studiodott. MECHELEN

Pathway to Participation in Autonomous Transport

City of Mechelen

18/08/2022

Contents

01

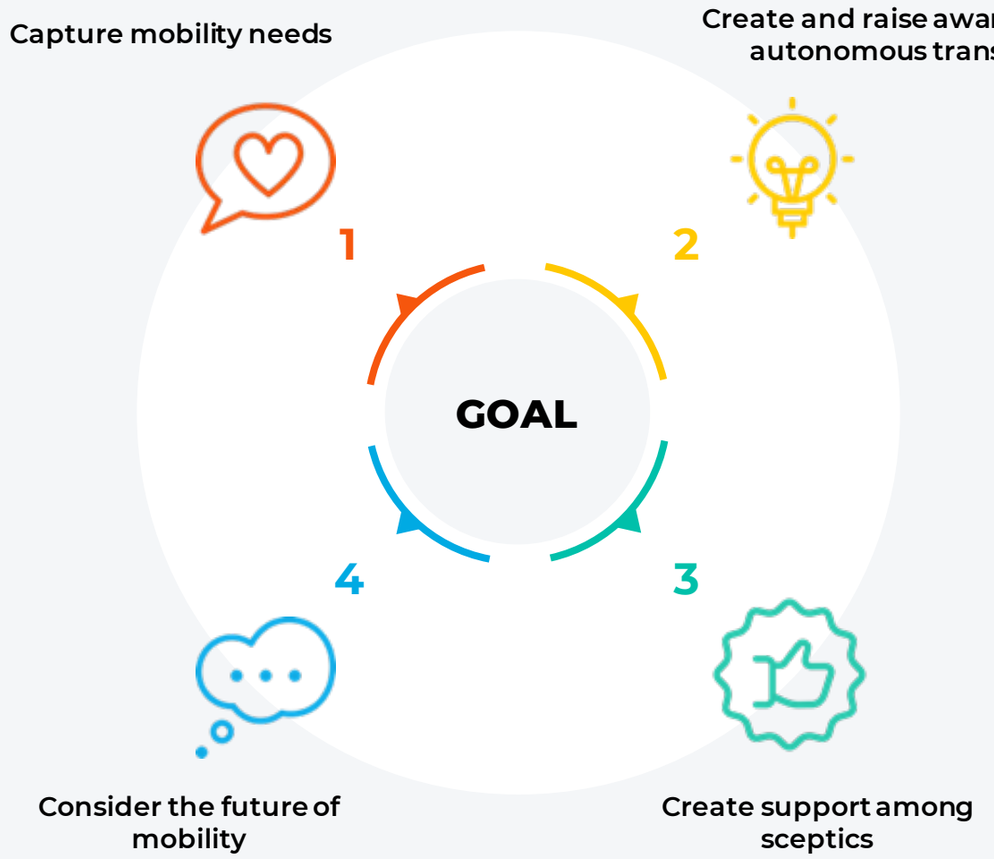
Context

Primary goal

With this survey we sought to discover what 'the Mechelener' thinks of driverless transport, to take this into account when deciding policy and continued implementation in the future.

As well as meeting this primary goal, we wanted to introduce the people of Mechelen to driverless transport and 'trigger' them to use the shuttle. In this way we aim to encourage a consideration of future mobility among the various stakeholders.

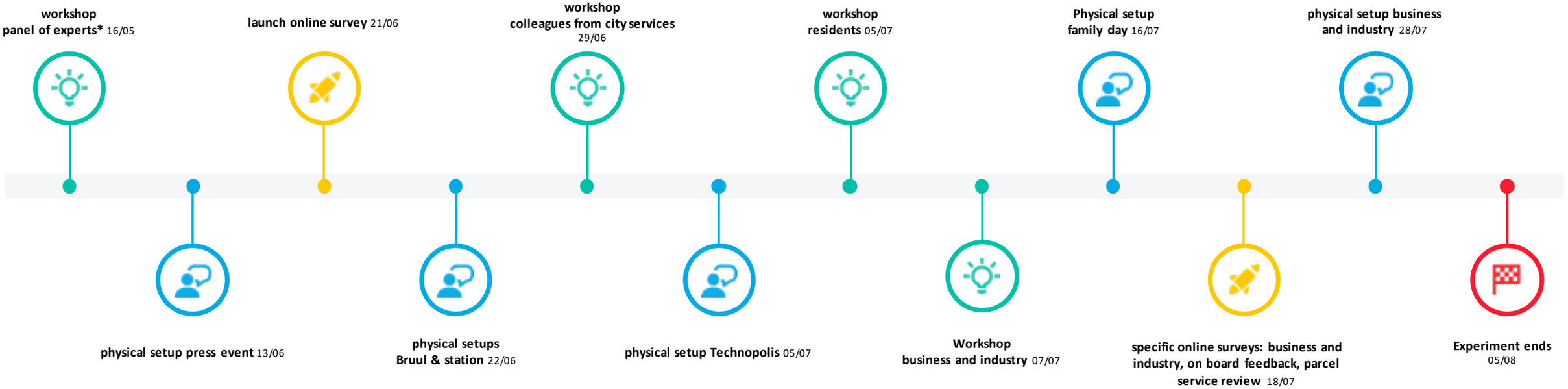
Indeed, driverless transport presents a great many benefits to these stakeholders. With this project we also set out to show them the benefits and opportunities, and so build support.



Methodology

A methodology tailored to the target group was used to achieve the goal and find answers to the primary research questions:

- Does mobility present any particular needs or frustrations?
- Are people prepared to relinquish their private use of the car? What would that necessarily entail, and what would convince people that shared transport was worth using?
- For what reason and in what circumstances would people use autonomous transport?
- What pathways would come into consideration?
- To what extent do people already rely on shared transport? What makes people opt for shared transport?



** EUproject ULaaDS partners from a variety of European cities*

02

Physical Setup

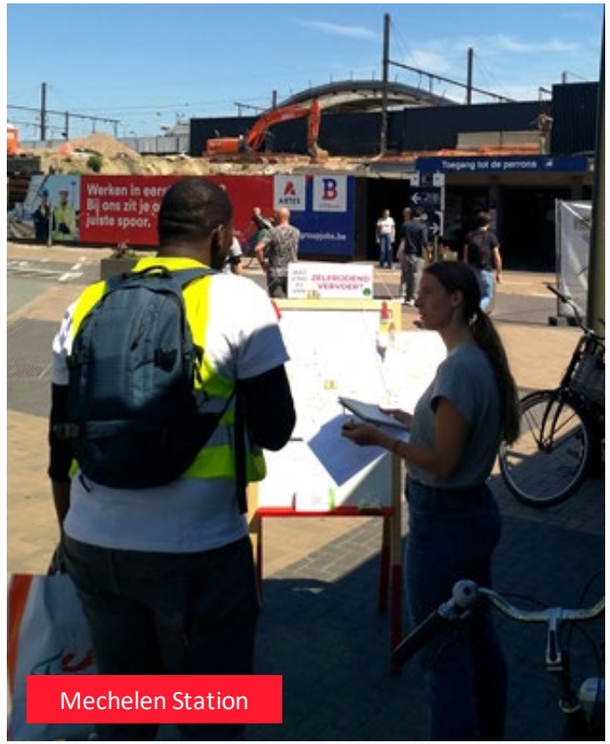
Design and methodology: physical setup

To ask the residents of Mechelen for their opinions on driverless transport and the opportunities that it would afford we took to the road with a physical setup. We wanted to reach a broad and **diverse public**, and for that reason we took up positions at **several locations**. These physical setups served in the first place **as conversation starters** to delve deeper into the topics of mobility and driverless transport.

There were two parts to this: firstly we asked specifically about **locations and routes** where residents envisaged the shuttle operating because they find them difficult to access at present, avoid them due to congestion or lack a sense of safety, etc.

And we also wanted to gauge the **types of user** they had in mind, the **applications** they wanted to see, what they thought about the absence of a driver and the **frustrations** they already have when it comes to personal travel.

By speaking to people in the street we got the opportunity to start up a dialogue and look deeper into their concerns, needs and dreams. By setting ourselves up as an open and independent party we gave people the opportunity to speak freely and give their unvarnished opinions.



