconsidered. Bus depots typically combine parking accommodation, servicing and maintenance facilities for vehicles, administrative functions and facilities for staff. As automated buses do not depend on bus drivers to start the service, they could in principle be stationed at strategic points along the route to provide extra capacity where needed. As they are expected to run on alternative fuels, also proximity to charging/ fuelling infrastructure will need to be considered. To be explored in the next phase:

- Is this idea based on valid assumptions?
- Are there ways to model the surplus of vehicles required?
- Does reduction in operational costs compensate the higher investment costs?
- Which practicalities need to be considered with regards to route planning, maintenance and stationing of vehicles?

- Can this idea be linked to the real-life demos, e.g., with large buses in Brainport Netherlands and Madrid?

The second idea was that driverless buses require prioritisation across the whole route.

High frequency bus transit ideally runs on separate infrastructure, including dedicated lanes, platforms and signalling systems (Bus Rapid Transit). As such they can provide a reliable, fast and safe alternative to car use, similar to metro or tram. Most high frequency bus services however are only partly operated on separate infrastructure, as their routes often continue into peri-urban and rural areas.

In the case of driverless buses, the potential impact of vehicles getting blocked – by congestion, double-parked vehicles, urban freight delivery, road works or incidents on the road network – becomes an even higher risk as it is yet unclear to what extent they will be able to adapt to these situations, for example by performing certain manoeuvres or by choosing alternative routes.

As the building of dedicated infrastructure represents a major investment and urban space is limited, the challenge related to this scenario is to ensure priority across the whole route. This could be partly achieved by making smart use of the communication and navigation technologies with which driverless busses are equipped, allowing them to influence traffic lights, claiming right-of-way at junctions, or by notifying other vehicles/ drivers on the road ahead.

To be explored in next phase:

- What can be done to guarantee priority for driverless buses providing mass-transit services across the wider urban area?
- What interventions would be possible in terms of technology, planning, infrastructure and regulation, interaction with other vehicles?
- Can this idea be linked to the real-life demos, e.g., with large buses in Brainport and Madrid?

The third idea is to ensure accessibility, audio-visual messaging and assistance for PRMs across the whole trajectory.

In order to provide automated mobility for all, also large driverless buses will need to ensure PRMs (Persons with Reduced Mobility) have easy access to vehicles, infrastructure and service information throughout the whole trajectory. Within the city, high frequency/ high-capacity busses will usually run on dedicated lanes with adapted platforms allowing for easy boarding, and provide audio-visual messaging that allows PRMs to travel independently and with confidence, maybe occasionally depending on the assistance of drivers or other passengers. This assistance might be required when picking up or dropping off passengers in peri-urban and rural areas, where bus infrastructure is often not providing the same level of quality, e.g. with bus stops that don't allow for level boarding or where the immediate environment creates potential risks (dangerous crossings, poor street lighting, potholes etc.), and where social presence and control is lacking.

One of the questions that will need to be addressed when providing driverless mass transit, is how PRMs can travel independently and conveniently across the whole trajectory, without being able to rely on occasional assistance from bus drivers. What happens for example if there's a gap between the platform and the vehicle and who will notify/ assist PRMs? Also: how can they stay informed about the trajectory, and what if there's an interruption of the service and no one else is nearby to help?

To be explored in next phase:

- What can be done to guarantee access and convenience to PRMs across the whole trajectory?
- In what sense do automated vehicles, infrastructure and support services need to be adapted?
- Is there a potential role for other passengers to provide support (e.g. social awareness campaign on Singapore public transport system)?
- What if a PRM relies on this support but no one is available?
- Can this idea be linked to the real-life demos, e.g., with large buses in Brainport Netherlands and Madrid?

Finally, it is worth to mention some other ideas that came up in this session:

- Not focus on BRT approach alone, keep flexibility of routes/ network in mind
- Need to consider wider integration in the transport system.

TWO IDEAS WERE CHOSEN TO MOVE ONWARD TO THE ASSESSMENT PHASE:

- **ADAPT TO INCREASE IN DEMAND IN A FLEXIBLE WAY**
- **ACCESSIBILITY, AUDIO-VISUAL MESSAGING AND ASSISTANCE FOR PRMS ACROSS THE WHOLE TRAJECTORY.**

BREAK-OUT SESSION 4: SHARED ON-DEMAND ROBOTAXIS

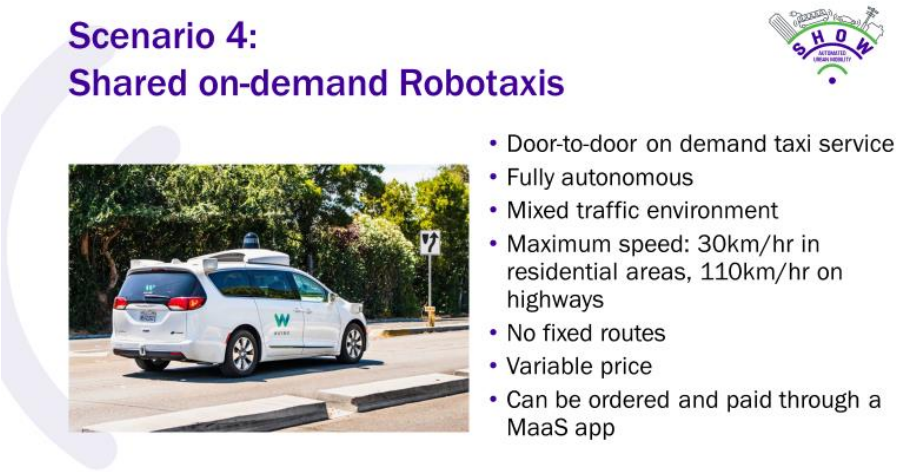

Figure 120 - Scenario 4: Shared on-demand robotaxis

The discussion in this session focused first of all on a new safety culture for AVs, i.e. improving the way safety is perceived (through training, awareness creation, familiarity of use through pilots).

Autonomous vehicles (AVs) are considered as the ultimate solution to future automotive engineering. However, safety still remains the key challenge for their development and commercialization. AVs are envisioned to reduce road fatalities by switching control of safety critical tasks from humans to vehicles (machines). Realizing safety benefits depends on various technological advancements, but at the same time on the scale and user rate of AVs adoption, which are influenced by the perceptions of the public. When we talk about perception, we refer to the ideas, practices, beliefs and values of (groups of) people. The term is also used frequently in the EC Independent Expert Report 'Ethics of Connected and Automated Vehicles' with respect to creating an ethical and responsible set of ideas, practices, beliefs and values among those involved in the manufacture, deployment and use of CAVs.

The alignment of the ***actual safety*** of the AV users, based on technical developments, pilot testing and different types of evaluations, and their ***feeling of safety*** is a basic issue to be addressed, in order for the public acceptance, uptake and market penetration of AVs to be facilitated.

For this to be achieved, the development of a new safety culture is needed, to be achieved through the participation and engagement of the users themselves. Improvements in safety by AVs should be ***publicly demonstrated*** and available to be ***monitored*** through solid and shared scientific methods and data, always in compliance with the respective ***ethical and legal principles*** (e.g., dilemma scenarios).

Individuals and the general public need to be adequately ***informed***, ***trained*** when possible (e.g., by participating in pilots and/ or demonstrations) and equipped with the necessary ***tools*** to exercise their rights and to actively and independently participate, understand, question and/or negotiate AVs types and levels of use and services.

Another topic discussed in this session was the shared use of Robotaxis.

In the proposed scenario, Robotaxis can be shared, which would lead to a reduction in cost and price. On the other hand, it was suggested to consider the possibility to provide this service to vulnerable users (e.g., people with disabilities) and in some cases – depending on their specific needs but also restrictions – not to allow its simultaneous use by other passengers. Such exclusive use of the vehicle might lead to a slightly increased fare as the cost will not be shared with other passengers.

Other ideas worth mentioning that came up in this session:

- Natural language (multi-language) interfaces through electronic personal assistants
- Turn AVs into 'mobile offices' (in combination with the trend of teleworking esp. now in Covid-19 context which may lead to other mobility schemes)
- Safety can be enhanced through AI and surveillance cameras in the vehicle. A recognition system can be introduced to access the vehicle (ID for every user).
- Need for dialogue between the service and the customer (for support) before and during the service
- The service needs to be easy to order, pay, and cancel.
- Payment must be modular, with different prices depending on user profile. For people with a disability and with a low income social support/ special prices could be needed.
- This service is part of a multimodal chain and can be cheaper when combined with a public transport ticket.
- Ensure that the service is accessible from the start by applying Universal Design principles
- Lower speed can be counterbalanced by high frequency, lower cost, and added comfort and services (e.g. infotainment).

TWO IDEAS WERE CHOSEN TO MOVE ONWARD TO THE ASSESSMENT PHASE:

- **NEW SAFETY CULTURE & IMPROVING PERCEIVED SAFETY**
- **POSSIBILITY FOR INDIVIDUAL USE OF ROBOTAXIS BY PRM.**

ENRICHMENT OF IDEAS - PLENARY

During the enrichment session, the most popular/ highly rated ideas from each of the break-out sessions were discussed in plenary in more depth. Some ideas came up in more than one session: the need for support/ (human) assistance especially when

something goes wrong, the need for services to be accessible to all users by applying Universal Design principles, the need to test with real users. The following ideas were selected in the enrichment to be taken to the next (assessment) phase:

- 24/7 surveillance + human assistance
- Tutorial film on board
- Pick-up points in the neighbourhood
- Adapt to increase in demand in a flexible way
- Accessibility, audio-visual messaging and assistance for PRMs
- New safety culture & improving perceived safety
- Possibility for individual use of robotaxis by PRM.

ASSESSMENT PHASE

Due to time restrictions, the assessment of the ideas was conducted separately, after the Ideathon, by an expert panel of SHOW consortium members (ERTICO, EPF, CERTH, UITP, EUROCITIES). Each idea selected from the Ideation (7 in total) was scored by our expert panel (consisting of one representative per organisation with various expertise and experience), in order to assess their potential impact on overall user experience and user acceptance. To guide this process, all participants in the assessment were asked to answer the following questions:

Table 4 - SHOW Ideathon - Assessment questions (1)

Topic	Question
Safety and security	Does the idea contribute to **higher safety**, i.e. less accidents, incidents, injuries while using the AV service?
	Does the idea contribute to a **higher perceived sense of safety and security** among passengers?
Cost/ willingness to pay	Does the idea have a positive effect on **cost** (lower cost)?
	Does the idea have a positive effect on **willingness to pay** (i.e. users willing to pay more for using the AV service)?
Ease of use	Does the idea have a positive effect on **ease of use** (i.e. through a better HMI, UX design, …)?
	Does the idea make it easier to **understand and use** the system for those unfamiliar with automation and/ or lacking digital skills?
Environmental friendliness	Does the idea have a positive effect on **environmental impact** (i.e. pollution, noise, energy consumption)?
Seamless travel	Does the idea have a positive effect on **seamless travel**, i.e. door-to-door connectivity and easy transfer?
Accessibility/ inclusion	Does the idea have a positive effect on accessibility for **PRM**?
	Will the idea contribute to more use of the service by **special/ vulnerable groups**?
Speed/ travel time	Does the idea have a positive effect on **speed/ travel time** (e.g. by limiting the stops, higher average speed, …)?
	Does the idea have a positive effect on **travel time perception**, e.g. by allowing to make productive use of time on board?
Comfort	Does the idea have a positive effect on travel comfort in terms of **driving experience** (e.g. acceleration and braking)?
	Does the idea have a positive effect on travel **comfort** in other ways (e.g. being sure to have a seat)?

Topic	Question
Quality of service	Does the idea have a positive effect on quality of service in terms of higher **frequency**?
	Does the idea have a positive effect on quality of service in terms of being able to **reach more destinations**?
	Does the idea have a positive effect on passengers' **perception of the quality** of the AV service?
User acceptance & modal split	Will the idea lead to more people being **willing to use** the AV service?
	Will the idea lead to more people being **willing to share** the AV service with other users?
	Will the idea contribute to more **consumer trust** in AV services?
	Will the idea lead to a **modal shift** away from private car use?

In developing these assessment questions, we took into account the SHOW KPIs, making sure that our assessment questions reflect the main topics covered by the KPIs that have been defined for the SHOW project as a whole, insofar as they are relevant for end-users. Each SHOW expert scored the ideas using the following guidelines:

- +5: The idea potentially has a really big positive impact
- +3: The idea potentially has a positive impact
- 0: The idea does not have an impact
- -3: The idea has a negative impact.

Adding up the scores of all participants for each idea, resulted in the following ranking:

- Adapt to increase in demand in a flexible way (total score 62,4)
- Accessibility, audio-visual messaging and assistance for PRMs (total score 60)
- Possibility of individual use of Robotaxis by PRM (total score 53,6)
- 24/7 surveillance + Human assistance (total score 53)
- New safety culture & improving perceived safety (46)
- Tutorial film on board (total score 42,8)
- Pick-up points in the neighbourhood (total score 41,2).

Starting from here, we checked the selected ideas in terms of feasibility, business potential and relevance for SHOW, keeping in mind the following questions:

Table 5 - SHOW Ideathon - Assessment questions (2)

Topic	Question
Feasibility	Which idea has most potential to be taken forward to the **Hackathon**?
	Is it an idea that can be realized within a reasonable **time**?
	Is it an idea that can be realized at a reasonable **cost**?
Business potential	Is it an idea that can lead to new business models?
	Is it an idea that can lead to **new partnership opportunities**?
	Is it an idea that positively impacts **efficiency** (less empty vehicles on the road, more shared use)?
Relevance for SHOW	Relevance for SHOW **Use Cases**
	Relevance for SHOW **pilot sites**
	Relevance for SHOW **simulation activities**

The reasoning behind this second checklist is that these elements have a big impact on each idea's potential of being implemented in practice during SHOW. Considering that the idea '24/7 surveillance + human assistance' was evaluated very positively in terms of feasibility and relevance for SHOW; that the idea 'individual use of Robotaxis by PRM' would impact efficiency in a negative way (less shared use, more vehicles on the road); that PRM needs are also addressed by the idea 'accessibility audio-visual messaging and assistance for PRMs'; and finally that the difference in initial scores between 3 and 4 was minimal, we decided to replace number 3 by number 4.

For the selected ideas, we saw the following potential for further deployment in SHOW:

1. Adapt to increase in demand in a flexible way

- Relevance for SHOW Use Cases:
  - 1.6 (Mixed traffic flows);
  - 1.8 (Platooning for higher speed connectors in people transport);
  - 3.1 (Self-learning Demand Responsive Passengers/ Cargo Mobility);
  - 3.3 (Automated parking applications);
  - 3.5 (Depot management of automated buses)
- Relevance for SHOW pilot sites: Rouen, Salzburg, Tampere, Madrid
- Relevance for SHOW simulation activities: Traffic simulation

2. Accessibility, audio-visual messaging and assistance for PRMs

- Relevance for SHOW Use Cases:
  - 1.3 (Interfacing non automated vehicles and travellers, incl. VRUs);
  - 1.7 (Connection to Operation Centre for tele-operation and remote supervision);
  - (1.10 (Seamless autonomous transport chains of Automated PT, DRT, MaaS, LaaS));
  - (3.2 (Big Data/ AI based added value services for Passengers/ Cargo Mobility))
- Relevance for SHOW pilot sites: Rouen, Rennes, Kista, Madrid, Graz, Salzburg, Karlsruhe, Turin, Trikala, Brainport, Brno
- Relevance for SHOW simulation activities: Driving & Pedestrian simulation

3. 24/7 surveillance + Human assistance

- Relevance for SHOW Use Cases:
  - 1.3 (Interfacing non automated vehicles and travellers, incl. VRUs);
  - 1.7 (Connection to Operation Centre for tele-operation and remote supervision);
  - (3.1 (Self-learning Demand Responsive Passengers/ Cargo Mobility))
- Relevance for SHOW pilot sites: Rouen, Rennes, Kista, Madrid, Graz, Salzburg, Karlsruhe, Turin, Trikala, Brainport, Brno, Linköping, Aachen
- Relevance for SHOW simulation activities: Driving simulator.

5.2 Ideathon with USF students (12-13.03.2023)

On March 12-13. 2023, the University of San Francisco (USF), UITP and the European Passengers' Federation (EPF) engaged in an 'Ideathon' with 22 USF students focused on developing strategies related to the SHOW project and CCAM efforts in the EU.[17]

Figure 121 - SHOW Ideathon with USF students at UITP premises

One of the objectives of SHOW is to foster international cooperation on automated mobility by collaborating with global organisations working on CCAM beyond Europe. Led by UITP (the International Association of Public Transport), the SHOW project had earlier joined forces with CCAM organisations in Japan, Australia and Taiwan.

Under a new partnership with the University of San Francisco (USF, California), both parties will advance research efforts to maximise the benefits of automated mobility for a more inclusive, sustainable transport network.

USF has been working for years in the field of automated mobility: its 'Autonomous Vehicles and the City Initiative'[18] focuses on bringing together international leaders in technology, business, policy, and academia to exchange how cities can innovate in the new mobility future.

The collaboration between USF and SHOW targets the drafting of recommendations towards viable business models for both public and private sectors. For SHOW it will be of particular interest how US developments and deployments of automated ride-hailing services could impact future European mobility systems. The work of USF

[17] European Commission. (2023, March 28). *Automated Road Transport*. https://transport.ec.europa.eu/index_en
[18] https://www.usfca.edu/management/engagement-impact/autonomous-vehicles-city-initiative

researchers, as part of their pilot level-4 rider programme with Cruise, has gathered data on fully automated driving that is highly valuable for SHOW members – particularly for use cases investigating robotaxis such as Graz or Brno.

The Ideathon on 12-13. March was one the initial outcomes of the collaboration between SHOW and USF. The exchanges offered the opportunity to explore concepts not only to reimagine the transport value chain (vehicle production, autonomous and connected car technology, fleet management and operations, and B2C mobility services) but also to outline business opportunities and models in this space. These are areas that require acute focus over coming years as increasing fleet deployments of AVs and new disruptive vehicles come to the market.[19] The dialogue provided a roadmap for collaboration between University of San Francisco and UITP focusing on best practice business models for autonomous and automated mobility.

The event offered a creative opportunity to develop 'outside of the box' stakeholder personas that can help identify the drivers and the limitations of CCAM services in a variety of scenarios (rural, logistic, tourism).

After being given some background information on SHOW project, CCAM initiatives and EU policies around automation, the students engaged in a facilitated discussion about various stakeholders in automated and autonomous vehicle (AV) deployments (day 1) and were challenged to explore their 'personas' and the potential issues these might be faced with in terms of AV adoption (day 2), considering various scenarios.

The applied concept of user personas was based on a TUMCREATE template[20] and included the following general components:

- Bio (Name, Age, Key Details)
- Goal
- Motivations
- Frustrations
- Quote.

Students engaged in brief ideation and then verbal presentation of how they were thinking about the persona of their chosen stakeholder. The group then gave feedback on the individual/ persona that had been developed. Following this the students took time to refine these profiles, conducting more research, coming up with a graphical representation of what they might look like and identifying any anticipated issues that might be related to each persona in the context of an AV deployment. These refined profiles were then presented and used for broader application to specific AV use-case deployments in tourism, logistics, and rural AV deployments.

The refined personas are presented on the proceeding pages.[21]

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[19] Riggs, W. (2019). *Disruptive Transport: Driverless Cars, Transport Innovation and the Sustainable City of Tomorrow*. Routledge. Riggs & W., & Beiker, S. A. (2020). Business Models for Shared and Autonomous Mobility. In G. Meyer & S. Beiker (Eds.), *Road Vehicle Automation 7* (pp. 33–48). Springer International Publishing. https://doi.org/10.1007/978-3-030-52840-9_4

[20] Cornet, H., Stadler, S., Kong, P., Marinkovic, G., Frenkler, F., & Sathikh, P. M. (2019). User-centred design of autonomous mobility for public transportation in Singapore. *Transportation Research Procedia*, *41*, 191–203. https://doi.org/10.1016/j.trpro.2019.09.038 & Kong, P., Cornet, H., & Frenkler, F. (2018). Personas and emotional design for public service robots: A case study with autonomous vehicles in public transportation. 2018 International Conference on Cyberworlds (Cw), 284–287.

[21] All graphics rendered by Riggs in Midjourney with: Description. Vibrant colours. Comic style. Hyper detailed. Headshot. Plain background . HD, 8K. Canon DSLR. --ar 16:9

Ted Baxter

39 years old, logistics worker/ driver

Bio & key details

Ted has a family, a wife and 2 kids. Lives in Tracy, California. He is assigned to the San Jose, California area. He works every day except Sundays, from 5 AM to 9 PM, driving for 61 miles, making 200+ stops a day. Package weight can go up to 150 pounds.

Goal

AVs could help decrease and ease working hours to 8 hours a day, while increasing delivery time and efficiency, making fewer stops. This will decrease work fatigue, relieve physical health, and promote driver safety. Increases work-life balance, and more time for family and himself.

With an AV, he would not have to drive and would focus on transferring, sorting, and delivering the packages to the location instead. The AV (unloaded) would pick him up from his house, then drive to the storage warehouse where he would load the packages. By doing that, he'll able to rest while being in the car during the day when he feels tired. It's also a way to secure his safety and prevents tired driving.

Motivations

He prefers less driving, driver fatigue, and more work-life balance. He wants to increase delivery efficiency, being able to focus on package delivery and customer service rather than driving.

Frustrations

The AV can malfunction and technical issues which would stop the service to keep going the whole day/ or in hours until the tech problems get resolved. The convenience of the product/ service might demotivate the energy he has for his job.

Quote

I am dedicated to my career, but I desire more work-life balance.

Simsim Kusuma

56 years old, politician

Bio & key details

Politician, with a Bachelor's degree in Civil Engineering, Masters of Structural Engineering and Doctorate of Engineering. Prior CEO of engineering firm and work in transportation consulting. Married with no kids.

Goal

As a middle aged and highly educated female politician, she wants to make a change at the governmental level and to provide a better quality of life and well-being for the people in her city.

Motivations

Simsim prioritizes sustainable transportation and reducing overall travel to mitigate air pollution concerns, driven by the fear of potential reelection consequences.

Frustrations

She is frustrated by poor public transportation and traffic congestion and worries about the impacts of AVs. At the same time, she needs solutions to environmental issues ($PM_{2.5}$) and poorly connected and functioning transportation networks.

Quote

Let's make our city more sustainable together.

Heddy Roebling

36 years old, advocate

Bio & key details

Heddy Roebling is an accomplished professional as the Vice President of Bleeding Edge Technology. She holds an undergraduate degree in Electrical Engineering and Computer Science (EECS) from CalTech, followed by a Masters in Engineering Innovation (MSEI) from USF.

Goal

Heddy's diverse expertise and extensive knowledge in emerging technologies make her a driving force in leading innovative initiatives and pushing the boundaries of technological advancements.

She wants to use AV shuttle technology to promote social equity.

Bio

Grew up in San Francisco and has always been a public transportation advocate and user her entire life. She does not have a driver's license and doesn't want one.

Motivations

Wants to make a big impact that will advance her career, but also contribute to the greater good for generations to come.

Frustrations

Slow adaptation and bureaucracy of public policy and city planning is demotivating.

Quote

Our world and our city need clean, reliable transportation that promotes the equitable inclusion of all members or our community.

Max Pronto

26 years old, disabled artist

Bio & key details

Disabled Sculptor/ Artist; BA, School of the Art Institute of Chicago.

Born in Rancho Cucamonga. Started using public transportation as an art student in Chicago. He would always sit in the front of the train car or near the bus driver and one time he was assisted by a driver when an unruly passenger threatened to physically assault him. He recently moved to San Francisco and his work is currently on display at the SFMOMA upcoming artists.

Goal

Ensure that AVs are designed to accommodate those with disabilities.

Motivations

He wants to represent the disabled community in the development process so that their needs can be addressed up front and seamlessly incorporated in the vehicle design.

Frustrations

Current lack for representation of the disabled community in the design process of vehicles and services.

Quote

I am all for improving public transportation options and accessibility, but we can't do it at the expense of our personal safety.

Daniel Martin

72 years old, retired mechanic

Bio & key details

Associate's degree, Daniel, Caucasian, widow with 2 adult children that live in other states, health condition (high blood pressure, arthritis to knees and hands). Lives alone in a senior center, does not have family nearby. Considers his other senior neighbor as his family and wants to improve their way of life.

Goal

Continue being independent and self-sufficient. He wants to do his own groceries, do leisure activities that involve walking in the park, visiting museums, and going to his medical appointments.

Motivation

Wakes up around 9AM to start his day, arranges his medication for the week, continues to do his errands (grocery, laundry, and cleans) and refuses help from others as it may seem as a sign of weakness. He refuses to be looked down on for asking for help and tries to continue living an independent life.

Frustrations

Relying on public transportation limited route options, transportation van not elderly friend – steps are too high, chair height for being able to stand from a sitting position.

Quote

Mobility is independence that contributes to overall wellbeing.

Chad Anderson

32 years old, Remote (tech) worker returning to in-person work

Bio & key details

Chad has a bachelor's degree and does sports and dates when he is not working. His interests are going to the park and keeping fit.

Lives in an affluent community for young singles and works in the fintech industry. Drives his own car or takes Uber.

Goal

The goal of using an AV should be to make life more convenient and efficient and be on the cutting edge of technology.

Motivations

He is interested in sustainability and but doesn't really want to be inconvenienced by doing the 'right thing'. He is not really interested in riding in transit because it's slow and unreliable.

Frustrations

Chad is frustrated by transit and thinks it is a waste of money. He is economically prosperous, politically a moderate and doesn't believe that money should be spent on AVs.

Quote

I am willing to support automated vehicles, but I will believe in their efficiency when I experience them myself.

Michelle Brown

45 years old, school director

Bio & key details

Director of local school responsible for transporting kids safely; interested in technology, digital transformation, reading books, and child psychology.

Michelle has a PhD in education and wants to lead the most innovative school in her community. She is married and committed to her own children as well as the students in her school. She makes a modest executive salary and when she is not working enjoys hiking and tennis. She is a well-organized learner with a growth mindset.

Goal

Make it easier and more sustainable for kids to safely get to school on buses or transit.

Motivations

Student safety is a primary concern for Michelle, and AVs offer the potential for enhanced transportation security. Additionally, Michelle recognizes the revenue potential that AVs can bring, whether through cost savings or potential revenue generation. Lastly, the desire for digital transformation drives Michelle's motivation, as AVs align with the broader goal of embracing advanced technologies for modernizing the school's operations.

Frustrations

Michelle, the school director, is frustrated by the disorganization of current transportation options and the slow pace of progress towards implementing necessary changes.

Quote

My commitment is to offer the best solution to students and their families.

Bob Miller

28 years old, baker

Bio & key details

Bob the Baker is a downtown resident and business owner; bakes the best bread in the neighborhood and wants to grow his business.

Proudly owns his business and works hard to keep his customers satisfied with delicious baked goods. When he's not working, he aspires to write a script for a show on Food.

Goal

Bake the best bread possible and not have to work about delivering bread; potentially have a baking show on TV someday.

Motivations

He wants to be able to trust on his transportation and potentially to be able to use it to scale his distribution networks.

Frustrations

Bob faces logistical challenges with distribution of his bread due to unreliable delivery services, which require him to periodically divert his focus from baking to delivering the goods.

Quote

I just want to focus on what I do best: baking the best bread.

Marcus Jacobs

43 years old, insurance executive

Bio & key details

Marc Jacobs is a local native who has been working In the car insurance industry for 16 years. He began his career after graduating from business school, and after a couple of years, he worked his way up to become an executive. When he is not working, he loves spending time with his two dogs and boyfriend.

Educated and wealthy local executive in the insurance field. He is highly motivated and vocal; ready to help with things that benefit his interest but hinder things that do not.

Goal

Maintain his position as an insurance executive.

Motivations

Ensure that his insurance company remains profitable and that insurance is being claimed by either autonomous vehicle manufacturing companies or drivers and that policies surrounding autonomous vehicles directly address liability issues in order to better assess and address insurance premiums – ultimately that benefit him personally.

Frustrations

Autonomous vehicles serve a safety purpose of reducing the number of car accidents, which is a complication to Marc's company. While the risk profile/ exposure of insurance is reduced, he expects premiums and demand for insurance are expected to go down. This could result in a loss of revenue and significant impact to the industry as a whole.

Quote

Self-belief and hard work will always find you successful.

Dannie Gallego

33 years old, business analyst

Bio & key details

Dannie is a strong, energetic, and enthusiastic woman who thrives as an extrovert. With a tech-savvy nature, she nurtures a keen interest in technology, automotive, traveling, and supporting non-profit organizations. As a married young professional and mother of two young kids, Dannie is driven by the desire to progress in her career while remaining dedicated to enriching her children's lives alongside her partner. Balancing an average income, she is focused on finding opportunities for growth within her company while continuing to make meaningful contributions to both her family and the community.

Goal

Wants to create a new company revenue stream by focusing on innovative initiatives.

Motivations

Dannie is motivated by career advancement through promotion, maintaining an impressive performance record, and her deep passion for technology.

Frustrations

Dannie's frustrations stem from encountering outdated technology and working with individuals who are risk averse.

Quote

AVs are the ultimate tool for young parents who want to focus on their kids and not on driving.

5.3 Ideathon Carinthia (05.07.2023)

On 5. July 2023, SHOW partner SURAAA organized an Ideathon **'Mobilität der Zukunft'** (future of mobility) at see:PORT, Pörtschach (Austria). It was a full-day event (from 8:30AM until 7:30PM, followed by an evening program), that gathered a heterogenous group of **52 participants**: 29 citizens of different ages and backgrounds, 10 SURAAA employees, 12 external experts and one external process support person from the Carinthian University of Applied Sciences. The Ideathon participants delved into **mobility challenges and users' needs**, and brought forward an inclusive vision of the steps towards safer and more efficient mobility.

Figure 122 - Carinthia Ideathon invitation for social media

Figure 123 - Carinthia Ideathon participants

The **mobility sector plays a crucial role** in the lives of individuals and communities and has a high capacity for innovation, with significant transformations evident in recent years. Understanding the specific solutions required and user demands firsthand is key to providing services and developing relevant technologies, as recognized by the Ideathon organisers and reflected in the **Press Release** accompanying the conclusion of the event. "*Mobility is one of the greatest challenges of the present and the future. There is no lack of ideas, but of solutions that can also be implemented quickly*", says Peter Zenkl, Department 7 of the Office of the Carinthian Provincial Government. Walter Prutej, a thought leader in the field of mobility and the project manager of SURAAA (Smart Urban Region Austria Alps Adriatic), highlighted the significance of this competition, emphasizing that "*Mobility has transcended mere transportation from point A to B. It now encompasses the broader concept of seamlessly navigating from one place to another. Mobility's influence extends to all aspects of our daily lives and moving forward, the innovative essence of ideas will be paramount*." Gloria Bottaro, Innnovation Manager at the Carinthian University of Applied Sciences, presented how new ideas are developed and how the methodology of 'prototyping' is applied. She provided instructions on how flashes of inspiration can grow into concepts ready for implementation and thus laid the foundation for this creative day.

During the Ideathon, participants were divided into **nine teams**, working on **three challenges** linked to public transport and urban mobility:

1) How can public transport be combined with autonomous, demand-oriented services?
2) How should autonomous shuttle systems be designed to enable contactless use (via app) without touching, e.g. with monitors, voice outputs or sensors?
3) How to combine the transport of people and small goods (small parcels and goods), and optimize the use of vehicles (avoid empty runs and empty buses)?

Each group consisted of a **mix of experts**, such as Roland Fercher and Hannes Schuschnig from Kärntner Linien, Peter Golser from KMG Klagenfurter Mobilitätsgesellschaft, Christian Gruber from Joanneum Research, Christian Kogler from AIT Austrian Institute Of Technology, Gerald Miklin from the state of Carinthia or Annika Dollinger from Austria Tech, as well as interested **citizens and users** of mobility services.

The **organising team** consisted of ten employees from SURAAA, supported by two photographers and 12 additional experts invited as moderators and/ or participants. External support was also provided by Gloria Bottaro, Innovation Manager at the Carinthian University of Applied Sciences.

The first participants **arrived at 8:30AM**. Participants who had not yet filled out the registration confirmation form via the SURAAA website were able to do so on-site during registration. There were two laptops available at reception. Every participant received a name tag and a drink voucher for lunch. The in-house cafeteria was stocked with pastries, drinks and coffee. The first exchange and networking between the participants, the experts and the organizational team took place after registration over breakfast in the cafeteria.

The day started with **keynote speeches** by Peter Zenkel (Carinthian government), Walter Prutej (SURAAA) and Gloria Bottaro (Innovation Manager at the Carinthian University of Applied Sciences), along with a presentation on the **SHOW project and the SURAAA pilot site in Pörtschach**.

To gain an understanding of the mobility of the future, the **automated shuttle** was placed in front of the venue throughout the day and could be visited by the participants.

In the meantime, the organizational team **allocated the challenges** to the participants in the background, hereby taking into account participants' preferences (most participants prioritised challenge n°1, followed by n°3) and also taking care to create groups that were as diverse as possible, per challenge. Participants then divided themselves into groups. Each group had a table moderator.

After the keynote speeches, teams could **start working** on their challenges around **9:30AM**. Only teams that had a different challenge sat next to each other so that the idea generation was not influenced. Each team had a flipchart and a pinboard available as well as other materials to choose from such as modelling clay, paper, scissors, craft materials, etc. to allow their ideas and visions to run wild. It was a deliberate choice not to work with digital aids but only to use **analogue** tools. At first, this was met with a bit of incomprehension by (younger) participants, but over the course of the day everyone accepted and was satisfied with the approach.

The work process was divided into two phases. Throughout the day, the groups strived to achieve **six milestones** set by the organizing team: three in the morning – focused on brainstorming, coming up with ideas – and three in the afternoon – dedicated to developing the idea further and creating a presentation. The milestones were:

1) Warm-up: getting to know each other, approaching the topic of the challenge
2) Goal statement: clarifying the group's expectations
3) Agreement within the group on final idea to be developed
4) Concretizing the idea and creating an initial concept
5) Completion of work on the idea
6) Creation of an analogue presentation in the form of a 2 minute pitch.

The participants were free to decide how they would like to **pitch their ideas** to the audience and the jury, using the materials provided to them. The task was to present the project in two minutes to an expert jury consisting of the well-known investor Bernd Hinteregger, the head of Department 7 of the State of Carinthia, Albert Kreiner and Thomas Zach from the mobile communications provider 'Drei'. The evaluation criteria consisted of the following points: presentation, degree of maturity/ feasibility, customer benefit/ market potential and innovation content/ originality. The audience could also vote. The following ideas were pitched by the teams:

Challenge 1: Addressing the challenge of poor bus stop facilities in the countryside, *Team DigiStop* proposed a comprehensive upgrade, envisioning dynamic hubs that offer protection from weather conditions and additional amenities appealing to all senses, to make public transport more attractive for all citizens. *Team 14Fun* presented the concept of transforming train stations into mobility hubs, integrating voice recognition for interactive booking. Their solution suggested additional nodes based on user preferences and availability. *Team App2Anywhere* showcased an integral Mobility as a Service (MaaS) app, enabling route planning, individual vehicle booking and integrated journeys. The app's modular design accommodated diverse user needs, emphasizing inclusivity and comfort.

Challenge 2: To overcome the hurdle of complex ticketing systems hindering public transport adoption, *Team MobilityFlow* introduced an innovative solution to eliminate the need for physical tickets or mobile phones, making public transport more accessible and convenient for everyone. *Team Tourismus+* envisioned a unique combination of autonomous driving and cultural experiences. Their proposal aimed at offering relaxing journeys to cultural hotspots, emphasizing easy online/ app payments and interactive cultural exploration. Introducing data-driven solutions, *Team ShuttleBots* analysed customer travel behaviour and optimized occupancy times to improve public transport efficiency, with a focus on enhancing user comfort and overall system efficiency.

Challenge 3: In Austria, there are many rural areas and numerous parcel delivery companies, each catering to specific households. At times, this results in a significant number of unnecessary routes. *Team SMS* (Smart Mobility Solutions) proposed transforming bus stops into central pick-up points for small parcels, seamlessly integrating public transport and parcel delivery. This innovative approach aimed to achieve cost savings for logistics providers, generate additional income for public transport and reduce environmental impact. *Team Automota* presented an automated shuttle solution equipped with modular logistics boxes, addressing issues of underutilization. Their proposal included on-demand delivery services and innovative add-ons like hot holding and cooling modules. With a vision geared towards optimizing package delivery, *Team Kings of Combination* crafted a strategic approach that harnessed the potential of current transportation resources such as trains, buses, taxis and private cars. Central to their solution was the prioritization of real-time route planning and the establishment of Transmobility Hubs as micro depots, all aimed at fostering a seamless and efficient package handling process.

Three **winning teams**, one per challenge, were awarded a cash prize of 500 euros: Challenge 1: App2anywhere, Challenge 2: Shuttle Bots and Challenge 3: Kings of Combination.

Figure 124 - Carinthia Ideathon winning teams

Figure 125 - Carinthia Ideathon teams at work

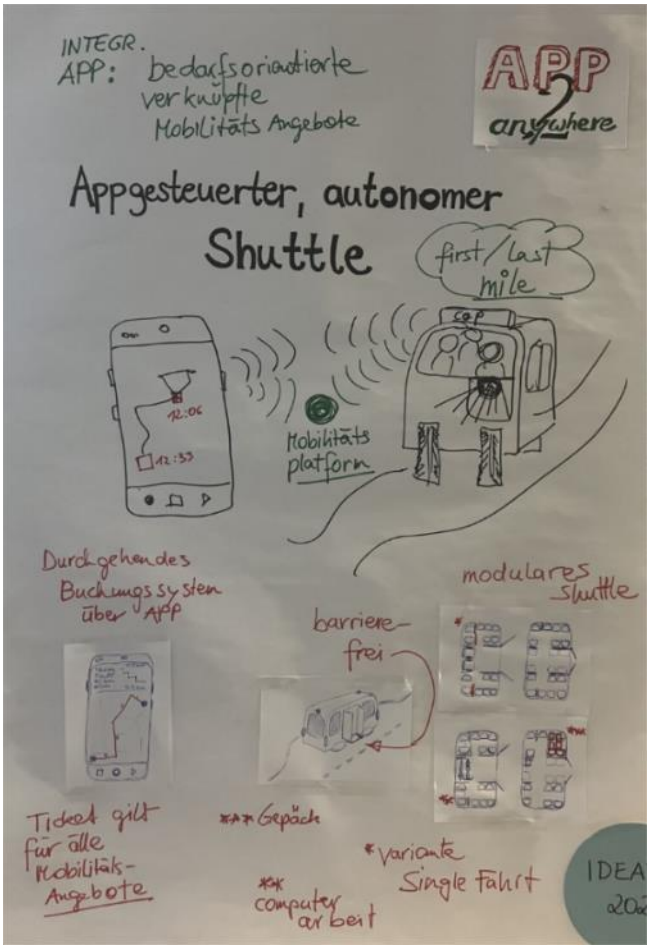

Figure 126 - App2Anywhere

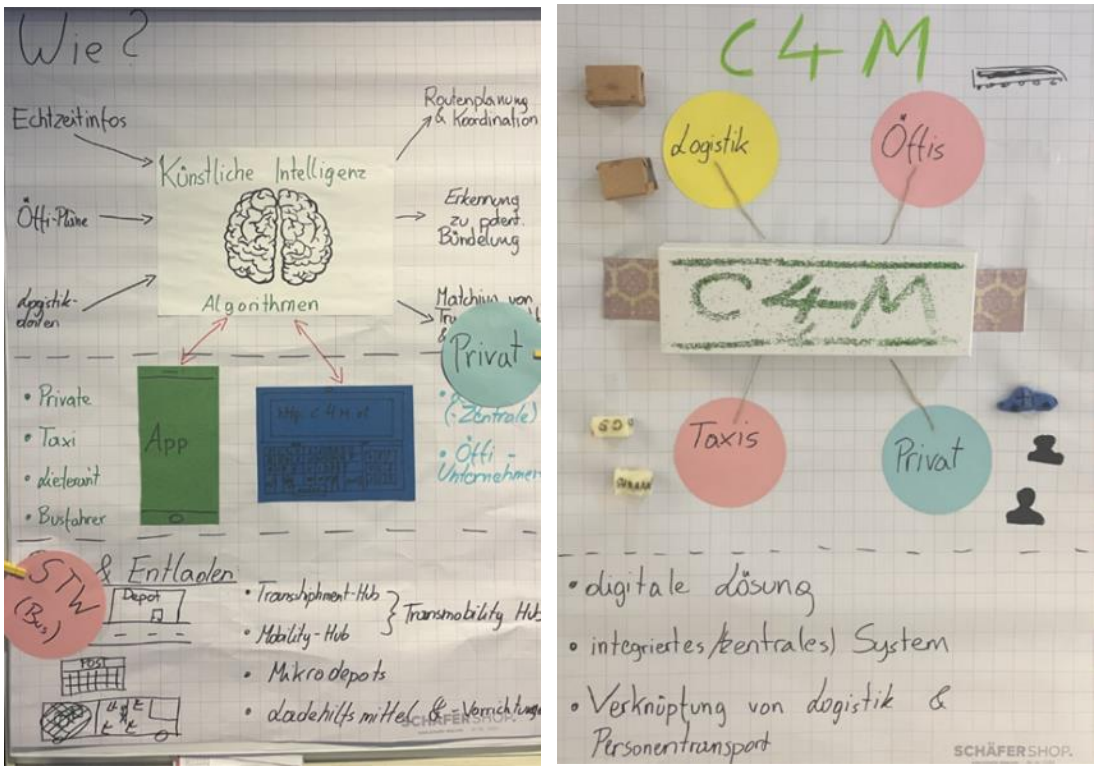

Figure 127 - Kings of Combination

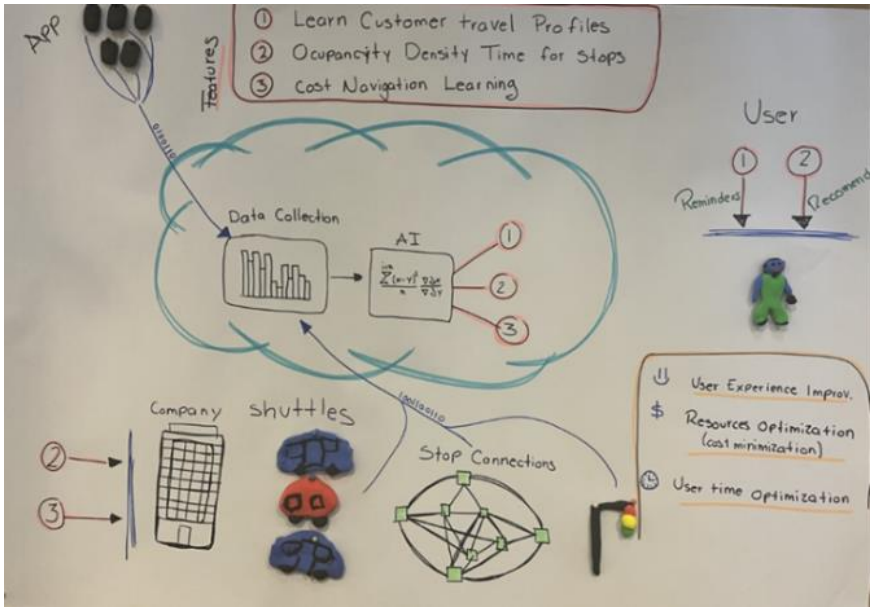

Figure 128 - ShuttleBots

As a little surprise, afterwards, it was revealed that the organizing team had already set the same challenges to ChatGPT that morning. The ChatGPT elaborations were played back as voice output and evaluated by the audience and the jurors, in the same way as the participants' pitches, but without competing with them. The aim of this approach was to achieve a scientific comparative value, since the mobility of the future is subject to the digital age, as are the latest developments in artificial intelligence.

