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Craftsmen in the Car-Free Livability Program

A systemic investigation of craftsmen taking assignments CFLP area

Master's Thesis in Product Design

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“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... The system, to a large extent, causes its own behavior”

(Meadows, 2008)

Abstract

The Car-free Livability Program has transformed the inner-city parts of Oslo from traffic dense streets to car-free, pedestrian areas. This transformation has been done through changing traffic patterns, removing parking spots and transforming roads and parking to pedestrian areas, facilitating for better accessibility between the city areas and offering better possibilities for outdoor activity. This thesis revolves around craftsmen's mobility while conducting service assignments in the Car-Free Livability area in Oslo. The aim of this thesis is to find leverage points and utilize them to promote change that could benefit both the craftsmen and the Car-Free Livability Program (CFLP). The thesis utilizes system-oriented design tools and follows a creative framework to answer the research question; What can be done to improve the conditions for craftsmen taking on service assignments in the Car-Free Livability Program area in Oslo, supporting the CFLP transition?

The first part of this thesis, *understanding the system*, sheds light on the situation in the inner city and craftsmen's mobility challenges today. It also addresses the theoretical framework on system parts and properties, cognitive biases, framing and leverage levels, as well as data collection. The data collection is based on phenomenology and qualitative in-depth interviews with craftsmen and mobility and urban planners.

The analysis of intervention points highlights different areas in the system with potential to alter mindset, system structure that are reflected in behavioral patterns and visible events. The changed traffic patterns, removal of public parking possibilities, and limited commercial parking situated nearby the assignments have led to increased time use in the CFLP area, resulting in decreased profitability for car-using craftsmen. This has, again, led to frustration and decreased interest in taking on assignments in the CFLP area. The craftsmen's systemic structure, mindsets and rigidness also have a saying in the reshaping and getting in line with the dominant CFLP system structure. Furthermore, is the oscillation between the systems causing an imbalance due to low number of mitigating measures and low facilitation of good options and alternative ways to conduct service assignments in the CFLP area.

The second part of the thesis, *changing the system*, revolves around developing ideas and concepts that could change the systemic structures. The proposed concept includes ideas that revolves around facilitating car-free mobility, using hubs, electric cargo scooters, delivery services, and the metro as means to decrease the reliance of the van in the CFLP area.
The concept functions also as a platform to potential cross-disciplinary collaborations. The concepts stakeholder connecting potential can bridge silos, create supportive relationships, and plant seeds for future ventures, that potentially increases the systems flexibility and resilience, especially as the CFLP area is expanding, creating a need for new innovations.

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Understanding the System

1. Introduction

Inner-city Oslo is a complex and diverse ecosystem consisting of many stakeholders and elements that are all shaping the dynamic whole that they are a part of. These stakeholders live and function together and are reliant of each other, whether it is a baker, baking bread for the people, a building, providing shelter and office facilities for its employees or a road engineer, designing speed bumps on the roads, urging drivers to slow down. Inner-city Oslo can be regarded as consisting of a set of systems with different human and non-human objects, interacting and influencing each other. This ecosystem is built up, designed, and governed in such manner that the systems are serving its users, and that the users serve the systems in order to have order and balance within in the interrelated systems.

We all contribute to shaping our surroundings, through being a part of our surroundings. We are all pieces of a puzzle, that represent a broad specter of various system features. The pieces and puzzles are systems, and when the pieces are interconnected, they add complexity and create larger wholes, sub-systems, and systems.

These days, Oslo is in the middle of a big transition, regarding its ambitious plans to reduce greenhouse emissions and transforming the inner-city Oslo, within the inner ring road (ring 1) from an unappealing area with dense traffic into an inviting urban area for its citizens. The Car-Free Livability Program (CFLP) is all about giving the streets back to people through improving urban areas, prioritizing pedestrians, cyclists, and public transport (Oslo kommune, 2019C). The inner-city urban areas will be more accessible, facilitate for green mobility and contribute in reducing emissions and the use of private cars through creating car-free areas (Oslo kommune, 2018A).

A transition of this magnitude is a “game changer” for many of the stakeholders. Altering the gameplay and conditions can have a ripple effect on the interrelated systems, influencing behaviors, patterns, and relations. A transition requires setting high demands of flexibility and adaptability from the sub systems. Some of the sub systems are more resilient and adaptive and can withstand bigger changes without problems. Some sub systems are influenced by economic stimulation and incentives to reach desired goals and to mitigate the possible negative effects. Other sub systems can have a cumbersome time in adapting to new situations and will struggle. The rigidness of the sub systems can weaken its buffer of resilience to the point from not being able to exist at all.

Ambitious plans often come with new rules and regulations for reaching the goals. Either you play by the book, adapt, or do not play at all. It might seem quite simple to adapt. But a systemic change that has an impact on multiple levels, spanning from e.g., desired mental models to visible events, one might question if the level of complexity and ripple effects are addressed in the facilitation of the CFLP transition.

1.1 Focus Area

This master’s thesis has a systemic approach and explores the effects of the Car-Free Livability program on craftsmen who are taking on service assignments within the area of the program. The craftsmen can be observed as a sub-system of a larger system, Oslo, and the CFLP area. In the inner-city parts of Oslo (inside ring road 1), the CFLP area, the system requirements are guided by political ambitions and personal beliefs that sets the terms for how to provide services in the most profitable way, to reach their corresponding goals. The craftsmen that are willing to adapt to the new rules, as a part of a bigger system, will

An urban area without parking.

continue to provide their services and their field of trade, but under new conditions that the CFLP program has created.

My hypothesis is that craftsmen are perceiving the Car-Free Livability Program as troublesome, due to the limited parking and mobility possibilities, making the CFLP area an unappealing area for car-using craftsmen.

I believe that a system change with a focus on improved conditions for the craftsmen could strengthen their position in the ecosystem within the Car-Free Livability Program area, making it a more appealing place both from a craftsmen and a livability perspective. A system change could also create positive momentum and shed light on the craftsmen, as promoting and pro-active parts of the CFLP transition rather than functioning as barriers against the ambitions of the CFLP.

1.2 Research Question

The focus in this master's thesis is to get an understanding of the phenomenon of craftsmen taking on service assignments within the Car-Free Livability Program area. The aim is to find leverage points in the system for making a change that could benefit both the craftsmen and the Car-Free Livability Program. Therefore, I have defined a research question:

What can be done to improve the conditions for craftsmen taking on service assignments in the Car-Free Livability Program area in Oslo, supporting the CFLP transition?

1.3 Project Frame

This thesis aims to showcase the complexity, interconnectedness and dynamics of the relevant systems, and present possible areas for intervention that has the potential to change the system for craftsmen within the CFLP area, on a micro, meso and a macro level. In order to keep the task manageable, I have made the following delimitations of the topic.

In this thesis, the CFLP area is delimited to the area within ring road 1, as defined prior spring 2021, before the area was enlarged to include Grønland an Tøyen area (Oslo kommune, 2020A).

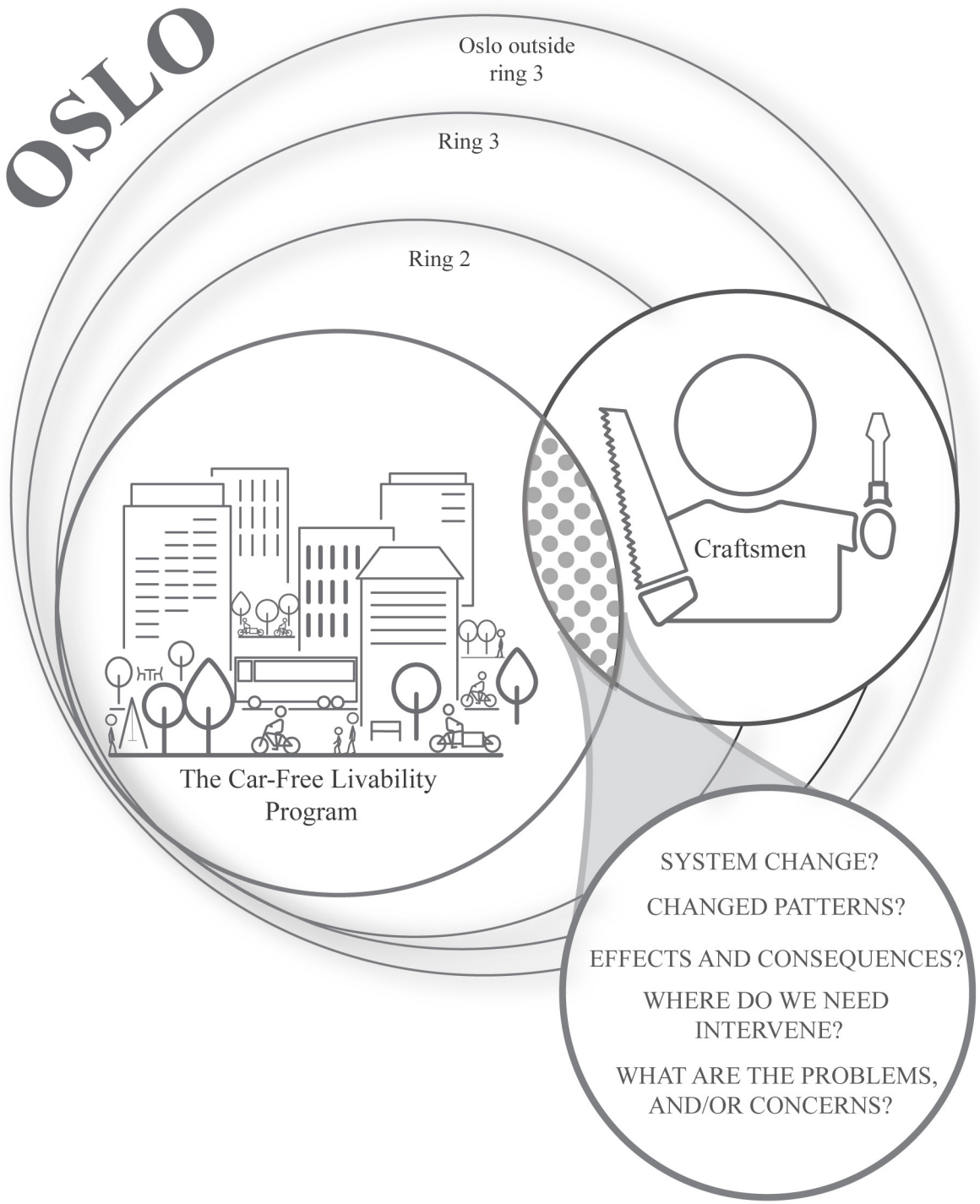
I focus on craftsmen based in Oslo, limiting the craftsmen's trades to represent electricians, carpenters (cabinet makers) and plumbers. They are a part of the inner-city system, conducting smaller service assignments that include transportation of themselves and necessary equipment within the limits of the CFLP area. The reason for choosing these three trades is that their service vehicles are frequently present in the urban environment as they are visiting several clients on a daily basis. Lumberjacks, industrial carpenters, industrial electricians and others working at larger building sites are excluded from this analysis as other assignment and parking conditions may apply for these groups.

This master's thesis is divided into two parts. The first discusses the understanding the system, while the second part focuses on finding ways to change the system.

The concepts that are developed and presented in this thesis are hypothetical propositions. These concepts do not take feasibility as their main target but aim to showcase the systemic potential and the ripple effect on the focused systems.

This project has been conducted in the spring of 2021 when Oslo was shut down due to Covid-19 pandemic. The rules and recommendations have set constraints on the possibilities to facilitate physical ideation workshops, where people have the possibility to discuss, register non-verbal communication and develop maps in a co-creative settings.

Frequently used shortenings used in this thesis:
Car-Free Livability Program: CFLP



The craftsmen being a sub system both of the City of Oslo and the CFLP area.

Figure 1. Urban living in Oslo, Kirkegata (Krook, 2019).

Figure 2. Walking street by (Bilfritt byliv, 2020).

2.The Transformation of Inner-City Oslo

Climate change, population growth, urbanization and a diverse and multicultural population demands a new direction for the development of the inner-city of Oslo. The city center is for everyone and it should be easy to choose environmental alternatives for transport to the city and within the city center. Tomorrows Oslo shall offer and create good prerequisites for people to engage and participate in urban living through public and urban areas that offers diversity and responds to the needs of the people (Oslo kommune, 2018B).

2.1 Car-Free Livability

In 2016 the City of Oslo established a program called Bilfritt byliv, translated to Car-Free Livability Program, with the goal of putting people first, making Oslo a better place for the people. This was and is done by reducing the number of private cars, making it less appealing to drive a car in the inner-city and creating a more inviting and appealing urban environment inside Oslo's inner ring road (Oslo kommune, 2019A).

"The traditional hierarchy of the road is being turned on its head: pedestrians are becoming top priority while private motorists are now in last place. Spaces previously used for private vehicles and parking are being made available for greenery, trees, play and activity" (Oslo kommune, 2020B).

The Car-Free Livability Program has its beginning as a response to both Oslo's desire to reduce the city's carbon footprint and increase the livability of Oslo (Elvaas, 2020). In 2012- 2014, Gehl Architects conducted a survey, Bylivsundersøkelse- Oslo sentrum, (Gehl Architects, 2014) on public living in Oslo. The survey unveiled Oslo lacking basic infrastructure for example public benches, drinking fountains and green spaces. In addition, the public spaces were unpleasant, heavy traffic that functioned as barriers for pedestrians, and the city center lacks good connections to the fjord and surrounding neighborhoods (Oslo kommune, 2018B).

Gehl Architects (2014) define urban living as the human activity in public spaces regardless of date and time and how the user, both tourist, visitors and inhabitants experience the public spaces. The central idea is to develop livable, people-oriented cities.

Livable environments are based on the integration physical and social well-being, that helps sustaining a productive and meaningful existence. Productive, meaning that, together people share and generate more than individually. Meaningful, in the sense that the need of participating and forming self-sustaining social systems is a basic human need, by their very nature (Kashef, 2016). In addition, livability can be seen as the sum of the factors that add up to a community's quality of life—including the built and natural environments, economic prosperity, social stability and equity, educational opportunity, and cultural, entertainment and recreation possibilities (Partners for Livable Communities, n.d.).

In 2015, the program *Handlingsprogram for økt byliv,* translated; The Action Plan for Increased City Life 2018–2027 was initiated to address the challenges, and develop a strategy for increasing urban living in Oslo (Oslo kommune, 2018B). Later in 2015, the city council initiated a project called Bilfritt sentrum, roughly translated Car-Free Inner-City (Oslo kommune, 2018B) to start Oslo's ambitions to reduce the carbon footprint and increasing urban living (Byrådet, Oslo kommune, 2015, p. 16). This was initially a response to address Oslo's climate and environmental ambitions to reduce high greenhouse gas emissions (Bratlie & Rasmussen, 2018, p. 73). When planning the transformation of a car-free inner-city area within the ring road one of Oslo, the city council became aware of the ongoing program of action for increased city life that focused on similar goals (Bratlie & Rasmussen, 2018, p. 73). The already ongoing program became a part of the program Car-Free Inner-City and was renamed Car-Free Livability Program in April 2016 (Oslo kommune, 2018B) with the focus to improve the city environment, making it more lively, using car free zones as a tool, prioritizing pedestrians, bikes, accessibility and public transport (Oslo kommune, 2018B).

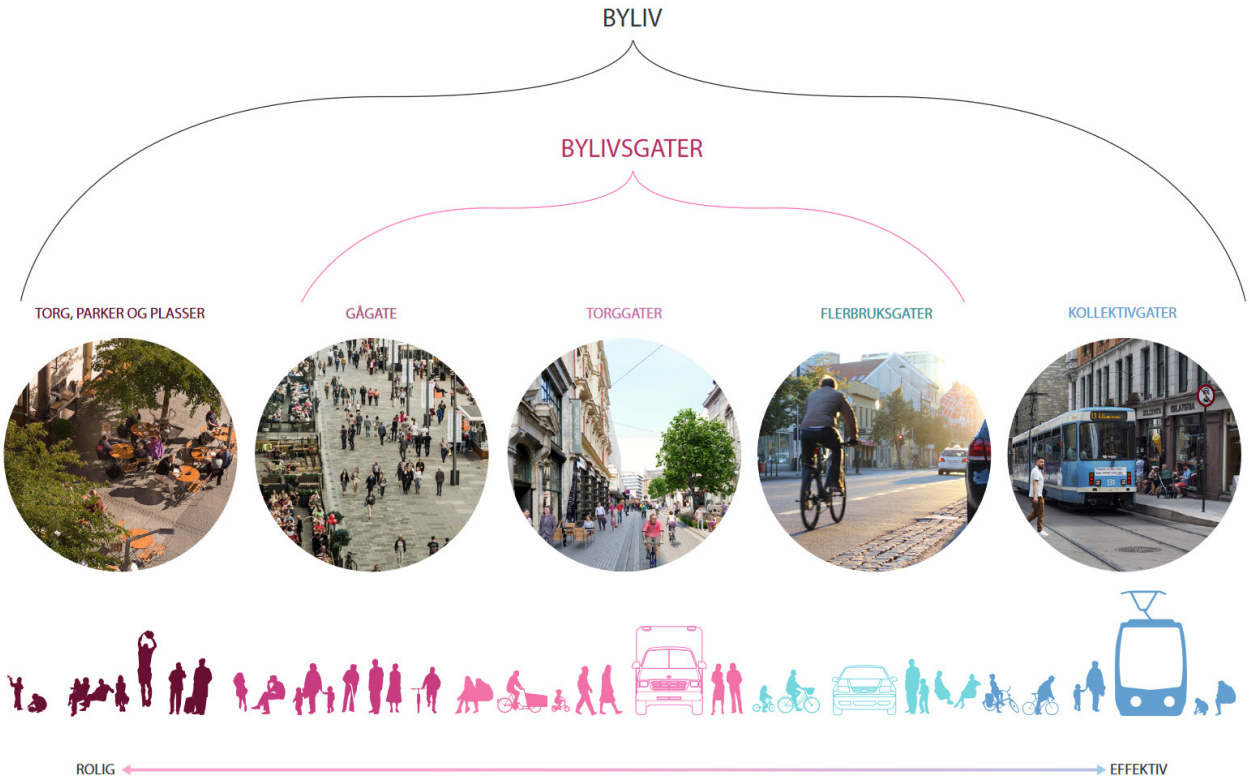


Figure 6. From gardens, parks and marketplaces to efficient transport (Oslo kommune, 2018B).

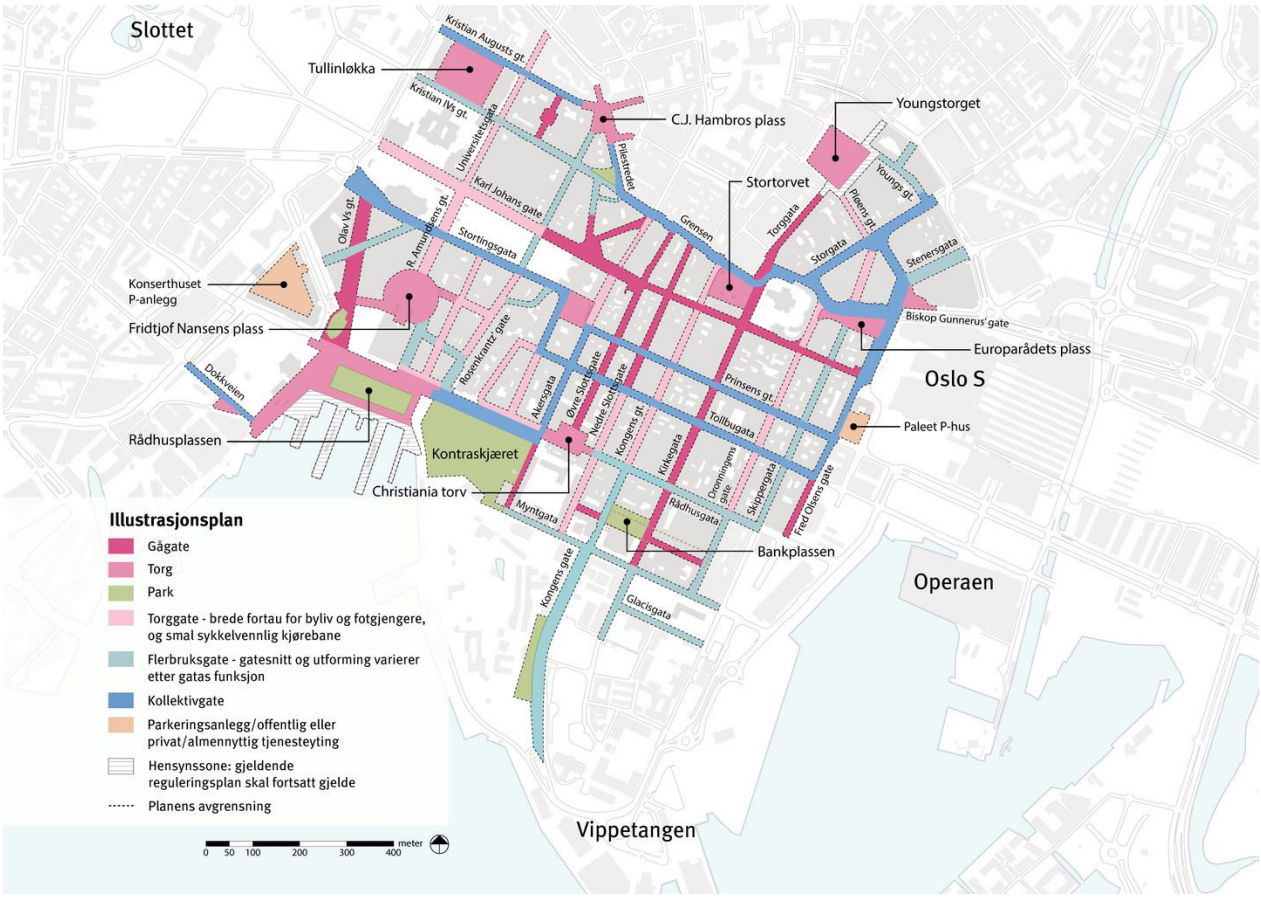


Figure 5. Illustration of the proposed area zoning plan that was approved by the city council 19.6.2019. Changes can occur. (Oslo kommune, 2018A).

Øvre Slottsgate, May 2021.

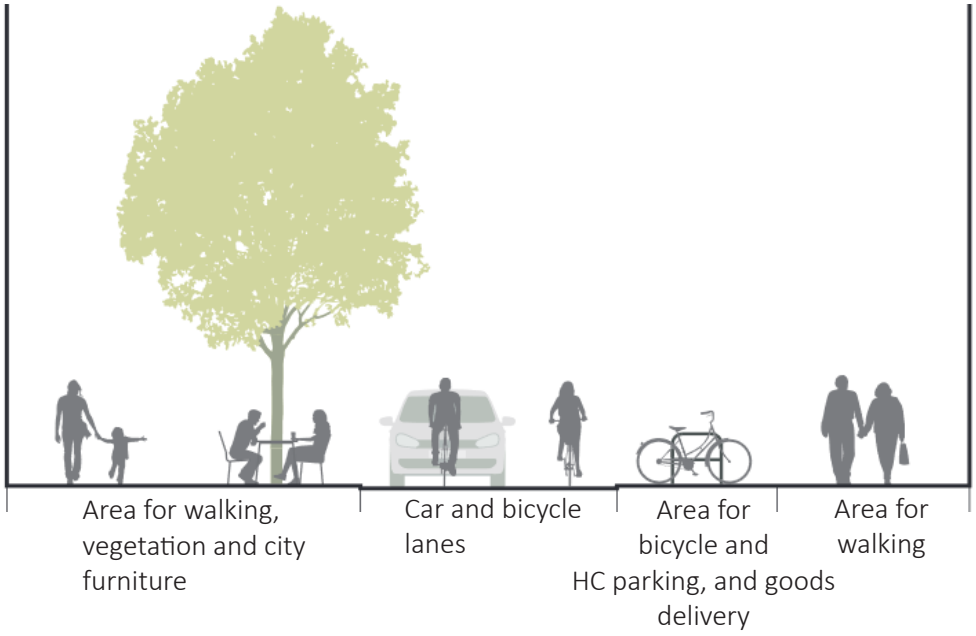
"A strengthened network, with a focus on accessibility for pedestrians and public transport will give all of us the possibility to discover the inner-city Oslo again. A city center where people can be together regardless of background, age, level of function, economy, and interests" (Oslo kommune, 2018B).

The inner-city urban areas are important social and cultural arenas that functions as places of interaction and inclusion (Oslo kommune, 2018B). The urban areas must therefore be easily accessible to all people and able to offer a multitude of different functions (Oslo kommune, 2020B).

Through prioritizing pedestrians, cyclist and collective transportation, the Car-Free Livability Program will improve urban areas facilitate a greener, accessible, environmentally friendly, inclusive, and safer inner-city (Oslo kommune, 2019C).

The Car-free Livability Program has since 2016 transformed the inner-city parts of Oslo from traffic dense streets to car-free, pedestrian areas. This transformation has been done through changing traffic patterns, removing parking places and transforming the layout of roads and parking to pedestrian areas, facilitating for better accessibility between the city areas and offering better possibilities for outdoor activity. The areas that formerly was parking places are transformed to parks, pedestrian streets, playgrounds, sitting areas, zones with vegetation and trees, café and bar terraces and areas for diverse activities within art and culture (Oslo kommune, 2018B).

Figure 8. Streets with narrow car lanes give more space for walking, cycling and city logistics including HC-parking, on- and offloading, and commercial parking (Oslo kommune, 2018B).



2.2 The CFLP area

The area of the Car-Free Livability Program has been set within the inner ring road of Oslo. This area counts ca. 1000 inhabitants, while ca. 100 000 travel in and out every day (Oslo kommune, 2019). However, the CFLP are planning on widening the program area outside of the city's inner ring, introducing the measures for improved and attractive urban environment to the areas of Tøyen and Grønland between 2020-2023 (Oslo kommune, 2020B).

The CFLP is an ongoing process and has through The Action Plan for Increased City Life 2018–2027 and the Area Zoning Plan for Streets and City Spaces in the Centre (adopted in June 2019), set legally binding rules for how urban spaces in the center are to be developed in a manner which contributes towards increased city life in the years to come (Oslo kommune, 2020B).

2.3 New Traffic Patterns

The transformation has set restrictions on where it is allowed to drive and park. But people will still be able to drive their cars in the city center, even though considerably large areas that previously was associated with traffic will be utilized for other use (Oslo kommune, 2019B). The traffic that has passed through the city is now led through the ring roads or the tunnel system, restricting private cars use the fast public transport routes that connects west-east and north-south areas. Delivery and service providers has been ensured same access to streets and squares as before, and the private cars have still access to private parking facilities (Oslo kommune, 2020B).

2.4 Commercial Parking

The City of Oslo stresses the importance of providing and ensuring good accessibility and parking possibility for service providers as for instance transport, distributors of goods, maintenance, disabled and craftsmen (Oslo kommune, 2018B). Therefore, many of the reclaimed parking spaces have been transformed and reserved exclusively for commercial use, enabling those who rely on parking to continue to provide their services in an efficient manner (Oslo kommune, 2019B). In addition, the municipality addresses the parking possibilities in the private parking facilities within and around the inner-city ring road that has ca. 9000 parking spaces in total (Oslo kommune, 2019B) and is running on 40-60% capacity, implying that the capacity is adequate even if all the public parking spots for private cars are removed (Oslo kommune, 2018B).

