VERKA Mobility Canvas

Bottom-up Mobility as a Service
Ministry of Transport and Communications

LV**W** MINISTRY OF TRANSPORT
AND COMMUNICATIONS

A!
Aalto University

Contents

PROCESS

Process
Bottom-up 'Mobility as a Service'

Brief from Ministry of Transport and Communications

Where are we now?

The contemporary transport ecosystem is rapidly changing. Options are multiplying (eg. Kutsuplus, Uber, car-sharing, etc.). There are also a variety of 'invisible' and 'informal' services, such as school and sports carpools, community-based delivery and transport of elderly, and socially networked delivery services, which are completely unaccounted for in the current system. In Finland today, the public transportation system is 'one size fits all'. There continues to be a need to provide a basic 'guarantee' of public transport, but the system is under-serving some users and over-serving others and, overall, consuming more public resources than necessary.

Focus and target groups

This project will focus on citizen needs and on invisible and informal mobility services organized by citizens, analyzed in the context of the varied (and emerging) transport ecosystem. The project will take the specific site of Hämeenlinna region, a Living Lab already engaged in relevant research and experimental initiatives. The audience target group for the project is political decision-makers at both national and regional levels. The target group to research and design for is the citizens.

Aim and goals

By investigating citizen needs and articulating citizen voices, the aim is to reach, inform and persuade decision-makers toward user-centric 'Mobility as a Service'. The Ministry would like to raise awareness and change the political and public mindset about transport services, and to build up confidence that system change can work. The Ministry wants to support that people have more and more individually suited options to choose from, while ensuring a democratic service offering.

Outcome

The outcome should be a persuasive formulation of 'citizen voices' in terms of their needs, desires and experiences. The result should include better insight into the true needs of the people and their ways of coping with transport and accessibility problems. The project might include visioning the future where user needs have been met and how this has improved quality of life of the citizens as individuals and at a society level.

74 Interviews **85** Survey Respondents **1** Workshop

7 Field Trips **3,173** Passenger km travelled

138 Research Articles Read **1,627** Post its **349** Photos

Image 1: Our two teams research processes in numbers in total

Knowledge gathering

We started the research phase of our Design for Government project in an interdisciplinary team of six students, "the mobility supergroup," and later on we divided into two different subgroups of three students each. The major share of our research was conducted while we were still in the mobility supergroup: We conducted an ATLAS Workshop, expert interviews, user interviews and discussions, field trips to Hämeenlinna, reading, and our own online survey. Through our research (image 1) we sought to understand the transportation in Hämeenlinna, needs of the people, informal (bottom-up) services and how to incorporate the voice of as many travellers as possible.

During our research we employed empathic design research strategies: empathic observation, interviews and experiencing things for ourselves. Jane Fulton Suri (2003) from IDEO defines design empathy as the ability to step into someone else's shoes and to understand them through their experiences. We tried to step into the shoes of citizens of the Hämeenlinna area by as many means as possible.

Research questions

- How could public and market driven transport options better meet the diverse needs of more people?
- How could the voices of more travellers be heard?
- Could a more varied mix of services allow people to leave their cars at home?
- How could informal (bottom-up) service provision open new space for service possibilities?

ATLAS workshop

In the beginning of our research phase for Design for Government we organized an expert workshop with the theme "bottom-up mobility as a service". The workshop's aim was to start the conversation with the stakeholders and begin to understand the context of our brief. Nine experts participated and they were divided into two groups. The ATLAS design game (compare Hannula 2014), was used to take notes from the participants and to spark the conversation during the workshop.

The two different groups had very different conversations. One group emphasized the resources used in mobility, the resources needed to create new services, as well highlighted the business potential of new transport services. The other focused more on the mobility services' user perspective, possible new services, as well as the future of mobility in autonomous vehicles. There was also discussion about the role of the user, and the juxtaposition between being a citizen and being a customer.

From the workshop we learned that bottom-up mobility as a service is a rather elusive concept. The stakeholders seemed to share a general vision for mobility as a service, as the integration of all mobility services under one payment system. This would then facilitate the development towards a more diverse array of mobility services to compete with private car ownership.

Image 3: Stakeholders and facilitator at the ATLAS-workshop

Image 4: Heading to Tuulos

Image 5 top: Testing the Hämeenlinna city bike and biking infra

Empathy through immersion into Hämeenlinna

To grasp what transportation in the Hämeenlinna area means, we immersed ourselves into the transport systems, experiencing all the modes of transport we could find in and around Hämeenlinna: walking, rental bicycles, private car, service bus, ride sharing, busses, train and hitchhiking. By emphatically trying out these different modes of transportation, we experienced first hand, what kind of problems could be relevant to our research: long distances, hurdles, dangerous spots, lack of information and unexpected delays. In Hämeenlinna we experienced both the sparsely populated rural areas, as well as the more densely populated urban area.

Key findings from urban areas

- The main train and bus stations are separated in Hämeenlinna, thus interconnections are difficult between long-distance bus services and train services
- The city offers four city bikes to rent for free from the tourist information
- It's quite unclear whether you can cycle in the centre of Hämeenlinna
- Cycling in the centre feels hazardous
- Hämeenlinna is quite small, it could be very cyclable. Bad maintenance/plowing especially during winter additionally impact cyclability
- Service buses are a great service. The service is however stigmatized, only the elderly use it

Image 6 bottom: Travellers wait for their buses at the Hameenlinna bus station

Image 8: The walk from the highway bus stop to Tuulos village center

Key findings from rural areas

- Large long distance buses are used, but they have very low ridership
- There are limited public transport options in rural settings, if any at all.
- Where public transport options do exist, schedules are often inconvenient and entirely inflexible.
- Municipal consolidations have led to services getting farther from citizens.
- Many public buses no longer go into the villages, but stay out on connecting highways.

- No sidewalks make for treacherous walks on the side of icy roads on dark winter nights.
- No bus shelters and no real time bus data makes waiting on the side of the highway for the bus less and less desirable.
- Thus, a private car is the default option and a necessity.

Image 7 bottom: 40 cm between the bus and the slush at a bus stop

Interviews

We conducted 74 interviews over the course of the project. 28 of our interviews were formal: they were recorded and consent forms (image 10) were filled. The rest, 46 interviews were more informal, ranging from interviews with key bottom-up mobility actors on the phone, to chatting with people we met in the villages. The interviews covered the public, private, and third sectors, including the Ministry of Transport and Communications, Hämeenlinna city officials, Growth Corridor, village associations, Sitra, Smart Kalasatama, Liikennevirasto, ITS Finland, Hämeenlinna Disability Council, Tekes as well as public transport planning in smaller cities of Pieksämäki and Pietarsaari.

We conducted many interviews and discussions with residents of the Hämeenlinna municipality to understand the user experience in Hämeenlinna and surrounding villages. We spoke with individuals we met along the way of our many trips to, from, and around Hämeenlinna. We spoke with individuals at the bus stops, on the regional buses, commuters on the train (image 9) to Helsinki, local village bus and service bus users, cyclists, even

our rideshare driver from the "Kimppakyyti Tampere - Helsinki" Facebook group.

We spoke with residents of small villages in Hämeenlinna & Jyväskylä: Evo, Sattula, Janakkala, Tuulos, Lammi, Tervakoski, Tikkala and Vuolenkoski. All of these discussions helped enlighten a deeper understanding of transportation users, and helped us to put these users at the center of our solutions.

Through these formal and informal interviews and discussions we began to gather information for our aforementioned research questions. In particular we obtained quite a lot of information about the voice of more travellers - of the elderly, of the commuters, of people with disabilities, and of people in small villages. We looked at different ways of organizing public transport and promoting it: Free public transport for the young in Pieksämäki and on-demand public transport in Pietarsaari. Additionally, we gathered story after story of the informal workarounds that people use to meet their own transportation needs (also in appendix 1).
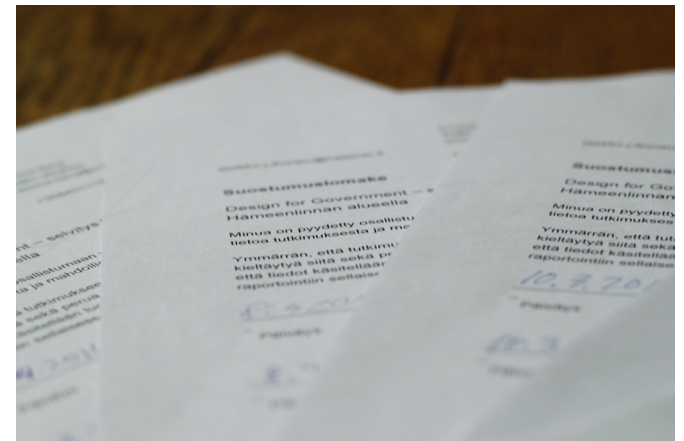

Image 9: Doing research in the train

Ilmage 10: Consent forms

Free public transportation for children in Pieksämäki

We interviewed the public transportation planning in Pieksämäki about their experience and found out that the ticket revenue and customer volumes in the Pieksämäki public transportation had been going down for many years. When the city went into the brutto-model of buying public transport services, they started to get the ticket revenue to the city. They realized that the ticket income was so low, that it couldn't really get much worse.

The planning in Pieksämäki had statistics that showed that school children and youth were not using public transportation as they could have. They made a radical decision to make public transportation free for children until the summer after 9th grade, but they decided not to make any adjustments to their current bus routes or schedules.

The trial started two years ago and there have been many good effects. Customer volumes have gone up 70 %, also parents are now using the bus more because their kids can use it for free. Young people continue to use the public transportation after they graduate 9th grade, because they are accustomed to use it, even though it is not free for them anymore. Their ticket income has even increased and their efficiency also by 130 %. Schools and kindergartens are saving money, because they do not need to get "tilausajo" an ordered bus to go to events, and that has increased the flexibility of the studies. Schools have started to schedule their studies, so that everyone can use the busses and fit in better. Pieksämäki has also gotten a lot of positive publicity about the their system.

## Bus line designed by the people in Tervakoski

A resident of Tervakoski contacted us to share her story. In 2012, Tervakoski didn't have bus service during the weekends, making shopping in nearby Riihimäki impossible without a car. The village association took matters into their own hands: They planned their own village bus from scratch - the route, the schedule, they contacted the service provider, and presented a full proposal of all of this to the municipality. The municipality had no option but to agree by allocating 5000 euro to run a pilot.