Finally, there was the opportunity to make contacts and network in the in-house cafeteria. On leaving the event, each participant received a **certificate** and a **goodiebag** backpack with numerous promotional materials from VKG, including pens, mouse pads, backpacks, flashlights, drinking bottles, etc. as well as a €50 shopping **voucher** for a local shopping centre.

Evaluating the event, the elaborated ideas showed a **highly innovative** character. The municipality of Pörtschach found **valuable insights** among the proposed solutions, which align well with regional development initiatives. During pitching, the groups consistently succeeded in **presenting their visions in a creative way**, without digital aids. The jurors were positively impressed by the pitches and the presentation methods. The **group dynamics** were very good in most groups; no significant conflicts were observed and each team completed their challenges. Participants **had fun** and enjoyed the prototyping phase in particular, working with a wide variety of materials, which had a very positive influence on the mood and the majority of participants were visibly happy.

Stories were continuously posted on **social media** throughout the event. Some participants, including experts, reported on the Ideathon on Instagram and LinkedIn. A press release was sent out a week after the event.

The event also received attention from the **press**:

- Ideathon Event in ‘Advantage’ and ‘Krone’ online newspaper ahead of the event https://www.advantage.at/artikel/ideenwettbewerb-zur-mobilitaet-der-zukunft, https://www.krone.at/3045273
- Ideathon Event Review in 5mins.at https://archiv.5min.at/202307681613/ideathon-2023-ideenwettbewerb-fuer-mobilitaet-der-zukunft/.

6 Hackathons

A Hackathon is an intensive collaborative event that brings together professionals, developers, designers and subject matter experts to solve specific problems or create innovative solutions within a limited timeframe – often spanning a day or a weekend.[22] Participants typically form teams and work on projects related to software development, hardware, data analysis, or other technological challenges, aiming to produce tangible outcomes, such as prototypes, proofs of concept or functional solutions. The term 'hack' in Hackathon is used in a positive sense, indicating a creative and dynamic approach to problem-solving rather than any malicious activity.[23] Hackathons are widely employed in various fields. In the context of mobility research, Hackathons can be utilized to address specific challenges related to mobility, traffic management, or the integration of emerging technologies such as CCAM.

In the context of SHOW, a three-day Hackathon was organised in Thessaloniki (21-23.03.2021), preceded by a pre-Hackathon workshop at the ITS World Congress in Hamburg (12.10.2021). Another duo-Hackathon was planned to take place in Sweden, but unfortunately was cancelled due to difficulties in recruiting a sufficient number of participants. Finally, SHOW set up a very successful collaboration with Open Summer of Code in Brussels (01-25.07.2024) whereby a team of students worked on designing the 'mobility hub of the future', assisted by OSoC mentors and SHOW partners EPF and ERTICO.

When preparing a Hackathon, there are many decisions to be made and many aspects to consider. The **Hackathon Canvas** (https://hackathoncanvas.co/, see Figure 129) provides a useful framework, consisting of 7 building blocks:

- **Hackathon Goals:** What are the objectives, what is the context, what is the purpose?
- **Hackathon Type:** Is it a public or private (by invitation only) event? For-profit or non-profit? How many participants are expected? How long is the event?
- **Key Partners:** Who are the sponsors, the stakeholders, the suppliers, the partners?
- **Attendees' Value Propositions:** How to recruit participants and how to prepare, support, and reward their participation in the best way?
- **Attendees:** Who are the participants, which profiles, skills are expected, are they invited or paid, or do they have to pay to participate?
- **Key Resources:** This includes financial resources, time resources, venue and materials, experienced coaches, moderators, jury members, …
- **Key Results:** What kind of results or deliverables are expected, what level of quality or detail, what are the success or evaluation criteria?

In the case of SHOW, the overall goal of the Hackathons was to develop further added value services to meet unfulfilled recognized traveller needs or interface/ supplement SHOW developed services. The outcomes – realised concepts and physical demonstrations, which could take various forms, e.g. hardware, software, mock-ups, designs, demos, publications, business plans, … – were meant to be included in the SHOW Services Marketplace (WP6) and, possibly, be deployed at SHOW demo sites.

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[22] Hackathon.com, "What is a Hackathon?" [Online]. Available: https://tips.hackathon.com/article/what-is-a-hackathon. Accessed: Dec. 22, 2021.
[23] G. M. Jones, B. Semel and A. Le, "'There's no rules. It's hackathon.': Negotiating Commitment in a Context of Volatile Sociality", Journal of Linguistic Anthropology, vol. 25, no. 3, pp. 322-345, 2015.

Both SHOW partners and external participants, including students and start-ups, could take part, with diverse expertise (e.g., developers, designers, engineers, …). Different incentives for participants were foreseen, including cash prizes but also free entrance to events like the ITS Congress, the opportunity to network, learn new skills, attend interesting keynote speeches, and also simply to have fun.

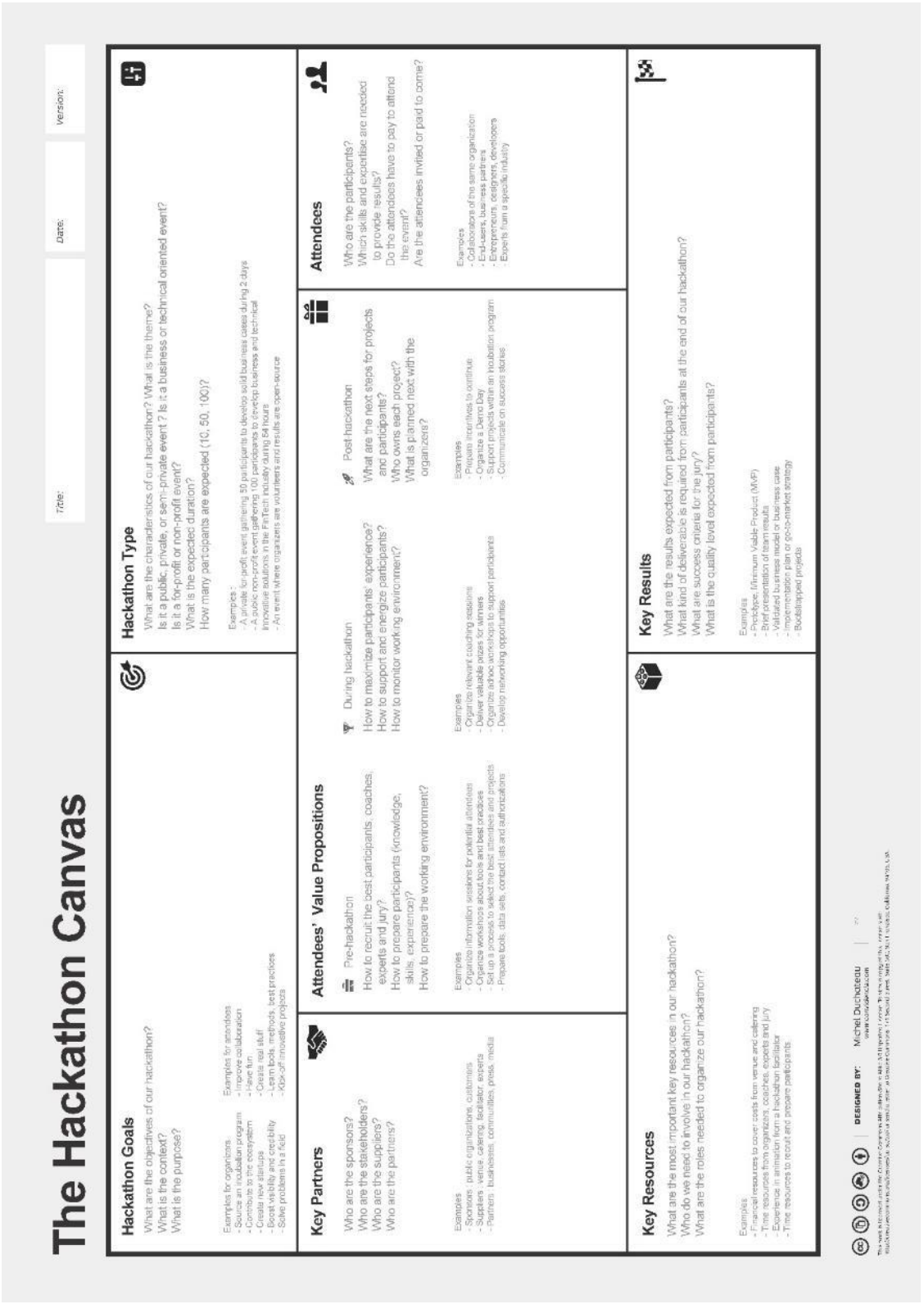

Figure 129 - The Hackathon Canvas

Our original plan for the SHOW Hackathon events was that these would build further upon the ideas that were co-created during the SHOW Ideathons. The best ideas (in terms of potential overall and potential to be deployed further in SHOW) would function as input to successor Hackathons in which we would work on realizing these ideas in practice as prototypes. Thus, the SHOW pre-Hackathon workshop in Hamburg (6.1) and the Hackathon in Thessaloniki (6.2), organised by CERTH, built further upon the three 'killer ideas' from the first SHOW online Ideathon (5.1). Likewise, the assignment given by SHOW to the students participating in Open Summer of Code (6.3) loosely built upon some of the concepts brought up by the participants to the Carinthia Ideathon (4.2) on the 'Mobility Hub of the Future'. On the other hand, the planned (but cancelled) Hackathon at the Swedish SHOW megasite (6.4) intended to focus on practical experiences and data gathering during the ongoing field trials – another useful starting point, in view of potentially implementing the outcomes of the Hackathons in real life, thus creating a real impact and moving beyond a merely theoretical phase.

6.1 Pre-Hackathon workshop ITS World Congress Hamburg (12.10.2021)

As a first step, a 'pre-Hackathon' workshop was organised as part of the ITS World Congress in Hamburg on 12. October 2021 (16:30-18:45).

Figure 130 - Pre-Hackathon announcement

The original idea of having a full-scale Hackathon (which normally lasts at least one, up to three, full days) within the context of the ITS Congress was not feasible, budgetwise nor timewise; nevertheless, as the Congress brings together a wide range of world class international, multidisciplinary experts, this still provided an excellent opportunity to 'launch' the Hackathon, bring together potential participants, and conduct a first brainstorm focused on three challenges, derived from the first SHOW Ideathon (see 4.1 and Figure 131 for the agenda):

- Human assistance stand-by in case of problems;
- Adapting capacity to increase in demand in a flexible way;
- Accessibility and assistance for persons with reduced mobility.

Focusing on the actual needs of the users while keeping feasibility and applicability in mind, the attendees of the pre-Hackathon workshop worked on the structures of new apps to manage service demand in a flexible way taking into account special needs (e.g. need for extra space).

Figure 131 - Pre-Hackathon programme

Participants were informed that their input would inspire the first SHOW 'real' Hackathon, which was originally planned for November 2021, but due to circumstances (COVID-19 impact) was postponed until March (see 6.2).

Figure 132 - Pre-Hackathon pictures

6.2 Hackathon Thessaloniki (21-23.03.2022)

A three-day SHOW Hackathon took place in Thessaloniki from 21st to 23rd March 2022, organized by CERTH (Centre for Research and Technology Hellas) with the support of Y4PT (Youth for Public Transport).

After months of preparation, including a pre-hackathon workshop at the ITS World Congress in Hamburg (see 6.1), the Hackathon was a hub of enthusiastic activity involving both lateral and vertical thinking by agile brains in Thessaloniki.

The purpose of the Hackathon was simple: it was a call to bright minds interested in exploring CCAM (Connected, Cooperative, Automated Mobility) and advancing automated mobility to create a more sustainable world' for the benefit of all citizens.

Young professionals and youth from around the world – especially those innovative and creative individuals willing to take up the challenge of getting the most out of limited resources – were welcome to attend along with members of the SHOW consortium and their partner companies. The applicants were required to demonstrate their creativity and commitment towards sustainability. Regarding the **invitations**, the main work was done by Y4PT through social media and the SHOW website. CERTH additionally sent some targeted invitations to Greek Universities and research organisations, etc. In total, **20 participants** joined the Hackathon, including students, software developers and young researchers, working in teams. Experts from the SHOW consortium and the global Y4PT team were at hand throughout the three days to guide and mentor the teams.

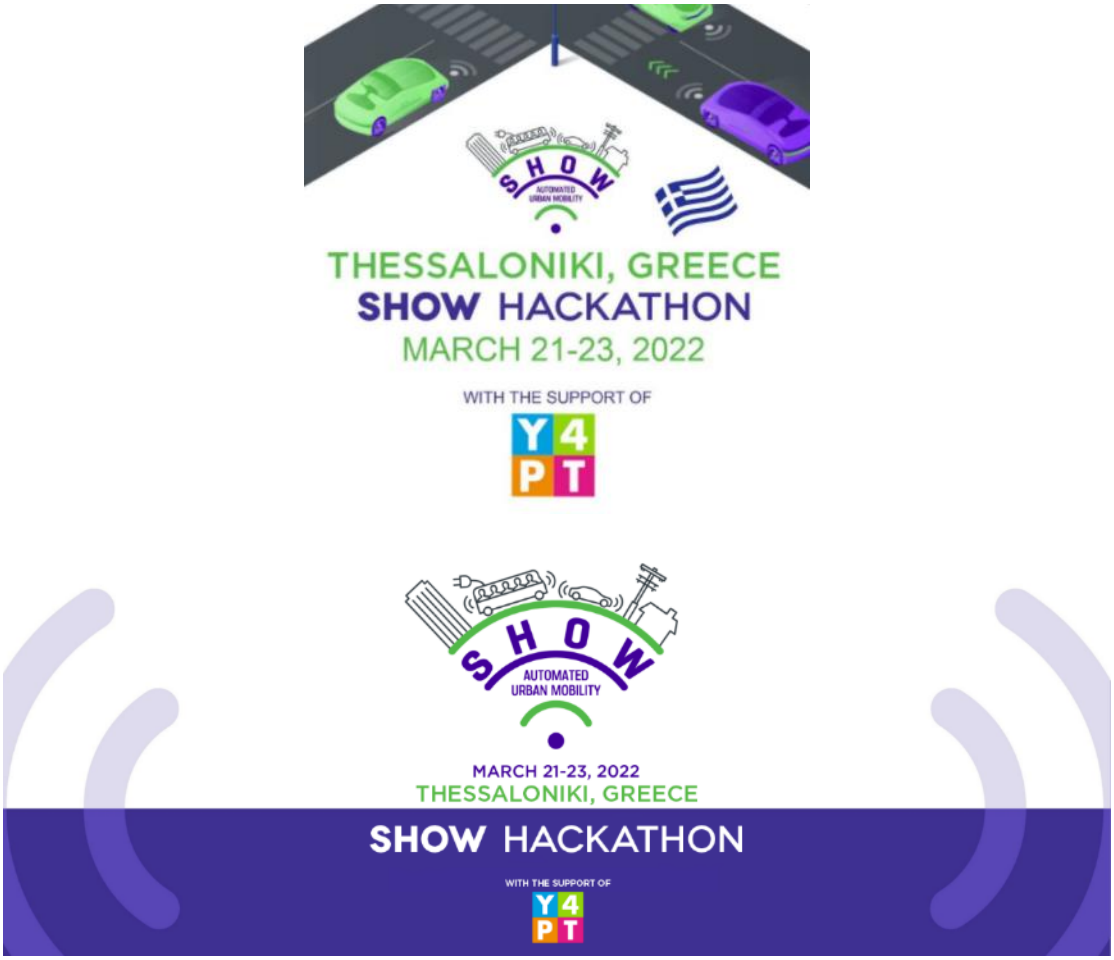

Figure 133 - Thessaloniki Hackathon - Visuals

The **objective** of the Hackathon was to develop added value services to meet end-users' (unfulfilled) needs related to the use of CCAM, focusing on three topics selected from a previous project Ideathon (see 5.1), namely:

1) Human assistance stand-by in case of problems. People may feel unsafe using an automated vehicle if there is no safety driver. Cameras on board could automatically detect a problem (using Artificial Intelligence) and notify the control centre which, if needed, can send someone to help.
2) Adapting capacity to increase in demand in a flexible way. Surplus demand (e.g., due to peak hour, large events, unforeseen circumstances) can be addressed by quickly deploying additional automated buses, to be summoned from a nearby bus depot.
3) Accessibility and assistance for persons with reduced mobility (PRM). How can we ensure that PRM can travel independently, how can we keep them informed (e.g., through audio-visual messaging) about accessibility, and how can they notify any need for assistance?

The programme during the three days included preliminary pitching sessions, coding, check points, final pitching, jury decisions and prize giving (see Table 6 – agenda).

Table 6 - Thessaloniki Hackathon - Agenda

DAY 1 – 21.03.22		
10.00 – 10:30	Arrival of participants – Welcome and registration	
10:30 – 10:45	Welcome and opening remarks	ERTICO & CERTH/HIT
10:45 – 11:45	Inspiring motivation: what is it and what they do – The Global Hackathon Project and the Mentors	Y4PT
11.45 – 12.00	SHOW Mentors Introduction	Y4PT & SHOW Mentors
12.00 – 13.00	Challenges specifications (Intro, Problem/s, Available information and possible solutions)	CERTH/ITI
13.00 – 13.30	Presentation of the 3 day's Hack Program	Y4PT
13.30 – 14.30	Lunch break	
14.30 – 15.30	Get to know the participants and first pitching session *(2-3 minutes per participant)*	Y4PT & SHOW Mentors
15.30 – 17.00	Teams finalization	Y4PT & SHOW Mentors
17.00 – 17.15	Wrap up & end of the meeting	Y4PT
DAY 2 – 22.03.22		
09.00 – 09.30	Welcome coffee and registration	
09.30 – 10.00	Intro with the program of the day	Y4PT
10.00 – 11.30	Team working activities and mentoring with all Mentors	Y4PT & SHOW Mentors
11.30 – 13.30	Coding session First check point – what your idea is missing	Developers (with the support of Y4PT & SHOW Mentors)
13.30 – 14.30	Lunch break	
14.30 – 16.30	Continuity of coding session	Developers (with the support of Y4PT & SHOW Mentors)

16.30 – 16.45	Info: Scenario of final day	Y4PT & CERTH/ITI
16.45 – 17.30	Coding for the ones willing to continue	Y4PT & CERTH/ITI
17.30 – 17.45	Wrap up & end of the meeting	Y4PT
18.30 – 20.00	Cocktail party @CERTH premises	
Day 3 – 23.03.22		
09.00 – 09.30	Welcome coffee and registration	
09.30 – 12.00	Coding and Checkpoint for each Team while other Teams continue to work: Final Pitch Preparation & Tech Demo	Y4PT & SHOW Mentors
12.00 – 12.30	Rehearsal of presentations and/or coding	Developers
12.30 – 13.00	Lunch break	
13.00 – 14.00	Final presentation to the Jury *(3 minutes pitch & 2 min Q&A)*	Developers
14.00 – 14.30	Judges deliberating & Winners announcement	SHOW Jury Committee
14.30 – 15.30	End of Hackathon and networking	ERTICO

The three finalist teams enthusiastically took on the task to design and develop novel solutions and applications for each of the challenges:

- *Team 1 – Gustav*: tackled the issue of making driverless automated vehicles safer and more secure for passengers and people on the road.
- *Team 2 – DeFORUS*: worked on a project for adapting/ optimising capacity to handle demand in a flexible way.
- *Team 3 – AsistIO*: addressed the important issue of accessibility and assistance for persons with reduced mobility.

The results of the Hackathon were judged by tech experts from CERTH – Dr Antonios Lalas, Dr Konstantinos Votis and Mr Pavlos Spanidis. All participants received a certificate (see Figure 134). The evaluation focused on meeting expected outcomes and specifications for each challenge, considering criteria such as innovation and creativity, functionality, impact, feasibility of implementation, inclusivity, and presentation and communication skills. The high quality of the results made judging difficult and the Gustav and AsistIO teams were declared joint first-place winners.

Figure 134 - Hackathon Thessaloniki - Certificate of participation

The Hackathon winners could also look forward to the chance of winning additional prizes such as an invitation for one member to attend the Y4PT Global Hack 2023 in Barcelona, during the UITP Global Summit, or a student registration pass for the 2023 ITS European Congress hosted by ERTICO.

But, the most important prize was the reward of being able to contribute towards tangible solutions for issues that impact the wider society. Because of their high quality, all three ideas/ concepts were endorsed and promoted through the SHOW Services Marketplace. Moreover, *Gustav* has led to a series of follow-up implementations, under different configurations, in the Trikala and Madrid SHOW pilot sites, whilst future implementations are expected in the ULTIMO project[24]. *DeFORUS* has led to different AI services configurations, based on only historical or historical and real time/ near real-time fed data. Specifically, on a historical data basis, similar services have been deployed in the Tampere and Frankfurt SHOW pilot sites, while on a historical and real time/ near real-time data feeds basis, implementations have been/ are being followed in the Trikala, Madrid, Turin and Carinthia pilot sites.

The dissemination of the event before, during and after was done by Y4PT. A video was made on the event, available https://www.youtube.com/watch?v=xQr5mQCVv6Y.

Looking back at the event, overall, Hackathon participants showed a keen understanding of end-users' challenges. Through collaborative efforts and creative problem-solving, they strived to propose solutions that catered to these needs, demonstrating depth of insight and ingenuity. Participants themselves also gave positive feedback, appreciating the smooth organisation, the support of experienced mentors and the ability to work together in diverse teams. For the future, the organisers identified some challenges, notably to enhance diversity and inclusion in terms of Hackathon participants, as well as ensuring continued post-Hackathon support, mentoring and networking opportunities.

Figure 135 - Hackathon Thessaloniki - Group picture of participants

[24] https://ultimo-he.eu/

6.3 Open Summer of Code (Brussels, 01-25.07.2024)

Open Summer of Code's 13th edition took place from 1 to 25 July 2024, as a hybrid event: partly in Brussels and partly remote, to reflect the current professional environment. After internal discussions with the SHOW project management team (CERTH, UITP), ERTICO and EPF, it was decided it would be a great opportunity for SHOW to work together with OSoC for an extended Hackathon event.

What is Open Summer of Code?

Open Summer of Code (OSoC) is a 4-week summer program providing Belgian-based students training and support to transform open innovation projects into real-world services. It is organised by Open Knowledge Belgium, a not-for-profit organisation and an official chapter of the international Open Knowledge Foundation.

OSoc takes place during July and gives talented students with IT, development, communications, design and business skills a summer job with a real challenge, enabling them to work on impactful and challenging projects with societal benefits. OSoc provides students with support, a network and fast paced training, which takes their skills to the next level and prepares them for the job-market.

External partners – which can be governments, non-profit organisations or companies – can benefit from OSoC as it allows them to tap into a pool of talent and fresh ideas from the upcoming generation. Potential partners can propose a challenge to work on, which is then translated into a concrete, solid project idea. Next, OSoC selects a customized team of suitable and motivated students to tackle the challenge.

During the 4-week OSoC programme, student teams – boasting a variety of skills and backgrounds, tailored to the proposed challenge – work on a proof of concept, marketing plan, visualisation, prototype or wireframe, with the help of OSoC coaches and mentors. During the programme, a kick-off meeting and follow-up meetings at regular intervals are planned with partners, the students and their coach for feedback and iteration. The end result of the students' work is showcased during 'Demo Day'.

SHOW's challenge for Open Summer of Code

After considering various options, we decided to task the students with the challenge of designing a cutting-edge and comprehensive concept for the **mobility hub of the future**, efficiently and seamlessly integrating new mobility solutions such as micromobility (e.g., e-scooters, e-bikes) and automated vehicles for both passengers and logistics. Ultimately, the aim of such a vision is to improve urban transportation, reduce congestion, enhance connectivity, and promote eco-friendly travel options for both individuals and goods.

The project **outcome** was envisioned as a detailed and visually appealing document that outlines the functional system architecture of the proposed mobility hub of the future, highlights the integration of various mobility solutions, explains their functionalities, and depicts how they interact to create a cohesive and efficient transportation ecosystem. Target audiences could be urban planners and city officials, transportation and mobility companies, technology and innovation firms, environmental and sustainability organisations, investors and stakeholders in the mobility sector.

As further considerations, we defined some **'must haves'** and **'nice to haves'**:

- Must haves: Detailed functional system architecture; integration plans for micromobility and automated vehicles; visual representations of the mobility hub and its components; explanations of the functionalities and interactions of different elements; sustainability and efficiency considerations

- Nice to haves: Case studies or scenarios showcasing practical applications; user experience design and interface considerations; potential economic and environmental impact assessments; feedback and insights from industry experts
- *Optional: Long-term scalability and adaptability plans; additional innovative mobility solutions (e.g., hyperloop, drone deliveries).

SHIFT: Sustainable Hub for Intelligent Future Transit

A team of **three students**, combining design, technical and innovation skills, worked on our challenge throughout summer, supported by coach Walter Vandervelde, Head of Programme BA Idea & Innovation Management at Erasmus Hogeschool Brussels.

To produce their concept, the team employed **various research methods** such as an expert interview, a brainstorming session and desk research where they investigated common frustrations of mobility users, emerging trends and best practices. The resulting visionary document details the functional system architecture of the mobility hub of the future, including passenger and parcel transport.

In addition to the mobility hub structure and concept, the team produced a number of **supporting elements** such as user personas, screens for a potential MaaS app, and the 'SHIFT Criteria for a Future Hub':

- Accessibility and inclusivity
- Safety and security
- Comfort and convenience
- Efficiency and operational reliability
- Sustainability and eco-friendliness
- Technological integration and innovation
- Versatility and flexibility
- User engagement and responsiveness.

On July 25th, the team delivered their **final concept**, accompanied by a presentation in Brussels at the OSoC Demo Day.

Figure 136 - The SHIFT team at OSoC Demo Day

The end result, SHIFT's comprehensive visionary report on 'The Mobility Hub of the Future', is attached to this Deliverable as Annex. A summary is provided below.

The report consists of **two main parts**: the actual description of the SHIFT Mobility Hub concept, and a description of the 'making of' process.

Figure 137 - SHIFT: The Mobility Hub of the Future

6.3.1 The Making of SHIFT

The **'Making of SHIFT'** explains the process that led up to the final outcome and covers three main stages: Input, Creation, and Building. The **'input' phase** itself consisted of two sequential stages: Introduction and Research. The initial introduction refers to the original briefing and in-depth intake meetings with the client (SHOW, in our case), to define a clear, actionable question to guide the project to success. With a well-defined briefing in hand, the SHIFT team transitioned to the hunting phase, or research stage, aiming to gather as much 'wisdom' as possible, helping not only to deeply understand the task but also to uncover data and insights that paved the way for original ideas and solutions. The **'creation' phase** was then approached in three distinct steps: defining key criteria for the future mobility hub, generating ideas through a brainstorming session and creating an overarching concept. The final **'building' phase** consisted of three interconnected parts: branding (look & feel) of the project, visuals and illustrations, and wireframes for the smartphone application.

6.3.1.1 INPUT phase

The first step was to **extensively consult with current public transport users**. Both **users and their complaints** were categorized into types and categories. Complaints related to parcel shipping and receiving were also considered. A brainstorm session with a **'complaint wall'** identified additional complaints. As part of this process, the SHIFT team created **six personas**, considering for each of them how they use public transport and what their wants, needs and frustrations are.

Figure 138 - Personas created by SHIFT

The second step was to **identify current and emerging trends** that could impact the project, ensuring solutions are future-proof. The following trends were considered:

- Supercharging destinations: EV charging stations transform a chore into an entertainment opportunity;
- Analog travel: Intentional travel is gaining popularity as people ditch smart tech on vacation;
- Co-creative futures: Brands are giving consumers creative control over their products;
- Our Speed Need: High-speed rail and transport are on the rise;
- Eco-responsible travel: Travelers are becoming more aware of their CO_2 footprint.

The team looked at how **innovative start-ups** such as Kiwee (zero-emission, space-saving 2-person cars for city roaming), Zipline (last-mile drone delivery for parcels), De Park (underground efficient and automated parking), NIO Power Swap (battery swapping stations for EVs) and OTIV (autonomous driving in railway industries) are redefining urban mobility and inspiring future mobility hubs.

Broadening the scope, the SHIFT team conducted **cross-industry research** to uncover innovative approaches from other sectors. Some of the concrete and creative ideas that could be integrated into the SHIFT solution included: autonomous delivery robots and drones, AI-powered predictive maintenance, smart interactive signage and wayfinding, sustainable design and renewable energy integration, biometric and facial recognition systems, Mobility as a Service (MaaS) platforms, augmented reality (AR) experiences, real-time data analytics and dashboard, community and stakeholder engagement platforms, hyperloop and high-speed transport integration.

Next, the team took a closer look at the **concept of a 'mobility hub'** – understood as 'a place where different modes of transportation – such as buses, subways, and bikeshare – are seamlessly connected, making transfers between them easy and convenient' and studied best practices in terms of accessibility, safety and comfort, information and wayfinding, and integration of micro-mobility services.

Finally, the team investigated specific **challenges and solutions for Autonomous Vehicle navigation** in the Mobility Hub of the Future, such as unpredictable human behaviour, legal responsibility and insurance liability, weather conditions, and ethical dilemmas. Fleets of AVs should be introduced to reinforce an efficient, high-capacity public transport network and/or provide feeder services to major hubs.

A compelling **interview** with industry expert Gregory Falisse, who has over 22 years of experience in mobility, provided the team with additional invaluable insights on how to create the ideal sustainable transit hub of the future.

6.3.1.2 CREATION phase

The input phase provided an overwhelming abundance of data, which made it challenging to see the forest for the trees. Therefore, the team decided to identify a specific **set of criteria** that the mobility hub of the future should meet, to ensure that it covers the diverse needs of users and promotes sustainability, safety and innovation. The criteria are depicted in Figure 139, and refer to:

- **Accessibility and Inclusivity**: Designing all aspects of the hub to be accessible and user-friendly for people of all ages, abilities, and financial backgrounds, ensuring seamless and equitable access for everyone.
- **Safety & Security**: Prioritizing physical and health safety of all users through advanced surveillance, emergency systems, and well-lit, secure environments.

- **Comfort & Convenience**: Providing a comfortable and convenient experience with amenities like clean facilities, optimal environmental controls, and family-friendly spaces.
- **Efficiency & Operational Reliability**: Ensuring the hub operates smoothly and reliably with integrated systems for real-time information, optimized passenger flow, and seamless ticketing and scheduling.
- **Sustainability & Eco-friendliness**: Incorporating sustainable practices and renewable energy sources to minimize the environmental impact and promote long-term ecological health.
- **Technological Integration & Innovation**: Leveraging cutting-edge technologies like AI, IoT, and autonomous systems to enhance the functionality and user experience of the mobility hub.
- **Versatility & Flexibility**: Designing spaces and services to be adaptable and scalable, accommodating various transportation modes and future developments.
- **User Engagement & Responsiveness**: Actively engaging with users through feedback systems, customer service, and adaptive services to continuously improve the hub based on user needs and preferences.

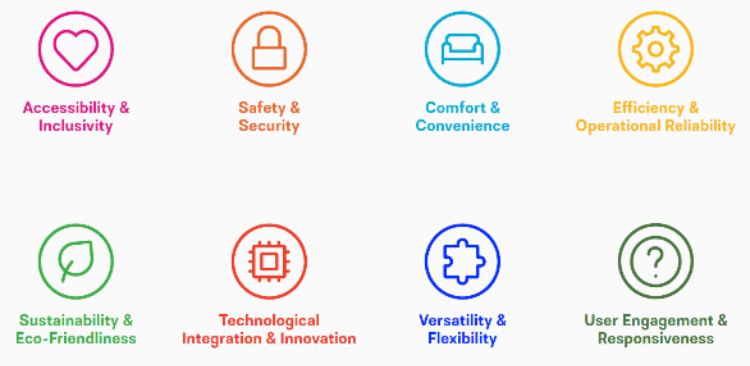

Figure 139 - SHIFT criteria

The next step in the Creation phase was a half-day **brainstorming session**, bringing together ten participants from various backgrounds, including designers, engineers, and linguists, ensuring a rich mix of viewpoints and expertise. Structured into several dynamic activities (like ‘sketch dump’, ‘frustration purge’, ‘mole question’, ‘scenario storming’), the session aimed to create a collaborative environment where participants could freely express their ideas and frustrations.

Figure 140 - SHIFT brainstorming session

The outcomes provided valuable ideas serving as building blocks for developing the SHIFT visionary hub **concept creation**. Brainstormed ideas were allocated to the eight criteria mentioned earlier, and then translated into tangible possibilities, focusing on the most original and promising concepts. Then, a second ideation session was held with the team, aiming to design an overarching concept, which should seamlessly blend sustainability and technology, and resonate with profound metaphors, symbols that could elevate the experience from mere functionality to a source of inspiration. The selected foundational concepts were: Tree of Life, Waterfall Flow, Gear Shift metaphor, Shifting Landscapes, Forest Canopy Hub, Shift in Motion, Solar Leaf Hub.

6.3.1.3 CREATION phase

Since the end result had to be an inspiring and visually appealing report, it made sense for the team to focus heavily on **creating strong visuals and illustrations**. It was an exciting journey of trial and error, choosing the right applications to generate these. In the end, Midjourney was used, a far from easy process but with satisfying results.

Added to this, work was done on **comprehensive branding** of the project, which included crafting a compelling name: SHIFT (which stands for 'Sustainable Hub for Intelligent Future Transit') as well as an accompanying logo and visual identity.

Finally, even though a smartphone app was not a top priority, the team found it hard to imagine the daily operation of the mobility hub without it. Therefore, sketching **wireframes for SHIFT's dedicated (MaaS) app** was included in the creation process.

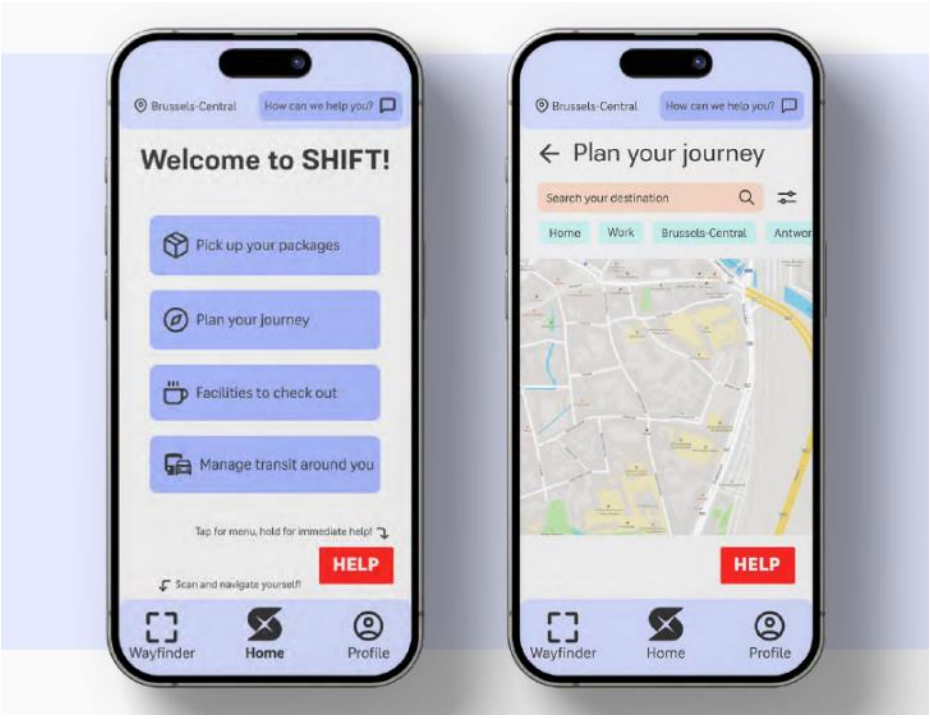

Figure 141 - SHIFT wireframes

When users first open the SHIFT app, they can create a profile, log in, or enter as a guest. Creating a profile involves a questionnaire about their public transport preferences and needs, such as assistance with wheelchairs or guidance for poor vision. This information is securely stored to tailor their experience and ensure smoother journeys. Upon accessing the homepage, users see a welcome message and their location. Clicking the 'How can we help you?' button directs them to an AI chatbot for any questions about the mobility hub and its features. From the home page, users can: Pick up packages; Plan a journey; Explore facilities; Manage transit options.

6.3.2 Introducing SHIFT: The Future of Mobility Hubs

The second half of the SHIFT report delves deeper into the concept of SHIFT: The Future of Mobility Hubs. Referring back to the **8 criteria** for such a hub, identified above, the team proposed **enhanced solutions for each of these**, indicating per idea how easy it would be to implement (feasible, ambitious, or futuristic).

Table 7 - SHIFT ideas for the Future Mobility Hub

Accessibility & Inclusivity	
Feasible	**1.** Clear and easy to understand communication
Feasible	**2.** Announcements in multiple languages
Feasible	**3.** Personalised app profiles
Feasible	**4.** Multi-sensorial design
Feasible	**5.** Wayfinding
Feasible	**6.** Animal friendly
Feasible	**7.** Toilets at stations
Ambitious	**8.** Affordable access
Feasible	**9.** Free trials for different transport modes
Feasible	**10.** Accessible transport
Feasible	**11.** Comfortable and accessible circulation
Safety & Security	
Feasible	**1.** First aid stations and medical assistance points
Feasible	**2.** Pharmacy in the hub
Ambitious	**3.** Timed entry systems and digital displays
Feasible	**4.** Integrated emergency response system
Feasible	**5.** Emergency response systems
Ambitious	**6.** Adaptive light and climate control
Feasible	**7.** Curtains on transport vehicles
Ambitious	**8.** Social carpool function
Comfort & Convenience	
Ambitious	**1.** Food delivery to trains
Feasible	**2.** Free drinking water stations
Feasible	**3.** Facilities for freshening up
Ambitious	**4.** Lockers for receiving packages
Futuristic	**5.** Under-seat package delivery on transport
Futuristic	**6.** Underground shopping shoots
Ambitious	**7.** Reserved seating on transport vehicles
Feasible	**8.** Soothing ambient environment
Feasible	**9.** Quiet rooms for relaxation
Ambitious	**10.** Warning notifications in the app
Ambitious	**11.** GPS navigation en route
Ambitious	**12.** Route preference system
Futuristic	**13.** Vibrating seats to wake up passengers
Futuristic	**14.** Comprehensive parking and storage solutions
Efficiency & Operational Reliability	

Ambitious	**1.** Single ticket for entire journey
Ambitious	**2.** Real-time occupancy information
Feasible	**3.** Pro-active service continuity
Futuristic	**4.** Automated underground delivery system
Ambitious	**5.** Conveyor belt to nearest pickup point
Futuristic	**6.** Underground parcel storage in lockers
Ambitious	**7.** Streamlined traffic flow
Futuristic	**8.** Reversible escalator & continuous lifts
Feasible	**9.** Efficient boarding and alighting
Ambitious	**10.** Stop only when necessary
Futuristic	**11.** Biometric and facial recognition systems
Sustainability & Eco-friendliness	
Ambitious	**1.** Community-driven logistics
Ambitious	**2.** Comprehensive recycling infrastructure
Ambitious	**3.** Carbon offsetting programme
Futuristic	**4.** Solar leafs
Ambitious	**5.** Optimized energy usage
Futuristic	**6.** Human-powered escalators and lifts
Ambitious	**7.** Urban green spaces and air quality management
Feasible	**8.** Nature-inspired design
Ambitious	**9.** Free public transportation
Technological Integration & Innovation	
Ambitious	**1.** AR wayfinding with live view
Futuristic	**2.** Dynamic electronic signage
Futuristic	**3.** Assistance robots
Ambitious	**4.** Automated self-cleaning hygiene system
Ambitious	**5.** Automated trains
Futuristic	**6.** Biometric authentication
Futuristic	**7.** Vertical construction and design
Ambitious	**8.** Delivery drones with zipline technology
Ambitious	**9.** Optimized scheduling
Versatility & Flexibility	
Ambitious	**1.** Multi-modal transport options
Futuristic	**2.** Mobility as a Service (MaaS) app
Ambitious	**3.** Outer ring parking with shared mobility
Feasible	**4.** Flexible use of spaces
Futuristic	**5.** Integration of future technologies
User Engagement & Responsiveness	
Ambitious	**1.** Surge pricing based on demand and time
Feasible	**2.** Discounts for frequent users
Feasible	**3.** Real-time feedback collection
Futuristic	**4.** User-centric service improvements
Ambitious	**5.** Personalised travel recommendations

SHIFT proposes a **vertical hub structure** designed to optimize the efficiency of transportation modes based on travel distances and including dedicated facilities for parcel handling. By organizing services and amenities across multiple levels based on transportation distances (ground level: first-last mile transport; level 1: short distance transport (5-20 km); level 2: medium-distance transport (20-100 km) and level 3: Long-distance transport (>100 km)), the SHIFT Mobility Hub maximizes space utilization, enhances user experience, and promotes seamless integration between various transport modes. The vertical structure of the SHIFT Mobility Hub is designed with adaptability and future growth in mind. Modular design elements and movable partitions allow for easy reconfiguration of spaces to accommodate new technologies and evolving user needs.

The SHIFT report also describes in more detail the **integration of Autonomous Vehicles and micro-mobility** in the mobility hub. V2X communication technology, relying on various sensors, allows AVs in the hub to interact with various devices and infrastructure elements, such as traffic lights, other AVs, IoT devices, or pedestrians' smartphones. At the hub, separated lanes are foreseen for AVs, bicycles, electric scooters and pedestrians, to reduce conflicts and ensure a safe environment. Users interact with AVs through intuitive mobile apps and smart kiosks, which allow them to reserve a journey, receive real-time updates, and customize their travel preferences. AVs are accessible to people with disabilities and equipped with advanced safety features. The hub's infrastructure supports easy transfers with other modes.

The report concludes by **looking back at the user personas** developed in phase 1, and how the SHIFT concept addresses their original struggles. It also refers to how SHIFT can contribute to the **Sustainable Development Goals (SDGs)**, notably SDG3 (Good health and well-being), SDG7 (Affordable and clean energy), SDG 9 (Industry, innovation and infrastructure), SDG11 (Sustainable cities and communities), SDG12 (Responsible consumption and production), SDG13 (Climate action) and SDG17 (Partnerships for the Goals).

SHIFT in a nutshell

SHIFT (Sustainable Hub for Intelligent Future Transit) is a revolutionary mobility hub that seamlessly integrates multiple transportation modes within a sustainable and user-friendly ecosystem. At its core is a tree, inspired by photosynthesis, featuring large, leaf-shaped solar panels that provide shade and generate renewable energy. This design combines technology with nature, creating shaded pathways and green rooftops that enhance both sustainability and aesthetics.

SHIFT offers seamless connectivity by integrating autonomous shuttles, electric bikes, and high-speed trains, ensuring efficient transitions between different transportation modes. Dedicated lanes and intuitive pathways make commuting smooth and effortless. The hub's design prioritizes user comfort, with quiet zones, comfortable seating, and real-time information displays. AI chatbots and service robots are available to assist travellers, enhancing the overall experience.