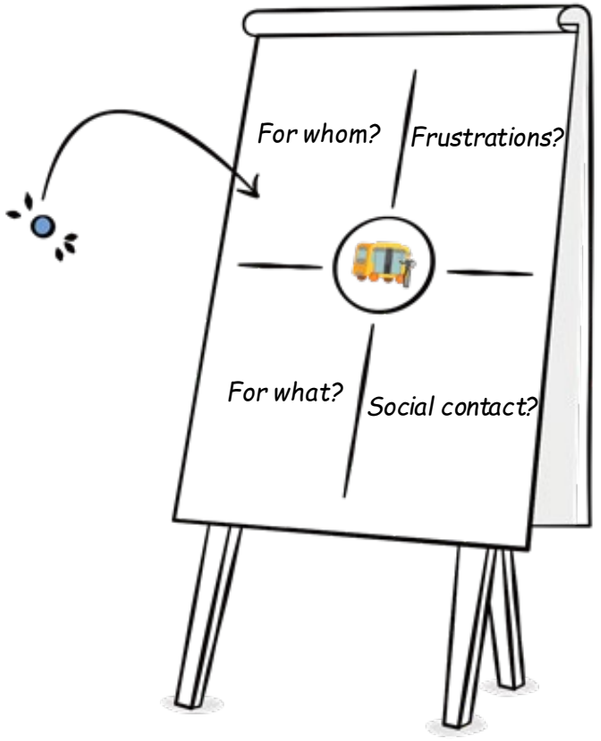
Design and methodology: physical setup

SIDE A

On one side, we ask them to highlight places:

- that they find difficult to access at present
- that they currently avoid due to congestion or a sense of not being safe
- to which they occasionally take public transport
- that are suitable as a route or destination for the driverless shuttle

SIDE B



On the other side, we ask them to choose from several options:

- Potential users: senior citizens, young people going out, people from the suburbs, ...
- Potential applications: parcels, shopping, commuting, etc.
- Current road traffic frustrations: too many cars, poor infrastructure, aggressive driving, traffic jams, ...
- The feeling they get when there is no driver: trust, uncertainty, detachment, progress, ...

*The setup is **not** a means to collect **quantitative results** but **an invitation** to engage in **qualitative conversations**. In which case the discussion can go beyond the options given in the setup. Results are expressed as anecdotes, needs and wishes and not as numbers of stickers.

Results of the physical setup

“I don't mind if there is no driver, as long as it is quicker.”

“I wouldn't trust it, because you can't control it yourself”

“It will be perfectly normal in 15 years. It's just a matter of time.”

“I’m too old for that now. I’ve been driving a car for 74 years and I’m not about to stop.”

“Oh no, it's a bit scary! But handy, really, and I suppose I could get used to it”

A few quotes

“Would I take my children on it? Why not, once I've tried it out for myself?”

“I don't think we are ready for it yet, but I would have to get used to it”

“Well it is pretty obvious that this is where we are headed!”

“If the town council brings it in, the technology must be reliable.”

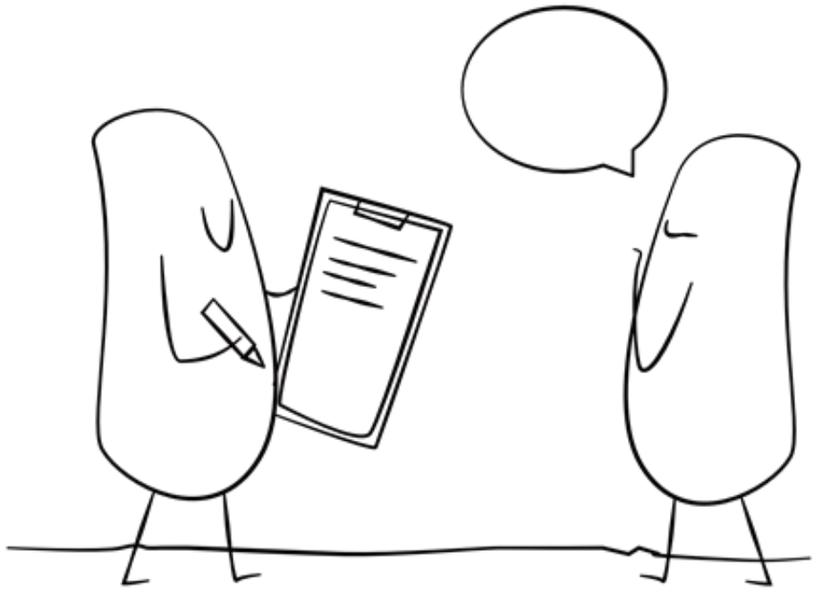
Main insights from the physical setups

Mindset

- To begin with, people tend to be negative and doubtful, but after some thought they come around to the idea
- It will take some getting used to: a thought that comes through in the responses as more questions are asked. People go back to their previous reactions and are more positive about it once they have thought it through
  - They say that they would like to test it before using it more often
  - “I don't think we are ready for it yet, but I would have to get used to it”
- People often see it as a thing for specific target groups like the elderly, tourists or people with reduced mobility, and so are less inclined to see it as something they would use themselves

Technology

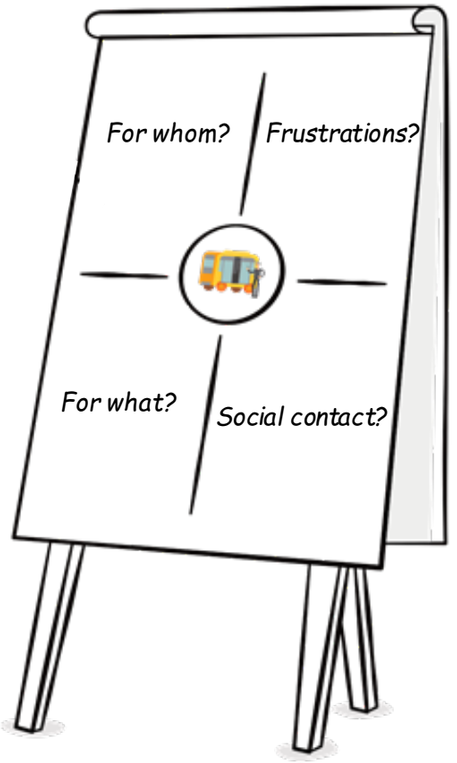
- People are confident about the technology “if the town council brings it in, it must be safe”
- People do, however, have concerns over ethical issues
  - “Who makes the programming decisions, and what choices are made?”
  - Legal aspect: who is liable if there is an accident?
  - Are there cameras to keep an eye on things? And where that's concerned, what about privacy?
  - While it leads to redundancies, it also creates opportunities where labour shortages and bottleneck vacancies are concerned



Main insights from the physical setups

Target groups & profiles

- Young people and secondary school children find the technology interesting, even a little exiting
  - The initial response is “oh no, that's scary”, but then they switch almost immediately to confidence in the technology
  - Tend to see it as ‘where the future is taking us’
  - Think that not having to ride a bike is a ‘chill idea’, but that right now it (this pilot) is too slow
  - Prefer to ride a bike for the flexibility and freedom it gives (stopping anywhere you like and leaving at any time you want)
  - View it as a replacement for the bus, as long as it's quieter (many young people think that there are too many people on regular buses)
- Parents are happy to let their children take the shuttle if, after testing it for themselves, they decide that it is safe
  - when asked if they would allow their daughter to use it at night, we get the response that riding a bike is a bigger unknown, as, after all, there must be some form of (social) control on the shuttle
- Notable point: at the setup near Technopolis people are significantly less impressed by the concept of ‘autonomous transport’, possibly because this location has a very strong focus on the future and on technological ingenuity
- People who are themselves employed in the technology sector have every confidence in the operation of the sensors (‘I trust people more than machinery’) but are less convinced by their deployability and lifespan. They are not sure whether, once in service, a shuttle would last very long, given that a lot can go wrong with repeated (public) use.
- Another group, albeit the minority, is looking forward to it and sees autonomous transport as inevitable



03

Workshops

Design

To reach out to certain target groups we arranged a number of workshops, each focused on a different aspect. While each workshop had a predefined structure, the content was tailored to the characteristics of the participants. This gave us the chance to delve deeper into needs and themes specific to that target group.