The pilot was a huge success: Initially 27 users showed up for a bus that seats 16. Usage numbers continued to soar during the pilot, and the municipality eventually agreed to make the Tassu-bussi permanent. To this day, usage numbers soar above similar village buses, averaging 87.5% usage in the Tervakoski bus vs. 25% usage in other Tassu-lines.

Pietarsaari - 17 years of on-demand public transport

We interviewed the public transportation planning in Pieksämäki about their experience and found out that the public transportation in the 20000 inhabitants' Pietarsaari has been an on-demand service for already the past 17 years. The city area of is small, about 15 km diameter and the service is used by calling to the centre that using a German trip planning software.

Their on-demand public transport service has been working very well and increasing customer volumes for these years and there is also demand for more services according to their feedback. Now the service operates from Monday to Friday from 7 am to 5 pm but currently they cannot afford to extend the operating hours of the service. They are very happy with their current flexible system but they haven't tried to promote it to other cities.

Trips from past years

Planning

Feed back

Harava

Public transportation services
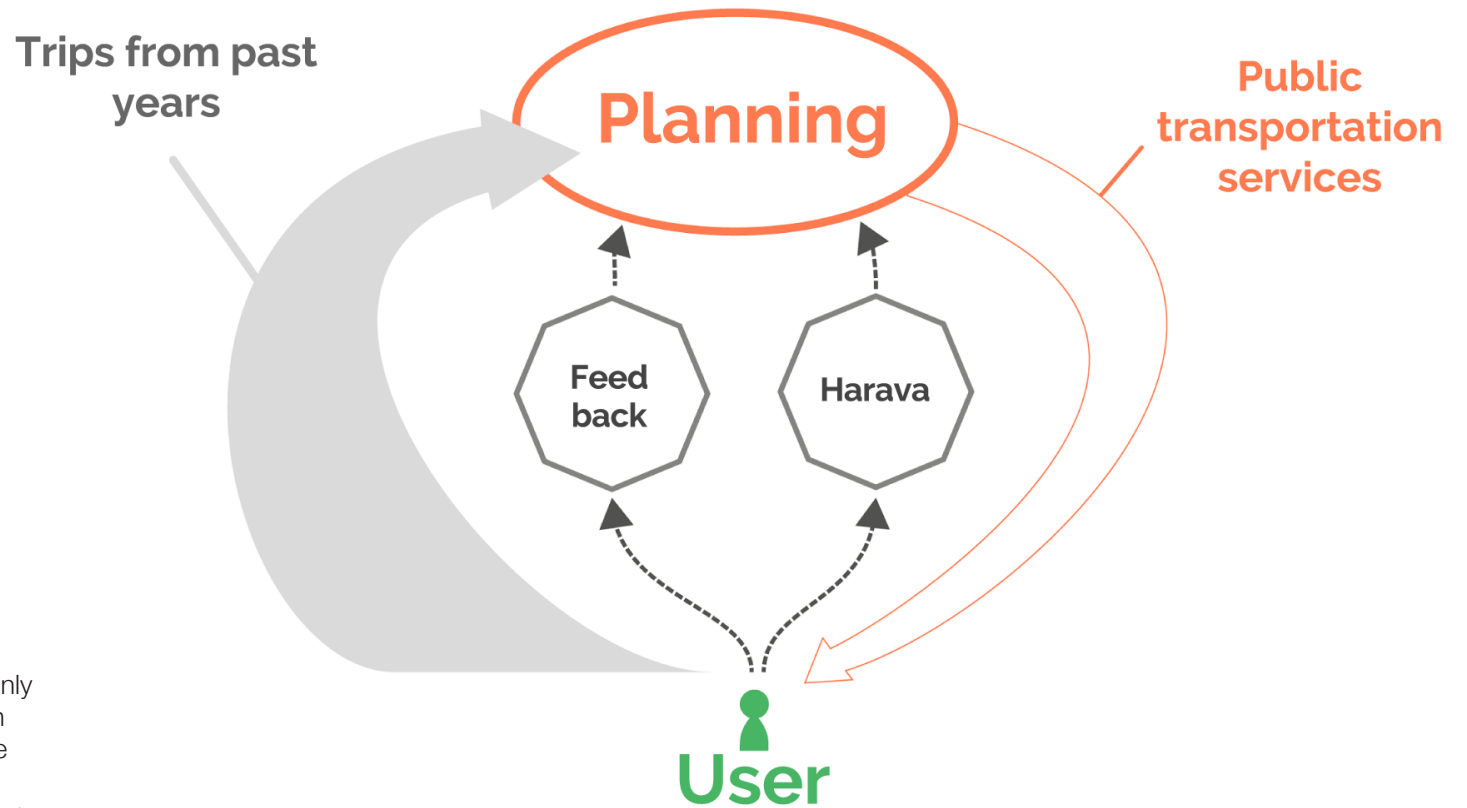
User

Planning

From our interviews with the transport planning we understood that the planning of public transport is mainly based on last years user volumes. Due to our research questions, we were especially interested in the way the users' voices are being heard in the planning and how the feedback data is gathered. We conducted interviews and tried to experience things for ourselves with this question in mind.

The user feedback is mostly used to do minor changes into the public transport system. If bigger changes have been made, sometimes the feedback has been misleading, as in one example where one person's request for a service had lead to the creation of a service that only one or two people actually needed. The perceived need for a service had been much bigger than the actual need.

The tools for user feedback in public transport planning were the Harava online tool, the general feedback form (both digital and paper format) and a user meeting. The

city of Hämeenlinna organized a meeting where people could comment on the bus routes, but only four people showed up. There is also a way for users to comment on the Hämeenlinna Facebook page, but that has not been used for public transport user feedback.

Our interviews with the transport planning also brought up the fact that hearing different stakeholders like workplaces and villages is very time consuming and therefore difficult to squeeze in the planners' work. The planning had tried to include some workplaces in the public transport decisionmaking, but that was rarely successful as it also took effort from the workplaces.

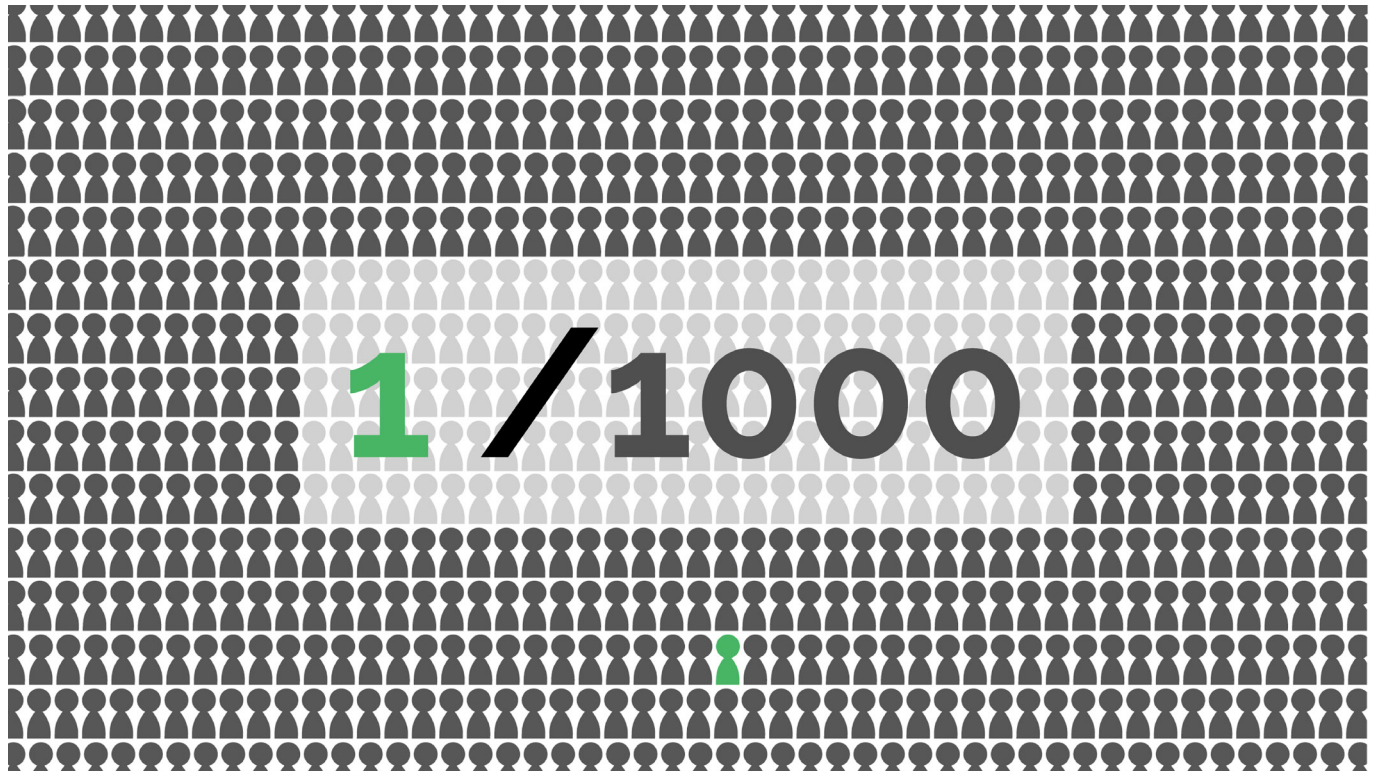Image 11: Visualising the user feedback channels the planning process

Hämeenlinna feedback form

Hämeenlinna has a good online feedback form (image 12) on their web pages where citizens can give feedback on the public transport services and pinpoint things on a virtual map. The feedback form also exists as a paper version.

Harava questionnaire

Harava questionnaire is an online tool that was used in the public transport planning during spring 2016 for commenting on the upcoming 2017 bus route reform in Hämeenlinna. In the Harava tool users could do minor route suggestions to the already planned 2017 routes

and request schedule changes: for the bus to be at a certain location at a certain time.