Environmental stewardship is a key aspect of SHIFT. The hub incorporates rainwater harvesting, greywater recycling, and comprehensive waste management systems, demonstrating a strong commitment to sustainability. These green practices ensure efficient resource use and minimize the environmental impact.

By reducing travel time and improving connectivity, SHIFT makes urban transit more efficient and convenient. Its reliance on renewable energy and sustainable practices sets a new standard for eco-friendly commuting. SHIFT represents the future of urban mobility, where technology and nature coexist to create a seamless, comfortable, and sustainable transit experience.

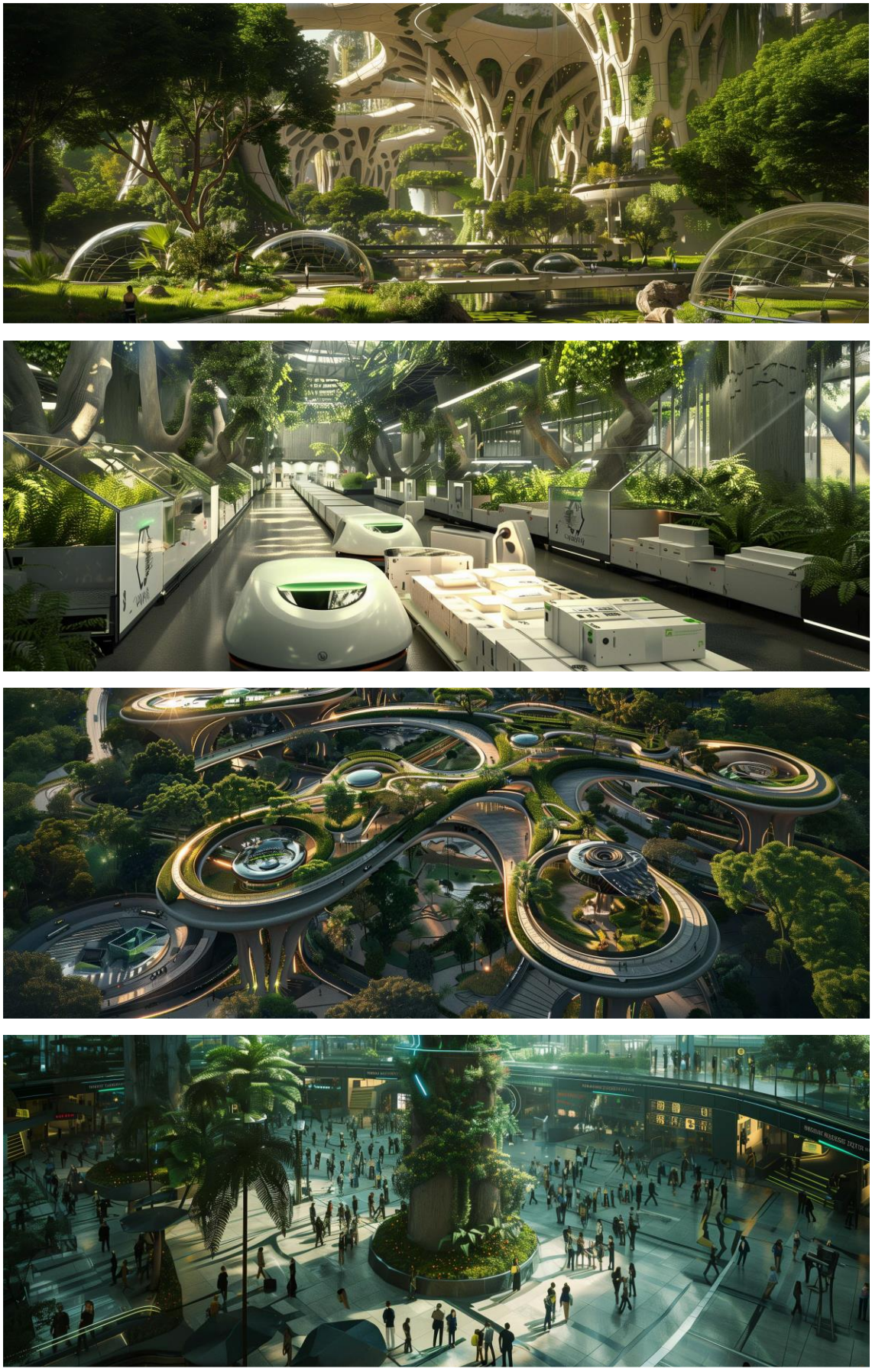

Figure 142 - SHIFT images of the Future Mobility Hub

6.4 Duo-Hackathon Swedish megasite (cancelled)

To conclude the overview, an additional SHOW Hackathon was originally planned to be held by the Swedish SHOW megasite (Linköping and Gothenburg), jointly organized by VTI and RISE. Unfortunately, due to too few registrations, the Hackathon was postponed and then cancelled. It proved to be very difficult to recruit participants. However, as the plans for the event had reached a quite advanced stage, we include them here. In the future, it might be considered to take up the idea again based on the preparatory work already conducted.

Figure 143 - Hackathon Sweden - Poster

As can be seen on the poster (Figure 143), the plan was for the Hackathon to take place in the weekend of 03-04. June 2023 – afterwards postponed to 07-08. October – at two locations: University Campus Linköping & Johanneberg and Science Park Gothenburg. A dedicated web page with a registration form was also created, the content of which is replicated below.

Bring your friends and join a Hackathon!

Automated shuttles are running in Linköping and Gothenburg, as part of the SHOW project (www.show-project.eu). Interested in knowing more about automated mobility and what benefits it can bring? Participate in our Hackathon and help us improve our services!

When: 7-8 of October 2023

Where: In Linköping and Gothenburg

Award: 10 000 SEK to the winning TEAM

Topic: Improving automated mobility services

Food and fika: Free lunch and fika and a lot of new insights and friends

A team: 3-5 persons (ish) with the same or different type of knowledge and experience, it is up to you to decide

WHEN and WHERE?

The Hackathon will be a two-day event, taking place simultaneously in Linköping (University area) and Gothenburg (Johannesberg) on 7 & 8 October 2023. We'll start at 10AM and end at 5PM.

CONCEPT

Teams will brainstorm and develop innovative solutions to improve the automated shuttle services that are currently operating in Linköping and Gothenburg, Sweden, focusing on three challenges:

1. Improve accessibility for children using Automated Vehicles (AV)

2. Develop solutions for AV interaction with other road users (pedestrians and cyclists)

3. Optimize battery charging.

We already collected a lot of data about the vehicles' performance (for example speed, accelerations and charging, number of passengers entering at each stop, …) as well as user feedback (what's working well, what can be improved?), which will be available to work with during the Hackathon.

WHO CAN PARTICIPATE?

Anyone can apply! A team consists of around 3-5 people, either with the same or a different background and expertise (designers, developers, scientists, business analysts, …). Up to you to decide who's in your team!

WHAT'S IN IT FOR YOU?

The winning team gets an award of 10.000 SEK. There's free fika and lunch on both days. And not to forget: Have fun, learn new skills, meet and work with great people!

SIGN UP YOUR TEAM!

Just click on the button 'start the survey' below to sign up your team. If you have questions do not hesitate to contact us: Anna Anund, Linköping (anna.anund@vti.se), Cilli Sobiech, Gothenburg (cilli.sobiech@ri.se).

AGENDA

Day 1 (October 7)

- 10.00 – 11.00 Introduction
- 11.00 – 11.15 Fika
- 11.15 – 12.30 Data sharing and installations
- 12.30 – 13.00 Lunch
- 13.00 – 14.30 Work in progress
- 14.30 – 15.00 Fika
- 15.00 – 17.00 Work in progress

Day 2 (October 8)

- 10.00 – 11.00 Work in progress
- 11.00 – 11.15 Fika
- 11.15 – 12.30 Work in progress
- 12.30 – 13.00 Lunch
- 13.00 – 14.30 Work in progress
- 14.30 – 15.00 Fika
- 15.00 – 16.00 Work in progress
- 16.00 – 17.00 1 page presentation

7 Supertesters

User perception of AVs depends on a multitude of factors. Existing studies focus mostly on user experience of specific AV services. Comparing results is difficult and may be biased because of different samples of users. To enable a deeper understanding of pros and cons, as well as the impact of context-specific elements, through a more profound qualitative feedback of passengers – end-users – the 'Supertesters' approach was introduced in SHOW, with Austria being the first pilot site to apply and establish it, as an example for other pilot sites following.

7.1 Overall approach

The novel 'Supertesters' approach is a within-subjects empirical method in which a consistent yet diverse group of individuals – referred to as 'Supertesters' – was recruited to experience various use cases, which allows a comparative analysis across diverse settings, use cases, vehicle types and user perspectives. The same set of users evaluated different AV services across identical criteria. User feedback with regard to the AV services was gathered through questionnaires, interviews and workshops. This approach strived to provide a more comprehensive perspective on the mobility requirements for various use cases within automated public transport.

Figure 144 - Supertesters - Recruitment

Who were the Supertesters?

In total, 21 Supertesters (10 female, 11 male) were recruited, primarily through the social media platforms as well as the websites of AustriaTech and local project partners (see Figure 144). To incentivize participation, all travel expenses to travel back and forth to the sites by public transport were covered. Additionally, catering on-site, including 30€ food vouchers per test day, was included for all participants.

57% of the participants reported having intermediate prior knowledge about automated mobility, while 43% claimed to have advanced knowledge. 64% of participants indicated that they stay informed about recent developments in automated mobility.

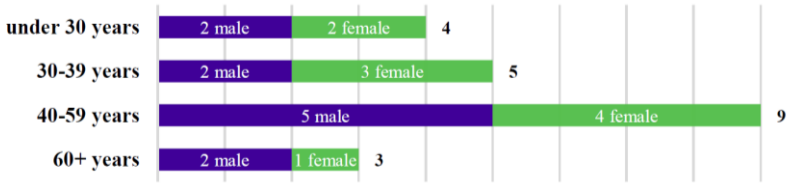

Figure 145 - Supertesters - Participants by age group (n=21)

The test days

Three test days were originally planned, one per SHOW Austrian Demonstration site:

- 30. June 2023: Supertesters gathered in Graz for the first test day.
- 28. July 2023: Second test day in Pörtschach am Wörthersee.
- *The test day in Koppl (Salzburg) was cancelled, due to the involvement of the SHOW Digibus® 2.0 Digitrans eVAN in an accident on the 2nd of August 2023 and the consecutive revocation of the test permit.*

The different sites cover a broad variety of relevant scenarios for automated mobility in Austria: urban, peri-urban, different vehicle and operating concepts.

Each test day started with a short **introduction** to the pilot site and the vehicles and participants giving their informed consent to participate.

Subsequently, all participants had **a first test ride**. After the ride, participants were asked to:

- rate their overall experience in a one-question-survey on a scale from 0 (not satisfied at all) to 100 (very satisfied) by moving a slider
- fill in the SHOW user acceptance survey
- share a few words about the experience.

For the **second test ride**, participants were each given a **"challenge card"**, inspired by the Catapult project[25], asking them to imagine specific events and challenges that occur during the operation of the automated mobility solutions (e.g., technical problem, conflict between passengers) or specific characteristics a potential user has (e.g., hearing difficulty, broken leg, accompaniment of child). In some cases, this included the use of utensils like a wheelchair, crutches, glasses simulating visual impairments or noise-cancelling headphones. Then, participants again gave feedback on their experience (they were instructed to pretend that no safety personnel or any other personnel was available in the vehicle)

The test drives were followed by a **workshop** session in three parts:

[25] https://jpi-urbaneurope.eu/project/catapult/

Group Session: participants discussed their experiences in small groups. Flipcharts were provided with a series of questions to guide the discussion. Participants wrote their responses on post-it notes and placed them on the flipchart posters.

Poster 1 – Specific experience with challenge cards

- What were the main challenges posed by the card or with the utensil?
- What needs to be changed or adjusted?
- Where were the challenges along the route?
- Were there challenges within the vehicle?

Poster 2 – General Experience

- How satisfied were you with the ride in general?
- How did you experience the braking and acceleration behaviour of the vehicle?
- How did you perceive the speed of the vehicle?
- How did you perceive the accessibility?
- If this service was commercial, what would you need before, during, or after the trip? (With a focus on automation)
- Would you use this service again tomorrow? If not, what would need to change or be further improved?

Panel Session: During this phase, all groups were asked to place their most noteworthy post-it notes onto a large pilot site poster, positioned at the front of the room. One representative from each group presented the key takeaways.

Dot Voting: To conclude the workshop, the moderators initiated a dot voting activity. Each participant received three dot points to mark the post-it notes they considered most important. Finally, the moderators summarized the topics receiving the highest number of dots.

7.2 Test day in Graz

On 30. June 2023, the Supertesters gathered for the first time in Graz, at the Puntigam traffic hub. After an introduction to the project, an overview of the day's activities, and a technical presentation of the vehicles – a Ford Fusion hybrid and a Kia e-Soul – it was time to try them out. The route, about 2 km long, connects Centre West and the Puntigam hub and includes three stops that can be selected via tablet.

Each Supertester completed two test drives, each with a distinct focus. The first round enabled participants to get an initial impression of the pilot site and familiarize themselves with the new technologies involved. The second test drive was a more challenging scenario, as participants should imagine that there was no safety driver and no help or support available, and ask themselves the following questions:

- Is it possible to start the ride even with a cast foot and limited mobility?
- What do I do if I forget my valuables in the vehicle?
- Who can I turn to if I need help?

In addition to the test drives, participants had the opportunity to learn about V2X (vehicle-to-everything) and C-ITS technology – how communication between vehicles and infrastructure works – during a technical presentation by Virtual Vehicle. In the afternoon, participants were divided into four groups for a workshop session, to discuss the challenges faced as well as general experiences related to vehicle speed, acceleration, braking, and the commercial utilization of the service.

The workshop’s main takeaways, focused on people’s needs, related to clear communication between the vehicle and passengers – including information and

instructions –, the presence of an emergency button and the ability to connect with an emergency call centre, as well as the integration of a voice module to aid passengers.

The results of the first day of the event series already provided valuable insights into the vehicles in use, the service and, in particular, the needs of specific groups of people. The participants emphasized the importance of barrier-free accessibility and the need for visual and auditory assistance.

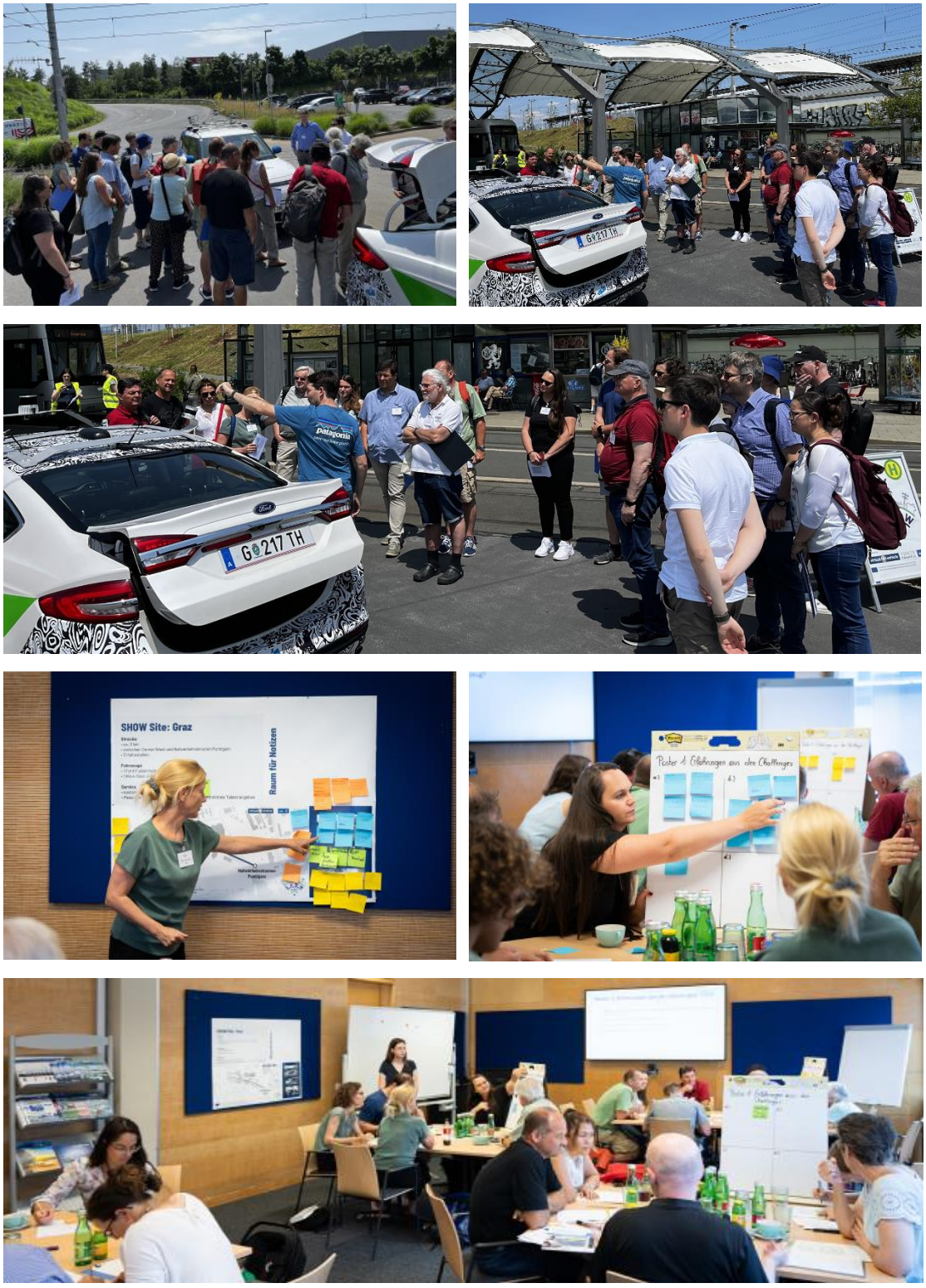

Figure 146 - Supertesters - Graz

7.3 Test day in Pörtschach

For their second test day on 28. July 2023, the Supertesters visited Pörtschach. After the introduction at see:PORT – an innovation, thinking, working and co-creation space at Lake Wörthersee –, participants boarded the shuttle, which has room for eight people and is equipped with comprehensive sensor technology. As in Graz, the Supertesters completed two rides on the shuttle.

Sunshine and high temperatures had attracted numerous tourists and locals to the lake, forcing the shuttle to move close to parked cars and pedestrians. The automated vehicle mastered these difficult driving situations on narrow streets with aplomb. The participants described the ride as fluid and very similar to human driving behaviour. The testers saw room for improvement in the abrupt braking processes. In mixed traffic with other road users, it was noticeable that the shuttle handled intersection situations rather more slowly, but overall the driving speed was perceived as appropriate.

Next, Supertesters were assigned scenarios that simulated challenges – assuming that there is no safety driver in the vehicle, such as:

- A conflict between passengers escalates
- Passengers with impaired vision (simulated by special glasses)
- Passengers with limited mobility (simulated by a wheelchair).

Based on their experiences during the challenges, the participants were asked to identify their needs and expectations in the respective situation, which were then recorded and discussed in the subsequent workshop at see:PORT. Overall, testers rated their experience as extremely positive. At the same time, the Supertesters would like to see more real-time information about vehicle and alternative routes displayed on a central information screen at the departure point. The integration of the timetable and the display of available seats in an app were also valuable suggestions. In the event of an emergency or accidents, a first-aid kit and a connection to the emergency call centre should be easily accessible at all times. While the accessible design of the shuttle was appreciated, testers identified potential for improving PRM experiences:

- People with visual impairments, for example, need further assistance to be able to estimate the exit heights at the respective stops.
- For wheelchair users, the ramp should be easy to operate and its inclination should be adapted to the different exit heights.
- The testers also saw room for improvement in the options for securing the wheelchair during the journey.

Figure 147 - Supertesters - Pörtschach

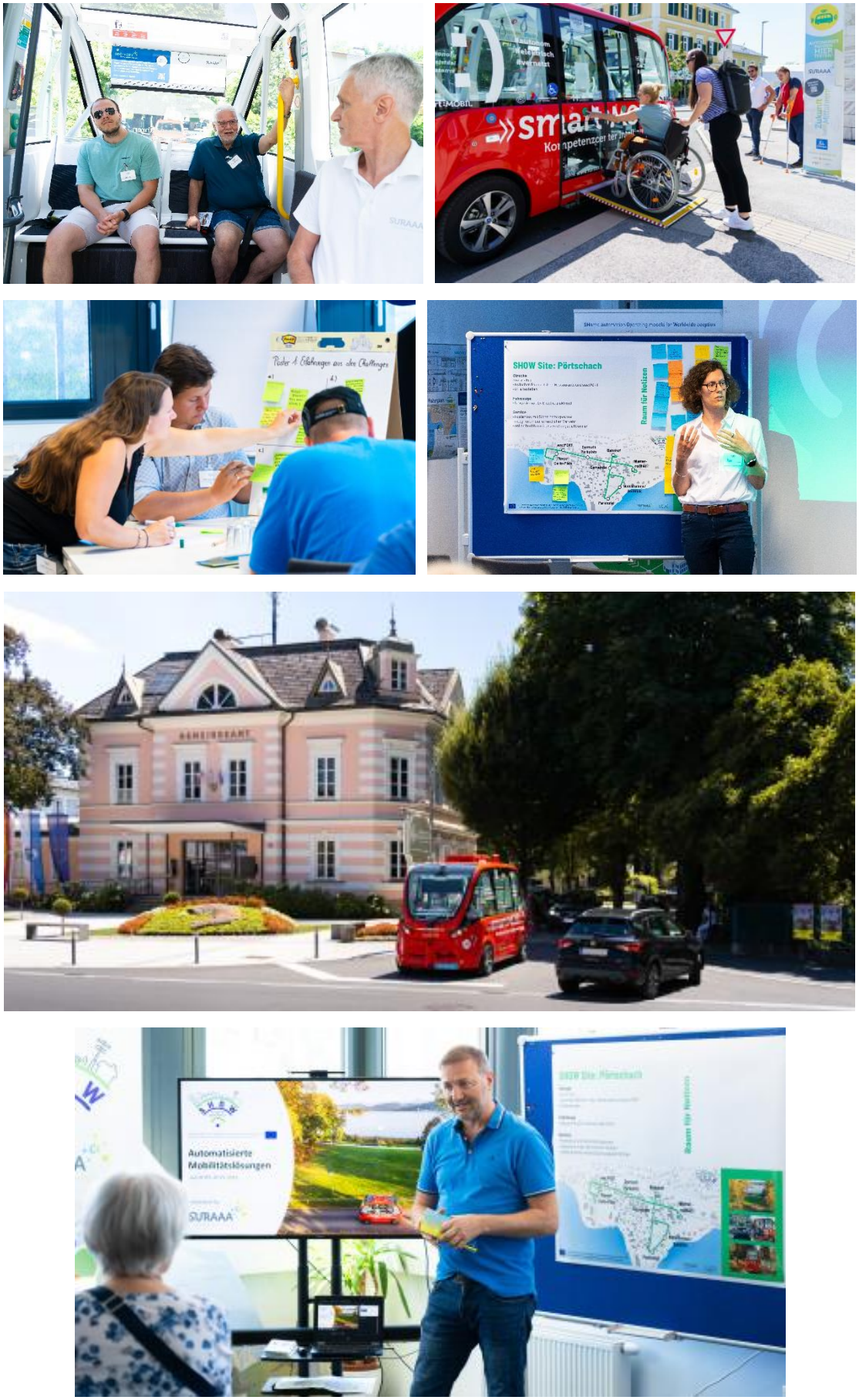

Figure 148 - Supertesters - Pörtschach

7.4 Results – Highlights

Following the initial survey after taking the first test ride, in Graz and in Pörtschach the overall average satisfaction with the AV services was generally high (see Figure 149), with slightly higher scores for the Robotaxi service in Graz, compared to the shuttle bus service in Pörtschach. Likewise, participants expressed a (significantly) higher willingness to pay for the Robotaxi services (see Figure 150).

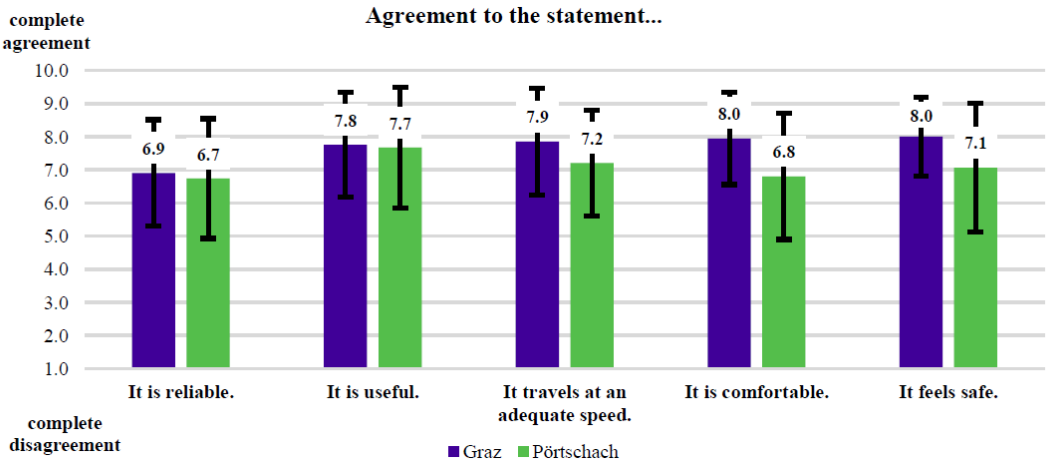

Figure 149 - Supertesters - Initial survey results (Graz n=20, Pörtschach n=15)

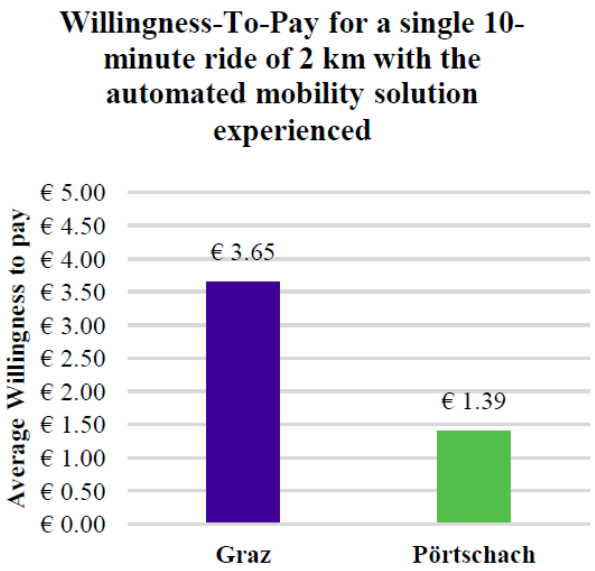

Figure 150 - Supertesters - Willingness to pay (Graz n=20, Pörtschach n=15)

Although overall satisfaction was consistently positive in both cases, differences in braking, speed, and accessibility emerged across various vehicle types (see Table 8).

Table 8 - Supertesters - Perception of specific factors related to the ride

	Graz (Robotaxi)	Pörtschach (AV shuttle)
General satisfaction with the ride	Overall good, especially for the Ford Fusion vehicle	Very good, fluent
Experience of braking and acceleration behaviour	Good for the Ford Fusion vehicle, partly jerky for the Kia vehicles	Acceleration fluent, but braking was too rough

Perception of the speed	Rather slow and too defensive	Good, adjusted for the situation
Perception of the accessibility	Not accessible	Accessibility for wheelchair users assessed positively, practicable with a ramp

The main factors to improve the existing solutions, as identified by the Supertesters, are shown in Figure 151.

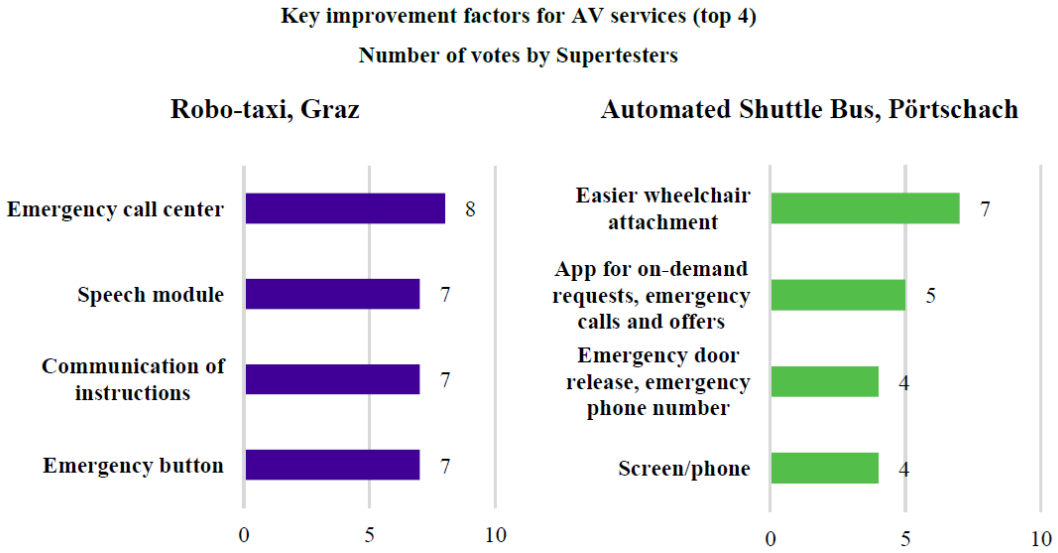

Figure 151 - Supertesters - Key improvement factors (Graz n=20, Pörtschach n=15)

In summary, the results of the two test days confirmed the key importance of essential safety and emergency features, with participants emphasising the need for emergency buttons, manual door openers, and relevance of human support, whether on-board or through remote communication. Accessibility and service-oriented information were also identified as crucial aspects, with participants desiring more comprehensive information through both audible and visual cues, along with improving the wheelchair attachment in the shuttle bus. The Supertesters' feedback also unveiled different passenger expectations, depending on vehicle type and use case: while participants expected a more personalised, one-on-one approach in case of the Robotaxi service, like a regular taxi service (Graz), the AV shuttle as deployed in Pörtschach was perceived more as a type of public transport, implying a more passive interaction, like a traditional bus service.

The Supertesters methodology represents advantages as well as limitations. The method allows for a detailed comparison in terms of overall satisfaction or perception of specific elements like safety, accessibility, usefulness etc. between different AV scenarios. However, it proved to be challenging to gather the same participants at different dates and sites: while 21 Supertesters were recruited, only 15 participated in both test days (20 in Graz, 5 of which did not attend in Pörtschach due to illness). In the future, efforts to diversify further he Supertesters group (attracting more people that are not initially interested in CCAM, for example) and expand the sample size, could enhance transferability of findings.

To note: The methodology and results of the Supertesters concept, as applied in Austria, is described in more detail in *Shared Mobility Revolution: Pioneering Autonomous Horizons*, open access book reporting on the results of SHOW (chapter "Unlocking the full spectrum of user perspectives on automated mobility using the 'Supertesters' method"), soon to be published by Springer (link).

8 Conclusions and lessons learned

In order to design and develop sustainable and successful AV services, the **needs and requirements of both end-users and stakeholders** involved in the (AV) transport and mobility ecosystem **need to be considered**. The overall objective of A9.3 Users engagement and co-creation initiatives, as a horizontal task within SHOW, was to support the SHOW Demonstration sites in reaching out to end-users and other stakeholders and to guide and monitor their engagement plans and efforts.

A **wide range of engagement activities** have been planned and deployed at the SHOW Demonstration sites, varying in scope, objectives and target groups – depending on the local context, scale of operations, and use cases, amongst others. Common to all active Demonstration sites, **user acceptance surveys and interviews** with stakeholders were conducted as well as **MAMCA (Multi-Actor Multi-Criteria Analysis) workshops**. In addition, sites were encouraged to conduct further activities.

There are many ways of engaging citizens, reflecting **different levels of engagement**. The choice for specific activities depends on the target groups, the local situation, and the desired level of public participation (in SHOW, mainly informing, consulting – through the user acceptance surveys and involvement/ collaboration – through the user engagement and co-creation activities).

Informing and communicating about the SHOW AV services was done in different ways across the Demonstration sites, but overall, sites mainly made use of the following communication channels and tools:

- Printed materials such as posters, flyers, stickers on the shuttles
- Press releases and press events (e.g., when launching a new service), leading to media attention reaching a wide audience
- Website and social media of SHOW members and other actors in the local ecosystem (e.g., municipalities and cities involved)
- Videos were produced as well by most sites, to support communication efforts.

Most sites organized **kick-off events** with the press and/ or the general public to launch operations (or a new phase in the pilot deployment), informing people about the new service and inviting them to come and try it out. In some cases, such actions were quite original and attracted a lot of attention, for example when Santa Claus arrived with an automated EasyMile shuttle to open the Christmas Market in Lahti. In other cases, pilot launches were done at important industry events such as IT-TRANS (launch Karslruhe pilot) or Urban Mobility Days (launch Brno pilot) and/ or in the presence of high-level officials (e.g., EU Commissioner Hahn in the case of Carinthia).

SHOW sites were also present at many – small and large – **external events and fairs**, which proved to be a very effective way of reaching a large audience in a short amount of time, allowing to raise awareness and provide try-out possibilities to the public, exchange information, and get immediate feedback. To mention a few of the largest and most successful examples: showcase week at Zollverein Coal Mine Industrial Complex (Monheim, 1.171 passengers), DLR's U-Shift vehicle showcased at BUGA, the Federal Garden Show, in Mannheim (almost 10.000 test drives and 85.000 visitors to the DLR booth), Yape droids delivering Christmas letters to Santa at the Christmas festival 'Mill of Elves' (Trikala, over 1.000.000 visitors of the festival), AV services operated during several big fairs at Brno Exhibition Centre (the biggest ones reaching up to 60-70.000 visitors, such as the International Engineering Fair) and many, many more. SHOW partners also contributed to several events that aimed to bring science closer to the public, such as Wissenswoche Mobilität (Karlsruhe), Scientists' nights at UTAD (Brno), or Lange Nacht der Forschung (Carinthia).

Sites organised their **own demo events** too, for example the German Demo Week and the FZI Open Days in Karlsruhe, public test days in Graz and Salzburg, or TNO's demo event at the Automotive Campus in Helmond and so many other that have been occasionally reported in status reports to the Commission and are also reported in WP12 Deliverables of the pilot sites. **Information sessions** for residents were also organised, for example in Frankfurt and Karlsruhe, as well as (a large number of) **field tests** with smaller groups at almost all sites.

Focus group sessions (in some cases combined with field tests) allowed to get more in-depth feedback from and interaction with users, including suggestions for future improvements. Such activities were organised, amongst others, in Gothenburg (with elderly people and students), Brno (with children and professionals) and Turin (with elderly people and people with a disability). Brno also organised a **meet-up** as part of the AI Days 2023 which included guided discussions allowing participants' creative input. Carinthia organised also a SHOW **Ideathon** on 'The Mobility of the Future' (in addition to two more Ideathons and further Hackathons organised as part of SHOW but not specifically linked to any Demo site).

An innovative way of obtaining in-depth user feedback was through the involvement of **'Supertesters'**. The concept, as applied at the Austrian Mega site, implied that the same set of users evaluated different AV services, allowing to compare results across sites and use cases. On the other hand, 'Supertesters' were also recruited in Linköping and planned in Turin, in which case the concept was interpreted a bit differently, namely rather as users that would experience the AV services multiple times, and then give their feedback in multiple iterations (e.g. by filling in surveys, participating in focus group sessions). In Carinthia, the 'Supertesters' were also asked to test the new app to book on-demand services of the shuttles.

Considering the needs of **elderly people** and **people with disabilities**, dedicated activities were organised with them, e.g. in Linköping (test rides with blind people and people with disabilities, broad engagement with elderly people), Carinthia (field tests with people with a disability), Tampere (close cooperation with the Accessibility Working Group, which provided useful guidance on how to improve accessibility of AVs in the future) and Turin (where several workshops with associations of people with disabilities and elderly took place, in collaboration with GTT's Disability Manager).

Another important target group of SHOW's user engagement activities consisted of **children**. Notably, SURAAA organised several Kids.DAYs in Carinthia, whereby kids were shown the shuttle, could take a ride, ask questions, … accompanied by fun activities such as drawing or colouring, quizzes, ball games, and more. In Linköping, shuttles were brought to the school yards, serving kids 'fika' and letting them take a ride. Monheim also organised a kids' day, whereby children could draw on a bus.

'Going the extra mile', some SHOW sites were really creative and organised exciting and original activities that included a **game or competition element**. For example, some sites organized drawing contests for children (Linköping, Turin), contests to name the shuttles (Monheim, Linköping, Carinthia, Turin), and even a riddle puzzle to be solved with the help of the digital voice assistant on the AV shuttle (Frankfurt).

Finally, it is evident that all SHOW sites also engaged with **professional audiences** such as policy makers, industry partners and research and academia, by participating in events (e.g., ITS Congress, EUCAD, IT-TRANS), hosting delegations from abroad (even Japan, US or South America), inviting local politicians (e.g., mayors), providing input to the regulatory framework (e.g. in the context of France Véhicule Autonome), and by organizing own events (e.g., SHOW final event, Autonomous Mobility Day in Crest, Austrian Mega site kick-off and final event).

It should be noted that, while in general all sites recognized the importance of end-user and stakeholder engagement, some sites struggled with **important hurdles** that delayed, or even prevented them from starting public demonstration activities (e.g., due to difficulties in obtaining the necessary permits, operational problems, bankruptcies). Obviously, in such cases, efforts put into engagement activities were also put on hold and some engagement activities, although planned, did not take place.

Nevertheless, among all SHOW sites, the **importance of engaging** end-users and stakeholders has been widely recognized, and all sites have made significant efforts to familiarize both important stakeholders – policy makers, industry partners, research and academia – and the general public with the concrete achievements of SHOW: AV services across Europe, serving various purposes, audiences, and territories. Some of the most successful and original activities have been highlighted above.

As demonstrated through SHOW's engagement efforts, **familiarizing people with new AV services leads to higher acceptance** – which confirms earlier research which links 'consumer acceptance' with the proportion of the population living in areas where AVs are being tested.[26] Interestingly, in Brno, results from a focus group with children showed that kids were overall surprisingly very tech-optimistic, with girls slightly less enthusiastic than boys, and kids from wealthier families talking about autonomous mobility as something that's already a reality.

An important caveat is that there are **no short cuts** – user engagement requires a **continuous effort**. Also, it is important to not only engage those already using the service, but also future travellers. The more mature the operation gets the less user engagement activities are most likely needed. Petra Schoiswohl from SURAAA (winner of the SHOW 'Community Engagement Award'): "*Engaging the community and passengers is crucial for the acceptance and integration of automated mobility solutions. As autonomous driving technology is still relatively new, there is a natural apprehension and fear associated with it. Community engagement initiatives play a vital role in familiarizing people with this technology, providing them with information, and building confidence in its safety and reliability. It's important to integrate the community and let them experience the shuttle first hand*." Note: acceptance rates for automated mobility in Austria are around 52%, while in Carinthia it's around 73%.[27]

Educational campaigns are quite important, besides AV passengers also targeting other road users, e.g. taxi drivers, so far focusing on safety drivers and emergency services, but perhaps to be extended to other groups. In Carinthia, workshops were organised with the fire brigade and the police. Experiences in Brno have shown that people like to test automated vehicles to see whether they will safely stop for them. Indeed, some pedestrians intentionally step in front of a moving vehicle to test if its sensors and computer onboard will recognise them and will act appropriately – in this case safely stop. Signs on the vehicle (e.g., 'keep your distance' or 'this vehicle is slow'), handing out flyers (e.g., at bus stops, to cyclists) or providing information stands could help. Linköping has released videos on how to help smooth and safe AV operation as a pedestrian or cyclist (https://ridethefuture.se/filmer/).

Considering **incentivisation and nudging**, in (almost) all SHOW sites, AV services were offered free of charge. In many cases, it was integrated into the public transport

[26] As elaborated in See also Grandsart, D. et al., Citizen and Stakeholder Engagement in the Development and Deployment of Automated Mobility Services, as Exemplified in the SHOW Project. In: E. G. Nathanail et al. (Eds.): CSUM 2022, 2023. https://doi.org/10.1007/978-3-031-23721-8_39.

[27] https://show-project.eu/2024/05/23/show-demo-awards-the-community-engagement-award-is-for-carinthia/

service (e.g., bookable through the public transport app or appearing in the route planner). Except in France, in all cases a safety operator was still present on board, which provided some reassurance for passengers. On the one hand, passengers may not see the added value of operating autonomous vehicles, especially with regard to the expected benefits when a safety driver is in the vehicle. On the other hand, human assistance remains a crucial point to address. Not knowing how the service works, and not being sure it is safe, or that someone will be able to help in case something happens, is a barrier especially for some user groups like elderly people or PRM. This is a topic that also repeatedly came up in the Ideathons and Hackathons organised as part of SHOW, showing how important it is to address it and find acceptable solutions.

Moving beyond mere user acceptance and adoption intention of CCAM, within SHOW **Ideathons and Hackathons** were organised. Diverging from more traditional methods like surveys, such engagement formats embrace a collaborative and interactive approach, bring together participants from diverse backgrounds and stimulate them to think outside of the box by adopting creative techniques, thus encouraging the generation of innovative ideas and solutions within a short timeframe.

Referring to the different stages in the **innovation process**[28] (idea generation, development, validation, and commercialisation), we have seen in SHOW that activities like Ideathons and Hackathons – but also MAMCA workshops and Supertesters events – efficiently generated ideas and helped validate local solutions with novel insights and perspectives. Whereas the focus of an Ideathon is on the development of ideas or concepts rather than the creation of finished products or solutions, a Hackathon aims at producing tangible outcomes, such as prototypes, proofs of concept or functional solutions. Supertesters and MAMCA workshops, in turn, rather focused on evaluating/ validating existing services and scenarios, highlighting the perspectives of end-users (Supertesters) or different stakeholders (MAMCA).

Not only in terms of **quality of insights**, but also in terms of **collaboration and team dynamics**, the Ideathons and Hackathons organised as part of SHOW were evaluated in a positive way, both by the organisers and the participants. Also, **post-event impacts** have been noted, e.g. looking at the swift implementation of the SHOW Hackathon's outcomes in some of the SHOW pilot sites and planned implementation in follow-up projects such as ULTIMO. Both the participants and organisers found the results useful for future projects and operations due to their high quality.

Challenges were also identified: a good preparation is key, both in terms of practical aspects (e.g., catering and supporting materials), support during the event, and content-wise (defining objectives). Organising successful citizen or stakeholder engagement events requires a professional approach and unavoidably takes time and requires effort and resources. Another challenge is to further enhance diversity and inclusivity, ensuring equal participation and representation across different demographics. This means not only providing potential participants with enough incentives to be motivated and committed to take part (before the event, e.g. by offering goodie bags, prizes, catering), including also offering post-event support (e.g. access to resources, networking opportunities and mentorship, or even simply keeping participants informed on what will be done with their inputs).

Future work could focus on **standardizing engagement methodologies** – e.g, streamlining evaluation criteria for judging event outcomes in line with the goals to be achieved, more robust feedback mechanisms for participants and mentors, ... – for

[28] B. Verworn and C. Herstatt, "The innovation process: an introduction to process models", Working paper, No. 12, 2002

better cross-context comparison, aiding evidence-based decision-making and effective approaches in developing and deploying CCAM.

