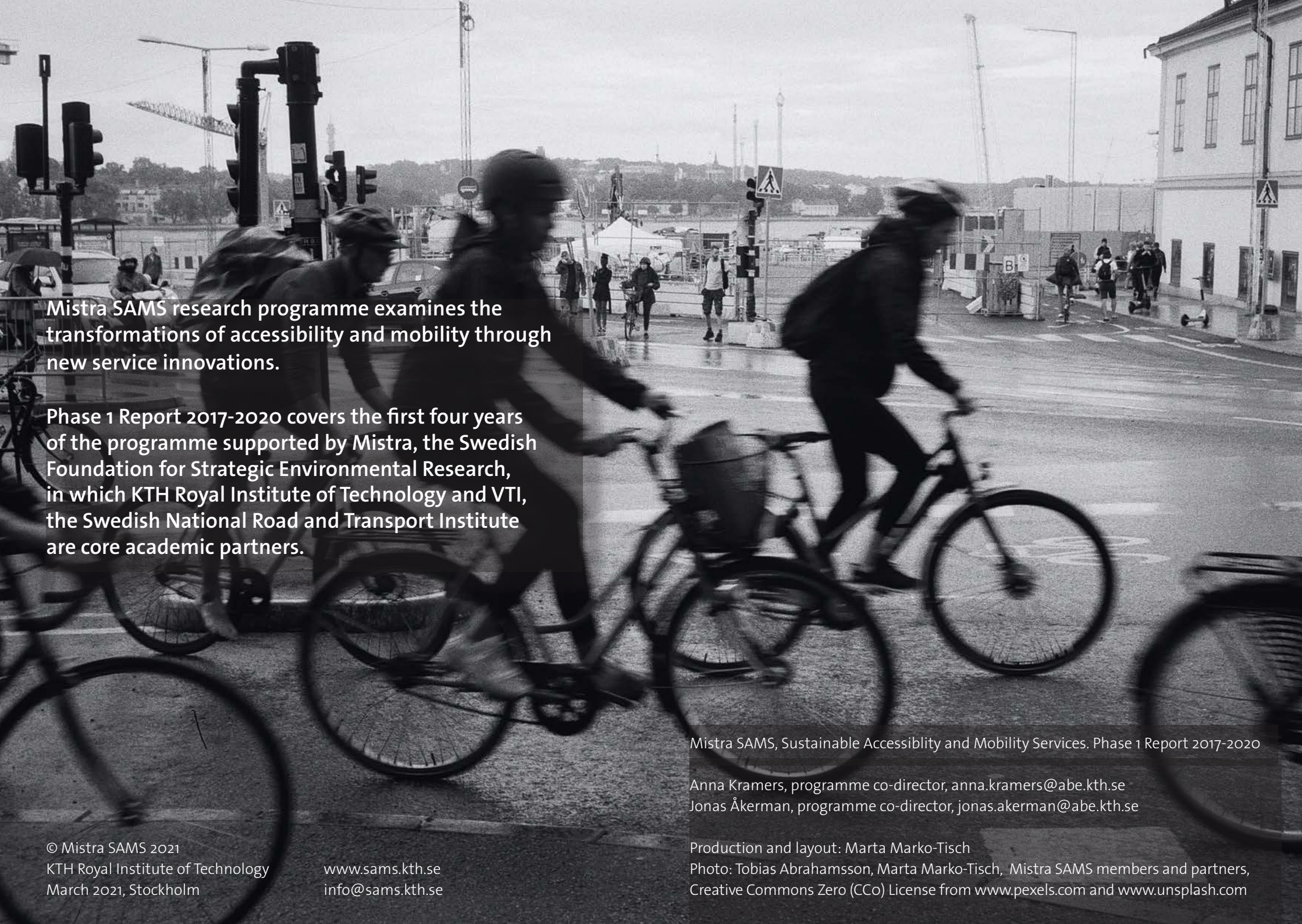
Mistra SAMS

Sustainable Accessibility and Mobility Services

Phase 1 Report
2017-2020



Mistra SAMS research programme examines the transformations of accessibility and mobility through new service innovations.

Phase 1 Report 2017-2020 covers the first four years of the programme supported by Mistra, the Swedish Foundation for Strategic Environmental Research, in which KTH Royal Institute of Technology and VTI, the Swedish National Road and Transport Institute are core academic partners.

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Mistra SAMS, Sustainable Accessiblity and Mobility Services. Phase 1 Report 2017-2020

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Introduction

In this report, we highlight the research carried out in the first phase of Mistra SAMS and share the scientific output and impact that we, along with our partners achieved in the programme during 2017-2020.

In its first phase, researchers in Mistra SAMS has made more than 50 scientific contributions through papers and conference presentations, and has created two living labs with together more than 70 participants. Researchers have had numerous workshops, presentations and public debates with decision-makers and contributed to popular scientific publications with the goal of influencing policy toward sustainability on an international level.

Where appropriate, this report uses hyperlinks in the text to help the reader find articles, publications and websites.

Table of contents

Chair's page

"Sweden has by 2030 achieved sustainable accessibility and mobility in urban regions" - Mistra SAMS' vision is ambitious but necessary if we want to achieve the level of decarbonisation that the Paris agreement requires.

Transportation is one of the most crucial systems to transform in order to ensure a sustainable future for humanity. Mistra SAMS is a research programme that works for just that.

During its first four years, the programme has provided significant scientific results on how accessibility and mobility services can contribute to a sustainable urban transport as well as the risks with these services. Researchers in the programme have frequently published papers regarding various aspects of smart mobility, for example implications of policy, economic interventions, user perspectives and climate change.

Technology evolves quickly, which creates not only new possibilities but also new challenges. There is great value in addressing these in a transdisciplinary way, connecting different discourses and competences, as well as combining theory with real-life experiments.

The two living labs created by the programme have allowed users to test future ideas in real life, which has generated great interest both in Sweden and internationally. Mistra SAMS has also participated in public debates with decision-makers and influenced policies at local, national and international level. The programme has organised seminars at the 2017 and 2018 Almedalen Week, and in 2019 at Järvaveckan. On a European level, Mistra SAMS has made an impact through meeting with the European Commission and showing how its research can contribute to the commission's strategic vision for a climate-neutral economy.

Though, one can rarely succeed alone; great achievements often arise from teamwork. Joint collaborations have been one of Mistra SAMS core strengths and the programme has always included its partners and consortium members from outside academia in co-producing studies, living labs, and other activities. At Ericsson, we have always appreciated this mindset and considered our partnership with Mistra SAMS as a possibility to gain new insight and shared knowledge that made it possible to develop, test, and spread innovations.

The programme's Living Lab in Tullinge has inspired us to investigate the role of the future enterprise using the advantages of cloud and mobile technologies to its full potential. Hopefully, as 5G technology generally available, we will be able to contribute even more to the implementation of autonomous transport and mobility services in order to achieve sustainable and efficient urban living.

For me, as the Chair of the Board, it has been a genuine pleasure to be a part of this journey. I am genuinely glad that Mistra SAMS has been awarded research funding for another four-year period and will continue investigating what a future mobility system might look like.

I am looking forward to our continued partnership and even more exciting projects in the coming years.