Panel of experts

Participants: experts from European cities in the context of a logistics workshop

Focus: their view of autonomous transport, its potential and its implementability in a logistics context

Business and industry in Mechelen North

Participants: Galapagos, Colruyt, Microtron, Goed, VZW Industrie Mechelen Noord, Stad Mechelen, Ziegler, Cube Lockers Solutions, NIPRO

Focus: opportunities presented by autonomous transport in a business context and its impact on their job and on coworkers

Colleagues from Mechelen Town Council

Participants: departments of public spaces, management, town planning, mobility, projects & planning

Focus: opportunities for the city, as well as matters of infrastructure and organisation in the implementation of autonomous transport

Panel of residents

Participants: members of the senior council and representatives of residents with reduced mobility

Focus: what autonomous transport could do for them, viewed through the lens of their own needs and expectations of public transport

Insights of the panel of experts

Feasibility

- Huge challenge to prepare the overall statutory and legal framework
- Given the current mindset, time is required to create confidence
- Along with a physical infrastructure, a good digital infrastructure is needed
- Major questions in relation to efficiency: how much more efficient is a driving locker than a stationary locker? The user has to consider the "set" times and availability of the driving locker
- Critical of the ideas about combining streams of goods with streams of passengers; in this case there are situations in which the streams are left waiting for each other

Safety

- Consideration of data security

Potential & expectations

- As an open system that can be used by other parties (not just Bpost, on which it is too heavily reliant at present)
- For the collection and transport of people, parts, parcels, etc., between businesses (e.g. those with multiple production establishments on the site, or those with offices, canteen, production facilities, etc., at other locations)

Other concerns

- Is it the job of the town council to make online purchasing even easier and more efficient? This is a way to stimulate it, but it is not sustainable: local purchasing is what deserves stimulation
- Transport by bike is still the most sustainable means: this system mustn't compete with the bike
- Danger of creating ghost cities: cities are built for people, therefore it mustn't be automated.

Insights of the panel of experts

At the session, several setups were presented to the partners in the EUproject ULaaDS to glean their opinions and expertise on a number of subjects.

"What would we like to hear from members of the public on the subject of automatic logistics?"

- Do people know what it is?
- Would people actually use it?
- Where is it best applied?
- General perception: safety, use, willingness to give up personal car
- What are the perceived benefits?
- Are people aware of the impact that (their own) logistics have?

"What would be the greatest benefits to a town like Mechelen if implementation were successful?"

- The quality of life in town improves when there are fewer cars on the roads: fewer parking spaces are occupied, CO_2 emissions drop, fewer cars in the town centre, etc.
- Could provide a boost for other towns and cities
- Could supplement public transport (smaller scale)
- More efficient urban logistics process

"What are the greatest challenges to implementation in our own town?"

- Win over the non-believers
- Revenue model
- Inclusion in the modal shift
- Politics, laws and regulations
- Match with current need
- Find use-case within legal limits, infrastructure and available technology
- Make sure it has more than gadget value
- Safety

"What are the greatest challenges facing mobility in the future?"

- Mobility as a luxury product for the rich
- Fewer vehicles on the road
- Modal shift ≠ mental shift
- Mass mind-shift

Insights of the city services

Feasibility

- There are some big questions around use in an urban environment; this sort of vehicle is not considered ready to drive in mixed traffic, given that there are still too many obstacles.
- Most of the questions are to do with infrastructure and regulations.
- Where infrastructure is concerned, it is hard to picture what would be required; if the sensors are always going to be so sensitive that it stops for everything and the maximum speed is 15km/h, it will have to have its own lane. This is perceived as very radical.
- It's feasibility is largely equated with fixed routes, because they are a lot more predictable
- Modal and mental shifts are needed to achieve it

Safety

- Most people see the shuttle as safe and ground-breaking before they have even taken a ride, but after trying it out they are a little disappointed by the current state of the technology
- The shuttle drives much more carefully than they had expected, meaning that it is perceived as safer, but less innovative and harder to implement in the short term

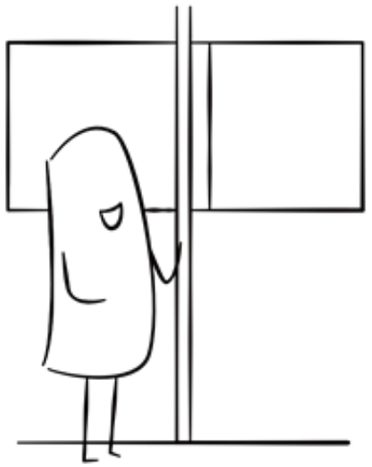
Potential & expectations

- There are more limitations than were considered beforehand, especially in terms of speed and sensitivity to other road users
- It must be a supplement to public transport and shared transport as a means of reaching every home/residential unit, as part of a broad palette of mobility solutions
- Under no circumstance should it encourage people to drop the bike in favour of the shuttle; the primary aim is to replace the car
- It must be state-run to keep the price affordable and make it accessible to all. It must not become a luxury product
- It must not be an on-demand transport service as this would be at the expense of sustainability, and it must be a part of shared mobility, not for personal use or private possession
- The greatest benefit is 24/7 availability (and cost-effectiveness for night staff)

Have we come to a stop because that cyclist is overtaking us? Quite an inconvenience in town.

It really is extremely careful...

It's the future, I'm a fan!



A few quotes from the trip prior to the workshop

Insights of the panel of residents

Feasibility

- The majority have faith in the technology and think that it can be introduced in Mechelen in the short term (3 to 10 years)
- It's chances of success will depend on whether it is a paid service, from an accessibility viewpoint, and people feel that it should be free if it is a city service
- Some cannot envisage it running in streets where there are lots of cyclists and pedestrians, not even in the distant future

Safety

- After riding it people think that it is not as safe as they had anticipated because the operator still has to step in frequently. The car stops rapidly and frequently in response to minor changes, which lessens the feeling of safety. These users felt that it was not used to unexpected obstacles
- People expect the system to be intelligent, like the robotic vacuum cleaner at home. It learns from past experience and adjusts accordingly
- In a busy environment especially, people report that they do not feel safe
- It is perceived as a hindrance to other road users as it drives so slowly
- The ramp on the shuttle is currently too steep for a walking frame or wheelchair

Potential & expectations

- Afterwards, most people are disappointed by the innovative character of the shuttle, as they had expected more from it
- It is much more limited than they had anticipated, and they perceive little to no system flexibility
- It tends to be seen as a solution for people with mobility issues or for those who are unable to use a bike for one reason or another
- They see it mostly as a custom transport solution, much in the way that people with mobility issues call a taxi today. Being dropped at a stop, but still having to walk is not a solution.
- It is mostly perceived as a short-distance service

In town there are many more obstacles...

It would be great if it was suspended from rails above the town.

If the host has to steer and take action, it can't be autonomous, can it?

***A few quotes from the trip prior to the workshop**

Insights from business and industry

Feasibility

- The overall sentiment is one of deep criticism of the pilot shuttle. That aside, there are high expectations of driverless technology (level 4) and they refer to examples from their own industries
- Most acknowledge that the technology has come a long way and think that it would be feasible to deploy driverless vehicles in Mechelen in the short term (under 5 to 10 years)
- For the majority this is less evident when it comes to goods logistics in the future, as businesses remain reliant on large-scale freight transport in the suburbs

Safety

- The feeling of safety lessens after the trip because the shuttle cannot get around an obstacle like a bus waiting at a stop

Potential & expectations

- Deployment as a shuttle between town and business parks. Ideally, employees could choose their own route and time for flexibility
- Offer employees the chance to work while on the move as a sort of office bus, because the work-life balance is becoming ever more important for personnel
- Deployment for quick delivery of urgent packages and orders (to assist clients today and save on high DHL costs) and deliveries between depots.
- May help ease the shortage of drivers, and improve cost efficiency by making it possible to deliver at night without paying night-rates to staff
- Delivery of shopping for workers (not having to rush to the shops before they close after work helps employees relax)
- They do not use the Bpost lockers because everything can be delivered to the business/warehouse, as a result of which the shuttle parcel service will not really be used
- Potential for transportation of visitors
- Electric, emission-free, quiet delivery (for example, Collect & Go)
- When it comes to attracting new personnel, it may be important to portray yourself as a 'green' business
- A question mark still hovers over the added value for the business park. "If only it could deliver sandwiches…"

I think the shuttle technology might be ready, but not the people around it. We're going to have to learn how to use it.

No longer watching every move? So you are feeling confident?