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Annexes

1. SHIFT's comprehensive visionary report on 'The Mobility Hub of the Future', outcome of SHOW collaboration with OSoC (01-25.07.24)
2. Outcomes of the online brainstorming session on user engagement strategies (Mural) conducted as part of the SHOW Partner Board meeting (15.06.2021)
3. Slides shown at the SHOW Demo Board meeting in Madrid (18.10.2022), offering information on a wide variety of engagement activities
4. Slides shown at the webinar for SHOW Follower sites focusing on stakeholder engagement (24.05.24)

shift

The Mobility Hub of the Future

A Visionary Report by:

Evi De Rudder Raman Talwar
Jordy Callens

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Appendix

Commuting Is Our Daily Struggle, and the Solution Is Yet to Be Found

Imagine your route from home to work. If you drive by car, you immediately think of the traffic jams that seem to have no end, or perhaps you are concerned about the environmental pollution generated by car driving. If you go by public transport, you cannot escape the buses and trains that are late or don't even show up on a daily basis. Or do you find it unpleasant that they are jam-packed and you feel like you are in a tin of pilchards? Commuting often evokes frustrations. These frustrations don't only occur when you want to go to work, but are also there for travelers, families who want to take a trip to the city, and so many more people.

Of course, solutions already exist. Instead of the car, we can take the bike. A taxi is at our fingertips through a simple app on our mobile phone. You can take an electric sharing scooter on the side of the street. Who knows, there might even be a self-driving taxi waiting for us at our front door.

However, as you might guess: All these solutions again raise hundreds of new challenges . But two problems really stand out. First of all, we have so many different options for getting around - too many even, perhaps - that we don't know which vehicle to take, and we don't even know which vehicles are all available to us. And second, the more vehicles there are, the harder it is to connect everything together. We already fail to bring together a train, tram, bus, and bicycle under one roof.

When everything is so disjointed and chaos becomes the new norm when we only want to travel two kilometers. Isn't it time for a stable solution then? A future where mobility becomes a flow. Switching from one vehicle to another, without any problems. A future with a Mobility Hub that makes transport feel like a pleasant journey again, rather than a daily burden. And all of this with sustainability and innovation in mind.

Imagine a place where your journey is as enjoyable as the destination itself ...

Chapter 00: Concept Teaser

.... a place where urban mobility leads you through the serenity of nature ...

... an environment that allows you to seamlessly shift into another gear.

Chapter 00: Concept Teaser

Introducing SHIFT: The Future of Mobility Hubs

Imagine a place where your journey becomes as captivating as the destination. Welcome to SHIFT, a revolutionary mobility hub that redefines urban transit with elegance and innovation. Inspired by the harmony of nature and powered by cutting-edge technology, SHIFT is not just a transit point but a living, breathing ecosystem.

As you enter SHIFT, you are greeted by a stunning canopy of solar leaves that provide shade and renewable energy. The design is reminiscent of the Tree of Life, with elevated walkways and lush greenery creating a serene, natural environment. Advanced lighting guides you effortlessly, while augmented reality tools offer a personalized journey through this vibrant space.

SHIFT seamlessly blends connectivity and efficiency. Autonomous shuttles, electric bikes, and high-speed trains ensure swift and smooth transitions. Interactive screens and AI assistants enhance the experience, while tranquil water features and green spaces offer moments of respite.

Sustainability is at the core of SHIFT. Solar panels, wind turbines, and kinetic floors power the hub, while rainwater harvesting and recycling systems promote eco-friendly practices. SHIFT is not just a hub; it's a vision of a future where technology and nature coexist in perfect harmony.

Step into SHIFT, and experience a new era of urban mobility where every journey is an elevated experience.

01 But first ... The Making of SHIFT

Chapter 01: The Making of SHIFT

1.1 INPUT

Like any groundbreaking innovation project, our endeavor begins with the crucial input phase. This often-underestimated stage lays the foundation for outcomes that not only meet but often exceed expectations. It's essential to invest the right attention and resources here. We break this phase down into two sequential stages: Introduction and Research.

Introduction

In this initial stage, we dive into the original briefing, conducting in-depth intake meetings with the client to define a clear, actionable question that will guide our project to success. We not only outline the client's needs but also introduce the dynamic innovation team that will drive the project forward.

Briefing of the Project

The Project: Pioneering the Future of Urban Mobility

In a rapidly evolving urban landscape, the project emerges as a groundbreaking initiative aiming to redefine the way we move and connect. Our mission is to conceptualize a futuristic urban mobility hub that seamlessly integrates all modes of human transportation, addressing the needs of both passengers and parcels.

Visionary Concept

The project envisions a central hub where diverse transportation modes converge, offering a harmonious and efficient transit experience. This hub is designed to serve everyone commuting in and out of the city, utilizing sustainable, accessible, and often autonomous transport solutions. From trains and buses to micro-mobility options like shared bikes and scooters, and even autonomous vehicles, every mode of transport should be catered for in one interconnected space.

Key Features

Integration of Modes: The mobility hub should integrate trains, buses, metros, water vessels, micro-mobility options, autonomous vehicles, and parcel delivery services. This ensures seamless transfers and enhanced convenience for all users.

Sustainability Focus: Emphasizing green transportation, the hub should promote sustainable practices, reducing the carbon footprint and fostering an eco-friendly environment.

Efficiency and Autonomy: By incorporating advanced technologies and autonomous vehicles, the hub should streamline operations, ensuring swift and reliable transfers for both people and parcels.

Project Objectives

Our primary goal is to design an innovative concept for the future mobility hub. The project will detail a functional system architecture, illustrating how different elements interact to form a cohesive and efficient transportation ecosystem. Visual representations should inspire stakeholders, showcasing achievable solutions alongside ambitious and futuristic scenarios.

Engaging Visuals: The visionary document should be enriched with visuals, including personas, user stories, and marketing posters, all adhering to the branding of the mother project, SHOW.

Innovation Scenarios: Three scenarios—feasible, ambitious, and futuristic—should be outlined, providing a roadmap from current capabilities to visionary aspirations.

Stakeholder Involvement: Insights from industry experts and feedback from stakeholders should be integral, ensuring the concept is both practical and forward-thinking.

Deliverables

The project should culminate in a comprehensive report and a visionary document, offering a detailed overview of the process and presenting our innovative ideas. The final presentation should encapsulate our findings, setting the stage for the future of urban mobility.

Timeline

Starting on July 1, 2024, with a project deadline of July 25, 2024, the project will include weekly feedback sessions to ensure continuous alignment and refinement.

Join us as we embark on this transformative journey, shaping the mobility hub of the future—a hub where efficiency meets innovation, and sustainability drives progress.

Chapter 01: The Making of SHIFT - INPUT

About the Client

ERTICO – ITS Europe (ERTICO), in partnership with the **European Passengers' Federation (EPF),** is leading projects to innovate intelligent future transit.

ERTICO – ITS Europe is a public-private partnership with nearly 120 members spanning service providers, suppliers, transport industries, research institutions, universities, public authorities, user organizations, connectivity industries, and vehicle manufacturers. ERTICO drives innovation through European co-funded projects, platforms, and international cooperation, and organizes the ITS European and World Congresses.

The European Passengers' Federation (EPF) unites major passenger organizations across Europe, advocating for public transport users. EPF works to improve public transport standards, ensure comprehensive passenger rights, and promote seamless multi-modal travel through research, reports, conferences, and collaboration with transport operators and policymakers.

The osoc project, by ERTICO and supported by EPF, is part of the **SHOW** initiative (https://show-project.eu/), funded by the EU's Horizon 2020 program. SHOW supports shared, connected, and electrified urban transport automation to advance sustainable urban mobility, specifically within Work Package 9, Task A9.3 on user engagement and co-creation.

Contact persons for the project are Delphine Grandsart, Senior Researcher EPF and Kathryn Bulanowski, Project Manager EPF.

Chapter 01: The Making of SHIFT - INPUT

The Team

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Coach

Jordy Callens

Graduate Idea & Innovation Management

Walter Vandervelde

Head of Idea & Innovation Management

Chapter 01: The Making of SHIFT - INPUT

1.1 INPUT

Research

With a well-defined briefing in hand, we transition to the hunting phase, or research stage. Here, our mission is to gather as much 'wisdom' as possible. This not only helps us deeply understand the task at hand but also uncovers data and insights that pave the way for original ideas and solutions.

We approached this from various angles: By closely examining user experiences, we confronted the real-world challenges and problems faced by public transport users today. We identified current and emerging trends that could impact our project, ensuring our solutions are future-proof. We explored existing mobility hubs and innovative start-ups in the mobility sector to draw inspiration from the best in the field. Broadening our scope, we conducted cross-industry research to uncover innovative approaches from other sectors. A compelling interview with a mobility expert provided invaluable insights. Additionally, we focused on how to optimally integrate autonomous vehicles into our vision, ensuring cutting-edge solutions for the mobility hub of the future.

Commuting Is a Hassle: A List of All Struggles

Everything begins with listening, especially in an innovation project. Improvement and renewal are impossible without first thoroughly listening to your target audience.

That's exactly what we did, extensively consulting with current public transport users. Unsurprisingly, they had a long list of complaints they were eager to share. We categorized both the users and their complaints into types and categories. We applied the same method to complaints regarding parcel shipping and receiving.

Finally, we dedicated part of our brainstorming session to a 'complaint wall,' transforming grievances into potential solutions.

Types of Commuters

Workers:

Daily commutes to and from work, prioritizing punctuality, comfort, and reliability, especially during peak hours.

Students:

Travel to educational institutions, seeking affordable and accessible transport with space for heavy bags and flexibility around school hours.

Single Travellers:

Solo travel for various purposes, valuing convenience, safety, privacy, and efficient routes, with varied travel schedules.

Travelling Families:

Family outings needing spacious seating, stroller accessibility, family discounts, and child-friendly facilities, emphasizing safety.

Travelling Couples:

Couples using public transport for outings, preferring to sit together, valuing affordability and convenience, and enjoying shared experiences.

Elders:

Senior commutes for shopping, medical appointments, and social visits, requiring accessible, comfortable, and safe transport with senior discounts.

People with Disabilities:

Mobility Impairments: Accessible vehicles with ramps, lifts, and designated spaces.

Sensory Impairments: Audio announcements, Braille signage, visual displays, and assistance dogs.

Cognitive Disabilities: Clear instructions, navigation assistance, predictability, and quiet spaces.

Service Animals: Adequate space and non-restrictive policies for service animals.

Holiday Travellers:

Seasonal travel needing ample luggage space, clear route information, flexible scheduling, comfortable seating, and scenic routes for an enjoyable experience.

Types of Complaints

Punctuality:

Delays and irregular timetables causing missed connections and late arrivals.

Prices:

High fares and limited discounts, making transport less affordable.

Inclement Weather:

Lack of shelter and service disruptions during harsh weather.

Lack of Personal Space:

Overcrowding and inadequate seating, leading to discomfort and lack of privacy.

Security Concerns:

Safety issues due to altercations, inadequate security measures, and insufficient surveillance systems.

Lack of Accommodation for People with Disabilities:

Inaccessible facilities and lack of support for individuals with disabilities.

Lack of Information:

Insufficient signage, unclear instructions, and outdated or malfunctioning information systems.

Violence Amongst Passengers and Drivers:

Safety concerns due to conflicts onboard and inadequate security measures.

Routes Not Being Served:

Limited coverage, inefficient route planning, and early termination of services.

Routes Getting Cancelled:

Last-minute cancellations causing disruptions, with a lack of alternatives.

Systems Glitching:

Malfunctions in ticketing systems, payment terminals, and digital platforms.

Transfers Being Stressful:

Inefficient transfer points and lack of synchronization between different transport modes.

Scheduling Issues:

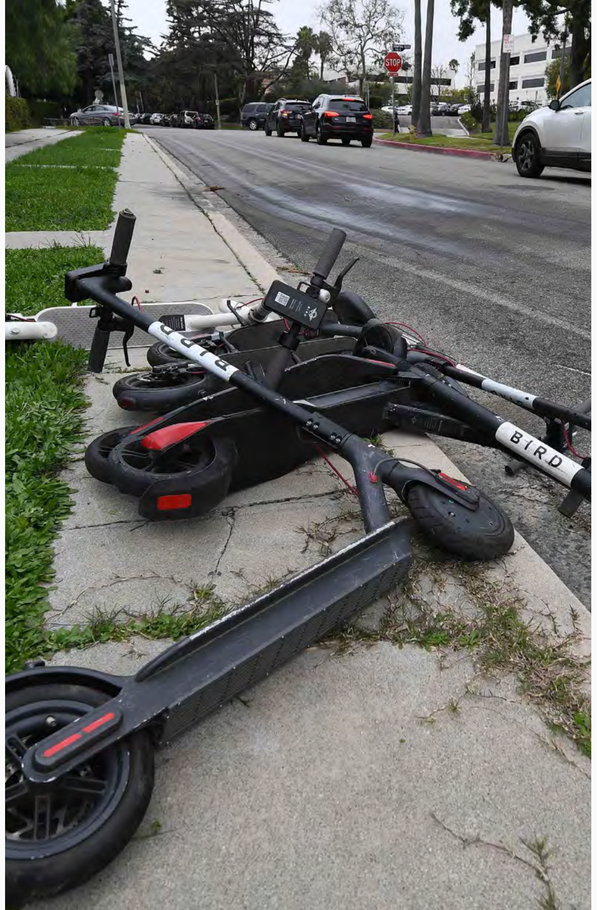
Overlapping schedules and inconvenient timetables.

Trains Not Accommodating to Users:

Uncomfortable seating, inadequate amenities, and lack of facilities for special requirements.

Limited Availability of Mobility Options:

Not enough e-bikes, e-scooters, and taxis, leading to inconvenience.



Complaints about Parcels

Delay in Delivery:
Long durations and missed deadlines.

Incorrect Addresses and Missed Deliveries:
Returned packages and failed attempts.

Package Theft:
Increased incidents and inadequate security measures.

Late Deliveries:
Unexpected delays and lack of real-time updates.

Damaged Goods:
Poor handling and inadequate packaging.

Lost Packages:
Tracking failures and mismanagement.

Customer Service Issues:
Unresponsive support and lack of resolution.

Inaccurate Tracking Information:
Discrepancies and outdated systems.

Delivery Instructions Not Followed:
Ignored special requests and improper drop-offs.

Additional Complaints from Brainstorm Session

Accessibility for Bikes on Trains:
Inadequate storage spaces and restrictive policies.

Lack of Nearby E-Steps or E-Bikes:
Inconvenience due to unavailability.

Unhygienic Toilets:
Dirty and poorly maintained facilities.

Excessive Number of Apps Required:
Confusion due to multiple apps for different services.

ESteps and Bikes Obstructing Walking Spaces:
Obstructions and potential hazards for pedestrians.

Inconsistent Wi-Fi Connectivity:
Unreliable connections on trains and at stations.

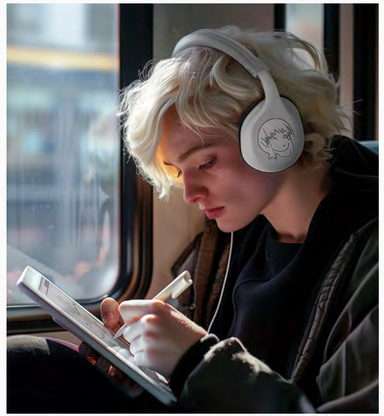
Limited Seating Availability in Waiting Areas:
Insufficient seating during peak times.

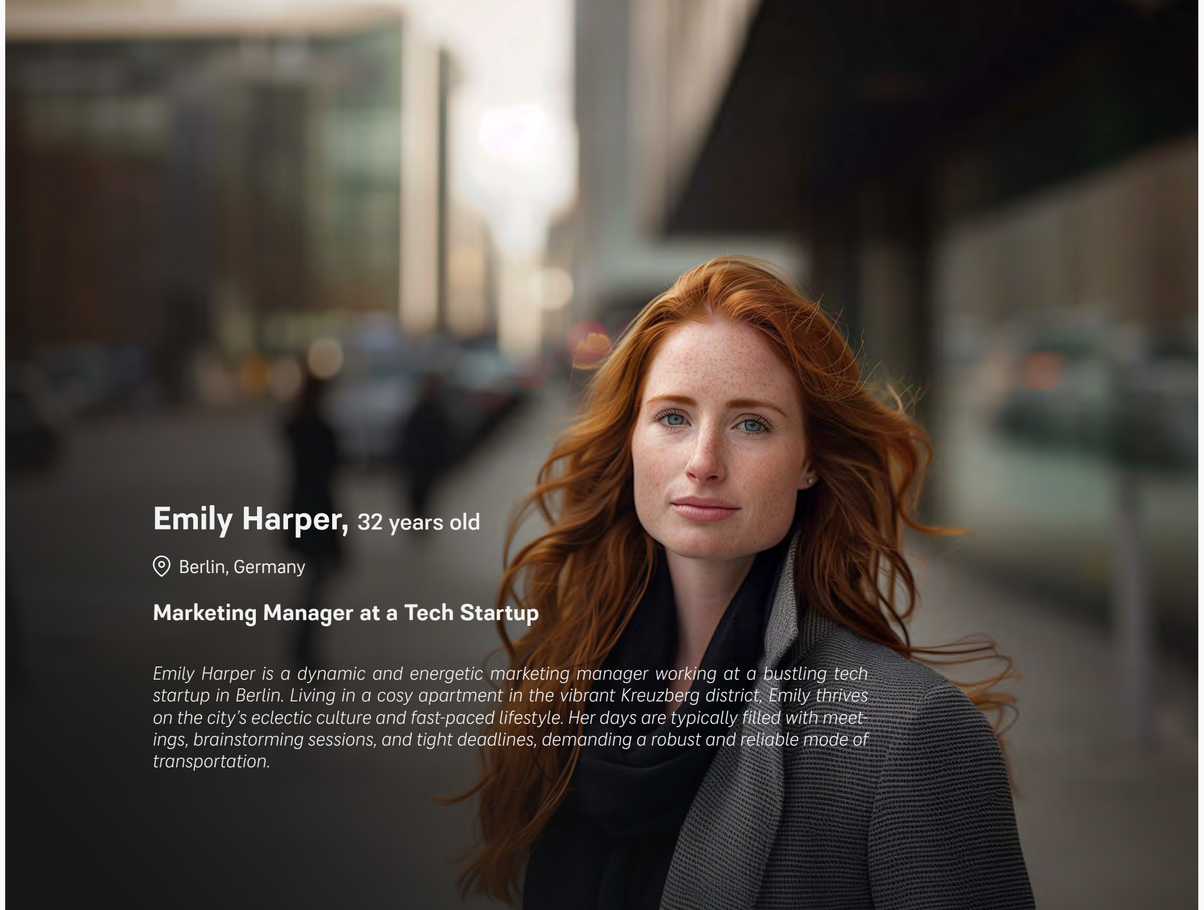
Poor Air Quality on Platforms:
Inadequate ventilation causing discomfort.

Inadequate Customer Service:
Difficulties in getting timely assistance or responses to queries.

Putting Ourselves in the Minds of Commuters

Based on the user profiles filtered from previous chapters, we created six personas. These personas provide us with a clear picture of their specific needs and desires, giving us the necessary tools to optimize the flow of transport and transit within the hub.





Emily Harper, 32 years old

Berlin, Germany

Marketing Manager at a Tech Startup

Emily Harper is a dynamic and energetic marketing manager working at a bustling tech startup in Berlin. Living in a cosy apartment in the vibrant Kreuzberg district, Emily thrives on the city's eclectic culture and fast-paced lifestyle. Her days are typically filled with meetings, brainstorming sessions, and tight deadlines, demanding a robust and reliable mode of transportation.

Use of Public Transport

Emily relies heavily on public transport due to its convenience and eco-friendliness. She appreciates the variety of options available at the mobility hub, allowing her to choose the most efficient route depending on the day's traffic and weather conditions. During the weekdays, she typically uses a combination of U-Bahn and S-Bahn to get to work, while weekends might see her opting for shared bikes or electric scooters for leisurely rides around the city.

Frustrations with Public Transport

Inconsistent Schedules: Emily often finds herself frustrated with the unreliable bus and tram schedules, leading to delays and missed connections.

Overcrowding: During peak hours, the public transport can become extremely crowded, making her commute uncomfortable.

Cleanliness: The cleanliness of public transport is a recurring issue, with litter and occasional unpleasant odours affecting her travel experience.

Limited Coverage: Some areas, particularly less central parts of the city, have limited public transport options, making it difficult for Emily to reach friends or attend events in these locations.

Wants and Needs from Public Transport

Reliability: A more consistent and dependable schedule to ensure timely arrivals and departures.

Comfort: Less crowded and cleaner vehicles to enhance her commuting experience.

Extended Coverage: Better coverage across the city to facilitate easy access to all areas.

Real-Time Updates: Accurate real-time information on arrivals, departures, and potential delays.

Luca Romano, 28 years old

Milan, Italy

Graphic Designer at an Advertising Agency

Luca Romano is a talented graphic designer working at a well-known advertising agency in Milan. He lives in a modern apartment in the lively Navigli district, known for its canals and artistic vibe. Despite being wheelchair-bound due to a spinal cord injury from a car accident five years ago, Luca leads an active and fulfilling life. His positive outlook and creative spirit drive him to excel in his career and personal endeavours.

Use of Public Transport

Luca depends on public transport for his daily commute and social activities. The mobility hub is equipped with elevators, ramps, and designated areas for wheelchair users, making it easier for him to navigate. On weekdays, he primarily uses the metro and accessible buses to reach his workplace, while weekends are spent exploring the city's cultural landmarks and meeting friends.

Frustrations with Public Transport

Limited Accessibility: Despite improvements, some stations and vehicles still lack proper accessibility features, causing inconvenience.

Elevator Malfunctions: Frequent breakdowns of elevators and lifts can disrupt his commute and leave him stranded.

Inadequate Space: During peak hours, finding space in crowded vehicles can be challenging, and designated wheelchair areas are often occupied by other passengers.

Inconsistent Assistance: The availability and quality of assistance at stations can vary, leading to occasional difficulties in boarding and alighting.

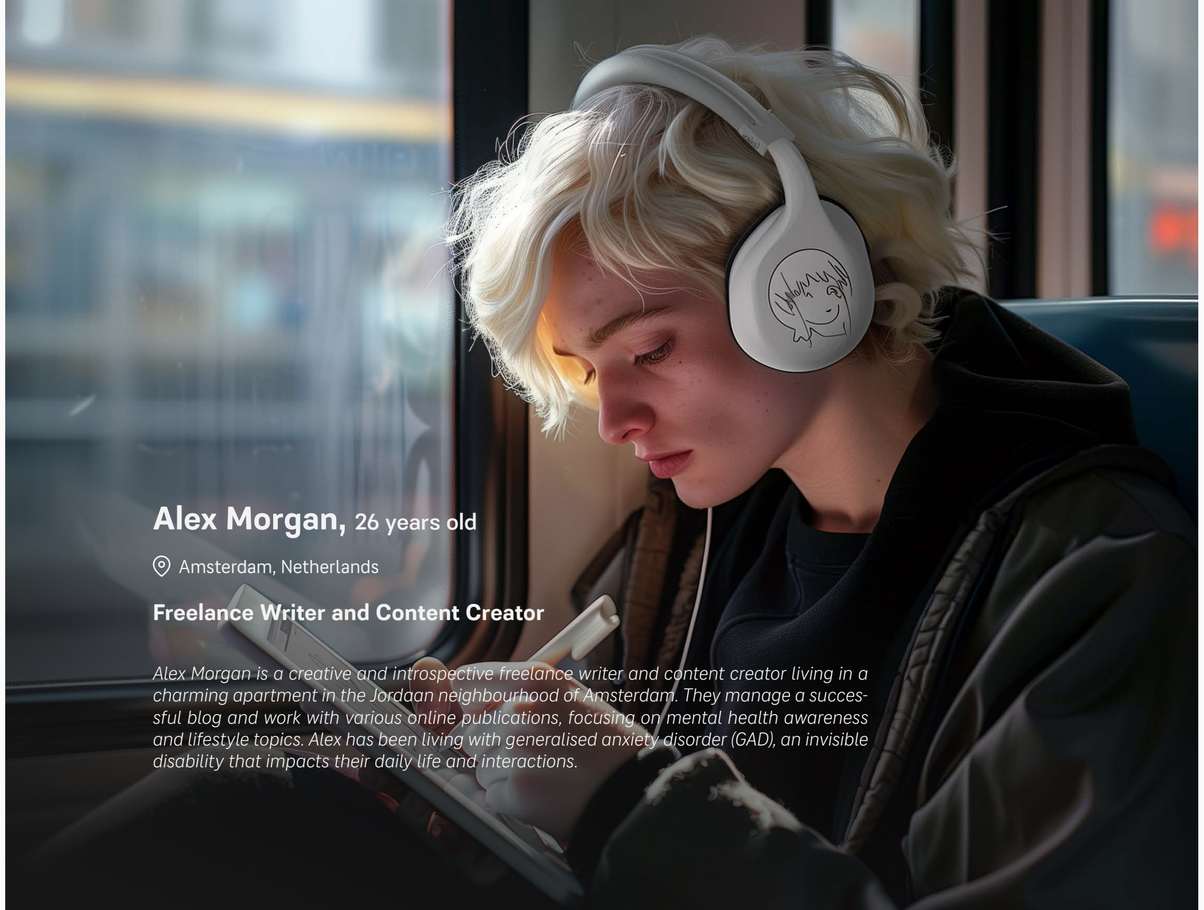
Wants and Needs from Public Transport

Comprehensive Accessibility: Ensuring all stations and vehicles are fully accessible with functional elevators, ramps, and adequate space.

Reliable Services: Consistent operation of accessibility features and prompt maintenance of any malfunctions.

Training for Staff: Better training for transport staff to assist passengers with disabilities more effectively.

Real-Time Updates: Accessible real-time information on service status, including the availability of accessibility features.



Alex Morgan, 26 years old

Amsterdam, Netherlands

Freelance Writer and Content Creator

Alex Morgan is a creative and introspective freelance writer and content creator living in a charming apartment in the Jordaan neighbourhood of Amsterdam. They manage a successful blog and work with various online publications, focusing on mental health awareness and lifestyle topics. Alex has been living with generalised anxiety disorder (GAD), an invisible disability that impacts their daily life and interactions.

Use of Public Transport

Alex relies on the city's efficient and advanced public transport system, including trams, buses, and metro, to attend meetings, visit friends, and explore new areas for their writing. The futuristic mobility hub near their home provides seamless connectivity, allowing them to switch between different modes of transport with ease and comfort.

Frustrations with Public Transport

Overcrowding: Busy and crowded public transport can trigger Alex's anxiety, making their commute stressful.

Noise Levels: High noise levels in public transport can be overwhelming and exacerbate their anxiety symptoms.

Lack of Quiet Spaces: The absence of designated quiet zones makes it difficult for Alex to find a calming environment during travel.

Inconsistent Information: Unreliable real-time updates can lead to unexpected delays, increasing their anxiety about being late.

Wants and Needs from Public Transport

Less Crowding: Measures to reduce overcrowding, especially during peak hours, to create a more comfortable travel environment.

Quieter Spaces: Designated quiet areas or compartments in trams and trains where noise is minimized.

Accurate Information: Reliable real-time updates on transport schedules and delays to help manage their anxiety.

Mental Health Awareness: Greater awareness and understanding from transport staff about invisible disabilities and the challenges they pose.

Joseph Okoye, 65 years old

Brussels, Belgium

Retired Teacher

Joseph Okoye is a 65-year-old retiree of African descent living in a charming apartment in the bustling Anderlecht district of Brussels. A retired teacher with a passion for lifelong learning, Joseph enjoys the vibrant culture and history of the city. His daily life is filled with leisurely activities, including reading, attending cultural events, and his favorite pastime—shopping. Joseph values independence and mobility, relying heavily on the city's current public transport system to navigate his daily activities.

Use of Public Transport

Joseph depends on the existing public transport system to reach various destinations throughout Brussels. He uses a combination of metro, buses, and trams to get to his favorite shopping areas, social gatherings, and cultural sites. The transport network is central to his routine, but it presents certain challenges that affect his experience.

Frustrations with Public Transport

Accessibility Issues: While some stations and vehicles are equipped with accessibility features, not all of them are, making it difficult for Joseph to navigate the system seamlessly.

Inconsistent Schedules: Joseph often encounters delays and missed connections due to unreliable schedules, causing frustration and inconvenience.

Overcrowding: During peak hours, the public transport can become extremely crowded, making his commute uncomfortable and stressful.

Cleanliness: The cleanliness of public transport is a recurring issue, with litter and occasional unpleasant odors affecting his travel experience.

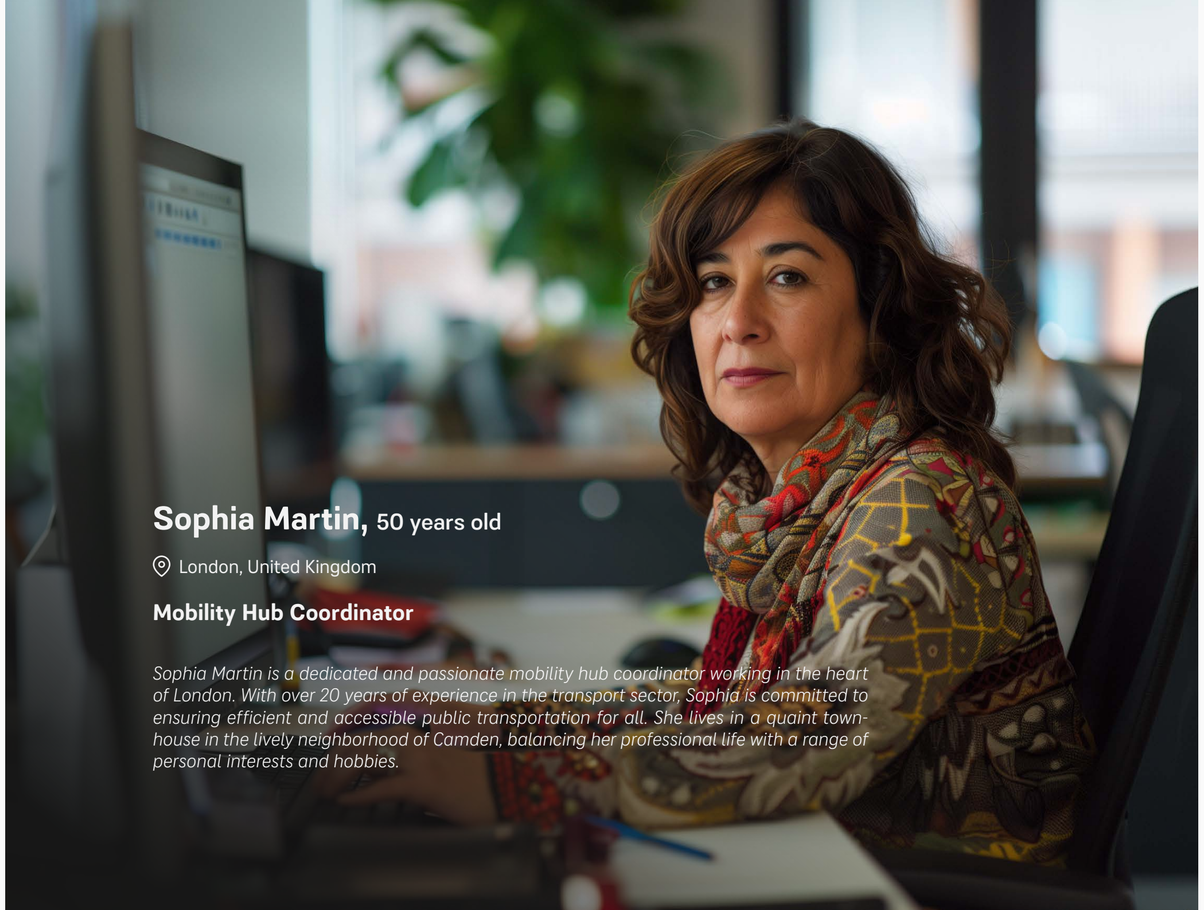
Wants and Needs from Public Transport

Comprehensive Accessibility: Ensuring all stations and vehicles are fully accessible with ramps, elevators, and priority seating.

Reliable Schedules: Consistent and dependable transport schedules to maintain his independence and punctuality.

Comfortable Travel: Less crowded and well-maintained vehicles to enhance comfort during his commutes.

Accurate Updates: Reliable real-time information on arrivals, departures, and potential delays to keep him informed and at ease.



Sophia Martin, 50 years old

London, United Kingdom

Mobility Hub Coordinator

Sophia Martin is a dedicated and passionate mobility hub coordinator working in the heart of London. With over 20 years of experience in the transport sector, Sophia is committed to ensuring efficient and accessible public transportation for all. She lives in a quaint townhouse in the lively neighborhood of Camden, balancing her professional life with a range of personal interests and hobbies.

Use of Public Transport

As a mobility hub coordinator, Sophia relies heavily on the public transport system to get to work and attend various meetings across the city. She uses a combination of the Tube, buses, and sometimes overground trains to navigate her daily commute. Her role involves constant interaction with the public transport system, making her acutely aware of its strengths and weaknesses.

Frustrations with Public Transport

Inconsistent Schedules: Delays and unexpected disruptions often interfere with her commute and work schedule.

Overcrowding: Peak hours are particularly challenging, with overcrowded trains and buses making travel uncomfortable.

Accessibility Issues: Despite improvements, not all stations and vehicles are fully accessible, creating barriers for those with mobility issues.

Cleanliness: Maintaining cleanliness is a persistent issue, with some areas and vehicles falling short of hygiene standards.

Wants and Needs from Public Transport

Reliability: A consistent and dependable schedule to ensure timely arrivals and departures.

Comfort: Less crowded and cleaner vehicles to enhance the commuting experience.

Accessibility: Comprehensive accessibility features across the entire network.

Real-Time Updates: Accurate and reliable real-time information to manage her schedule effectively.

ParcelBox 3000, 2 months old

Parcelland

Just a Box

ParcelBox 3000 is a high-tech delivery package designed to ensure the safe and efficient transport of goods in urban environments. This particular ParcelBox contains a bestselling novel eagerly awaited by a reader in Berlin. Starting its journey at a major logistics hub, ParcelBox 3000 navigates through the city's advanced mobility infrastructure to reach its destination quickly and securely.

Use of Public Transport

ParcelBox 3000 starts at a logistics hub in Berlin, is manually sorted, and loaded onto a delivery vehicle. Delays occur due to outdated traffic management and lack of real-time integration. Upon arrival at the local delivery center near Emily Harper's home, the package is placed in a locker. Emily retrieves it after receiving a notification, though the process can be inefficient. Improvements in sorting, tracking, and traffic management could enhance the process.

Frustrations with Public Transport

Manual Sorting: Manual sorting at the logistics hub can lead to errors and delays in processing packages.

Traffic Delays: Delivery vehicles often get stuck in traffic, causing delays in the delivery schedule.

Limited Tracking: Basic tracking methods provide limited visibility into the package's journey, leading to uncertainty for recipients.

Inconsistent Notifications: Notifications about package status are often delayed or inaccurate, causing confusion and frustration for recipients.

Overcrowded Delivery Centers: High volumes of parcels can lead to overcrowded delivery centers, causing delays and longer wait times for package pickup.

Wants and Needs from Public Transport

Automated Sorting: Implementation of automated sorting systems to reduce errors and speed up the processing time at logistics hubs.

Traffic Management: Improved traffic management solutions to minimize delays and ensure timely deliveries.

Advanced Tracking: Enhanced tracking technologies that provide real-time updates and greater visibility into the package's journey.

Reliable Notifications: More accurate and timely notifications to keep recipients informed about their package status.

Efficient Delivery Centers: Streamlined operations at delivery centers to handle high volumes efficiently and reduce wait times for recipients.

Creating a Future-Proof Concept by Integrating Trends

When we look at the past and the present, we can analyze patterns and practices to predict the future. This is what we call 'trends'. In a way we're predicting what the next big thing of tomorrow will be. What style of clothing will we like? How many people will be present online?

How will people transport themselves? In trends we can find unique elements to integrate in a futuristic concept. These trends will help the concept be future-proof, so people will more likely like and use the concept, than if trends were not included.

A Look into the Future of Transit & Travel

Building a futureproof mobility hub involves integrating key trends to meet evolving traveler needs. By transforming charging stations into engaging destinations, supporting tech-free travel experiences, involving consumers in the design process, providing high-speed transport options, and prioritizing eco-friendly practices, we can create dynamic, efficient, and sustainable mobility hubs. These elements ensure the mobility hub of the future is adaptable, environmentally responsible, and aligned with modern lifestyles.

01. Supercharging Destinations

Ev charging stations transform a chore into an entertainment opportunity

* **Inspiration from:** Mobility industry
* **Concept:** Petrol stations used to be social hubs where people met, refueled, and sometimes even dined with friends. Today, refueling is a quick, mundane task. However, with electric cars that require longer charging times, charging stations can once again become vibrant destinations. Imagine a place where you can socialize, relax, and enjoy activities while your vehicle charges.
* **Quick takeaway:** Ensure the mobility hub of the future is not just a stopover, but a destination where people can gather and enjoy unique experiences.

02. Analog Travel

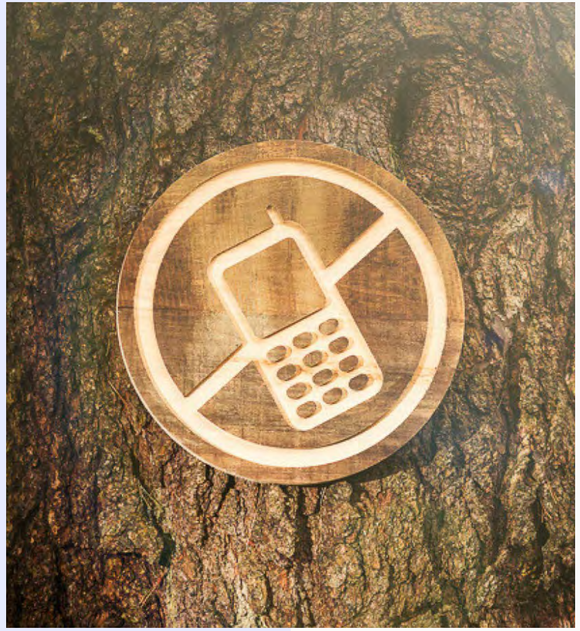
Intentional travel is gaining popularity as people ditch smart tech on vacation

* **Inspiration from:** Digital detoxing
* **Concept:** People are increasingly leaving their phones behind to escape the constant digital noise. Instead of being absorbed in screens, travelers are rediscovering the joy of real-world interactions and experiences. The journey itself becomes a meaningful part of the trip, enjoyed without digital distractions.
* **Quick takeaway:** Design the mobility hub of the future to cater to mobile detoxers, providing ample information and experiences that don't rely on smartphones.

03. Co-Creative Futures

Brands are giving consumers creative control over their products

* **Inspiration from:** Marketing & branding
* **Concept:** The idea that "we do better when we do it ourselves" is increasingly relevant. Consumers want to contribute more than just money; they seek to be part of the creation process. Involving them in the development of products and services fosters loyalty and innovation. Co-creation with consumers is essential for the future.
* **Quick takeaway:** Develop the mobility hub of the future collaboratively with travelers, allowing them to participate in key decisions and personalize their experiences.



04. Our Speed Need

High-speed rail and transport are on the rise

* **Inspiration from:** Travel, mobility
* **Concept:** The world is always in motion, and so are its people. The demand for quick and efficient travel to new cities and countries is growing. Modern infrastructure is evolving to meet this need, with high-speed trains becoming the new standard for travel.
* **Quick takeaway:** Offer a variety of fast and efficient transport options within the mobility hub of the future to meet the needs of speed-conscious travelers.

05. Eco-Responsible Travel

Travelers are becoming more aware of their CO2 footprint

* **Inspiration from:** Travel, mobility
* **Concept:** Decades ago, carbon footprints were not a major concern. Today, however, environmental consciousness is a significant factor for travelers. People are increasingly choosing eco-friendly travel options to reduce their impact on the planet.
* **Quick takeaway:** Design the mobility hub of the future to be environmentally friendly, aiming for CO2 neutrality or even a negative carbon footprint.

Inspiring Innovation in the Mobility Hub of the Future

Startups create innovation. They are small companies with limited budgets, but big dreams. These companies need to break through boundaries set by their limited resources. It makes them think in different ways, creating innovative ideas. These ideas can inspire us when creating a futuristic concept, or we can even just integrate one of the startups' solutions entirely.

Startups Constructing the Future of Transit

Innovative startups are redefining urban mobility and inspiring future mobility hubs. Kiwee Mobility offers zero-emission, space-saving electric car-sharing, while Zipline uses autonomous drones for swift last-mile deliveries. De Park optimizes urban space with underground automated parking systems, and NIO Power Swap's battery swapping technology reduces EV charging times. OTIV's autonomous rail technology enhances rail safety and efficiency. Together, these startups envision mobility hubs that are efficient, sustainable, and user-centric, inspiring us to create smarter and greener urban spaces.

01. Kiwee Mobility

Zero-emission, space-saving, 2-person cars for city roaming

Concept:

Kiwee Mobility offers an eco-friendly car-sharing service with electric vehicles. Their innovative "car train" system efficiently connects and charges these vehicles, each accommodating up to two passengers.

User experience:

Kiwee's service could seamlessly integrate into a mobility hub, utilizing their advanced connecting and charging systems for efficient vehicle redistribution and on-demand availability. This enhances sustainable urban mobility and reduces the need for private car ownership.

→ Visit their website

02. Zipline

Last-mile drone delivery for parcels

Concept:

Zipline uses autonomous drones to deliver parcels, providing quick and efficient logistics solutions for cities and suburbs.

User experience:

Zipline's drones could be integrated into the mobility hub for swift parcel delivery. With rooftop charging stations, the drones would maintain high efficiency and reliability, offering a cutting-edge urban logistics solution and significantly reducing delivery times and road congestion.

→ Visit their website

03. De Park

Underground efficient and automated parking

Concept:

De Park designs advanced underground parking systems that optimize space and improve efficiency, addressing urban parking challenges.

User experience:

De Park's underground parking systems could revolutionize parking at the mobility hub, providing ample space and easing the stress of finding parking in the city. This innovation would encourage more people to use the hub, reduce traffic congestion, and enhance urban mobility.

→ Visit their website

04. NIO Power Swap

Battery swapping stations for EVs

Concept:

NIO Power Swap offers a battery swapping service for electric vehicles, allowing drivers to quickly exchange depleted batteries for fully charged ones, eliminating long charging times.

User experience:

NIO's battery swapping stations can be a core feature of a futuristic mobility hub, providing EV users with a rapid and convenient way to recharge. This promotes the adoption of electric vehicles by minimizing downtime and enhancing convenience, while also saving space as cars are not parked for extended charging periods.

→ Visit their website

05. OTIV

Autonomous driving in railway industries

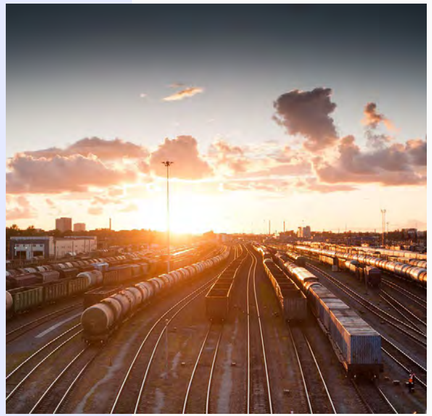
Concept:

OTIV develops autonomous driving technologies for rail systems, enhancing safety and efficiency in railway transportation.