The questionnaire gathered 120 replies during its' operation time of a few months. This is however roughly only 0,1 % meaning 1 person out of a 1000 Hämeenlinna region citizen (image 13), even though they had tried to promote the questionnaire by many means: newspaper, radio, Hämeenlinna service points and web services. The planners described the Harava tool as rigid and not as helpful as the Hämeenlinna general feedback form. In Harava they experienced problems with integration to other map data systems as well as analysing the results.
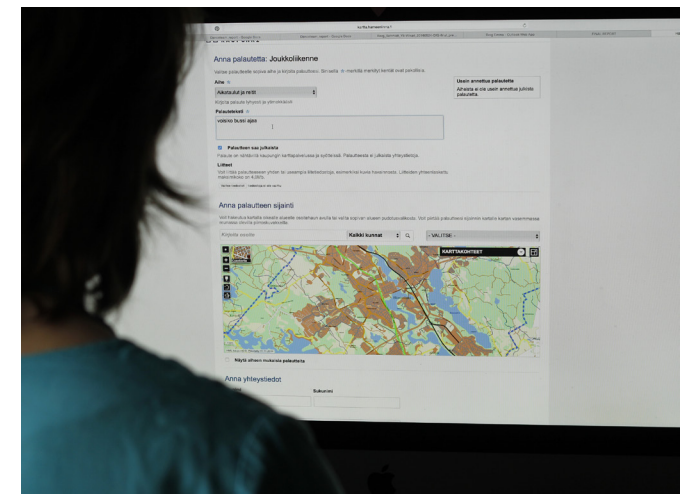

Image 12: Filling the Hämeenlinna feedback form

"I am so used to having to rely on my own car, that I am not able to imagine better bus connections."

Online survey

We conducted an online survey, polling residents of Hämeenlinna, 18 villages around Hämeenlinna, and members of various ridesharing facebook groups. The City of Hämeenlinna's Communications Office even helped to spread the survey further by posting it as a press release (Hämeenlinnan kaupunki 2016) to Hämeenlinna Kaupunki website. We asked a few simple questions to understand user experiences with transportation. The questions covered modes of transportation, public transport usage, changes users would wish for, knowledge of bottom-up solutions, and obstacles or challenges in users everyday mobility. 85 individuals participated in the survey, residing in and around the Hämeenlinna region.

Key findings

- Of the rural village resident respondents, 80% of respondents said that using public transport is not

an option. They state challenges with unavailability of services, inflexibility of routes and schedules, safety and infrastructure issues.

- 56 % of the respondents would like to have a higher frequency of busses in their area or better scheduling of routes. Despite the fact that most of the respondents do not use busses currently, because they do not meet their needs, they still have a wish for better services.
- Such a high response rate within a week was somewhat surprising for us as the questions we asked were not just multiple choice, but left room to write quite specific feedback and many respondents wrote quite long answers which to us clearly shows that they care a lot about the topic.
- The car centricity and the consolidation of services in the area has lead to the situation where some citizen cannot even imagine better services as the following quote shows.
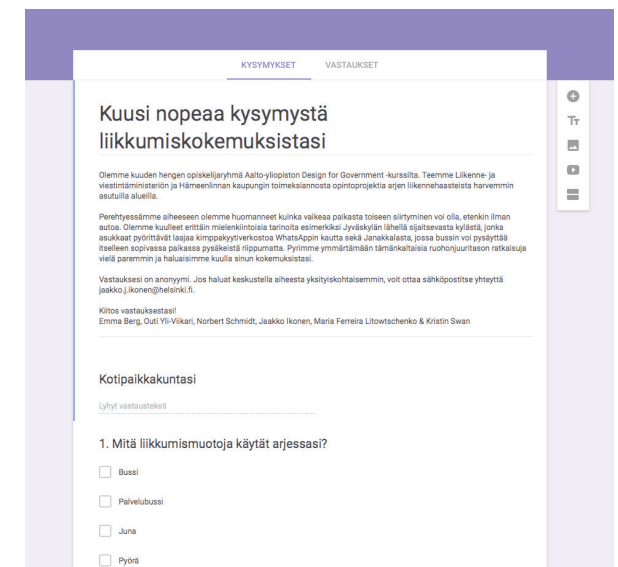

Image 14: Our online survey

Image15: Stakeholder influence/Interest map

Interpretation and synthesis

Our research and knowledge gathering helped us to gather a considerable amount of data and information. That information came in various forms, as described above: interviews, stories, quantitative data, experiences, and images. As such, various tools and techniques were required to interpret the different types of data and synthesize it. Our interpretation and synthesis approach took guidance from the schools of Design Empathy and Systems Thinking.

Stakeholder Analysis

Transportation and mobility involve a complex matrix of stakeholders and participants. These stakeholders come from various sectors, have diverse interests, and hold disparate levels of authority and interest. Subsequently it is important to begin my mapping the stakeholders to understand where they all fit in the problem.
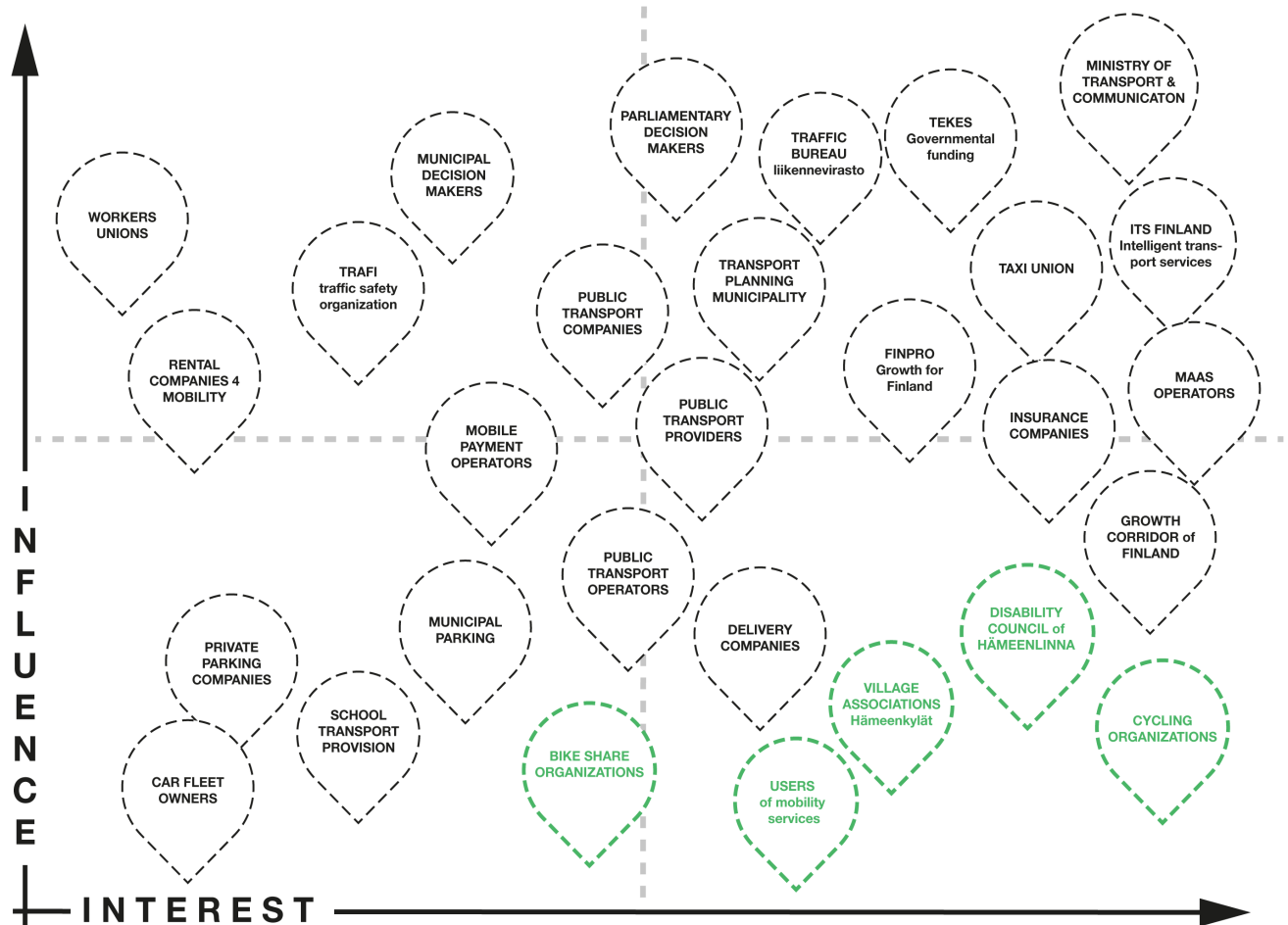
One such version of the stakeholder map (compare e.g. Morphy 2015-2016) is the influence/interest map. In this style of map, stakeholders' power and influence is mapped on the vertical axis, while interest level is mapped on the horizontal axis. The subsequent 2x2 matrix elucidates a prioritization of stakeholders: key players on top right, meet their needs on top left, show consideration on bottom right, and least important in bottom left quadrant. Our team created this kind of stakeholder map in order to help prioritize where we would begin interviews and research.

One of the critical findings we realized was the consistently low influence/power of the users (shown in orange). This stood out to us quite a lot, especially as the quadrants they landed in the stakeholder map suggests only "showing consideration," while shouldn't we be at least meeting their needs? This was a critical tool that shaped the rest of our project, as we began to understand that the users themselves must be put in the center of the decision making and service design.

"Without a private car, life would be horrible."

A quote from a Tuulos resident

Going from Data to Knowledge

Once interviews, observations, workshops, and research have been conducted, all of that data has to be gathered and synthesized in some way in order to turn it into knowledge. Our project leveraged various tools to do so, including P.O.I.N.T. analysis, affinity diagrams, and opportunity questions introduced to us by Juha Kronqvist in his lecture "Making Sense of Data".

P.O.I.N.T. analysis is a technique to identify problems, opportunities, insights, needs and themes among all the data gathered. The data is then organized and grouped in an Affinity Diagram. This method allows to examine relations, connections, and patterns within the data, and encourages new ways of thinking.

This helped us to highlight the various needs of the users within the larger mobility ecosystem. The most important finding for us was the car-centricity of rural Finnish life. This was central in all of our discussions with users, as well as our own observations.