Torbjörn Lundahl
Chair of the board, Mistra SAMS

A reflection from Mistra SAMS Programme directors

The year 2020 has been not only intensive for Mistra SAMS but also stimulating. The finalisation of work in phase 1 of Mistra SAMS has been carried out in parallel with the preparation of the application and programme plan for phase 2, which will last from 2021 to 2024.

We recently had two successful doctoral dissertations. More than 50 publications will be the scientific result from phase 1. Since the aim of Mistra SAMS is to make a real contribution towards a sustainable transport system, impact on transport policy, outreach to decision-makers has been much in focus. Besides media coverage in newspapers, on the radio and television, we have held seminars and meetings with Karolina Skog (Minister for the Environment), Tomas Eneroth (Minister for Infrastructure), Per Bolund (Minister for Housing), Daniel Helldén (Vice major of traffic, City of Stockholm), Kristoffer Tamsons (Regional Chair for Transport, Region Stockholm), Anne Berner (Minister for Transport, Finland) and representatives of the European Commission., among others

Last year, the Covid-19 virus appeared on the scene and since then has disrupted much of life and activities world-wide, while causing much suffering. On the positive side, global emissions of carbon dioxide decreased by 7% in 2020. Car travel in Sweden decreased by 10 %, while air travel by the Swedish population was down 74%. A large part of the work force has been part of an involuntary trial regarding location-independent work.

Here the research around the work hub in Tullinge and other parts of Mistra SAMS will fit in nicely and contribute to making part of this change smooth and permanent.

The consequences of Covid-19 for urban transport patterns in general are very uncertain. While the trend towards working near or in one's home is promising, others are a matter of concern. Public transport, which should be the backbone of sustainable urban travel, has taken a hard blow. The possibility for some professions to work anywhere may cause urban sprawl and possibly even de-urbanisation, developments that would erode the market base for public transport even further.

The Mistra SAMS research is highly relevant for analysing these diverging trends as well as on-going policy initiatives like the Transport infrastructure plan for 2022-2033, the investigation about phasing out fossil fuels and vehicles as well as the design of urban environment agreements.

It is an exciting period that lies ahead of us when the vaccine will relieve us from isolation and where the knowledge on digital access has increased enormously in society. Utilising the results and efforts made in phase 1, Mistra SAMS phase 2 is well-positioned to continue to conduct research about the very much needed transformation to a sustainable transport system.

Anna Kramers & Jonas Åkerman

Programme directors, Mistra SAMS

What is Mistra SAMS

Sweden aims to become one of the first fossil-free welfare states in the world, with a vehicle fleet independent of fossil fuels by 2030. Stockholm strives to decrease car traffic despite a rapidly growing population. These goals require a rapid and radical transformation of accessibility and mobility in the country.

We at Mistra SAMS have been aware of these challenges and addressed them by involving both inter-disciplinary research and a close collaboration with users and practitioners in the programme.

Our researchers come from engineering, behavioural studies, and social sciences, and work together to identify promising services, understand user needs and institutional conditions that enable services to be adopted, design and test services and service platforms, and influence policy and society.

The iconography shows examples of services that Mistra SAMS investigates. Public transport, autonomous vehicles, telecommuting, bike- and car-sharing initiatives, integrated ticket purchasing, walkable streets, co-offices etc. All of these can be regarded as services that provide accessibility to different users.

Vision

The vision of Mistra SAMS is that Sweden has by 2030 achieved sustainable accessibility and mobility in urban regions.

This requires that by the end of the decade:

- the use of privately owned cars for commuting in dense urban traffic has been to a significant extent replaced by a combination of working at local co-working hubs, the use of shared vehicles, and home delivery services
- the use of platforms has enabled the integration of services, providing booking and payment of whole transport chains and improving the competitiveness of intermodal transport
- key actors have acquired in-depth knowledge of the accessibility preferences of different user groups, as well as increased capacity to address these needs in planning and policy making
- the development, testing and adoption of innovative accessibility services have contributed to increased competitiveness of Swedish industry, as well as increased attractiveness of the urban areas in which these services are used

Aim

The aim of the Mistra SAMS programme is to provide in-depth scientific knowledge on how platform based accessibility and mobility services can contribute to sustainable urban transport and influence public actors' ability to, together with private actors, contribute to the transformation of the transportation sector.

AVOID • SHIFT • IMPROVE

Mistra SAMS is underpinned by an understanding that the transformation to a sustainable transport system needs to be based on the following three measures.

Avoid inefficient or unnecessary travel and transport

for example via improved and integrated urban planning, less complex delivery chains and e-communication options (teleworking, mobile solutions)

Shift transport mode

to the most efficient or sustainable modes, and/or move the journey to off-peak times

Improve transport's environmental performance

via technical, operational, legislative or pricing-related improvements. Use existing infrastructure and vehicles in a more resource-efficient way.

Read more about the Avoid-Shift-Improve strategy

Literature seminar on Governance of the Smart Mobility Transition (photo: Tobias Abrahamsson)

Work Packages

During its first phase, Mistra SAMS has been working through a number of interconnected research projects called work packages, led by the researchers of the programme.

The tasks of the work packages were:

- Examine the transition towards sustainable accessibility within a theoretical framework
- Take a strategic outlook on accessibility service innovations and platforms
- Understand the needs and capabilities of the various actors involved
- Design and test service systems
- Explore the impact of accessibility services on different levels of society
- Provide scientific knowledge to decision makers

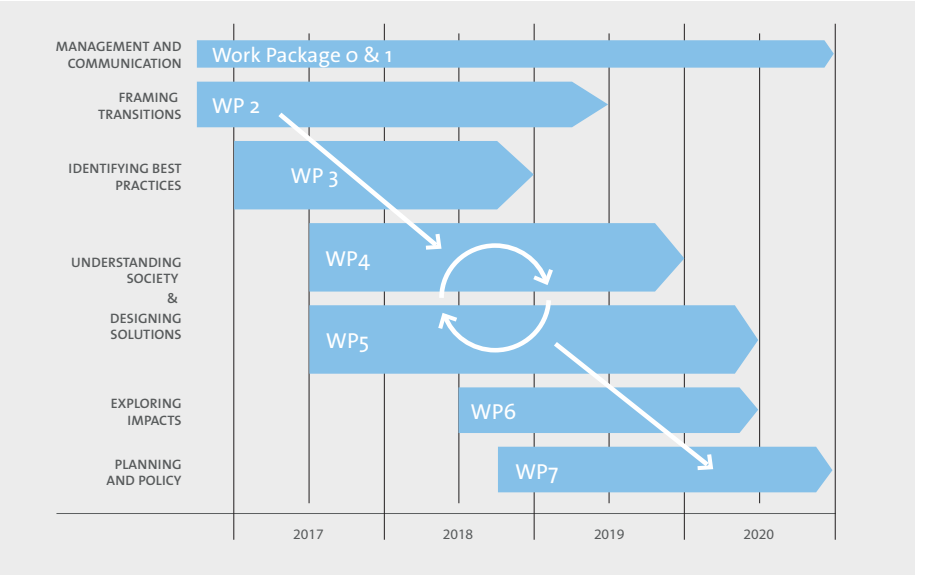

Figure 1: Overview of the work packages

Mistra SAMS Team

Programme executive committee

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Anders Gullberg, UrbanCity

Karolina Isaksson, VTI

Teo Enlund, KTH

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Åsa Aretun, VTI (from January 2019)

Malin Henriksson, VTI

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Peter Georén, KTH

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Christer Hårrskog, Chief Strategist, Swedish Transport Administration

Gunnar Björkman, Innovation Director, City of Stockholm

Professor Göran Finnveden, KTH

Professor Sofia Ritzén, KTH

Anna Anund, Research Director, VTI

Co-opted member: (until February 2019)
Christopher Folkesson Welch, Programmes Director, Mistra

Co-opted member: (from February 2019)
Linda Bell, Programmes Director, Mistra

Read more at sams.kth.se/team

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Tina Ringenson, KTH

Wilco Burghout, KTH

Mistra SAMS annual conference 2020 was held via Zoom, photo: Tobias Abrahamsson

The Consortium

Mistra SAMS engages researchers as well as key public and private actors. Consortium partners participate in the administration of the programme as well as in research.