User experience:

OTIV's autonomous rail technology can create a more efficient and reliable public transit system within the mobility hub. This integration improves safety, reduces operational costs, and provides a seamless travel experience, with virtually connected trains enhancing overall efficiency.

→ Visit their website



Looking Across Industries to Stimulate Fresh Idea Generation

Cross-industry research is essential for driving innovation and inspiring new solutions to complex challenges. By collaborating across different sectors, we leverage diverse perspectives and expertise, fostering a fertile ground for creative problem-solving. Companies engaging in cross-industry research are more likely to innovate and achieve significant breakthroughs compared to those operating in isolation.

A Cross-Industry Investigation: How Do They Utilize Innovation?

Based on the extensive research across various industries, here are some concrete and creative ideas that can be incorporated into the SHIFT Mobility Hub to make it a futuristic and innovative solution.

01. Autonomous Delivery Robots and Drones

* **Innovation / Problem solving:** Real-time tracking and delivery of parcels within minutes.
* **Inspiration from:** Retail and E-commerce, Healthcare, Agriculture
* **Concept:** Implement autonomous robots and drones for last-mile delivery of parcels and medical supplies within the mobility hub. These can navigate through dedicated pathways and air routes, ensuring swift and contactless delivery.
* **User experience:** Imagine arriving at the hub and needing to send a parcel across town. You can place the parcel in a designated robot or drone station. The autonomous robot navigates through the hub's corridors, avoiding obstacles, and reaches its destination within minutes. Drones handle urgent deliveries, flying directly to specified locations, ensuring quick and contactless service.

02. AI-Powered Predictive Maintenance

* **Innovation / Problem solving:** Near-zero downtime and seamless operations of all transportation modes.
* **Inspiration from:** Aviation, Energy
* **Concept:** Use AI and machine learning for predictive maintenance of all transportation modes within the hub. This ensures minimal downtime and maximizes efficiency by predicting and addressing issues before they occur.
* **User experience:** A commuter bus within the hub is fitted with sensors that send real-time data to the central AI system. The AI detects early signs of brake wear and schedules maintenance during off-peak hours, preventing any service disruptions.

03. Smart Interactive Signage and Wayfinding

* **Innovation / Problem solving:** Personalized and immersive navigation experience for all passengers.
* **Inspiration from:** Hospitality, Smart Cities
* **Concept:** Implement interactive digital kiosks and AR-based wayfinding systems to help passengers navigate the hub effortlessly. These systems can provide real-time updates, personalized route guidance, and information on nearby services.
* **User experience:** Upon entering the hub, you approach a digital kiosk that recognizes your face and greets you. You input your destination, and the kiosk provides an optimal route. As you walk, AR glasses or a smartphone app overlays arrows and information in your field of vision, guiding you through the hub and highlighting points of interest like cafes or restrooms along the way.

04. Sustainable Design and Renewable Energy Integration

* **Innovation / Problem solving:** A self-sustaining, green energy-powered mobility hub.
* **Inspiration from:** Energy, Smart Cities
* **Concept:** Design the hub with sustainable materials and integrate renewable energy sources like solar panels and wind turbines. Use energy-efficient lighting and HVAC systems to minimize environmental impact.
* **User experience:** The roof of the hub is covered with solar panels that generate electricity, powering the building and charging electric vehicles. Inside, energy-efficient lighting and HVAC systems ensure a comfortable environment with minimal environmental impact. Passengers can see real-time energy usage and savings displayed on screens throughout the hub, promoting awareness and engagement in sustainability efforts.

05. Biometric and Facial Recognition Systems

* **Innovation / Problem solving:** Enhanced security and streamlined passenger experience.
* **Inspiration from:** Aviation, Event Management
* **Concept:** Utilize biometric systems for secure and quick access to various transportation modes within the hub. Passengers can use facial recognition for ticketing, check-ins, and boarding.
* **User experience:** A commuter enters the hub and approaches a facial recognition turnstile. The system instantly verifies their identity and access permissions, allowing them to board a high-speed train or autonomous shuttle without the need for physical tickets. This streamlines the boarding process and enhances security by preventing unauthorized access.

06. Integrated Mobility-as-a-Service (MaaS) Platform

* **Innovation / Problem solving:** Seamless end-to-end journey planning and payment integration.
* **Inspiration from:** Smart Cities, Retail
* **Concept:** Develop a comprehensive MaaS platform that integrates all transportation modes, allowing users to plan, book, and pay for their entire journey through a single app. Include options for ride-sharing, bike rentals, and autonomous shuttles.
* **User experience:** Using the MaaS app, a traveler plans a trip from the suburbs to the city center. The app suggests a route that includes an e-scooter to the hub, an autonomous shuttle within the hub, and a high-speed train to the city. The traveler books and pays for the entire journey in one transaction. The app provides real-time updates and alternative routes in case of delays.

07. Augmented Reality (AR) Experiences

* **Innovation / Problem solving:** Engaging and informative AR experiences that enrich the passenger journey.
* **Inspiration from:** Hospitality, Education
* **Concept:** Provide AR experiences for passengers, including virtual tours of the hub, historical insights about the city, and interactive entertainment options while they wait.
* **User experience:** While waiting for a connection, passengers use AR glasses or their smartphones to explore a virtual tour of the city's history, view 3D models of future urban developments, or play interactive games. This keeps passengers engaged and entertained, making their wait time more enjoyable.

08. Real-Time Data Analytics and Dashboard

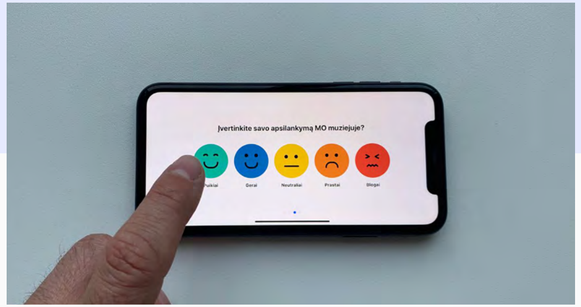
* **Innovation / Problem solving:** Data-driven insights leading to optimized operations and enhanced user experience..
* **Inspiration from:** Retail, Healthcare, Energy
* **Concept:** Implement a central data analytics dashboard that monitors and analyzes real-time data from all transportation modes and hub facilities. This helps in optimizing traffic flow, resource allocation, and improving passenger services.
* **User experience:** Hub operators use the dashboard to monitor passenger flow, vehicle status, and energy consumption. When data shows increased congestion at a specific time, operators adjust schedules and open additional service lines to alleviate/avoid crowding. Passengers benefit from reduced wait times and smoother transit experiences due to these data-driven adjustments.

09. Community and Stakeholder Engagement Platforms

* **Innovation / Problem solving:** Inclusive and participatory approach to hub development and management.
* **Inspiration from:** Event Management, Education
* **Concept:** Create platforms for community and stakeholder engagement, allowing users to provide feedback, participate in planning, and stay informed about developments in the mobility hub.
* **User experience:** Residents and businesses near the hub use an online platform to share their opinions on new developments and improvements. They participate in virtual town halls and surveys, influencing decisions on facilities and services. This inclusive approach ensures the hub meets the needs of its users and fosters a sense of community ownership.

10. Hyperloop and High-Speed Transport Integration

* **Innovation / Problem solving:** Revolutionary travel speeds and connectivity.
* **Inspiration from:** Ambitious and Futuristic Concepts
* **Concept:** Explore the integration of hyperloop systems for ultra-fast intercity travel. This can be a part of the ambitious and futuristic scenario, showcasing cutting-edge transport technology.
* **User experience:** A business traveler books a hyperloop ticket through the MaaS app for a meeting in a neighboring city. They arrive at the hub, pass through biometric security, and board the hyperloop pod. The pod travels at near supersonic speeds, reducing a two-hour journey to 20 minutes. This integration revolutionizes travel, offering unprecedented speed and convenience.



Understanding Mobility Hubs: Best Practices & Status Quo

Beyond Connectivity: Enhancing the Transit Experience

Mobility Hubs do more than connect various transit options. They enrich the transit experience with elements such as bus shelters, information displays, and parklets. These hubs are crucial for a well-functioning transit system, empowering people with the information and connections needed to move around freely.

A Mobility Hub is a place where different modes of transportation—such as buses, subways, and bikeshare—are seamlessly connected, making transfers between them easy and convenient.

Types & Sizes of Mobility Hubs

Mobility hubs are versatile urban solutions designed to streamline transportation by integrating various transit modes, making travel more efficient and convenient. These hubs come in different sizes, each tailored to specific community needs and locations, ensuring that the right type of hub is available where it is most beneficial.

1 Corner Hub

Size
Small

Location
Near residential areas

Purpose
Facilitates first/last hops

Features
Limited transportation modes, parking and bike storage, etc.

2 Center Hub

Size
Medium

Location
Residential and commercial districts

Purpose
Connects corner and gateway hubs

Features
Versatile mobility options, rideshare points, fare vending, neighborhood maps, etc.

3 Gateway Hub

Size
Large

Location
In the center of a large cities

Purpose
Connecting all kinds of hubs

Features
Extensive mobility options, extra amenities, WiFi, vehicle repair stations, etc.

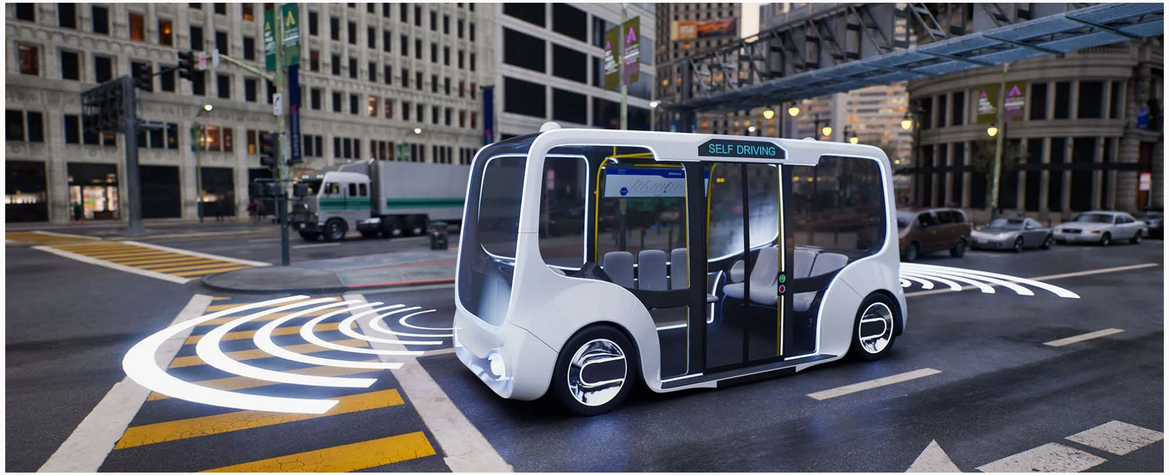
Size increase

Best Practices for Existing Mobility Hubs

Mobility hubs are designed to enhance the accessibility, safety, and comfort of urban transit, catering to a wide range of needs and improving the overall travel experience. Ensuring that these hubs are accessible and user-friendly for everyone, including those with disabilities, is paramount. These are the present best practices for mobility hubs:

* **Accessibility covering both disabilitie access and access to mobility**
  - Disability Access: Wheelchair accessibility, level boarding for buses, ramps, tactile paving, and audible signals.
  - Other items like multilingual fare vending machines help riders pay fares at the mobility hub and accept multiple payment options (QR codes, contact less, cash , ...) .
* **Safety and Comfort - incorporating placemaking, lighting, and more**
  - Shelters: Provide protection from weather and traffic.
  - Lighting: Enhances safety and deters anti-social behavior. Proper lighting reduces road accidents.
  - Pedestrian crossings – positive contrast creates a sense of safety, deters anti-social activity and increases satisfaction with transit.
  - HVAC (Heating, Ventilation, and Air Conditioning) systems offer several positive effects in public areas
  - Parklets and Public Art: Create engaging spaces for riders.
  - Flow Control: Design strategies to manage pedestrian traffic and ensure smooth movement. Identifying when and where railway congestion occurs is useful for both transportation operators and the passengers who use their services.
  - Drinking Water: Accessible water fountains for hydration.
  - Natural Light and Green Spaces: Create an inviting and relaxing atmosphere.
  - Charging Points For phones
  - Parcel Pick-Up Points: Convenient for riders to collect packages.
  - Smart Elevators and Escalators: Enhance accessibility.
* **Information and Wayfinding**
  - Countdown Clocks: Provide real-time arrival information.
  - Wayfinding Signs: Direct people to nearby destinations.
  - Real-Time Information Kiosks: Help riders find and compare transit options.
  - Dedicated Drop-Off Areas: For shared mobility and taxis.
  - Automatic Notifications: Inform travelers about expiring tickets or low credit balances.
* **Micro-Mobility**
  - Bikeshare Stations: Rent and return bicycles within a network.
  - Bike Racks and Cages
  - Electric Bike/Scooter Charging Stations
  - Bicycle Repair Stations; Provide tools for basic repairs.
  - E-scooters

Challenges and Solutions for Autonomous Vehicle Navigation in the Mobility Hub of the Future



Challenges for Autonomous Vehicle Navigation

01. Unpredictable Human Behavior

AVs must handle a range of unpredictable human behaviors, including those of toddlers, reckless drivers, and other road users, as well as unexpected obstacles like fallen trees and construction zones.

* **Possible Solution:** Dedicated lanes for AVs within the mobility hub can mitigate some of these risks by providing a controlled environment for autonomous operation. The impact of dedicated lanes outside depends on the market penetration rate (MPR) of AVs. Studies indicate that a dedicated lane becomes significantly beneficial only when the MPR exceeds 50%.
* **Innovative Solution:** To cope with the challenge of unpredictable human behavior, Mun et al. proposed a methodology based on using people in the robot's surroundings as indicators of potential obstacles. For example, if a driver brakes sharply, it can be inferred that a pedestrian may have run out onto the road in front of that driver. The model predicts occluded objects' locations using observed social behaviours and a variational autoencoder. This approach enhances the AV's ability to navigate safely by leveraging social cues from human behavior.

02. Legal Responsibility and Insurance Liability

Regulation is needed to define the legal framework for accidents involving AVs. The responsibility could shift from drivers to manufacturers or operators, depending on the circumstances.

* **Create regulations:** The advent of autonomous vehicles brings forth complex questions regarding legal responsibility and insurance liability. In the event of an accident involving an AV, the determination of fault may shift from individual drivers to manufacturers or service providers, necessitating a new regulatory framework. Insurance policies will also need to adapt, potentially focusing more on product liability and less on individual driver error. This shift requires robust legislation to ensure clear guidelines and protection for all parties involved.

03. Weather Conditions

Adverse weather such as rain, fog, snow, and lighting interference can significantly impact the sensors and perception systems of AVs.

* **Sensor Fusion:** Combining data from multiple sensors (LiDAR, radar, cameras, ultrasonic sensors, GNSS/INS) to enhance perception capabilities.
* **Perception Enhancement Algorithms:** Techniques such as de-raining algorithms can improve sensor performance in adverse weather.

04. Ethical Dilemmas

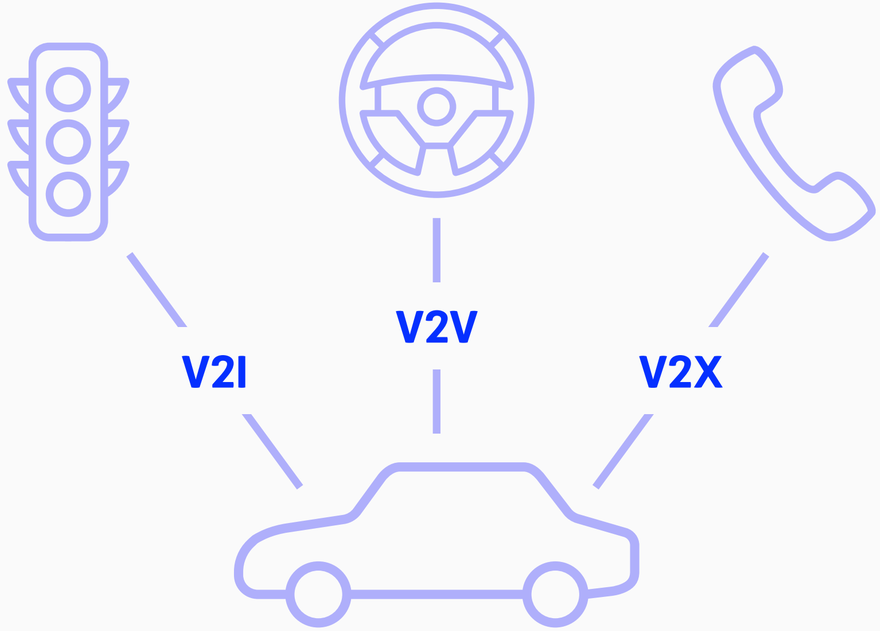
Programming AVs to handle emergencies and make ethical decisions during unavoidable accidents is a significant challenge.

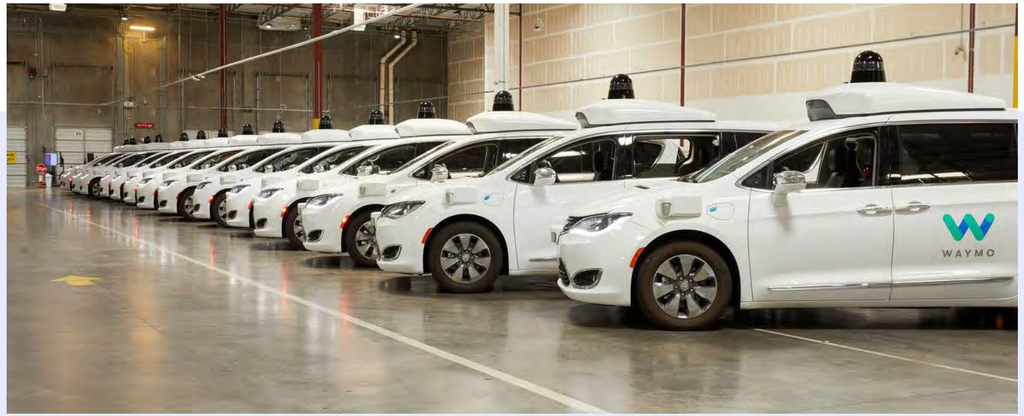
* **Ethics:** Autonomous vehicles must be programmed to handle ethical dilemmas, particularly in situations involving unavoidable accidents. These decisions, often referred to as the 'trolley problem' in ethics, involve choosing the lesser of two evils, such as deciding whether to harm pedestrians or passengers in a critical situation. Developing a universally accepted framework for these decisions is crucial, requiring collaboration between ethicists, engineers, and policymakers to ensure that AVs operate in a manner that aligns with societal values.

Communication Types for Autonomous Vehicles

To facilitate smooth operation within the mobility hub, AVs will rely on various communication technologies:

* **Vehicle to Infrastructure (V2I):** Communication between vehicles and road infrastructure such as traffic lights and sensors.
* **Vehicle to Vehicle (V2V):** Communication between vehicles to share information about their movements and intentions.
* **Vehicle to Everything (V2X):** A comprehensive communication system that includes V2I and V2V, as well as interactions with pedestrians' smartphones, IoT devices, and cameras.





Integration of Autonomous Vehicles

The integration of autonomous vehicles (AVs) into urban transit systems presents a unique set of challenges and opportunities. AVs have the potential to significantly impact urban mobility if introduced correctly. By carefully managing the introduction of AVs, cities can enhance their transit systems without undermining existing high-capacity transport networks.

* **Fleet Integration:** AVs should be introduced in fleets of driverless, shared autonomous vehicles to reinforce an efficient, high-capacity public transport network.
* **Supporting Role:** Walking, cycling, and shared AV fleets are ideal for providing door-to-door transport or acting as feeders to major transit hubs. However, they should not be seen as substitutes for traditional public transport due to their limited capacity in densely populated urban areas.

Case Study:
Autonomous Shuttles in Sion

In a pioneering project, researchers at EPFL, in collaboration with the startup BestMile and PostBus, are integrating autonomous shuttles into the public transport system of Sion, Switzerland. This initiative marks the first time in Switzerland that driverless shuttles could operate in a city center, carrying up to nine passengers.

Project Goals

The project aims to expand public transport services, particularly in outlying areas, by introducing flexible, on-demand driverless shuttles. These shuttles are designed to provide cost-effective, last-kilometer (or last mile) connections to areas with better transport links.

Testing Phase

Initial tests will be conducted on a closed site, with plans to run two electric shuttles on public roads in Sion. These tests will evaluate the shuttles' ability to navigate public roads, communicate with other vehicles, and adhere to traffic regulations.

System Development

EPFL researchers and BestMile are developing a fleet-management system to ensure the shuttles operate safely and efficiently. This includes real-time management of on-demand services, route flexibility, and passenger needs.

Future Integration

The project will assess the viability of using autonomous shuttles in public zones and their effectiveness in serving isolated areas. Successful integration could pave the way for broader adoption of AVs in urban transport systems.

Creating the Ideal Sustainable Transit Hub of the Future: An Interview with Industry Expert Gregory Falisse

Gregory Falisse

Over 22 years of experience in mobility

* Degrees in Communication and Management
* 10 years at the Mobility Unit of the Walloon Union of Enterprises
* 5 years at Traject consultancy firm
* Mobility Manager at Delhaize (2017)
* Mobility Expert at UCLouvain (2019-present)
* Career transitioned from corporate mobility solutions to urban planning and development

What are the most common mobility challenges companies or cities face today?

I think the most pressing issue is space management. We often find ourselves in a battle for space on the streets. We need room for pedestrians, cyclists, rubbish collection, bus stops, and other needs. The challenge is fitting all these requirements into the limited space available. Another significant challenge is encouraging people to try different modes of transportation. Many people stick to their routines, like driving a car, without considering other options. To overcome this, we need to create opportunities for people to test different modes, making it a habit to think about the most efficient way to commute.

What solutions do you see for these challenges, especially for space management?

Shared mobility is one viable solution. Reducing the number of private cars and bikes can help alleviate parking issues. We can also create more space for parking underneath buildings. Active modes of transportation, like biking or walking, are essential. Many people take short bus or tram rides when they could easily walk or use a scooter or bike. For a mobility hub, it's crucial to determine whether it serves daily commuters or tourists, as the approach for these two groups differs. The concept of mobility as a service (MaaS) can also play a role by integrating planning, booking, and payment systems into a single platform.

In your experience, what are the biggest obstacles in integrating different modes of transport within a mobility hub?

One major obstacle is the complexity of ticketing and the plethora of apps needed. Every week, new apps emerge while others disappear, making it hard to keep up. A unified system where you can use one subscription for all modes of transport would be ideal. For instance, a single app could manage bookings and payments for various transportation modes, making the process seamless for users.

How can cities or companies better support the integration of autonomous vehicles and micro mobility?

Regulation and thoughtful design are key. For example, Brussels has regulated spaces for scooters and shared bikes, which helps manage their use and placement. Autonomous vehicles are more challenging due to our current infrastructure and high population density. We are not quite ready for widespread adoption of autonomous vehicles in cities, although they may be feasible on motorways or specific routes sooner. The technology needs to improve to handle the complexities of urban environments.

How can mobility hubs be designed to enhance commuter experience?

One key aspect is placing mobility hubs in densely populated areas where people work, live, shop, and eat. Good connections with public transportation are essential. People need to be able to transition smoothly from one mode of transport to another, with services that support these transitions, such as bike repair shops or secure parking facilities. The design should also consider accessibility for people with disabilities, as making a hub accessible for all will inherently make it more user-friendly for everyone.

What are some effective ways to use technology to improve mobility services?

While less technology might be better for the actual movement of people, certain technological advancements can enhance accessibility. For instance, connected locks on bikes and cars allow for easy sharing and security. Programs that enable car sharing or ride-sharing with smart locks and subscriptions can reduce the number of private vehicles parked on the streets. Additionally, integrating these technologies into one cohesive system where users can book and pay for multiple modes of transport through a single app would streamline the user experience.

How do you envision the mobility hub of the future?

It's difficult to have a clear vision, but a successful mobility hub should provide users with the most efficient travel options, whether it's a bike, train, car, or scooter. The hub should organise trips in a way that minimises stress, even when changing modes of transport. AI could play a role in optimising these travel plans based on individual preferences for efficiency, cost, and environmental impact.

What role will sustainability play in the future of urban mobility?

Sustainability will be crucial. Improving air quality and reducing traffic congestion are necessary to make cities more livable. Long-term goals for sustainable mobility should be supported consistently, regardless of political changes. Cities like Amsterdam and Copenhagen have shown that with a clear, long-term vision, significant improvements can be made over time.

How can different stakeholders effectively collaborate on mobility projects?

Collaboration requires a shared goal, such as making the city more livable. Stakeholders, including governments, companies, and citizens, must agree on this target and work together towards it. It's essential to consider the needs of all groups, from the wealthy to the poor, and ensure that measures are inclusive and equitable. Consistent communication and explanation of the benefits of mobility projects can help gain public support and smooth implementation.

What are the key performance indicators (KPIs) to measure the success of a mobility hub?

Key KPIs include the number of users, the amount of CO2 saved by using alternative modes of transport, and the reduction in car usage. Financial savings for individuals who switch to shared mobility should also be highlighted, as many people underestimate the total cost of owning a car. Additionally, metrics showing how many private cars are replaced by shared vehicles can be compelling for policymakers.

How can we nudge people to switch from one transportation mode to another?

Incentives like free trials, gamification, and personalised travel advice can encourage people to try new modes of transport. Programs that lend bikes or other vehicles for a period can also be effective. Making the process of trying and using alternative transportation as easy and attractive as possible will help people overcome their habits and make more sustainable choices.

When would you personally use a mobility hub?

For me, the proximity and ease of use are crucial. The process should be simple, without the need for extensive subscriptions or training. Ideally, I could find a mode of transport at the corner of my street, book it easily, and use it without hassle. For example, a system like Cambio's, but more streamlined and user-friendly, would be ideal.

How do you envision a day using a mobility hub?

I would start by taking the train to a central station, then use a bike or scooter to reach my destination within the city. The key is having the flexibility to leave the bike or scooter at another hub, making the return journey just as easy. The entire process should be simple and intuitive, ensuring a seamless transition between different modes of transport.

What role does privacy play in public transport?

Privacy can be important for some people, and offering options like private spaces or bubbles within public transport could make it more appealing. Providing facilities that allow passengers to work, make phone calls, or relax comfortably could enhance the overall experience and make public transport more competitive with private car use.

How can we maintain the political and public support needed for long-term mobility projects?

Consistent goals and clear communication are vital. Even with changes in political leadership, maintaining a long-term vision for urban mobility ensures that projects continue to progress. Engaging the public by highlighting the benefits, such as improved air quality and reduced congestion, can help garner support. Successful examples from other cities can also provide inspiration and justification for ongoing efforts.

> *"We need to create opportunities for people to test different modes, making it a habit to think about the most efficient way to commute."*

1.2 CREATION

After completing the input phase, the ideation or creative phase kicks off in every innovation project. This is where creativity takes center stage as we initially pursue the wildest and most original ideas, eventually selecting the most promising ones and transforming them into robust concepts. We approached this phase in three distinct and sequential steps: defining key criteria, generating ideas through a brainstorming session, and creating an overarching concept.

Defining Eight Criteria

The input phase provided us with an overwhelming abundance of fascinating data. It's often challenging to see the forest for the trees and establish a clear structure and hierarchy. Therefore, we decided to define a specific set of criteria that our future mobility hub should meet. Ultimately, we identified eight crucial criteria under which all our research findings could be categorized.

Brainstorming Session

A professionally organized and facilitated brainstorming session often results in a flood of ideas. We dedicated ample time and care to this process, and the outcome did not disappoint. For half a day, a group of around ten individuals generated the most original and creative ideas, and we had a great deal of fun in the process.

Concept Creation

Based on the previous steps, our team set to work on developing a strong and fitting concept. This concept would serve as the visual and structural framework for the architecture of our future mobility hub.

The 8 Criteria for Creating a Successful Mobility Hub of the Future

Creating a mobility hub of the future demands a holistic approach that addresses a range of essential criteria to ensure it meets the diverse needs of users and promotes sustainability, safety, and innovation. The following eight core categories have been identified by us as the foundation for designing an efficient, user-friendly, and forward-thinking transportation center. These categories encompass accessibility and inclusivity, safety and security, comfort and convenience, efficiency and operational reliability, sustainability and eco-friendliness, technological integration and innovation, versatility and flexibility, and user engagement and responsiveness. Each category is meticulously defined to provide a comprehensive blueprint for developing a mobility hub that not only addresses current demands but also adapts to future advancements and evolving user needs.

Accessibility & Inclusivity

Safety & Security

Comfort & Convenience

Efficiency & Operational Reliability

Sustainability & Eco-Friendliness

Technological Integration & Innovation

Versatility & Flexibility

User Engagement & Responsiveness

Accessibility & Inclusivity

Designing all aspects of the hub to be accessible and user-friendly for people of all ages, abilities, and financial backgrounds, ensuring seamless and equitable access for everyone.

* **Universal Design:** Ensure all areas are accessible to people with disabilities, including ramps, elevators, and accessible ticket counters.
* **Affordable Access:** Implement fare structures that are financially accessible to all.
* **Language and Communication:** Multilingual signage and staff, real-time info kiosks, and automatic notifications.
* **Special Needs:** Features for elderly people, families with children, and those with specific mobility needs.

Safety & Security

Prioritizing the physical and health safety of all users through advanced surveillance, emergency systems, and well-lit, secure environments.

* **Physical Safety:** Surveillance cameras, emergency response systems, and well-lit areas.
* **Health Safety:** Sanitization stations, clean facilities, and medical assistance points.
* **Crowd Control:** Measures to prevent overcrowding and ensure safe transit during peak times.

Comfort & Convenience

Providing a comfortable and convenient experience with amenities like clean facilities, optimal environmental controls, and family-friendly spaces.

* **Amenities:** Clean and accessible toilets, drinking water stations, comfortable seating, and quiet rooms.
* **Environmental Comfort:** Optimal HVAC systems, lighting, and shelter from weather.
* **Technology Access:** Charging points, Wi-Fi, and real-time information systems.
* **Family-Friendly:** Play areas for children and spaces designed for families.

Efficiency & Operational Reliability

Ensuring the hub operates smoothly and reliably with integrated systems for real-time information, optimized passenger flow, and seamless ticketing and scheduling.

* **Integrated Systems:** Seamless ticketing and scheduling across multiple modes of transport.
* **Real-Time Information:** Digital displays, countdown clocks, and wayfinding signs.
* **Optimized Flow:** Efficient crowd management, designated pathways, and smart door systems.

Sustainability & Eco-Friendliness

Incorporating sustainable practices and renewable energy sources to minimize the environmental impact and promote long-term ecological health.

* **Green Building:** Use of sustainable materials and energy-efficient designs.
* **Renewable Energy:** Integration of solar panels, wind turbines, and other renewable energy sources.
* **Waste Management:** Comprehensive recycling and waste reduction programs.
* **Carbon Neutrality:** Strategies to achieve or exceed carbon neutrality.

Technological Integration & Innovation

Leveraging cutting-edge technologies like AI, IoT, and autonomous systems to enhance the functionality and user experience of the mobility hub.

* **AI and IoT:** Predictive maintenance systems, smart infrastructure, and AI-driven traffic management.
* **Autonomous Solutions:** Implementation of autonomous vehicles, drones, and robotics for transport & delivery.
* **Interactive Technology:** Augmented reality for navigation and information, smart kiosks, and mobile apps.

Versatility & Flexibility

Designing spaces and services to be adaptable and scalable, accommodating various transportation modes and future developments.

* **Multi-Modal Options:** Bike-sharing stations, electric scooter charging, and AV shuttle services.
* **Adaptable Spaces:** Areas that can be repurposed for different uses as needed.
* **Scalability:** Design that allows for future expansion and integration of new technologies.

User Engagement & Responsiveness

Actively engaging with users through feedback systems, customer service, and adaptive services to continuously improve the hub based on user needs and preferences.

* **Feedback Mechanisms:** Suggestion boxes, online forms, and active social media channels.
* **Customer Service:** On-site representatives and help desks.
* **Adaptive Services:** Regular updates and improvements based on user feedback and travel patterns.

Getting Inspired by Creatives: A Fertile Brainstorm

The brainstorming session for the SHIFT project was designed to generate a wide array of ideas and draw inspiration from diverse perspectives. Our objective was to delve into the frustrations people face with current mobility systems and explore innovative solutions for the mobility hub of the future. The session included ten participants from various backgrounds, including designers, engineers, and linguists, ensuring a rich mix of viewpoints and expertise.

Structured into several dynamic activities, the session aimed to create a collaborative environment where participants could freely express their ideas and frustrations. This process not only helped identify common pain points but also fostered creative thinking to address these issues. The outcomes of this session provided valuable ideas that will serve as building blocks for developing our visionary mobility hub concept.

1

Welcome & Introduction
- 10 minutes

The session begins with a welcome and an introduction where the facilitator, Walter, greets all participants. The goals for the day are explained along with the brainstorming rules.

Props: Brainstorm rule cards for each participant.

Purpose: To communicate clear goals and essential rules to run the brainstorm as smooth and efficient as possible

2

Sketch-Dump Energizer
- 15 minutes

Participants create as many sketches as possible on the theme "something that enables you to move." Afterwards, each participant selects their top 5 sketches and presents them to the group.

Props: Sketch-dump templates and markers for each participant.

Some results: Catapult, rocket, teleportation, dinosaur, ...

Purpose: Taking participants out of their comfort zone and warming them up to think creatively and boldly

3 Frustration-Purge
- 15 minutes

A loud session where participants express all their frustrations and inconveniences they've experienced.

Props: Post-its, markers, and a flipchart.

Some results: Bad bike infrastructure, getting ill because of HAVC, no washrooms close by, too many apps, crowded, unclear wayfinding,...

Purpose: This is intended to clear the air and 'purge' their brains from negativity and frustration to allow for more constructive brainstorming afterwards

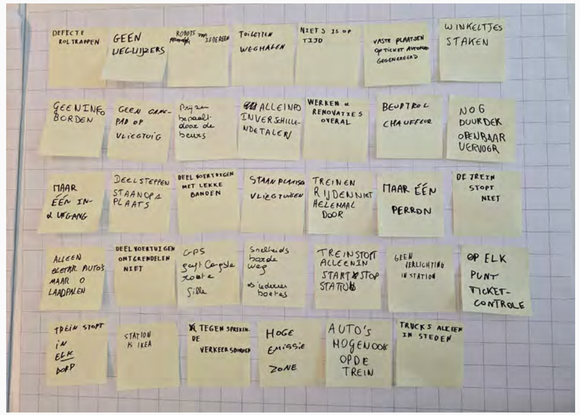
4 Reversed Question
- 25 minutes

Participants act as "moles" within a team of innovators and engineers tasked with ensuring smooth public transport and package delivery in a city. They brainstorm sabotage ideas which are then flipped into solutions for the original problem.

Props: Post-its, markers, and a flipchart.

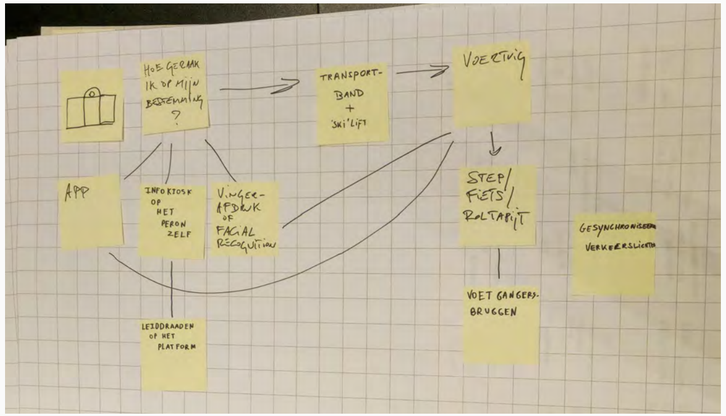
Some results: See next page.

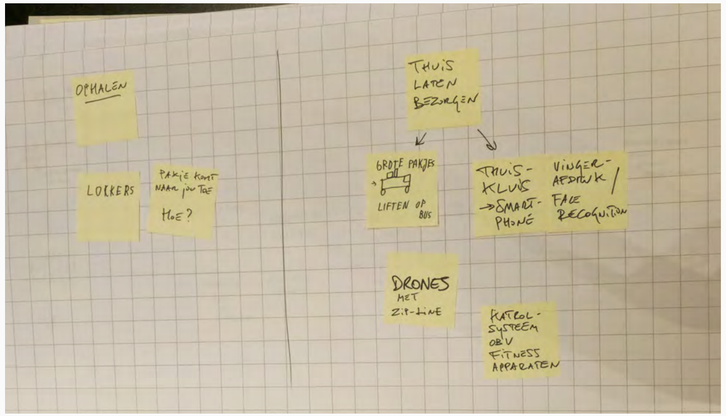
Purpose: This is a fun technique in which the participants are allowed to play 'the bad guy' and thus coming up with the most crazy scenario's. In the second phase, the facilitator stimulates the participants to flip the ideas in the most creative and original ways possible.



1. Mole answers (in dutch)

2. Reversed answers (in dutch)





5 Scenario-Storming 1
- 15 minutes

Participants are placed in a scenario to generate specific ideas: Arriving at a mobility hub by train on a busy Monday morning, needing to travel 3km to work in the city. Participants visualise how this situation could be handled.

Props: Post-its, markers, and a flipchart.

Some results: See images.

Purpose: By putting themselves into the skin of an imaginary persona and walking their specific journey, the participants can easily imagine the ideal scenario and come up with ideas to make it as smooth and effortless as possible.

6 Scenario-Storming 2
- 15 minutes

Another scenario is presented: Living in the city, arriving at the mobility hub by train, and needing to collect a package from Zalando. Participants brainstorm how and where to collect the package.

Props: Post-its, markers, and a flipchart.

Some results: See images.

Purpose: By putting themselves into the skin of an imaginary persona and walking their specific journey, the participants can easily imagine the ideal scenario and come up with ideas to make it as smooth and effortless as possible.

7 Scenario-Storming 3
- 30 minutes

Participants work in pairs focusing on 'limitations': How would you navigate the mobility hub with a specific limitation (assigned via cards)? What do you need in the mobility hub to feel comfortable?

Props: Post-its, markers, flipcharts, and 'limitation' cards.

Some results: See images.

Purpose: By putting themselves into the skin of an imaginary persona and walking their specific journey, the participants can easily imagine the ideal scenario and come up with ideas to make it as smooth and effortless as possible.

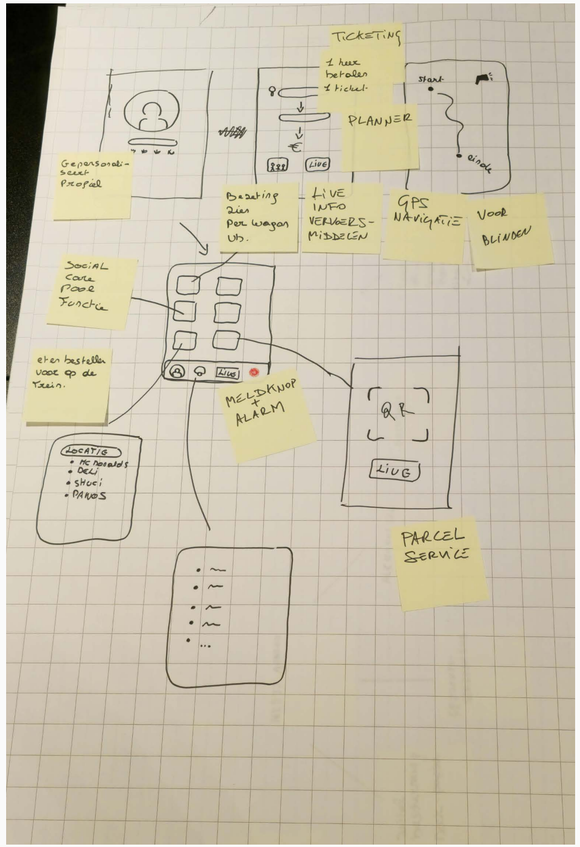
8 Design the SHIFT-App
- 30 minutes

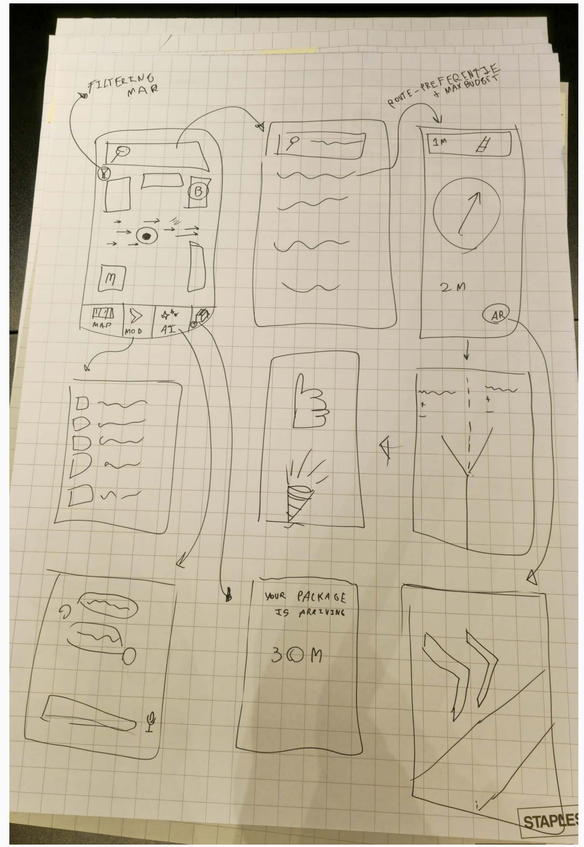
Participants choose to work alone, in pairs, or in trios to design the flow and screens of the SHIFT app using the provided templates. The designs are then shared with the group.

Props: App templates.

Some results: See images.

Purpose: After imagining all frustrations, solutions and scenario's, this is the ideal time to start designing an app that contains all of the elements that came up during the brainstorm and which will make the passenger's life easier and participative.

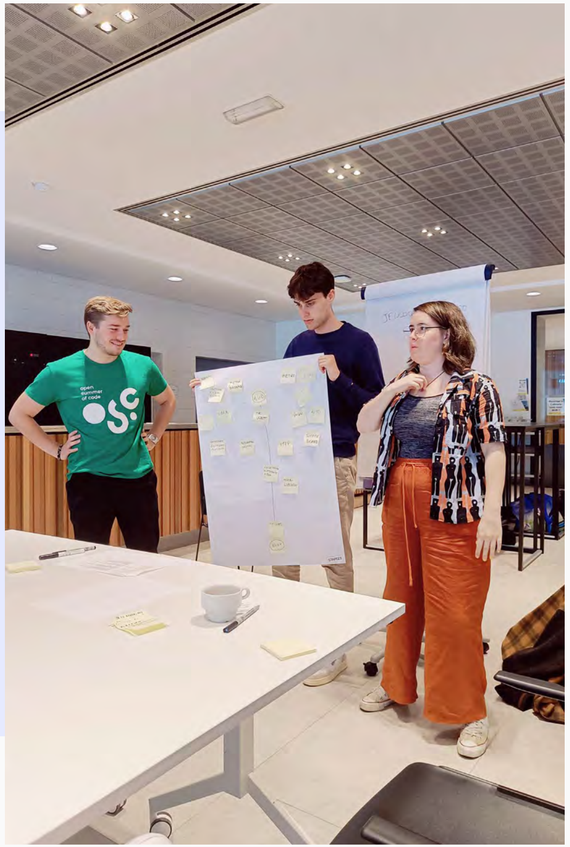




Conclusion

We were highly satisfied with the results of the brainstorming session. The diverse backgrounds of the participants contributed to a rich pool of innovative ideas and solutions that will significantly inform the development of our mobility hub concept. The session successfully highlighted key user frustrations and potential solutions, providing us with a solid foundation to build upon.