Another theme of findings was the user experience of public transportation: inflexible, infrequent, inconvenient, and unsafe. The diagram helped to deepen our understanding of the transportation ecosystem: infrastructure, technology, and macro-level issues like service consolidation. This process helps to then identify opportunity questions based on the findings.

Critical questions

- What if you didn't have to go to services?
- How could we make walking and cycling more attractive?
- What if there was no tech required to solve this problem?
- What if Hameenlinna was a car-free city?

What if you didn't have to own a car in rural Finland to have the autonomy and flexibility you need?

Urban

Autonomous ←————————————————————→ Dependent

Rural
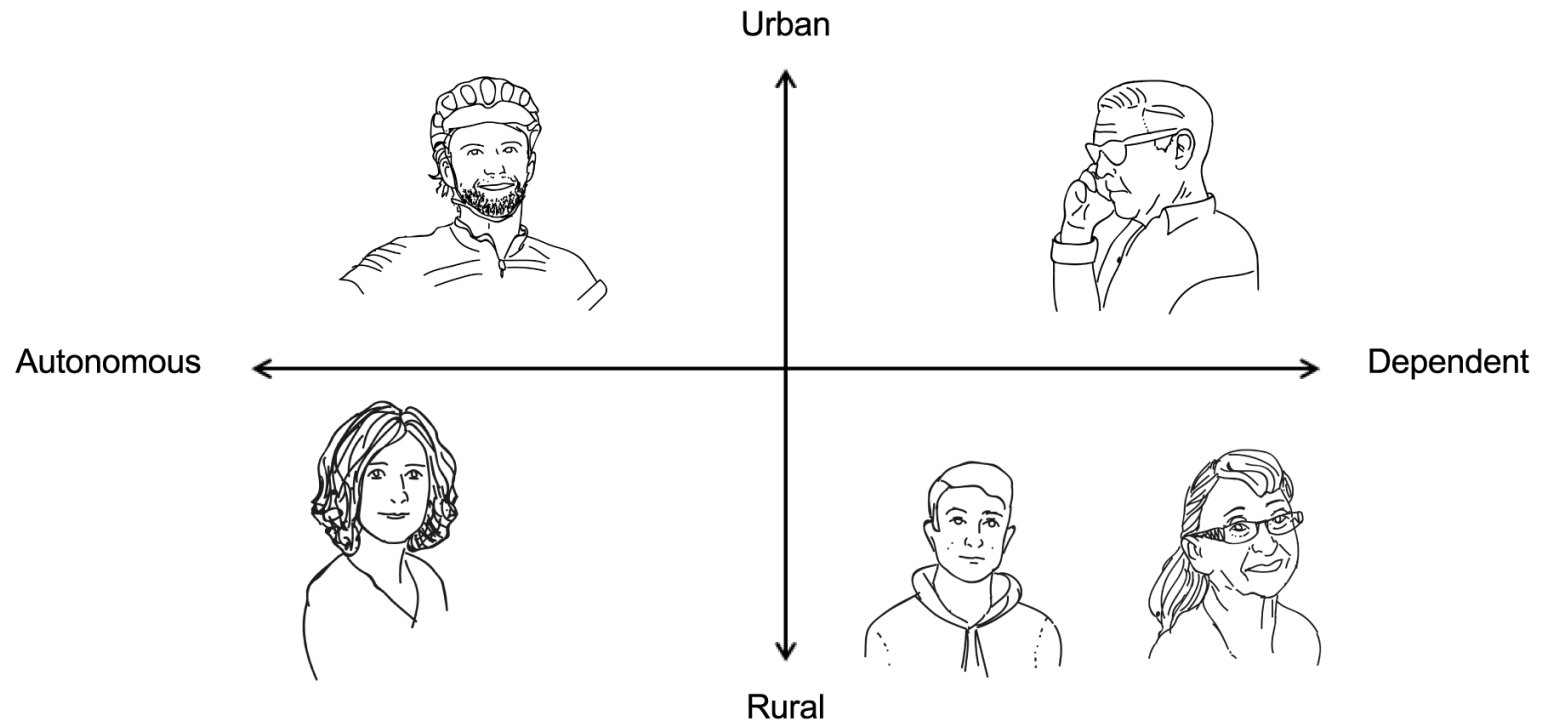
Image 16: Persona Diagram with the two axes

Personas as a shortcut to users

Based on our interviews, discussions, and research, we created personas, which are archetypes of certain user profiles. Personas embody the backgrounds, needs, and frustrations of certain user groups, and thus help make the needs of those groups tangible.

Based on our earlier findings in the Affinity Diagram, it was critical that we create personas that allowed us to look at the dimensions of dependence vs. autonomy when it comes to transportation and mobility. Thus, we

needed to ensure we had a spectrum of users representing those dependent on public transport or others for their mobility, as well as those autonomous and independent, whether via public transport or their own vehicle. Considering the drastic differences in service levels in rural and urban settings, we found it critical to examine these 2 different experiences as well (see Image 17)

Pasi Pyörä

Cyclist, commuter

General information

31 years
No kids
Lives within 5 km of the city
Works for Hämeenlinna city
Active in local bike scene

Preferences/ Motivations

Sustainable lifestyle
Independence
Public transit vs. car ownership
Healthy lifestyle
<3 Ridesharing TRE - HKI via FB

Frustrations

No bike storage near shops
No bike maps
Cant ride bicycle trough the centre of Hämeenlinna
Cycle paths not plowed
Cant take bicycle on the bus
Private cars rule the streets

Needs / Expectations

Infrastructure:
  roads, parking, lanes
  safety, IT, delieveries
Getting an Air-donkey lock
Starts renting out his other bikes
Owns bicycles
Lends bikes to friends too

> There is so much potential and variety in bicycles! From babies to grandpas!

"it's all about natural pure energy"

Image 17: Persona Pasi Pyörä

Pasi

The first persona is Pasi Pyörä (Image 17), a bike enthusiast from Hämeenlinna. Pasi represents the extreme bike user and urban resident with the lacking infrastructure and service level to enable commuting by bike comfortably.

Pirkko

The second persona is Pirkko Perheinen (Image 18), a mother of two from Lammi. She represents a large portion of rural residents in Finland with limited public transport options, and the requirement for a car to meet the needs in her family.

Pirkko Perheinen

Private car, commuter

General information

40 years
2 kids, single parent
Works 10 km from home
Drops kid to daycare+school
Lives in Lammi, works in Tuulos

Preferences/ Motivations

Easy logistics
Quick + flexible
Control with kids
Safety, affordability
Goes to latotanssit, shares ride
Hobbies in the city

Frustrations

Consolidation of services
Public transit being reduced, complicated and unreliable
Dangerous bus stops
Low income, car is big expense
Child's speech therapy to drive to in the city

Needs/Expectations

Flexible mobility (kids, work, shopping)
Services, daycare, healthcare
Transport for kids - (school bus and carpool to get son to ice-hockey)

> Not having a car would be impossible, let alone dangerous!

"safety, flexibility, convenience"

Image 18: Persona Pirkko Perheinen

Unraveling the transportation System

One of the important next steps in the sense-making process was to move beyond the individual experiences and see the macro-level system as whole, as well as how all of the micro-level elements interact within it. Subsequently, Helsinki-based Designer and Architect, Hella Hernberg, taught us Systems Thinking.

One of the tools of systems thinking is system mapping which show the different actors and their interactions within the system. According to Donella Meadows (2008 ref. in Hernberg 2016:20), "A system is a set of things – people, cells, molecules, or whatever – interconnected in such a way that they produce their own pattern of behavior over time." We applied STEEP analysis on our system maps. STEEP stands for the social, technological, environmental, economical, and political elements within a system.

We created multiple systems maps with STEEP methodology throughout the project. We went back to a micro-level to map the experience of a typical family in Rural Finland, this is further elaborated in the next chapter titled Mapping a day in Finland.
We also created a bigger map (shown in image 19) to better understand all the elements contributing to transport choice as we began to consider the research opportunity: "You don't have to own a car to have autonomy and flexibility in rural Finland."
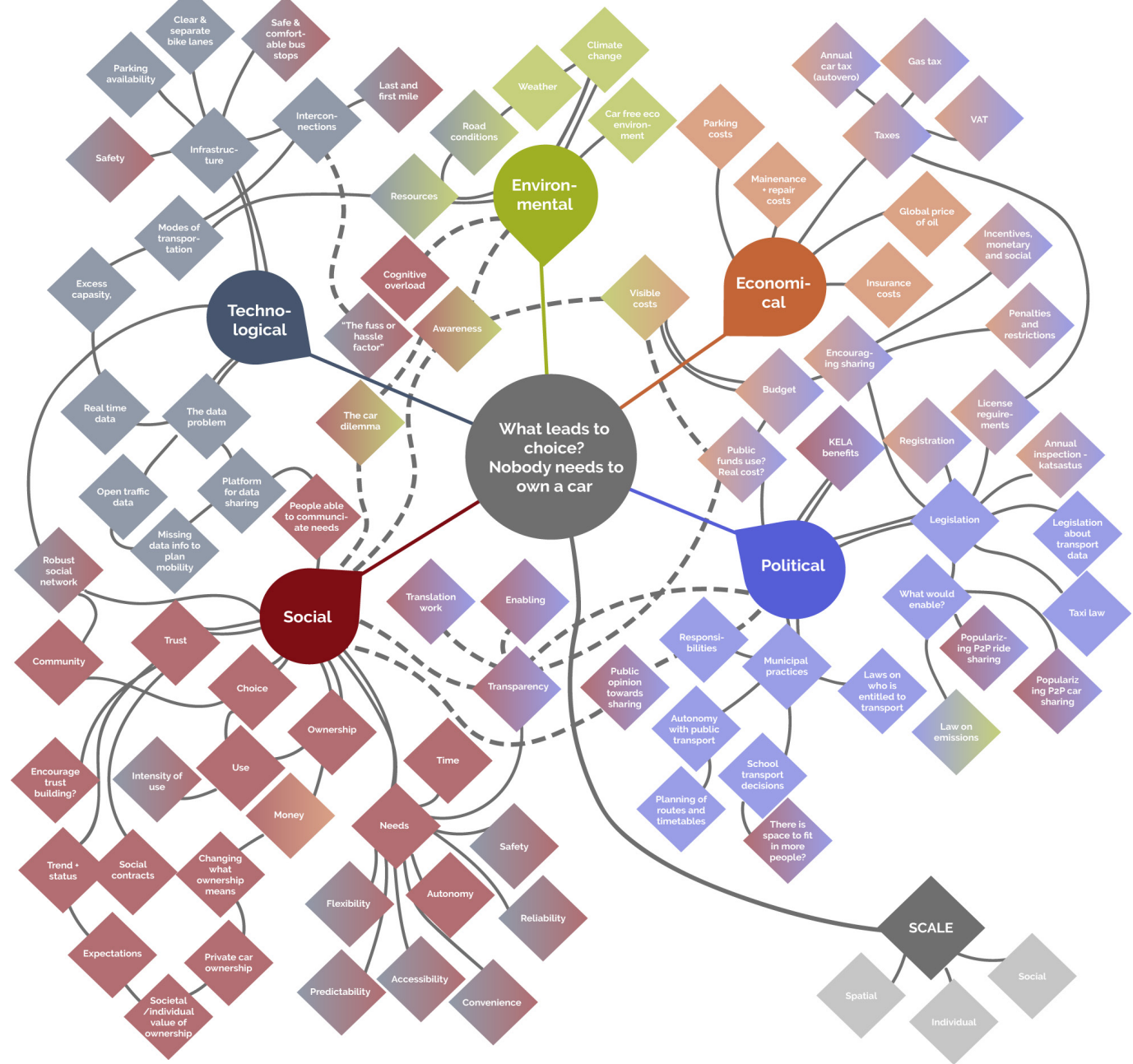