Before the initiation of the program for car-free livability, the number of public street level

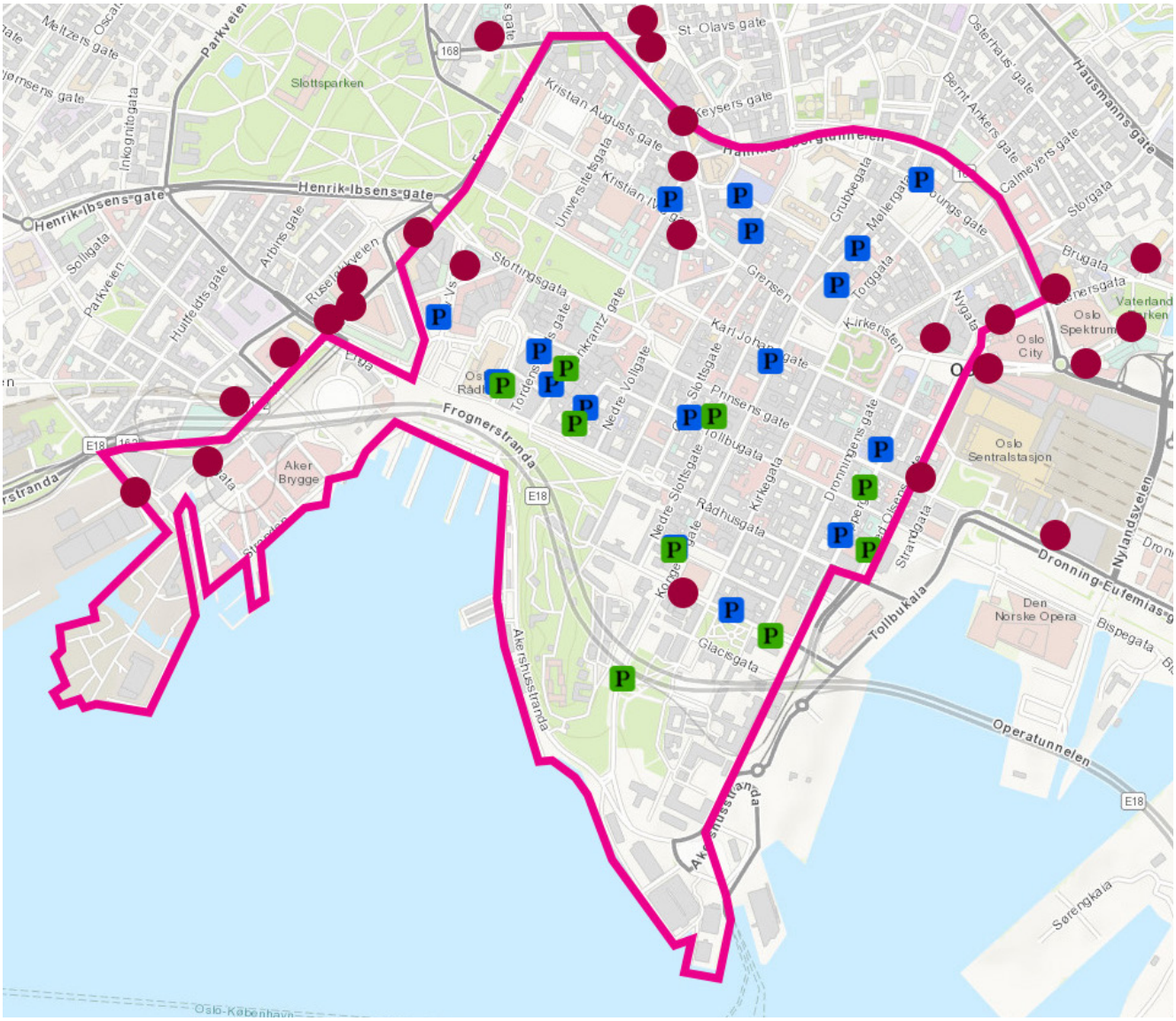


Figure 9. The parking possibilities in and near the CFLP area. Figure adopted from Bymiljøetaten, n.d., and Oslo kommune, 2018A.

parking spots in the inner-city area was ca. 760 (Sweco Norge, 2019). Today, there are no public parking spots for private cars within the limits of the program (Oslo kommune, 2019C).
However, number of parking spot reserved for commercial vehicle parking has been increased due to the importance that the service industry will continue to have good accessibility within the inner-city areas (Oslo kommune, 2018A). The current situation, in January 2021, according to the agency for Urban Developments map over commercial parking spaces on their webpage, shows 104 commercial parking spots reserved for the service industry of which 35 are reserved for electric vehicles in the inner-city (Bymiljøetaten, n.d.). According to a survey conducted by consultancy

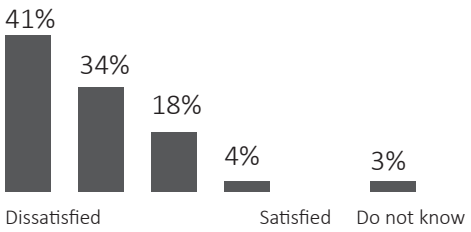


Figure 10.
The availability of commercial parking.
Figure redrawn from the Sweco survey (2019).

agency Sweco in May-April 2019, most of the respondents are unhappy with the parking availability the inner-city area of Oslo. 69% of the respondents believe that the parking possibilities has become worse (Sweco Norge, 2019).

The Sweco survey reports that 80/100 represents for the service industry responded that they rarely or never find an open parking spot of the offered commercial parking spaces (Sweco Norge, 2019, p. 143). The occupancy of the commercial parking places is on average between 50 and 60 % during the daytime. However, the registration shows that almost every parking spot was occupied at least once during daytime, meaning that there are specific and shorter timeframes during daytime when it is difficult to find open parking spots. The registrations show also that 33% of the parked vehicles are parking without a permit during weekdays while the number is 74 during weekends. 70 % of the respondents share that they are often forced to illegal parking. The parking frequency is summarized that 85% of the respondents use the commercial parking spots daily while 4% park monthly, 1% few times pr year and 10% answer, using the parking less than two times a year (Sweco Norge, 2019, p. 142).

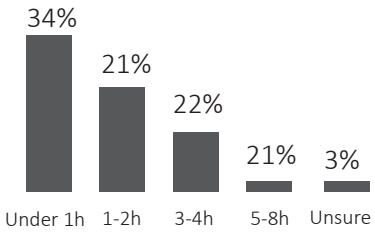


Figure 11. Length of parking.
Figure adapted from the Sweco survey (2019).

The length of parking is varying and is evenly divided between under 1 hour to over 5-8 hours, stretching potentially over several days.
The commercial parking places and parking garages are not situated in every street. This means that there is often a distance to walk to the service task after you found an available parking spot(Sweco Norge, 2019).

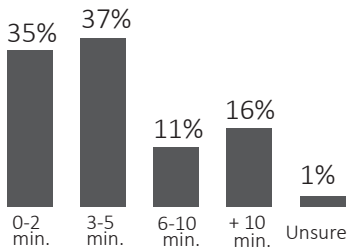


Figure 12. Walking to/from commercial parking.
Figure adapted from the Sweco survey (2019).

2.5 Number of Craftsmen's Companies

To map the number of plumbers, electricians and carpenter's offices, it was conducted a web search, using www.1881.no with filters focused on Oslo area. The search words were elektriker (electrician), rørlegger (plumber) and snekkere (carpenter/cabinet maker).
The search for snekkere gave 12 hits for Oslo City (city center), and 465 hits for Oslo, including all city areas. When searching with elektriker, the search gave 227 hits for Oslo of which 1 is situated in Oslo City. Searching with the search word rørlegger resulted in 460 hits in all city areas of Oslo, of which 8 companies are registered in Oslo city.

2.6 Climate Targets

One of the many CFLP and climate strategy goals is to lower the carbon footprint and emissions. Oslo has addressed the challenge by proposing ambitious goals of reducing the city's greenhouse gasses with 95% compared to the level in 2009 by 2030 within the City of Oslo's boundaries (Klimaetaten, 2020). 47% of these emissions are generated by road transport, of which 34% are from private cars and vans.
By 2030, all traffic in Oslo shall have greenhouse emissions, meaning that all gasoline and diesel driven vehicles should be a part of history then. This also affects the craftsmen, being reliant on vehicles that can transport tools and material. The municipality has started several stimulus programs as measures to incentivize people to contribute transitioning to an emission free vehicle park (Klimaetaten, 2020).
The City of Oslo has for example a stimulus program that funds companies that buy cargo bicycles to replace their vehicles. The City of Oslo promotes cargo bikes through participating in a collaboration with several European cities through a project called the City Changer Cargo Bike-project. The project has an aim to promote the potential that cargo bikes have and accelerate implementation and take-up (Klima Oslo, 2019). The project sees a potential margin of cargo bikes to replace 25% per cent of the commercial deliveries in the cities, 50 per cent of commercial service and maintenance trip and 77 per cent of private trips such as shopping or leisure trips. There are also other economic stimulus offers that are relevant to craftsmen, as for example programs that will give economic aid when replacing a diesel or gasoline driven van to an electric van and to install a charging point at home and at the office for the craftsmen (Klima Oslo, 2019).

Nedre Slottsgate, May 2021.

Øvre Slottsgate, May 2021.

Øvre Slottsgate, May 2021.

3.Theoretical Framework

This chapter sheds light on system behavior, interrelations, and system influences, to get a better understanding of the systemic relation between craftsmen and the CFLP, and possible areas of leverage within the system.
As Monat and Gannon (2015) points out; "In order to understand behaviors, we must first identify and then understand the systemic structures and underlying mental models that cause them".
The theoretical background in this chapter, functions as a framework for the desired systemic change proposed through the concepts, presented in later chapters.

As described in the introduction, the City of Oslo can be seen as an ecosystem consisting of many parts, of which each has their own role that constructs the whole. These parts are not only interconnected, but function based and reliant on each other. This description fits well into the description of a system as Meadows (1999) describes, "A system is an interconnected set of elements that is coherently organized in a way that achieves something". And "Systems must consist of three kinds of things elements, interconnections, and a function or purpose". For example, craftsmen can be observed as a system with elements, consisting of material, vehicles, and tools, that are interconnected through the craftsman's trade. They are utilized to serve customers, with the purpose to make a living through providing craftsmen services. The elements are organized and structured in a manner that the different system goals and desired states are possible to reach. For example, the craftsmen and their interrelated parts and elements are ruled by politics, customer needs, user-manuals, peer to peer communication and best practice approaches to name a few.

3.1 Cybernetics

The research question addresses the systemic effects and reactions of the Car-Free Livability program on craftsmen daily routines in an ecosystem within the boundaries of the CFLP area. In this system, there is constant activity and communication with the parts involved, whose interaction affects the systems future behavior. The action-reaction interplay and making decisions can be complex because of the connectedness to multiple things in systems. The economy strives one way, the politics another way, and the social self might be influenced by a certain mindset, while other persons might not care at all and so on.
The craftsmen, as part of a system, are guided and influenced by their own beliefs and the environment, that the system is connected to and a part of. As for example, a craftsman is not only a craftsman, but also a complex system of needs, desires and perceptions based on its own knowledge and environment that does its best to maintain an optimal state or balance in the perceived situation.
When addressing the aspect of behavior in systems, it is important to know what the driving forces are and their structure, possibilities and constraint, the cybernetics. It is also important to see how we gain and limit knowledge, the epistemology based on the communication between the systems.

"Cybernetics is a control theory as it is applied to complex systems. Cybernetics is associated with models in which a monitor compares what is happening to a system at various times with some standard of what should be happening, and a controller adjusts the system's behavior accordingly" (Encyclopedia Britannica, n.d.)

Cybernetics is concerned not so much with what systems consist of, but how they function. Cybernetics focuses on how systems use information, models, and control actions to steer towards and maintain their goals, while counteracting various disturbances (Heylighen & Joslyn, 2001).

The definition of epistemology is according to Merriam-Webster dictionary, the study or a theory of the nature and grounds of knowledge especially with reference to its limits and validity. (Merriam-Webster, n.d.) This description is in line with Badkes (2012) description;

"Epistemology is not the study of what we know but of how we know what we know, i.e., what

are our sources of knowledge, where do they come from, in what forms are they transmitted to us, and why would we find one source more credible/usable than another?"

When cybernetics and epistemology put together, one can see it as the process when you "scan" and read the interaction of systems and their characteristics. The systemic interaction is a cognitive process where you gain insights and knowledge based on the most credible and valid information and determines the next step towards the desired system goal. The optimal system state/goal is determined by the information at hand that defines the difference between current and desires state of the system. This feedback loop is described more closely in part 3.4, feedback loop.

3.2 First and Second Order Cybernetics

There is a need to point out the difference of perception and observation points of systems can have, influencing the feedback and behavior of systems. The role of the observer of systems has developed over the years since the postwar era with thinkers as Norbert Wiener, Ludwig von Bertalanffy, William Ross Ashby, and Heinz von Foerster (Sieniutycz, 2020). The first order cybernetics was developed into second order cybernetics in the early 1970's as the system observer being system observed perspective gained stronger foothold and is the main perspective for cybernetics today (Heylighen & Joslyn, 2001).

The first order can be seen as a system if it were as Heylighen & Joslyn (2001) describes "objectively given thing that can be freely observed, manipulated, and taken apart". This can be seen as a craftsman working with a jigsaw, operating it to the best of his abilities. The craftsman is his own brains (thought, knowledge, and beliefs) prisoner that triggers his desired states and feedback loops. He sees what he is capable of seeing and does what he is capable of doing and constructs a model based that without references to outside environment or being influenced by the jigsaw (Baron, 2007). The system is closed. The second order craftsman recognize themselves to be part of the system they are studying and acknowledge being influenced by the perceptions and feedback of both herself and the observed (Becvar & Becvar, 2006). In the jigsaw example, the saw has been configured by an engineer with certain design goals in for example how to handle the saw when operated. The context, or environment, is created by how the craftsmen perceives it (Becvar & Becvar, 2006), creating an own reality based on the interaction of the systems that influence the craftsman using the jigsaw.
The craftsman is a cybernetic system, trying to construct a model of another cybernetic system, the jigsaw, creating a "meta" system or a second order system through their interaction (Heylighen & Joslyn, 2001).

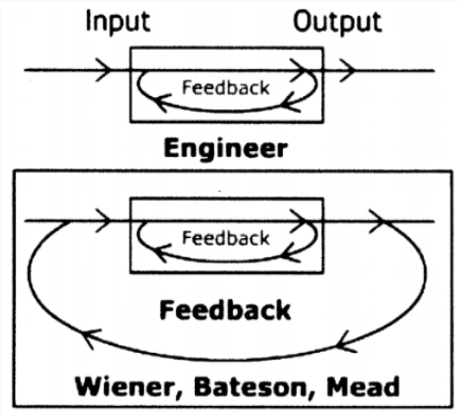


Figure 15. The feedback difference between first and second order cybernetics. Brand, S. (1976)

3.3 Stocks and Flows

The foundation of a system, is the elements that you can feel, see, and measure, that are called stocks, which affects the behavior of a system. And when a system is connected to multiple other parts, a change in stocks can have major ripple effects on the rest of the interrelated parts (Meadows, 1999). The stock in a system, sensors the inflow which can have influence on the outflow and vice versa. It is usually inflows that increase the stock and outflow that decreases it. As Meadows exemplifies it, one could think about a bathtub with an inflowing faucet and an outflowing drain. The water level in the tub can be adjusted by both inflow and outflow and can be balanced if the inflow and outflow are in the

same rate (Meadows, 1999). The mechanism when you adjust your inflow or outflow are called feedback loops. A feedback loop is a closed chain of causal connections from a stock, through a set of decisions or rules or physical laws or actions that are dependent on the level of the stock, and back again, through a flow to change the stock (Meadows, 1999).

3.4 Feedback Loop

A balancing feedback loop is self-correcting, and a reinforcing feedback loop is self-reinforcing. Reinforcing feedback loops are sources of growth. As Meadows (1999) points out "the more people catch the flu, the more they infect other people, and the more babies are born, the more people grow up to have babies". If a reinforcing stock has the capability to reproduce itself or reinforce itself without a balancing counter act, it will lead itself to a runaway collapse over time. These reinforcing loops are also the source for collapse, which ultimately happens when reinforcing a loop grow out of control (Meadows, 1999). For example, if the CFLP program would be a machine, programmed with a self-reinforcing loop and without a counter act, it would expand its boundaries, transforming every street to car-free pedestrian streets in Oslo and ultimately grow out of control, collapsing the system through other systems that are connected and reliant on the same stocks.

The balancing feedback loops are equilibrating or goal-seeking structures in systems and are both sources of stability and sources of resistance to change.

The basic structure of a balancing loop involves a discrepancy between the goal (desired level) and the actual level. It can be seen as a communication loop that signals the stock to adjust the inflow and outflow to achieve or stay in in a desired state. When the difference between the two increases, corrective actions adjust the actual level until the gap decreases. In this sense, balancing processes always try to bring conditions into balance and stability (Meadows, 1999). Balancing processes in the CFLP program can be for example the increased number of commercial parking spaces that function as system balancing loop and a counter act to the removal of municipal parking spaces, affecting the craftsmen daily trade, providing the possibility to easily find available parking that results in faster and more efficient service

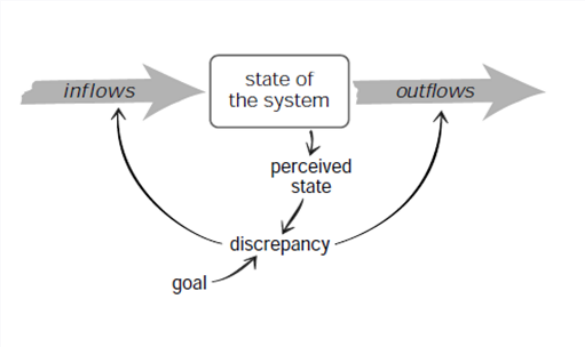


Figure 16. Feedback loop (Meadows, 1999).

3.5 Delay

The example also showcases the important determinants of behavior that is caused by delay. Due to CFLP and the transformation of streets to parking free or car-free in the inner-city of Oslo, the traffic patterns has changed, making the accessibility for private cars potentially cumbersome. The politicians have pointed out that driving a car in Oslo city center is and will become less attractive (Oslo kommune, 2020). The new traffic patterns and the reduces number of possible parking spaces can result in delays, making the craftsmen use a lot of time in traffic, driving from A to B, finding parking places and walk the distance from the parked car to the job site. Changing the length of a delay may (or may not, depending on the type of delay and the relative lengths of other delays) make a large change in the behavior of a system (Meadows, 1999). Delays are also causing to oscillations. For example, given that craftsmen have a need for a dumpster for a demolition assignment. They order it with a delivery time of three days and by receiving it the dumpster is filled with all the waste that has piling up during the last three days and he needs to order a new, delaying the goal of being ready in expected time. As Meadows expresses (1999); "Delays in feedback loops are common causes of oscillations, if you're trying to adjust a system state to your goal, but you only receive delayed information about what the system state is, you will overshoot and undershoot. Same if your information is timely, but your response isn't".

3.6 The Ability to Bounce Back

Systems can be resilient, meaning that they can bounce back and restore themself. This resilience is thanks to the feedback loops that can inform the system in how to change to overcome

problems, survive a changing environment and restoring itself to the desired state. However, if the balancing feedback loop malfunctions, the reinforcing loop will make the system collapse and the cause the resilience mechanism to break down. This can be seen in for example diseases, where the malfunctioning resilience mechanism has caused imbalance in the system. The resilience of system can also loose effect on a longer period due to delays that are caused by the many layers that the system feedback travel through (Meadows, 1999). This can lead to system vulnerability as Meadows (1999) describes, “One day it does something it has done a hundred times before and crashes”. But when working optimal, the resilience of a system can achieve resilience on a higher level due to their interconnectedness to other subsystem, through which the systems restore or rebuild feedback loops. This can evolve to “meta-meta-resilience” if the systems are able to learn, design and evolve to help and mitigate possible unwanted scenarios with the help feedback loops. This capacity to change makes the systems own structure more complex. This turns them to self-organizing systems, as for example humans, animals, and ecosystems (Meadows, 1999).

3.7 Self-Organization

“Self-Organization is a process in which a pattern at the global level of a system emerges solely from numerous interactions among the lower-level components of the system. Moreover, the rules specifying interactions among the system components are executed using only local information, without reference to the global pattern” (Camazine, et al., 2001). Guardans, (1989) exemplifies this from a nature viewpoint, taking a school of fish as an example, where a group of fish self-organizes, and influencing the schooling in a certain pattern, addressing a local information change, when for example facing a narrow underwater passage. These systems come together a build a formation through interactions and build a greater unit as a pattern, based on local, not global information (Guardans, 1989). In other words, the pattern is an emergent property of the system, rather than a property imposed on the system by an external influence (Monat & Gannon, 2015). In natural systems, the structures are always self-organized, while in human-designed systems the structures may be either self-organized or designed (Monat & Gannon, 2015).

Self-organization can relate to emergence, that can be seen as Monat & Gannon (2015) describes it, as the emergent property of a system as a whole rather than emergent properties of its components. In other words, the emergence property should influence the individual components as a whole, but cannot be pinpointed to a specific component. Monat & Gannon (2015) exemplifies emergence in nature as for example the V formations of geese, schooling of fish and ant colony structure. Emergence of human designed systems include for example traffic jam patterns, usability of a user interface and the power of religion to influence behavior.

3.8 Our View of Reality

How we think, act, and value are all associated with our view of reality.
This implies that we do not see the world and our surroundings objectively but subjectively and fits to the model Chris Argyris developed in the 1970’s (Coghlan & Brydon-Miller, 2014), illustrating how people process information and assign meaning. The model, named Ladder of Inference is a tool to become aware of biases and reasoning, and understanding that assigning meaning produces change in both behavior and values and assumptions (Coghlan & Brydon-Miller, 2014). The model shows how mental models are formed unconsciously and suggests that our assumptions, values, and beliefs influence how we select data, interpret what is happening, and decide what to do. Our interpretations and decisions then feedback to reinforce (usually) our assumptions, values, and beliefs. We act based on our interpretations, and our actions affect what data is available to us (Coghlan & Brydon-Miller, 2014). So, our way of understanding and acting in the world create a self-reinforcing system, insulating us from alternative ways of understanding.

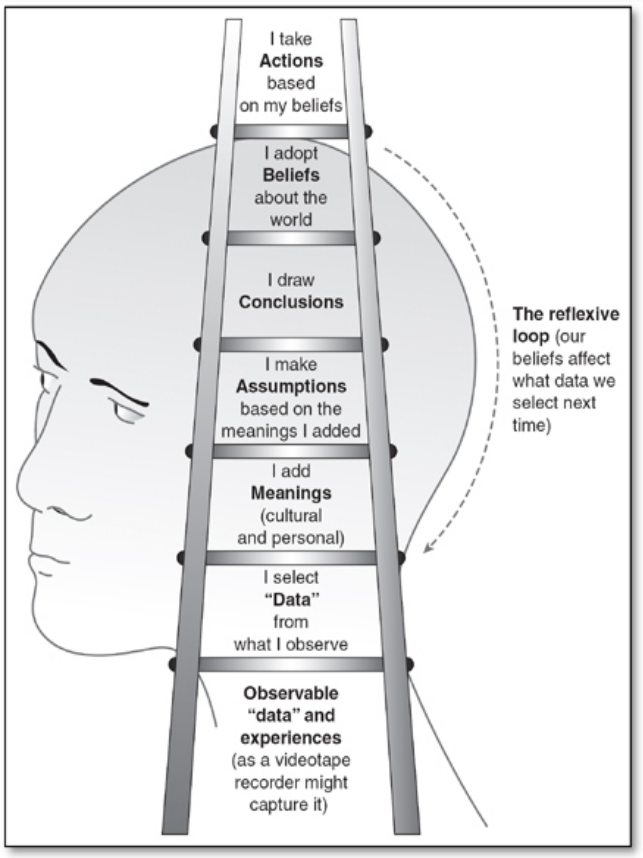


Figure 17. "The ladder of inference" by R.Ross (1994).

Being open to alternative ways of understanding is associable with the thoughts by Scott and Bansal (2014), that human is by nature programmed to learn, especially in things that are of meaning and interest to learn. As Scott and Bansal (2014) describes that humans are systems that "survive by adapting to their worlds by actively becoming informed on how their worlds work". This information gathering is a pursuit of current need-satisfying goals and something that happens incidentally in that context of learning and acquiring knowledge (Scott & Bansal, 2014). This mechanism is ongoing all the time through reflection, constructing mental models and creating new desired goals. This can be associated with the cybernetic feedback mechanism, that functions as the mechanism that supports our learning and information acquiring and guides us to new forms of behavior based on the feedback that drives us towards the desired state.

3.9 Desired State

Our desired state is guided and influenced by the discrepancy against our current view of reality (Meadows, 1999) (Scott & Bansal, 2014). It can also be limited by our own view of reality, keeping the field of interest areas narrow, which might keep important, viewpoint broadening information hidden. This has a resembles with Argyris Ladder of Inference model as well as Kahneman (2011) who described this as people, not seeing the whole potential, because of our own routines and knowledge that prevents us. As Kahneman (2011) describes "We focus on what we want to do and can do, neglecting the plans and skills of others". This is to take the inside view and applying blinders to prevent to see the outside perspective. Taking the outside view is better because it helps you gather the right and relevant data that will lead to a thought through and reflected outcome. However, even if you know that the outside view is preferable, the human mind has a bias towards optimism and taking the easiest way out which is to stick to what you know (Kahneman, 2011). This can also be linked with Kahneman's theory about system 1 and 2. System 1 and 2 are modes of thinking or two operating systems that are running simultaneously and determining how much brainpower and the level of reflection we use in certain situations. System 1 operates with mental activities that do not demand a lot of subjective reflection. It is in use when we do fast decisions that are more or less automatic and unconscious as driving a car on an empty street or brushing your teeth. The decisions are made non-consciously without a deeper reflection applying a what you see is all that is to it, which is 98% of the decision we make. System 2 kicks in when the mental events require more effort in reflecting and concentrating on a deeper level. This suggests that we tend to run on autopilot, sticking to what we know and use the toolkit that we possess. However, if the "need-satisfying goals" demand a greater subjective effort in reflection, the impressions, feelings, and inclinations that are typical system 1 characteristics can turn into something on a more fundamental, system 2 level as beliefs and attitudes (Kahneman, 2011).

When learning happens and a new state in the human system is achieved, it is according Kahneman (2011) a general limitation of the human mind is its imperfect ability to reconstruct past states of knowledge, or beliefs that have changed. Once you adopt a new view of the world (or of any part of it), you immediately lose much of your ability to recall what you used to

believe before your mind changed (Kahneman, 2011). Changing the way we see can have a large influence on systems. Changing beliefs and attitudes can alter purpose which can change system profoundly, even if every element and interconnection remain the same (Meadows, 1999). Changing beliefs and attitudes might be the result of a change in action or perception that can lead to a relational change between the interrelated subsystems in a system, contributing to a system change (Meadows, 1999).

As already mentioned, how we think, act, and value are all associated with our view of reality and the epistemological feedback loop. This can be connected to a strive to change behavior. The City Council and CFLP has set new rules and restrictions for the inner-city that affects the stakeholders that are a part of the system having social affects and behavioral changing effects and with that, also desires and wishes in how one should behave and act.

According to Hermsen one can address behavior change processes based on different strategies whether the change is focused on automatic behavior, like system 1 or more controlled and reflective, focus associable with Kahneman's system 2. Often is a combination of both because of their entwinement in human thought processes that demands both the automatic and the reflexive systems (Hermsen, 2015). But if focusing on changing only on an automatic, system 1 behavior as habits or impulsive behavior because of a feedback from the discrepancy between current and desired state, one can according to Hermsen (2015) utilize two strategizes. One can either hide or replace the signal that evokes the automatic behavior or disrupt the signal – automatic response chain so that the behavior becomes available for conscious reflection. As Hermsen (2015) exemplifies, "Campaigns aimed at increasing knowledge by offering information, or aimed at attitude change through emphasizing social norms, are not likely to have any effect on behaviors that are largely automatic." When focusing on the more controlled and reflective behavior, motivation, opportunity, and ability play a key role in achieving the change. The common denominator between the system1 and 2 is according to Hermsen (2015), is the cognitive biases and own subjective realities that deviate from norm or rationality that counteract the change processes. There is always something that can lead to disengagement and resistance when taking social aspects in consideration with behavior change, which is inevitable because every step in our self-regulatory cycle is influenced by our social environment (Hermsen, 2015). Hermsen (2015) emphasizes on the necessity to consider the system in which the behavior is performed, because in is not enough to only target on behavior when aiming at behavior change.