Malmö stad · Lunds universitet · OPENLAB · Samtrafiken · Trafikverket · itch · Savantic · Stockholms stad · Botkyrka kommun · Scania · Hertz · Ericsson · KTH Vetenskap och konst · vti · Mistra – The Swedish Foundation for Strategic Environmental Research

Insights on users' perspectives

A substantial part of the research in Mistra SAMS has been focused on users' needs, restrictions and preferences in relation to emerging mobility and accessibility services. We completed several research activities, some of them with a theoretical emphasis and others which a focus on gaining new empirical insights.

PAC - a new way to measure accessibility

One key ambition with the research in Mistra SAMS has been to develop new insights on how new mobility and accessibility services may contribute to sustainable accessibility and mobility in urban regions.

Our work to explore this has built on **conceptualisations** of sustainable mobility and accessibility that start from the perspectives of the users, with a focus on their perceived accessibility. One of the key concepts developed in the programme is the **perceived accessibility scale (PAC)** which is a new theoretical and methodological concept for incorporating the individual dimension of accessibility in current transport and mobility planning practice. Perceived accessibility is defined as **"how easy it is to live a satisfactory life with the help of the transport system"** and is proposed as a complement to objective measures and understandings of accessibility. This approach can help determine specific mobility and accessibility initiatives that will improve the lived experience of accessibility for specific groups or individuals.

Our key publications on the topic:

Perceived Accessibility: Living a satisfactory life with help of the transport system

Restricted car-use and perceived accessibility

A new approach to accessibility – Examining perceived accessibility in contrast to objectively measured accessibility in daily travel

Real-life experiences from new mobility and accessibility services

Throughout the programme, we have studied several new initiatives and mobility services from a users' perspective. Below some key examples.

Free-floating car-sharing of electric vehicles

The purpose of this study was to understand how new car-sharing services may affect modal choice, and thus the potential for these types of services to contribute to sustainable mobility. We analysed the effects on travel behaviour of one specific new car-sharing service in the inner city of Stockholm. The study showed that individuals who participated in the free-floating car service increased their car-use compared to the control group. The study provides insights that new shared mobility services can change modal choices, but not automatically in a sustainable direction.

Micro-mobility services

In Mistra SAMS, several studies have been carried out with a focus on the increased number of commercial e-scooter services in Stockholm.

E-scooters in the Swedish city district press of Stockholm, Göteborg and Malmö

A reflection of public views on this phenomenon. The study, which was a collaboration with an EIT Urban Mobility programme, and specifically the project " MOBY: Living lab e-micromobility", showed that the media debate has so far focused on traffic safety, working conditions for collection/ charging and environmental aspects of operation, discarding and production of e-scooters.

Download the report

How e-scooters affect public space

The study focus on pedestrian environments in the inner city of Stockholm. One conclusion was that the current use of e-scooters in Stockholm has negatively affect the perceived safety of pedestrians . However, the effect varies depending on the specific design of streets and sidewalk environments. The study also concluded that urban design may be used as a tool for reducing the negative impact of e-scooters for pedestrians and that the behaviour of e-scooter users during rides and parking needs to be regulated more clearly.

Download the study on the impact of e-scooters

Potential role of commercial e-scooter services in a transition towards a sustainable mobility system in Stockholm.

This study was based upon a survey with residents in the Stockholm city and region and showed that commercial e-scooter services currently does not contribute to sustainable mobility. However, if batteries, systems for charging, and lifespan of e-scooters improve, it could potentially have a place in a future urban sustainable mobility system.

Along these lines, the study proposes several suggestions of ways forward to steer e-scooters in a more sustainable direction.

Download the study on sustainability issues of e-scooter services in Stockholm

Case study on a bike-sharing system

The study focused on usage from a transport justice perspective. The LinBike system is currently the largest electrical bike-sharing system in Sweden. It was launched in the middle-sized municipality Linköping in 2019 and differed from many previously established bicycle systems in that it was initiated by the local authority and not by a commercial actor. The analysis built on interviews with LinBike users and showed that the system primarily attracted users that already have high accessibility, even if there are examples of users that gain wider/higher accessibility due to the service.

Docking stations were placed in vulnerable residential areas and the service had a price model that was accessible for different social groups. Together, this suggests that the system has the potential to contribute to transport justice.

Groups and perspectives that risk being marginalised

A concern related to emerging mobility and accessibility services is that these services tend to target privileged groups who already benefit from easily accessible transport options. They favour able-bodied and well-off individuals that can conform to a *"one size fits all-design"*. They also tend to neglect that women and men have different travel patterns and favour work related trips.

We especially highlighted these issues in a focus group study with employees from Botkyrka municipality. We interviewed two groups of employees, one group that worked with cleaning and maintenance and one with public servants working with environmental issues.

The participants differed when it came to income, education and living conditions. In both groups, the car was regarded as a convenient mode of travelling compared to public transport. The cleaners often start their shift early in the mornings and have to carry tools and materials needed for their duties. Thus for some of them public transport is not considered an option, and the car is an essential part of everyday-life. Fuel costs represent a significant monthly expense . Some still rely on public transport for commuting and everyday trips. They are less satisfied with aspects of their daily travel. The results reflect previous findings in international literature on transport poverty, where it has been highlighted that while the car is a common mode of travelling in different socio-economic groups, it is the poorer groups that spend more of their income on costs related to the car. Therefore, car dependency has to be understood in relation to socio-economic status.

When it comes to travelling in the future and emerging accessibility and mobility services both groups are more interested in a functioning public transport system than new mobility services. The cleaners had innovative ideas related to their work trips for example shuttle buses that offer free trips to work and home.

Living Labs

Creating a Living Lab together with our partners makes it possible to explore different futures that are not commercially viable today.

Mistra SAMS carried out a number of intervention studies with users of accessibility and mobility services. These Living Labs provided useful data for the ongoing research into user needs and preferences, as well as the sustainability impact of various services.

Living Lab methodology

The design driven living lab methods used in Mistra SAMS has been developed by the programme's researchers.
Design interventions in the Living Labs were used to gain knowledge on how users respond to a combination of accessibility and mobility services together with policy instruments. We provided a combination of services via a digital platform and tested it in different urban contexts.

Having different user groups with daily interventions for several months, allowed us to generate knowledge on the possible design of new service concepts for achieving a resource-efficient travel pattern.