It is more complex than I imagined

***A few quotes from the trip prior to the workshop**

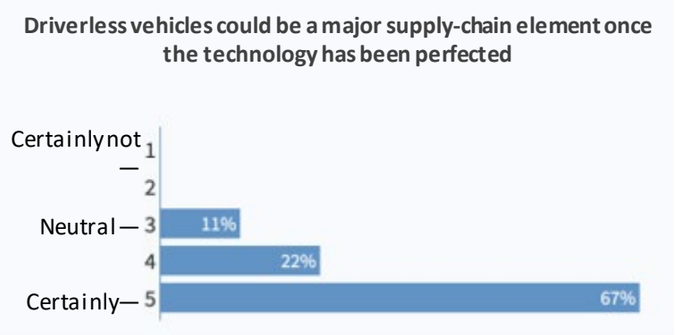
Insights from business and industry

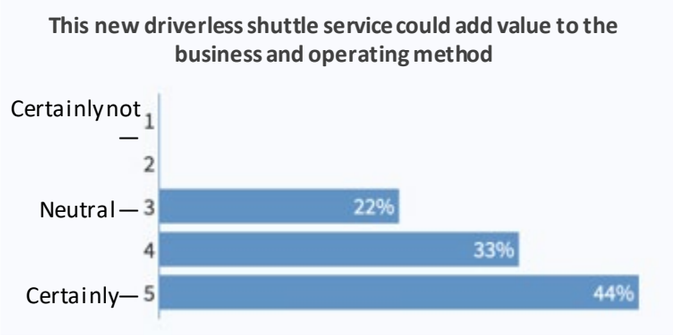
At the workshop, setups were presented through an online polling platform and the workshop participants were invited to respond individually on their mobile devices. This gave a snapshot of group opinion before the discussion began. But with only 8 participants, the outlying opinions were more noticeable, and the survey cannot be described as qualitative. For this, we used three central themes:

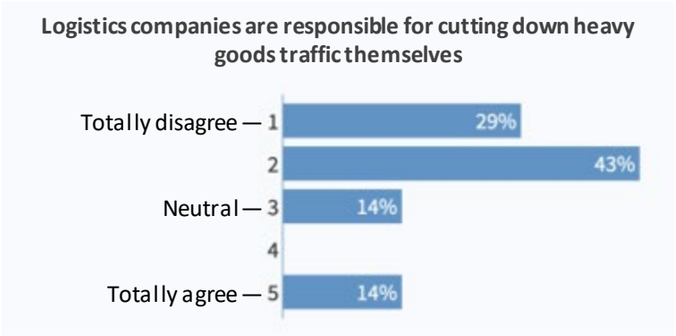
- Ecological impact
- Economic impact
- Social impact

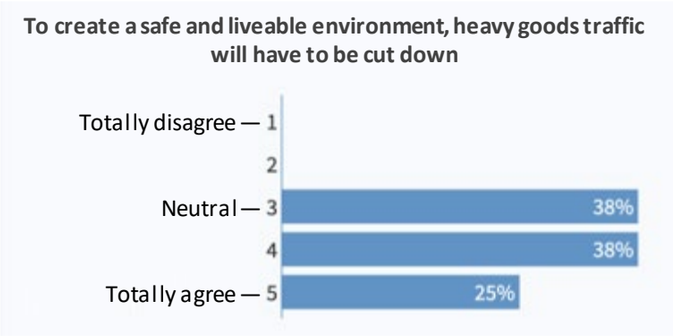
It is agreed that **heavy goods traffic will have to be cut down** if we are to create a safe and liveable environment, but it is noticeable that businesses do not feel that it is their responsibility to cut down heavy goods traffic on the business park, as they believe it is not a nuisance (only in residential areas). Furthermore, it is thought that a small shuttle does not present a solution here, as they feel that lots of small buses do not make it safer or more liveable than the occasional heavy goods vehicle.

The majority say that driverless transport **could add value to the business and operating method** and that it certainly could be a major supply-chain element once the technology has been perfected. Examples refer mostly to logistics on their own site or in their own warehouse or production line.









Scenarios

At the workshops, three fictitious scenarios were presented to throw a light on and then assess the desirability, application opportunities and potential of driverless transport. Each scenario contains several unique elements that distinguish it from the others:

Scenario 1: hop-on hop off

The shuttle travels a **set route** around de Vesten and is **organised by local entrepreneurs**. It operates as a **hop-on hop-off service** for use by residents and tourists.

Scenario 2: taxi system

The shuttle travels **on demand** to a **chosen destination** and is offered **by Mechelen town council** as a public taxi system. There are several shuttles in circulation, and they can be reserved as and when required.

Scenario 3: parcel service

The shuttle is deployed **by Bpost** with a view to **delivering parcels.** The shuttle travels a **set route** and can be called by a customer to collect a parcel when it suits them.

A presentation of these scenarios gives us a better picture of where the target groups see the greatest potential from their perspective and how they might adapt the scenarios to make them achievable or desirable in their own specific situation.

Conclusions on the scenarios

average preference in all workshops

Scenario 1: hop-on hop off

Added value & potential

- Desired scenario for city services
- Suitable mostly for people with mobility issues
- Possible in cooperation with current buses and local traffic, as a supplement to other forms of public transport
- Attractive mainly to tourists and shoppers
- Verifiable, predictable and easy to board, as you can be certain that it travels the route frequently
- Departure from parking pockets (free parking and shuttle takes you to the town centre)

Concerns & risks

- De Vesten is extremely busy and the shuttle will come to a halt frequently as a result
- 1 shuttle is insufficient, the capacity/frequency must be adequate
- Is there enough demand?
- Devote as much space as possible to the shuttle and less to cars
- Useful only if quicker than the bus or car
- Advantageous only if the route is used by a lot of people
- What about transport to de Vesten to reach the shuttle?
- And what about cutting across to certain places?
- Tourists often travel in groups so the shuttle will have to be bigger

Scenario 2: taxi system

Added value & potential

- Mostly seen as a project for external providers or external partners offering bike or scooter rentals, for example (not council-run)
- Desirable on a small scale only for people with reduced mobility, as a reduced-mobility centre service

Concerns & risks

- Least preferred scenario for city services because individual use is involved
- Avoid creation of 'Zombie cars', .e.g. by offering a shared-ride system only
- Still a thing of the distant future
- People will get lazy and give up the bike, which is not what is wanted
- Still a lot of technological and organisational issues to be resolved
- Not desirable on a large scale due to quality of life and detachment
- Operation by app is possible but not an obvious choice for older people
- What about the existing taxis? (risk of taking people's jobs away)
- Infrastructure needed: Set-up of zones, parking when they are not in use, large car park with loading points, separate lanes, development of an app, infrastructure for stops

Scenario 3: parcel service

Added value & potential

- Is seen more as a shuttle to transport parcels to fill lockers (in addition to existing lockers) or replace a set of empty lockers with full ones
- Could be the first step in the acceptance process, after which passengers could be transported when people are more used to it
- Grouping per neighbourhood or street so that the shuttle is never too far away or waiting times too long

Concerns & risks

- Only sustainable if grouped and not by individual demand (on-demand means more movement in town)
- Stops needed for loading and unloading
- For set routes only, with set pick-up and drop-off points
- What if the parcels are not collected?
- Not envisaged in combination with passenger transport due to lack of space and different streams

04

Digital Survey

Design

General survey

A large, general digital survey was set up firstly to survey people who have used the shuttle and secondly to reach a broader target group by questioning them on the subject of mobility challenges and asking what sort of solutions autonomous transport might offer.

The survey was spread by means of the Mechelen website, flyers in the shuttle, flyers at the physical setup and on social media.

100 people took part in the survey, 75 of whom also took a ride on the shuttle.

Specific questions

In addition to a general survey there were questions aimed at specific target groups or designed to obtain specific feedback:

- Survey of employees in Mechelen North
- Review aboard the shuttle (on a tablet)
- Review after using the parcel service

The feedback from these surveys is incorporated in the insights.

General insights

Of the **75% of people who tested the shuttle, 89% were positive** when asked for an initial response. People are mostly **surprised**, and find it **fun**, **educational, inspirational**. A frequent note in the margins was that the shuttle is **slow**. People are generally positive about the experiment and the test experience. The responses were more critical on issues concerning the detail and application.

Perception

When we asked for people's perception of driverless transport it turned out that it is **obviously a thing of the future**. People are, however, **anxious about handing over control** to machines, but also say that it could be a solution to **public transport bottlenecks.**

Negative responses

The majority of negative responses related to concerns about **technical defects, interventions by the operator**, **slowness** and **hold-ups** due to frequent stopping. Additionally, people are not sure about how the shuttle would respond in a town-centre context, in **interaction with other road users.**

The **lack of human control** was also cited, e.g. “No driver to help you by giving directions” or “A computer does not have the responsivity of a human being”. That fact that the introduction of 30 zone in the test case was met with irritation shows that other road users will have to learn to adapt to autonomous transport.