3.10 Framing

To target a specific system when striving a behavioral change and broaden our epistemological boundaries in the personal cybernetic feedback mechanism, and becoming aware of automatic behaviors, one could utilize framing, contextualizing and setting boundaries on information and its interpretation.

According to Hoffman (2006), it can be difficult to define framing, due to the number of different views and theories about framing that are linked to different disciplines. I have, best to my knowledge, chosen the definition that are most suitable to the project, applying my own frames on the matter.
Frames can be seen as our mental information processors of new information.
New information is filtered and organized based on our epistemological frames, meaning that people view the world through frames based on the limits and validity of own knowledge, and make information fit into them (Hoffmann, 2006, p. 12). How one present and frames information is crucial in how it is received and processed. Framing can have a reinforcing effect on the system in both a negative and positive manner. For instance, if a newspaper states that craftsmen do not care about the climate referring to a low number of electric vehicles sold to craftsmen. This message is not framed as uplifting and is assumingly not well received and has a reinforcing effect on the negative aspects, as the information is contextualized and fit to the frames of the reader. For the craftsmen that already switched to electric cars, this information will assumingly contextualize different in their frames and notice this information perhaps as confirmation that making the transition to electric was a good choice.
As Gamson (1975) reviewing Erving Goffman's thoughts on the organization of experience,

pointed out, the realness of an experience is "having to do with the camera and not what it is the camera takes pictures of". This thought of the camera illustrates the sense of realness that are formed by how we interpret the conditions and define the circumstances that we think are real. This draws parallels to the cybernetic feedback loop where the thrive to evolve based on the discrepancy between current and desired state. The current state, from a cybernetic and framing perspective, could be a combination of happenings there a person is "rendering situations meaningful for himself" (Gamson, 1975) after having applied frames based on prior knowledge, where the frames are as Gottman defines (cited in Gamson,1975) "a set of rules that governs a given type of activity".

3.11 Anchoring

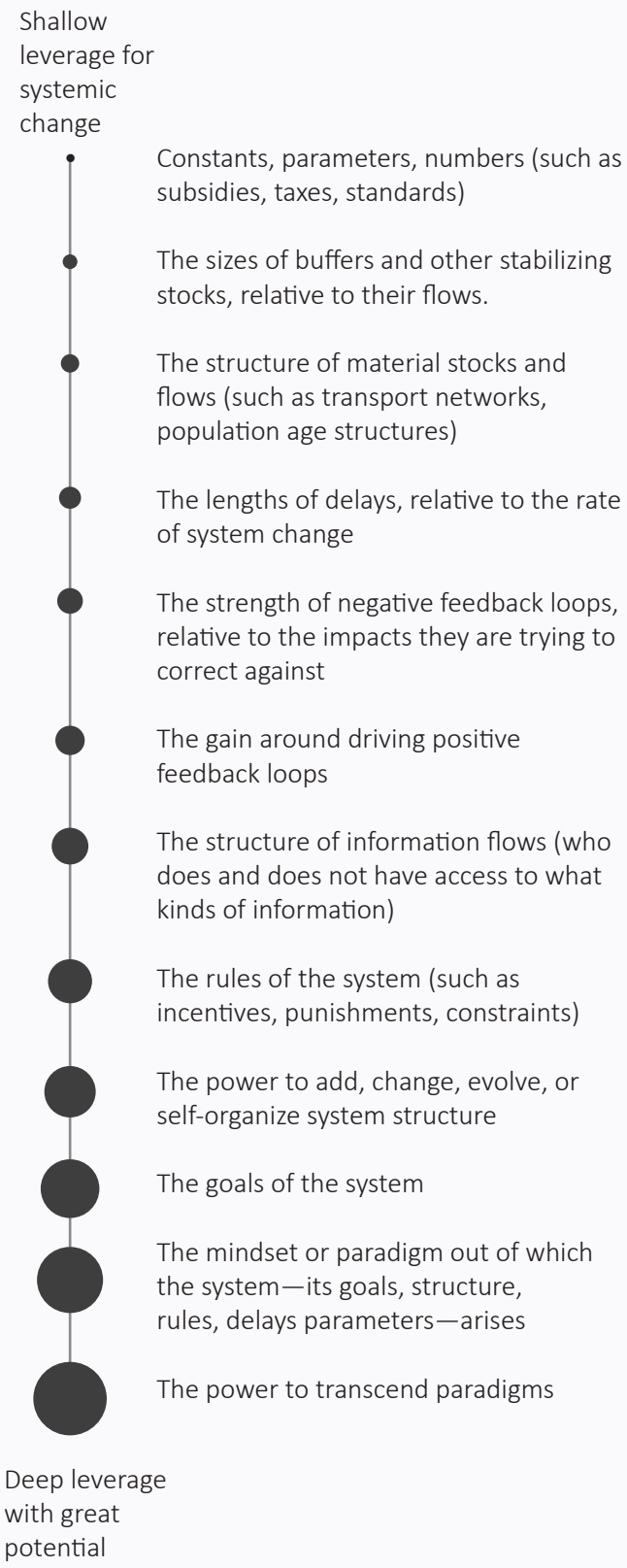
Gottman had also a concept about anchoring an activity, being both inside and outside the frame. The inside, being the primary activity set by the frames, or rules and the outside as the surrounding external context (Gamson, 1975). The primary and internal activity is influenced by the external world.
To exemplify this from a craftsmen perspective, while driving in the inner-city Oslo, trying to find an open parking place. The primary activity is to drive the car and is guided by the set of rules of the internal activity frame, to steer, navigate and handle pedals, sticks and signals in a certain pattern and manner to drive. The set of rules are influenced by the surrounding context, for example if you are frustrated, due to the lack of parking spaces, traffic jams and knowing that the clock is ticking and the customer is waiting for you, leading to a more aggressive driving.
So, as Gamson (1975) points out, "there is always an interface between the activity being framed and the external world in which it is anchored". This, with a reference to Gottman (cited in Gamson, 1975), frames are "a set of rules that governs a given type of activity" suggest that the environment can have influence how one frame a situation, and therefore can also influence a change in behavior, attitude, the interactions between interrelations in systems. Kahneman (2011) describes anchoring as a one of many cognitive biases people have when making decisions, exemplifying anchoring as the making judgements that are based on an anchor point of information that you base your decision or judgement on. This anchor point can be influenced with an external piece of information leading to a decision that seems as a good one. For example, a craftsman, accustomed to other health, safety and environment (HSE) standards from an another country, might base his anchor point of information on them that frames his understanding of the task and conditions less or more risky in comparison to the HSE rules in country he is working in.

As pointed out with assigning meaning, the feedback loop of information, being an incidental and automatic pursuit of current need-satisfying goals, the modes of thinking with systems 1 and 2, and how you organize and filter information through framing, one can conclude that our behavior and decision making are steered by our subjective realities, our cognitive biases and our surroundings based on current understanding.

3.12 Finding Leverage

The Car-free Liability program has a widespread effect and is connected different parts of a large, interconnected system. The system incorporates for economics, environment, and social pattern. These are all controlled by various organizations, governing institutions that are influenced by politics. The program also incorporates the people and companies living inside of the perimeter of the program, which can have an enforced role due to living in the CFLP transition area.
When the objective is to change a system, the starting point is to look at all the components of a system and understand the system goal. Systems are complex and information rich. Therefore, is it essential to get an understanding of the complexity and an overview over the interrelations and structures to find patterns, power structures and root causes. The issues or problems can be many, in many different levels, that are connected. To transform a system including all its components and interrelations, it is essential that the transformation is aimed at the fundamental principles and beliefs of a system (Meadows, 1999). Therefore, it is crucial to ask what is driving the driving forces for a specific issue and setting system boundaries to address the right root causes for the problem. The boundary setting and addressing root

causes play an important part, because of their widespread effect on the connected entities in the system (Narberhaus & Sheppard, 2015). As Narberhaus & Sheppard (2015) describes," It is not the same to fix symptoms as dealing with underlying causes, and therefore it is inadequate trying to fix problems by only fixing symptoms". To understand the possibilities to influence systems, this project has utilized a systems analysis expert, Donaella Meadows theories on levels of leverage and ways to intervene systems. There is, according to Meadows, a significant difference where you alter a system. The goal is to find a suitable intervening point in a system that can influence the system in the most effective manner.
Meadows has developed twelve ways to intervene and influence a system, all of them focusing on different levels of leverage. The levers, or places within a complex system, being slightly altered can produce big changes in everything (Meadows, 1999).



Understanding the System

4. Design Approach

To get an understanding of systemic effects of the Car-Free Livability program on the craftsmen daily task within the inner-city ring road, there is a need to identify the systems, patterns, viewpoints and relations and interconnections from multiple perspectives and scales.
In this master thesis, I have chosen to use a System Oriented Design (SOD) approach. The design steps, philosophy and tools are suitable to visualize, organize, and analyze the complexity and interrelations with a level of freedom that allows creative sense-making.

4.1 Systemic Design

The Systems oriented design is a discipline and part of the pluralistic field systemic design. Systemic design is an approach that combines design thinking, design practice with systems thinking, and systems practice (Ryan, 2014). Systems thinking can be seen as the interdisciplinary field for seeing the world in terms of connections and interactions in systemics (Ryan, 2014) and understand a phenomenon within the context of larger whole (Van der Bijl-Brouwer & Malcolm, 2020). With design thinking, lending Ryans (2014) thoughts, it can a be hands-on, intentional, human-centered, iterative, and constructive process of creating something that has embedded meaning and value. This joint use of the fields has been developed and adapted within several fields during the last decades to address an increased need for solving and understanding complex and systemic challenges (Dorst, cited in Van der Bijl-Brouwer & Malcolm, 2020). As Van der Bijl-Brouwer & Malcolm (2020) explains the development, as going from “designing products and services to designing complex service systems, organizations, policies, and strategies”.

Systemic design can be seen as Rowland (2015) explains it, an approach where one emphasizes on thinking holistically when designing, expanding boundaries, considering interdependencies and interactions, including all who would be affected, and consider and reflect on the system impacts, enabling systems to be designed (Rowland, 2015). This is relatable with synthesis, an essential part of systems thinking and a method for reasoning, where one considers things in relation to a larger system or their mission being a part of a system (Van der Bijl-Brouwer & Malcolm, 2020).

Both fields, that are foundations for systemic design, design thinking and systems thinking, benefit as Ryan (2014) describes it “from a rich and diverse tradition of interdisciplinary praxis”. There are many representations of respective field that are highlighted in various ways, adopting different perspectives on things, employing own methods, and defining own roles. These can be seen in the various orientations and approaches in systems and design, e.g., second order cybernetics, soft system methodology in systems and e.g., organizational design and

fashion design (Ryan, 2014). But, when put together, systems and design, called systemic design, it opens "multiple new practices based on intersections between perspectives" (Sevaldson, 2019B) and opens the possibility for sense making, shed light on challenges from various angles and scales, embrace and tackle complexity and wickedness and construct a broader context of the matters we examine (Ryan, 2014).

"Systemic design is to us an approach to working together to act, reflect, and learn while doing" (Ryan, 2014). and adds the importance of systemic design providing a space there one can harness dynamic complexity as a generator of innovation and value creation. Providing a specific space there one can understand, and harness dynamic complexity can be linked with Sevaldsons (2019B) thoughts on systemic design being a place of practice and reliant on emergence, meaning that new processes or patterns are created from the interaction of structures and behaviors represented by a variety of practices (Sevaldson, 2019B).

4.2 System Oriented Design

The name is explanatory, Systems Oriented Design, where Oriented aims on its orientation, the emphasis on systems in design. In other words, SOD investigates systems and complexity through using systems thinking lenses in combination with a designerly approach, combining designer skills and design thinking, trying to benefit both disciplines (Sevaldson, 2009)((Sevaldson, 2017B). SOD seeks to use the full potential of design and systems thinking without simplifying them in order to fit into other disciplines frameworks with the risk of having a degradation of design and also a reduction of potential to contribute in solving systemic problems (Sevaldson, 2017B).

System Oriented Design addresses the ability to design for complexity, using designerly skills and capabilities to tackle highly complex and wicked problems (Sevaldson, 2013). The designerly and practice-oriented approach that SOD is, welcomes complexity, through which a designer can map, design and model representations of a system for to test altered systems, system reactions, new systems, and their interrelations (Sevaldson, 2017B). System Oriented Designs also offers tools to manage and analyze the richness and complexity within wicked problems

" The systems oriented designer is looking beyond the object (product or service) and she perceives the object merely as a "symptom" or "outcropping" of vast systems that lay behind the object" (Sevaldson, 2013)

and systemic interrelations to reach solutions that can as Sevaldson (2013) point out, "combine ethical issues with sustainability, economy, new technology, social, cultural and commercial considerations etc."

The approach emphasizes on a multicentric approach, taking distance from a single user centricity problems. Instead, SOD acknowledge the multifaceted, "everything is connected" issues in problems that are usually connected with multiple agendas and problem "networks (Sevaldson, 2009).
The world is complex, it is changing, it is unpredictable, and everything is connected. It sets demands designers to have the ability to understand complexity and design with multiple agendas (Sevaldson, 2009).

4.3 Tools

The toolkit of SOD consists of tools that will help one to visualize, organize and collect insights of the matter at hand. Amongst them are GIGA-mapping, zoom, innovation and problem/potential (ZIP) analysis and impact and threshold analyses (IMP).

One of the most central tools in the SOD toolkit is giga maps. A giga map is an information dense diagram with visualizations, connections and relations that functions as a design tool to gather, understand, and process the information presented in them (Sevaldson, 2011). They can include a huge variety of different elements that emphasizes on different categories or systems from specific perspectives as for example processes, structures, people, channels, platforms, rules, insights, and effects (Stickdorn, Lawrence, Hormess, & Schneider, 2018).

By visualizing all the components of systems, the interplay, and interrelations between these systems, stakeholders and all possible concerned, can be analyzed, designed, and made more understandable. More understandable do not necessarily mean to simplify and tame problems as GIGA-mapping try to grasp, embrace, and mirror the complexity and wickedness of real-life problems (Sevaldson, 2011).

GIGA-mapping is super extensive mapping across multiple layers and scales, investigating relations between seemingly separated categories and so implementing boundary critique to the conception and framing of systems (Sevaldson, 2011).

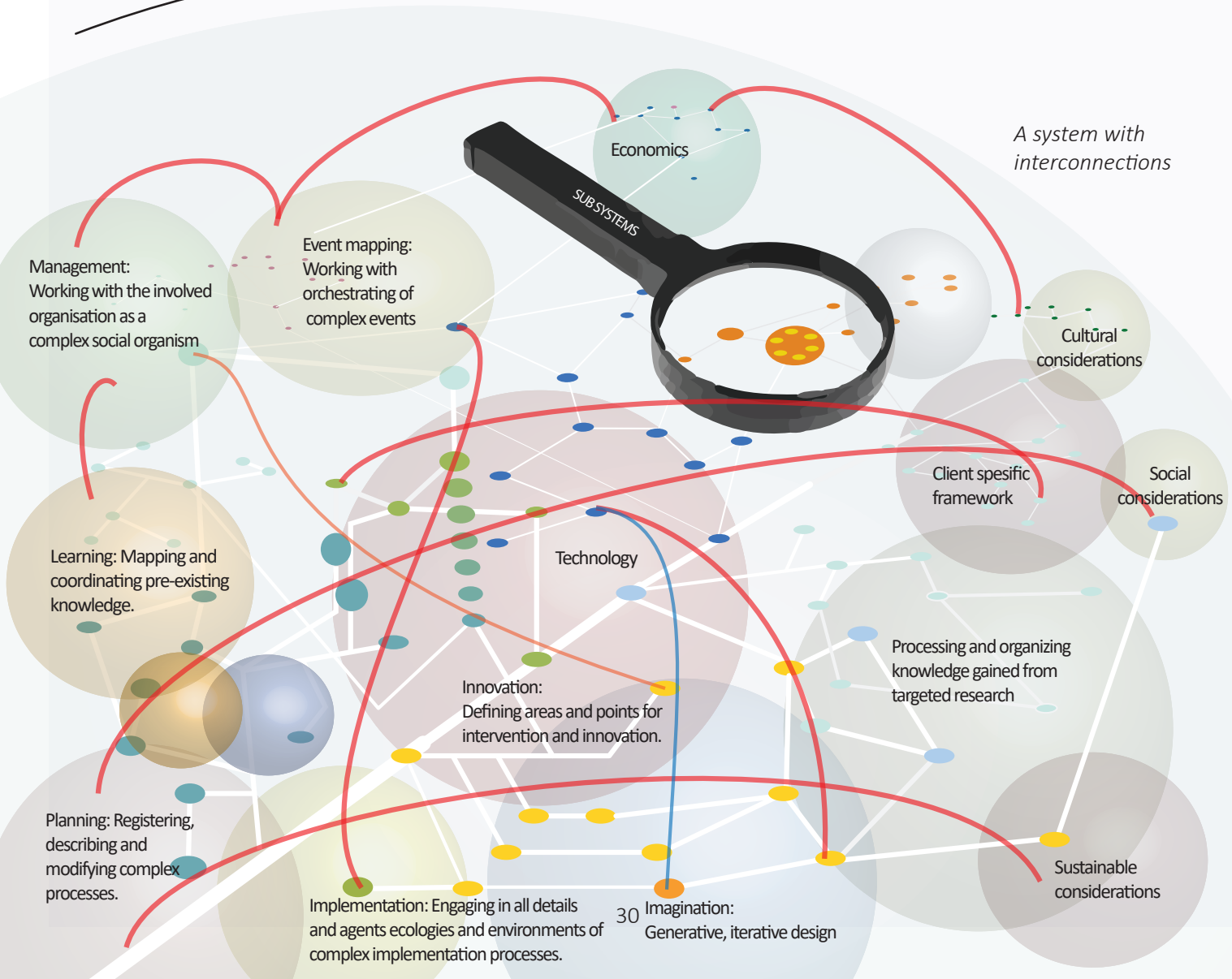
The visualization of the systems gives also the opportunity to design or predict future scenarios, intended and unintended benefits and disadvantages in systems based on the changes in relations and dynamics between systems (Stickdorn, Lawrence, Hormess, & Schneider, 2018)

The giga and system maps integrates numerous methods that assist the process of working with complex issues. These various methods are tools for processing the complexity and understanding wicked problems, which are presented in giga maps in different graphic and visual formats of presentation and expression (Stickdorn, Lawrence, Hormess, & Schneider, 2018).
The giga map is to be “more of an organized strategy” than just a mind map (Sevaldson, 2017A), and a visual and sense making process through gathering everything on paper, as a spreadsheet

Possible information processing methods that GIGA maps can integrate.

Collage
User Journey
Scenarios
Diagramming
Service Blueprint
Information Visualisation
Causal Loop Model
Mind Maps
Concept Maps
Time based Maps
Image Maps
Spatial Maps
Intensity Maps

A system with interconnections



for visual thinking of complex issues. The aim with a giga map is to be a tool for design analysis, where one can both develop and define the "what is" questions as well as the "what ought to be" questions on a large, information rich giga map. The ability to present and process information in an easy and informal manner is also one of the qualities of giga maps that makes it suitable as a bridging tool when it comes facilitating participatory processes, including co-creation and information sharing with stakeholders (Sevaldson, 2011). The information that is gathered in GIGA maps functions as the building blocks for designing. The information, that is everything from abstract, figurative to textual and visual should as Sevaldson (2011) points out "be alive throughout larger parts of the process either spontaneously or at checkpoints or iterations.

"Significant is the ability to incubate and synthesise solutions within fields and applications where there are no singular and clear responses to be found, and where the value of responses is evaluated iteratively through practice and by gathering experience, expertise and intuition over time" (Sevaldson, 2011).

Understanding the System

5. Data Collection

In order to answer the research question and utilize the systems oriented design approach, I have gathered information about the current situation and how craftsmen are experiencing it. In this master's thesis, I have based the investigation on qualitative research using phenomenological approach. The phenomenological approach focus on the experiences related to specific situations and individuals points of view about a certain phenomenon (Muratovski, 2016). The methods for data collection were:

- **Literature, documents & online resources**
  The information collection has revolved around searching and reading relevant literature related to the topic.

- **Semi-structured and in-depth interviews**
  The type of interview was found suitable regarding its conventional manner and low threshold to discuss and reflect the discussed subjects (Muratovski, 2016). The interviews were based on predetermined questions, that functioned more as guiding tool to shed light on subjects and encourage elaboration to explain different issues in question. The interviews were conducted between January and April 2021, with craftsmen representing the plumber, electrician and carpenter trades in addition to craftsmen's trade association, representants from the City of Oslo and mobility and urban development advisors. The interviews were conducted by telephone, due to Covid 19 limitations and lasted between 35 minutes to 1 hour. The interviewees are anonymized as an effort to respect privacy and the general data protection regulations (GDPR). The interviewees are being referred with numbers. The participants were chosen based on geographic location, having office location within ring road 3. This was to include the possibility that the closeness to the CFLP area has a correlation to the participants number of assignments in the CFLP area and have potentially more reflection regarding the situation in the inner-city than other craftsmen who have their core area of business in the outskirts of Oslo.

  - 4 craftsmen using vans
  - 2 craftsmen using bicycles and vans
  - 2 Mobility and urban planners of which one represented Bymiljøtetaten/City of Oslo
  - 1 Represant for a trade association

- **Non-participant observation**
  If find observation to be a good method in gaining insight in how craftsmen engage and behave in the CFLP area. The observation of craftsmen was done in May 2021, observing situational contexts of craftsmen parking and offloading /onloading their vans in the inner city CFLP area. Observation is a suitable method for gaining a "real-life" understanding of the context the craftsmen are working in. It also gives the opportunity to observe what the craftsmen are doing, their body language and gestures, and also the things they are not doing (Stickdorn, Lawrence, Hormess, & Schneider, 2018). This form of visual research is way of gathering and identifying structures and settings and behaviors and interactions (Muratovski, 2016).

6. The Creative Framework

There is a need to point out that there is a variety of different design frameworks and approaches within the different fields of design.
By Frameworks, it is meant “A framework is a particular set of rules, ideas, or beliefs which you use in order to deal with problems or to decide what to do” (Collins Dictionary, 2021).
The frameworks provide structure and direction on a preferred way to do something without being too detailed or rigid. In essence, frameworks provide guidelines that can be customized and to be flexible enough to adapt to new changing conditions (Ellis, 2008).
The frameworks are many and focus on respective design fields characteristics, as for instance IT, construction, and graphic design.
In systemic design, it is developed variants of frameworks with an emphasis on a systemic approach that combines both design thinking and systems thinking.

The SOD creative process framework includes the four stages of creativity (Sevaldson, 2019A). Graham Wallas book Art of Thought (1926) presented a four-stage model of creativity consisting of preparation, incubation, illumination, and verification (Wallas, 1926 as cited in Sadler-Smith, 2015).

Preparation is the stage the designer formulates the problem and collects the information and materials considered necessary for finding new solutions. This process involves research, planning and entering the right frame of mind (Popova, 2016).

In the second stage, incubation, the creative process is running on autopilot. The organization of information is done partly subconsciously, blending, funneling, and analyzing the data (Popova, 2016). This can be connected with Sevaldsons (2011) description of the processing of information and how that is a part of designing. ”Designing “builds” material for decision making. This material is both textual and visual, abstract and figurative. The complex information in a design process should be “alive” throughout larger parts of the process ether spontaneously or at checkpoints or iterations. This means that designing generates information that will modulate itself along the process”(Sevaldson, 2011).

Illumination entails the “aha” moments of insight that prevails after the information has been gathered and processed both unconsciously and consciously in the prior steps. The creative ideas occur suddenly, and the information becomes clearer (The Interaction Design Foundation, 2020).
The fourth stage is verification, where one build on the insights and “aha” solutions from the illumination stage. In the verification, one evaluates, analyze, test, and build on the ideas (The Interaction Design Foundation, 2020).

These steps of creativity come and are utilized organically in a System Oriented Process (Sevaldson, 2019A).

The stages of creativity addresses the divergent and convergent thinking. The divergent and convergent thinking is fundamental in e.g., the double diamond framework that was developed by the British Design Council as a tool to help designers and non-designer to tackle the most complex social, economic, and environmental problems (Design Council, 2019). The problem solving in a design process can be seen as the interplay between divergence and convergence. First, we gather, explore and seek for information that creates opportunities (divergence), that we refine and process through adding boundaries, making decisions for to move forward (converge) (Stickdorn, Lawrence, Hormess, & Schneider, 2018). This loop is to be seen as vital part of sense making and processing information for coming further. It is also wort shedding light on the design process, not being a linear process. It is iterative, you go back and forth. Therefore, it is worth mentioning that this loop of divergence and convergence happens hundreds, if not thousands of times during a creative process in the project.