By creating prototypes together with partners that represented different actor perspectives we have been able to produce detailed knowledge while we also found that Designerly Living Labs tend to uncover the requirement of a multi-disciplinary research team to effectively analyse and evaluate the results.

The purpose of the Living Lab study has been to encourage businesses, researchers, authorities, and citizens to work together for the creation, validation, and testing of new services, business ideas, markets and technologies in real-life contexts.

The problem/opportunity

Evaluation of accessibility and mobility services in Mistra SAMS phase 1 showed that these services are mainly available in city centres. From an environmental point of view, it would be beneficial if these types of services also could be available in inner and outer suburbs.

Car sharing services and co-working hubs have found it difficult to gain traction in suburbs, where there is a more or less in-built necessity for a privately-owned car. Co-working hubs on the other hand are primarily located in city centres and are mostly aimed for startups and small companies.

Work process

The process for setting up and running Living labs was developed during phase 1 by four different steps.

1. Frame the scope: The first step was to frame the research scope for the living lab. This step was based upon previous knowledge and carried out in collaboration with different research perspectives in the programme. The framing process identified specific research objectives and set the research arena for systems that were to be explored in the research programme.

2. Listen and co-create: The second step was to organise workshops with partners in order to define and collaboratively create specific interventions. These included proposals for rich scenarios and rough prototypes that were to be developed. All of those were based on insights from previous research as well as interviews and workshops with living lab participants, partners and stakeholders.

3. Shape and reshape: In the third step, the living lab was implemented according to the previously decided design interventions to provide empirical grounds for exploration and data collection from different research perspectives and enable learning spaces for exploring research questions. The participants were considered as co-researchers of their own practices and were engaged in specific research activities for each intervention.

4. Sustain the living lab: This was the phase of managing practical issues whereby additions and adjustments were required. Managing a living lab has been similar to running a start-up company and as interventions often challenged surrounding structures many actions were required, often on a daily basis.

Martin Sjöman has lead the work with Living Lab 1.
Photo: Tobias Abrahamsson

Living Lab 1 “Future playing rules of everyday travel”

The duration of Living Lab 1 was six months between June and November 2018, apart from the baseline measurement a month before the interventions were presented to the participants. After brief phone interviews, 20 participants took part in a one-month base measurement of their everyday travel by use of the TravelVU app.

The three interventions in this Lab were:

1) Making the cost of car ownership transparent
2) Cheaper public transport during off-peak hours
3) Economic reward for bicycling

Results

Findings from Living Lab 1 support the view that privately owned cars are hard to replace with new mobility services that contribute to sustainability and are not based on individual cars. Economic interventions for increased sustainability would likely have limited impacts, since the alternatives do not offer what car owner value most. Limited understanding of the car’s full costs may make the new services appear comparatively more expensive.

Urban planning to reduce the need for travel and the capacity of the physical public transport infrastructure will continue to be important. Long vacation trips and “medium sized flows” are opportunities for further research and for new solutions to support sustainable mobility transitions.

Results from the research conducted in this living lab have been published in the European Transport Research Review:
Exploring everyday mobility in a living lab based on economic interventions

Living Lab 2 “Near Work – Smart Mobility”

Living Lab 2 was based upon the idea to offer a local work hub in a suburb close to people’s homes together with mobility services at the same digital platform.

Place:	Tullinge
In operation:	January 2019 -January 2022
Participants:	Approx. 60 participants from the neighbourhood, working for different companies
The hub:	Professional work space to book via an app, conference room, three soundproofed rooms, social areas, electric bikes etc.

Results

The results from the Living Lab in the town of Tullinge have shown that teleworking gives a great relief in everyday life. Many participants have chosen to walk or bicycle to the hub and “retrained” themselves not to use the car for local activities.
The work hub is not an ordinary ”co-working place” for meetings, instead it is meant to be a place to stay calm and concentrate at. Interviews with participants has shown that there have been other benefits, such as increased health and well-being, better coping with work-life balance, which also lead to increased equality.

A work hub might even have possible beneficial effects on the local community that can become more vibrant. Local business owners may benefit from a larger market as there are more people around in the local area, which also increases local safety.

The hub can even function as a local knowledge centre for sustainable lifestyles.
Most participants have been very positive and seen great potential for the concept but felt that teleworking is still hindered by norms that are hard to change, like daily routines and habits as well as standards regarding attendance, control and leadership.

Read more about Mistra SAMS Living Labs at sams.kth.se/activities/living-labs

Teo Enlund at the opening of the Tullinge work hub photo: Tobias Abrahamsson

Achieving transport climate targets with the help of new accessibility and mobility services

A significant share of the CO2-emissions from the Swedish transport sector originates from the passenger car-fleet. In a scenario study, we have explored the role that electrification and sharing of cars could have in reducing these emissions by 2030.

The transition from ICE (internal combustion engine) cars to electric cars imply that the share of total emissions that are accounted to indirect emissions will increase.

We assumed a strict target for direct emissions, meaning that emissions from road transport should be reduced by 70% between 2010 and 2030. The indirect emissions on the other hand are largely included in the EU Emission Trading System (ETS). Due to fixed cap and that higher level of emissions in one sector would force emissions to a lower level in other sectors, the target here is not as clear. Relatively high emissions in one sector may put stress on the system due to that a high price of emission permits may lead to industries leaving the EU with negative consequences for employment.

We also examined what the scenarios could come to mean for the future need of electric car battery metals, e.g. cobalt, lithium and nickel.

A further conclusion from this study is that limiting the number of ICE cars in service until 2030 is a key factor to achieve the reduction of direct emissions. This would, from a resource perspective, preferably be achieved by substantially reducing new sales of ICE cars the coming years. If this strategy fails, premature scrapping of ICE cars will likely be necessary to reach the target.

Which scenarios are consistent with the ETS depend on how/if the system is revised, e.g. with a lowered cap, and on the emission reduction potential in other sectors.

Conclusions from both studies

- In order to meet transport and climate targets car traffic needs to be reduced by 15-40% and air travel by 15-25% per capita until 2030
- Accessibility and mobility services can have positive impacts on emissions, not least on the indirect emissions related to vehicles and infrastructure.
- These services may also contribute to climate targets by creating acceptance for economic policy instruments needed for target fulfilment.

Back-casting study covering the Swedish transport system

In a research paper we inspected the entire Swedish transport system, including air and sea transport and even indirect emissions related to e.g. building of infrastructure, manufacturing of vehicles and production of fuels.

We have developed three images of the future (*Build, Optimise and Digitalise*) achieving the climate targets, each one based on its own leading idea and withholding its own opportunities and challenges. The aim has been to highlight a number of important decisions and to give a basis for an informed discussion on transport and GHG-emissions.

In developing the images we have analysed the potential of working from other places than a primary work place and how the opportunities for car sharing might vary, depending on the density and size of a municipality. By analysing the Swedish Occupational Register, we have found that around 30% of working days could be carried out from a work-hub, home office or other places.

Build - The first image of the future is characterised by substantial investments in the public transport systems in cities. Added buildings are localised with good accessibility to rail transport nodes. A high-speed rail system serves Stockholm, Gothenburg, and Malmö.

Optimise - The second image focuses on using existing infrastructure and vehicles as efficiently as possible. Mobility services supporting new mobility solutions, shared vehicles as well as less difference in traffic volumes between different parts of the day, are key aspects. The latter is achieved by differentiated road charges in time and space.