Experiment

People were very positive about the fact that Mechelen is considering this and prepared to **experiment**. However, comments were made in relation to the **route**, which a lot of people considered useless: “Nice test, but fairly unrealistic given that the environment is too safe: parking ban, traffic travelling at 30 km/h maximum, light traffic, no cyclists. In other words: an overly controlled environment.”

“It was a great experience to see how the vehicle scans its environment and actually sees everything at quite a distance!”

“Amazing, the innovation behind this gives me a sense of excitement for the future”

“Nice demo, but slow with lots of manual interventions.”

“Fun and educational. Although it was a bit slow”

““Delighted to see you looking into this.
More of that, please!”

“Impressive but still not driverless, as the shuttle can't yet negotiate small obstacles”

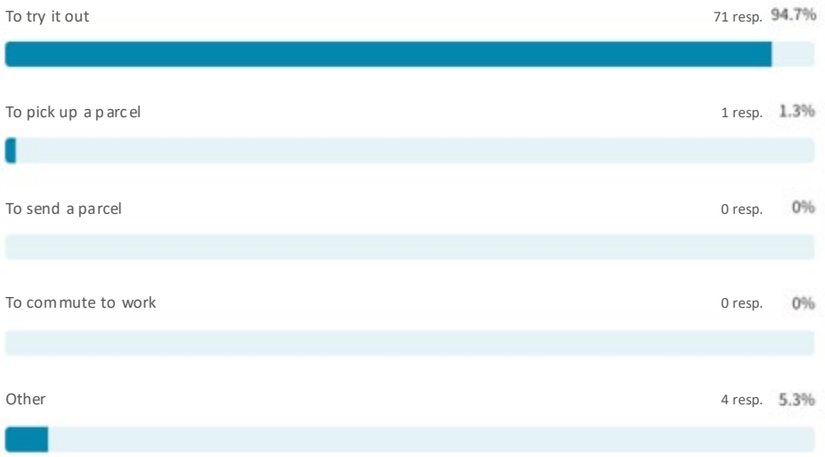
“For an overall solution to Belgian tailback misery. 100% automation eliminates conscious and unconscious human error.”

Quantitative results

Why did you use the shuttle?

The vast majority of respondents **used the shuttle to try it out**.

R = 75 of 100



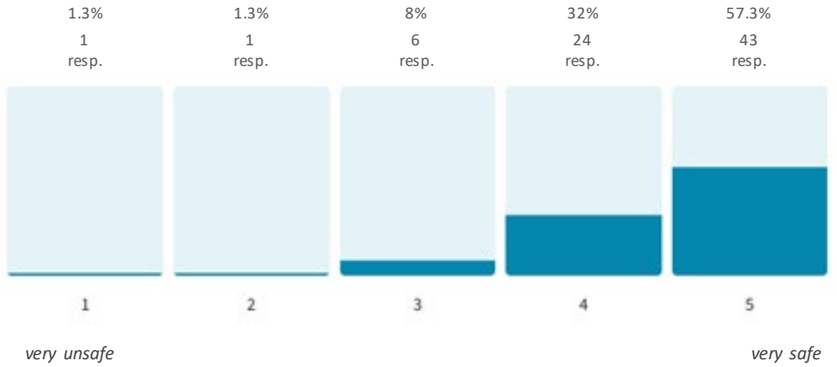
Other...

- to go to the sandwich shop
- to use the air-conditioning
- went along with others

How safe did you feel while riding it?

The shuttle was perceived as predominantly **safe** (average 4.4)

R = 75 of 100



Quantitative results

Would you use it again?

The **vast majority** of people who tested the shuttle would **use it again or recommend it to others**

R = 75 of 100

Yes...

- Because of their experience of the test and their interest in the experiment and the technology.
- If it took another, more useful route
- Because they are curious about the progress of the project and technology

No...

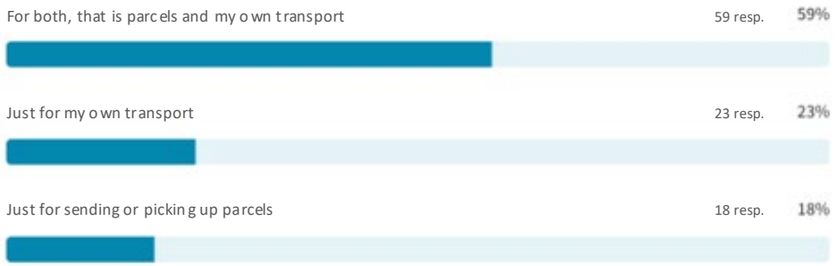
- People who don't wish to try it again say that this is because of the route (which was of no use to them) and slow speed (it would be quicker to walk to their destination)

Quantitative results

What would you prefer to use the shuttle for if you had the choice?

The respondents in the online survey envisage the shuttle as a **combination** of **parcel and passenger transport**.

R = 100 of 100



What do you think that driverless transport (like this) would be good for?

The most frequently chosen applications are transport in a **business context**, transport as a **shuttle service to the town centre** and to **amenities**.

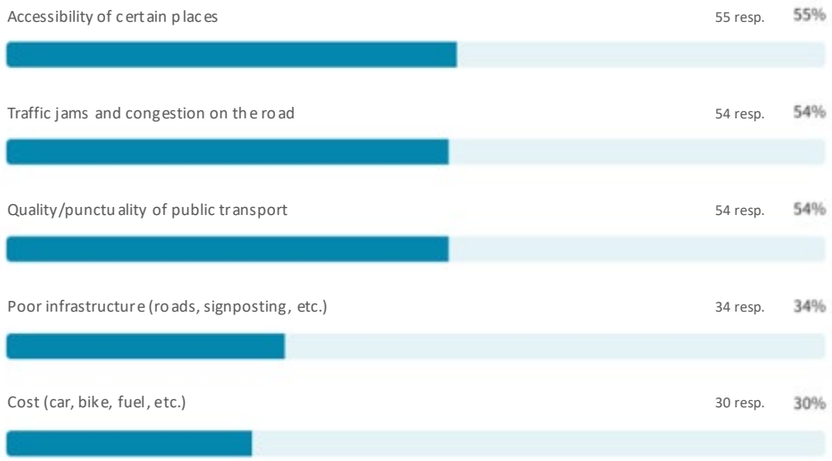
R = 75 of 100, top 5 most frequently chosen:

Quantitative results

What is your biggest frustration in terms of mobility?

It is noticeable that the **biggest mobility frustrations relate to public transport**. To its quality and punctuality, and the accessibility of a place. Additionally, **traffic jams and congestion on the road** are a major source of frustration.

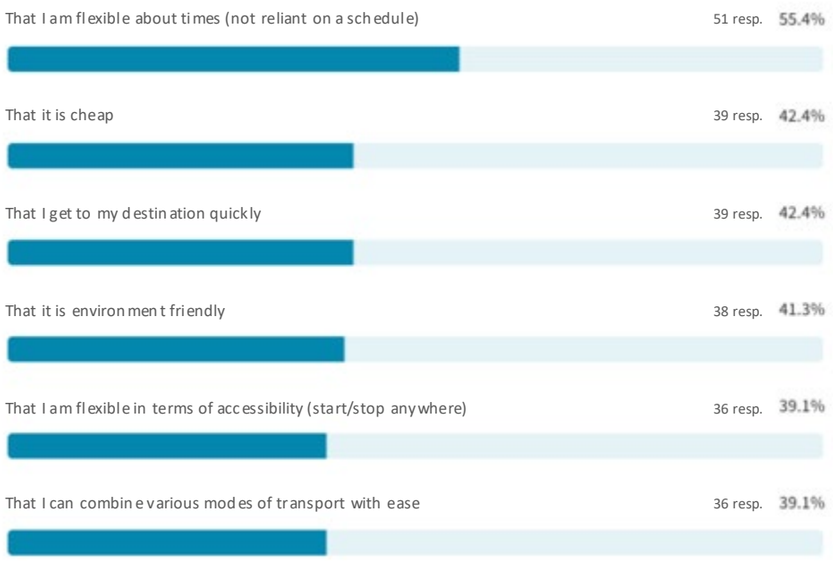
R = 92 of 100, top 5 most frequently chosen:



What would you say is most important when taking a journey?