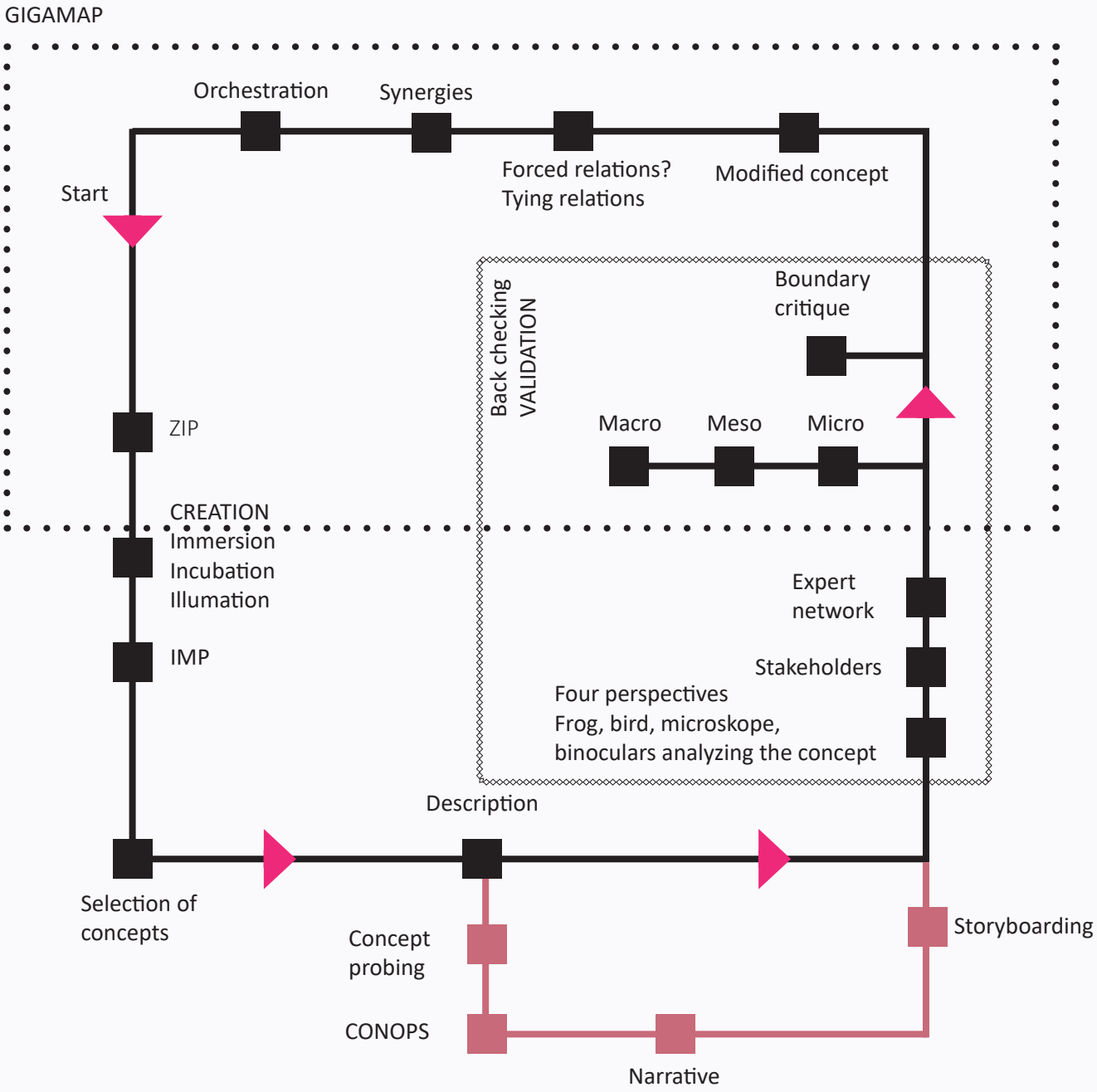
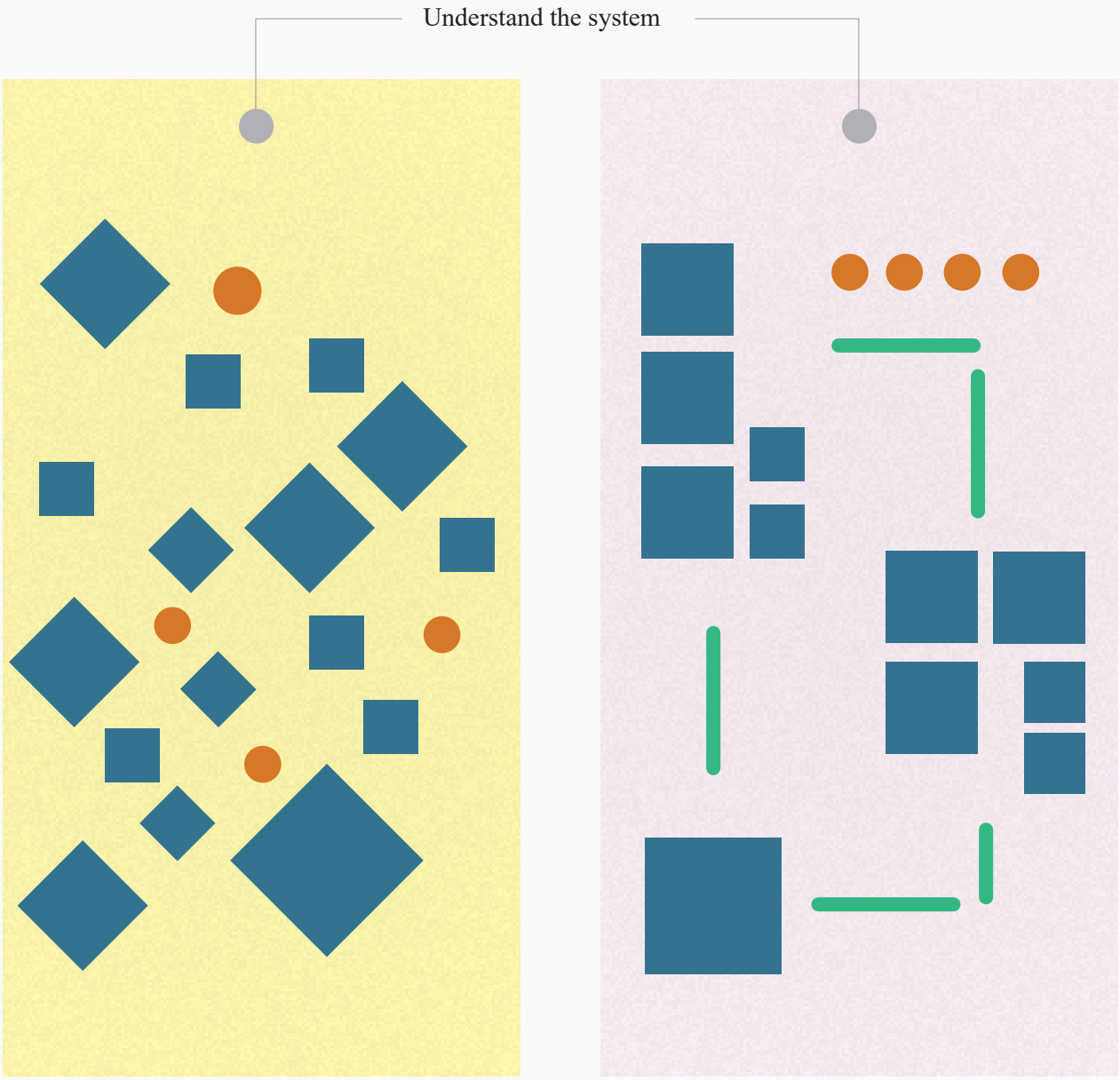


Figure 20. Creative framework (Sevaldson, 2019A)

The creative process framework of SOD can function as a guide and can be adjusted to project specific preferences, regarding project specific criteria's, perspectives, and needs. The framework can be entered from any entrance point and be iterated as many times as needed and can be utilized in any stage of a project (Sevaldson, 2019A).

In this project I have decided to follow the SOD creative framework with some adjustments to fit the project format and size. The concept probing and narrative, in addition to parts of the validation steps has been excluded in this project. The information richness of one big giga map is adjusted to fit the report format and size and is therefore been divided into the chapters of this report.

6.1 Design Phases



Diverge. Information gathering and research planning.

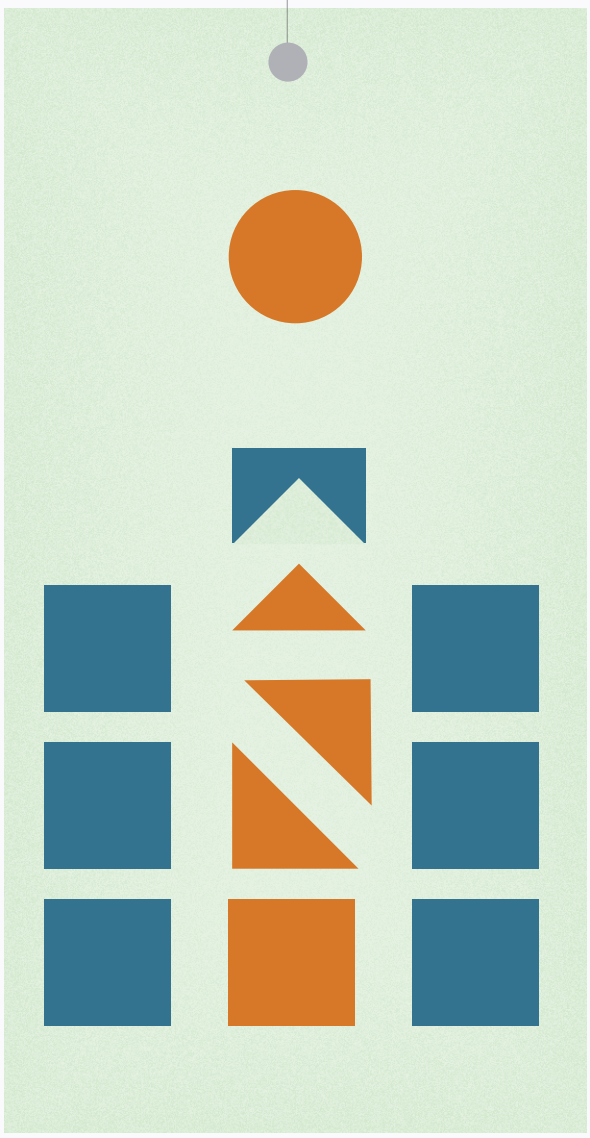
Converge. Order and understand information.

Phase 1- Preparation:
Gather information.
Examine, understand, and gain understanding of the system and the information connected to it.

Phase 2 -Incubation:
Organize and process the information and make sense of it. Create a holistic picture from various angles and layers through information processing methods. The subconscious organization of "floating information" is processed throughout the project as the designing and sensemaking is a back-and-forth type of process.

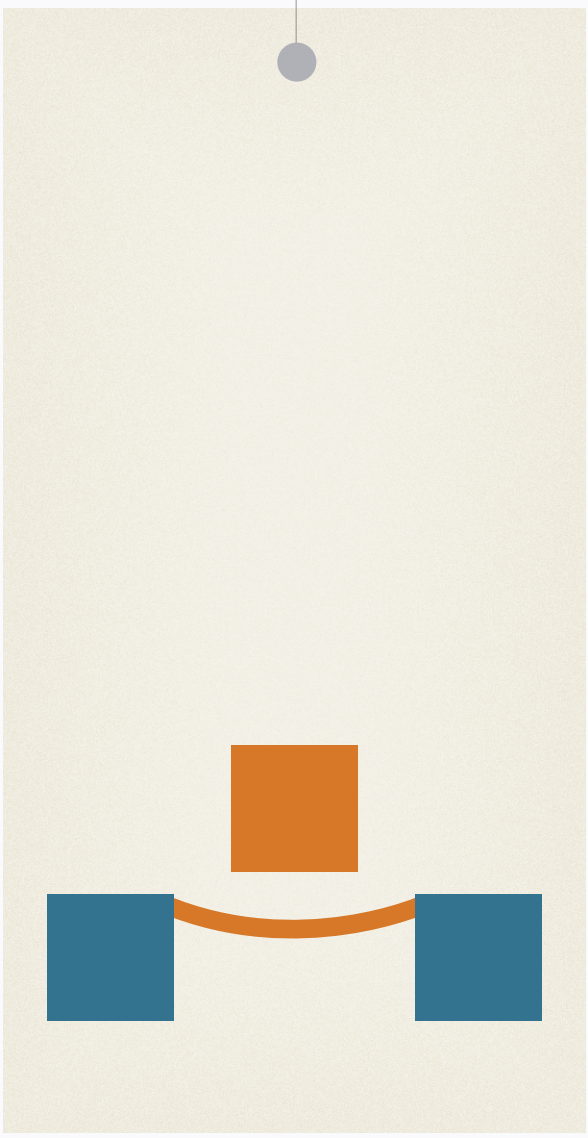
Non-linearity between the phases

Change the system



Diverge. Ideate possible solutions to get the information function ideally.

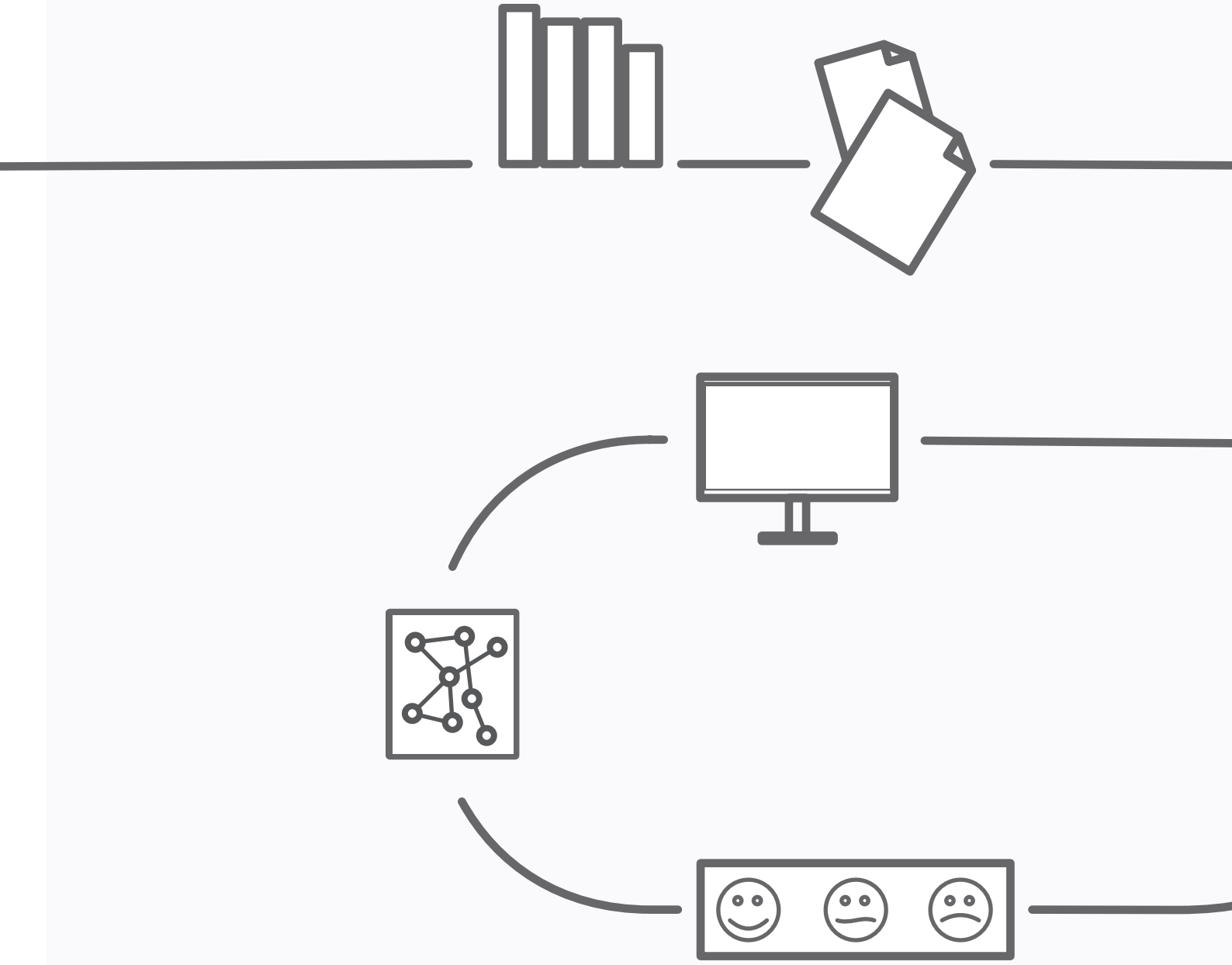
Phase 3 - Illumination:
Reflection in action. Utilizing the processed information and insights in ideation of concepts.

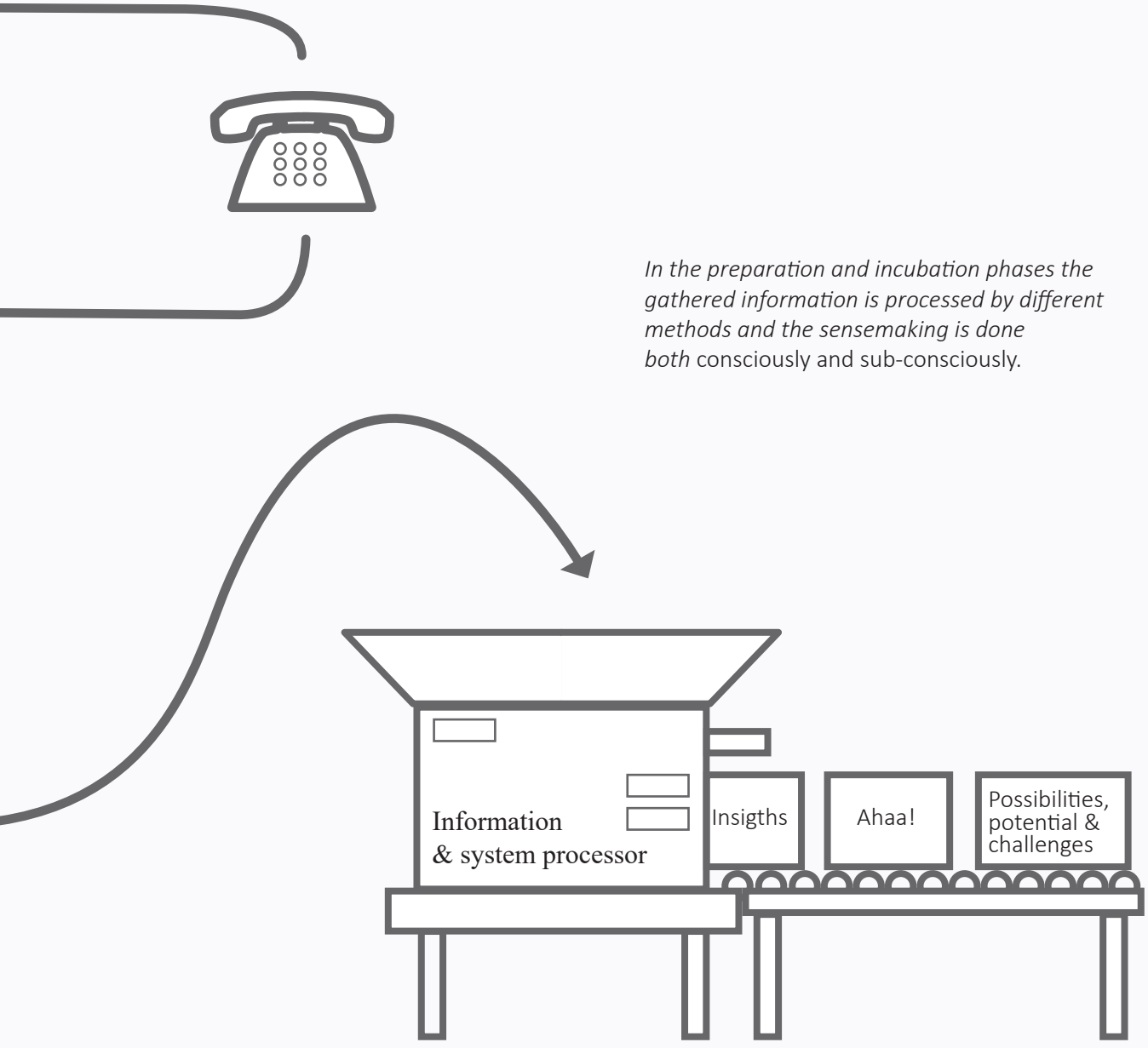


Converge. Filter and evaluate the concepts, does it bend or brake?

Phase 4 - Verification:
At this stage, the concepts are developed further through evaluation and analysis that will help shape the concept with desired system impact.

7. Preparation & Incubation





In the preparation and incubation phases the gathered information is processed by different methods and the sensemaking is done both consciously and sub-consciously.

Understanding the System

7.1 Who is Involved?

When investigating the phenomenon of carpenters, plumbers, and electricians taking on service assignments in the CFLP area (inside ring road 1), it can be messy, complex, and interconnected. There is a need to understand the systems involved and make sense of their dynamics.

The stakeholder map distinguishes stakeholders that has a saying in how the system works today. The stakeholder map is a simplified map showing only central actors and stakeholders without subsystems or interrelations.

Macro:
Institutional, socioeconomic, cultural context

Meso:
Groups in society, organizations, and communities

Micro:
The individual and its interaction with others

"To ask whether elements, interconnections, or purposes are most important in a system is to ask an unsystemic question. All are essential. All interact. All have their roles. But the least obvious part of the system, its function or purpose, is often the most crucial determinant of the system's behavior" (Meadows, 1999)

System purpose

1. To govern and develop Norway as a welfare state through it own structural systems.

2. To transform Oslo's inner-city area from a polluting car and traffic dense area to an accessible and appealing urban area focusing on livability. Prioritize pedestrians, cyclists, and public transport users, and reduce private vehicle traffic by creating car-free streets.

3. To govern the Oslo area through policies, rules and regulations, building a better tomorrow.

4. Provide good parking possibilities for people coming by car to Oslo.

5. Providing both local and visiting people services and contributing to a vital and appealing Oslo. Everything from cafeterias and banks to gyms.

6. To provide emission free, time- and cost-efficient service assignments with high customer satisfaction in the CFLP area.

7. To live in a service providing, people dense capitol with good public services and closeness to nature.

8. To represent, promote and develop craftsmen's interests within certain craft disciplines.

9. To sell and provide customers with tools, material, and other necessities.

Stakeholder map. A simplified map showing only main stakeholders.

7.2 ZIP Analysis

The ZIP-analysis is a method to find and keep track of points of potential, pain points and areas of interest when developing a giga map. As the giga map evolves from a simple map to an information dense and rich map, it is helpful to have an overview over the ZIP-points that will guide you further in the investigation and developing of potential innovations (Sevaldson, 2012A).

Z

Z indicates a Zoom point, and marks areas or points of interest that need further research. It can be used as a reminder that there are areas that are lacking information as well as being an initiator for making more maps from a closer or further view, hence the name zoom (Sevaldson, 2012A).

I

"I stands for innovation, intervention and idea" (Sevaldson, 2012A). It is used to mark areas where new ideas and problem solutions emerge, or areas where there are possibilities to alter the system by linking nodes in a different way, ultimately creating new relationships (Sevaldson, 2012A).

P

"The P stands for potential, problem, problematic or pain point" (Sevaldson, 2012A).
Sevaldson (2012A) explains that P-points can be understood as potential actors such as "enablers" and "blockers". P-points do not only mark areas where there are unresolved problems or areas where things do not work, but also areas with potential with things that work well.

7.3 Systemic Relations

A central feature of systems thinking is its shift in focus from objects to relations. And based on the need for more detailed ways of visualizing relations, the "library of systemic relations" was created by Sevaldson (Sevaldson, 2012B). Relationships can be drawn as lines between the entities in a system. These lines can be used to define different features of relations or characteristics that one might see in systems (Sevaldson, 2016A). The colour coding of relationship lines drawn in this giga map is based on Sevaldson's (2012B) library of systemic relations. As the library is complex containing 16 different types of relations, including nuances, it was decided to simplify and focus on using relations with clear distinctions. Sevaldson (2016A) points out that nodes or entities seldom have only one relation. However, in the systemic relations map on the next page, I have decided to simplify and define the relations with only one color per relation that is based on my subjective understanding of relevance and what is important to highlight. **The ZIP analysis and systemic relations are applied in the systemic relations map on page 42 and have functioned as initial sensemaking process.**

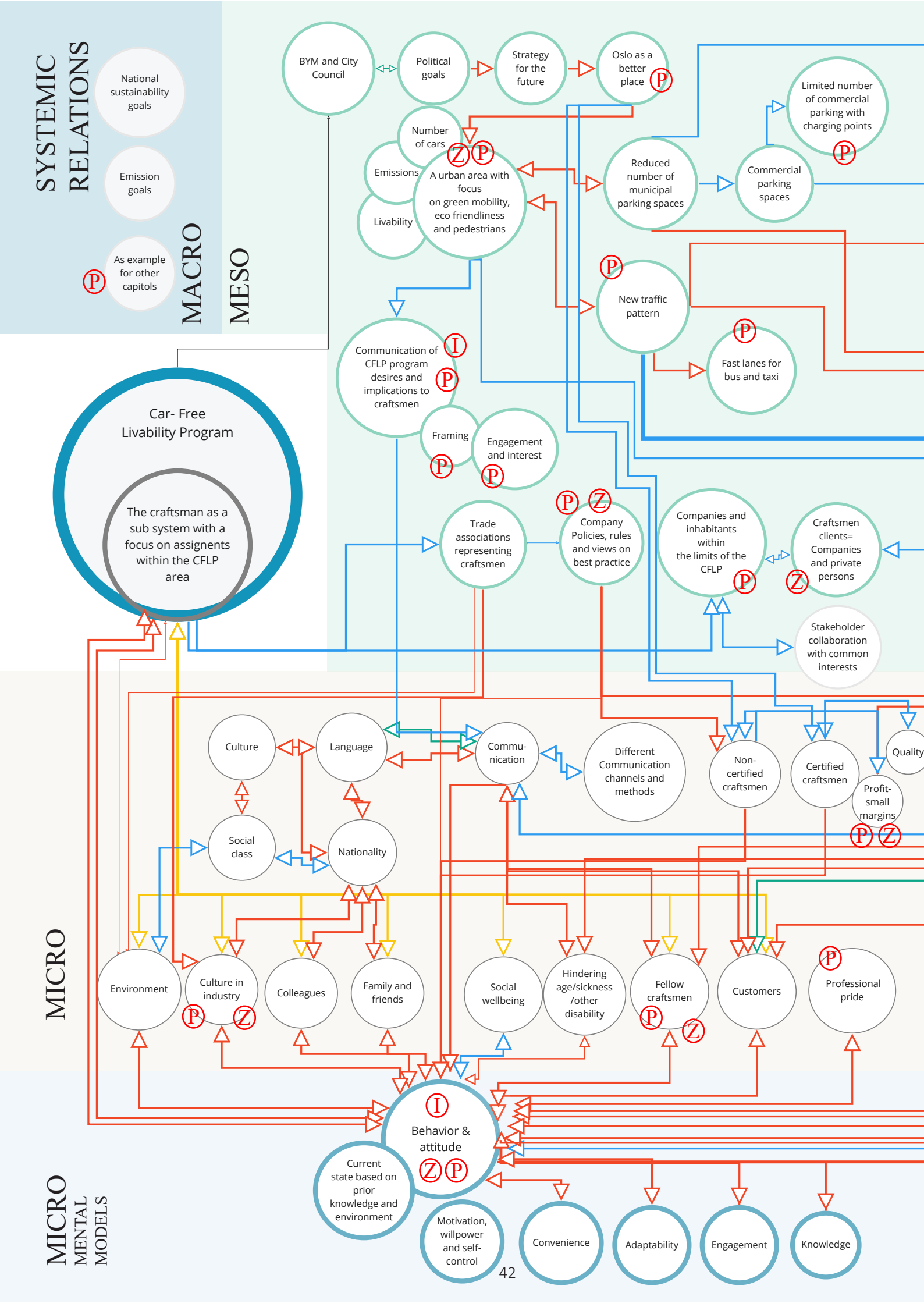
Red:
Hard relations,
casual relations,

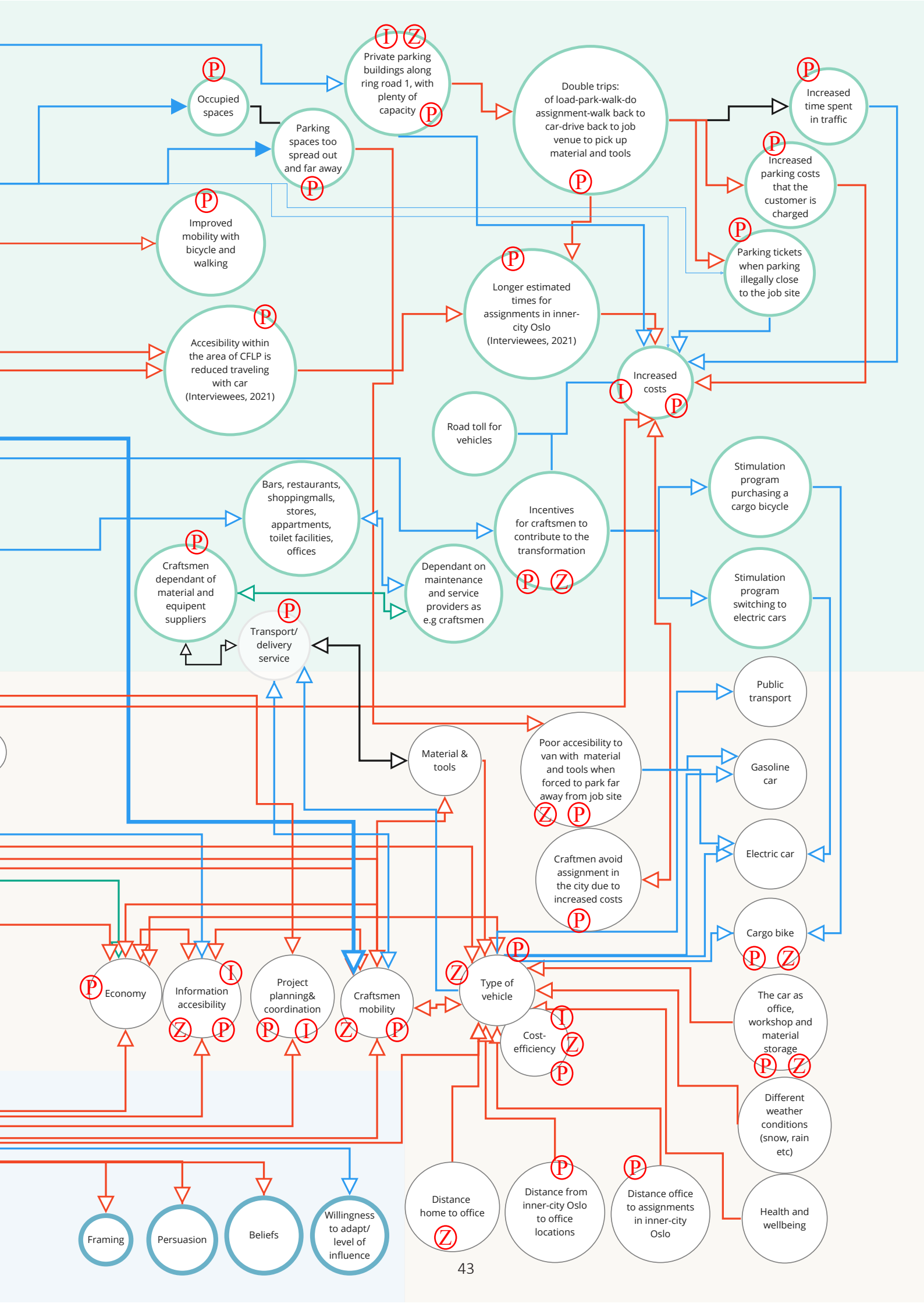
Yellow:
Social relations

Blue:
Associative
semantic
& thematic
relations

Green: structural relations (functional relations)
Structural interrelations are not cause effect relationships, but are parts of a structural system, that when put together, they generate a surplus output.