Image 19: System Map: What leads to transportation choice?
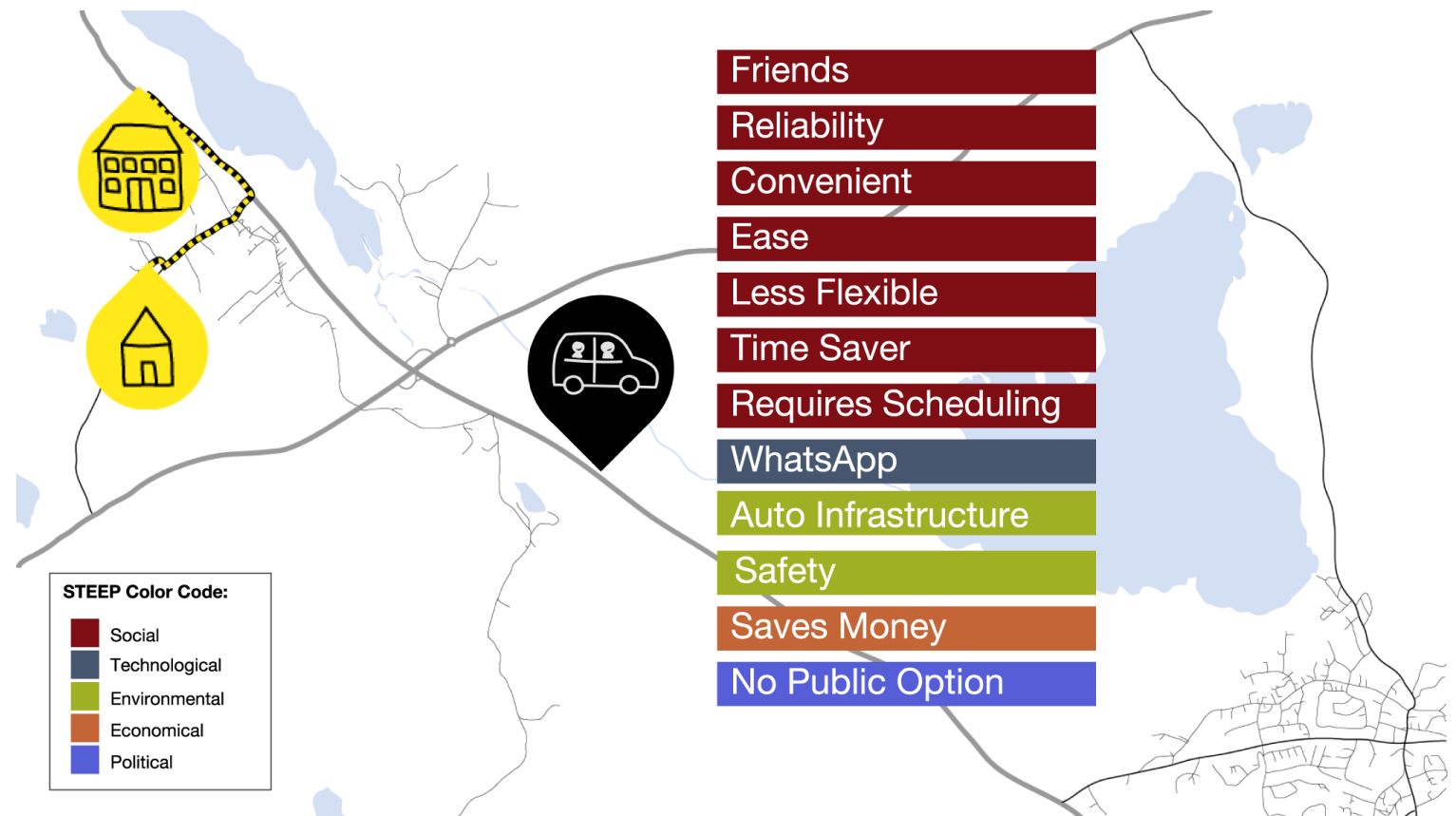
Image 20: A day in the life of a rural family - Pirkko's decision factors when taking her daughter to school via carpooling

Mapping a day in the life in rural Finland

Applying systems thinking with the STEEP methodology to user decisions proved to be highly enlightening about rural users' needs and decision drivers. We used Pirkko Perheinen persona and our interview data to create a systems map of a typical "day in the life" of a rural Finnish family, and the transportation decisions they make on a daily basis. We for example mapped the decision factors of Pirkko using carpooling with other parents to get her daughter to daycare.

One of the key takeaways for us in this exercise was the overwhelming role that social elements play in transportation decision making. This was consistent among most individuals we talked to and surveyed in rural Finland. Social concerns almost always outweighed economic concerns for rural citizens; convenience, flexibility, autonomy, time, and ease were the critical decision factors.

We found that environmental elements play another critical role in the decision making of a family in rural Finland. Many users we spoke with discussed the lack of sidewalks, bus shelters, bike racks, bus routes etc.

Image 22: Separation of the Mobility supergroup into different solutions

Image 21: Vision

Vision & approach

We concluded that the problem of transportation in rural Finland cannot be solved by simply connecting existing services, because they are not sufficient. Thus, we began to conclude that solving this problem of transportation would require totally new approaches. We created a bold vision as a reaction to the reality of lacking services in rural Finland (image 21).

Our two teams diverged with two different approaches to reach the vision. Team Verka approached the challenge from the standpoint of top-down services, using existing resources, like public transport, better. Team Liike approached the challenge from the bottom-up, by accelerating citizen-created transport solutions (image 22).

Climate change

Digitalisation & Big data

Autonomous vehicles

Aging population

Peer-to-peer economy

Legislative shift
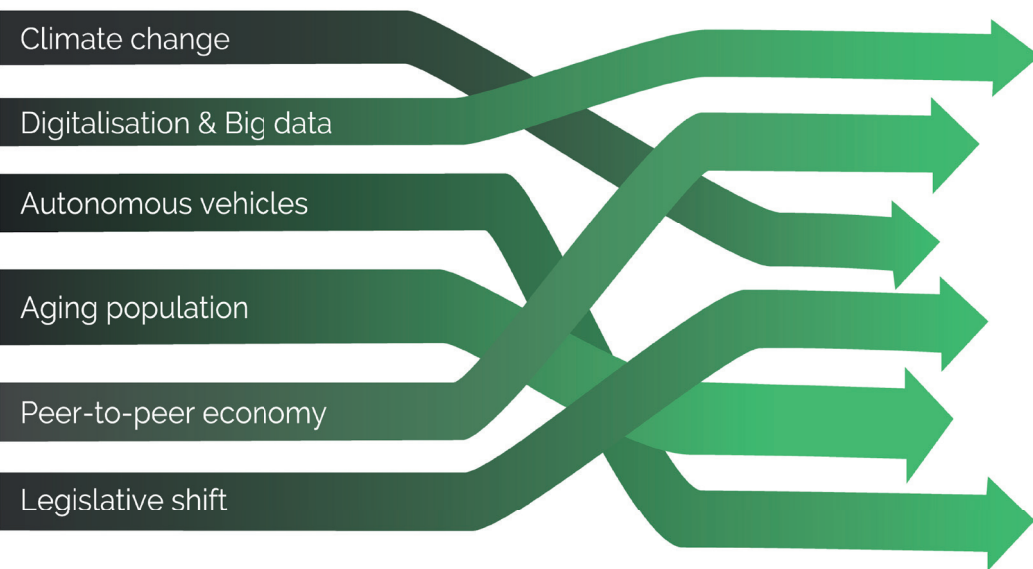
No need to own a private car

VISION 2030

Re-briefing the original brief

Transportation field is in transformation due to simultaneous changes, possibilities and challenges; climate change, digitalisation, autonomous vehicles, the aging population and peer-to-peer services. Mobility as service thinking opens up new business areas and there is also a legislative shift coming and creating new possibilities and threats.

As mobility is facing changes there is a need to develop the way things are both done and perceived. Public transport services are under-serving most people outside the biggest city centers. Overall the public transport services could be planned in a more efficient and need serving way. The public transport services in Hämeenlinna region are failing to complement to the actual needs of most people living in rural area. Private car dependency is high and the overall infrastructure and

level of public services is making life in the rural areas more and more car centric

There is a need for a mindset change and for new bold thinking in the transport field. Public transport has more potential in rural Finland than what is currently being acknowledged. There also continues a need to have sufficient amount of public transport services and solutions in order to provide flexible, reliable and sustainable interconnections between different modes of transport.

We focused on the following question: How could the planning of public transport services be the number one resource to be developed in order to successfully meet the mobility needs of more people as well as face the changes in the transportation field?

Image 23: Mobility faces big changes, how do we reach the vision?