For those interested in replicating this brainstorming session, we have included the brainstorm rule cards and disabilities in the appendix of this report, on page 228. These resources can help guide your own sessions and ensure a structured, productive, and inclusive brainstorming process.



Chapter 01: The Making of SHIFT - CREATION

Creating an Inspiring Mobility Hub of the Future

Integrating the Brainstorm Results

Our brainstorming session was a treasure trove, generating hundreds of innovative ideas. The real challenge now was to weave these gems—at least the most dazzling ones—into the fabric of our project.

We revisited the eight categories we had established earlier and meticulously sorted each post-it into one or more of these groups. Next, we translated these brainstormed ideas into tangible possibilities, focusing on the most original and promising concepts. You can explore the full array of our findings on page 228.

Designing an Overarching Concept

From the very beginning, our mission was not just to name the project—'SHIFT'—but to craft a unifying vision that would drive the project's soul. This overarching concept would enhance the coherence and architecture of our endeavour, providing a robust framework for its visual and experiential elements.

To achieve this, we embarked on a second ideation journey with the team, aiming to create a vibrant and inspiring 'anchor' for our concept. Our criteria were clear: the concept must seamlessly blend sustainability and technology, delivering an exceptional user experience at every turn. We envisioned lush natural elements interwoven with cutting-edge technological features, creating a symbiotic relationship that would captivate and inspire.

We also wanted our hub to resonate with profound metaphors—symbols that could elevate the experience from mere functionality to a source of inspiration. We considered metaphors that evoke growth, connectivity, and transformation, aiming to encapsulate the essence of a future where nature and technology intertwine.

Initially, we conjured up about twenty foundational concepts, each one a unique narrative in itself. Through a collaborative and creative selection process, we distilled these down to a top seven, choosing the ones that not only met our criteria but also sparked the most excitement and imagination within the team. These chosen concepts can be discovered in detail on page 229.

Our journey through the concepting phase has been both challenging and exhilarating, pushing us to think beyond conventional boundaries and envision a future transport and mobility hub that is not only functional but also deeply inspiring. We are excited to share these visions with you and look forward to bringing them to life.

1.3 BUILDING

To make all ideas and concepts tangible, we move to the final phase: the actual 'building' of the project. This phase consists of three interconnected parts: the branding (look & feel) of the project, the visuals and illustrations, and the wireframes for the smartphone application.

Branding

To give the mobility hub of the future a strong visual identity, we decided to develop a comprehensive branding. This branding should inspire trust and enhance recognizability. It also serves as the backbone for the rest of our visual communication.

Visuals and Illustrations

Since the end result needs to be an inspiring and visually appealing report, it only made sense to focus heavily on creating strong visuals and illustrations. It was an exciting journey of trial and error, but what matters most is the result. And we are incredibly proud of it.

Wireframes for the Smartphone App

Although the client emphasized that a smartphone app might not be the top priority, we found it hard to imagine the daily operation of the mobility hub without it. Therefore, our team's designer created a complete design for the functional and visual look & feel of this dedicated SHIFT application.

The Creation of a Visually Appealing Mobility Hub of the Future

One of the most significant challenges we faced during this project was creating captivating and visionary images to bring our SHIFT concept to life. The client emphasised during the briefing that the final product needed to be an inspiring and visionary document, making the visual aspect crucial.

Initially, we sought applications that could generate 3D environments simply and quickly. Our goal was to use these images to demonstrate the interactions between different modes of transport, the environment, and users. We chose Spline, which seemed to offer the best combination of acceptable results, manageable difficulty (and learning curve), and affordability. However, the initial results were disappointing, and the learning curve was steeper than anticipated.

Another option was to create all images in Adobe Illustrator, but achieving acceptable results would have taken several weeks—a luxury we couldn't afford.

Thus, we decided to fully embrace artificial intelligence. While we were familiar with Chat GPT, its integrated visual application, DALL-E, was still somewhat limited in creating the images we envisioned. **Ultimately, we turned to Midjourney.**

Midjourney was an uncharted territory for all of us, as none of us had worked with it before. We invested a significant amount of time exploring its capabilities and—after hundreds of attempts—crafting the right prompts needed for the application to produce the visionary and inspiring visuals we aimed for. The process was far from easy and was marked by numerous frustrations and setbacks. However, it also brought moments of intense excitement and discovery.

When we finally began to see the results from Midjourney, the sense of relief and enthusiasm was palpable. We were overjoyed to witness the transformation of our ideas into stunning visuals. It was a fantastic learning process, blending moments of joy and exhilaration with the challenges we overcame.

We are extremely satisfied with the outcome and believe that the images significantly enhance the final product, adding immense value and aligning perfectly with our vision.

Designing the Identity

Crafting a Compelling Brand Name

As an innovation team, we unanimously agreed that a strong and unique name would greatly benefit the project. The name needed to embody the essence of mobility and transport, while also serving as an acronym that succinctly encapsulates the project's core objectives.

We conceived the name SHIFT:

SHIFT not only signifies switching between modes of transport but also evokes the image of a gearbox, both of which are deeply connected to the world of mobility. Moreover, it symbolizes the 'mindshift' we aim to inspire in users, encouraging them to choose the fastest, most logical, efficient, and sustainable route from point A to point B, rather than sticking to the same mode of transport.

As an acronym, SHIFT stands for 'Sustainable Hub for Intelligent Future Transit.' These five words comprehensively define the project, and we believe it is accessible and memorable for everyone.

Giving a Style to SHIFT

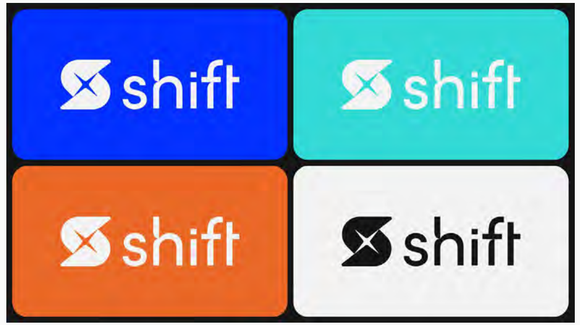
In creating the logo and color palette for the SHIFT Mobility Hub, our objective was to craft a visual identity that not only aligns with the innovative essence of the project but also enhances the overall appeal of our report. The assignment specifically called for a visually compelling presentation, and we have meticulously designed each element of the logo to reflect the core values and vision of SHIFT.

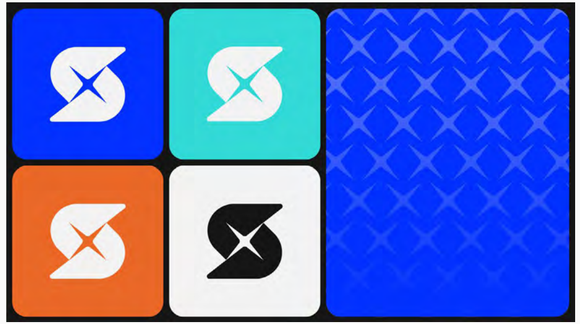
At the heart of our logo design is the letter "S," which stands as the initial of "SHIFT." This choice is intentional, aiming to emphasize the central concept of change and movement inherent in the project. The "S" is depicted in a modern, dynamic style to convey a sense of progress and forward-thinking, resonating with the transformative nature of the mobility hub.

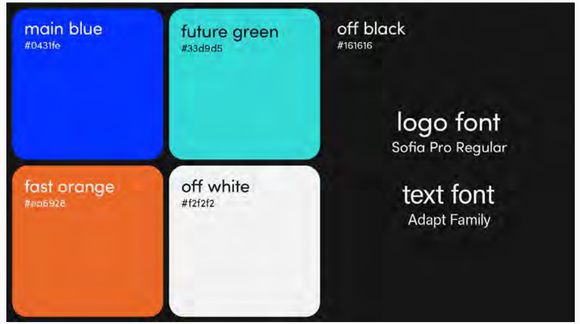
Central to the "S" is a star, symbolizing the pivotal role of the SHIFT Mobility Hub as a nexus of transportation. The star represents the central point from which all means of transport radiate and connect, highlighting SHIFT's function as a key facilitator in integrating various transportation modes. This imagery is meant to evoke a sense of unity and interconnectedness, underscoring the hub's mission to streamline and enhance mobility.

The chosen colors for the logo are vibrant and contemporary, selected to captivate attention and foster a sense of energy and innovation. These colors not only make the report more visually appealing but also contribute to establishing a strong, memorable brand identity for SHIFT. The palette is carefully balanced to ensure clarity and readability, making it effective for both the current report and future presentations of the hub.

In summary, the logo and colors for the SHIFT Mobility Hub were designed with a clear purpose: to create a strong, engaging visual identity that reflects the hub's innovative and central role in urban transportation. The logo, with its prominent "S" and central star, encapsulates the essence of SHIFT, symbolizing both movement and connectivity. The vibrant colors enhance this identity, making it stand out and resonate with our audience now and in future applications.



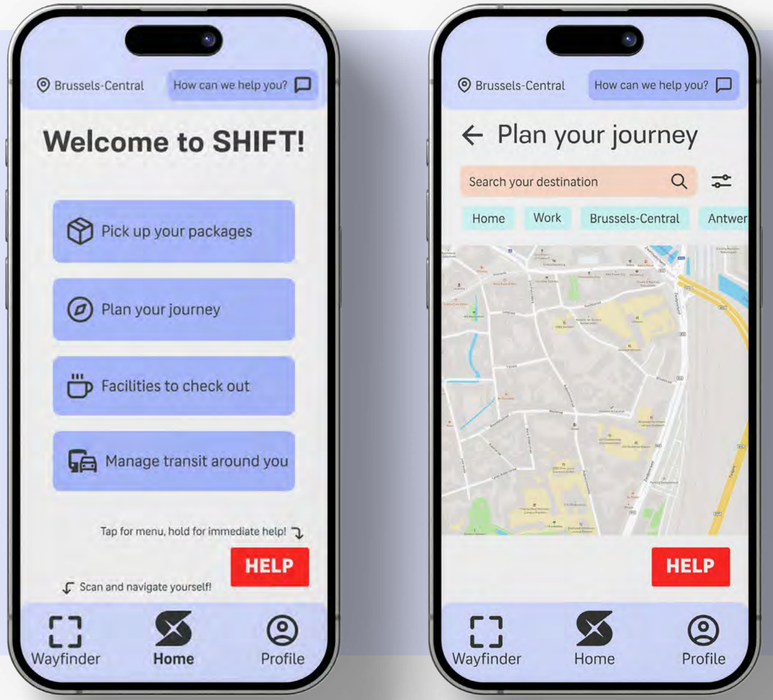


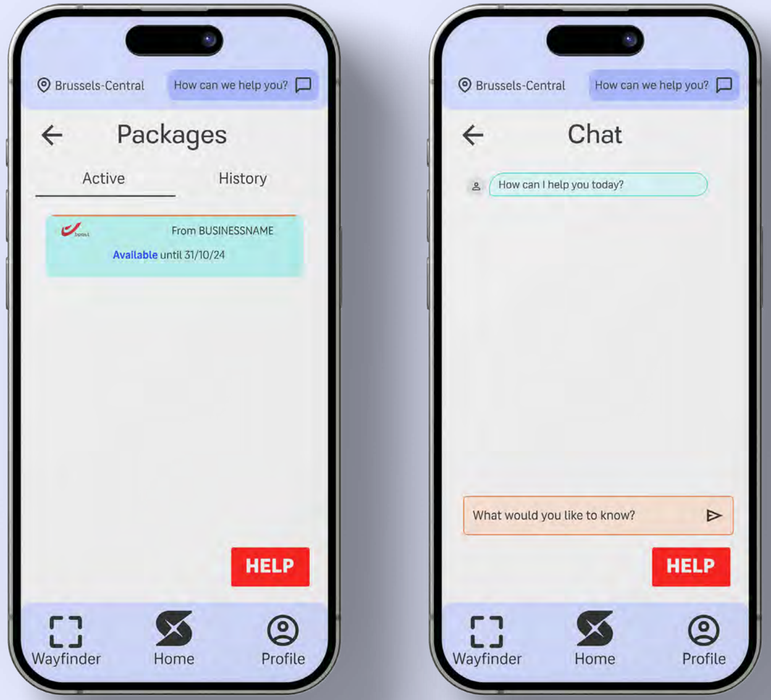


Sketching Wireframes for SHIFT's MaaS App

Technology plays a crucial role in the mobility hub of the future, making a mobile application a natural component of this vision. The wireframes provided are designed to guide the development of the future mobility hub. This application serves as an extension of the larger project.

Scan Here to Test It Out!





When users first open the SHIFT app, they can create a profile, log in, or enter as a guest. Creating a profile involves a questionnaire about their public transport preferences and needs, such as assistance with wheelchairs or guidance for poor vision. This information is securely stored to tailor their experience and ensure smoother journeys.

Upon accessing the homepage, users see a welcome message and their location. Clicking the "How can we help you?" button directs them to an AI chatbot for any questions about the mobility hub and its features.

From the homepage, users can:

1. Pick up packages: Access a list of active and past packages, view details (e.g., distribution company, codename, sender), and choose to pick them up at a neighborhood or gateway hub. Users can also rename their packages and change the sender's name.

2. Plan a journey: Enter a destination to create a travel plan. They can select from three route options (eco-friendly, faster, or scenic), which are saved as their preference. The app provides navigation instructions and arrival notifications, allowing users to stop their journey upon arrival.

3. Explore facilities: View a list of facilities in the mobility hub, including information on opening hours, location, and prices.

4. Manage transit options: Access various transport modes supported by the hub, including NMBS, De Lijn, Poppy, and autonomous vehicles. Users can view and manage public transport tickets, plan routes, receive delay notifications, and buy new tickets. They can also access autonomous vehicles for transport from the nearest parking spot to their destination. Under this page users will also be able to view tickets: They'll see a list of their tickets, such as Youth Holiday or Ten Ride tickets, with details on validity, remaining rides, purchase history, and invoices.

A persistent help button is available on every screen. Pressing it briefly opens a menu for assistance options: requesting an assistant (who arrives within five minutes), navigating to an information desk, asking a general question (directed to the chatbot), or calling emergency services (112 in Belgium) if pressed and held.

The app's navigation bar features:

1. Home Button: Returns to the homepage.

2. Wayfinder Button: Uses the camera to scan surroundings, highlighting exits and nearby facilities.

3. Profile Button: Accesses settings, notifications, preferences, and logout options.

02

Introducing: SHIFT

Chapter 02: The SHIFT Concept

SHIFT: The Future of Urban Mobility

SHIFT (Sustainable Hub for Intelligent Future Transit) is a revolutionary mobility hub that seamlessly integrates multiple transportation modes within a sustainable and user-friendly ecosystem. At its core is a tree, inspired by photosynthesis, featuring large, leaf-shaped solar panels that provide shade and generate renewable energy. This design combines technology with nature, creating shaded pathways and green rooftops that enhance both sustainability and aesthetics.

SHIFT offers seamless connectivity by integrating autonomous shuttles, electric bikes, and high-speed trains, ensuring efficient transitions between different transportation modes. Dedicated lanes and intuitive pathways make commuting smooth and effortless. The hub's design prioritizes user comfort, with quiet zones, comfortable seating, and real-time information displays. AI chatbots and service robots are available to assist travelers, enhancing the overall experience.

Environmental stewardship is a key aspect of SHIFT. The hub incorporates rainwater harvesting, greywater recycling, and comprehensive waste management systems, demonstrating a strong commitment to sustainability. These green practices ensure efficient resource use and minimize the environmental impact.

By reducing travel time and improving connectivity, SHIFT makes urban transit more efficient and convenient. Its reliance on renewable energy and sustainable practices sets a new standard for eco-friendly commuting. SHIFT represents the future of urban mobility, where technology and nature coexist to create a seamless, comfortable, and sustainable transit experience.

SHIFT Based on the 8 Criteria

Next to each idea is an icon indicating how easy the idea is to implement.

Feasible: *The idea can be implemnted with our current technologies.*

Ambitious: *The idea requires advancements in existing technologies but is achievable soon.*

Futuristic: *The idea depends on emerging technologies that may take decades to develop.*

Enhanced Solutions for:

Accessibility & Inclusivity

Designing all aspects of the hub to be accessible and user-friendly for people of all ages, abilities, and financial backgrounds, ensuring seamless and equitable access for everyone.

1. Clear and Easy-to-Understand Communication

Universal Symbols: Icons combined with text to help those who do not understand the local language. Maps are available in both tactile and digital formats.

Innovative Application: Augmented reality (AR) wayfinding tools that overlay visual directions on users' smartphone screens, enhance navigation without relying solely on physical signs.

2. Announcements in Multiple Languages

Comprehensive Announcements: All announcements are made in at least three languages, reflecting the primary languages spoken in the area.

Innovative Application: AI provides real-time translation services through the hub's app, allowing users to receive announcements in their preferred language.

3. Personalized App Profiles

Customized Navigation: An app that offers personalized navigation and alerts. Users can create profiles with preferred transportation modes, mobility needs, and language preferences.

Innovative Application: Gamification elements where users earn rewards for eco-friendly actions, such as using bikes or public transport, which can be redeemed for discounted fares.

4. Multi-Sensorial Design

Dynamic Zones: Different zones using varied materials and sensory inputs, such as lower ceilings for intimate spaces and high ceilings for open areas. Materials like stone for high-traffic zones and wood for relaxing areas.

Innovative Application: Ambient soundscapes and subtle scent diffusers in waiting areas to create calming environments.

5. Wayfinding

Audio and Tactile Wayfinding: Audio wayfinding devices that provide spoken directions and updates. Tactile paths with raised, textured surfaces for the blind or visually impaired.

Innovative Application: Bluetooth beacons for precise indoor navigation, providing real-time audio instructions through an app that adjusts to users' locations.

6. Animal friendly

Enhanced Comfort: Designated waiting areas and rest zones for assistance animals, complete with water stations and comfortable flooring.

Innovative Application: Self-cleaning dog toilets using advanced sanitation technology to maintain hygiene.

7. Toilets at Stations

Accessible Toilets: Toilets are available at all stations, clearly marked, and accessible, with features like wide doors, handrails, and lower sinks.

Innovative Application: Smart toilets that use sensors to automatically clean and sanitize after each use, maintaining hygiene standards.

8. Affordable Access

Income-Based Pricing: A fare structure that adjusts prices based on the user's income, with a confidential application process.

Innovative Application: AI offers personalized fare suggestions and discounts based on users' travel habits and needs, ensuring affordability.

9. Free Trials for Different Transport Modes

Encouraging Exploration: Free trials to encourage users to explore various transportation options.

Innovative Application: The app tracks users' preferences and provide tailored recommendations and promotions for transport modes they haven't tried yet.

10. Accessible Transport

Inclusive Transport: Accessible transportation options like leveled boarding for wheelchair users and communication through tactile, visual, and sound cues.

Innovative Application: Adaptive seating in vehicles that can adjust height, width, and space to accommodate various needs.

11. Comfortable and Accessible Circulation

Enhanced Elevators: Elevators with clear audio announcements, Braille buttons, visual displays, clear doors, and enough space for bicycles.

Innovative Application: Smart elevators with AI to predict and reduce wait times, and real-time updates on elevator status through the hub's app.

Enhanced Solutions for:

Safety & Security

Prioritizing the physical and health safety of all users through advanced surveillance, emergency systems, and well-lit, secure environments.

1. First Aid Stations and Medical Assistance Points

Comprehensive Medical Support: First aid stations with medical assistance points staffed by healthcare professionals. Automated external defibrillators (AEDs) and clear app notifications guiding users to these points.

Innovative Application: Telemedicine kiosks within the hub, allowing users to consult with doctors remotely for non-emergency health concerns.

2. Pharmacy in the Hub

Integrated Health Services: A pharmacy that offers over-the-counter medications, prescription services, and health advice. Self-service health check stations for blood pressure and BMI monitoring.

Innovative Application: A prescription delivery service within the hub using autonomous robots for convenience.

3. Timed Entry Systems and Digital Displays

Dynamic Crowd Management: Timed entry systems and digital displays showing current occupancy levels to manage peak time flows. Staff to manage flow during busy periods.

Innovative Application: AI and real-time data analytics to predict peak times and adjust entry/exit points dynamically, reducing congestion.

4. Integrated Emergency Response System

Help and Assistance Buttons: Easily accessible help and assistance buttons in transport vehicles and restrooms. These buttons trigger immediate alerts to security personnel.

Alarm and Report Button in the App: An alarm and report button in the app, providing real-time location to security for swift response.

Surveillance Cameras: High-definition surveillance cameras monitored by security personnel in real-time. AI to detect unusual activity and alert security staff.

Innovative Application: A central command center that integrates all emergency response systems, including real-time monitoring of cameras, emergency buttons, and app alerts.

5. Emergency Response Systems

Robust Systems: Clear evacuation plans, regularly tested alarms, and designated assembly points. Train staff for efficient emergency management.

Innovative Application: Augmented reality (AR) for emergency drills, allowing users to participate virtually and understand evacuation routes and procedures.

6. Adaptive Lighting and Climate Control

Smart Lighting and HVAC Systems: Smart lighting and HVAC systems that adjust based on occupancy, time of day, and weather conditions to enhance energy efficiency and user comfort.

Innovative Application: Motion sensor lighting that activates as people approach and adjusts brightness in real-time based on current conditions. In addition there are climate control systems that adapt to occupancy and external weather, ensuring optimal comfort while conserving energy.

7. Curtains on Transport Vehicles

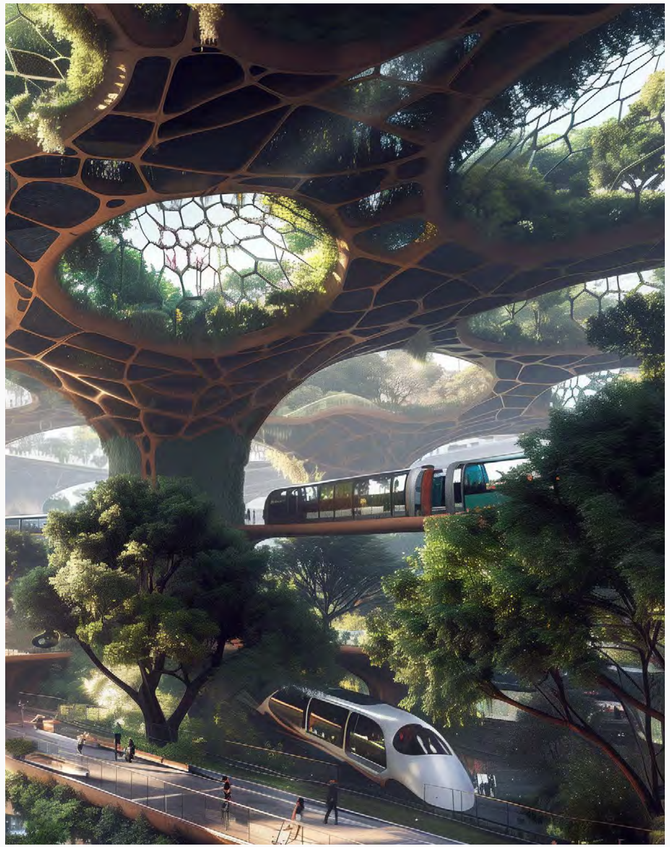
Private Spaces: Curtains on transport vehicles for private spaces and different seating types to cater to various needs, enhancing privacy and security.

Innovative Application: Soundproof booths for calls or private conversations within the hub, ensuring personal privacy.

8. Social Carpool Function

Enhanced Community Security: A social carpool function in the app, encouraging ride-sharing with user ratings and reviews to build a trusted community.

Innovative Application: AI matching algorithms to pair users based on travel routes and preferences, enhancing safety and convenience.



Enhanced Solutions for:

Comfort & Convenience

Providing a comfortable and convenient experience with amenities like clean facilities, optimal environmental controls, and family-friendly spaces.

1. Food Delivery to Trains

Convenient Dining: A service where passengers can order food to be delivered directly to their seats on the train.

Innovative Application: Autonomous delivery robots bring food directly to passengers, ensuring timely and contactless service.

2. Free Drinking Water Stations

Hydration Stations: Free drinking water stations throughout the hub.

Innovative Application: Smart water stations that track usage and notify maintenance when refills or cleaning are needed.

3. Facilities for Freshening Up

Refreshment Rooms: Rooms equipped with showers, sinks, and mirrors for passengers to freshen up.

Innovative Application: Self-cleaning features and real-time occupancy indicators for user convenience.

4. Lockers for Receiving Packages

Convenient Pickup: Secure lockers for package storage with app notifications for arrivals.

Innovative Application: Smart lockers that adjust compartment sizes based on package dimensions and notify users of package conditions (e.g., temperature-sensitive items).

5. Under-Seat Package Delivery on Transport

Efficient Delivery: Systems for packages to be delivered directly under passengers' seats.

Innovative Application: Robotic arms within the transport vehicles to deliver and retrieve packages efficiently and securely.

6. Underground Shopping Shoots

Seamless Delivery: An underground delivery system for packages between hubs.

Innovative Application: Automated guided vehicles (AGVs) to transport packages quickly and securely through dedicated tunnels.

7. Reserved Seating on Transport Vehicles

Guaranteed Seats: Reserved seating options on transport vehicles.

Innovative Application: Dynamic seat reservation systems that adjust availability based on real-time demand, ensuring efficient use of space.

8. Soothing Ambient Environment

Calming Atmosphere: Calming music is played throughout the hub to reduce stress.

Innovative Application: Adaptive soundscapes that change based on the time of day and crowd density, creating a dynamic and relaxing environment.

9. Quiet Rooms for Relaxation

Peaceful Spaces: Quiet rooms equipped with comfortable seating, soft lighting, and soundproofing.

Innovative Application: Smart glass that can switch between transparent and opaque to control privacy levels are implemented in these rooms.

10. Warning Notifications in the App

Enhanced Notifications: Personalized warning notifications in the app, informing users of disruptions, delays, or changes. Alternative routes and transportation modes are offered.

Innovative Application: AI predicts potential delays and suggest proactive measures, such as adjusting departure times or recommending less crowded routes.

11. GPS Navigation En Route

Comprehensive Navigation: GPS navigation within the app for turn-by-turn directions, real-time traffic updates, and estimated arrival times.

Innovative Application: GPS navigation with augmented reality (AR) overlays that guide users visually through their journey both inside and outside the hub.

12. Route Preference System

Tailored Routes: Users choose routes based on criteria like fastest, shortest, greenest, or most scenic.

Innovative Application: Machine learning learns user preferences over time and automatically suggest optimized routes for frequent journeys.

13. Vibrating Seats to Wake Up Passengers

Wake-Up Alerts: Vibrating seats on transport vehicles that gently wake passengers before their stop.

Innovative Application: This feature is integrated with the app, allowing passengers to customize vibration patterns and intensity for a personalized wake-up experience.

14. Comprehensive Parking and Storage Solutions

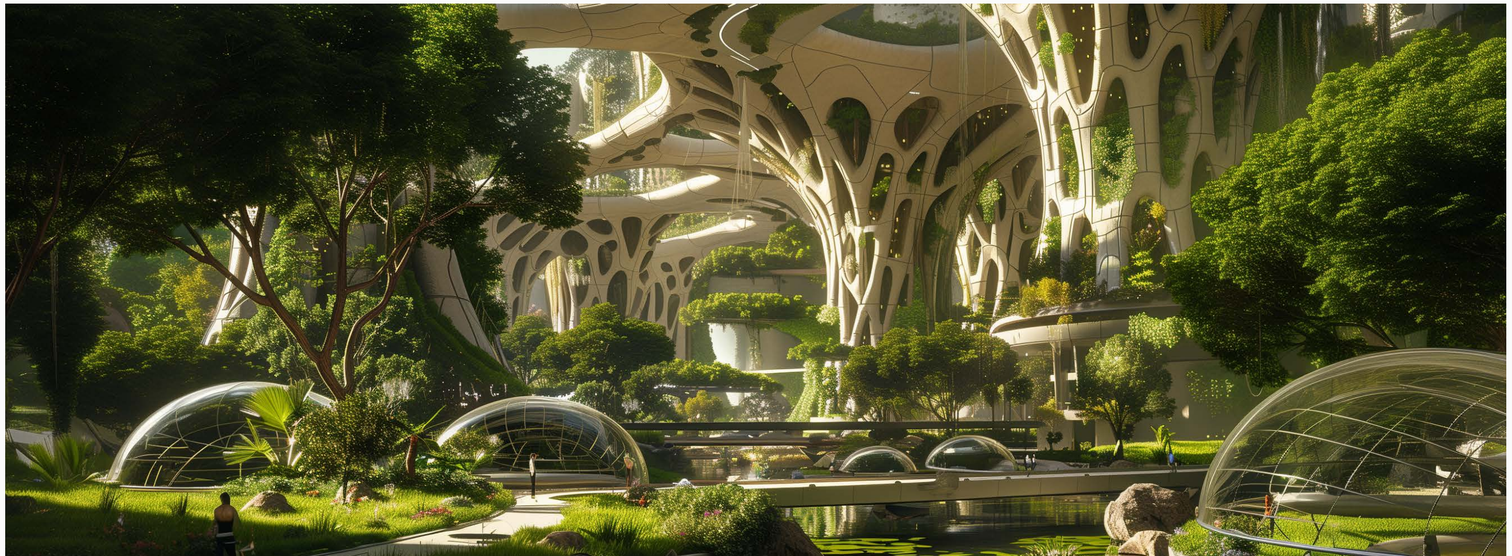
Multi-Modal Parking and Storage: Provide parking spaces for a variety of personal transport vehicles, including bicycles, skateboards, scooters, and electric steps.

Innovative Application: Implement automated storage solutions that secure and charge electric vehicles, integrating them with the hub's app for easy access and monitoring. The system includes electric bike charging stations and secure locking mechanisms for various vehicle types. Additionally, an automated car parking system will enhance user convenience, featuring a reservation system within the app that allows users to book parking spots in advance and track their car's location.

Enhanced Solutions for:

Efficiency & Operational Reliability

Ensuring the hub operates smoothly and reliably with integrated systems for real-time information, optimized passenger flow, and seamless ticketing and scheduling.



1. Single Ticket for Entire Journey

Unified Ticketing System: A single ticket that covers the entire journey across different transport modes within the hub, allowing passengers to switch seamlessly between buses, trains, trams, and other modes.

Innovative Application: A contactless payment system integrated with a mobile app that automatically calculates the best fare based on the journey, ensuring the most cost-effective travel option.

2. Real-Time Occupancy Information

Real-Time Seat Availability: Real-time information is displayed about available seats and standing room inside transport vehicles before passengers board.

Innovative Application: This information is integrated in the app, allowing passengers to choose the most comfortable carriage before boarding and enabling seat reservations in less crowded carriages.

3. Proactive Service Continuity

Backup Transportation: Replacement transportation modes are readily available in case of service cancellations or delays due to accidents or other disruptions.

Innovative Application: AI manages and deploys replacement vehicles dynamically, minimizing downtime and ensuring continuity.

4. Automated Underground Delivery System

Seamless Delivery: An underground delivery system for packages between hubs.

Innovative Application: An airport-style conveyor belt system with automated guided vehicles (AGVs) to transport packages quickly and securely through dedicated tunnels. Use RFID tags to track luggage and parcels in real-time, allowing passengers to monitor the location and status of their items through the hub's app.

5. Conveyor Belt to Nearest Pickup Point

Parcel Conveyor System: A conveyor belt system that transports parcels to the nearest pickup point within the hub.

Innovative Application: Smart lockers with conveyor belts for automated parcel sorting and delivery, notifying users when their parcels are ready for pickup.

6. Underground Parcel Storage in Lockers

Secure Storage: Underground storage facilities equipped with secure lockers for storing parcels.

Innovative Application: Temperature-controlled lockers for sensitive items and integrate them with the hub's app for easy access and notifications.

7. Streamlined Traffic Flow

Designated Pathways: Separate tunnels or pathways for different vehicle types and construct pedestrian bridges for safe and efficient pedestrian movement.

Innovative Application: Dynamic signage that changes based on real-time traffic conditions to guide pedestrians and vehicles, optimizing flow and reducing congestion.

8. Reversible Escalator & Continuous Lifts

Adaptive Vertical Mobility: Reversible escalators and continuous moving lifts that adjust direction based on traffic flow.

Innovative Application: AI predicts peak times and automatically switch escalator and lift directions to accommodate changing passenger volumes.

9. Efficient Boarding and Alighting

Boarding Indicators: Lights on platforms and vehicles indicate the side for boarding and alighting.

Innovative Application: A predictive boarding system that uses sensors to detect passenger flow and adjust door opening times and locations accordingly.

10. Stop Only When Necessary

Adaptive Stopping Patterns: Transport vehicles stop only when necessary, reducing travel times.

Innovative Application: AI predicts and adjust stopping patterns based on real-time passenger demand and occupancy levels.

11. Biometric and Facial Recognition Systems

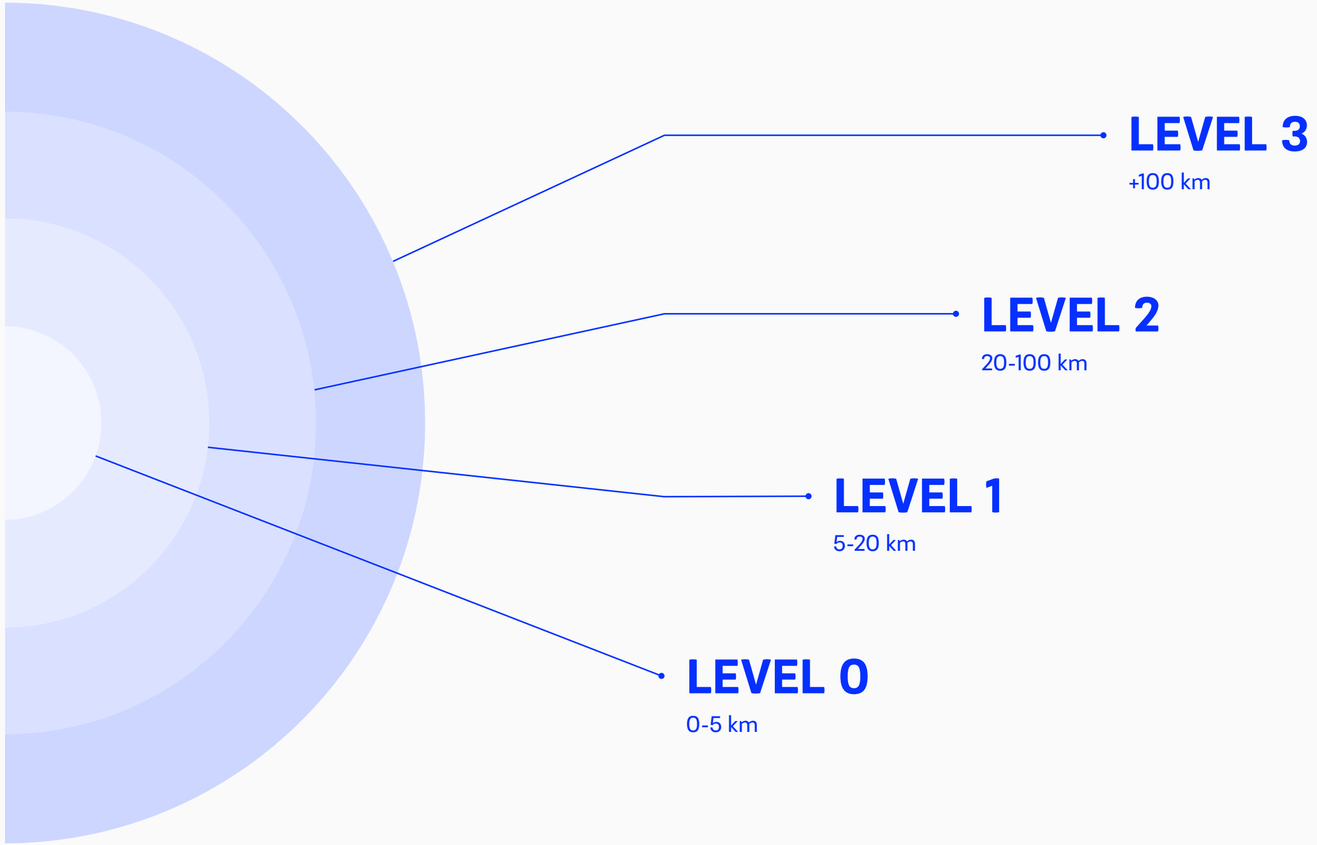
Biometric Systems for Ticketing and Boarding: Security is enhanced and passengers streamlined by using biometric systems for ticketing and boarding, ensuring quick and secure access.

Innovative Application: Facial recognition technology with automated ticket inspection processes using electronic scanners and sensors on transport vehicles. This system verifies tickets, streamlines the boarding process, and enhances security.

In depth:

Vertical Structure of the SHIFT Mobility Hub

The SHIFT Mobility Hub's vertical structure is meticulously designed to optimize the efficiency of transportation modes based on travel distances and includes dedicated facilities for parcel handling. By organizing services and amenities across multiple levels according to first/last-mile, short-distance, medium-distance, and long-distance transport needs, the hub ensures seamless connectivity and enhances the overall user experience for both people and parcels.



0

Ground Level: First/Last-Mile Transport
(0-5 km)

The ground level is dedicated to first/last-mile transport solutions, facilitating quick and convenient short-distance travel for both passengers and parcels:

* Shared Bikes and Scooters: Extensive docking stations and charging points for shared bikes and electric scooters, promoting sustainable transport options for short trips.
* Personal Mobility Devices: Areas for personal mobility devices such as Heelies, automatic golf carts, and skateboards, with secure storage and maintenance facilities.
* Ride-Hailing Zones: Designated pick-up and drop-off points for ride-hailing services, ensuring efficient and organized flow of traffic.
* Smart Kiosks: Information kiosks providing real-time updates on availability, routes, and payment options for all first/last-mile transport services.
* Pedestrian Access: Easy access to the hub's entrances and exits, with clear pathways connecting to nearby neighborhoods and facilities.
* Parcel Lockers: Secure lockers for parcel pick-up and drop-off, allowing for convenient last-mile delivery solutions.

1

Level 1: Short-Distance Transport
(5-20 km)

The first level focuses on short-distance transport options, enhancing connectivity within a broader urban area for both passengers and parcels:

* Autonomous Shuttles: Dedicated lanes and pick-up/drop-off zones for autonomous shuttles that provide efficient short-distance travel within the city.
* Bus Services: Platforms for city buses with real-time scheduling information and easy boarding processes.
* Car Sharing and Rentals: Facilities for car-sharing and rental services, offering flexible short-distance travel options for users.
* Bike Sharing Hubs: Centralized hubs for bike sharing, equipped with maintenance stations and secure parking.
* Charging Stations: Ample charging points for electric vehicles, supporting the transition to greener transport options.
* Parcel Sorting Stations: Automated parcel sorting and handling facilities to manage the distribution of packages efficiently within the city.

2

Level 3: Long-Distance Transport
(100 km and above)

The third level is dedicated to long-distance transport, ensuring seamless connectivity for intercity and international travel for both passengers and parcels:

* High-Speed Train Platforms: Dedicated platforms for high-speed trains, providing efficient and comfortable long-distance travel options.
* Long-Distance Bus Terminals: Terminals for long-distance buses, equipped with advanced scheduling systems and passenger amenities.
* Flight Check-In and Transfer Zones: Areas for passengers to check-in for flights or transfer between long-distance travel modes.
* Lounges and Amenities: Premium lounges offering comfortable seating, refreshments, and workspaces for long-distance travelers.
* International Transport Links: Direct connections to airports or other international transport hubs, ensuring smooth transfers for global travelers.
* Parcel Transfer Hubs: Specialized hubs for transferring parcels between different long-distance transport modes, equipped with secure storage and handling facilities.

3

Level 2: Medium-Distance Transport
(20-100 km)

The second level is designed for medium-distance transport, catering to suburban and regional travel needs for both passengers and parcels:

* Train Platforms: Elevated platforms for regional trains, facilitating efficient boarding and alighting with clear signage and real-time information displays.
* Autonomous Vehicle Integration: Specific zones where autonomous vehicles can pick up and drop off passengers for medium-distance journeys.
* Park and Ride Facilities: Secure parking areas where commuters can park their cars and transfer to regional transport services.
* Waiting Areas: Comfortable waiting lounges with amenities such as Wi-Fi, charging stations, and food and beverage options.
* Customer Service Desks: Centralized help desks to assist passengers with travel queries, ticketing, and other needs.
* Parcel Distribution Centers: Facilities for the distribution and temporary storage of parcels, ensuring smooth transfers and efficient handling for medium-distance deliveries.

Integration and Future-Proofing

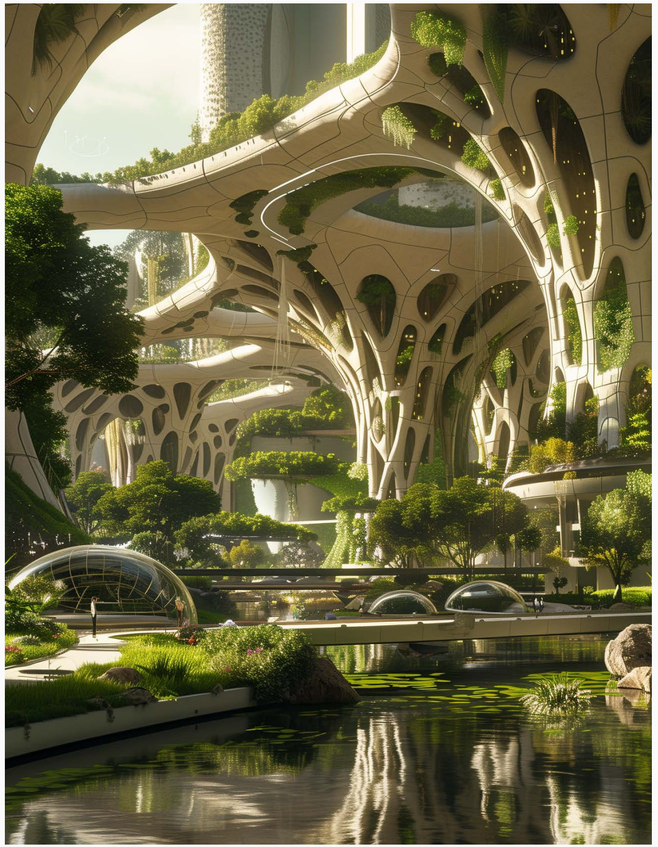
The vertical structure of the SHIFT Mobility Hub is designed with adaptability and future growth in mind. Modular design elements and movable partitions allow for easy reconfiguration of spaces to accommodate new technologies and evolving user needs. This flexibility ensures that the hub can continue to serve as a dynamic and efficient transportation center well into the future.