Black: Unspecified relation

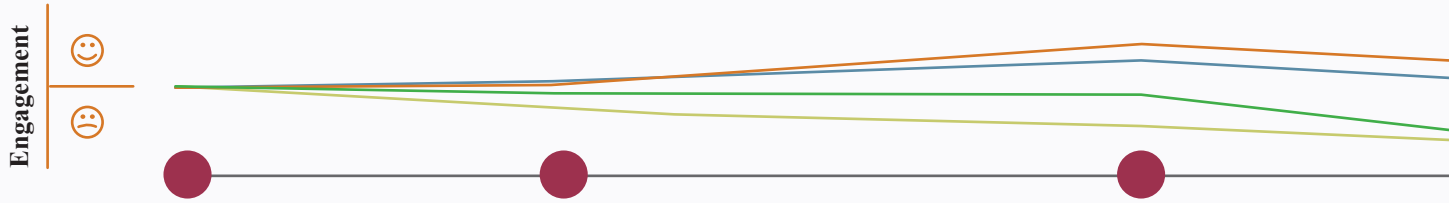

SYSTEMIC RELATIONS
MACRO
MESO
MICRO
MICRO MENTAL MODELS
National sustainability goals
Emission goals
As example for other capitols
BYM and City Council
Political goals
Strategy for the future
Oslo as a better place
Number of cars
Emissions
Livability
A urban area with focus on green mobility, eco friendliness and pedestrians
Reduced number of municipal parking spaces
Commercial parking spaces
Limited number of commercial parking with charging points
New traffic pattern
Fast lanes for bus and taxi
Communication of CFLP program desires and implications to craftsmen
Framing
Engagement and interest
Car- Free Livability Program
The craftsman as a sub system with a focus on assignments within the CFLP area
Trade associations representing craftsmen
Company Policies, rules and views on best practice
Companies and inhabitants within the limits of the CFLP
Craftsmen clients= Companies and private persons
Stakeholder collaboration with common interests
Culture
Language
Commu-nication
Different Communication channels and methods
Non-certified craftsmen
Certified craftsmen
Quality
Profit-small margins
Social class
Nationality
Environment
Culture in industry
Colleagues
Family and friends
Social wellbeing
Hindering age/sickness /other disability
Fellow craftsmen
Customers
Professional pride
Behavior & attitude
Current state based on prior knowledge and environment
Motivation, willpower and self-control
Convenience
Adaptability
Engagement
Knowledge


Occupied spaces
Private parking buildings along ring road 1, with plenty of capacity
Parking spaces too spread out and far away
Double trips: of load-park-walk-do assignment-walk back to car-drive back to job venue to pick up material and tools
Increased time spent in traffic
Increased parking costs that the customer is charged
Parking tickets when parking illegally close to the job site
Improved mobility with bicycle and walking
Longer estimated times for assignments in inner-city Oslo (Interviewees, 2021)
Accesibility within the area of CFLP is reduced traveling with car (Interviewees, 2021)
Increased costs
Road toll for vehicles
Bars, restaurants, shoppingmalls, stores, appartments, toilet facilities, offices
Incentives for craftsmen to contribute to the transformation
Stimulation program purchasing a cargo bicycle
Stimulation program switching to electric cars
Craftsmen dependant of material and equipent suppliers
Dependant on maintenance and service providers as e.g craftsmen
Transport/ delivery service
Material & tools
Public transport
Poor accesibility to van with material and tools when forced to park far away from job site
Gasoline car
Craftmen avoid assignment in the city due to increased costs
Electric car
Cargo bike
Economy
Information accesibility
Project planning& coordination
Craftsmen mobility
Type of vehicle
Cost-efficiency
The car as office, workshop and material storage
Different weather conditions (snow, rain etc)
Distance home to office
Distance from inner-city Oslo to office locations
Distance office to assignments in inner-city Oslo
Health and wellbeing
Framing
Persuasion
Beliefs
Willingness to adapt/ level of influence

7.4 Journey Map

Journey maps visualizes the experience of a person over time and helps to reveal key steps of and experience (Stickdorn, Lawrence, Hormess, & Schneider, 2018). This method will assist me in shed light on the patterns and uncover possible pain points and opportunities for improvement. The journey maps are based on interviews with craftsmen.

The journeys presents the current situation with car-using craftsmen, taking on a service assignment in the inner-city of Oslo



Alternative A

The craftsman drives towards the inner-city through traffic dense streets. He passes one road toll. Speed limit is 50, traffic is going between 20-30km/h. The changed traffic patterns forces him to take prolonging routes to the job site.

Arriving at site.
There are no parking places nearby. The assignment, delivering and mounting 3 counter tops, is estimated to take 45 minutes. The craftsman parks his car on the sidewalk, in front of the customer's entrance and offloads the tools and material.

Having offloaded the material, he begins searching for a nearby parking spot. There are not any commercial parking spaces around the nearest blocks. He continues to check the commercial parking spaces further away. They are occupied by both private and commercial vehicles. That is a pity, because the need for recharging his electric car is high. The only alternative is the private parking garage that is 1 km away from the site. The craftsman walks to the site after parking.

Alternative B

The carpenter drives towards the inner-city from Lysaker to do a service assignment Nedre Slottsgate.

While driving to the site, the craftsman observed available commercial parking spaces nearby. He parks temporarily outside the customer and offloads the tools and material.

After offloading tools and material, the craftsman drives and parks his car at the nearby commercial parking place and walks back to the site.

Alternative C

Two craftsmen sits in are on their way to the CFLP area to do a service assignment.

Arriving at site.
One of the craftsmen begins the service task while the other waits in the car.

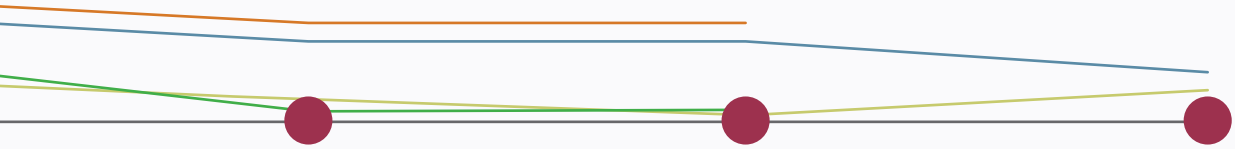
The assignment is estimated to take 10-15 minutes. That is the reason why a colleague was taken a long for the assignment. The collegue drives around the block until the job is done. This, due to the high propability to not find parking spot nearby and the risk, having to park far away from the job site.

Alternative D

The electrician has used ca. 40 minutes from the last assignment at Aker hospital to the next assignment in the CFLP area.

The electrician drives past the nearest commercial parking from the site. Every spot was occupied. He decides to park his car in front of the clients office building. Its only a quick assignment that does not take more than 10 minutes. The tools needed for the job is a foldable ladder and a bigger backpack, containing the essential power tools and supplies for worst case scenarios.

The electrician heads up to the clients office on the 4th floor.



While working, the craftsman realizes that the pliers are left in the car that are needed for getting the work done.
The craftsman has no other option than to go back to the car to pick them up and returning to completing his assignment.

The assignment is completed. It was initially estimated to take 45 minutes, but took almost 2 hours, due to the extra trip back and forth to the car.
The craftsman returns to his car in the parking building and drives back to the job site to pick up his tools. There is a lot of traffic, prolonging the transport from the parking back to the customer.
The customer is charged with the parking fee, adding several hundred kroners extra to the bill.

The craftsman onloads his tools and continues to the next appointment, after adjusting his schedule with planned appointments that must be postponed due to prolonged time caused by parking and mobility issues.

While working, the craftsman realizes that the jigsaw is left in the car that is needed for getting the work done.
The craftsman picks up the wanted jigsaw, taking just a couple minutes.

When the assignment is completed, the craftsman walks after his car and returns to the site to pick up his tools and the waste from the construction materials that he had used.

The craftsman onloads his tools and continues to the next appointment.

While working, the craftsman realizes that the pliers are left in the car that are needed for getting the work done.
The craftsman calls his colleague, who quickly delivers the pliers.

When the assignment is completed, the craftsman is picked up by his colleague and are thereafter off to the next assignment.

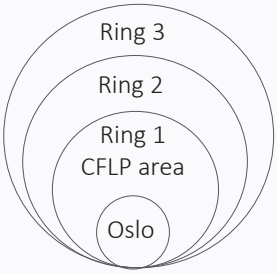
While working he realizes that the assignment will be completed in record time. It was not as complicated as first anticipated.
The assignment took 5 minutes.

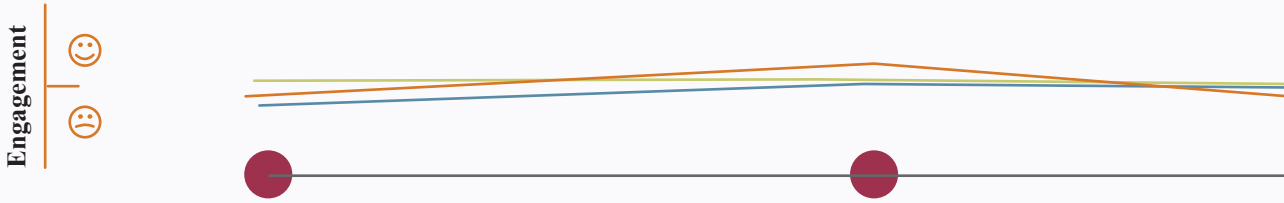
He heads down to his car. As he glanced at his car, he could see a familiar yellow note, a parking ticket, fastened on his windshield wiper.
The 5-minute assignment cost him 900 kroner.

He returns to the office and shares his frustration, discussing the politics of the inner-city parking situation with his colleagues.

Craftsmen taking on assignment in the CFLP area by bicycle from office locations between ring road 1 and 3.

The journey maps illustrates scenarios of craftsmen, using cargo bicycles, inspired by the interviews that was conducted with craftsmen.





Alternative A

It is sunny weather in May. The craftsman is starting his trip to the scheduled assignment in the CFLP area from the office location at Skøyen. The craftsman loads his tools and material in the front carrier of the bicycle.

Arriving at site.
The craftsman calls the client to hear if there is space to park his bicycle in the back yard. He parks his bicycle in the inner yard after getting an ok from the client and takes his tools and heads inside and starts working.

Alternative B

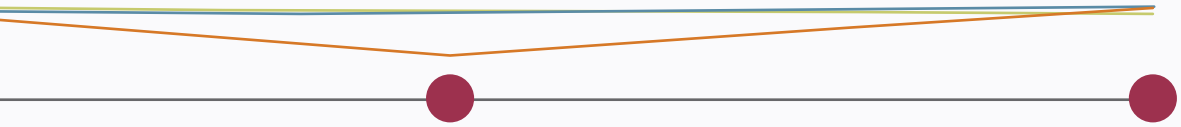
It is rainy weather in May. The craftsman is starting his trip to the scheduled assignment in the CFLP area from the office location between ring road 2 and 3 with his cargo bicycle.
The assignment includes mounting and assembling three bigger cabinets.
The craftsman packs his tools on the bicycle. The material for cabinets is not possible to transport with a bicycle, and it requires two persons to carry the heavy material. In this case, the company has a logistics guy who is responsible to transport the required and ordered material to the sites at planned dates and times with an electric van.

Arriving at site.
The craftsman meets the company's logistics guy at the site. The craftsman parks his bicycle outside the client, leaving plenty of space for pedestrians. They offload the material and tools and carry it to the 4th floor in an office building. The craftsman begins to mount the cabinets as the logistics guy continues to his next delivery.

Alternative C

It is winter. The electric cargo bicycles are equipped with studded tyres and the craftsmen are dressed accordingly. The craftsman is starting his trip to the scheduled assignments in the CFLP area from the office location at Grunerløkka.
The assignments for the craftsman are three in total, of which two are in the CFLP area and one at Holmenkollen ski jump museum.
Knowing that using a bicycle in the CFLP area and within ring 1 and 2, he will save time and money, he packs his tools in the bicycle carrier and cycles of towards the first assignment.

Arriving at first client. The craftsman parks his bicycle outside of the job site, the client's restaurant.
The jobs take only 20 minute and heads of to the next assignment, that is seven city blocks away. The trip does not take more than 10 minutes.



After 2 hours, the assignemt is completed and the craftsman gathers his tools on his bicycle.

Craftsman returns to the office.

After 4 hours, the assignment is almost completed, and the craftsman calls the logistics guy to come and pick up waste and materials from the old and used de-assembled cabinets.

When the waste is gathered and tucked in the van, the craftsman continues, with his bicycle and tools to his next appointment that is four city blocks away. The next assignment does not require any transportation of heavy materials or waste.

The next assignment is at Nedre Slottsgate that has good bicycle parking racks, where the craftsman parks his bicycle. During the task, the need for special tools, that the craftsman does not have, became apparent. It was impossible to continue without them. The alternatives were either to bicycle to the nearest hardware store and buy them, rent the tools and have them delivered to the site or bicycle back and forth to the office to pick them up.
Every option was too time consuming, so the solution was to leave the task half-finished and continue the next day, when all the necessary tools were at hand.
The craftsman returns to the office with his bicycle and onloads his tools to his van and drives towards his last assignment at Holmenkollen.

The last assignment at Holmenkollen is done by car, due to the eight 2X4's that is needed for the assignment and the distance, making it too difficult to do using an electric cargo bicycle. The craftsman finishes his task and heads back to the office.

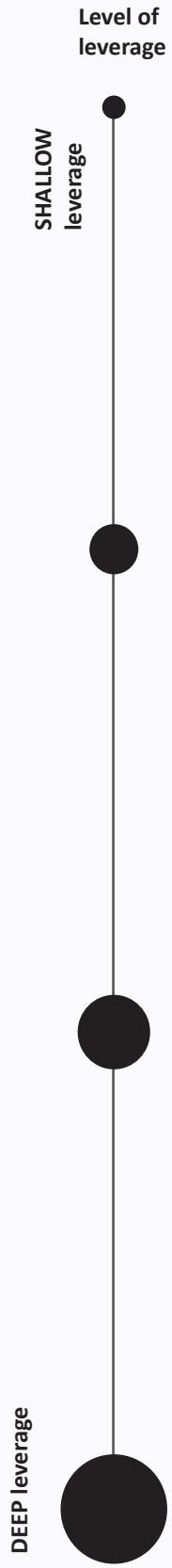
Understanding the System

7.5 Iceberg Model and Levels of Leverage

"Folks who do systems analysis have a great belief in "leverage points." These are places within a complex system (a corporation, an economy, a living body, a city, an ecosystem) where a small shift in one thing can produce big changes in everything" (Meadows, 1999).

The Iceberg Model is a core element of systems thinking that portrays the connection between the hidden mental models and systemic structures with the visible patterns and events. The connection between the categories have dynamic relations, were the mental models influence how the systemic structures are applied, which in turn are established and mirrored through patterns, behavior, and events (Monat & Gannon, 2015).

When regarding human designed systems, the structure is based more on designed and planned actions rather than naturally self-organized structures that emerge from the interactions in the system. Therefore, it is essential to recognize that event and patterns derive from the systemic structure and mindsets, and for to understand the behavior and patterns, one has to understand the causing and underlying reasons in the designed structures and mental models (Monat & Gannon, 2015).



System levers
(Meadows, 1999)

•Constants, parameters, numbers (such as subsidies, taxes, standards)

•The sizes of buffers and other stabilizing stocks, relative to their flows.

•The structure of material stocks and flows (such as transport networks, population, age structures)

•The lengths of delays, relative to the rate of system change

•The strength of negative feedback loops, relative to the impacts they are trying to correct against

•The gain around driving positive feedback loops

•The structure of information flows (who does and does not have access to what kinds of information)

•The rules of the system (such as incentives, punishments, constraints)

•The power to add, change, evolve, or self-organize system structure

•The goals of the system

•The mindset or paradigm out of which the system, its goals, structure, rules, delays parameters, arises

•The power to transcend paradigms

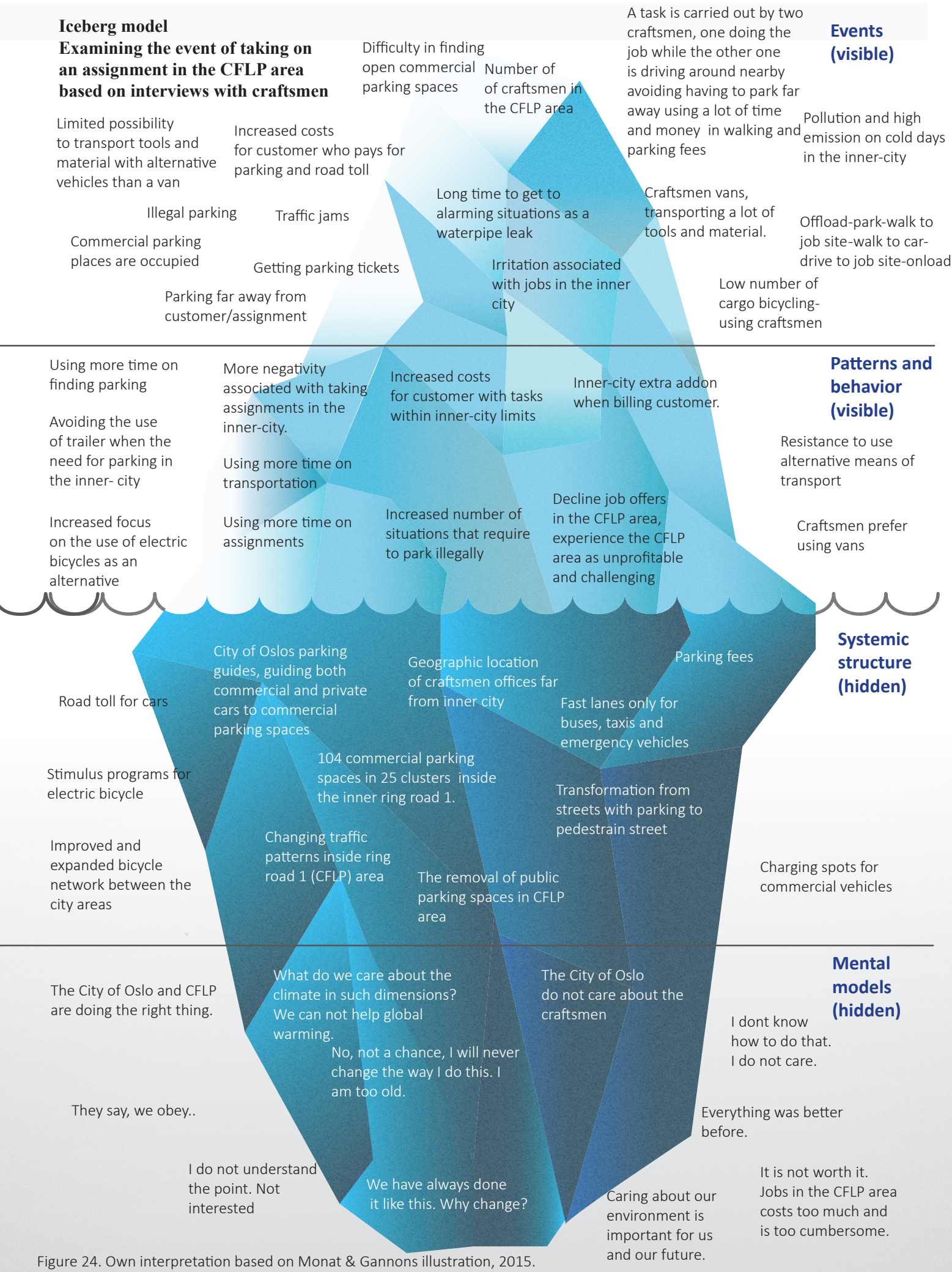
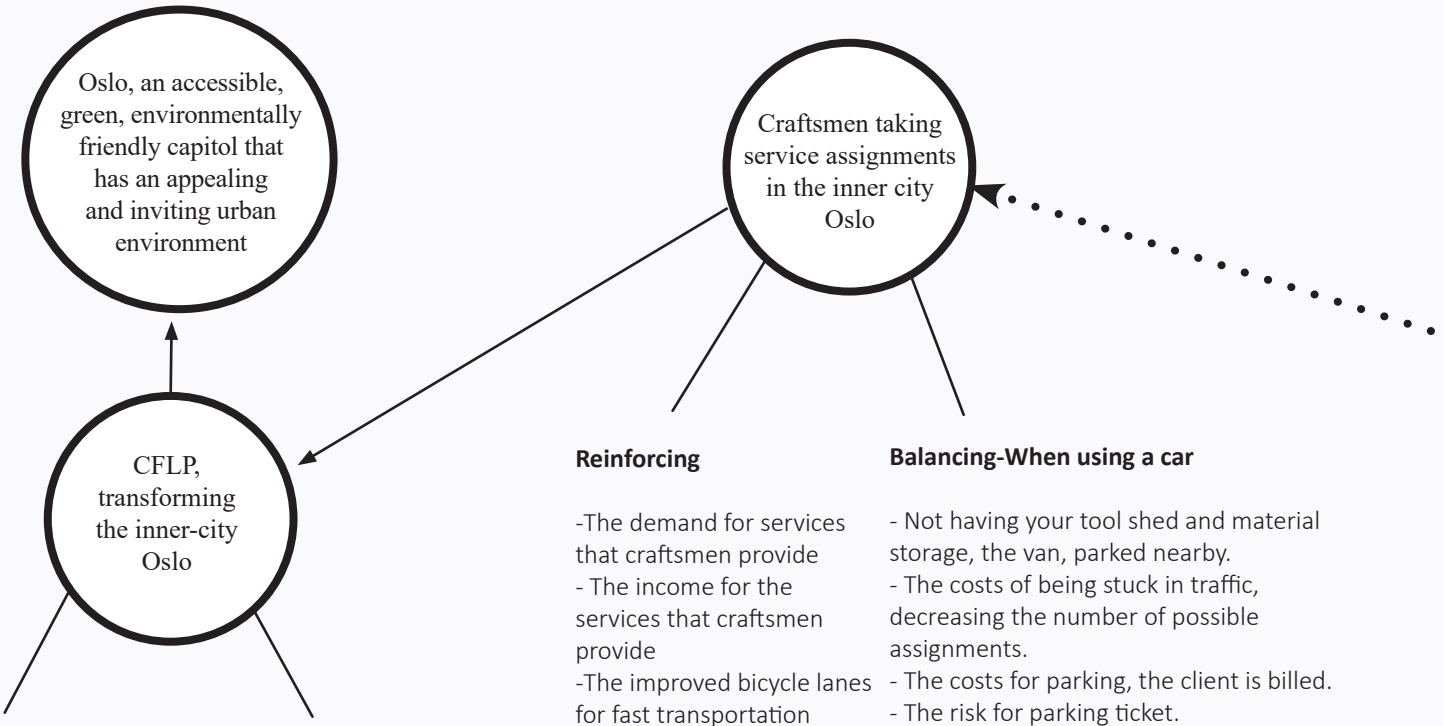


Figure 24. Own interpretation based on Monat & Gannons illustration, 2015.

7.6 Finding Systemic Challenges and Opportunities



Reinforcing

- Politically initiated
- Majority of the people of Oslo are positive to CFLP and its goals (Sweco, 2019).
- The removal of parking spots and transforming the streets to car-free pedestrian areas with city furniture (Oslo kommune, 2018).
- Lower emissions in the city as result of the zero-emission strategy in Oslo (Klimaetaten, 2020).
- Improved bicycle network (Oslo kommune, 2018).
-Stimulation programs for craftsmen to buy electric cars and bicycles.
- New traffic patterns, making it deliberately difficult to drive in the inner-city for to facilitate for a better urban environment (Oslo kommune, 2019).
-Positive media coverage regarding CFLP (Sweco, 2019).

Balancing

-The resistance by people or groups of different trade representatives that do not share the same view and desire as the City of Oslo
-Negative media coverage regarding CFLP (Sweco, 2019).
-Lack of information about the ongoing CFLP actions
- The lack of good facilitation in assisting its sub-systems in a possible transition can increase the opposition.
-Car reliant people are more dissatisfied with the traffic patterns and parking possibilities (Sweco, 2019).

Reinforcing

-The demand for services that craftsmen provide
- The income for the services that craftsmen provide
-The improved bicycle lanes for fast transportation between city areas, if using a bicycle.
-If you have and can afford an “on call” driver making the assignments more convenient and faster.
-Some craftsmen can experience a decrease in competition due to other actor declining jobs

When using a bicycle

-Having the company structure revolving around the bicycle can have an advantage and reinforcing effect (interviewee 3, 2021)
- Faster transportation than using the car (interviewee 3, 2021)
- No problem with parking (interviewee 3, 2021)
- More time to being a craftsmen than sitting in a car stuck in traffic (interviewee 3, 2021)
- Money saved (no parking, toll or gas) (interviewee 3, 2021)
- Good exercise, social sustainability.

Balancing-When using a car

- Not having your tool shed and material storage, the van, parked nearby.
- The costs of being stuck in traffic, decreasing the number of possible assignments.
- The costs for parking, the client is billed.
- The risk for parking ticket.
- Road toll.
-Not allowed to drive with trailer in some of the private garages.
-Traffic patterns that create bottlenecks
-Only 104 commercial parking spots that are usually occupied and not nearby (Bymiljøetaten, n.d.).
- The risk for having to use time on offloading, finding parking and then walking back and forth to the job site from the parking.
- The height limitations in parking garages, preventing higher vans than 2m-2,3m to enter (Interviewee 4,2021).
- Limited charging possibility.
- The lack of having an application that would inform you the parking status in the CFLP area.
-Emission free areas, meaning that car using craftsmen are forced to invest in changing to emission free vans (Oslo kommune, 2020C).