A frequently cited preference is **flexibility**, which is also evident here:

R = 92 of 100, top 5 most frequently chosen:

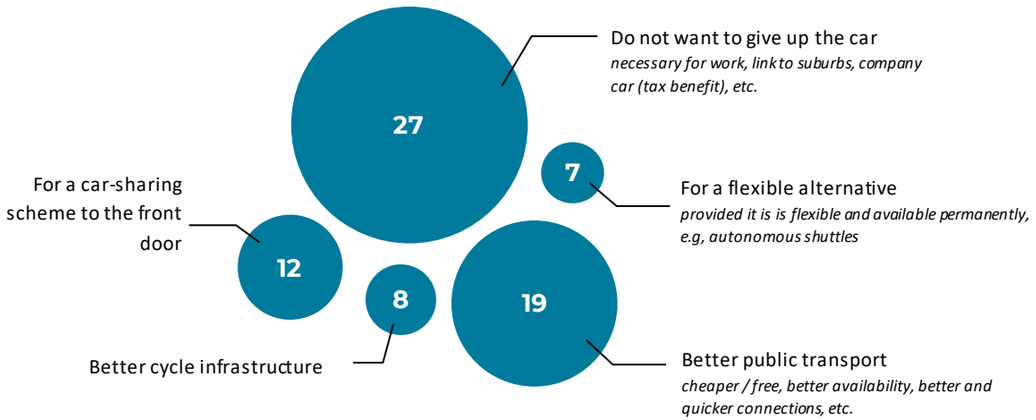


Quantitative results

What would make you give up the car?

The vast **majority (83%) of respondents are car owners**. We asked them what it would take for them to give up the car...

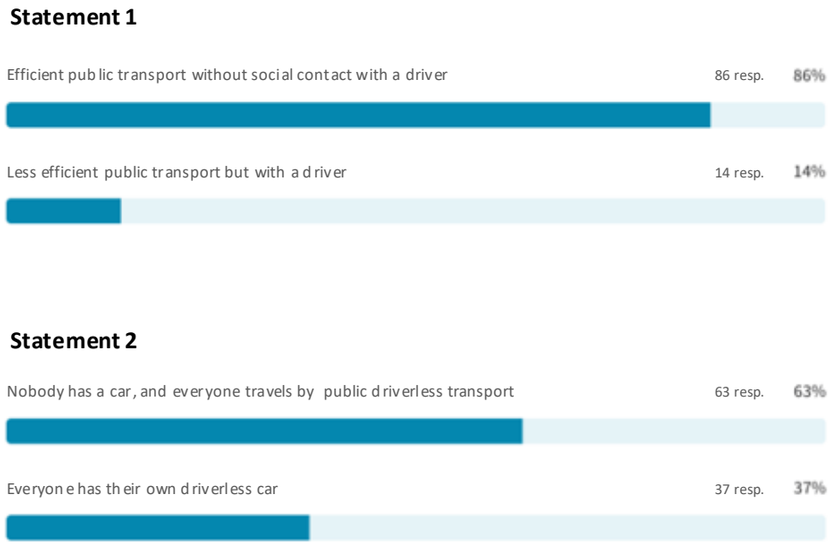
R = 74 of 83



If you had to choose, what would you choose?

Finally, two more statements from which to deduce what people see as the deciding factors in the following scenarios:

R = 100 of 100



05

Overarching Insights

Overall conclusions on the set-up, workshops and surveys

The different points of focus

Experts and city services

- Focuses essentially on a set route, with the vehicle operating in its own infrastructure
- The main concern is that it could replace the bike, which is definitely to be prevented
- See it entirely as a a form of shared mobility and not for individual or on-demand use
- Show concerns about the creation of ghost cities, in which all things are automated

Residents

- See the greatest potential in custom transport, given that flexibility is one of the main conditions
- Environment friendliness is very important
- As a replacement for public transport, given that there is a lot of dissatisfaction with it here today (accessibility, congestion, punctuality)
- Price is an important aspect, must be low-threshold and available to all
- Accessibility must be guaranteed (through low price, adaptation to needs, such as wheelchair friendly, etc.)

** The next slide shows the different resident target-groups*

Workers in Mechelen North

- See the greatest potential in an express shuttle service to ferry workers between the station and the business premises without stopping on the way (workers themselves not yet convinced to give up the company car for this)
- Focus on efficiency and time savings
- Strong belief that driverless transport can be incorporated in own supply chain and logistics, but not in the short-term

Differences per target group

- Initial reaction varies greatly, but both say that “this sort of thing is inevitable anyway”:
  - ***“COOL!“* group (biggest)**
    Would have preferred yesterday to today and has been waiting a while for it to come. Has total confidence in the technology and sees nothing but benefits.
  - ***“OH NO!…” group***
    Is concerned about “the machines taking over” and about ethical decision-making in the absence of human intervention.
- Says that it might solve **public transport issues** such as congestion, strikes and delays.

- They are not impressed with the idea that this is possible in the future.
- The older age group (80+) is not interested, as the future outlook is not one that they themselves feel a part of.
- Younger senior citizens see it as an **opportunity** to stay mobile in the future “when they might need it”. They mostly see it as a solution for people with reduced mobility.
- They have **confidence** in the technology when it is introduced by the town council and say that they **would get used to it** once they had given it a try.

- They need a custom, **door to door** solution, to the destination of their choice, of the type offered by a taxi service.
- This target group often **needs time** to get ready, a shuttle would have to wait.
- People who have **difficulty walking** would use the shuttle if they tired while walking or had a lot to carry
- The shuttle as tested has **too steep a ramp,** and its interior is too small to accommodate a walking frame or wheelchair
- For them, public transport is often a means of **social contact**

- Residents that go **everywhere on foot or by bike** give as a reason that they wouldn't use it to get around the town centre. If they couldn't use their bike, e.g. due to bad weather, too much to carry, not (or no longer) able to cycle, … it would be an option for them.
- They express strong views over **improvements needed in public transport** and are enthusiastic about the deployment of autonomous shuttles in the context of shared transport and last-mile applications.
- Car owners in this group say that if it was combined with better public transport, they **hope to have no need for a car** in the future.

- Use the bike a lot, but are also attached to the car for flexibility when it comes to reaching inaccessible places and doing the shopping.
- They complain mostly about **poor bus connections** to their neighbourhood/village.
- They see autonomous transport as a solution to **park+ride situations on the outskirts of town** that would prevent them from having to find expensive parking spaces in the town centre.
- These car owners do not expect to have to give up their car in the future because it offers them **freedom and flexibility**. Only if the town council makes it impossible

General insights

advantages  positives

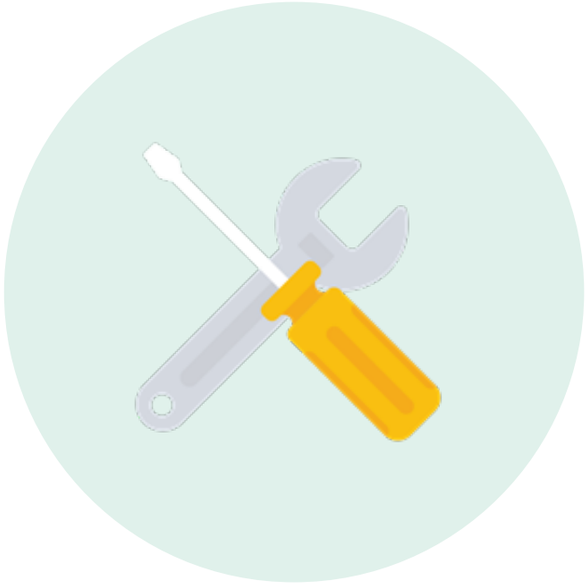
- **No driver** to consider: pay, driving and rest periods
- **Solution to the parking issue**: many people suggest running the shuttle between parking pockets outside and within the town centre. There would be no need to spend time searching for an expensive parking space when visiting the town centre.
- It could be an alternative (clean and quiet) mode of transport in a **care-free centre**
- Suitable as a **24-hour service**
- Ideal as custom transport **for people with reduced mobility** as they cannot use a bike or walk a long distance
- Useful for **tourists** as they are not in a hurry and do not have their own transport, e.g. from the station to Kazerne Dossin
- Could reduce parking space numbers: no parking spaces needed at the station as the shuttle can pick you up and drop you off at home. This **creates more space** for green initiatives and other applications.
- Most people have **confidence** in the technology and the town council. That if this is implemented, the technology must be reliable/safe
- The shuttle **does not respond emotionally to traffic situations,** i.e. aggressive driving is not an issue
- Could offer a solution for electric vehicle parking: the shuttle can be used as transport between the charging points and the place you wish to visit. This could allow a better **grouping of the charging points**.

