



Mistra **SAMS** 

Living Lab #2

Work near, Travel Smarter



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KTH Royal Institute of
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Living Lab #2 Work near, Travel Smarter

About the project

Using the living lab method developed by researchers in the Mistra SAMS research program, this report aims to understand how a professional work environment closer to home, combined with new mobility services, can operate in practice.

The programme is hosted and managed by KTH Royal Institute of Technology in close cooperation with VTI Swedish National Road and Transport Research Institute. Together with its partners, Mistra SAMS conducts innovative research on the transformation of mobility, primarily in an urban environment.

Background

As cities continue to expand, urban challenges related to housing shortages, increasing living costs, and longer distances to work are making commuting a burden. Not only is commuting inconvenient for the individual it also has an adverse effect on the environment. Hence, there is a need for sustainable travel practices and solutions.

With the development of ICT as well as digital technological advancements, virtual accessibility to different locations and activities is now a reality (Maeng & Nedovic-Budic, 2010).

With the help of these technological advancements, new mobility services such as MaaS (Mobility as a Service) are able to bring together various transport providers that can offer public transport, public transport on demand, and rental bicycles, through a common digital platform (Jittrapirom et al., 2017; Pangbourne et al., 2018).

Studies have started to suggest that services Neighbourhood Telecommuting Centres (NTC) that can replace or shorten travel could be included in such platforms (Jittrapirom et al., 2018; Kramers et al., 2015; Maeng & Nedovic-Budic, 2010; P. L. Mokhtarian, 1998; Sjöman et al., 2020). NTCs can be described as office spaces shared by employees of two or more employers to enable remote working.

A combination of NTCs and sustainable modes of transport could yield positive impacts, essentially reducing long-distance commuting as well as help in avoiding the disadvantages of working from their HO, such as lacking ergonomics and social

isolation (Buffer, 2021; P. Mokhtarian, 1991; Vaddadi et al., 2020). However, empirical studies regarding remote working state that although it may reduce commuter travel, it may also lead to additional trips and urban sprawl (Moeckel, 2017).

Gaining an understanding of the possible potentials and impacts of new services is not straightforward, as it is difficult to predict how it would be used and accepted before it is fully launched and operational (Henderson & Kyng, 1991).

An NTC's direct effects on commuting and uptake may be offset by unexpected changes to other travel practices, or unrelated factors and the true extent of these effects can only be understood after a long process of adaptation.

Hence, as Spaargaren, (2011) concludes, products, technologies, or infrastructures for sustainability purposes must be designed with knowledge of user practices. Real-life experimentation methods such as Living Labs make it possible to explore the potentials of innovations.

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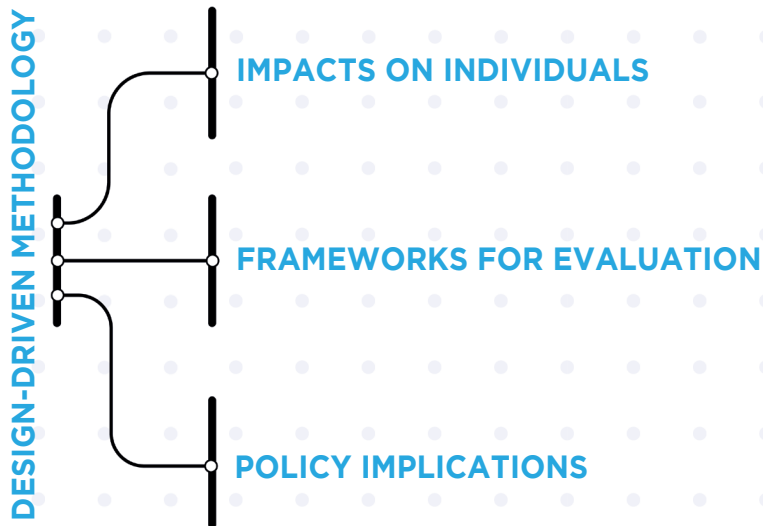
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The living labs within the Mistra SAMS research program were developed with a design-driven approach. We call them

“DESIGNERLY LIVING LABS”

or DLLs. Compared to other types of Living Labs, DLLs have a more explorative approach, where the users are exposed to future scenarios, staged in the context of their everyday lives in the form of “design interventions”.