When using a bicycle

- Negative if having long distances between office, CFLP area and other assignments in the Oslo area.
- Requires transport service of material and equipment that is not possible to transport by electric cargo bicycle.
-Weather conditions
-Physical limitations to bicycle
-Mental models that functions as a barrier to use a bicycle

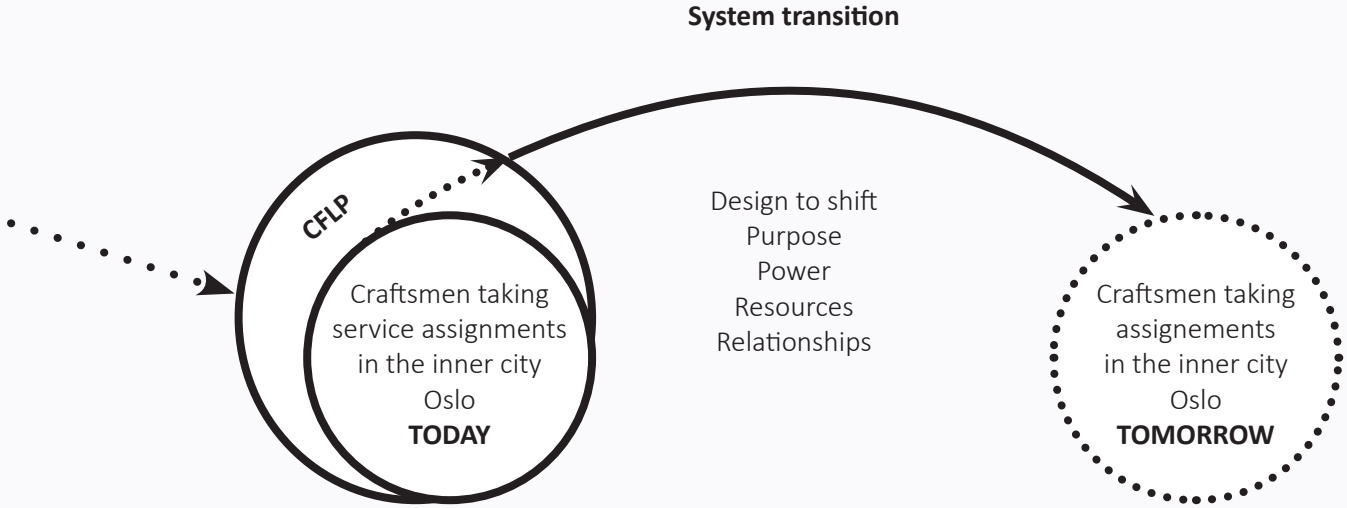


Figure 25. Design for system transition. Own interpretation based on Winhall & Leadbeater, 2020.

Winhall & Leadbeater (2020) suggests the four categories under, to be the design material when aiming for a system transition. I find the suggested categories helpful as tools when investigating possible leverage points.

Purpose
Reframe the challenge that system is addressing, its mission and so its method.

Power
Create structures that change who have power over decisions, rules, legitimacy, flows of resources or information.

Resources
Make new resources from inside and outside the system, part of meeting the challenge-
people, money, knowledge, and technology.

Relationships
Catalyse new, generative relationships between existing and new actors in the wider ecosystem.

Tollbugate, May 2021.

No parking,Prinsens Gate May 2021.

Myntgata, May 2021.

Revierstredet, May 2021.

8. Insights

8.1 From a Macro Perspective

Finding greener alternatives is highly relevant within many trades and car-free cities is an ongoing discussion in several of the largest cities in the Nordic countries (interviewee 8, 2021). This is connected to the focus on facilitating for a better future through sustainable and environmentally friendly efforts as Norway is committed to achieving its emission reduction targets under the Paris Agreement (Regeringen.no, 2021). The government intend to reduce emissions and enhance removals of CO2 in a way that transforms Norway and promotes green growth. The main tools to reach the goals are information spread on climate-friendly options, regulatory measures, taxation of greenhouse gas emissions, climate-related requirements in public procurement processes, financial support for the development of new technology, and initiatives to promote research and innovation (Regeringen.no, 2021).

8.2 The CFLP System

The City of Oslo's urban development strategy and the Car-Free Livability set demands and applies a framework for all its sub-systems, including the craftsmen. The CFLP strategy is to turn the car revolving urban and city design philosophy upside down, focusing on pedestrians and cyclist. The CFLP system goals include a better urban environment, green mobility, better public transportation, and lower climate pollution (Oslo kommune, 2018A). The City of Oslo is as interviewee 1 (2021) illustrates "Shooting with all the canons at the same time" creating a setting where there are many new challenges for the craftsmen going on simultaneously, hindering an ideal workflow and efficiency when taking on assignments in the CFLP area.

There is a complexity revolving commercial parking and traffic patterns within the CFLP area, that can have many opinions depending on perspective one sheds light on the topic. Hence, the possible number of problems in the interrelated systems regarding craftsmen's issues when taking assignments in the CFLP area.

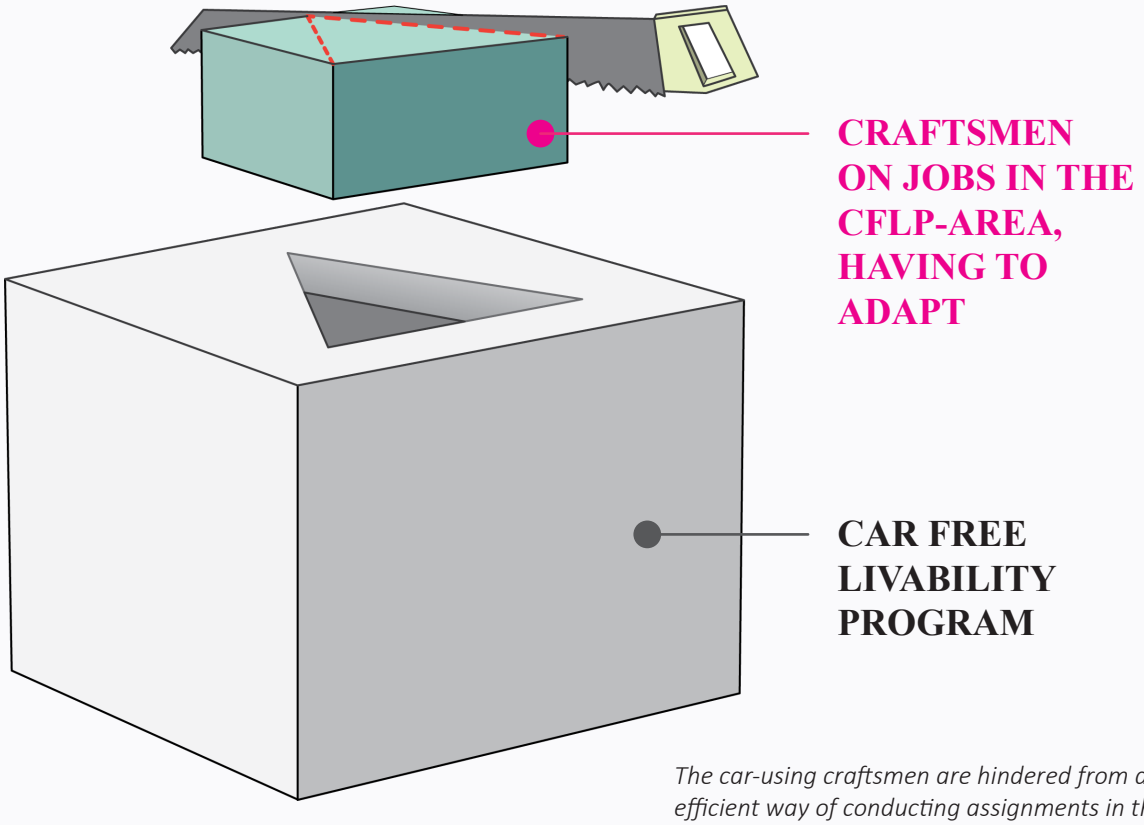
One could try to fix all the problem through addressing the symptoms, but doing so, without addressing the underlying and invisible causes will not fix the problems, and might have a counter effect, influence other connected entities. From a system thinking perspective, we can see how solutions often feedback to create other problems, or even a repeat of the same problem. So, systems can be nested within systems and therefore, there can be system purposes within other interrelated system purposes (Narberhaus & Sheppard, 2015). To present possible areas in where to intervene the systems that has best potential in changing the systems for the craftsmen within the CFLP area, it is important to view the problem from different perspectives and address the right underlying root causes for the problem.

8.3 Status Today

The car-using craftsmen's discontent towards the current situation is based on the changed traffic patterns and the removal of public parking spaces, making it challenging to find nearby parking and making it time consuming to use a car in the city center (interviewees, 2021).

The changed traffic patterns have made driving cumbersome and slow. The "fast lanes" routes connecting the north-south and west-east Oslo in the inner-city are for public transportation only. This restriction forces private cars use the ring roads or the tunnel system (Oslo kommune, 2020B). There is also a possibility that craftsmen follow old habits and break the rules therefore. Interviewee 2 (2021) indicated that it is impossible to follow all the traffic signs today, doing service assignments. It was pointed out that many craftsmen have to use public transport routes and drive through areas where the sign says "permission for delivery transport only" even though they are not delivering anything.

Parking is a major concern when conducting assignments in the inner city with cars (interviewee 4, 2021). It is highly desirable to have easy and nearby access to the car, that functions as the tool shed and material storage. The van is also the office and place for lunch breaks for many craftsmen (interviewees 1, 2021). Therefore, is the van an important everyday essentiality, that offers the most efficient and convenient way of transporting oneself and all the equipment when doing



The car-using craftsmen are hindered from an efficient way of conducting assignments in the CFLP area due to CFLP system structure.

service jobs (interviewee 1,3,4 and 6, 2021). Now, craftsmen struggle to find nearby parking, if not a private parking garage/facility happens to be next door to the assignment (interviewee 1,2021). 69% of the commercial parking user are under the impression that the offering of commercial parking has become worse compared with the situation two years ago (Sweco Norge, 2019, p. 149). Even though the City of Oslo has stressed the importance of having good and adequate commercial parking in the CFLP-area (Oslo kommune, 2020, p. 36), the Sweco survey concluded that it is difficult to find open commercial parking spots , whereof 1/3 of the parked cars in commercial spots were private cars without permit (Sweco Norge, 2019, p. 142). The private parking facilities are often the only reasonable option as the public parking spots are removed and the clustered commercial parking spots are often occupied or too far away (interviewee 2, 2021).
The private parking facilities have capacity and offers a good number of parking spots that are situated near the inner ring road 1 (Oslo kommune, 2019B). However, the private facilities are often more expensive and have varying height limits, spanning from two meters to above three meters. This limits the possibility for higher cars to enter, forcing craftsmen using bigger vans or vans with material, fastened on the roof to seek other private or commercial parking with suitable height limits (interviewees 1 & 4, 2021).

One of the main problems according to the car using interviewees is the time spent on finding open commercial parking spots or driving to private parking facilities, and then transiting from the parking, back to the job site, and then back to the parking has become frustrating (interviewees 1,2 3,4,5, 2021). According to interviewee 2 (2021), the time usually takes about 30 minutes to drive and find a parking spot in the city. Then the time to run back and forth from the parked car to the job takes between 5-15 minutes with all the equipment. This meaning that the steps for getting to the job site are time demanding especially for service

assignments that most often is done in 15 minutes. The Sweco survey (2019, p.145) shows that 72% use 5 minutes or less on walking between parking and jobsite, whereas 11% uses 6-10 minutes an 16% use more than 10 minutes.

8.4 Car Using Craftsmen from a Meso Level Viewpoint

When analyzing the car using craftsmen from a meso level, one might question if the craftsmen's parking and traffic issues are alarming problems for the City of Oslo and the CFLP. Is there an interest to mitigate the possible consequences of a decreased craftsmen service? The City of Oslo's interest lays on serving a wide range of needs and desires of all stakeholders, connected to the CFLP transformation, being a multifaceted and complex challenge where compromise is a key factor to achieve the goals. The document, Handlindsprogrammet for økt byliv i Oslo sentrum 2018-2027 describes the transport and mobility solutions as strategic decisions that emphasizes on increasing livability and the value of experiencing the inner-city as a green urban and people friendly environment. One can also interpret the current situation with strategically decided traffic patterns and commercial parking as a desired system structure to reach the goals. Ambitious plans demand drastic measures.

The craftsmen are connected to the livability of Oslo, them being a part of an important service and maintenance segment that are prerequisites to many functions and basic needs for the inner-city Oslo's community wellbeing. The questions lay in how resilient and flexible the level of livability can be and how much one can constrain the craftsmen, without it having visible and negative consequences for the inner-city living environment.

This illustrates the potentially risky "squeeze" that both the car using craftsmen and the systems connected to livability are put in. However, it seems based on Oslo kommune (2020), that the politics of reaching the CFLP goals and the "squeeze" is necessary from a CFLP perspective, applying pressure to the connected entities to accept and follow the common goals of CFLP.

The craftsmen's limited possibilities to park their vans outside or at least nearby their assignments in the CFLP area does not seem like a high priority topic in the parking facilitation of service providers. In comparison to the spread and number of nearby street level handicap parking spots, the commercial parking clusters are not as integrated and widely spread in the urban environment. The priority level can also be seen from a supply- demand and adaptability perspective of the craftsmen. The craftsmen are service providers in Oslo, who contribute with important skills to maintain the level of convenience and safety through their services for their clients. The demand of craftsmen services will not disappear as long as people want to live, work, visit, have offices, stores, malls, restaurants, and other facilities that are reliant of the services by craftsmen. The craftsmen will most likely adapt to new situations if the cost-benefit calculations land on the plus side, being profitable. The key word is cost-efficiency. For some craftsmen businesses, the new CFLP setting with the parking has caused an unprofitable and cost-deficient situation, who have chosen to decline jobs in the inner-city (Riaz, 2020). Other companies have solved this by an inner-city, CFLP compensatory addon as an extra payment, billing the client for lost time and extra parking costs (interviewee 1, 2021). This might lead to a risk of discrimination of the customers, making the inner-city an area where craftsmen services cost more (interviewee 1, 2021). The craftsmen operate with small margins, meaning that time is money and the time spent on other than billable actions are undesired (interviewee 3, 2021). This is also connected to the level of profit margin that the craftsmen see as acceptable. Interviewee 1, (2021) shares the concern of craftsmen companies that are uncertified and/or registered in other countries or having employees that are accustomed to other national salaries, forcing the profit margins to an unsustainable level.

8.5 Bicycling craftsmen from a Meso Level Viewpoint

Using electric cargo bikes divides the craftsmen. Some craftsmen are positive, embracing the efficiency and money saving aspect of using them, while other cannot imagine doing their daily work without a car (interviews, 2021). Regarding transportation by bicycle, one can there are leverage points, but considerably more entangled in different prerequisites.

The CFLP, promotes green transportation through expanding the bicycle network and having stimulation programs for craftsmen to buy and use electric bikes, is already working with a change that is desired to influence both mindset and behavior. There are many positive sides with using bicycles. It is faster to use a bicycle in the inner-city area (interviewee 3, 2021). From a climate and emission perspective, using a bike is the most desired alternative. Using a bicycle also removes the problem with nearby parking. Parking outside the job sites has never been a problem for craftsman

using a cargo bicycle since 2016 (interviewee, 2021). However, using bicycles has many barriers and sets a lot of prerequisites to be able use bicycle in an efficient manner. Some of the biggest challenges with bicycling are the long distances and material transport. The material transport varies between the trades. Plumbers, for example have a lot of heavy equipment that also requires space. Carpenters transport interior installations and furniture, that are easiest to transport by a van (interviewee 1,2021). However, there is also smaller service assignments and site visits and inspections that do not require the space of a van. A cargo bike with bigger toolbox can transport the essentials (interviewee 4,2021).

Long distances are not cost-efficient if using a cargo bike. As interviewee 2 (2021), points out, "It is simply not sustainable to use so much effort and time in bicycling long distances if there are no big advantages in it." If the core area of business is limited to bicycle friendly distances, for example the inner-city of Oslo, the mobility and accessibility by bicycle is much faster and better than using a car (interviewee 2, 2021). This implies also that the office and workshop is in the same geographical area as the clients.
Using a bicycle demand also a strong and determined mindset, which can be cumbersome while tackling for example weather conditions. Using a bicycle also requires coordination and careful planning of the transportation of equipment and material that is not transportable by an electric cargo bicycle (interviewee 3, 2021).

From a cost-benefit perspective, comparing an electric van and an electric bicycle, the convenience and practicality in a van, providing fast transport, shelter and warmth, and storage for tools and material and without the need to plan and coordinate deliveries of material, the van will come out as a winner. Even though electric cargo bikes are nice to have, the van is a better all-round tool regarding the variety of places, assignment and material craftsmen have to consider in their trade (interviewee 2, 2021).

However, if the current cumbersome situation with craftsmen, being prevented of parking their vans nearby, is not on a list of planned changes in the near future, the bicycle alternative might tempt some craftsmen, especially regarding the stimulation programs for acquiring cargo bicycles and the expansion of the bicycle road net (interviewee 2, 2021). In their list of action, the City of Oslo points out that the city shall facilitate climate-friendly innovation and restructuring through close collaboration between the municipality and the city's business community, researchers, organizations, and residents (Klimaetaten, 2020). An addition to this is the Oslo city councils-initiated plan of transforming the inner-city to a fully emission free area in the coming years (Berg, 2021).

Using an electric cargo bicycle is entangled to multiple prerequisites that demands possibly more than economic incentives to get more craftsmen using a bicycle. One of the biggest obstacles is the craftsman and her subjective point of view and the fact that the van is still a good option and more attractive and convenient way of transport when doing service assignments in the inner-city and CFLP area (interviewee 1, 2021).
The system could be altered on a structural and rule setting meso level to communicate, re-frame and create incentive for a changed approach and mindset for using alternatives to the car in the CFLP area. A reason for this is according to interviewee 3 and 4 (2021), is the City of Oslo's poor effort to promote, create interest and demand for alternatives to the van. A possible solution could according to interviewee 3 (2021) be an information channel with a focus on craftsmen that informs and promotes. The City of Oslo could benefit from having accessible information, presented through animations or similar to get everyone to understand, and involved, both the Norwegian craftsmen and the craftsmen with other nationalities working in Norway (interviewee 4, 2021).

8.6 From a Micro Level Viewpoint

The ongoing CFLP transformation has forced the craftsmen to alter their accustomed way of doing things, regarding nearby parking and orientating in the inner-city. There is a discrepancy between craftsmen's perceived state and the desired state. Many of the car using craftsmen associate the assignment in the inner-city CFLP area with irritation due to the parking situation and traffic patterns in the CFLP area.
The CFLP system structure, instructs the behavior and sets boundaries to the craftsmen's desired state. This, however, is reliant that the craftsmen's mental model, is open for pursuing a desired state through following the CFLP structure. Changing (craftsmen's) mental model can be a difficult task to do (Meadows,1999). It determines the behavior and actions in how the craftsmen tend

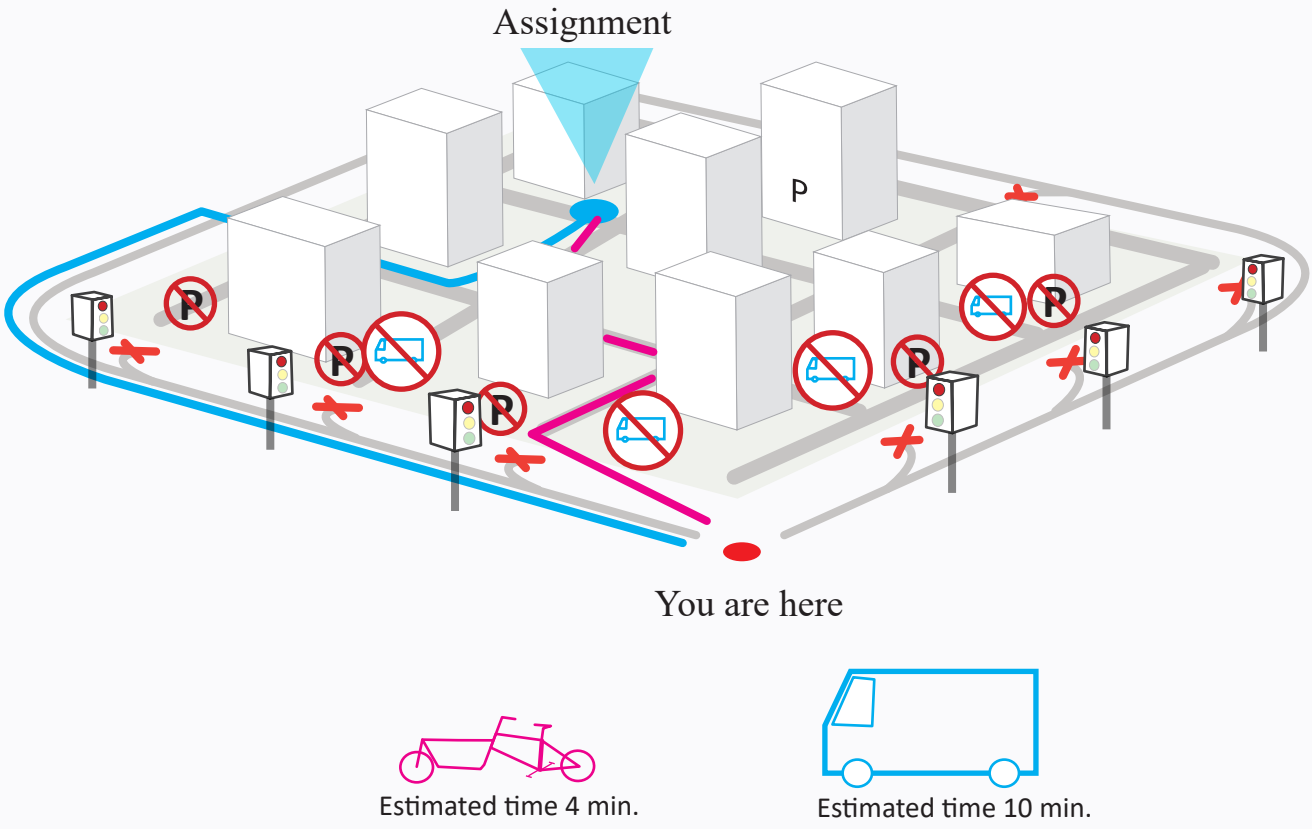


Illustration over the frustration that the car using interviewees experience the inner-city Oslo.

to relate to the system structure. The mental model is embedded to the way we see our side of the story and the cognitive bias adds blinders to see it from other perspectives. Having been accustomed to rules, processes and business strategies based on it, it can be difficult to adapt to a new updated set of rules and guidelines. As the interviewee 4 (2021) pointed out, "craftsmen are not lazy, but we might be too comfortable in the way we are accustomed to do things, we are a bit narrow-minded". Interviewee 7 (2021) pointed out the possibility that the craftsmen's subjective understanding and habits might portrait a more negative picture of the parking situation in the inner-city, than it is in reality. The craftsmen are used to certain patterns, and now when the structure is changed, they need to familiarize with the changes, which naturally take some time to adapt to. The cognitive bias, personal framing and epistemological feedback process emphasizing on using system 1 can be connected to the comment, suggesting that craftsmen go on auto pilot and address the challenges with the knowledge they have, trying to continue with the accustomed ways as far as possible. "We know a tremendous amount about how the world works, but not nearly enough. Our knowledge is amazing, our ignorance even more so" (Meadows, 1999).

There are, however, craftsmen, who have transformed and adapted their business to fit better into the systemic structure of the CFLP program, changing mental models to see the systemic structures as possibilities rather than obstacles.

8.7 Closing Thoughts

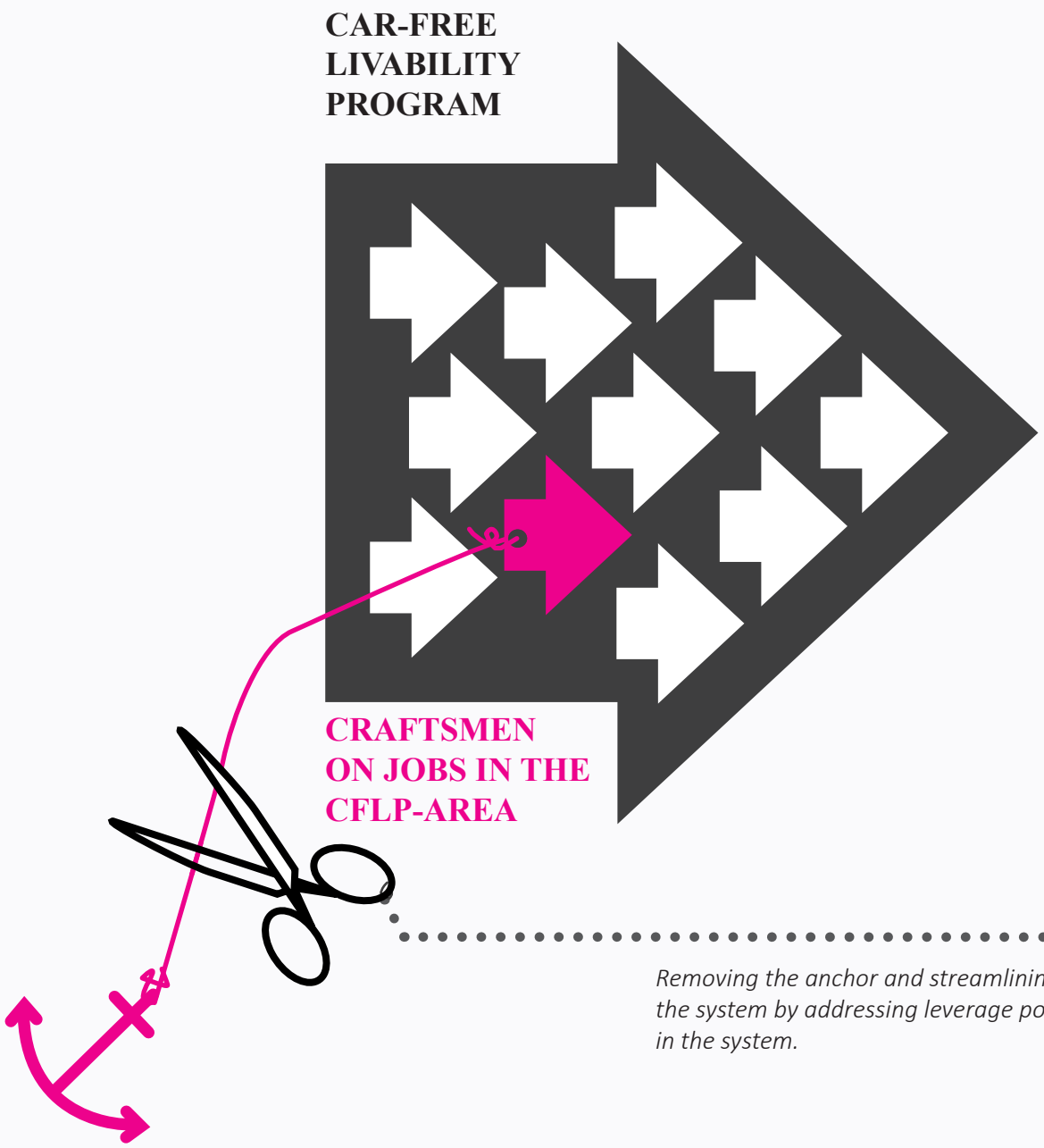
The systems, the craftsmen and CFLP and their components, see their side of the story. They are trying to achieve their desired goals to the best of their knowledge. It depends on the perspective and with the epistemological foundation you do it with. A number of car-using craftsmen have experienced the deteriorating effect of the CFLP transformation and its system structure, choosing to decline jobs in the CFLP area while some bicycle using craftsmen are pleased with the accessibility and speed that the bicycle offers, but are reliant of having a nearby location to their clients (Interviewees 1&3, 2021).

The CFLP systemic structure and its "game changing" effects comparing with mobility and parking possibilities prior to initiation of the CFLP has led to decreased profitability for car-using craftsmen, resulting in irritation and decrease of interest of the CFLP area. This is also because of the mindsets and rigidness of the subsystem, the craftsmen, that is preventing the needed flexibility and adaptability. Furthermore, has poor mitigating measures and low facilitation of good options from the City of Oslo and the CFLP, helped the situation.

The CFLP transition has caused an oscillation between the subsystem and CFLP system, where the craftsmen are forced in finding a way to integrate and adapt, decreasing the vibration, and aligning with the dominating CFLP systemic structure. The current situation is not sustainable for a number of the car-using craftsmen (interviewee1, 2021.) The answer may lay in altering both systems through concepts that address the challenges through providing flexibility to the systemic structures. A wider range of possible ways to conduct assignment in the CFLP area could benefit both systems. This can be accompanied with the policy makers facilitating and embracing the alternatives that can mitigate potential system oscillations with for example stimulus programs or other promoting or collaborative measures. It is about combining forces. A criteria is to elicit interest and interrupting the current view of reality, questioning assumptions and shedding light on alternative behavior and knowledge, nudging, as Kahneman (2011) described, "automatic" system 1 thinking towards reflective system 2 thinking.