Emerging ideas

We discussed four different ideas on our final round of ideation: improving data gathering on citizens' needs, making public transport partly free for users, branding and renovating infrastructure/interconnections ("connection hubs").

The idea to improve data on needs emerged from understanding the way public transport is planned and how little the citizens' needs and voices are actually taken into consideration due to the lacking tools as well as the high dependency on past performance.

The idea to work on the branding came from understanding how public transportation is perceived and how it is stigmatised. The latter especially being the case with regard to service bus routes.

Making the public transport partly free was an idea inspired by a trip to Tallinn and experiencing their free-for-citizens public transport system as well as talking people using the service. We thought whether parts of re-designed public transport services could be made free to incentivise more people to use them.

The infrastructure renovation idea was inspired by the experiences in the field in Hämeenlinna as well as expert interviews. However we felt that the EKOLIITU report published by the city of Hämeenlinna and the ELY-centre already answered to many of our concerns about infrastructure for now. (compare Uudenmaan elinkeino-, liikenne ja ympäristökeskus 2011)

As we had our direction and vision in mind we evaluated these four ideas according to their usefulness to the ministry of transport and communications as well as to the citizens and to Hämeenlinna. We also looked at their environmental aspects, practicality and their relatedness to the mobility-as-a-service-concept.

Choosing our proposal

We saw more and more potential in the present public transport services as they are currently described as inefficient both by the potential users and the city officials. 73% of people in rural Finland describe public transportation services as bad. (Tekes 2014:15) With 1.6 million Finnish residents living in rural areas (Statistics Finland 2014), this equates to 1.2 million unsatisfied people in Finland.

Through the research, interviews, online survey and analysis of the current situation it became clear to us that people seemed generally open to using more public transport services if they would meet their needs. The citizens we met also appeared to be very willing to contribute to improving public transport services including the ones who have access to their privately owned car and are thus less dependent on improved public transport services.

We decided to look closer at how services are currently being designed and found out that there is room for improvement in the data flows between users, planners and service providers of public transport. We realized that the focus needs to be away from looking mostly at past user volumes when planning public transport services. Eventually we went with the idea of improving the gathering of citizens' needs data with a new tool, because that could actually reshape the public transport services and serve as a stepping stone for other development.

We elaborated on how we could get away from dependency on past performance. Instead of having feedback tools for users to comment on existing bus routes, we came up with the idea to simply gather information about from where to where the citizens need commute and at which times. This idea encourages also people who are currently not using public transport to contribute their feedback for the planning.

Three main reasons why public transport is the best basis for service infrastructure are the environmental, safety and cost issues. All of this combined led us to focus on how to improve the planning process of public transportation services in non-urban or rural areas where current service offerings are described as poorly meeting citizens' needs.
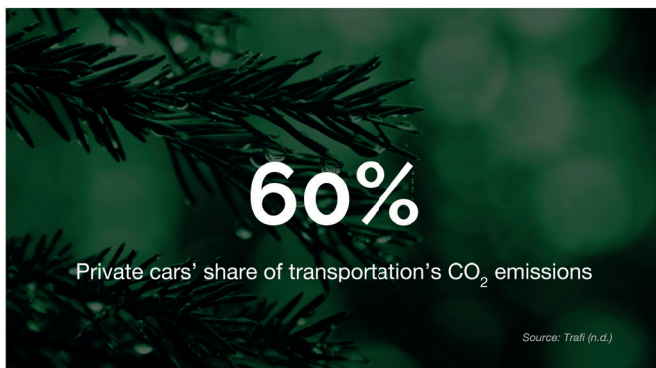
60%

Private cars' share of transportation's CO_2 emissions

Source: Trafi (n.d.)

Image 25: Emissions produced in transportation

75%

Predicted decrease of traffic accidents

Source: Niemi, A. (2012)

IMAGE: Jan-Erik Finnberg, Liikennemerkki, Flickr, (CC BY 2.0) Adapted to use by Emma Berg

Image 26: Reducing private car usage leads to safer traffic.

69 000 000 €

Overall costs of traffic accidents in Hämeenlinna region

Source: Uudenmaan elinkeino-, liikenne ja ympäristökeskus (2011)

IMAGE: Emma Berg

Image 27: Traffic accidents are hugely costly

Environment

Offering people well working public transport services gives them the possibility to leave their private car behind and thus enables a significant reduction of greenhouse gas emissions. Today about one fifth of all greenhouse gas emissions in Finland occur from the transport sector which does not only include individual mobility, but also cargo transport as well as planes, trains, boats etc. Out of that the majority, 60% of the greenhouse gas emissions produced in transportation, are attributed to private car use. (Trafi n.d.)

Greenhouse gas emissions are a main contributor to climate change and therefore the European Commission (2011 and n.d.) has set goals to reduce emissions drastically by 2030 and wants to reach a low carbon economy by 2050. By signing the Paris Climate Agreement, Finland has also shown its commitment to climate change mitigation strategies to keep global warming below 1.5°C to 2.0°C.

The representative commitment now needs to be put into action with measures to significantly reduce greenhouse gas emissions quickly. Improving public transport services and motivating people to use their private car significantly less provides for a great chance to reach these goals.

Safety

Public transport is a safer mode of transportation than using a private car. Currently the Hämeenlinna region (Kanta-Häme) has the highest rates of registered cars per capita in Finland. (Uudenmaan elinkeino-, liikenne ja ympäristökeskus 2011:11).

Offering better public transport services could contribute hugely to a decreased number of traffic accidents. Niemi (2012:23) suggests that the amount of traffic accidents could be reduced to one fourth if 80% more people could be motivated to use public transport services.

Costs

Currently costs as much as 69 million Euros result from traffic accidents in the Hämeenlinna area. Out of this about 10 to 14 million Euros are being paid by Hämeenlinna. (Uudenmaan elinkeino-, liikenne ja ympäristökeskus 2011) This amount is almost four times as much as Hämeenlinna currently spends on public transportation (Hämeenlinna kaupunki 2015:11).

By improving public transport services and subsequently reducing the amount of traffic accidents municipalities would be able to save a big amount of money. Money that could in turn be used to better public transport services and reach environmental goals of reducing greenhouse gas emissions even faster by investing in more sustainable services.

Image 28: Three simple questions

Proposal

VERKA mobility canvas

To facilitate the re-imagination of public transportation we propose VERKA Mobility Canvas - A digital mapping tool, that makes the mobility needs of the citizens visible to the planners in order to re-imagine public transport services.

Verka is the Finnish name for a type of woven fabric, that has been used in the work uniforms and table fittings in the places of decision making. Verka is also an integral element in Hämeenlinna, with the Verkatehdas (Verka-factory) in the middle of the city. Verka as a word combined with the notion of mapping creates an idea of an interwoven network of needs, the fabric, that together serves to meet those needs.
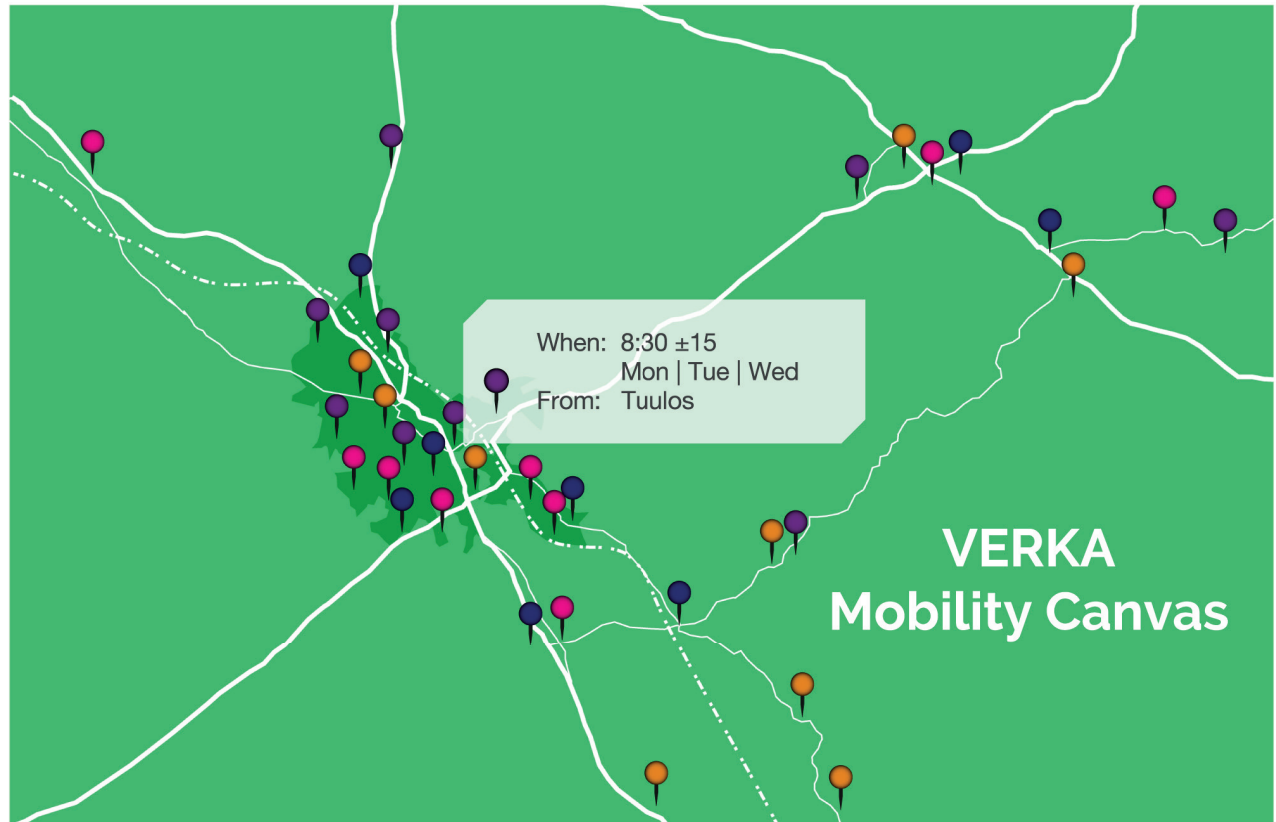
When: 8:30 ±15
      Mon | Tue | Wed
From: Tuulos

**VERKA
Mobility Canvas**

Image 29: VERKA Mobility Canvas makes mobility needs visible

Using VERKA

Verka aims for an easy and fast user experience and thus only asks the citizen three simple questions about their most common transportation needs: Where are you departing from? Where do you need to go? When do you need to arrive? (image 28)

The citizens will insert their mobility needs on the map and then the planners use this accumulated information to base their decision making. Citizen and planners are the two main user groups for VERKA. Additionally there can be the group of third parties who could benefit from the data to develop new kinds of transport services later on, this is discussed under the Next steps - headline.