Digitalise - In the third image digital services has been much developed and are used extensively. The amount of commute travel is considerably reduced through more work from work hubs and business trips are to a high extent substituted by video meetings.

Governing the transition to sustainable and smart mobility

Research in Mistra SAMS has also provided insights into institutional conditions that influence the development and implementation of emerging mobility and accessibility services. Our research has focused both on the national policy discourse on smart mobility and accessibility, and on governing strategies in relation to smart mobility among actors at the local governance level.

The discursive framing of smart mobility in Sweden

In one study, we analysed Swedish policy and planning documents from the years 2015-2017 and explored how the shift towards "smart" mobility was discursively framed. We found that digitalisation and smart mobility was framed as a rapid, unstoppable transformation, expected to lead to reduced climate emissions, less congestion, improved accessibility, and a smoother and more resource-efficient transport system. The policy documents were also characterised by an explicit belief in market actors to lead the development into an era of smart mobility, and a lack of reflections on potential risks or downsides with such a development.
The study concluded that there is a need for more in-depth considerations about benefits and risks, winners and losers in the ongoing transition to smart mobility, and for developed reflections on what type of mobility practices and power relations that the ongoing transition may reproduce.

Download: All Change or Business as Usual? The Discursive Framing of Digitalized Smart Accessibility in Sweden

The role of municipalities in steering towards smart and sustainable mobility

Another study was an in-depth exploration of how local municipalities in the Stockholm region understand and form their governing strategies in relation to smart mobility. Based upon interviews with planners and other professionals from local policy and planning, we found strategies that involved leadership as well as market-driven approaches and reactive tactics. Another finding was that commercial interests are currently shaping the introduction of smart mobility in local municipalities, and that there is a risk that the ongoing transition will not lead to a more sustainable transport system but instead reinforce unsustainable mobility practices. One of the main conclusions from this study was that there is a need for a thorough political discussion about the role of public actors in the transition to smart mobility, and their responsibility for securing that smart mobility will also support long term goals of sustainable transport.

Download: The Role of Local Public Authorities in Steering toward Smart and Sustainable Mobility: Findings from the Stockholm Metropolitan Area

A remaining conventional approach to transport planning

Other parts of our research focused on national transport planning and explored the ways in which specific approaches and practices in national transport policy and planning affect prospects for a transformation to meet climate and sustainability goals. It was found that national authorities with strategic and operational responsibility for the transport system, despite ambitious policy objectives, are still stuck in a "conventional approach" to transport planning, with dominant quantitative practices and knowledge perspectives, through which the future is mainly portrayed as a continuation of the historical development.

In practice, this has proved to constitute significant obstacles to considering policy measures that may affect future travel behaviour as well as implementing a transformative policy agenda.

Download the doctoral thesis: "Approaching transformative futures: Discourse and practice in Swedish national transport policy and planning"

Download the article: " Assessment tensions: How climate mitigation futures are marginalized in long-term transport planning"

Transformative capacity for climate mitigation in strategic transport planning

A fourth study carried out within this part of Mistra SAMS was an analysis of a national policy initiative where six public agencies had the task to produce a strategic plan for a transformation towards a fossil-free transport sector.

The goal here was to provide empirically grounded insights on principles and practices of importance to consider potentially transformative measures in long term transport planning. We found that several elements of transformative capacity were developed through the process. Of specific importance was the ways in which the organisations involved in the policy initiative started to challenge existing routines and perspectives in conventional transport planning. New joint principles for the assessment of policy measures for climate mitigation were developed, as well as ways to accommodate uncertainties.

This allowed for a broader consideration of measures of relevance for a sustainable transformation of the transport system, including digitalised accessibility solutions. However, while the national policy initiative showed an interesting potential for transformation, it was detached from more established planning settings. The future will show whether the new principles and practices will actually lead to a more substantial transformation of the transport system.

Can smart mobility, citizen participation, and the corona crisis spark a transformation?

One of the final studies carried out in Mistra SAMS 2017-2020 was a desk study where we analysed if and how smart mobility, citizen participation and experiences from the corona crisis can work as 'catalysts' for initiating a transformation to a sustainable transport system.
The study is based on the Multilevel Perspective (MLP) on sustainability transitions and literature on policy instruments.

The report concludes that smart mobility and deliberative citizen participation, together with the pressures from both the corona crisis and the sustainability and climate crisis, have the potential to destabilise conventional transport planning and transform the sector towards more sustainable development.

However, this will not happen all by itself, and the direction of change is not given. Politicians have a particularly heavy responsibility to lead the process of the transport system's transition to sustainability with will, perseverance and relevant policy instruments.

Policies to reach transport climate targets

In the final period of Mistra SAMS Phase 1 we drew conclusions regarding policy strategies to reach transport climate targets with the aid of new mobility services.
The awareness of climate change has now permeated the entire political spectrum. There is a wide agreement regarding the national climate targets set-up in Sweden. At the same time it is clear that progress towards the targets is not at a sufficient pace and that there is a disagreement regarding what measures should be applied.

As has been shown in Mistra SAMS and by research elsewhere, car and air travel per capita needs to be reduced in order to reach climate targets. The belief, still partly prevalent in national transport planning, that this is not necessary builds on assumptions that biofuel use possible in Sweden is not realistic to generalise globally.
It is also clear that the real climate benefit of biofuels needs to be scrutinised regarding changes to carbon sinks over time and effects in terms of land-use changes.

International experiences have shown the importance of combining "push" (e.g. taxes and charges) and "pull" (e.g. improved alternatives to travel by car and air) measures in order to increase accessibility in relation to transport input and spur modal shifts. (OR "contain road and air transport volumes and spur modal shifts") Push measures like fuel taxes, congestion charges and parking charges, however, often meet significant public resistance. New accessibility and mobility services here have an important role to play. Besides giving positive direct effects on emissions, a possibly even more important contribution is that these services constitute attractive alternatives to private car use and so increases the likelihood of implementing powerful push measures.
To reach the targets a wide array of policy measures will be needed, preferably put together in packages to assure both theoretical target achievement and acceptance of practical implementation. Here we mention a few of them.

Work carried out from a work hub, the home or another place has gained a dramatic increase during the pandemic. The work hub in Tullinge run by Mistra SAMS has given important experience in this area. Although the involuntary trail during the pandemic has made much of the work force comfortable with this way of working, more needs to be done.

The lessons from the Tullinge work hub and other living labs can be used to make handbooks for setting up such hubs, and thus lower the threshold for municipalities around Sweden. There is also an urgent need to update national regulations that are 20 years old, to be more relevant for work independent of a fixed location. Finally, employers responsibilities also need to be reconsidered.

Having convenient access to cars when needed without having to own one is an important part of sustainable mobility. Thus, car and bike sharing services need to be stimulated. One important measure is to increase parking charges in densely populated areas to reflect actual costs. At present, parking is often heavily subsidised. Legislation need to be changed to allow that some parking lots in streets are reserved for station- based car sharing. A revision of parking policy for new apartment buildings is needed. Instead of the present requirements of a certain number of parking lots, requirements should rather concern the supply of sufficient accessibility and mobility services, like car and bike pools.