As Klimaetaten, 2020, referring to the climate ambitions which are included in the CFLP, "City life doesn't just happen on its own. It is created through good cooperation between private, voluntary and public actors". This underlines the importance of developing system structure that benefits not only the CFLP system both also the craftsmen and their goal.

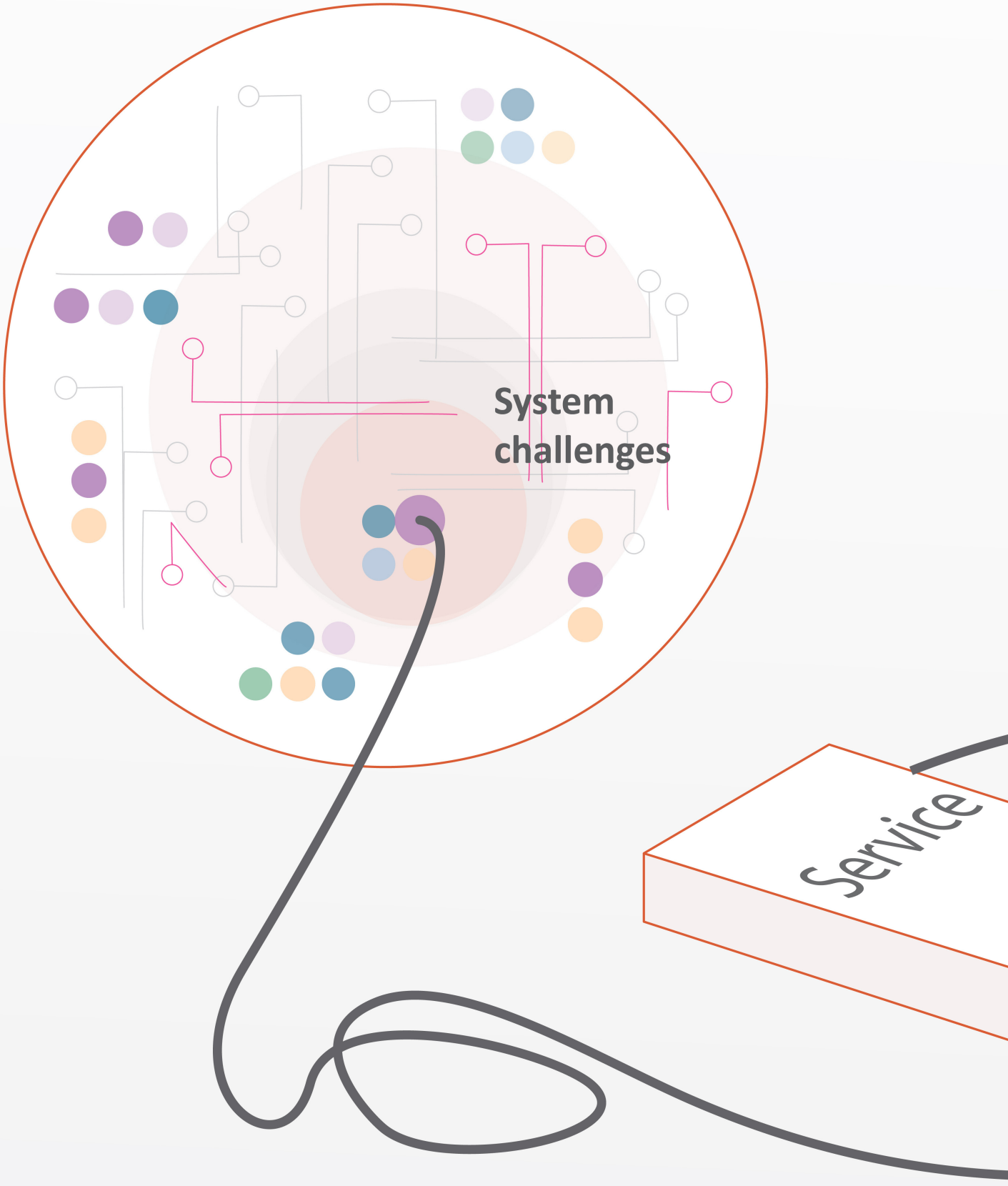
8.8 Insights - Intervention Points



Removing the anchor and streamlining the system by addressing leverage points in the system.

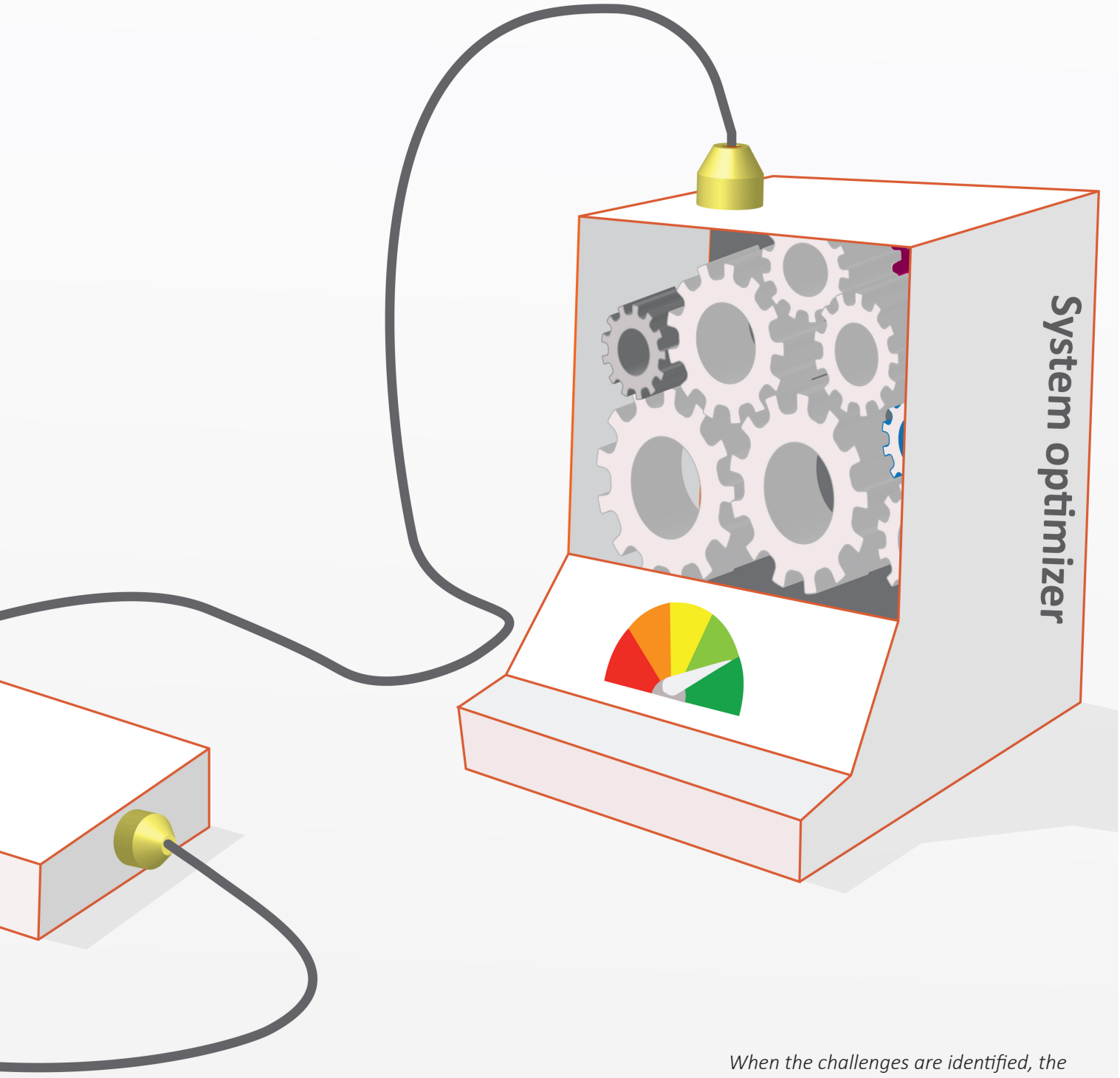
Intervention points in the systems for making a change towards a joint effort to achieving both system goals for craftsmen and the CFLP area.

- Increase flexibility in the craftsmen's system and the CFLP system
- Contribute to fixing the delays in the system regarding traffic and parking.
- Create "we" spirit and let the interested craftsmen in on the planning process.
- Bridge silos. Facilitate new arenas that generates emergent and new fruitful interrelations, both physical and relational, to solve or obsolete the parking and mobility issues for craftsmen in the CFLP area. Brake cognitive bias, through differentiating the relationships, opening for new things and relationships.
- Facilitate easy accessibility to tools and material under CFLP area assignments.
- Incentivize behavior and thinking that promotes new ways to achieve craftsmen's goals in the CFLP area.
- Create interest by demonstrating value. New resources from people, money, knowledge and/or technology.
- Interrupt the current view of reality and question assumptions and beliefs. Shed light on alternative ways. Expose craftsmen for situations of compromise.
- Facilitate for better framing and communication channels between craftsmen and the City of Oslo/CFLP to make the invisible, visible, mitigate possible frustration and promote pro-activity amongst the craftsmen.

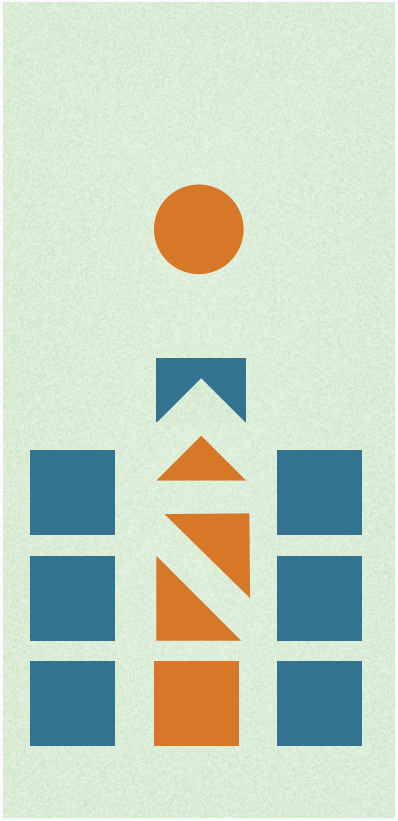

System
challenges
Service

Part 2 - Changing the System

In part 1, the systems, their goals and challenges are identified. In part 2, the insights are processed further to concepts that have the potential to change the systems.



When the challenges are identified, the system optimization can be targeted.



Changing the system

9. Illumination

In this phase, the insights and sensemaking from the prior phases are developed further. The aim with the illumination is to shed light and develop ideas with the most promising systemic impacts through an ideation process to answer the research question. As Drew (2020) points out, designers practice *synthesis*, which is to investigate how elements fit together and create a whole consisting of many sub elements. Synthesis: the act of combining different ideas or things to make a whole that is new and different from the items considered separately (Cambridge Dictionary, 2021).

The ideation process has been an iterative an ongoing throughout the whole project time.

The methods for gaining quantity and diversity of the ideas, was through presenting "how might we fix this" questions to the interviewees. The insights from the findings, intervention points, journey maps, system relation map and iceberg model has also triggered ideas.

Comments and reflections from steakholders answering *how might we fix this* question

I would have thought that clients would be more interested in contributing in green thinking by favorising craftsmen that uses cargo bicycles (interviewee 2, 2021).

A cargo bicycle is not a problem if you have you assignments within cycle friendly distances and the bicycle is good (interviewee 2, 2021).

If the City of Oslo wants us to use electric vans, then we need to have more charging possibilities, otherwise it is no point (interviewee 2, 2021).

Potential in digital and smart technology (interviewee 7, 2021).

Use the existing possibilities that are in the inner-city today, for example taxis etc. (interviewee 7, 2021).

Get craftsmen to use cargo bicycles (interviewee 3, 2021).

Two commercial parking spots in for every apartment building or having a certificate, placed in the car, saying that its an ongoing service assignment, giving you the permission to park outside the assignment(interviewee 5, 2021).

Craftsmen's certificate, giving permit to only certified craftsmen to use public transport routes, commercial parking and gaining road toll reduction (interviewee 1, 2021).

The City of Oslo should invest in informing and communicating car-free alternatives to craftsmen (interviewee 3 & 4 2021).

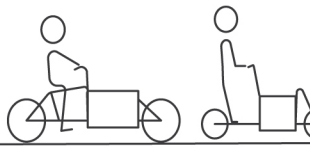
Craftsmen's taxi for craftsmen and their equipment (interviewee 1, 2021).

The CFLP has done it more expensive for the client, who pays for our parking and time spent searching for parking. The best way is to let us park outside of our assignments (interviewee 4, 2021).

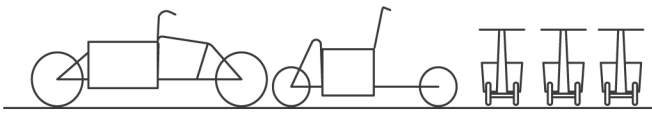
The ideas presented in this part are hypotetical propositions and presents a number of ideas that has been considered.

Offer the fastest way of transportation in Oslo to craftsmen by providing a customized cart without seats. This could give the craftsmen using cargo bicycles and cargo scooters an advantage in accessing different city areas quickly.

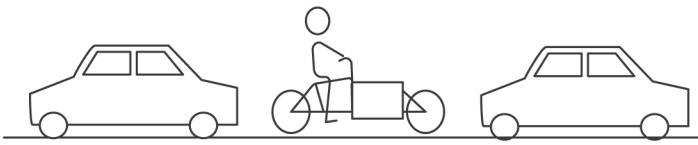
Having the City of Oslo coordinate a marketing campaign focusing on the craftsmen's companies in the Oslo region to focus more on car-free alternatives.
-Craftsmen's services could be partly subsidized if the services are done car-free (incentivizing the public to desire car-free services)
-Car-free marketing through webpages both through the



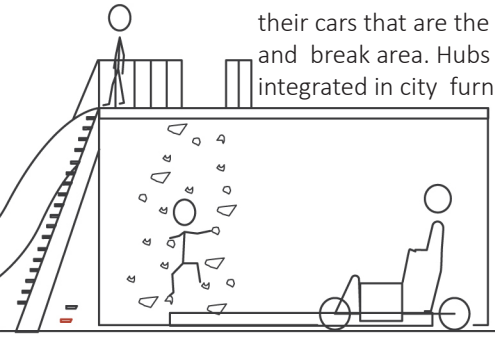
Utilize the vehicles and service that are already established in the urban environment (interviewee 8, 2021) for example buses, taxis, and delivery services. One could introduce a City of Oslo operated transport service that transports craftsmen and their equipment around the inner-city. for free. Inner-city based craftsmen could benefit from this, not having to invest in expensive vans.



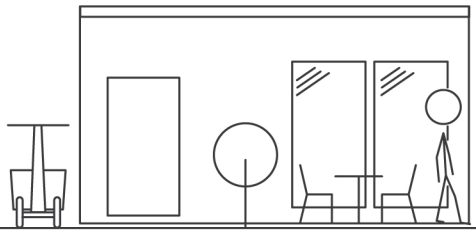
Easy access to cargo bicycle and scooters nearby commercial parking spots.



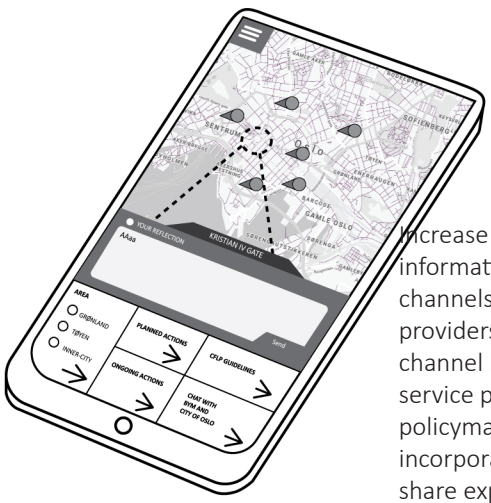
Give the craftsmen an alternative to their cars that are the office, lunch and break area. Hubs or micro offices integrated in city furniture.



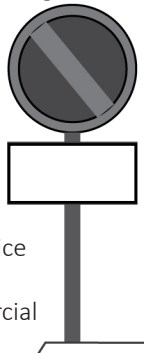
Sharing culture in the inner-city. Tool sheds with rentable tools in the CFLP areas for the public and businesses.
Mobile workshop, for example a barrack with the essentials of machines for rent in the inner-city for businesses.



Digital permit to enter walking and pedestrian areas in the CFLP area for example having a scannnable code to open physical barriers that are blocking the entrance.



Increase and improve the information flow with channels focusing on service providers as craftsmen. A channel between commercial service providers and the policymakers, through incorporating a possibility to share experiences about the CFLP, letting the commercial stakeholders be a more active part of the CFLP planning.

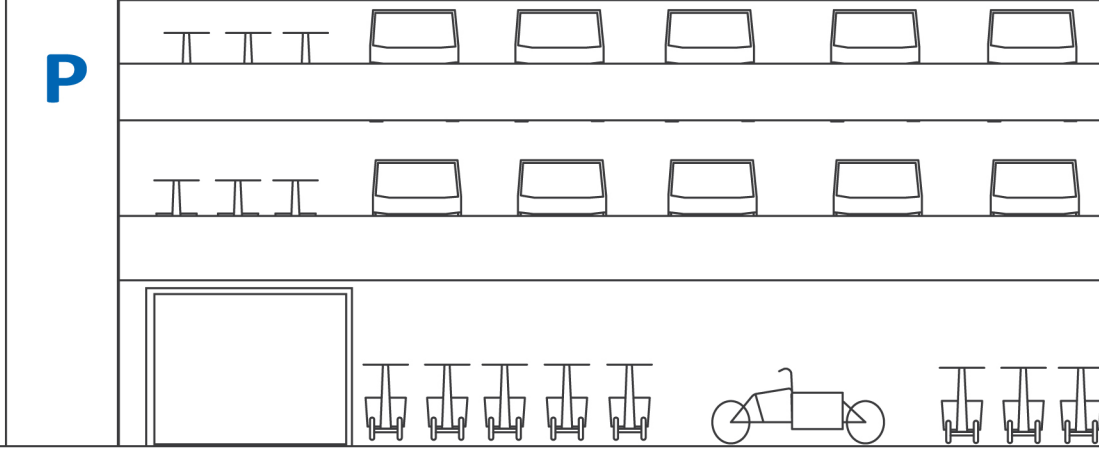


Give craftsmen the permit to park in a no parking zone at certain hours.

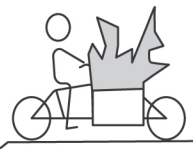
A car collective of electric vans for craftsmen for short- and long-term rent.

A service that offers people who can "guard" the car while standing on a no parking spot. No parking allows to have the car parked if there is movement and activity involving the car. Craftsmen having short assignments could benefit from a service as this.

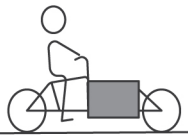
Hidden potential with facilities in the inner-city that are empty or not used to full capacity as for instance parking facilities. Offers new ways of thinking regarding the possibility with having a city location for companies.



Micro hardware stores in the CFLP area to prevent craftsmen having to travel long distances to hardware store in the outskirt of Oslo for equipment.

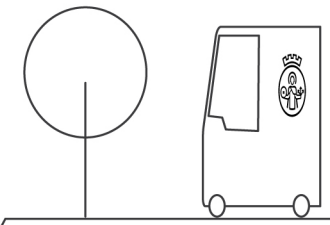


Trash is a problem when using a bicycle (interviwee 3,2021). Transport and trash pick up services.

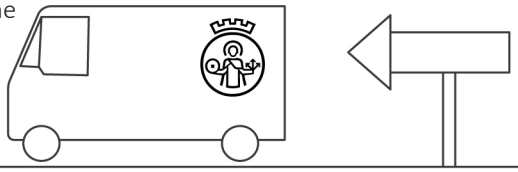


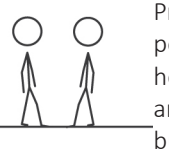
Lockable and GPS traceable, small size cargo containers, that are mountable on cargo bikes, electric cargo scooters and vans. Optimizes off- and onloading when switching between bike, scooter or van. Craftsmen could benefit from having their own cargo container, having all the essential tools needed for “standard” assignments easy at hand, gathered in one place.

Transport service to pick up thrash and deliver supplies as a external logistics partner for the craftsmen that are using car-free alternatives with electric micro vans.



Craftsmen having the permit of using the bus lanes for fast access to the city.



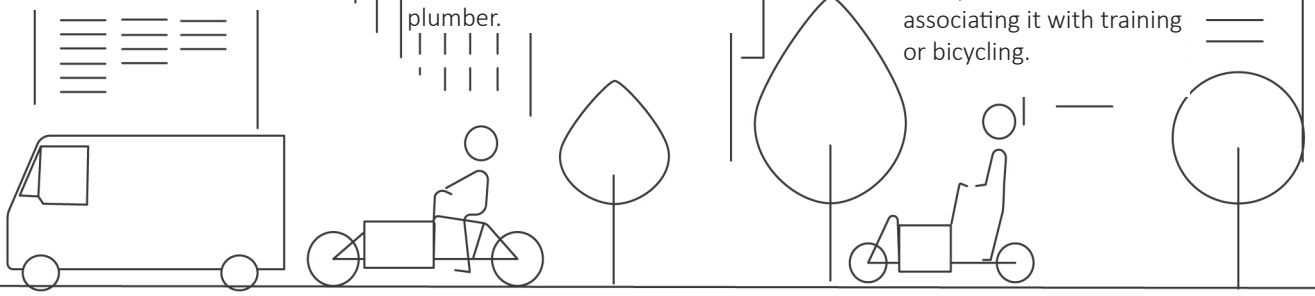


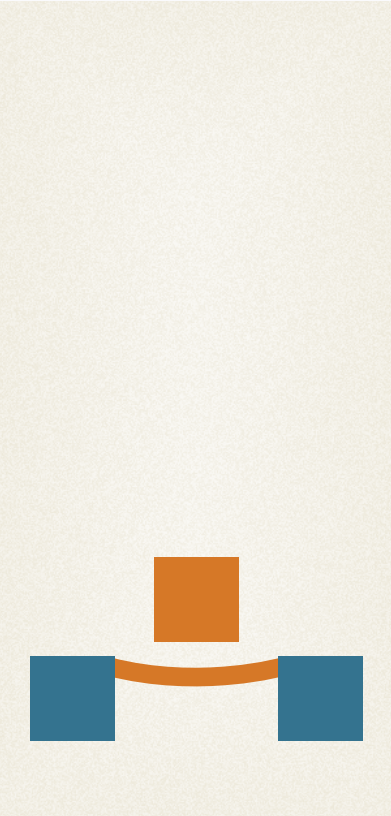
Promote livability through political rules that would help both certified and local craftsmen’s businesses to thrive. To create a demand for local craftsmen in the future.

Services that has a good cost-benefit ratio for both systems. Easy fixes that do not demand big physical changes. Price is always a factor. Utilize the systems and structure we have today with small adjustments (interviewee 6, 2021).
Provide solutions that do not cost so much. The craftsmen operate with small profit margins, meaning that the solutions has to benefit the craftsmen, not add an extra cost (interviewee 1, 2021)

Having a digital service, a portal, through which one could order car-free craftsmen. This can be relevant as the general pubic are becoming more enviromentally aware and would appreciate having the possibility to choose a car-free alternative when having the need for an electrician or plumber.

Heavy duty cargo scooters that categorizes as micro-mobility. This to offer craftsmen a tool to transport oneself without associating it with training or bicycling.





Changing the system

10. Verification

At this stage, the concepts are developed further through evaluation and the most potential ideas are filtered out. The final concepts will be developed further, analyzing the potential system impact.

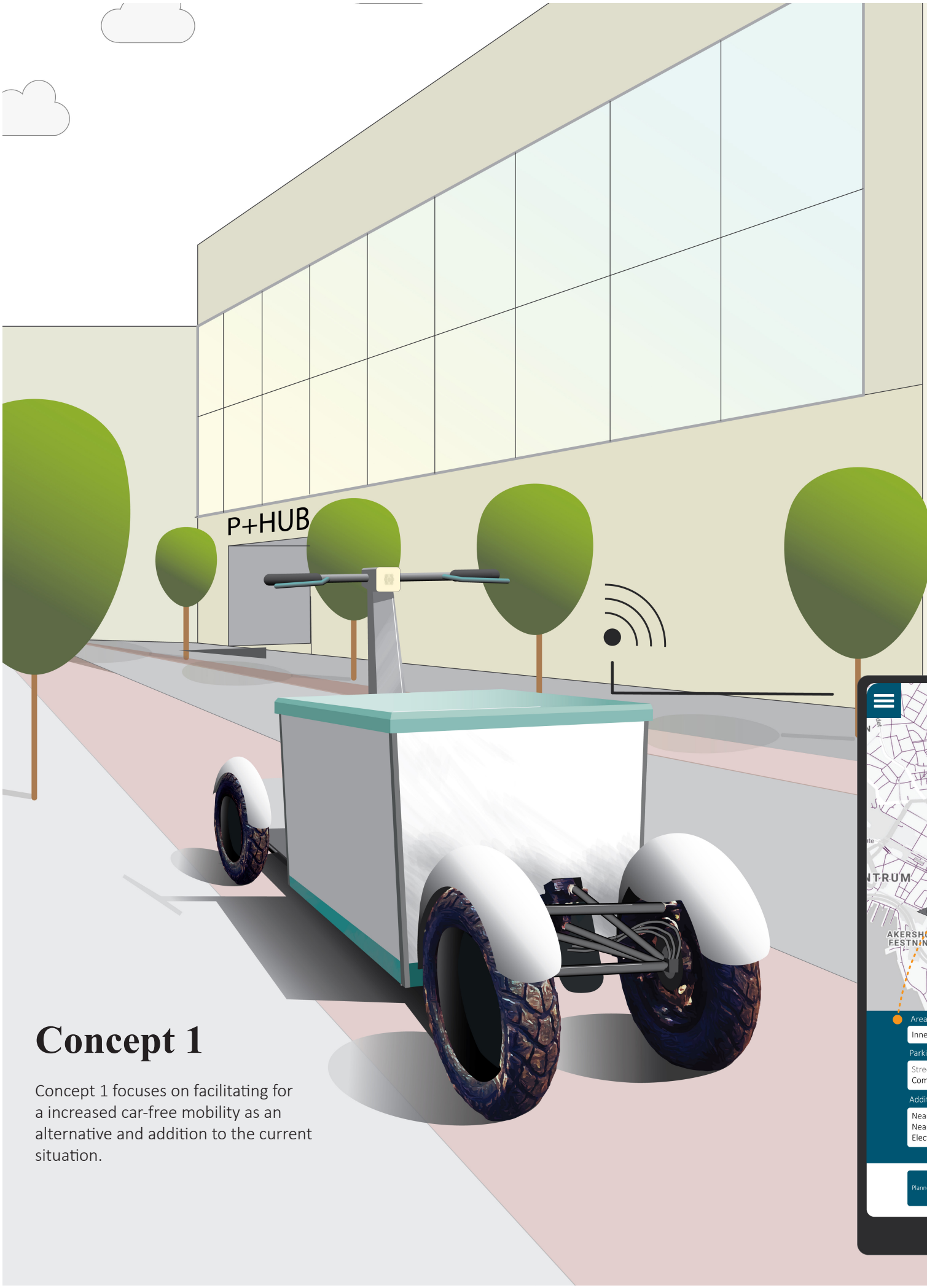
Through the research and illumination phase, it became apparent that there are many possible ideas for answering the challenges and intervention points. In the light of the system goals, leverage, and potentiality for resolving the problems, two concepts were filtered out.

Concept 1 focuses on facilitating for an increased car-free mobility as an alternative and addition to the current situation.

Concept 2 focuses on the facilitating of easy and nearby access of the van, while conducting assignments in the CFLP.