disadvantages  concerns

- **Flexibility** is one of the conditions: the shuttle would have to run frequently and be available on call, through an app for example. People do not want to wait for more than 10 or 15 minutes.
- **Interrelationship** between two major mobility requirements: flexibility (on-demand service) and sustainability/shared transport (set route)
- **Lack of social control** is a major issue for many due to:
  - Sense of safety (nobody to take action in an emergency)
  - Contact with the driver is important for some target groups to counter social isolation
- There is little faith in the system's ability to function in a **public area with other road users** such as crowds of cyclists and pedestrians, as there are too many obstacles in an urban environment
- For that reason people expect an **adapted infrastructure** to be needed to enable its combination with other road users
- The shuttle runs **too slowly**, and if it is slower than the bike then most people will use the bike. And if it actually is quicker, do we want to **compete with the bike,** which is greener and healthier?
- The shuttle must **deal with obstacles in a smarter way** (anticipate, give way, ethical decision-making, etc.)
- Most people would **split passenger and goods transport** because:
  - it takes up a lot of space, leaving fewer seats
  - they often take very different routes, and people think of these flows as getting in each other's way and having to stop and wait for each other
- Members of the public still have to learn how to deal with **driverless vehicles as fellow road users** (perhaps support will come in the shape of a government information campaign)

Required adaptations

To take maximum advantage of the potential of both the shuttle and driverless transport, quite a few more adaptations are considered necessary. These suggestions come in response to the needs of the user and as adaptations to the **shuttle as tested in this test phase**.



Infrastructure-wise

- Routes will have to be cleared of obstacles
- Given the sensitivity of the shuttle, the public space will need to be adapted and this is envisaged as a separate lane for the shuttle to run in (re-arrangement of the lanes)

Human

- A shift in mindset is needed if people are to volunteer to relinquish possession of a personal car, or at least to stop using one
- Mecheleners will have to get used to this sort of transport and learn how to live with it
- Incorporate some form of social control, e.g. by means of cameras

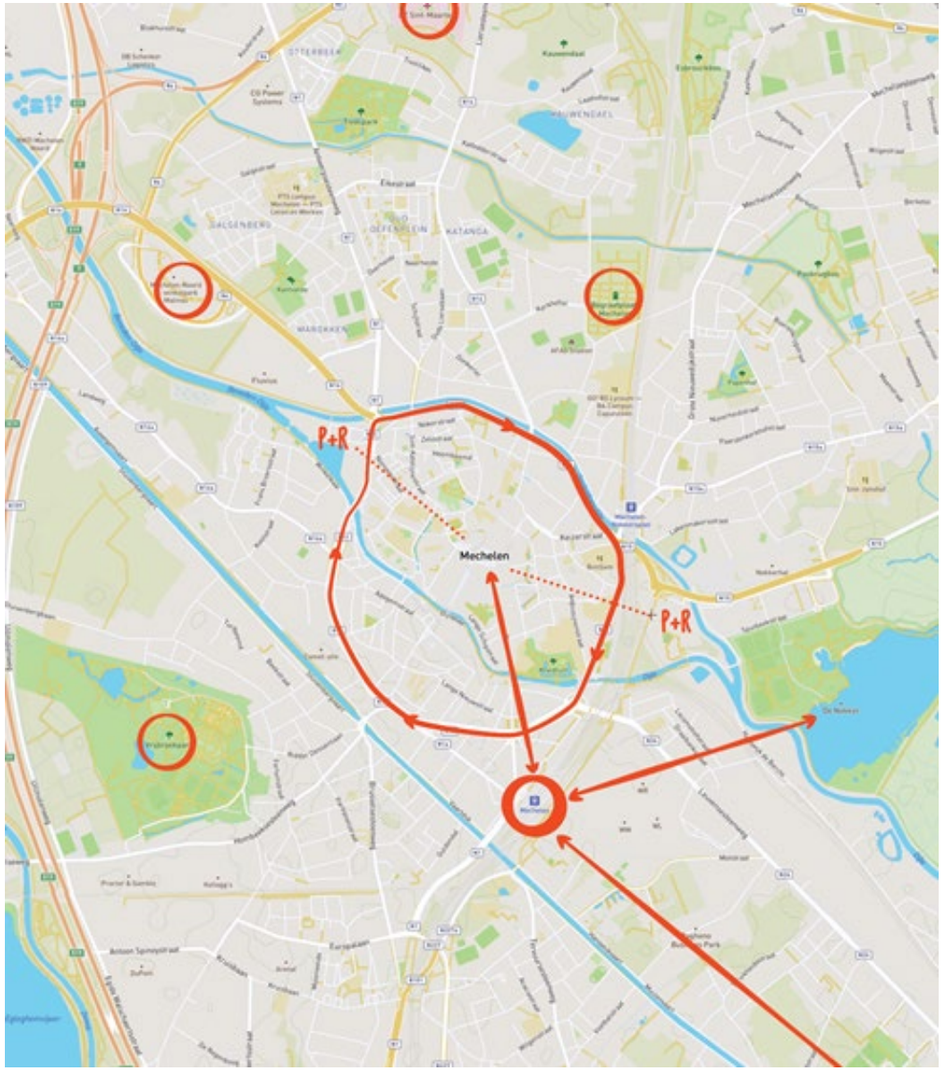
Technological

- The shuttle must drive more assertively to improve the interplay with other road traffic factors
- Obstacles will have to be interpreted in a way that allows the shuttle to give way appropriately
- Speed must increase (30 km/h), as it is considerably slower than cycling at present
- More flexibility with regard to obstacles
- Autonomous = unmanned. People want someone to be able to step in, but remotely rather than in the shuttle (from a control room, for example)

Vehicle-wise

- Capacity must be increased to maximise the number of seats and make the shuttle suitable for large group of travellers such as tourists (10 to 15 people minimum), and to allow more space for a passenger in a wheelchair, or with a stroller or walking frame
- The step-up must be easier (for elderly people) and the ramp not as steep for wheelchair or walking-frame users
- There must be luggage space (if it is used for shoppers)
- At present the shuttle is too wide to be used on cycle paths
- Visibility must be better; the windows lower and transparent so that passengers can see where to get off
- Size must be adjustable, e.g. by attaching another carriage in peak periods
- For logistic purposes:
    - More loading space
    - Day and night service, availability 24/7
    - Must be able to stop anywhere, and not just at predefined stops
    - Shuttle must be able to drop goods off autonomously

Route



Types of route

- Mostly seen as useful for **short journeys** and **last mile solutions**
- More a solution for journeys from the outskirts of town to the centre than just around the centre, because for journeys under 15 km the Mechelener will take the bike or go by foot and “everything is within walking distance in the centre, so there's no need for a shuttle”
- Tends to be on **set routes** so that people can be confident that it will always be running
- Has to run very **frequently** (people will wait 10 minutes maximum) cf. the metro lines
- **Dial-a-bus** is also seen as a possibility, e.g. calling through an app (but what about the people already inside?)
- To make it better than public transport it requires **extra flexibility**: no set stops, not a (fully) set route
- It has to be something you can hop on easily in combination with other transport, e.g. when your personal transport (bike, car) is parked up far away.

Interesting locations

- In a circle around de Vesten (in the future)
- From the station to the town centre
  - Or to Planckendael (as the boat once did)
- From several park + rides to the centre, e.g. Rodekruisplein out-of-town car park
- Connecting suburbs with the centre and hospital
- Places that are hard to access by public transport today, like:
  - Residential areas with poor bus connections
  - De Nekker
  - Malinas shopping centre
  - The cemetery
  - Vrijbroekpark
- Places that senior citizens with reduced mobility could visit, such as:
  - Library
  - AZ Sint Maarten
- Along the canal, the river Dijle
- From anywhere to the destination of your choice within 10 to 15 km radius (“driverless Uber”)

Alternative to the personal car?

- Residents indicate that they would leave the car when they are no longer allowed to take it into town or to park in town
- Residents indicate that shared electric transport is sustainable only if residents leave their own cars in favour of it
- The shuttle is mostly considered as an option when people are no longer able to cycle, when the weather is bad enough to make cycling less attractive or when they have a lot to carry
- Many people rely on their car for their jobs, which they cannot get to by public transport, or for flexibility
- Freedom and flexibility is the main argument in support of the bike and the car
- Some people see the car as a status symbol. This mindset will need to change if they are to give up the car altogether. Young people are much less concerned by this and do not necessarily have to have their own car.

Conclusion:

External incentives will be needed before people give up their cars. The shuttle is not seen as an alternative to the car, but as an alternative to the bike (or walking) when circumstances dictate.

For what would people give up the car?