VERKA for users

The people using VERKA insert their destination on the map on the level of specificity that they feel comfortable with. This creates a pinpointed location and the citizens are asked to indicate the time of arrival and where from they need to get there (image 29). Additional information that should be possible to enter by simply checking boxes regards special needs e.g. wheelchairs, prams, assistance, etc.

The needs put onto the VERKA map show as pins of different colours to indicate each user's point of departure. In order to motivate citizens to map their needs other citizens' needs are also visible, but not accessible in detail such as exact schedule or special needs. However, seeing other people's pins on the map gives a feeling of contributing to something bigger and meaningful, to the weaving of the mobility canvas.

Image 30: Maija, together with other users inserts her mobility needs to VERKA

Image 31: Planning creates a test service to the area

Maija

To describe the operation of VERKA, we created a user example; Maija. Maija shares a car with her husband, however they work in the opposite directions which creates scheduling difficulties and driving back and forth. This is why they are considering to buy a second car.

At work Maija hears about VERKA. She pins her mobility need onto the VERKA mobility canvas, which takes her 3 minutes. Other people have also added their needs onto VERKA.

In time, the planners begin to see the mobility pattern: other people are travelling into the same working area as Maija roughly at the same time.

Based on these needs the planners decide to create a test service bus route. Maija and the other people contributing to VERKA are informed that their needs were taken into consideration and that there is now a service matching their needs.

VERKA for planners

The transport planners have their own user interface into the system and additional options to filter visible needs, such as for example for time or origin. Thus they have the ability to easily visualise flows of people at different times of day and develop more diverse services that efficiently meet the needs of more people. VERKA allows the planners to reduce dependency on past user volumes and base their decisions on actual user need data.

Privacy

VERKA is not introducing any real time tracking of users. Location is a sensitive piece of data, and we feel that major amounts of people we want to incentivise to use VERKA would not agree to real time tracking. VERKA is also not to be used as an on-demand service, that is not its' purpose. The information you update to VERKA is more like the information about your address: you change it if your residence or need changes, but not every day. Changing it every day doesn't allow the planning to detect patterns in flows of people.

Usability

Users need to be able to update the information they insert into VERKA. Whether this is done by creating an (optional) user account or a specific link sent to the user needs to be determined during the implementation phase. A user account enables easier updatability, but having to login might discourage some from using the service. If the planning can connect with people through their user account information people can easily be

Image 32: Planning creates services

notified when new services addressing their needs are being tested out. A link for updating information provides more privacy, but is more difficult to access once users want to update their information. This can lead to information being out of date or incorrect over time.

For the VERKA map data the same maps as currently used in Hämeenlinna's online feedback form or openstreetmap data should be used as a basis. We prefer the latter option because it would provide for easier scalability and use of the tool in other areas in Finland. For the planners an integration for the upcoming on-demand flexible transport system for the elderly and the disabled that is being designed for Hämeenlinna is very important. In addition to the website there should be mobile apps for the users for the major mobile operating systems.

Motivation

VERKA motivates users to participate more than the previous user participation solutions because it addresses everyone, not just the people who already
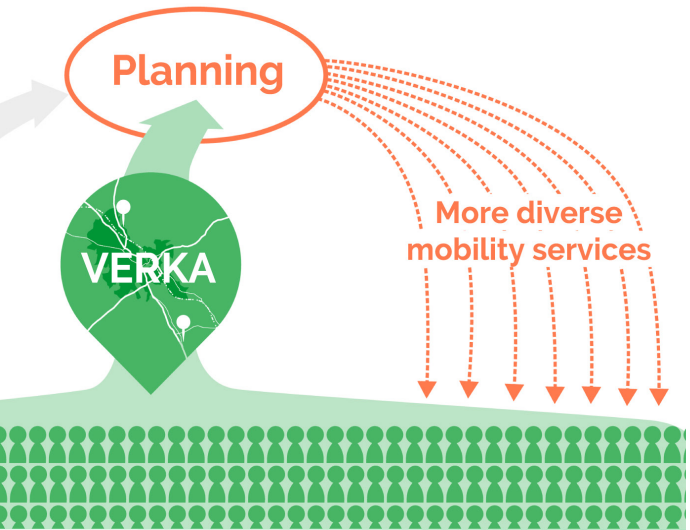
use public transportation. The fact that your need will be taken into consideration when planning also motivates into giving your data.

The system should be built in a way that the user has a clear idea of how the information they contribute is being used. It is motivating to contribute when the promotion of VERKA is done in a way that highlights the benefits to the user: " Contribute to help us re-imagine the best services for you."

Costs

VERKA should be free of charge both for its users and the municipality. People contributing mobility data help design better public transport services and enable greater efficiency for the municipalities as well as reduced traffic accident costs. Parts of these savings will cover the development and maintenance costs of VERKA.
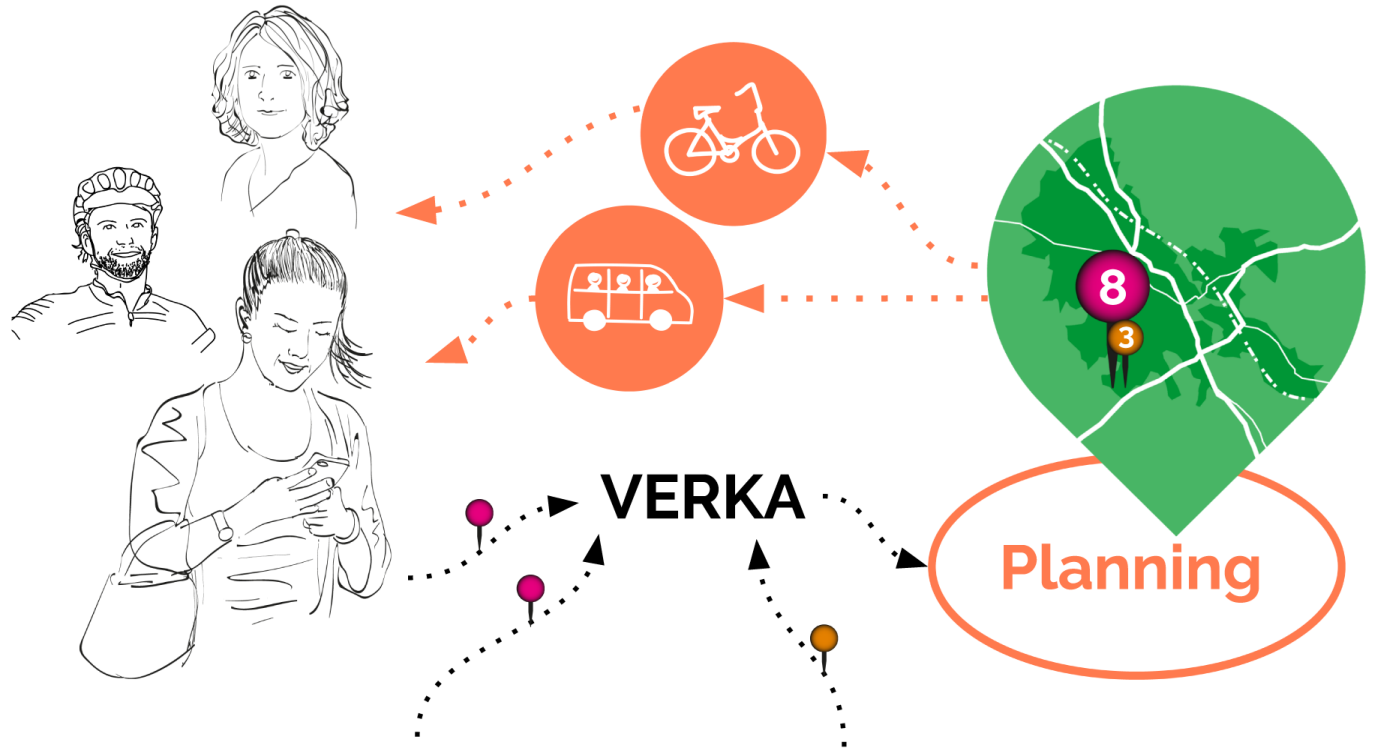
Expected Outcomes

With VERKA mobility canvas, we expect to create a substantial basis to plan new public transport services. By focusing on citizens' needs instead of existing services we expect to increase the amount of feedback to base the planning on. Visualising these needs on a map that includes easy options to filter the data for the planners makes this feedback furthermore more useful to evaluate and process than the existing solutions that generate mainly text based comments from few comparable individuals.

By mapping the flows of people independently from modes of transport VERKA provides a basis to determine different solutions. As it will be easier to estimate amounts of travelers at a given time it will be easier to decide which routes should be covered by bigger buses, which areas could be served by service bus lines and

where to put bike sharing stations that connect well to other services.

In a more long term perspective VERKA helps to determine potential spots for "connection hubs"–places where streams of people traveling from many directions converge which would be ideal places to connect bus transport with possibilities for ride- and car-sharing or taxi services as well as larger amounts of parking spots and bike parking.

On a bigger scale we expect VERKA to contribute to decrease CO_2 emissions and lower costs related to traffic accidents as it enables needs based planning of re-imagined public transport services that will be more appealing to citizens and reduce for own private car.

Image 33: VERKA data used in planning of bike sharing stations

Image 34: The steps to start weaving the VERKA mobility canvas

Scaling **VERKA** to other municipalities in Finland

Weaving the canvas

VERKA for third parties

Piloting **VERKA** in Hämeenlinna

VERKA tool creation

Connecting to a project

Next steps

Ownership and tool development

We propose VERKA to be developed within the "Liikkujain ääni" project by Liikennevirasto, Trafi and the Ministry of Transport and Communications. The development should closely involve planners' and users' feedback. We expect the development to take one year.