Significantly, these interventions are not seen as product or service concepts to be evaluated and refined, but as “learning devices”.

We employed this method to gain a better understanding of how the individuals (users) respond to accessibility and mobility services, what their possible policy implications could be and how can these services be evaluated to study their impacts society on a larger scale.

By testing a combination of services via a digital platform in various urban contexts allowed us to gain insights into how different user groups respond to these services which in turn helped us generate knowledge on the possible design of new service concepts for achieving a resource efficient travel

pattern.

We found that DLLs tend to uncover many unanticipated issues, often reframing challenges and connecting to several different fields of research. This requires a multidisciplinary research team to effectively analyse and evaluate the results.

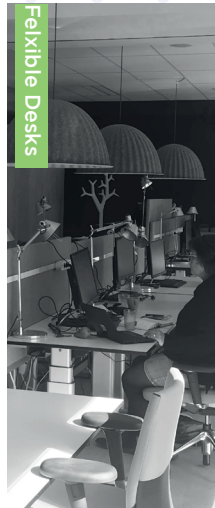
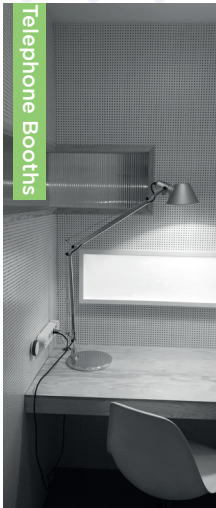
Furthermore, some of the results raised concerns about the possibility of including non-travel accessibility services to Mobility as a Service (MaaS) such as Neighbourhood Telecommuting Centers (NTCs).

Using this design driven methodology, the aim for Mistra SAMS Living Lab #2 was to offer an NTC living lab in a suburb close to people's homes together with mobility services combined in the same digital platform.

WHAT IS AN NTC?

A Neighbourhood Telecommuting Center (NTC) can be described as office spaces shared by employees of two or more employers to enable remote working.

NTC Features



Photographs by Mistra SAMS WP5 team

The Mistra SAMS Living Lab #2 Work near, Travel Smarter NTC was set up on January 2019 in the municipality of Botkyrka, 20 kilometres south of Stockholm.

The aim with the NTC was to investigate the effects of a professional workplace environment in close proximity to the users' homes on their travel and work behaviour.

Through this NTC living lab, researchers at Mistra SAMS investigated whether combining accessibility and mobility services could provide a combined work and travel arrangement

tailor-made to cater to an individual's specific travel needs while promoting better quality of life.

The NTC was set up in a neighbourhood centre, in close proximity to the local library, supermarkets, and a commuter train station.

This neighbourhood was chosen as it significantly had more housing than workplaces, and limited accessibility to the workplaces of most residents.

The NTC offered a fully-equipped activity-based office space with

**14 bookable desks,
3 telephone booths,
1 conference room,
1 kitchen,
1 lounge area,
2 electric bicycles and 1
electric cargo bicycle.**



A google maps view of the NTC located in Tullinge, south of Stockholm.