Pull measures like these exemplified above need to be accompanied by economic instruments differentiated in time and space to the mirror external environmental and health effects of traffic. This would mean higher charges in urban areas compared to smaller cities and the countryside. In the longer term differentiated road charges will likely be the primary measure. Meanwhile, strengthening congestion charges and making parking pay the full costs in larger cities will probably be to prefer compared to raising fuel taxes.

International Collaborations

International Scientific Advisory Panel - ISAP

The ISAP has contributed to the scientific assessment of Mistra SAMS, where research height and innovation has been key criteria.

During Phase 1, members of Mistra SAMS International Scientific Advisory Panel (ISAP) visited Stockholm twice to give feedback to the work packages and programme management.

The panel consisted of internationally recognised senior researchers and experts who are outstanding academic leaders in core fields that are directly relevant to the programme. The task of this panel has been to explicitly **review, guide and challenge** the work and progress of the programme on an on-going basis. The panel strengthened the programme's academic excellence by bringing state-of-the-art knowledge and research results, as well as providing comparative perspectives and policy experiences with regard to "best practices and lessons learned" in their respective areas.

Read more at sams.kth.se/team/isap

Members

- **Professor David Banister**, University of Oxford, UK,
- **Professor Emerita Elizabeth Deakin,** University of California, Berkeley,
- **Professor and Director Simon Marvin**, The Urban Institute, University of Sheffield, UK.
- **Professor Bert Van Wee**, Delft University of Technology, The Netherlands.
- **Professor Anna Sparrman**, Linköping University

Some reflections from ISAP

> Don't be afraid to raise critical and provocative questions, based on Mistra SAMS results!

> The programme's focus on the role of public actors is excellent but the public sector alone cannot materialise the new mobility paradigm, so don't forget to closely examine the relationship between different actors. Connect more with the consortium and different actors in society.

> Mistra SAMS seems to be on track! The team has a climate of open discussions, with high potential to produce results that are scientifically and practically useful.

> We're delighted to see how much collaboration is happening between the PhD students, and between PhD students and senior researchers.

From left to right: David Banister, Bert Van Wee, Anna Sparrman, Elizabeth Deakin, Simon Marvin(2017)
Foto: Tobias Ohls

Exponential Climate Action Roadmap & 1.5°C Business Playbook

The Exponential Roadmap Initiative brings together innovators, scientists, companies and NGOs with the mission to halve emissions before 2030 by means of exponential climate action and solutions.

Read more at exponentialroadmap.org

Digital revolution and market forces poised to drive economic transformation away from fossil fuels, but not without the right policy mix and bold climate leadership. The roadmap is based on the idea of a "Carbon Law" where emissions are halved every decade. Researchers from Mistra SAMS contributed to the roadmap, especially in the section on transport.

Mistra SAMS is also a partner to the 1.5°C Business Playbook initiative, a spin-off from the Exponential Roadmap. It is a concrete tool guiding companies and organisations of all sizes to exponential climate action, and helping them align with the 1.5°C ambition.

> *"We believe that the Playbook has a great potential to be widely spread and thereby support the necessary transformation of companies and organisations"*
> Dr. Anna Kramers, Programme director of Mistra SAMS

Download the Playbook

Study trip to Finland

In October 2018, researchers from Mistra SAMS visited Helsinki to study the development of Mobility-as-a-Service (MaaS) in Finland.

Helsinki was chosen as a relevant place for the research team to visit as Finland has started to transform its transport legislation in an extensive way to open up for innovation in the transport system.
The Act on Transport Services, implemented in 2018, was intended to create a framework for a more efficient arrangement of publicly subsidised passenger transport by utilising digitalisation, combined transport, and different fleet types.

In Helsinki, researchers met representatives from academia, business and government.
All of these parties presented very similar views on the development of MaaS in Finland, with the same keywords: **innovation, business opportunities** and **user perspectives**.
Public actors in Finland appeared to have a great willingness to test innovations in real life and many MaaS innovations have started to develop as a result.

Mistra SAMS looks forward to observe how MaaS develops in our neighbour Finland and what effects its current boom will have on sustainable accessibility and mobility for Finnish travellers.

Download the Study trip report

Open lecture with Iain Docherty

The future of connected and autonomous vehicles and potential threats to public transport systems

> “The publicness of the mobility system is under threat from smart mobility.

Together with the Integrated Transport Research Lab (ITRL) at KTH, Mistra SAMS invited Professor Iain Docherty from the University of Glasgow Adam Smith Business School to hold a lecture which was also live-streamed online. Professor Docherty’s research and teaching addresses the interconnecting issues of public administration, institutional change and city and regional competitiveness, with particular emphasis on the structures and processes of local and regional governance, policies for delivering improved economic performance and environmental sustainability, and the development and implementation of strategic planning and transport policies.
Read more about Iain Docherty’s lecture

Open lecture with Glenn Lyons

> “Uncertainty is an uncomfortable position. But certainty is an absurd one.

Handling uncertainty in transport planning and decision making

Glenn Lyons is Mott MacDonald Professor of Future Mobility at the University of West England. Professor Lyons visited Mistra SAMS in January 2019 and headed a seminar on uncertainty in planning and decision-making, a topic on which he has written extensively.

Professor Lyons highlighted that while the future has always been uncertain, uncertainty currently about what lies ahead is widely recognised to be “deep” with a number of dynamics at play in terms of social, technological, economic, environmental and political drivers of change. *Read more about Lyons’ lecture*

Open lecture with Lorenz Hilty

Simulating the post-fossil Swiss city in a game

Lorenz M. Hilty is a Professor at the Department of Informatics at the University of Zürich and heads the Informatics and Sustainability Research (ISR) Group. Professor Hilty gave a talk on 24 May 2019 on the following research projects:

Post-fossil cities; *Extending the lifespan of mobile devices*; *A time-use approach to sustainability impact assessment of digitalization* (with Jan Bieser) and *The sharing economy and sustainability* (with Maria Pouri)

> “This simulation game enables players to experience the impacts of their decisions in the process of the transition to a post-fossil city.

Impact

Outreach and societal impact have been important to Mistra SAMS.
The researchers involved in the programme has been active in traditional and social media, and the programme has a science communicator from KTH linked to it. The programme's online outreach has been based on the program website, Twitter and newsletter, while the societal impact has taken place via the news media, public presentations by researchers as well as in meetings and workshops with decision-makers.

Public actors

A crucial target group for Mistra SAMS has been public decision-makers, who have a central role in creating a context in which accessibility and mobility services can contribute to sustainability. The programme established relationships with relevant public actors and raised their awareness of the possibilities and challenges with mobility and accessibility services towards their goals.

Scientific capacity-building

Mistra SAMS has made concrete contributions to capacity-building in the scientific community that studies mobility, accessibility and digitalisation. The programme engaged several doctoral and licentiate candidates, let their researchers attend and present at international scientific conferences. The programme also hosted public lectures and seminars by a number of international experts.

Stakeholder collaboration

Mistra SAMS has from the start had a close collaboration with its stakeholders, involved its consortium members from outside academia in co-producing studies and activities. This cooperation has been an integral part of the transdisciplinary approach to research that guides the programme.

Mistra SAMS on the IVA 's 100 list

Mistra SAMS was one of the research programmes highlighted by IVA, the Royal Swedish Society of Engineering Sciences, on their list of research projects with potential to create near-term positive impact.