VERKA should be commissioned to an experienced IT service company. However, the ownership should be with a central body such as Liikennevirasto, the different ELY centres and the Ministry of Transport and Communications who would oversee the development of the tool and then make it available for the planners in the municipalities.

Piloting and Scaling

We suggest that VERKA is piloted in Hämeenlinna area that aims to be a forerunner in developing new mobility solutions. Verka should be piloted for about two to three years allowing for constant evaluation and improvements. After the pilot phase, VERKA should be scaled to serve other municipalities in Finland and could also be adopted to be offered on an international level.

VERKA for third parties

After the successful piloting of VERKA, the gathered data could be opened up and licensed to third parties. The usage scenario would be similar to that of the planners. Third parties could then have access to valuable information, which would enable them to design new services that complement public transport. These services could then be created and tested much faster as VERKA would shorten the time needed to invest in market research. For this access third parties would have to pay which would contribute to the maintenance costs of VERKA.

DISCUSSION

Discussion

The suitability of methods

The formal face-to-face interviews with different organisations helped to understand the frame of the project better, but also to find out that mobility-as-a-service still is to some extent a vague concept. We found that interviews on the phone were a good way to get information and confirmation fast in the latter phase of the process.

The trips to Hämeenlinna proved to be particularly important to form our understanding of the context. The theoretical background we had gotten on empathic design was very helpful for that. We had set up only a few interviews for our initial trip, but not having a full-day schedule was very helpful. Through that we were able to experience the city and region to get a feeling for the area and make surprise discoveries such as for example the city bikes.

Trying out as many forms of transportation as possible to get to Hämeenlinna and back as well as for getting around in the Hämeenlinna region was greatly beneficial and most of the people we met were willing to share their opinions and experiences with us. We could feel that mobility is a core issue in people's everyday lives. The vision we created was an excellent driver to creating our solution and finding our direction. The online survey that we conducted was a crucial method in finding out what people actually think and validating and quantifying that information into our presentation and solution.

All of these methods backed up by vigorous online searches, reading reports (image 35), studies and relevant scientific papers helped us to understand the wider context, formulate the problem definition and yielded very helpful insights.
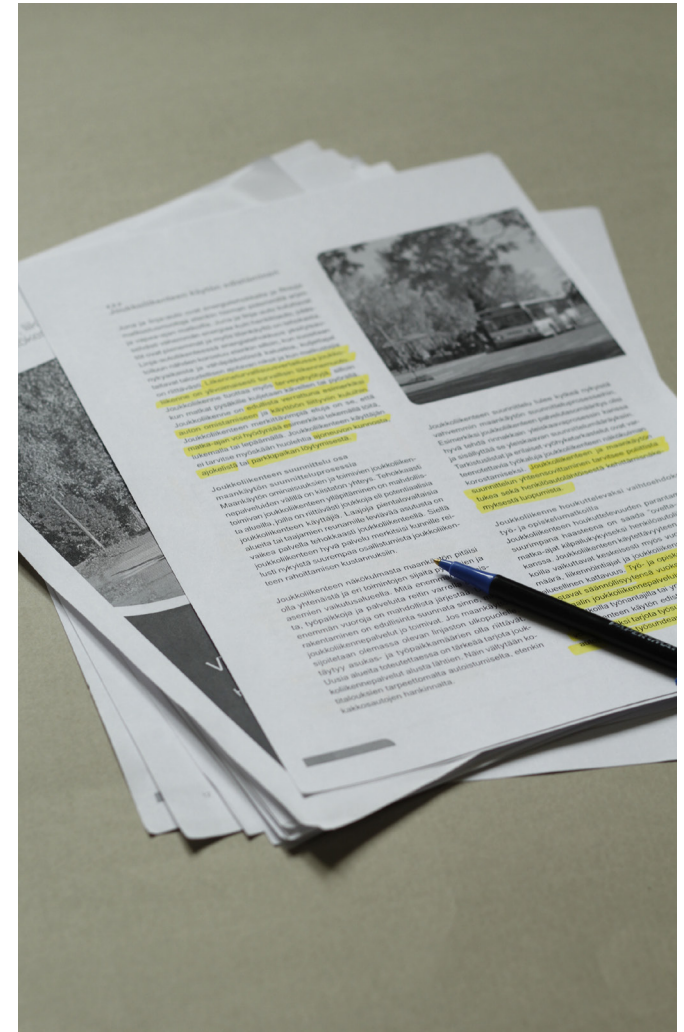
Image 35: Getting to know the Hämeenlinna EKOLIITU report

Implementation competences

In order to successfully implement VERKA it is crucial to both understand the ways users can and want to contribute to service improvement as well as to understand which data in what form can improve the decision making process for the planners. It could be beneficial to have a project manager who mediates the planners' and citizens' needs with the approach of the IT service company that is to develop the tool. Leaving this role to the planners who are eventually going to use the tool might leave out the focus on usability on the citizens' part. Leaving this role to the IT service company developing the tool could result in barely adapting existing technology to a certain degree instead of developing something that actually serves both planners and citizens better.

Though Hämeenlinna has gathered feedback through different online based solutions before, the turnout has been quite low, and the tools have been described as being "rigid" or complicated to use. This is why someone in the project should also have a strong communications and motivation competence.

It is crucial to have an understanding of current trends shaping the field of transportation in order to not tailor VERKA too much to existing services like long-distance buses or service bus lines. The understanding of municipal decisionmaking and transport planning practices are also very important.

Challenges

Our biggest practical challenge during the project was to arrange meetings in the Hämeenlinna area. That was not because people would be unwilling to talk to us, in most of the cases the complete opposite would be true. Instead it was because getting to Hämeenlinna and back always required a lot of time, especially as we wanted to meet people also outside Hämeenlinna city centre and experience the smaller villages.

While it was very beneficial to immerse ourselves so deeply into the context and gather information and experiences during the process it felt like the solutionizing phase could have been even longer. We could have used additional time to work on our proposal and discuss the idea with citizens and planners in order to learn more about its practical feasibility or where might be some hindrances in the implementation.

We were unfortunately not able to try out Mobility-as-a-Service solutions in practice as none were working at the time of our research. Sonera Reissu launched later than expected and Tuup was not usable for us during the time of our research.

Luckily we had Finnish speakers in our team, but some key documents and most of the publications regarding the ongoing discussion around the Liikennekaari legislation were only available in Finnish so it required significant amounts of time to get the non-finnish-speaker in the team up to speed. Translating the interview notes from the interviewees that declined to have the interview in English also took time.

Otherwise, having a diverse team with people from different thematic and cultural backgrounds was very beneficial for the overall process. It created small occasional struggles with regard to "speaking the same language" concerning fields of expertise or the way certain methods were employed, but overall it enabled us to learn immensely from each other.

REFERENCES & APPENDIX

References

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Appendix 1

Based on our interviews and meetings, we know that citizens all over Finland are creating their own transportation solutions to fill in the gap where public transportation doesn't meet their needs. In many cases of course that "solution" is citizens having their own car. In others, however, it involves informal ride-sharing with neighbors, family, friends. Yet, in others it begins to take new forms and become more organized in communities, villages, and even across villages.

Riding the bus in Janakkala

We spoke with a resident of Janakkala who shared how their village takes the bus. Citizens and the bus driver in Janakkala have taken safety and convenience matters into their own hands with common-sense regulation of their own, allowing the bus driver to pick up the residents from safe and convenient locations.

WhatsApp Ride sharing in Tikkala

We interviewed a woman in Tikkala who coordinates a village-wide ride sharing group. They use the mobile messaging app, WhatsApp, to enable real time ridesharing! It's simple, it's easy, and it's a huge success. 24 families currently participate in the group.

Crowdsourced sidewalks in Vuolenkoski

We interviewed a farmer from Vuolenkoski who was a member of the 5 person planning committee and core planning team for the crowd-sourced sidewalk of Vuolenkoski. In 2001, the villagers of Vuolenkoski wanted a sidewalk on the heavily trafficked road that went through their village. As the local authorities didn't find the project feasible, the village association planned the road on their own and provided significant funding and hundreds of volunteers for the construction of the road, which was carried out in collaboration with the local authorities.

Appendix 2

The services and solutions we found on a matrix on the right.

FORMAL

KAUPPABUSSI

BUSSES PRIVATE

TAXIS

ALUETAXI

TRAINS

BUSSES PUBLIC

FREE PUBLIC BUS for kids under 16 in Pieksämäki

LIBRARY BUS

SERVICE BUS

DISABILITY SUPPLIES DELIVERY (Matkahuolto)

SONERA REISSU

HOPEALINJA (Ship)

RENTAL CARS

BIKE RENTAL

YLLÄS AROUND

VILLAGE BUS (Kylapussi)

VILLAGE BUS route planned by citizen

POSTI Delivers services, mail + people

ONNI BUS

TUUP (Turku MaaS)

MaaS (Finland)

ON DEMAND PUBLIC BUS Pietarsaari

PIHKA Project on making personal service transport better

EKORENT.FI (& other flexible car renting & sharing services)

CITYBIKES

INVA TAXIS

KUTSUPLUS

UBER

AUTOLEVI

TURO.COM

PIGGY BAGGY Transport of goods

KALASATAMA LIVING LAB

PRIVATE ← → **PUBLIC**

TRAINING OF TAXI DRIVERS Disability council

AIR DONKEY (Bike locks)

ELDERLY IN SCHOOL BUS

CO-OWNED CAR

ACCESIBILITY APPS Blind square

PEKKA NISKA Paying for cycling

PRIVATE CAR

MOPOAUTOS

GREENRIDERS

FLAGGING DOWN BUS

AUTOKYYTI.FI

P2P KIMPPA.NET

P2P KYYDIT.FI

BICYCLE ROUTES MAPPING by users

CROWD-SOURCED CYCLE PATHS

BICYCLE

FACEBOOK GROUPS Ridesharing Commuting

CARPOOLING WHATSAPP GROUP

FAMILY CARPOOLING

YELLING FROM PORCH

HITCH-HIKING

Existing private and public services

Mobility as a Service solutions

Modes of transportation

Solutions we found

INFORMAL

Solutions Matrix. (Development of ideas by mobility supergroup, graphics by Berg)

Planning

VERKA

VISION
2030

Re-imagine public transport!

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