THE USERS

User's Profile*

77% were in the 45-65 age group



70% Males



30% Females

54% had at least 2 kids in the household



61% had children in the 0-10 age group

65% have at least 3 people in the household



76% living in Villa type housing

Workplace Preference



65% worked at least 4 days from the EO



52% worked at least 1-3 days/month



61% were highly satisfied with their work space

Travel Preference



80% took the commuter train to work



90% took their car for leisure travel



71% traveled more than 25 kms to work

Average time spent in workplaces



8.5 hours/day at the EO

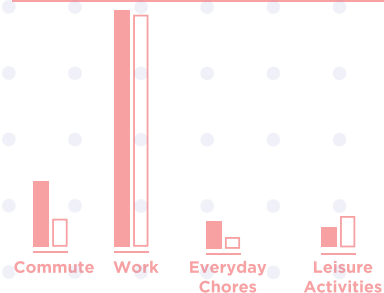


7.5 hours/day at the HO



8 hours/day at the NTC

A comparison of time spent on various activities



Travel Diaries*

Average time spent on travel for commute



20 mins/day by car



37 mins/day by public transport

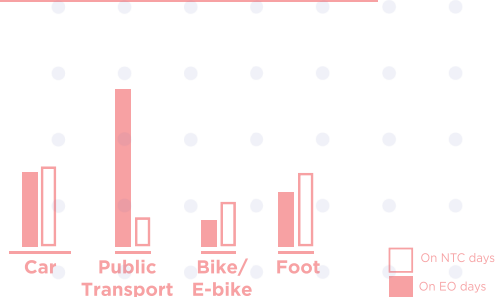


7 mins/day by bike/e-bike



4 mins/day by foot

A comparison of time spent commuting in various travel modes



*these data were collected in September 2019 before the COVID-19 Pandemic

Users said...

"It is instead of working at home, which would have been the alternative otherwise."

"[The NTC] is better than sitting at home, more like a real job; it supports discipline."

"I experience less stress if I can go home sometime in the middle of the day and sit here [at the NTC] for a few hours and work before I have to pick up [the kids]."

"Save/saving time or to reduce travel time"

"If you work a lot from home, you cannot distinguish between free and work time at all."

As the NTC was intended to function as an accessibility service to support shorter commutes, recruitment of users focused on commuters who lived in close vicinity to the NTC.

Users were recruited in two rounds via local Facebook groups and Facebook ads targeting commuters in the neighbourhood, as well as by word of mouth within partner organisations of the research programme. This round of recruitment happened later, as participation in the DLL had to be cleared at several levels of the organisation.

The organisation's human resources department then identified employees who lived within a 5 km radius of the NTC and offered these employees the opportunity to work at the facility as a complement to their normal office attendance. In total,

67 people registered as users in the Living Lab, and **52 ended up actively using the NTC**. Out of the 52 users, 27 regularly filled in a travel diary for a three-week period.

The diary was designed to indicate work, travel, everyday chores, and leisure activities, and time spent travelling via different transport modes during each diary day. A total of **416 weekdays** were recorded, out of which **227 days** were recorded to be **employer's office days**, followed by **76 days at the NTC** and **49 days working from home**.

We also conducted interviews to capture the participants' thoughts, feelings, and reflections, as well as more detailed accounts of their work life, needs, and travel habits, interviews were conducted.

The interviews were semi-structured to allow for a combination of structure and flexibility. Our study indicated that the NTC became an alternative to going into the office, as well as an alternative to working from home. Some participants stated that they used the NTC instead of working from home while others indicated that the NTC was largely considered to be an extension of and an alternative to the employer's office.

Some users preferred to walk, bike/ebike or take the PT to the NTC while some chose their own car for the same in order to combine their activities.

Those who lived in very close proximity to the NTC, observed significant changes in their everyday lives.

Over the past two years, we have conducted a range of research activities to build knowledge in the four main categories: Design-driven methodology, Impacts on Individuals, Frameworks for evaluation and Policy Implications.

Design-driven methodology:

Our Living Labs produced generative and actionable results, suitable to inform development in next steps, specifically mapping out barriers and opportunities.

Designery Living Labs tend to uncover many unanticipated issues, reframing challenges and connecting to several different fields of research which may require a multi disciplinary research outlook to effectively analyze and evaluate the results.

Designery Living Labs do not aim to design proto-practices, instead, new concepts and solutions are designed to disturb, thereby learning from the users' reflection and experimentation.

Impacts on Individuals:

We found that the NTC users did not significantly avoid travel or shift to more

sustainable travel modes, for those few who used the NTC often and lived fairly closer to the NTC, it triggered significant lifestyle changes.

Factors such as demographic characteristics, daily habits, usual travel preferences and existing workplace norms, roles and preferences have a significant impact on the way users utilized the NTC.

Workplace roles, regulations, norms and expectations were some of the conditions that made it difficult for the users to use the NTC as per their expectations.