IVA's 100 list 2020 consists of prominent and current research on sustainability that can create value in the form of knowledge, processes, products and business development. The 100 list aims to highlight researchers and research teams with interest in increased contacts with the business sector and the society-at-large.
Read more at iva.se/research2business

photo: IVA

Per Bolund visited Mistra SAMS Living Lab workhub


photo: Mistra

The Minister for Housing and Finance, Per Bolund, visited the work hub in February 2020. By the time of the visit the hub in Tullinge has been running for more than a year, raising interest on a national level.

"I have received many inspiring impressions. This type of solution has the potential to tackle both environmental problems, facilitate people's everyday lives and contribute to the strengthening of local communities. As I see it, this is a real win-win solution," observed Bolund.

Read the article about the visit

Seminar at the European Commission

In June 2019 Mistra SAMS visited Brussels for a seminar on how Mistra's research can contribute to the European Commission's strategic vision for a climate-neutral economy.

Anna Kramers, Photo: Mistra

Reaching net-zero emissions in the EU by 2050–opportunities and potential in the context of partnerships between academia, industry and the public sector were discussed.

Anna Kramers, programme director for Mistra SAMS, highlighted that the transformation of the transport system will be accelerated by the digitalisation of society. The solutions consist partly of more effective mobility and partly of finding new alternatives to transport, such as digital meetings.

Read more about the seminar and download the presentations

Mistra SAMS researchers at ICT4S

Researchers from Mistra SAMS attended the ICT for Sustainability conference in Toronto.

In 2018 it was the fifth time ICT4S was held and the conference has slightly shifted focus from Information and Communications Technology (ICT) itself to more focus on different applications such as ICT in transportation, building and food sectors. The conference format was a mix of speakers in plenum and ConverStations given by the authors of the accepted peer reviewed papers.

ICT4S
ICT for Sustainability

At such a ConverStation **Tina Ringensson,** Mistra SAMS, presented the paper "*AaaS and MaaS for reduced environmental and climate impact of transport*" by Kramers A, Ringensson T, Sopjani L, Arnfalk P.

Mistra SAMS at Almedalen

Seminars with politicians and other decision-makers have been an important tool for Mistra SAMS to highlight the need for further study and policy surrounding digital platforms in the transport sector.

The Almedalen Week is one of the most important forums in Swedish politics. Mistra SAMS participated at the event in 2017 and 2018 with two seminars, both of which drew a large audience and led to an interesting discussion around the risks and benefits of digital information platform technology in the mobility and accessibility sector.

2017 - How can digitalisation and new mobility services make Stockholm a world leader in climate transition?

There was a full range of topics in the Mistra SAMS debate, everything from political frameworks to make services feasible (via autonomous vehicles) to the importance of making Stockholm residents give up their car-habit.

Panel members were: Daniel Helldén (MP), Gustav Hemming (C), Lena Smidfelt Rosqvist and Charlotte Wäreborn Schultz.
Read more about the seminar in 2017

2018- How much should Google and Baidu control in our transport system? Which is the role of public institutions?

Rapid development of digital platforms and services can be a central part of reaching a sustainable mobility and accessibility system. However, criticism aimed at data companies such as Facebook and Google surrounding user integrity, violation of competition laws and the spread of "fake news" show some of the problems that can arise from companies having large amounts of data about their users. In order to reach goals of sustainability and data security in accessibility, the public sector will need to create a framework for private actors to develop within.
Read more about the seminars in 2018

Mistra SAMS Panel at Järvaveckan

Photo: Mistra SAMS

In 2019 Mistra SAMS organised a seminar at Järva Political Week: "***Outside the city centre: what's the benefit of digitalisation and new mobility services?***" Järva Poltical Week is an up-and-coming forum for political debate in Sweden, and aims to complement Almedalen week with more focus on issues related to integration.

Mistra SAMS seminar elaborated on the need for better connections between areas around Stockholm, micro-mobility, work hubs outside the city centre and much more. Panel members were political leaders from municipalities outside Stockholm and a mobility expert from the Swedish association of local authorities and regions.

Read more about the seminar at Järvaveckan

Mistra SAMS International Young Researchers Grant

Through the Mistra SAMS International Young Researchers Grant, five doctoral students from outside Sweden have visited the programme, and two students from Sweden have had an opportunity to visit universities in the United States. The work with young international researchers has so far resulted in two publications co-written by researchers from KTH and the

Read more about the grant

Kitchen Talks

At every party it is in the kitchen where you find the most interesting conversations. That is where you get drawn into the best discussions, exchange ideas, and make new connections. That's why we started Mistra SAMS Kitchen Talks in 2019. The concept was to host a series of informal seminars where our researchers and partners would present interesting and up-to-date research, followed by lively conversations and mingle.

During the past years, the kitchen talks have become a popular monthly meeting venue, and now, due to the pandemic, a digital one.

Watch Mistra SAMS Kitchen Talk on e-scooter research

Reflections from Anders Gullberg

Photo: Orlando B Boström

Anders Gullberg is owner and co-founder of Urbancity, Associate Professor at KTH and former head of research with long experience in the field of sustainable mobility. Mistra SAMS has been regularly publishing his takes on political, scientific and business development in the field.

Read insights from Anders Gullberg

Mistra SAMS in the news media

The programme and its researchers have actively participated in the public debate around the topic of urban mobility and accessibility and frequently appeared in the news media or in other research and sustainability organisations' news feeds.

All of these would be impossible to list within the boundaries of this report.

Follow this link for a list of the programme's media appearances

Presentations and participation at conferences events and workshops

Mistra SAMS researchers have participated in many different seminars, research conferences, workshops and meetings throughout the years, to talk about the programme and about sustainable accessibility and mobility. This list is a short selection of some of these occasions.
Read a full list of activities on our website

May 8 2017 - Anna Kramers was one of the speakers at Global Compact Nordic Network Meeting 2017

Sept 27 2017 - Darja Isaksson discussed sustainability at the Royal Colloquium

March 6 2018 Katrin Lättman. *Perceived Accessibility - a complement to conventional measures of accessibility.* Accessible Cities, event arranged by Mistra Urban Futures

May 22. Jacob Witzell and Karolina Isaksson. *The discursive framing of digitalized smart accessibility in Sweden*. Breakfast seminar arranged by ITRL.

June 11 2018. Anna Kramers. *Promising AaaS and MaaS.* ITRL Conference on Integrated Transport CIT'18.

June 13 2018 Malin Henriksson, Jacob Witzell and Karolina Isaksson. *All Change or Business as Usual? The Discursive Framing of Digitalized Smart Accessibility in Sweden.* mobil. TUM 2018 "Urban Mobility – Shaping the Future Together" - International Scientific Conference on Mobility and Transport.

July 10 2018. Jacob Witzell. *Organizing status quo.* Congress of the Association of European Schools of Planning (AESOP).

July 15 2018. Margereta Friman, Lars E. Olsson and Katrin Lättman. *Capturing Perceived Accessibility in Daily Travel* 15th International Conference on Travel Behavior Research (IATBR).

October 15 2018. Margereta Friman, Lars E. Olsson and Katrin Lättman. *Hur tillgängligt upplevs ett hållbart resande?* Nationell konferens i transportforskning, arranged by Handelshögskolan i Göteborg och Chalmers tekniska högskola.