By organizing services and amenities across multiple levels based on transportation distances, the SHIFT Mobility Hub maximizes space utilization, enhances user experience, and promotes seamless integration between various transport modes. This vertical structure not only supports current needs but also anticipates future growth and technological advancements, positioning the hub as a leader in urban mobility for both people and parcels.

Enhanced Solutions for:

Sustainability & Eco-Friendliness

Incorporating sustainable practices and renewable energy sources to minimize the environmental impact and promote long-term ecological health.



1. Community-Driven Logistics

Volunteer Engagement: Volunteers collect and deliver packages during their routine visits to the hub.

Innovative Application: A community rewards program that offers incentives for participating in sustainable logistics and other eco-friendly activities.

2. Comprehensive Recycling Infrastructure

Recycling Programs: A comprehensive recycling infrastructure with clearly marked bins for various materials.

Innovative Application: Smart recycling bins that use sensors to detect and sort recyclable materials automatically, providing real-time data on recycling rates.

3. Carbon Offsetting Programs

Greenhouse Gas Mitigation: Carbon offsetting programs to achieve or exceed carbon neutrality.

Innovative Application: A carbon credits marketplace within the hub's app, allowing users to invest in local reforestation projects and renewable energy initiatives.

4. Solar Leafs

Solar Integration: Amenities such as escalators and lighting are powered using solar energy, with solar panels shaped as leafs installed on top of the hub.

Innovative Application: Building-integrated photovoltaics (BIPV) where solar panels are part of the building materials, such as solar windows and facades.

5. Optimized Energy Usage

Energy-Efficient Systems: LED lighting, motion sensors, and smart controls to optimize energy usage and reduce electricity consumption.

Innovative Application: AI-driven energy management systems that learn and adapt to usage patterns to optimize energy consumption dynamically.

6. Human-Powered Escalators and Lifts

Kinetic Energy Systems: Human-powered escalators and lifts that use kinetic energy generated by user movement.

Innovative Application: These systems are combined with fitness tracking apps that reward users for the energy they generate, promoting physical activity.

7. Urban Green Spaces and Air Quality Management

Vertical Gardens and Green Roofs: Vertical gardens and green roofs integrated into the hub's architecture to enhance aesthetics, improve air quality, and support biodiversity.

Innovative Application: Hydroponic and aeroponic systems in green spaces to maximize plant growth and efficiency, creating lush green areas with minimal water usage. Additionally, green walls and urban forests act as natural air filters, improving air quality and providing pleasant outdoor spaces for users.

8. Nature-Inspired Design

Biophilic Principles: Natural lighting, views of green spaces, and use of natural materials to create a healthier environment.

Innovative Application: Dynamic facades that adjust to environmental conditions, providing optimal natural lighting and reducing energy consumption.

9. Free Public Transportation

Eco-Friendly Transport: Free public transportation services within the hub reduce traffic congestion and emissions.

Innovative Application: A fleet of autonomous electric shuttles powered by renewable energy, providing efficient and sustainable transit options.

Enhanced Solutions for:

Technological Integration & Innovation

Leveraging cutting-edge technologies like AI, IoT, and autonomous systems to enhance the functionality and user experience of the mobility hub.

1. AR Wayfinding with Live View

Real-Time Navigation: Augmented reality (AR) wayfinding similar to Google's Live View, providing real-time navigation guidance overlaid on the user's smartphone camera view.

Innovative Application: AR wayfinding with personalized suggestions based on user profiles, offering tailored routes and points of interest within the hub.

2. Dynamic Electronic Signage

Personalized Display Boards: Electronic display boards that emit different frequencies to cater to specific user profiles, similar to personalized advertising in sports stadiums.

Innovative Application: AI analyzes user data and preferences, dynamically adjusting the displayed information to provide relevant and timely updates.

3. Assistance Robots

Robotic Helpers: Robots equipped to assist users with tasks such as carrying luggage, providing information, and guiding them to their destinations.

Innovative Application: Robots are equipped with AI-driven language translation capabilities to assist international travelers more effectively.

4. Automated Self-Cleaning Hygiene System

Self-Cleaning Benches and Floors: An automated self-cleaning system for benches and floors, utilizing UV-C light and sanitizing sprays during low-traffic periods to ensure continuous disinfection.

Innovative Application: Cleaning robots equipped with UV-C light sterilization to autonomously maintain hygiene in public toilets and other areas, operating during off-peak times.

5. Automated Trains

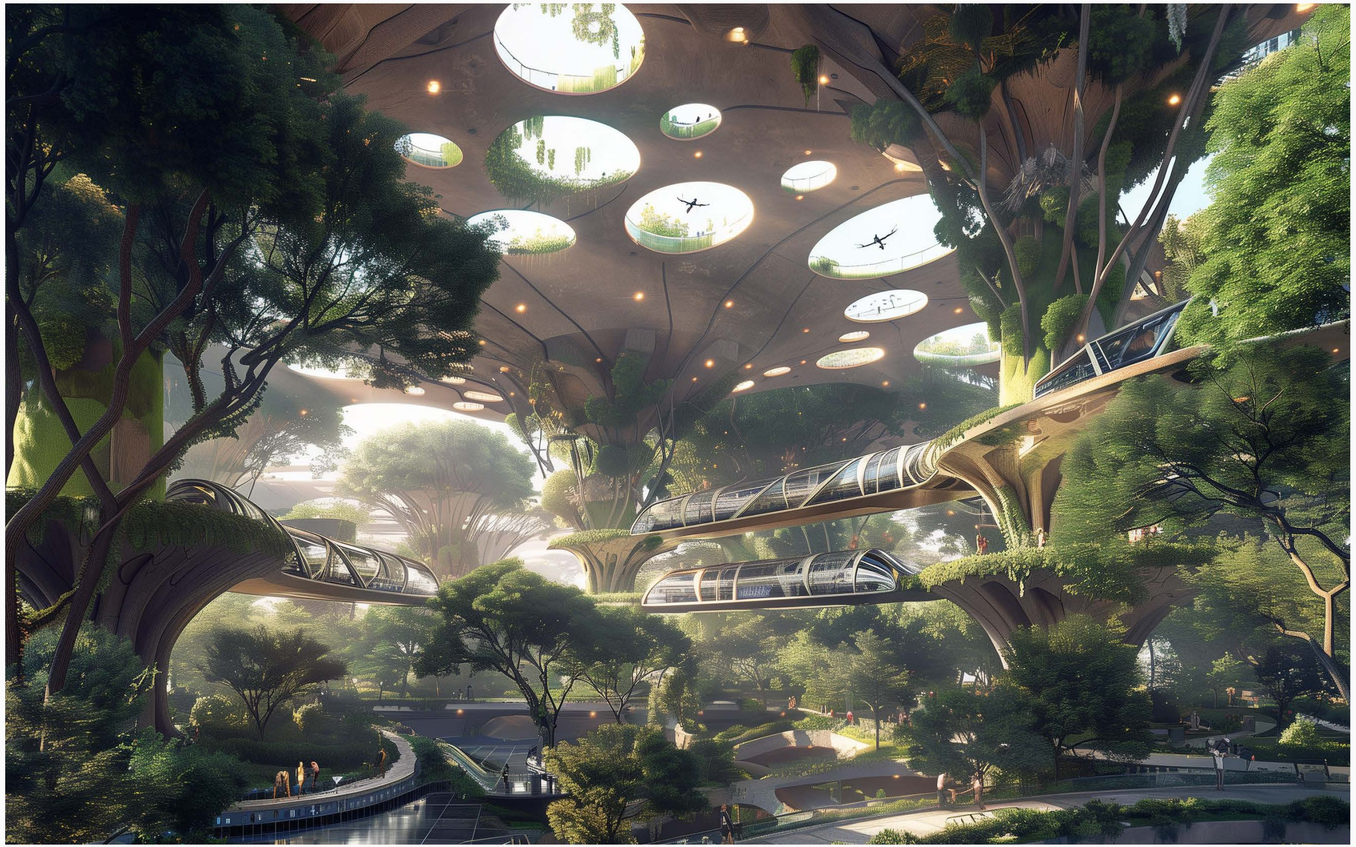
Driverless Trains: Fully automated train systems that operate without human intervention, ensuring precise scheduling, safe operations, and efficient transport services within the hub.

Innovative Application: AI-driven predictive maintenance for the trains to prevent breakdowns and optimize performance.

6. Biometric Authentication

Enhanced Security: Biometric authentication methods such as fingerprints or facial recognition for secure access to facilities, vehicles, and services within the hub.

Innovative Application: A central database that allows seamless access across multiple locations within the hub.



7. Vertical Construction and Design

Space Optimization: Vertical building techniques and designs to optimize space and infrastructure within the hub.

Innovative Application: Modular construction methods that allow for easy expansion and reconfiguration of spaces as needed.

8. Delivery Drones with Zipline Technology

Efficient Logistics: Delivery drones equipped with zipline technology transport parcels swiftly and safely between different parts of the hub.

Innovative Application: A real-time tracking system that allows users to monitor their parcels throughout the delivery process.

9. Optimized Scheduling

Smart Synchronization: Systems automatically synchronize train schedules and operations, optimizing traffic flow and reducing waiting times for passengers transferring between different modes of transport.

Innovative Application: AI predicts and adjusts schedules dynamically based on real-time data and passenger demand.

In depth:

Integration of Autonomous Vehicles and Micro-Mobility in the SHIFT Mobility Hub

The SHIFT Mobility Hub is designed to seamlessly integrate autonomous vehicles (AVs) and micro-mobility solutions, transforming urban mobility with advanced technology and innovative infrastructure. This integration ensures efficient, safe, and sustainable transportation for all users.

Autonomous Vehicles (AVs) in the Mobility Hub

V2X Communication

AVs within the SHIFT Mobility Hub utilize Vehicle-to-Everything (V2X) communication technology, allowing them to interact with various devices and infrastructure elements. Vehicle-to-Infrastructure (V2I) communication lets AVs sync with traffic lights, road sensors, and other hub infrastructure, optimizing traffic flow and responding to real-time conditions. For example, traffic lights adjust their timing based on the number of AVs approaching an intersection, reducing waiting times and boosting efficiency.

Vehicle-to-Vehicle (V2V) communication enables AVs to share information about their movements and intentions, such as speed, direction, and lane changes. This prevents collisions, improves coordination, and maintains smooth traffic flow. Additionally, Vehicle-to-Pedestrian (V2P) and Vehicle-to-IoT (V2X) communication allow AVs to interact with pedestrians' smartphones, IoT devices, and cameras, ensuring safety and facilitating seamless navigation. AVs detect pedestrians using crosswalks or cyclists in designated bike lanes, adjusting their speed and trajectory to avoid accidents. IoT devices embedded in the infrastructure provide AVs with real-time data on road conditions, weather, and potential hazards.

The V2X communication system relies on various sensors and data sources, including LiDAR, radar, ultrasonic sensors, GPS, and high-definition cameras. These devices offer a comprehensive view of the environment, enabling AVs to make informed decisions and navigate safely within the hub.

Dedicated Lanes and Zones

The hub features dedicated lanes and zones for different types of transport, enhancing safety and efficiency. Specific lanes for AVs allow them to operate without interference from traditional vehicles, while designated paths for bicycles, electric scooters, and pedestrians reduce conflicts and ensure a safe environment for all users. By segregating these different modes of transportation, the mobility hub minimizes the risk of accidents and improves overall traffic flow.

Integration of Autonomous Vehicles

The integration of AVs within the SHIFT Mobility Hub revolutionizes how people interact with transportation. Users interact with AVs through intuitive mobile apps and smart kiosks located throughout the hub. They can request an AV for their journey, receive real-time updates on vehicle location and estimated arrival times, and customize their travel preferences, such as temperature settings and preferred routes. AVs seamlessly integrate with other transportation modes within the hub, allowing users to transition easily from an AV to a shared bike or electric scooter for the last mile of their journey. The hub's infrastructure supports easy transfers between different modes, with clearly marked pathways, docking stations, and charging points.

The hub prioritizes safety and accessibility for all users. AVs are equipped with advanced safety features, such as emergency braking and collision avoidance systems, to protect passengers and pedestrians. Additionally, the hub ensures that AVs are accessible to people with disabilities, providing features such as wheelchair ramps and audio-visual aids. The AV fleet is managed through a sophisticated real-time system that optimizes routes and adapts to changing conditions. This system considers traffic patterns, user demand, and external factors such as weather to ensure efficient and reliable service. During peak hours, more AVs are deployed to high-demand areas to reduce waiting times.

Integration of Micro-Mobility Solutions

The SHIFT Mobility Hub supports a diverse range of micro-mobility options, catering to different user preferences and travel needs. These options include shared bikes and electric scooters, accessible through the hub's shared mobility services and equipped with secure parking and charging stations. Additionally, areas within the hub are designated for personal (shared) mobility devices such as Heelies, automatic golf carts, and skateboards, enhancing flexibility and user choice.

Users can easily access these micro-mobility solutions through a combination of mobile apps, smart kiosks, and designated pickup points. The mobile app allows users to locate, unlock, and pay for shared bikes and scooters. Smart kiosks positioned throughout the hub provide real-time information on availability, usage instructions, and the location of the nearest docking stations. These kiosks also offer an intuitive interface for users who prefer not to use a mobile app.

The hub promotes sustainable and flexible transportation through shared mobility services. Shared bike services tailored for daily commuting are provided, complete with facilities like maintenance support and secure parking. Moreover, designated parking areas on the hub's perimeter are coupled with shared mobility options like electric scooters and bikes for convenient last-mile connectivity. This approach encourages the use of eco-friendly transport modes and reduces congestion within the hub.

To optimize availability and efficiency, the hub implements a dynamic allocation system that adjusts the number of available micro-mobility options based on real-time demand and usage patterns. This system ensures that users always have access to the transportation modes they need, reducing wait times and enhancing the overall user experience. By dynamically allocating resources, the hub maintains a balance between supply and demand, ensuring efficient use of micro-mobility solutions.

The hub's infrastructure is designed with adaptability in mind, using modular design elements and movable partitions to reconfigure spaces for various purposes as needed. This flexibility allows the hub to accommodate future technological advancements and evolving user needs. For example, spaces can be easily transformed to host events, exhibitions, or temporary retail outlets, maximizing the utility of the infrastructure and keeping the hub relevant and useful over time.

By integrating autonomous vehicles and micro-mobility solutions, the SHIFT Mobility Hub creates a versatile, efficient, and sustainable transportation network. This integration enhances user experience, reduces environmental impact, and promotes the adoption of innovative transport technologies, positioning the hub as a leader in urban mobility.

Enhanced Solutions for:

Versatility & Flexibility

Designing spaces and services to be adaptable and scalable, accommodating various transportation modes and future developments.

1. Multi-Modal Transport Options

Wide Range of Options: Transportation options such as bikes, scooters, moving walkways, cargo bikes, and autonomous shuttles within the hub.

Innovative Application: A dynamic allocation system that adjusts the number of available transport modes based on real-time demand and usage patterns.

2. Mobility as a Service (MaaS) App

Comprehensive Integration: A MaaS app that integrates all transportation services, allowing users to plan, book, and pay for various modes of transport including bikes, scooters, autonomous shuttles, buses, and more.

Innovative Application: Real-time data on availability, traffic conditions, and environmental impact, providing users with the most efficient and eco-friendly route options.

3. Outer Ring Parking with Shared Mobility

Last-Mile Connectivity: Designate parking areas on the outer perimeter of the hub for private vehicles, coupled with shared mobility options like electric scooters and bikes for last-mile connectivity.

Innovative Application: A seamless transition system where users can easily switch from private vehicles to shared mobility options, integrating ticketing and payment through the MaaS app.

4. Flexible Use of Spaces

Adaptable Spaces: Flexible spaces within the hub that can be easily adapted for events, exhibitions, or temporary retail spaces.

Innovative Application: Modular design elements and movable partitions to quickly reconfigure spaces as needed, maximizing utility and efficiency, including interactive community spaces for local events, workshops, and pop-up markets, fostering community engagement and supporting local businesses.

5. Integration of Future Technologies

Future-Proof Infrastructure: Infrastructure and design layouts that anticipate future technological advancements, allowing for seamless integration of new transport technologies like flying taxis or hyperloop systems.

Innovative Application: Flexible power and data grids that can easily accommodate new technologies, ensuring the hub remains at the cutting edge of innovation.

Enhanced Solutions for:

User Engagement & Responsiveness

Actively engaging with users through feedback systems, customer service, and adaptive services to continuously improve the hub based on user needs and preferences.

1. Surge Pricing Based on Demand and Time

Demand-Responsive Pricing: A surge pricing mechanism where transportation fares adjust according to demand and peak times, encouraging travel flexibility and managing congestion.

Innovative Application: AI predicts peak times and dynamically adjusts prices, offering discounts for off-peak travel and incentives for flexible travel times.

2. Discounts for Frequent Users

Loyalty Rewards: Discounts or loyalty rewards for frequent users of the hub's transportation services to promote regular usage and enhance customer retention.

Innovative Application: A tiered loyalty program with personalized rewards based on travel frequency, such as free rides, priority boarding, or exclusive access to amenities.

3. Real-Time Feedback Collection

Instant Feedback Mechanisms: Real-time feedback collection through mobile apps or digital kiosks at strategic locations within the hub.

Innovative Application: Real-time feedback with a dashboard for hub management, enabling immediate action on common issues and tracking improvements over time.

4. User-Centric Service Improvements

Continuous Updates: Updated services based on aggregated feedback and travel patterns, adjusting schedules, optimizing routes, and enhancing amenities.

Innovative Application: A continuous improvement loop where user feedback directly informs service adjustments, with visible changes communicated back to users to show responsiveness.

5. Personalized Travel Recommendations

Algorithm-Driven Recommendations: Algorithms that provide personalized travel recommendations based on travel history, preferences, and real-time conditions within the hub.

Innovative Application: Real-time route optimization and travel tips tailored to individual users.

Our Personas' Lifes Utilizing the Mobility Hub

Their Original Struggles

Emily Harper, a dynamic marketing manager from Berlin, faced numerous challenges with the city's public transport system. Inconsistent schedules led to delays and missed connections, overcrowded trains and buses made her commute uncomfortable, and cleanliness was a constant issue. Additionally, limited coverage in some areas hindered her ability to balance work and leisure effectively. Luca Romano, a talented graphic designer in Milan, relied on public transport for his daily activities but struggled with accessibility. Some stations and vehicles lacked proper features for wheelchair users, frequent elevator malfunctions, and crowded spaces during peak hours made his travels difficult, and inconsistent assistance from transport staff added to his frustrations. Alex Morgan, a freelance writer and content creator in Amsterdam, battled anxiety triggered by overcrowding and high noise levels in public transport. The lack of quiet spaces made it hard for Alex to find a calming environment during travel, and inconsistent real-time updates increased their anxiety about delays. Joseph

Okoye, a retired teacher in Brussels, faced accessibility issues with the public transport system. Inconsistent schedules and overcrowded vehicles were common problems, making his shopping trips and social outings less enjoyable. Sophia Martin, a customer service representative in Barcelona, encountered frequent complaints about the same issues, which challenged her ability to provide exceptional service. Even the high-tech ParcelBox 3000 struggled with logistical challenges, facing delays, unreliable tracking updates, and occasional mishandling of packages.

A Big Sigh of Relief by Our Personas

The introduction of the futuristic mobility hub revolutionized the transport experience for everyone. In Berlin, Emily Harper's commute became reliable and comfortable, with AI-driven predictive analytics ensuring precise scheduling, smart crowd management preventing overcrowding, and automated cleaning bots maintaining cleanliness. Expanded transport routes offered better coverage, making it easy for her to reach any part of the city. Luca Romano in Milan found his commute seamless with comprehensive accessibility features, reliable schedules, and reduced congestion, all supported by well-trained staff. Alex Morgan in Amsterdam benefited from measures to reduce overcrowding and designated quiet areas, creating a calming environment, while reliable real-time updates managed their anxiety. In Brussels,

Joseph Okoye experienced smooth and enjoyable travels with comprehensive accessibility features, AI-driven scheduling, and smart crowd management systems. Reliable real-time updates maintained his independence and punctuality. Sophia Martin in Barcelona thrived in her role, with advanced systems ensuring consistent schedules, less crowded vehicles, and comprehensive accessibility features, allowing her to provide exceptional service. The ParcelBox 3000 achieved greater efficiency with reliable scheduling, real-time tracking, and advanced handling systems, meeting all delivery expectations seamlessly. The futuristic mobility hub not only addressed previous frustrations but also enhanced the overall quality of life for all users, making daily commutes and tasks more efficient, comfortable, and enjoyable.

Seamlessly switching between U-Bahn and shared bikes keeps my schedule flexible and reliable. I no longer worry about delays or overcrowding, and the cleanliness is impeccable. My journey to work has never been smoother.

The reliable accessibility features and real-time updates make my trip to the office stress-free. The well-trained staff are always ready to assist, and the ease and independence they provide have made my daily journey truly enjoyable.

Emma Harper

Marketing Manager at a tech startup in **Berlin** in **Germany**, 32 years old

Wants to use the mobility hub to get from her home to her work

Journey step	Emily Harper, a dynamic marketing manager from Berlin, arrives at the SHIFT Mobility Hub early in the morning. As she steps out of the U-Bahn, she immediately notices the hub's sleek, modern design and user-friendly layout. The real-time occupancy information displayed on digital screens guides her to a less crowded carriage for her onward journey.	Emily uses the hub's personalized app, which integrates AI to offer customized navigation and alerts. The app guides her through the hub, using augmented reality (AR) wayfinding tools that overlay visual directions on her smartphone screen. As she follows the AR arrows, she appreciates how easy it is to navigate through the various zones of the hub.	Walking towards her transfer point, Emily passes by the smart self-cleaning benches and floors, which use UV-C light and sanitizing sprays to maintain hygiene. She also notices the automated hygiene maintenance robots efficiently cleaning the public toilets and other areas, ensuring a consistently clean environment.	Emily decides to use a shared electric bike for the last leg of her journey to work. She heads to the bike-sharing station, where automated storage solutions secure and charge the bikes. The app informs her about available bikes and allows her to unlock one with a quick tap. She appreciates the seamless transition from the U-Bahn to the bike, facilitated by the integrated Mobility as a Service (MaaS) app.	As Emily rides through the hub, she feels secure knowing that the area is monitored by high-definition surveillance cameras, with AI detecting any unusual activity. The presence of well-lit paths with motion sensor lighting and clear audio announcements in multiple languages further enhances her sense of safety.	After reaching her workplace, Emily remembers that she left a package to be delivered. She uses the hub's app to track her package, which is being transported through the automated underground delivery system using AGVs and an airport-style conveyor belt. The app provides real-time updates, reassuring her that her package will arrive on time.	At the end of the day, Emily heads back to the mobility hub to return her shared bike. The app guides her to the nearest drop-off point, and she seamlessly transitions to the S-Bahn for her journey home. As she boards the train, she is pleased to find reserved seating options and appreciates the hub's commitment to comfort and convenience.
Feeling	Excited	Relieved	Impressed	Empowered	Safe	Satisfied	Content
Thoughts	"I love how modern and efficient this place looks. It's a great start to my day."	"The AR wayfinding makes it so easy to navigate. No more getting lost in a crowd."	"These self-cleaning benches and floors are such a great idea. Everything feels so clean and hygienic."	"The bike-sharing station makes my commute so flexible and fun. I love having options."	"With all these cameras and well-lit paths, I feel secure no matter what time I travel."	"The real-time updates keep me on track and reduce any stress about being late."	"What a smooth day. Everything worked perfectly, from my bike ride to catching the S-Bahn home."

Luca Romano

Graphic Designer at an advertising agency in **Milan** in **Italy**, 28 years old

Wants to use the mobility hub to get from his home to his agency

Journey step	Luca Romano, a graphic designer from Milan, arrives at the SHIFT Mobility Hub early in the morning. As he wheels into the hub, he immediately notices the well-designed ramps and wide, unobstructed pathways that facilitate smooth navigation. The real-time occupancy information displayed on digital screens guides him to the metro platform with the least crowd.	Luca uses the hub's personalized app, which offers customized navigation and alerts. The app, integrated with Bluetooth beacons, provides him with real-time audio instructions, guiding him to the elevators. These smart elevators are equipped with clear audio announcements, Braille buttons, and visual displays, ensuring they are fully accessible and operational.	Luca reaches the metro platform where accessible transport options await. The metro has level boarding for easy wheelchair access and adaptive seating that adjusts to accommodate his wheelchair comfortably. The hub's app provides real-time updates on train schedules and the availability of accessible features, ensuring Luca can board without hassle.	On his way to the metro platform, Luca stops by an information kiosk. The AI-powered kiosk offers real-time updates, maps, and multilingual assistance, making it easier for Luca to find his way. He appreciates the clear and easy-to-understand communication provided by universal symbols and tactile maps, which help him navigate the hub independently.	As Luca boards the metro, he notices the reserved seating area for wheelchair users is clearly marked and unoccupied. The adaptive seating in the metro adjusts to his needs, providing a comfortable and secure space for his wheelchair. The real-time occupancy information displayed on digital screens ensures that Luca can find a less crowded carriage, enhancing his travel experience.	During his journey, Luca decides to use the hub's personalized app to check the availability of accessible restrooms. The app guides him to the nearest smart toilet, which uses sensors to automatically clean and sanitize after each use. Luca appreciates the high standards of hygiene and the availability of accessible facilities throughout the hub.	At the end of the day, Luca heads back to the mobility hub to catch a bus home. The app guides him to the nearest accessible bus stop, where the bus features leveled boarding and adaptive seating for wheelchair users. The real-time updates and reliable services ensure a smooth and comfortable journey for Luca, enhancing his overall travel experience.
Feeling	Empowered	Reassured	Comfortable	Supported	Relaxed	Satisfied	Content
Thoughts	"These ramps and pathways make it so easy to get around. I feel so independent."	"The app's audio instructions are so helpful. I never have to worry about getting lost."	"The level boarding and adaptive seating make traveling so much easier. This metro is perfect for me."	"These information kiosks are great. The tactile maps and clear symbols make everything so straightforward."	"It's so nice to find an unoccupied reserved seating area. This journey is going to be smooth."	"The smart toilet is a lifesaver. It's so clean and accessible. They've really thought of everything."	"What a pleasant day. The bus home is just as accessible and comfortable as everything else here."

“he quieter spaces and reliable real-time updates mean I can journey to my favorite writing spots without anxiety triggers. The smart crowd management ensures a calm and peaceful commute every day.”

“Navigating to my favorite shopping districts and cultural sites is now effortless and comfortable. It’s a fantastic asset for seniors like me who value accessibility and reliability in public transport.”

Alex Morgan

Freelance Writer Creator in **Amsterdam** in **the Netherlands,** 26 years old

Wants to use the hub to get from their home to their favourite park

Journey step	Alex Morgan, a freelance writer from Amsterdam, arrives at the SHIFT Mobility Hub mid-morning to avoid the peak hour rush. The hub's dynamic crowd management system, using timed entry and real-time occupancy displays, ensures that Alex can find a less crowded entry point.	Alex uses the hub's personalized app, which offers customized navigation and alerts. Additionally, helpful stewards are stationed throughout the hub to assist passengers. These stewards guide Alex through quieter pathways to avoid crowded areas. The adaptive lighting system, which adjusts based on occupancy and time of day, creates a calm and soothing environment.	As Alex navigates through the hub, they appreciate the designated quiet rooms equipped with comfortable seating, soft lighting, and soundproofing. These spaces allow Alex to take a moment to relax and manage their anxiety before continuing their journey. The hub's ambient soundscapes and subtle scent diffusers in waiting areas further enhance the calming atmosphere.	When Alex reaches the platform for their tram, they notice the dynamic electronic signage displaying real-time information about occupancy levels in each carriage. This helps Alex choose a less crowded and quieter carriage. The tram itself features designated quiet zones where noise levels are minimized, providing a more comfortable travel environment.	During their journey, Alex uses the app to access real-time updates on transport schedules and any potential delays. The app's reliable information helps reduce their anxiety about being late. Alex also notices that the transport staff are well-trained and aware of mental health challenges, providing discreet and understanding assistance when needed.	In the evening, Alex decides to use one of the shared electric bikes for the last leg of their journey. The hub's automated storage solutions secure and charge the bikes, making them readily available. The transition from tram to bike is seamless, facilitated by the integrated Mobility as a Service (MaaS) app, which also tracks their eco-friendly travel and offers rewards.	At the end of the day, Alex heads back to the mobility hub to catch a train home. The app guides them to the platform with the least crowd and real-time information on train schedules. The adaptive seating in the train offers a comfortable space for Alex, with the quiet zones ensuring a peaceful journey back to their apartment.
Feeling	Relieved	Calm	Relaxed	Comfortable	Reassured	Empowered	Content
Thoughts	"Avoiding the peak hour rush makes such a difference. It's so much quieter now."	"The stewards here are so helpful. They always guide me to the quietest paths."	"These quiet rooms are a lifesaver. It's nice to take a moment and just breathe."	"Finding a quiet zone in the tram really helps. I can travel without feeling overwhelmed."	"The real-time updates are accurate and help keep my anxiety in check. The staff here really understand mental health challenges."	"Switching from tram to electric bike is so smooth. The MaaS app makes everything so convenient."	"What a peaceful day. The adaptive seating and quiet zones make my commute back home so relaxing."

Joseph Okoye

Retired Teacher in **Brussels** in **Belgium**, 65 years old

Wants to use the hub to get from his home to his favourite shops

Journey step	Joseph Okoye, a retired teacher from Brussels, arrives at the SHIFT Mobility Hub mid-morning, after enjoying a leisurely breakfast at home. As he approaches the hub, he notices the wide, gently sloping ramps that lead him smoothly to the entrance. The well-marked pathways and clear signage guide him effortlessly towards the metro platform.	Upon entering the hub, Joseph follows the clear wayfinding signs and markings that direct him to the escalators. These smart escalators adjust direction based on traffic flow, making his journey to the metro level smooth and efficient.	Joseph makes his way to the platform where he finds clearly marked priority seating areas for seniors and those with mobility needs. He appreciates the under-seat luggage storage, which allows him to stow his shopping bags conveniently. The train arrives on time, and he boards with ease, placing his bags in the designated storage area. The priority seating is comfortable and located close to the doors, making his commute stress-free.	Later, Joseph decides to visit a cultural event at a nearby venue. He disembarks at a well-maintained station where the crowd management system ensures that the area is not overcrowded. Clear, multilingual announcements keep him informed about the next steps in his journey.	After the event, Joseph heads to his favorite shopping district. The hub provides easy access to shared mobility options like electric scooters and bikes, but he opts for the bus. He finds the bus stop equipped with comfortable seating and a digital display showing real-time updates on bus arrivals, ensuring he doesn't have to wait long.	Throughout his day, Joseph encounters several interactive digital displays and kiosks designed for user feedback. While he doesn't use the app, he appreciates these easily accessible points where he can share his experiences and suggestions. The hub's commitment to user engagement ensures that his feedback is valued and considered for future improvements.	In the evening, Joseph returns to the mobility hub to catch a tram back to his apartment. The tram arrives promptly, and the journey is comfortable with ample space and priority seating. The real-time updates and reliable schedules help him plan his day without the stress of unexpected delays.
Feeling	Content	Reassured	Comfortable	Enthusiastic	Relaxed	Appreciated	Satisfied
Thoughts	"These wide ramps make it so easy to get around. It's going to be a smooth start to my day."	"The wayfinding signs are so clear. I can get to the elevators without any trouble."	"The luggage storage is perfect for my shopping bags. It makes my commute so much easier."	"The crowd management system works wonders. It's nice not having to deal with a crowd."	"The bus stop has comfortable seating and real-time updates. I won't have to wait long."	"These feedback kiosks are a great idea. It's nice to know my opinions are valued."	"The tram is right on time and the priority seating makes the ride home comfortable."

Technology makes everything so efficient and user-friendly. Seeing how our innovations improve people's daily journeys is incredibly rewarding. I love being part of a team that's shaping the future of urban transport.

The futuristic mobility hub in Berlin ensures that every delivery is quick, secure, and efficient. From the logistics hub to Emily Harper's doorstep, the journey is smooth and hassle-free, making missed deliveries and package theft a thing of the past.

Sophia Martin

Mobility Hub Manager in **Barcelona** in **Spain** 50 years old

Wants to use the mobility hub to get from her work back home

Journey step	Sophia Martin, a dedicated mobility hub coordinator from London, arrives at the SHIFT Mobility Hub early in the morning. She steps out of her overground train and is immediately impressed by the clear and comprehensive wayfinding signs that guide her through the bustling hub.	Sophia follows the intuitive wayfinding signage and uses the reversible escalators to reach the metro level. These escalators adjust direction based on traffic flow, ensuring efficient vertical mobility even during peak hours. As she navigates through the hub, she notices the dynamic crowd management system that uses real-time data to prevent overcrowding.	As part of her role, Sophia decides to inspect the various services and facilities offered by the hub. She visits a first aid station, which is staffed by healthcare professionals and equipped with automated external defibrillators (AEDs). She also takes note of the telemedicine kiosks that allow users to consult with doctors remotely for non-emergency health concerns, ensuring comprehensive medical support within the hub.	Sophia makes a point to evaluate the hub's accessibility features. She is impressed by the level boarding on metros and buses, adaptive seating that can adjust to different needs, and the accessible toilets equipped with sensors for automatic cleaning. These comprehensive accessibility features ensure that all users, including those with mobility issues, can navigate the hub with ease.	Later in the day, Sophia attends a community workshop held in one of the hub's flexible spaces. The modular design elements and movable partitions allow the space to be easily adapted for various events. This interaction with community members provides valuable feedback that Sophia uses to further improve the hub's services.	After her work inspection, Sophia takes a moment to relax in one of the hub's quiet rooms. These rooms are equipped with comfortable seating, soft lighting, and soundproofing, providing a peaceful environment away from the hustle and bustle of the hub. She also appreciates the smart glass that can switch between transparent and opaque, offering privacy when needed.	In the evening, Sophia heads back to the mobility hub to catch a bus home. She appreciates the clear real-time updates provided by the digital displays at the bus stop, ensuring she knows exactly when her bus will arrive. The bus itself is well-maintained, less crowded, and equipped with priority seating, making her journey home comfortable and stress-free.
Feeling	Impressed	Efficiënt	Thorough	Impressed	Engaged	Relaxed	Satisfied
Thoughts	"The wayfinding signs are so clear and comprehensive. This is going to be a breeze."	"These reversible escalators are brilliant. They really help manage the flow of people."	"The first aid stations are well-equipped, and the telemedicine kiosks are a fantastic addition."	"The level boarding and adaptive seating are fantastic. This hub is truly accessible for everyone."	"The flexibility of these community spaces is wonderful. They really bring people together."	"The quiet rooms are a perfect retreat. I can recharge before heading back out."	"The real-time updates make catching my bus stress-free. What a smooth day."

ParcelBox 3000

Parcel in **the logistics hub** in **Berlin** in **Germany**, 2 months old

Wants to use the hub to get from its distribution system to its client

Journey step	Emily Harper, a dynamic marketing manager from Berlin, arrives at the SHIFT Mobility Hub early in the morning. As she steps out of the U-Bahn, she immediately notices the hub's sleek, modern design and user-friendly layout. The real-time occupancy information displayed on digital screens guides her to a less crowded carriage for her onward journey.	Emily uses the hub's personalized app, which integrates AI to offer customized navigation and alerts. The app guides her through the hub, using augmented reality (AR) wayfinding tools that overlay visual directions on her smartphone screen. As she follows the AR arrows, she appreciates how easy it is to navigate through the various zones of the hub.	Walking towards her transfer point, Emily passes by the smart self-cleaning benches and floors, which use UV-C light and sanitizing sprays to maintain hygiene. She also notices the automated hygiene maintenance robots efficiently cleaning the public toilets and other areas, ensuring a consistently clean environment.	Emily decides to use a shared electric bike for the last leg of her journey to work. She heads to the bike-sharing station, where automated storage solutions secure and charge the bikes. The app informs her about available bikes and allows her to unlock one with a quick tap. She appreciates the seamless transition from the U-Bahn to the bike, facilitated by the integrated Mobility as a Service (MaaS) app.	As Emily rides through the hub, she feels secure knowing that the area is monitored by high-definition surveillance cameras, with AI detecting any unusual activity. The presence of well-lit paths with motion sensor lighting and clear audio announcements in multiple languages further enhances her sense of safety.	After reaching her workplace, Emily remembers that she left a package to be delivered. She uses the hub's app to track her package, which is being transported through the automated underground delivery system using AGVs and an airport-style conveyor belt. The app provides real-time updates, reassuring her that her package will arrive on time	At the end of the day, Emily heads back to the mobility hub to return her shared bike. The app guides her to the nearest drop-off point, and she seamlessly transitions to the S-Bahn for her journey home. As she boards the train, she is pleased to find reserved seating options and appreciates the hub's commitment to comfort and convenience.
Feeling	Efficiënt	Organized	Optimized	Secure	Protected	Accounted for	Ready
Thoughts	"The automated sorting system is processing me quickly. This is going to be a fast journey."	"These high-tech sensors and scanners ensure that I'm correctly identified and tracked."	"With all these connected devices, I'm on the most efficient route possible."	"Flying through the skies with drones makes my delivery quick and avoids all the traffic below."	"The smart locker keeps me secure and maintains the right conditions for my contents."	"I'm accurately tracked and monitored every step of the way."	"Emily will know right away that I'm here and ready for pickup."

Contribution of the SHIFT Mobility Hub to the Sustainable Development Goals (SDGs)

The SHIFT Mobility Hub project is aligned with several of the United Nations Sustainable Development Goals (SDGs), contributing to the global agenda for sustainable development. By integrating advanced technologies and innovative infrastructure, the mobility hub aims to create a sustainable, efficient, and inclusive urban transportation system. Here's how the project supports specific SDGs.

SDG 3: Good Health and Well-being

Promoting Healthier Lifestyles: The SHIFT Mobility Hub encourages the use of active transport modes such as cycling and walking, promoting physical activity and contributing to better health outcomes. Dedicated bike lanes, pedestrian pathways, and safe, accessible routes within the hub make it easier for people to choose healthier modes of transport.

Reducing Air Pollution: By promoting electric vehicles, shared mobility services, and micro-mobility options, the hub reduces reliance on fossil-fuel-powered vehicles, leading to lower emissions of pollutants. Improved air quality has a direct positive impact on public health, reducing respiratory and cardiovascular diseases associated with air pollution.

SDG 7: Affordable and Clean Energy

Utilizing Renewable Energy: The mobility hub integrates renewable energy sources, including solar panels and wind turbines, to power its operations. This reduces dependence on non-renewable energy sources and supports the transition to a clean energy future.

Energy Efficiency: The hub employs energy-efficient technologies such as LED lighting, motion sensors, and smart energy management systems, minimizing energy consumption and promoting sustainability.

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SDG 9: Industry, Innovation, and Infrastructure

Building Resilient Infrastructure: The SHIFT Mobility Hub is designed with resilience in mind, featuring modular and adaptable infrastructure that can evolve with changing urban needs. This ensures long-term sustainability and reliability of the transportation network.

Fostering Innovation: The hub serves as a testing ground for cutting-edge technologies like autonomous vehicles, V2X communication systems, and AI-driven traffic management. By fostering innovation, the project contributes to advancements in urban mobility and smart city solutions.

SDG 11: Sustainable Cities and Communities

Enhancing Urban Mobility: The mobility hub enhances urban mobility by providing seamless connectivity between various transport modes, reducing congestion, and improving the efficiency of the transportation network. This contributes to more livable and sustainable cities.

Promoting Inclusive Transportation: The hub is designed to be accessible to all, including people with disabilities and those with limited mobility. Features like wheelchair ramps, audio-visual aids, and dedicated lanes for different transport modes ensure that everyone can benefit from the hub's services.

SDG 12: Responsible Consumption and Production

Promoting Sustainable Transport Options: By encouraging the use of shared mobility services and electric vehicles, the hub promotes responsible consumption of transport resources. This reduces the environmental footprint of urban transportation.

Efficient Resource Use: The hub's infrastructure includes automated systems for managing energy, water, and waste, ensuring that resources are used efficiently and sustainably. This includes rainwater harvesting, greywater recycling, and comprehensive recycling programs.

SDG 13: Climate Action

Reducing Greenhouse Gas Emissions: The SHIFT Mobility Hub contributes to climate action by promoting low-emission transport options and integrating renewable energy sources. This helps reduce the overall carbon footprint of urban transportation.

Climate Resilience: The hub's design incorporates features that enhance climate resilience, such as green roofs and vertical gardens, which mitigate urban heat island effects and support biodiversity.

SDG 17: Partnerships for the Goals

Collaborative Approach: The success of the SHIFT Mobility Hub relies on partnerships between city planners, transport operators, technology providers, and community stakeholders. By fostering collaboration, the project advances shared goals for sustainable development and urban mobility.

Engaging Stakeholders: The hub actively engages with stakeholders to gather feedback, address concerns, and ensure that the project meets the needs of the community. This inclusive approach strengthens the project's impact and sustainability.

Conclusion

The SHIFT Mobility Hub is a transformative project that aligns with and supports multiple Sustainable Development Goals.

By creating a sustainable, efficient, and inclusive transportation network, the hub contributes to healthier communities, cleaner environments, and resilient urban infrastructure. It exemplifies how innovative urban mobility solutions can drive progress towards a more sustainable and equitable future.

Questions and Answers for the SHIFT Mobility Hub of the Future

How will the mobility hub integrate with existing city infrastructure and public transportation networks?

The SHIFT Mobility Hub is designed to seamlessly integrate with existing city infrastructure and public transportation networks. It connects directly with bus stops, tram stations, and metro platforms on the ground and first levels, ensuring smooth transfers and improving the overall connectivity of the city's transport system. The hub also features dedicated lanes and zones for different transport modes, minimizing congestion and enhancing traffic flow.

What impact will the mobility hub have on traffic flow and congestion within the city?

By organizing transportation modes vertically and optimizing the use of AVs and micro-mobility solutions, the hub reduces congestion and improves traffic flow. Dedicated lanes for AVs, bikes, and pedestrians ensure that each mode of transport operates efficiently without interference, while real-time traffic management systems adjust routes and schedules to prevent bottlenecks.

What regulatory changes are necessary to support the development and operation of the mobility hub?

Regulatory changes may include updating traffic laws to accommodate autonomous vehicles, establishing safety standards for AV operations, and implementing data privacy regulations to protect user information. Additionally, policies supporting the integration of renewable energy sources and promoting shared mobility services will be necessary.

How will the hub ensure the safety of all users, including pedestrians and cyclists?

The hub ensures safety through dedicated lanes and zones for each transport mode, minimizing conflicts and reducing the risk of accidents. AVs are equipped with advanced safety features like emergency braking and collision avoidance systems. Real-time monitoring and V2X communication enhance coordination between vehicles, infrastructure, and pedestrians, ensuring a safe environment for all users.

How will user data be collected, stored, and protected?

User data will be collected through secure, encrypted systems integrated into the hub's infrastructure and mobile apps. Data privacy regulations will be strictly adhered to, ensuring that personal information is protected. Users will have control over their data, with transparent policies regarding data collection, storage, and usage.

How will existing technologies and services be integrated into the mobility hub?

Existing technologies and services will be integrated through a unified Mobility as a Service (MaaS) platform, allowing users to plan, book, and pay for various transport modes. The hub's infrastructure supports seamless transitions between buses, trains, AVs, and micro-mobility options, with real-time data sharing and coordination among operators.

How will the hub enhance the customer experience for passengers and parcel delivery?