Frameworks for evaluation:

We believe that the Avoid-Shift-Improve (ASI) approach can guide MaaS towards better environmental performance of urban mobility by being a framework for consideration by both public and private actors.

From the authorities' perspective, uncertainties regarding who should run the NTCs, how and what are the legal aspects are and how difficult it would be to package mobility and accessibility services together were raised.

We will need to further examine the connections between MaaS and urban form, and an ASI perspective can both provide an urban form perspective and safeguard that environmental concerns are not forgotten in that examination.

Policy Implications:

We developed a conceptual framework of direct, indirect and structural environmental effects of an NTC and a system-level evaluation framework at individual, company, and societal levels and environmental, economic, and social dimensions.

Factors such as deduction of total travel time and distances, net reduction of (heated) floor space at the NTC, at the employer's office (EO) and home office (HO) and use of sustainable transport modes could act as potential levers in order to realize energy savings.

With the help of strategic travel and work-based incentives, NTCs can be optimized and could have an immense impact on improved quality of life and better sustainable travel practices.

The NTC and the Pandemic

Impact of the pandemic



86% agreed that the pandemic highly impacted their work-life



96% agreed that the pandemic highly impacted their daily travel



68% went to the NTC less than once a month



89% went to the EO less than once a month



53% went grocery shopping once a week



72% performed physical activities 2-4 times a week



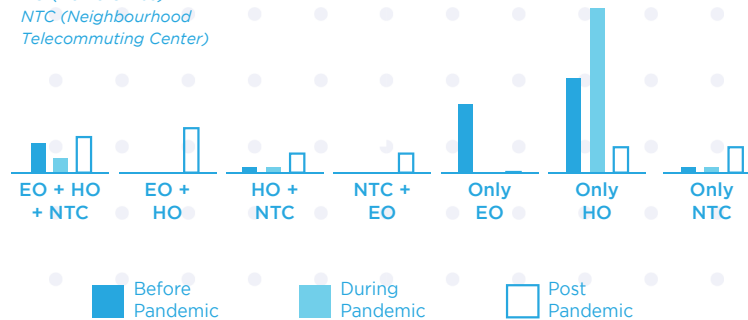
68% found working from the HO as a great experience



57% found working from the NTC as a great experience

Workplace preferences before, during & after** the pandemic

EO (Employer's Office)
HO (Home Office)
NTC (Neighbourhood
Telecommuting Center)



*These data were collected in October 2021 after one year of the COVID-19 Pandemic **Time periods: Before refers to the time the DLL was operational before the onset of COVID 19 pandemic (January 2019-January 2020). During refers to the period when the Swedish Public Health Department issued regulations to reduce the spread of the COVID-19 pandemic were active. (Januray 2020- September 2021). After refers to the time when the regulations set by Swedish Public Health Department had been relaxed allowing people to return to work (October 2021 onwards). Post refers to the time when COVID 19 pandemic would completely subside (a future timeline).

With the onset of the COVID-19 pandemic, the users observed changes in attitudes towards remote work.

Many users expressed the need for NTCs during this period, believing that they would use one more

often after the pandemic to remedy some of the negative aspects of working from home.

As of October 2021 we invited the users of the living lab to resume working at the NTC (In accordance to the Swedish Public Health

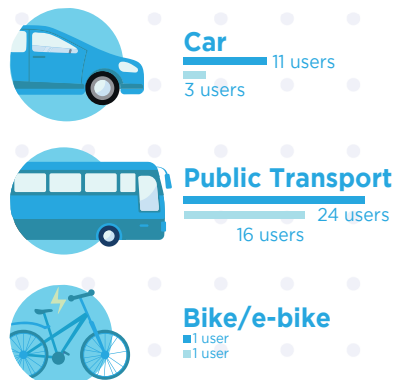
Agency regulations).

Our users stated that, since the rules regarding remote work have been revised at their companies, they felt working from home is a convenient alternative (quitters).

However, there were about 10 users who have been regularly working at the hub since early October 2021 (regulars). We sent out a **short survey** regarding the changes in the users' everyday work and travel aspects during the COVID-19 Pandemic to all the 52 active users, of which **we received 28 responses**.