November 7 2018. Anna Kramers. *Hållbar framtid – har vi någon handbok för det?* Seminar by Global Utmaning and Kulturhuset Stadsteatern.

November 20 2018. Karolina Isaksson. *Kunskap för ett hållbart transportsystem - en kritisk reflektion.* Transport Analysis annual conference.

December 2 2018. Anna Kramers and Jonas Åkerman were invited to act as observers during the 24th Conference of the parties to the United Nations Framework Convention on Climate Change (COP24)

April 29 2019. Anna Kramers participated in a seminar at the Swedish Parliament and presented research on behaviour changes in transport.

June 13-14 2019. Several Mistra SAMS researchers presented at ITRL:s CIT 19 conference

April 7 2020. Jan Bieser presented his research about the environmental impacts of co-working at RemoteCon

Transportforum

Many researchers from the programme participated in VTI:s Transportforum, the largest Nordic transport conference of its kind.

Please follow the link for each respective year to see the presentations of Mistra SAMS researchers at the event

Presentations at Transportforum 2019

Presentations at Transportforum 2020

Publications

With its extensive scientific output Mistra SAMS has contributed to in-depth knowledge on accessibility and mobility service innovations: their technical configurations, institutional conditions and user's perspectives.

For the full list of articles, studies, thesis and reports please visit *www.sams.kth.se/publications*

Below are a handfull of key publications from phase 1.

Indicators for Promising Accessibility and Mobility Services
T Ringenson, P. Arnfalk, A Kramers, and L Sopjani. "Indicators for Promising Accessibility and Mobility Services." Sustainability, 2018, vol. 10, 2836.

Kramers A, Ringenson T, Sopjani L, Arnfalk P. AaaS and MaaS for reduced environmental impact of transport: Indicators for identifying promising digital service innovations. EPiC Series in Computing, Volume 52, 2018, Pages 137–152

The discursive framing of smart mobility
A Wallsten, M Henriksson, K. Isaksson. "The Role of Local Public Authorities in Steering toward Smart and Sustainable Mobility: Findings from the Stockholm Metropolitan Area" Planning Practice & Research, 2021, vol. 36

J Witzell "Assessment tensions: How climate mitigation futures are marginalized in long-term transport planning" Transportation Research Part D: Transport and Environment 87 102503

Economic interventions and everyday mobility
M. Sjöman, T. Ringenson and A. Kramers. "Exploring everyday mobility in a living lab based on economic interventions." European Transport Research Review, 2020, 12:5

Perceived versus objectively measured accessibility
K Lättman, L. E. Olsson and M. Friman. "A new approach to accessibility – Examining perceived accessibility in contrast to objectively measured accessibility in daily travel." Research in Transportation Economics, 2018, vol. 69, pp. 501-511.

What is next?

Mistra SAMS has been awarded research funding for 2021-2024 and the programme is about to start its Phase 2 period. This means that we will continue our research and concentrate on finding solutions to achieve a climate-neutral and socially just transport system by 2030 in metropolitan regions.

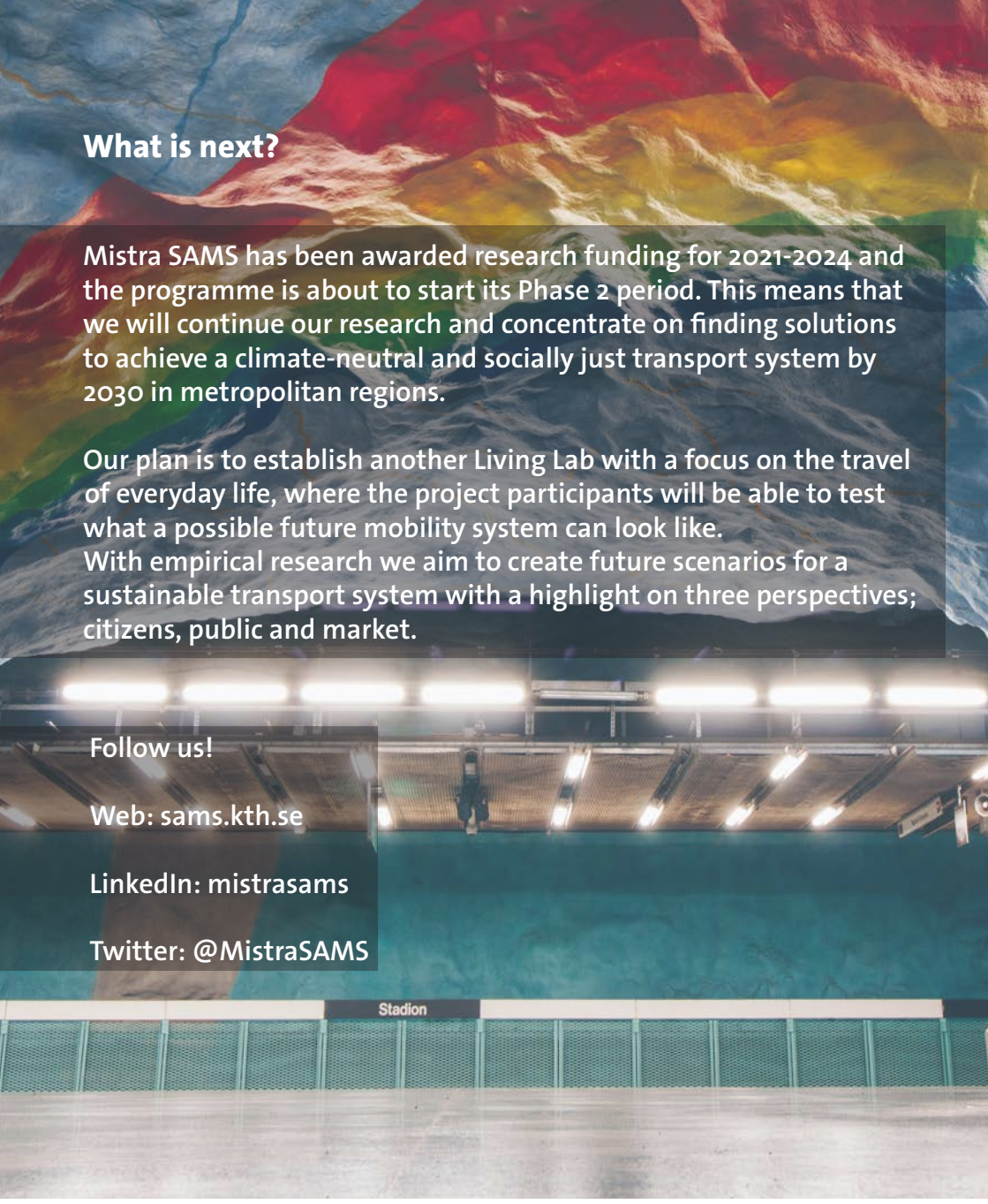
Our plan is to establish another Living Lab with a focus on the travel of everyday life, where the project participants will be able to test what a possible future mobility system can look like.
With empirical research we aim to create future scenarios for a sustainable transport system with a highlight on three perspectives; citizens, public and market.

Follow us!

Web: sams.kth.se

LinkedIn: mistrasams

Twitter: @MistraSAMS



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