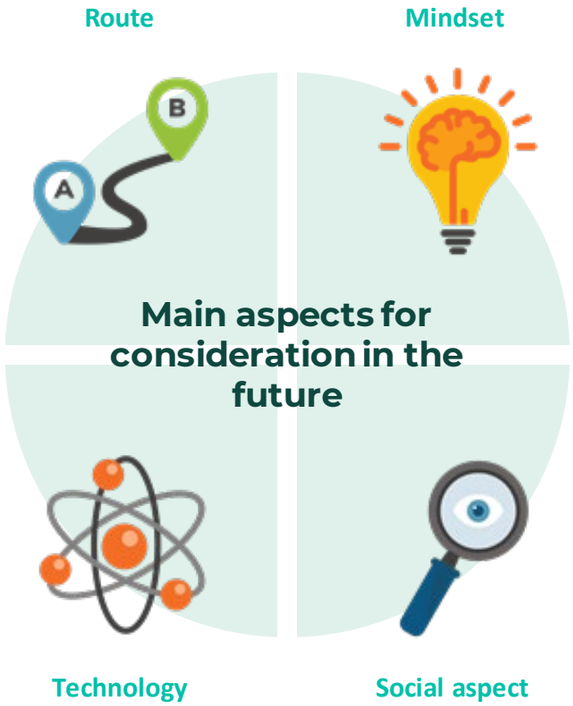
06

Guidelines

Autonomous transport in the future

One of the main factors in ensuring a successful implementation is choosing a route that is of use to a large group of people.

- Both the station and Mechelen town centre are locations that are often cited
- A circular route around de Vesten is also seen as an opportunity, combined with a car-free town centre and parking pockets/P+R
- Connection to other public transport services, e.g, last-mile applications
- Thought must be given to how driverless transport can be implemented with parking pockets on the outskirts of the town to ward cars away from the centre yet at the same time guarantee accessibility.
- A useful route, frequency, numbers and capacity are important factors in assuring sustainability. People are not convinced that driverless transport as presented here is actually a sustainable measure.



The mindset of the public is a crucial element when it comes to implementing driverless transport, and the following issues are central to that:

- Education of members of the public about the behaviour of autonomous transport in public spaces and how they should interact with it. e.g. communication campaign
- Incentives will be needed to get people to leave their cars at home. What is crucial here is to offer an affordable, flexible and customised alternative.
- There must be a clear, ethical and statutory framework in place to bolster public confidence.
- To quiet the sceptical voices, there must be clear and quantifiable benefits that outweigh the high costs compared to other public transport improvements.
- The Mechelener does a lot by bike, and autonomous transport cannot be in competition with the bike, thereby stimulating a 'lazy' mindset.

Members of the public have a lot of confidence in the technology. If the town council has introduced it, it is assumed to be safe. For that reason it is important that nothing happens that could damage that confidence.

- As it is still just an experiment, errors will be accepted, but once it is implemented it has to be fully on point to eliminate the risk of losing the citizen after the first try.
- Today the technology is not sufficiently advanced to manoeuvre independently on the public highway among other road users, and this needs further development.
- Smooth progression and anticipatory driving behaviour are crucial. If the shuttle drives too cautiously its behaviour will be perceived as hesitation, which could cause confusion in other road users and lead to dangerous situations.

Social and human control is a major concern for many. Serious thought will have to be given as to how it can be addressed.

- The system will have to incorporate an element of social control. Many people are open to social control by means of a screen, e.g. a host observing remotely and responsible for several shuttles. Obviously, privacy must be borne in mind here.
- Some form of human contact will have to be involved, so that action can be taken if needed, and so that people have someone to consult.

Use of the car

The majority of the people we spoke to are not yet willing to give up the car. A few important factors to bear in mind are:

- Many people have a company car, and the tax benefits are so good that possession of one is unquestionable
- Lack of a good alternative, with flexibility and custom use being the main factors
- Price is an important aspect: the alternatives must be very cheap or even free
- People outside the town centre especially have no alternative for the car
- Whenever an alternative is mentioned, it is most often a shared car
- There is a huge difference in perception when it comes to responsibility: residents look to the town council to get people to reduce their car usage, whereas in the business context they are more likely to consider it themselves.

It is the job of the town council to incentivise people to give up their cars and to find alternatives to car transport. The logistical problems will be tackled by suppliers and businesses, as it is their problem and they benefit from it themselves.

Parcel service

In the online survey and during the physical setups we asked for ideas about the shuttle as a parcel service, and we note a difference between the two surveys. There was dialogue at the setups, through which practical implementation was considered and from this it appeared that no advantage could be seen with a travelling locker, and in fact disadvantages were sometimes given. The online survey respondents reacted to the idea without being able to give suggestions on usage, and their response was neutral. These are the main insights:

- Respondents indicate that it is just as easy to have their parcel delivered to a locker in the neighbourhood, and this may be to do with the fact that the town of Mechelen has one of the highest densities of Bpost Lockers (says Bpost).
- Workers in Mechelen-North indicate that they usually have their parcels delivered directly to their employer's address, at the warehouse, for example
- Since it has become more common to work from home, many people have their parcels delivered at home and then exchange it through a locker or post point
- The automated system takes up a lot of space that could be more efficiently used to transport more passengers
- Where parcel delivery is concerned, people are less willing to compromise on functionality if it benefits sustainability (“It might be less green, but it's more convenient when it comes to my door”)
- User streams can get in each other's way, e.g. passengers having to wait for someone who is just picking up a parcel (without travelling)
- However, it could be an opportunity to see how driverless transport can be used to replenish or empty sets of stationary lockers automatically (the way a glass bin is emptied)

Combining a parcel service with driverless transport is not ideal for private individuals. It might be an idea to offer it to business and industry, so they could send parcels and goods between sites or to customers. To do this, we would have to look at how the vehicle could be built for optimal use. There are too few benefits with the passenger-parcel combination to make it worth pursuing any further.

Lessons learned for any follow-up experiment(s)

The whole point of experimenting is to evaluate and learn. These are the main recommendations for any future test drive experiments:

- Route selection is crucial in the user survey
  - It has to be a useful route that gives the user a reason for using it (e.g. quicker than walking, exclusivity, etc.)
  - It must serve a diversity of users, e.g. mirror the people of Mechelen (depending on the research goal)
  - Presence of other road users in sufficient numbers to give a realistic picture
  - The shuttle must have a certain visibility: people should come across it without making a special journey to try it out and without arriving with expectations or preconceived ideas
  - It is best to choose a short route of no more than 10 minutes. The present 15-minute route would appear to be too long “to just try it out”. A narrow loop or 8-shape would make it easier for people to get off earlier and get back to where they started, e.g. where their bike is parked.
- Extra communication channels can be used to tell Mecheleners about the experiment. It should be done before the project starts and should certainly be repeated at regular intervals to ensure a more continuous footfall.
- Consider that the wording sets a level of expectation among the test public; autonomous (no driver) and shuttle (there and back: A → B)
- Implementation in a broader innovation context, e.g Wijk Ragheno (see next page)

The choice of route and the context in which the test case is shown is crucial in getting residents on board with the experiment and makes it palpably easier for them to gain a realistic idea about it. This will produce more extensive and more accurate research results.

The Ragheno project

In terms of route choice and application types, talks were arranged with spatial planners and urban developers working on the Ragheno project, to look at how in the future autonomous transport could be of use in the district of the future. Reasons in support of why this could be an opportunity for a (test) implementation of autonomous transport:

- There is very little parking space envisaged, but plenty of offices, which creates an opportunity for a vehicle that would run to, from and through the area and allow people to step on and off with plenty of flexibility (as a last-mile solution)
- Strong match with the project in terms of smart mobility (and less in terms of sustainability). It ties in with the project image, and this can be taken further through, for example, the development of digital elements such as an app or system of smart cooperation between shuttles.
- Whenever a separate route is needed, implementation is difficult, but when use can be made of the infrastructure used by cyclists, cooperation is possible
- Of interest for parcel delivery: parcel capture at a central hub at the entrance to the area. From there, driverless transport may add value when it comes to further distribution
- As a supplement to public transport: De Lijn will not operate in the district itself, but there will be a bus stop at the rear. Driverless transport could become a link in the chain
- Investigation of whether a shuttle service to the town centre would be useful, desirable, viable, etc.
- May be of benefit to people working in the Ragheno offices, visiting businesses, … (not familiar with the area and therefore not likely to come by bike): impact of coronavirus still to be assessed (will people spend more time working from home, will offices get smaller, etc?) This will also impact on visitor streams.

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