Additionally, we conducted **short interviews** with **regular users and users who quit** as of October 2021. During these interviews we dove deeper into the changes in their daily work and travel patterns, workplace rules and regulations, their new working set up and reasons for staying on at or quitting the NTC.

Users' travel mode preferences for commuting to the employer's office before & after the pandemic

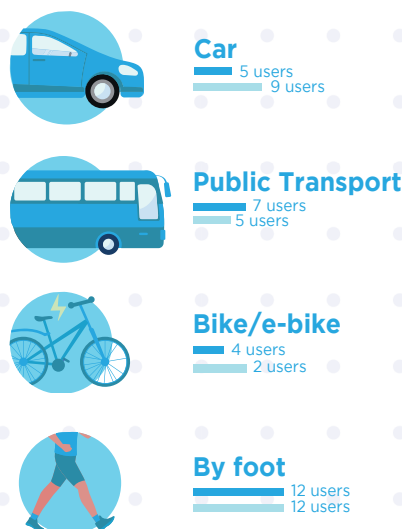


Before the pandemic: As more than 50% of the users worked in the north of Stockholm and lived in the south, the majority preferred to commute to work by public transport.

Mainly those who live far away from the commuter train also travelled by bus, bicycle, or car to the train station. There were also a few users who preferred to commute to the EO by bike.

After the pandemic: Due to the changes in rules and regulations, many users worked from their HO and hence significantly reduced the need to travel to the EO.

Users' travel mode preferences for commuting to the NTC before & after the pandemic



Before the pandemic: As most of our users lived in close proximity to the NTC, they usually walked, biked or took the public transport.

However there were a few users who preferred to use their car to commute to the NTC as they would find that option more flexible. This allowed them to combine various other activities such as grocery shopping.

After the pandemic: Users generally worked from home. Those few who did use the NTC often preferred to walk or bike or use their car (mostly to avoid using the public transport).

before the pandemic

after the pandemic

**In this report, by "after the pandemic" we mean the period after October 2021 when the restrictions were lifted and people could partially work from the employer's office*

USERS SAID...

We conducted short 20-30 minute interviews with 9 users of which 5 were regulars and 4 quit the NTC as of October 2021.

We identified 5 main conditions under which the users used or did not use the NTC during and after the pandemic.

- **Working without distractions**
- **Technological requirements**
- ★ **Co-worker collaboration & workplace norms**
- ▲ **Changed conditions under the COVID-19 pandemic**
- ◆ **Separating time for personal activities**

Due to the COVID-19 rules and regulations set up by the Swedish Health Agency, our users informed us that during 2020 and early 2021 their companies had a strict work from home policy.

While some users eventually fell into the routine of working from home, some required a change of space to be more productive. Compared to the previous company norms stating that employees could work from home 1-3 days a month, it

was understood from these new interviews that largely, the previous NTC users and their employers have realised that efficient work from the home office can be achieved.

Users informed us that, to ensure efficient and comfortable work environment at home, their companies provided them adequate professional workplace kit including a table, chair, screens and other technical equipments. This was one of the main reasons why users quit working at the NTC.

Those who quit stated that while it was a difficult to work at home to begin with but their home set-up provided by their company offered them an ideal work environment to be as productive as possible. Some users who quit the NTC also told us that even before COVID, the NTC did not provide them enough opportunity to socialize with other users.

The online platform of working from home provided them to set up quick meetings, phone calls and after-works with their colleagues.

Those regular users who lived in close proximity to the NTC walked, biked or took their car to the NTC and on the contrary to those users who quit, some of the regular users stated that the hub offered a place to concentrate on work as working from home offered many distractions such as household chores.

Due to this, the distinction between work and free time was difficult to make. The NTC offered them a space to work without distractions for 7-8 hours.

I *did not* use the NTC because...

Most common reason for quitting the NTC among all users.



"My company has provided incentives in the form of a full office kit. I work from home, it is more comfortable & I don't need to travel and save time."



"Work from home gives me time to look after my kid, take gym breaks and do household chores which has been quite good for me."