The hub enhances the customer experience by providing seamless, multi-modal transport options, reducing waiting times, and offering real-time updates through mobile apps and smart kiosks. For parcel delivery, the hub features automated sorting and distribution centers, secure lockers for last-mile delivery, and efficient transfer points for different transport modes, ensuring timely and reliable service.

What market opportunities does the mobility hub present for AV manufacturers?

The hub offers significant market opportunities for AV manufacturers by providing a platform for deploying and testing AV technologies in a real-world urban environment. Manufacturers can collaborate with the hub to showcase their latest innovations, gather valuable data, and refine their products based on user feedback and operational performance.

How will autonomous vehicles be deployed and managed within the hub?

AVs will be deployed through a centralized fleet management system that optimizes routes and schedules based on real-time demand and traffic conditions. The system will ensure efficient utilization of AVs, reduce waiting times, and enhance service reliability. AVs will operate in dedicated lanes and zones within the hub, ensuring safe and smooth operations.

What specific benefits will the mobility hub offer to vehicle users?

Vehicle users will benefit from seamless multi-modal transport options, reduced waiting times, real-time updates, and enhanced safety features. The hub provides convenient access to a variety of transport modes, making travel more efficient and enjoyable.

How accessible will the hub be for people with disabilities and those with limited mobility?

The hub is designed with accessibility in mind, featuring wheelchair ramps, audio-visual aids, and dedicated lanes for different transport modes. Smart kiosks and mobile apps provide easy access to information and services, ensuring that all users can navigate the hub comfortably.

How will the hub address risk management and liability issues, especially with autonomous vehicles?

The hub will implement comprehensive risk management protocols, including advanced safety features for AVs, real-time monitoring, and strict adherence to regulatory standards. Liability issues will be addressed through insurance policies specifically designed for AV operations, ensuring that all parties are protected.

How will the hub improve the efficiency of parcel delivery services?

The hub features automated sorting and distribution centers, secure lockers for last-mile delivery, and efficient transfer points for different transport modes. These facilities streamline parcel handling, reducing delivery times and improving reliability.

How does the mobility hub contribute to the city's sustainability goals?

The hub contributes to sustainability goals by promoting the use of electric vehicles, shared mobility services, and micro-mobility options. It includes solar panels and wind turbines on the roof level to generate renewable energy, and green roofs and vertical gardens enhance urban biodiversity and improve air quality. The hub's design encourages the use of eco-friendly transport modes, reducing the overall carbon footprint.

How scalable is the hub model for deployment in other cities?

The hub's modular design and flexible infrastructure make it highly scalable for deployment in other cities. The model can be adapted to different urban environments and transport needs, ensuring that the benefits of the mobility hub can be extended to a wider range of locations.

03 The End: Conclusion of SHIFT

Chapter 03. Conclusion

Create the SHIFT to a New Future

As we bring this report on SHIFT to a close, we envision a future transformed by innovative and sustainable urban mobility solutions. SHIFT is more than a project; it's a beacon of hope, illuminating a path towards seamless, enjoyable, and efficient travel. It addresses the frustrations that commuters face daily—traffic congestion, environmental pollution, unreliable public transport, and overcrowded vehicles—by reimagining what a mobility hub can be.

At the heart of SHIFT lies our commitment to integrating diverse modes of transport with elegance and sustainability. Advanced technologies like AI, autonomous vehicles, and IoT converge to create a transit experience that is not only seamless but also intuitive. Our detailed personas ensure that SHIFT meets the needs of everyone, from daily commuters to travelers with disabilities, making transportation accessible and inclusive.

This visionary project would not have been possible without the unwavering support and collaboration of our client. Your dedication to advancing sustainable urban transport has inspired us every step of the way. We are deeply grateful for your trust and partnership.

We hope this report serves as a catalyst for innovation, sparking new ideas and inspiring all stakeholders in urban mobility. SHIFT embodies a future where transportation is no longer a burden but a joy, where every journey is an opportunity for connection and discovery. It is a vision of a world where sustainability and progress go hand in hand, creating connected and vibrant urban environments.

Thank you to everyone who contributed to this project. We look forward to seeing SHIFT lead the way to a new era of urban mobility, where the possibilities are boundless and the future is bright

04 Sources

Chapter 04: Sources

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05 Appendix

Chapter 05: Appendix

01. Brainstorm Supplies, Results, and Findings

All pictures of this brainstorming session can be found via this link.

01. More Research, Findings, and Picture

Reach out to OSOC if you want to know more about this project.

03. 7 Concepts to Choose From

The Tree of Life:

Description: Structure the hub like a giant tree, with a central trunk housing the main facilities and branches representing different transportation modes. This can include elevated walkways, hanging gardens, and vertical transit options.

Wow Factor: The tree symbolizes growth, sustainability, and interconnectedness, providing a visually stunning and environmentally friendly hub.

The Waterfall Flow:

Description: Design the hub to incorporate flowing elements like waterfalls and streams, guiding passenger movement through fluid and natural pathways. This can include water features and smooth, curved architecture.

Wow Factor: The waterfall metaphor emphasizes tranquility and continuous movement, creating a calming and efficient transit environment.

Gear Shift Metaphor:

Description: Design the hub to resemble the components of a gear shift mechanism. Different levels or sections of the hub can represent various gears, each catering to different speeds and modes of transportation.

Wow Factor: This concept symbolizes progress, adaptability, and efficiency, conveying the message that the hub can adjust to the needs of all passengers, providing smooth and seamless transitions.

Shifting Landscapes:

Description: Create a dynamic hub where elements such as seating, kiosks, and walkways can shift and reconfigure based on the time of day, traffic flow, or specific events. Use movable partitions and modular furniture to achieve this.

Wow Factor: This concept showcases flexibility and innovation, allowing the hub to transform and adapt to various scenarios, ensuring optimal functionality at all times.

Forest Canopy Hub

Inspiration: Rainforest Canopy

Design: Multi-level platforms and pathways interwoven with lush, green canopies and treetop walkways.

Ease of Movement: Elevators and suspension bridges connect different levels, providing a seamless and scenic journey through the hub.

Shift in Motion:

Description: Design the hub to constantly convey a sense of motion and fluidity, with features like moving walkways, rotating platforms, and fluid architectural lines that guide the flow of passengers and vehicles.

Wow Factor: This concept captures the essence of continuous movement and progress, creating a dynamic and engaging environment that embodies the spirit of urban mobility.

Solar Leaf Hub

Inspiration: Photosynthesis

Design: Solar panels shaped like giant leaves cover the hub, providing shade and generating renewable energy.

Ease of Movement: Shaded pathways with integrated solar charging stations for personal devices and electric vehicles, along with clear, leaf-patterned signage.

This was an inspirational and visionary report by Evi D.R., Raman T., Jordy C., & Walter V.

Business Park

User Groups and Stakeholders

- Commuters
- Employees
- land owner (which may not be a public administration)
- Catering company
- maintenance personnel
- Visitors
- Charwoman
- Taxis
- Restaurants
- owner of business park

Channels, tools etc. for communication and engagement

- Posters
- Radio & TV
- Flyers at restaurant
- Travel planner app
- Kiosk
- Accessible information
- YouTube
- Screens in the lobbies/recepti
- Companies' newsletters and internal communication channels
- spam emails
- Screens in the lobbies/reception

Hospital Site

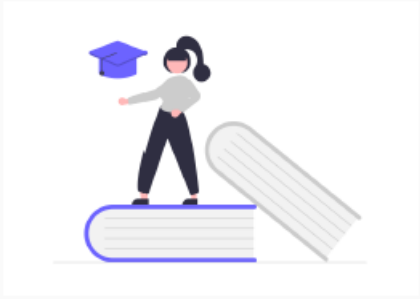
User Groups and Stakeholders

- Visitors
- hospital staff (medical and non-medical)
- Supply staff (either medical or non-medical supplies)
- Corpses
- Morticians
- maintenance personnel
- patients without any disabilities
- minors (pediatric hospital)
- Special users with disabilities (mobility, audio, visual and even social)
- pregnant women (obstetrics and gynaecology hospital)
- people living in the area near the hospital
- Cyborgs

Channels, tools etc. for communication and engagement

- Accessible information
- flyers hung in hospital waiting rooms
- Radio & TV
- notice on the hospital's examination booking webpage
- Hospital booking app
- message to all hospital employees (mailing list)
- YouTube
- notice on the Municipality web/social pages

University Campus



User Groups and Stakeholders

land owner (which may not be a public administration)

Students

Academic staff

Visitors

Other staff, such as cleaning personnel etc.

maintenance personnel

Parents

Channels, tools etc. for communi engagement

All types of social media

Student associations

Accessible information

Poster

Radio & TV

Radio & TV

Social media

YouTube

Flyers

Screens in the lobbies/reception

Travel planner app

Radio & TV

deepfake videos

Special Needs School

User Groups and Stakeholders

Children

Teaching staff

maintenance personnel

Special users with disabilities (mobility, audio, visual and even

Neighbourhood residents

Children with special needs

guiding stuff

Maintenace staff

(personal) assistants

Channels, tools etc. for co n and engagement

App - adapted for the specific user group and its need.

School magzine/e-newsletter

Big touch screen outside the school to book a service or just visualise where the shuttle is.

social media

Informative material provided to parents

Accessible information

Press conference

Local newspapers

YouTube

SMS

Flyers

Accessible information

Fun stickers on the vehicle

Elderly Residence

User Groups and Stakeholders

- Visitors
- Consulting and caring services (foot, massage, hairdressers)
- Special users with disabilities (mobility, audio, visual and even social)
- Flower delivery services
- Pet visitors
- maintenance personnel
- Catering company

Channels, tools etc. for communication and engagement

- Radio & TV
- Audio announcement
- App - adapted for the specific user group and its need.
- YouTube
- Posters at the entrance
- Staff at the residence
- Accessible information
- Screens in the lobbies/reception
- Campaign with a elderly celebrity

City Centre

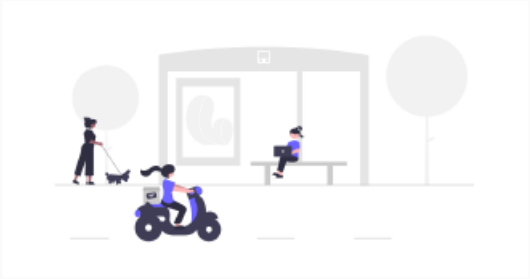
User Groups and Stakeholders

- Shops & stores
- Tourists
- City authorities (different dept)
- Special users with disabilities (mobility, audio, visual and even social)
- PTOs
- Homeless people
- Residents
- residents
- Restaurants
- Mobility competitors
- Visitors/commuters from surrounding cities
- Teenagers group

Channels, tools etc. for communication and engagement

- COmmunication over the Internet
- YouTube
- Publicity panels like JCDECAUX in France
- Travel planner app
- Tourist centre
- Accessib Informati
- PTA
- Radio & TV

Suburban/Peri-Urban Area



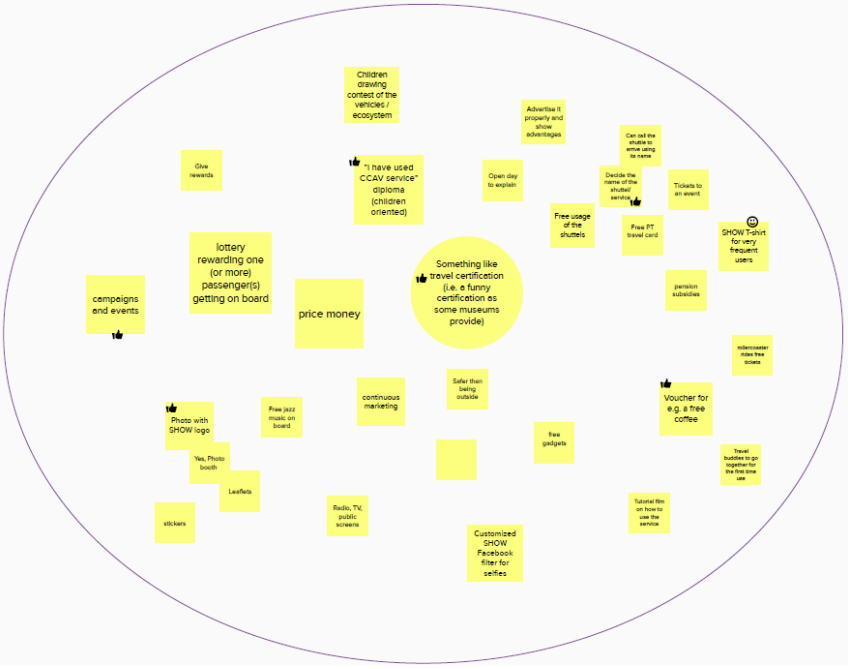
User Groups and Stakeholders

- Public administration (different levels, from local to regional). Also Road Administration
- day-trippers
- Residents
- school kids of appropriate age
- Agriculture workers
- tourists
- Special users with disabilities (mobility, audio, visual and even social)
- Commuters
- Teenagers group

Channels, tools etc. for communication and engagement

- Standard mail
- tourism association
- hospitality: hotels, restaurants etc.
- Accessible information
- incl. in tourism campaign
- Social media
- YouTube
- Radio & TV
- Travel planner app

Which incentives can you think of to encourage people to make use of the SHOW CCAV services?



User engagement

Demo board meeting #10

Delphine Grandsart, EPF – Madrid, 18.10.22

Engagement activities

Focus group

A focus group can be defined as a ‘group interview involving a small number of demographically similar people or participants who have other common traits / experience’ (Wikipedia). They are an important tool for obtaining feedback on new products / services.

In Brno, two focus group sessions have been organised:

- First one was aiming at children (elementary school level) as the source of unorthodox worldviews and perspectives.
- Second one involved professionals active in the field of autonomous vehicles.

Demo Board meeting #10, 18.10.22, Madrid

Citizen dialogue

Citizen dialogues are large-scale debates with citizens on a specific topic. Missions Publiques organized a series of citizen debates on the future of driverless mobility.

One of them was in Pörtschach (2019) and another might follow!

Ideathons / co-creation workshops

Co-creation or co-design workshops are an interactive type of workshops, focusing on gathering new innovative ideas from a diverse group of participants who are invited to think out of the box, using creative methodologies.

Demo Board meeting #10, 18.10.22, Madrid

Ideathons / co-creation workshops

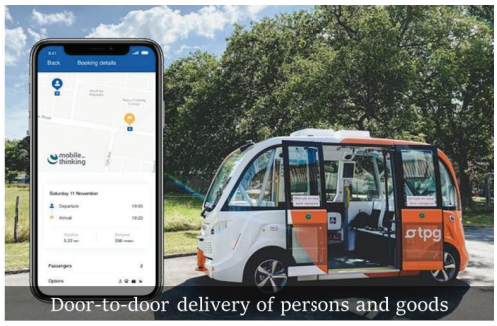
- First Ideathon on 15.01.21
- Organised by ERTICO & EPF, supported by UITP, CERTH and Eurocities
- 39 participants
- Plenary session to set the scene
- Parallel sessions to brainstorm
- Starting point: end-user needs

Mobility personas © TUMCREATE

Demo Board meeting #10, 18.10.22, Madrid

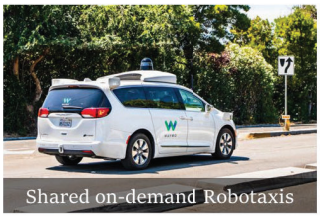
Ideathons / co-creation workshops

Driverless shuttle for first/last mile



Door-to-door delivery of persons and goods

Mass transit with driverless buses


Shared on-demand Robotaxis

Demo Board meeting #10, 18.10.22, Madrid

Ideathons / co-creation workshops

- 24/7 surveillance on board and stand-by human assistance
- Tutorial film on board to explain how the service works
- Pick-up points for parcels in the neighbourhood
- Flexibility to adapt capacity to increased demand and potential impact on bus depots
- Accessibility, audio-visual messaging and assistance for PRMs across the whole trajectory
- New safety culture for AVs & improving perceived safety
- Possibility for individual use of Robotaxis by Persons with Reduced Mobility

Demo Board meeting #10, 18.10.22, Madrid

Hackathons

A Hackathon is a 1- to 3-day workshop during which attendees form multidisciplinary teams that together, in a spirit of positive competition, develop prototype solutions for a specific problem.

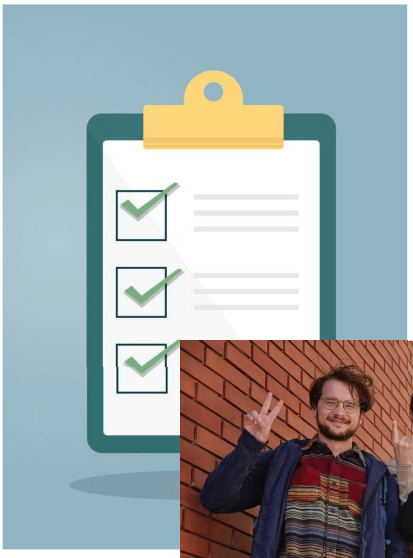
Originally, Hackathons referred to developing software only, nowadays they can also refer to non-IT events. Outcomes of a Hackathon can be: software, prototypes, pitches, business models, demos, ...

Demo Board meeting #10, 18.10.22, Madrid

Hackathons

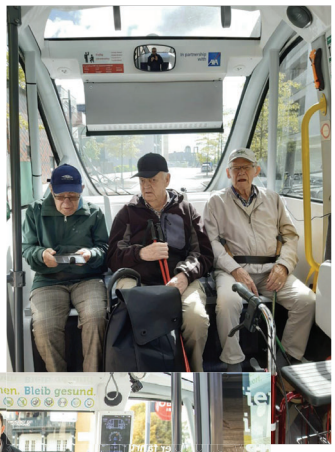
How to start?

- Dates & venues
- Objective & thematic focus
- Expected results
- Target audience
- Prizes / rewards
- Concept
- Partners & organizing team
- Dissemination & communication
- Project management & planning



Meeting, Date, Place

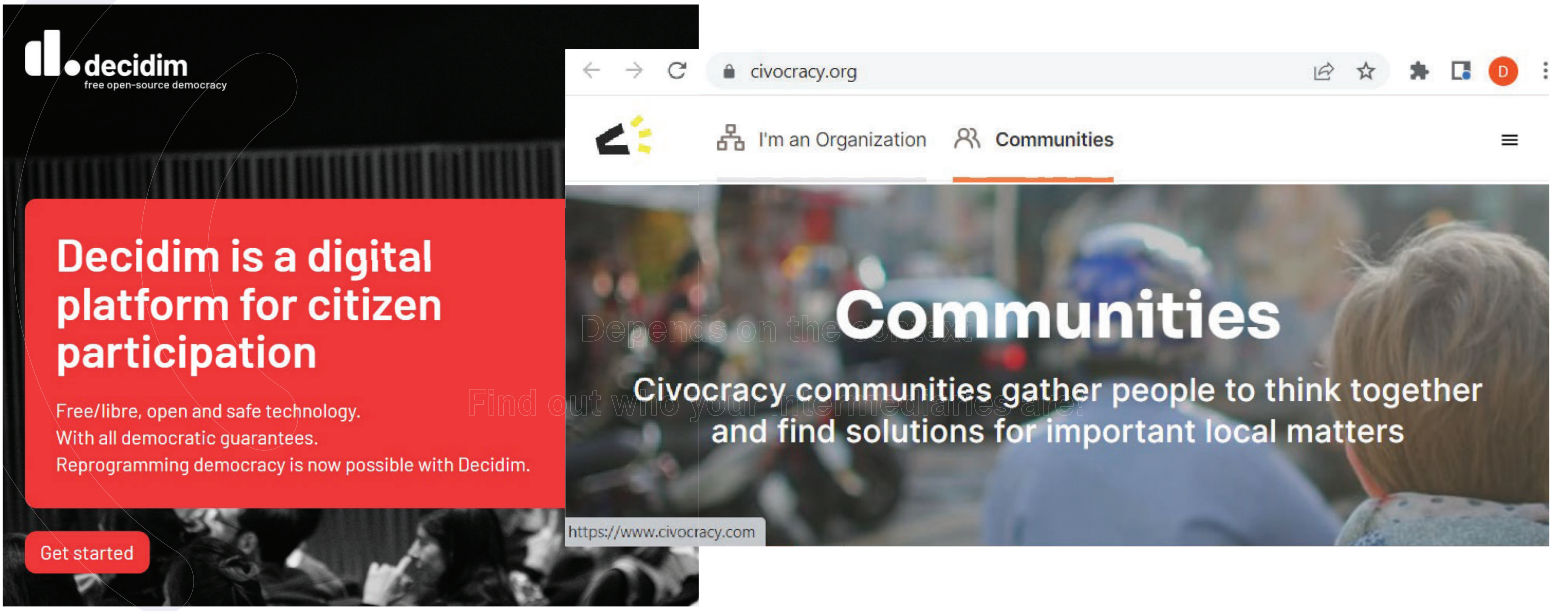
Field tests



Crowdsourcing campaign

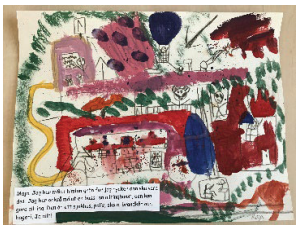
Crowdsourcing generally means ‘outsourcing work to the crowd’, typically using the internet. Crowdsourcing can be used for different purposes: to gather data, to develop new content, to raise funds, to generate new innovative ideas etc.

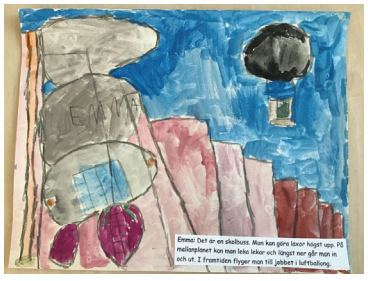
Citizen participation platform

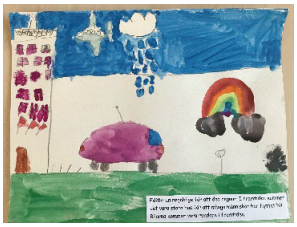


Demo Board meeting #10, 18.10.22, Madrid

Competitions







Gewinnspiel: Der autonome Bus sucht einen Namen

Demo events

Demo Board meeting #10, 18.10.22, Madrid

Over to you!

Mega Sites

	Focus group	Citizen Dialogue	Ideathon	Hackathon	Field tests	Crowd-sourcing	Citizen participation platform	Competition	Demo event
F – ROUEN									
F – RENNES									
SE – LINKÖPING									
SE – GOTHENBURG									
ES – CARABANCHEL									
ES – VILLAVERDE									
AT – GRAZ									
AT – SALZBURG									
AT – CARINTHIA									
DE – KARLSRUHE									
DE – MONHEIM									
DE – FRANKFURT									

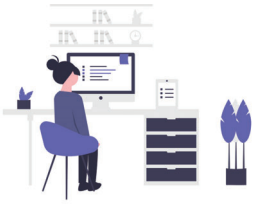
Satellite & Follower Sites

	Focus group	Citizen Dialogue	Ideathon	Hackathon	Field tests	Crowd-sourcing	Citizen participation platform	Competition	Demo event
IT – TURIN									
GR – TRIKALA									
FI – TAMPERE									
CZ – BRNO									
DK – COPENHAGEN									
NL – BRAINPORT									
B – BRUSSELS									
GR – THESSALONIKI									
CH - GENEVA									

Want to know more?

SHOW podcast on user acceptance and user engagement

https://show-project.eu/show-podcast/



SHOW / R2A joint webinar on user acceptance and user engagement:

https://summalab.nl/show-ride2autonomy-webinar-gained-perspectives-on-user-engagement-and-public-acceptance-of-connected-and-cooperative-automated-mobility/

Thank you!

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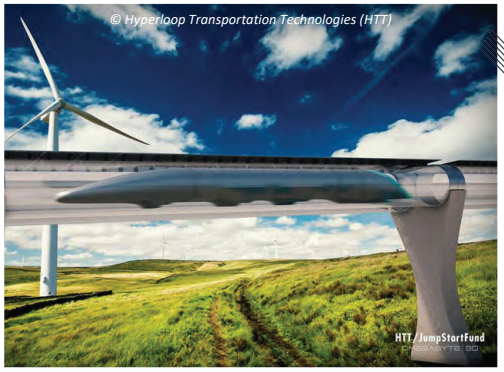
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875530.

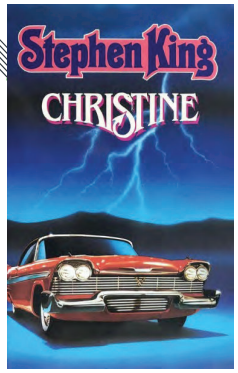
User & stakeholder engagement

SHOW Webinar for Follower Cities

Delphine Grandsart, EPF – online, 24.05.2024

Is this what we really want/need ?





Involving citizens and stakeholders

Customized engagement strategies

Stakeholders & end-users


Business park


Hospital site


University campus


(Special needs) school


Elderly residence


Suburban – peri-urban area


City centre

Stakeholders & end-users

Stakeholders

- Public interest groups and associations
- Decision-making authorities or regulators
- Operators (e.g. public transport operators, private fleet operators)
- Mobility service providers
- Industry (e.g. AV manufacturers)
- Vehicle users (end-users, drivers, remote operator)
- Other (e.g. insurance companies, banks, delivery service providers)

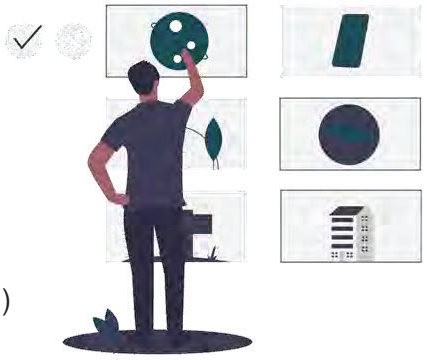
End-users

- Commuters
- Residents
- Students
- Children/young adults
- Elderly
- Tourists/visitors
- Hospital visitors
- Vulnerable Road Users
- Persons with Reduced Mobility
- Other (e.g. shoppers, women, migrants)

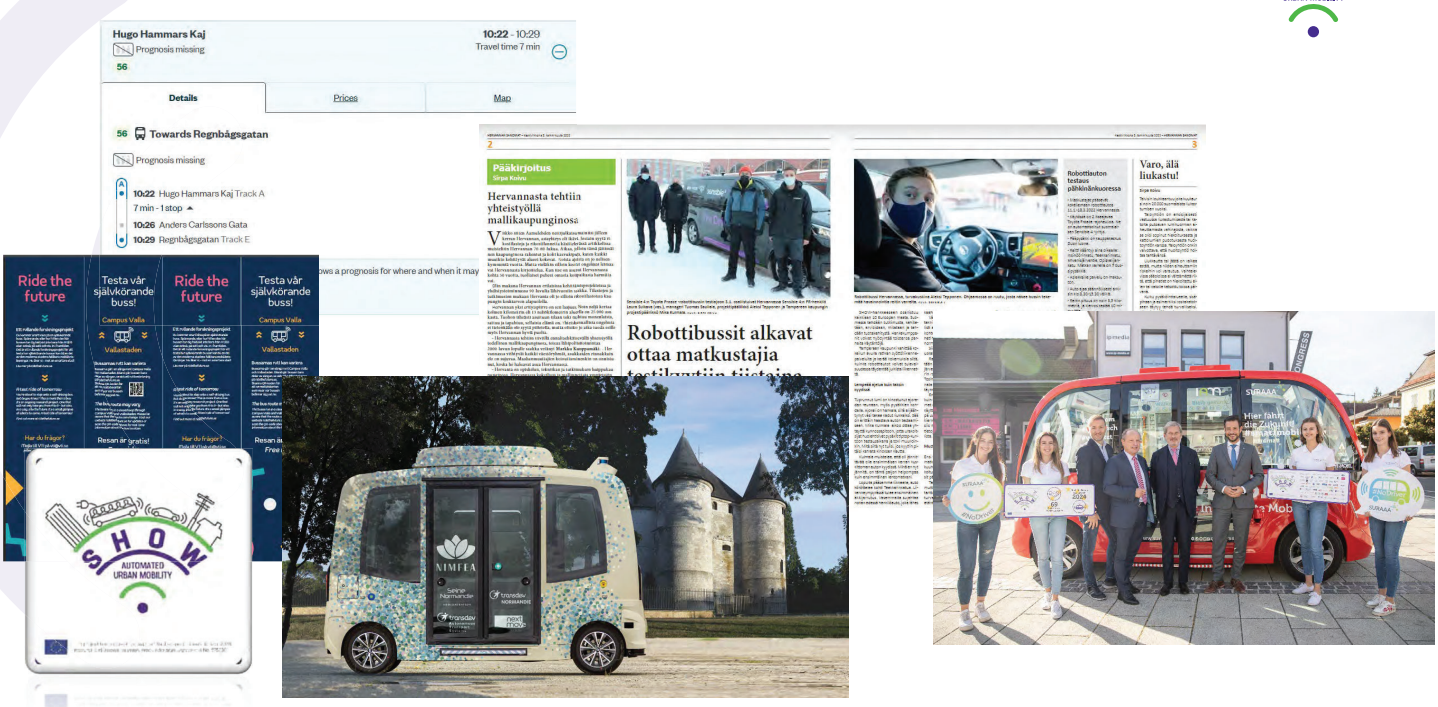
Communication

- Printed materials (leaflets, posters, stickers, ...)
- Press (press release, press conference, interviews, ...)
- Videos
- Social media (Facebook, LinkedIn, ...)
- Advertising (online, billboards, magazines, ...)
- Apps & booking sites (e.g. transport operator, hospital)
- Information screens (e.g. city hall, library, lobby, reception area)
- Letters, calls, e-mails (respecting GDPR rules)
- Events (e.g. fairs, exhibitions, markets)
- Marketing campaigns (with a professional agency)
- Educational campaigns (e.g. using webinars, leaflets, infographics, ...)
- ...

- Involve intermediaries
- Targeted campaigns
- Accessible information
- Use a variety of channels



Communication

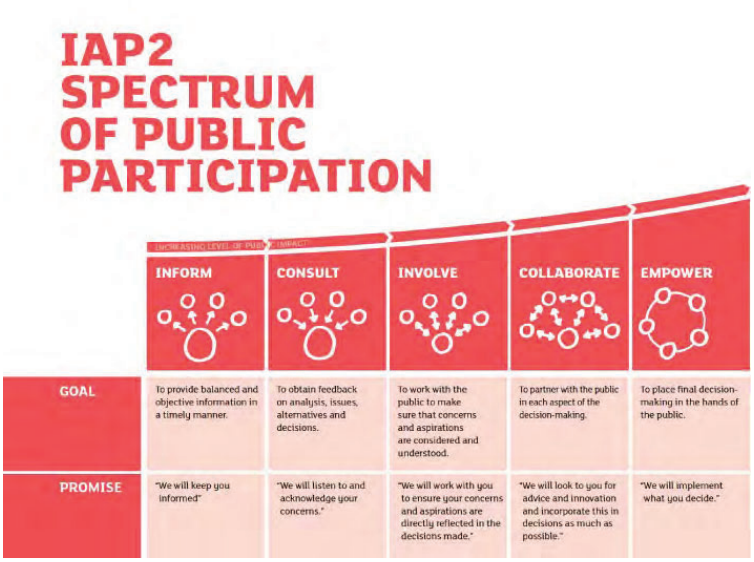


Step 3: Engagement!

How to go a step further and

actively engage people?

Engagement

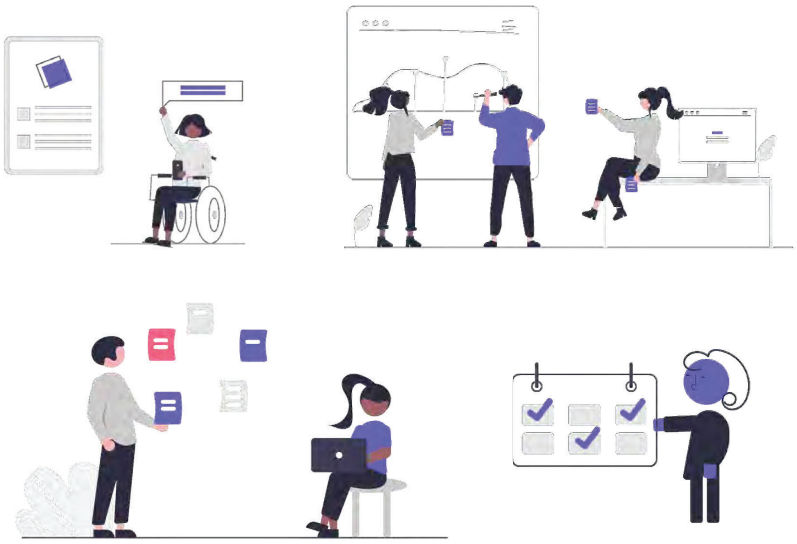


(c) International Association for Public Participation www.iap2.org (Source: Place Speak)

Engagement

Different levels of engagement

- Surveys and interviews
- Focus groups
- Citizen dialogues
- Crowdsourcing campaigns
- Citizen participation platforms
- Co-creation workshops / Ideathons
- Hackathons
- Field tests or demo days
- Competitions
- ...



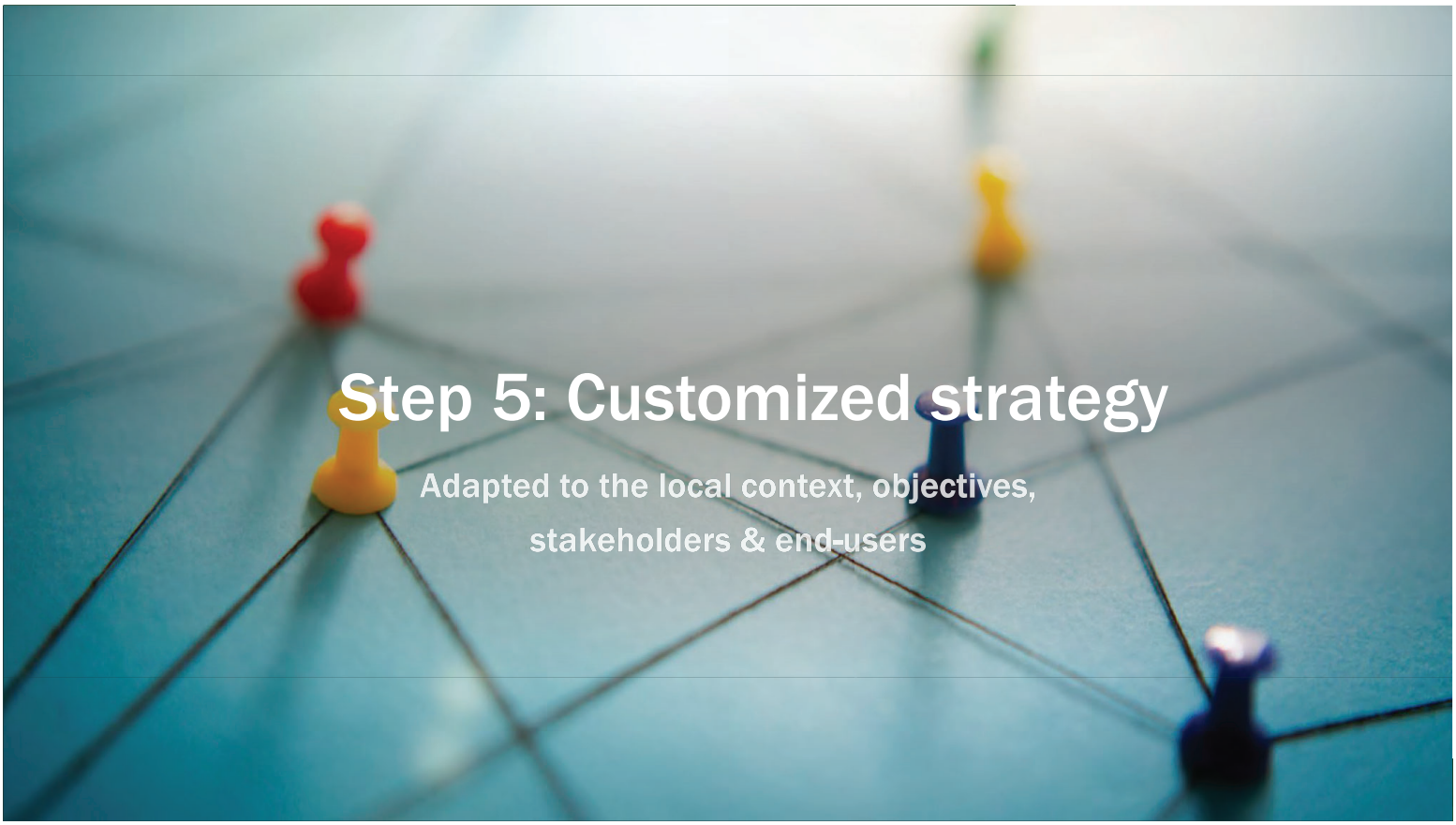
Step 4: Incentivisation and nudging strategies

How to encourage people to use / try out the services?

Incentivisation & nudging

How to encourage people to try out CCAM services?

- How will you make sure that users know about the service?
- How will you make sure people know how to the service works / how to use it?
- Which advantages does the service bring for end-users?
- Which incentives or rewards are foreseen?
- How will you make the service attractive?
- Do you provide some try-out possibilities?
- Do you provide some form of human assistance?
- ...



Customized engagement strategies

Main topics to address:

- Identifying the stakeholders and end-users
- Communication channels and tools
- Engagement activities
- Incentivisation and nudging strategies
- Timeline

Zooming in on a selection of engagement activities in SHOW

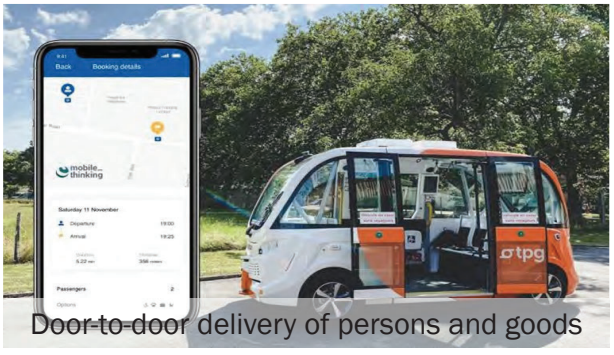
Idea generation: Ideathon
Development: Hackathon
Evaluation: MAMCA workshop

First SHOW Ideathon (I)

- Took place on 15. January 2021, virtually
- Organised by ERTICO & EPF, supported by UITP, CERTH/HIT and Eurocities
- 39 participants
- Plenary session to set the scene
- Parallel sessions to brainstorm
- Starting point: end-user needs

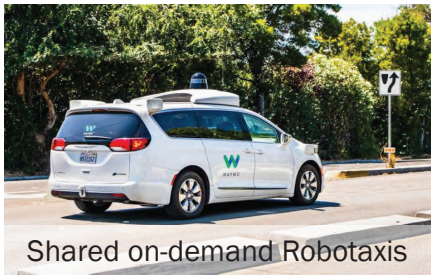
First SHOW Ideathon (II)

Driverless shuttle for first/last mile



Door-to-door delivery of persons and goods

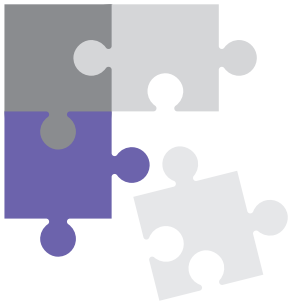
Mass transit with driverless buses


Shared on-demand Robotaxis

First SHOW Ideathon (III)

Context setting → Brainstorm → Enrichment → ASSESSMENT

- 24/7 surveillance on board and stand-by human assistance
- Tutorial film on board to explain how the service works
- Pick-up points for parcels in the neighbourhood
- Flexibility to adapt capacity to increased demand and potential impact on bus depots
- Accessibility, audio-visual messaging and assistance for PRMs across the whole trajectory
- New safety culture for AVs & improving perceived safety
- Possibility for individual use of Robotaxis by Persons with Reduced Mobility



SHOW Hackathon (I)

SHOW Hackathon (II)

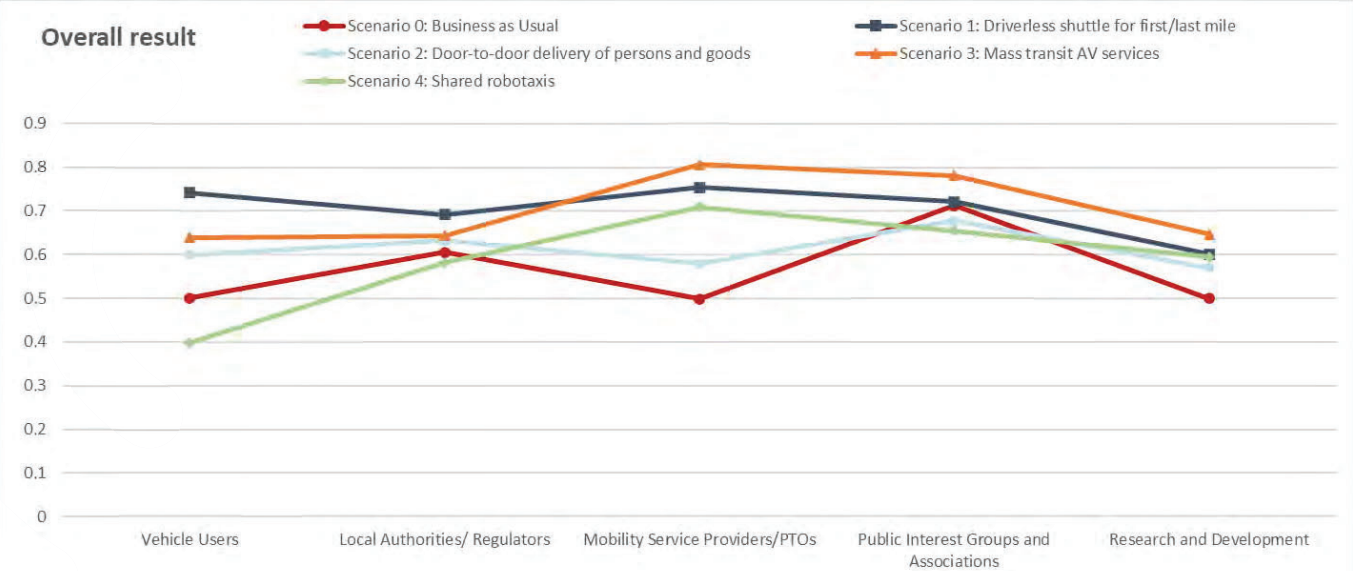
3 teams, 3 challenges:

- ‘GUSTAV’ worked on the topic of “How To Make Safer and More Secure Driverless Automated Vehicles for Passengers and People on the Road”
- ‘AssistIO’ worked on finding a solution to improve “Accessibility and Assistance to Persons with Reduced Mobility”
- ‘DeFORUS’ worked on “A Project for Adapting/Demanding Capacity to Handle Demand in a Flexible Way”

MAMCA workshop (I)

MAMCA (Multi-Actor Multi-Criteria Analysis) is a method that brings together a variety of stakeholders in a workshop, to evaluate different alternatives across multiple crititeria.

MAMCA workshop (II)



Overall MAMCA result – Tampere pilot site

Evaluation

- **Opportunities:**
- Quality of insights
- Collaboration and team dynamics
- Community engagement and post-event impact

- **Challenges:**
- Time, resources & a professional approach needed
- Diversity of participants

Thank you!

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875530.