"In the booths at the NTC I have to put on headphones but at home I can talk freely without disturbing others and myself."



"I feel I can concentrate at home much better than even at my office. It is quite at home. The open landscape office layout can be quite distracting."



"Due to lack of professional technical equipment at the NTC, I did not prefer to go all the way there to work, now that I have a professional set-up at home."



"Thing I miss the most about going to work is the chit-chat with my colleagues. At the NTC, a social factor is missing as I don't know anyone."

Most common reason for regularly working at the NTC among all users..



"The hub (NTC) is much nicer. At home I get distracted by chores and end up working late hours into the night"



"I feel a bit lonely to work at home, so the hub (the NTC) offers me a place to concentrate and socialise with my hub colleagues."



"Working with other working family members sometimes gets challenging as we spend working time & free time with the same people all day. The hub (the NTC) offers a good change."



"Sometimes I come to the hub (NTC) for change of space. I also like to do be at the hub when I have some writing or reviewing to do, for meetings, I don't see the need to travel to the hub."



"It feels like going to the main office when I work from the hub (the NTC). At home, I find it difficult to schedule my day correctly."

I *did* use the NTC because...

Before the COVID-19 pandemic, the NTC offered a professional work environment closer to the users' homes. This saved them almost 2 hours a day in commute.

However, due to workplace norms and regulations, these users could not be away from the office more than 1-3 days a month. Hence, they merely exchanged working from home for working from the NTC.

For a small number of participants who lived in close proximity to the NTC and whose working conditions allowed using it often, the NTC triggered more significant lifestyle changes.

During the COVID-19 pandemic, due to the rules and regulations set up by the Swedish Health Agency, the users of the NTC observed changes in attitudes towards remote work as they were asked to work from home full-time.

During the early months of the pandemic in 2020, we spoke to the NTC users over the phone regarding this sudden change in their working patterns. **Many participants expressed**

the need for NTCs during this period, believing that they would use it more often after the pandemic to remedy some of the negative aspects of working from home.

However, in October 2021 when the country wide COVID restrictions were relaxed, we opened up the NTC to full capacity.

We found that many of our users opted out of the NTC stating the reason that they were now fully accustomed to working from home and do not see the NTC as a viable option.

They also stated that working from home saved them time as they completely avoided commute.

In the last set of interviews with our users, we asked them how was the experience of working from home. **Many told us that before the pandemic they used have long virtual meetings with their colleagues across the world. This mix of online and offline meetings often led to unclear outcomes.**

However, after a year in the pandemic, the users told us

they now feel all their colleagues felt equal in their online meetings.

We also asked our users, how to they see their work and travel life after the all the pandemic restrictions have been removed.

Most of the users told us that they are considering working half the time from their home office and the other half from their employer's office.

Some even mentioned they do not see the point of commuting all the way to their employer's office, espically on the days they only have meetings.

To adapt to these workplace changes, we learnt that the users' employers have decided to set up a new office plan with flexible desks and booking systemsso the office doesn't reach full capacity.

Reflecting on this new office set-up most of our users said: ***"If I can be physically around my colleagues and/ book my desks according to them, especially on meeting days, I could consider working from the office 50% of the time otherwise, I will work from***

home 90% of the time.”

The question we now ponder upon is, **what really is the future of NTCs after the pandemic subsides completely?**

Employers are also working towards reducing their overall capacity of their office space hence saving space and reducing rental prices and ultimately reducing the need for users to commute to their main workplace.

We believe that in these new conditions, NTCs could continue to offer professional work spaces without distractions and help users save commute time.

Additionally, we asked the users how much would they be willing to pay for the NTC per month if given an option and who should be responsible for paying for the NTC.

Most of our users agreed that the payment or subscription of the NTC should be the employer's responsibility and built into their contracts.

Payment for NTC like services could be complica-

ted and could involve aspects such as insurance and protection of company data.

Currently, researcher at Mistra SAMS are conducting research on this particular aspect of NTCs.

We believe post COVID-19, with changes in attitudes towards remote working and new office layouts, NTCs could play a role in, potentially supporting more local and sustainable lifestyles, and reducing the need for travel.

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