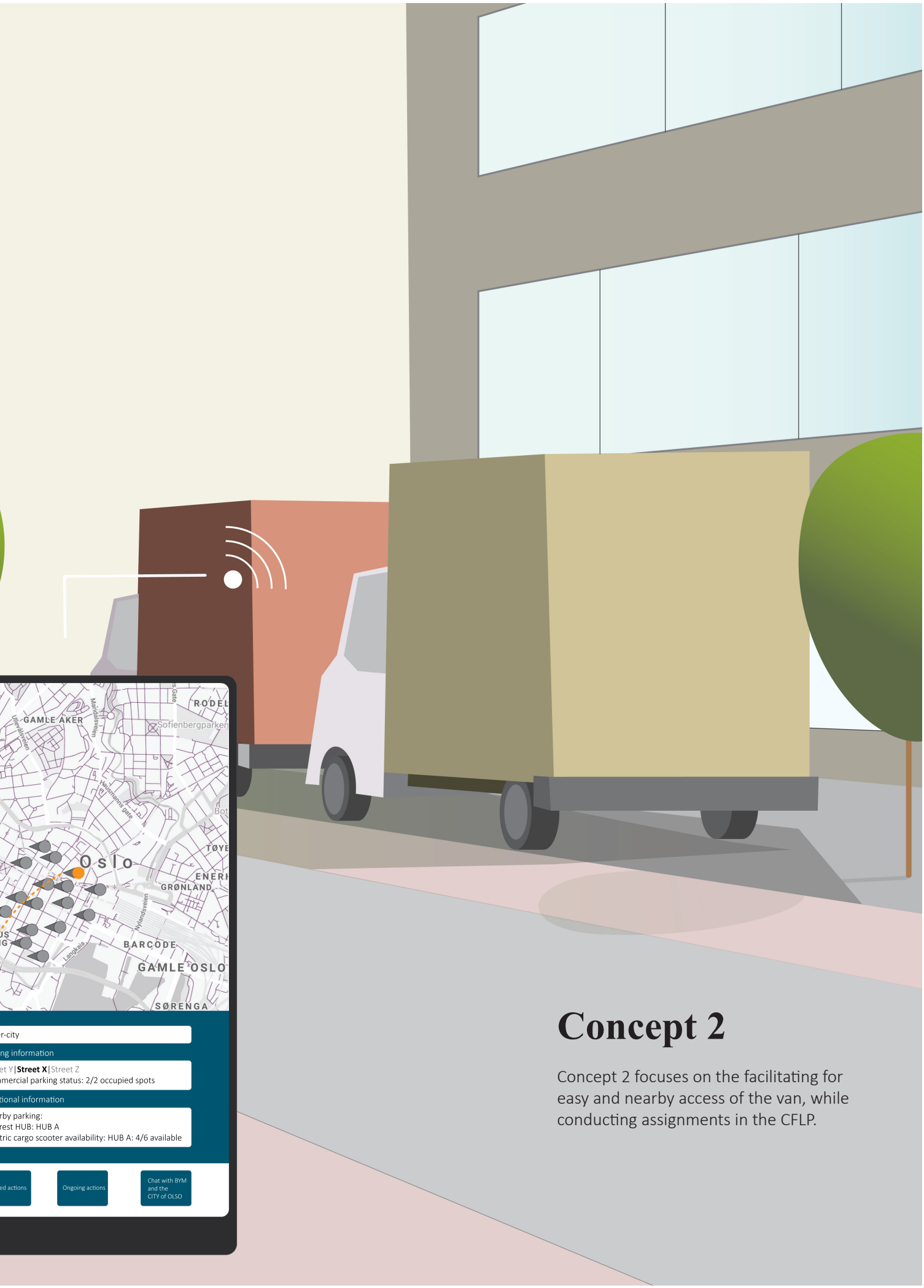
The two concepts, their potential and effects were discussed with stakeholders representing a craftsmen's trade association and mobility and urban planners.

It is essential to clarify that he proposed concepts do not take feasibility as their main target but aim to showcase the systemic potential and how they address the intervention objectives and the system challenges.



Concept 1

Concept 1 focuses on facilitating for a increased car-free mobility as an alternative and addition to the current situation.



Concept 2

Concept 2 focuses on the facilitating for easy and nearby access of the van, while conducting assignments in the CFLP.

10.1 Concept 1

Concept 1 focuses on encouraging for an increased car-free mobility as an addition to the current situation with commercial and private parking.
The ideas revolves around facilitating car-free mobility, using hubs, electric cargo scooters, delivery services, and the metro as means to decrease the reliance of the van in the CFLP area.

Hubs in the city center, providing office and smaller workshop facilities for craftsmen. The use of cargo bicycles requires having a core area of clients that are located from a reasonable cycling distance from the office (interviewee 3, 2021). Hubs brings the office and workshop in the CFLP area, facilitating a closer assignment-office distance in the CFLP area. A bigger hub, situated in for example an office location could facilitate several companies as a collective, providing storage for tools and cargo bikes, lunch and break areas, and office and smaller workshop facilities. Hubs could also be placed as portable modular buildings/site barracks in e.g., in private parking facilities. Having hubs in parking facilities provides easy access to vans, hubs (office, storage) and electric cargo scooters. The hubs could therefore function as transfer point between the most suitable means of transportation when doing jobs in the inner-city. Some assignments demand having to use the van, while others can be done, transporting oneself with a car-free option, as the electric cargo scooter, described in the right.

Hardware companies could also have hubs in for example private parking facilities, offering craftsmen and the public the "basics" of equipment's and material, in addition to functioning as a pickup point for urban people in need of hardware equipment or material. Renting for example an office/storage barrack in a parking facility with a number of other craftsmen's businesses in the CFLP area can be desired if a company has the interest of expanding their business area to focus on the CFLP area.

The hubs could be coordinated through using online services and apps (renting, booking, paying etc.).

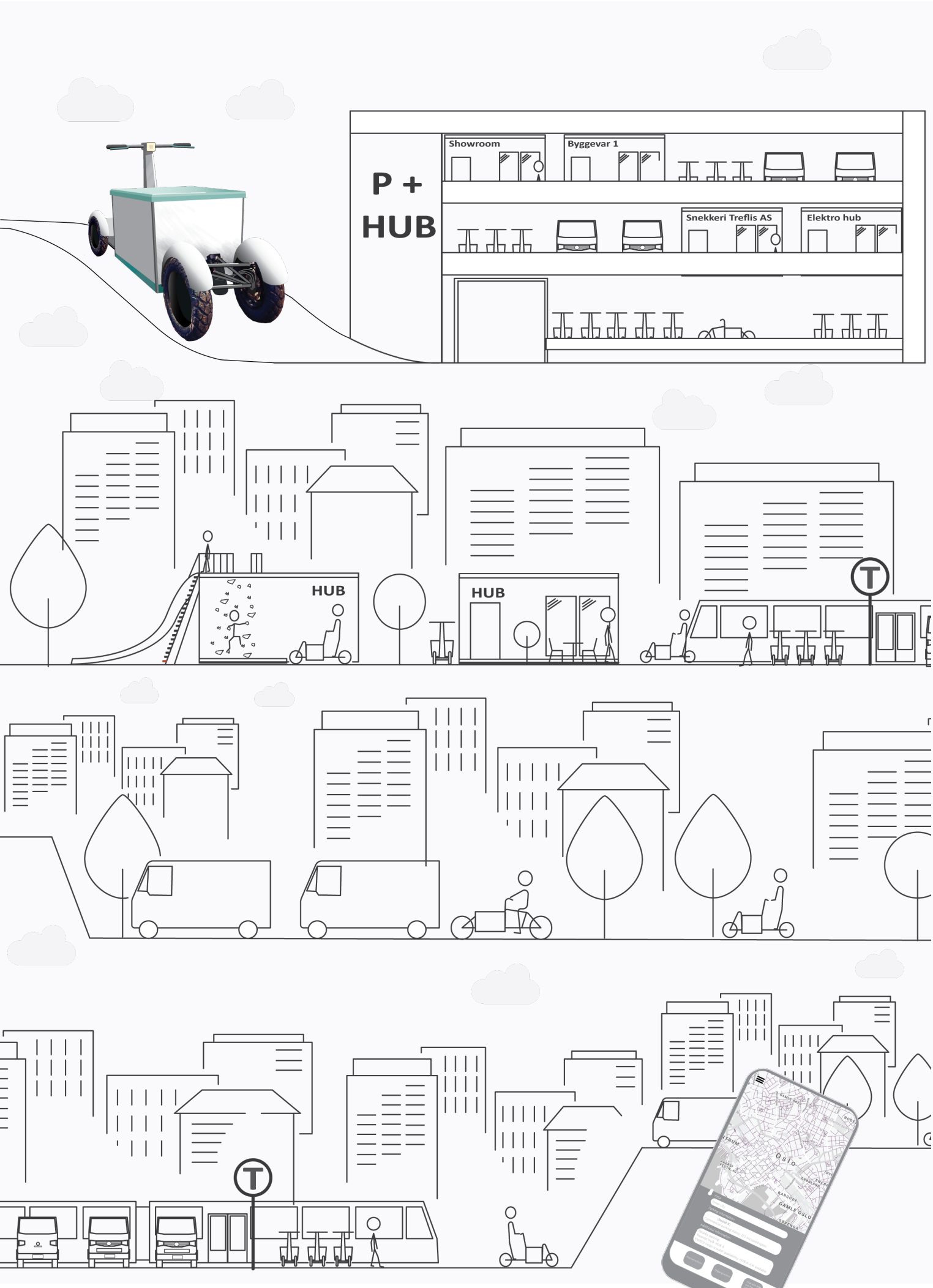
The hubs could also be partially funded by the City of Oslo as an incentive to bring life and businesses back to the inner-city.

Craftsmen/service cart on the Metro
The last cart of the Metro being a craftsmen's and other service providers cart, without seats, designed for to transport cargo bikes and electric cargo scooters. This gives the possibility to travel fast and efficiently between city areas.

Emission free delivery service
An emission free delivery service that facilitates for increased use of car-free transportation. The delivery service can be seen as the bicycle or scooter using craftsmens logistical partner that adresses the need for transporting heavy material and equiment in the CFLP area. In this way parking will not be an issue for the craftsmen conducting the jobs.
This service could be provided by external transport companies through an application, similar to the City of Oslo administrated project "Aldersvennlig transport" that is for people over 67 years and in need of a door-to-door transport, that can be ordered from an app. A delivery service opens the possibility for craftsmen, not having to pick up material at hardware stores, but instead having the possibility to order and have the hardware being delivered to a desired location at a specific time. The delivery service could also include a pickup service for trash and left-over material from job sites and a rental service of tools. The delivery service supports the thought of liberating oneself from the van, making the van more obsolete.

Electric cargo scooters for service craftsmen, with the possibility to transport heavy cargo. Offered at central parking facilities, commercial parking spots and metro stations.
The electric cargo scooter offers a more efficient way of transporting craftsmen and equipment in the CFLP area. This service provides an opportunity to cut out delaying traffic patterns and steps in the process of finding nearby parking after having onloaded tools and material at the job site when using a car.
The electric cargo scooters could be programmed to be unlocked and used only by service company registered employees, as a safety measure, preventing them being used by others. They should also be returned to one of the commercial parking points to stop the rental time, preventing the scooters from being left around the city area. The scooters are operated by an app, for unlocking/locking, paying,reserving, checking availability and status etc.

Scooter specifications:
The electric cargo scooter should be robust and be able to handle weight, and the weather conditions in Oslo. A requirement is also a good loading capacity, being able to transport tools and material, indicating the need of a box like carrier, with a top that protects the equipment from rain and snow. The box could also be utilized with side straps, giving the opportunity to fasten longer material or equipment. An electric cargo scooter with four all-round wheels (studded wintertime), could offer fast and efficient transport for craftsmen within the


P +
HUB
Showroom
Byggevar 1
Snekkeri Treflis AS
Elektro hub
HUB
HUB
T
T
Oslo

10.2 Concept 2

Concept 2 focuses on the facilitation of easy and nearby access to the van, while conducting assignments in the CFLP. The concept is also, as concept 1, thought as an addition to the current situation and number of commercial parking. The ideas focus on continuing the use of a van and facilitating for easy nearby access to van, and therefore also tools and material.

The concept “Increased parking” aims at securing that the craftsmen has the best possibilities to contribute with their expertise to serve their clients in the CFLP area with a vehicle that is parked nearby, providing easy access to tools and material.

The concept with increased parking focuses on providing commercial parking pockets for electric vans, with charging points, similar to HC parking that are scattered all over the inner-city Oslo. The parking spots would be placed with an even spread, assuring that craftsmen are offered easy and nearby access to their vehicles in the CFLP area. The ideal situation would be 4-6 commercial parking spots per city block. An addition to this, is a service permit that allows craftsmen to park in the inner yard of apartment buildings, if possible, during assignments. The parking spaces could be incorporated with easy measures, as for example having designated parking pockets/areas that are marked with paint/road marking. This gives the possibility to easily implement the parking area in for example pedestrian streets.

The time spent on finding parking and transiting between parking and job site is removed with concept 2. It gives the possibility to find nearby parking and have all the equipment in the van, nearby and easy accesible.

A similar “smart parking” application that is already in a testing phase for HC parking, showing the availability of parking spaces through an interactive map. The smart parking could be developed further to have sensors that can register the vehicles owner and billing address automatically, similar as the Autopass roadtoll sensor. This could be implemented by having “pay per plate” systems, with cameras that register the vehicles that park, or by having identification tags in the car that sensors, mounted in the pavement under the parking spots can register. In this way, it would be possible to prevent private cars from parking in commercial places, resulting in giving them a parking ticket for parking in commercial places. “Many of the interconnections in systems operate through the flow of information. Missing information flows is one of the most common causes of system malfunction. Adding or restoring information can be a powerful intervention, usually much easier and cheaper than rebuilding physical infrastructure” (Meadows, 2009).

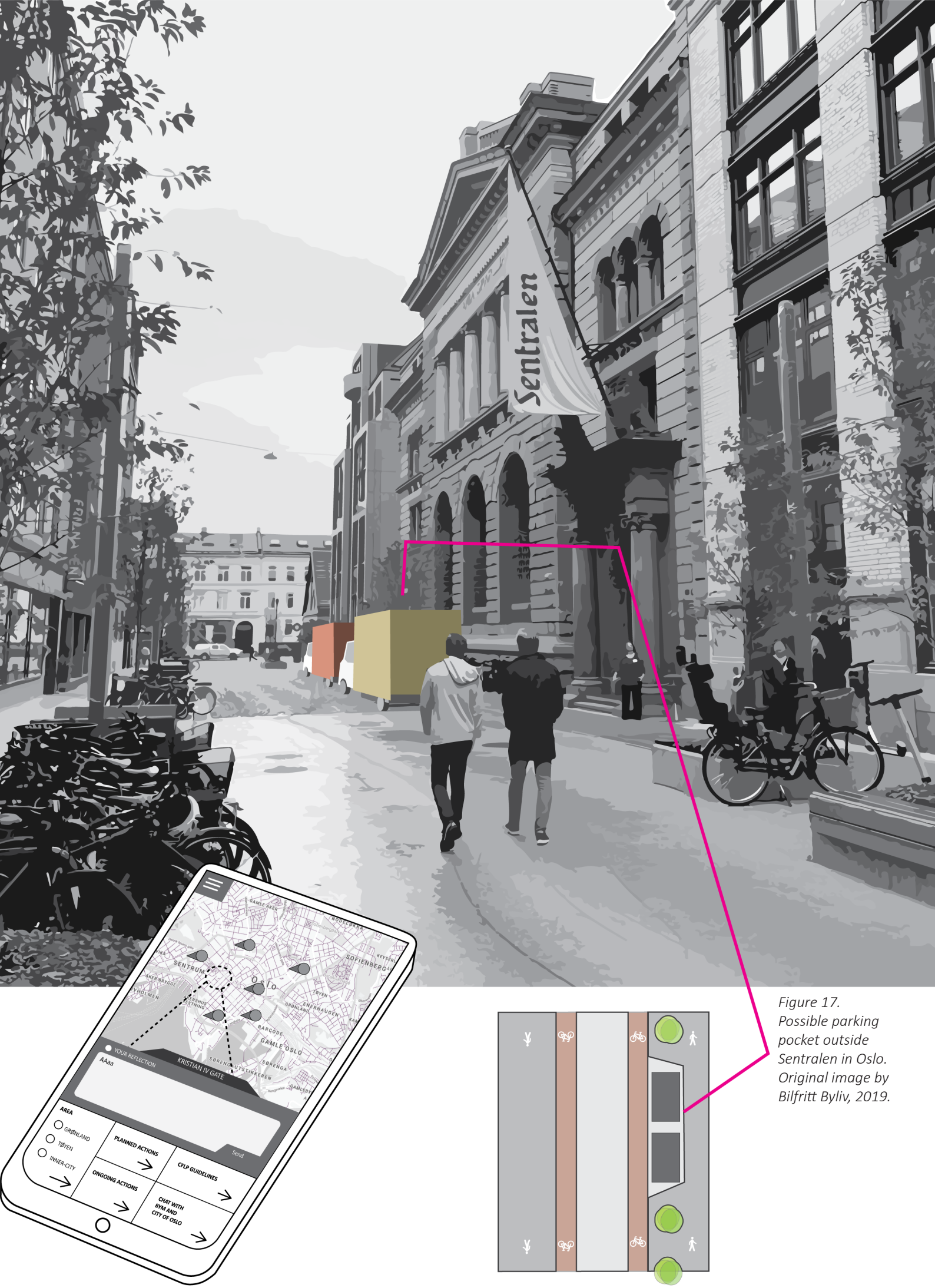


Figure 17. Possible parking pocket outside Sentralen in Oslo. Original image by Bilfritt Byliv, 2019.

10.3 Journey Maps of the Concepts

Concept 1, hubs and, delivery and electric cargo scooters

Plumber Pete has experienced an increased interest for his services. His workshop and office are situated outside the ring road 3, in addition to the storage and workshop that he and two other companies rent at a private parking facility in the inner-city. Pete has recently switched his diesel van to an emission free electric van. The van is packed to the rim with different equipment and material that can be useful when doing task in various settings.

Pete has an appointment in the inner-city.
The client is in need to get a sink installed. Pete drives to the storage locker/hub that he rents in a private parking facility. This is for two reasons, 1; It is easy accessed and functions as his primary office two days per week. 2; he wants to use the electric cargo scooter in the inner-city area, because of the saved time spent on transport and finding parking in comparison with the van. The company that operates the electric cargo scooters has 6 scooters next to the craftsmen storage lockers/hub in the parking facility. He gathers all the essential equipment for the job in the cargo carrier tool box, and straps on the longer pipes on sides of the scooter. In addition, Pete visits the hardware micro store, that has also rented a little space in the parking facility, to buy a drill that he needs for the job. He unlocks the scooter from the charging point with the scooter app and heads of towards the job site.

Concept 1, hubs and, delivery and electric cargo scooters

Electrician Eric is a part of a craftsmen's community that has rented a street level office/workshop with large windows towards one of the car-free streets in the inner-city.
Electrician Eric has an employee, Linda, who has her core working area outside ring road 3, while Eric administrates the assignments within the ring roads. They have both vans, with rented parking spots for them in the nearest parking garage. Linda uses her van daily, while Eric prefers using the electric cargo scooters in the inner-city. He is currently saving money to being able to buy his own but is still happy to rent the scooters.

Today, both Linda and Eric are needed at the same assignment situated close to the Oslo opera building between 11-14pm. Eric and the rest of the community have a bicycle and scooter depot outside their office. Eric, onloads his tools and ladder on the scooter and heads of, towards the assignment. Linda, who just finished a job in Bøler area, drives towards the Oslo Opera and parks her car at the Oslo S trafikktorget parking garage. Eric has already started the wiring tasks, while Linda carries her tool bag and equipment from the car to the job site. Linda arrives at 11:45, late, due to the unexpected traffic.

Concept 2, increased parking

Christian the carpenter is one of many craftsmen who decided to decline job offers within the CFLP area when it still was cumbersome to find nearby parking. But now, it is no problem, there is parking spots available due to the new commercial parking pockets. As Christian describes, "The traffic patterns make it still time consuming to drive round in the inner-city but it is not as hopeless as before when it took ages to find parking and then having to walk long distances back and forth from the parking to the job site"

Christian is building interior modules for a new restaurant in the inner-city. These modules are so big that his van is not large enough to transport them from his workshop at Østerås. He orders transport for the modules. He reserves also the two parking spots just outside of the restaurant via an application for commercial parking. Christian onloads the modules on the truck bed, and heads towards the city with his own van.

Pete parks the cargo scooter outside of the office building after a 8 min. ride from the parking facility. He takes the needed equipment and material, goes up to the client and starts with the job.
The drill that Pete just bought, was not as long lasting as he thought. He is now in need of a new drill. He, picks up his phone, opens the hardware store app and orders a new one with a rapid delivery request. This delivery service is operated by the hardware store and their subcontractors.
After 15 min., while Pete worked with other tasks, the delivery arrives, and Pete could return to drilling the needed holes.

During the assignment, Pete receives a telephone call from a customer, living in Borgen area, who is planning a bathroom renovation and wants a price offer. After finishing the job, he takes the cargo scooter to the nearest metro station and drives on to the metro cart for craftsmen and other who need to transport bigger things and heads of towards Borgen metro station.

Pete is ready with the assignment and returns to his hub where he returns the scooter and offloads his equipment and construction waste from the scooter.
It is lunch time. Pete joins the other craftsmen for a lunch break, in their hub.

During the assignment, both Linda and Eric had to take several trips to both the scooter and the car for extra equipment that was not anticipated for the job. The scooter that is parked outside, but not in the way for pedestrians or other traffic, was relatively quick to pick up spare parts from, compared to the car that was parked ca.400m from the job site and costs 90 kroner/ hour.

The assignment is done. Eric has agreed that he and Linda could help the carpenters with the cleaning, as one of the carpenters had an accident and had to be driven to the emergency room. Linda ordered a pickup service to pick up the big bags of waste. The delivery and pickup service retrieved the waste bags with two couriers on electric cargo scooters. Usually, they would have used an electric van, but when Linda had inserted the number of cubic meters in the order specifications, the pickup service choose to use scooters, to save time in traffic.

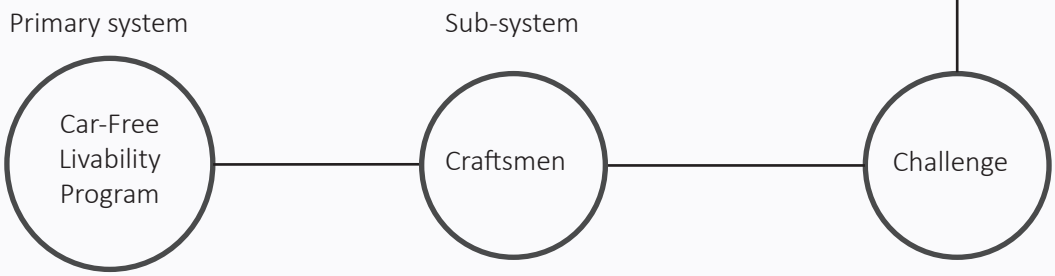
Linda and Eric returned to their office after the assignment, Eric spending 9 minutes, while Linda spent 23 minutes on the trip.

Christian used the whole day on assembling and mounting the interior parts in place. He had his van outside, legally parked, to which he had been running back and forth multiple times to pick up tools and equipment.

Christian fastens the final screw and is thereafter done with the assignment. He collects his things and onloads them in his van. He unplugs the charger from his electric van and carefully drives of from the street that is filled with pedestrians as the clock begins to be late afternoon on a sunny Friday in the middle of June.

10.4 Goal and Leverage Analysis of the Concepts

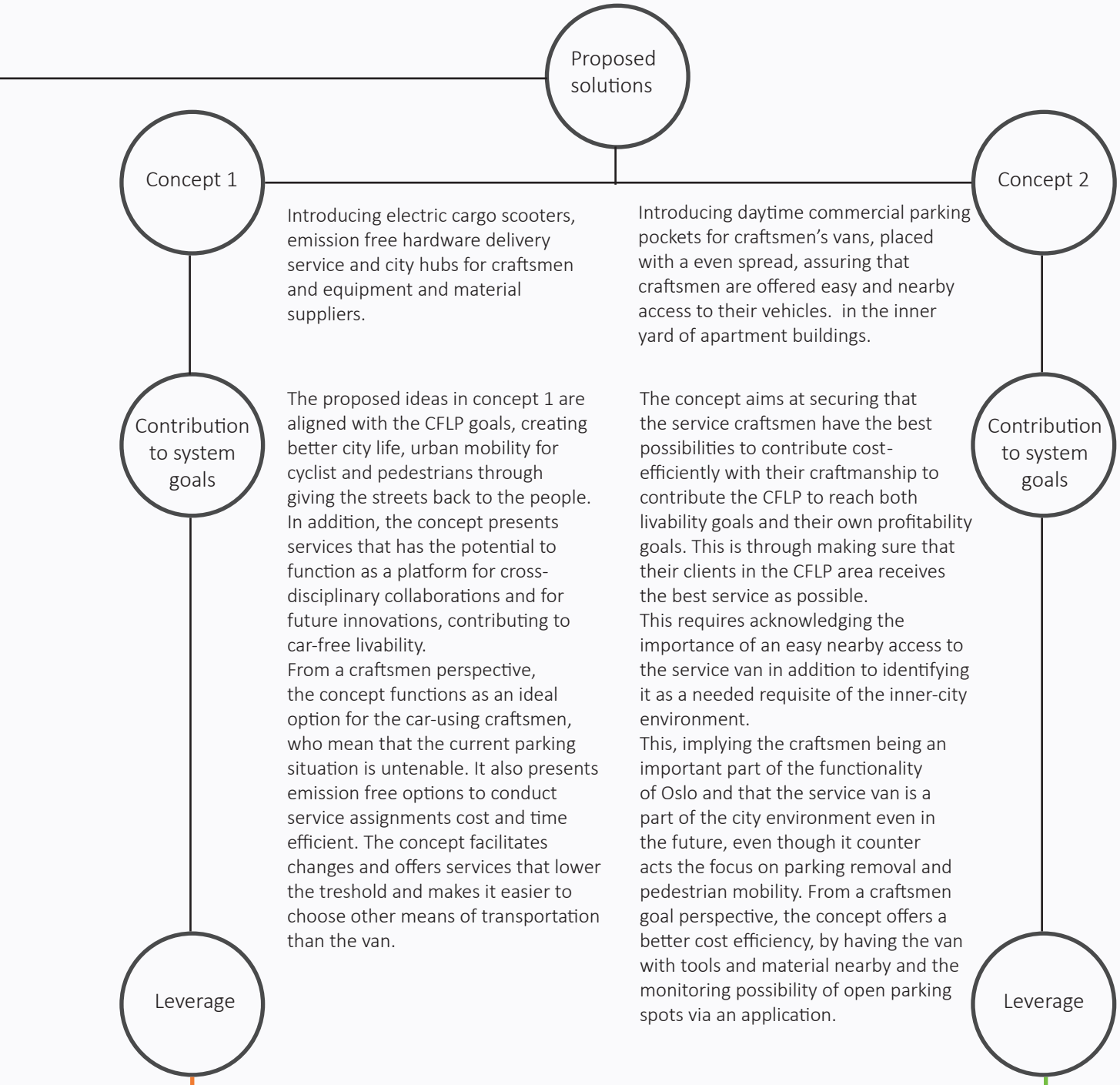
Concept 1 and 2 are analyzed in order to choose the concept that is most suitable to change the system and improve the conditions for craftsmen, taking on assignments within the Car-Free Livability program area, and being a pro-active part to the CFLP transition.



Goal:
To transform Oslo's inner-city area from a polluting car and traffic dense area to an accessible and appealing urban area focusing on livability. Prioritize pedestrians, cyclists, and public transport users, and reduce private vehicle traffic by creating car-free streets.

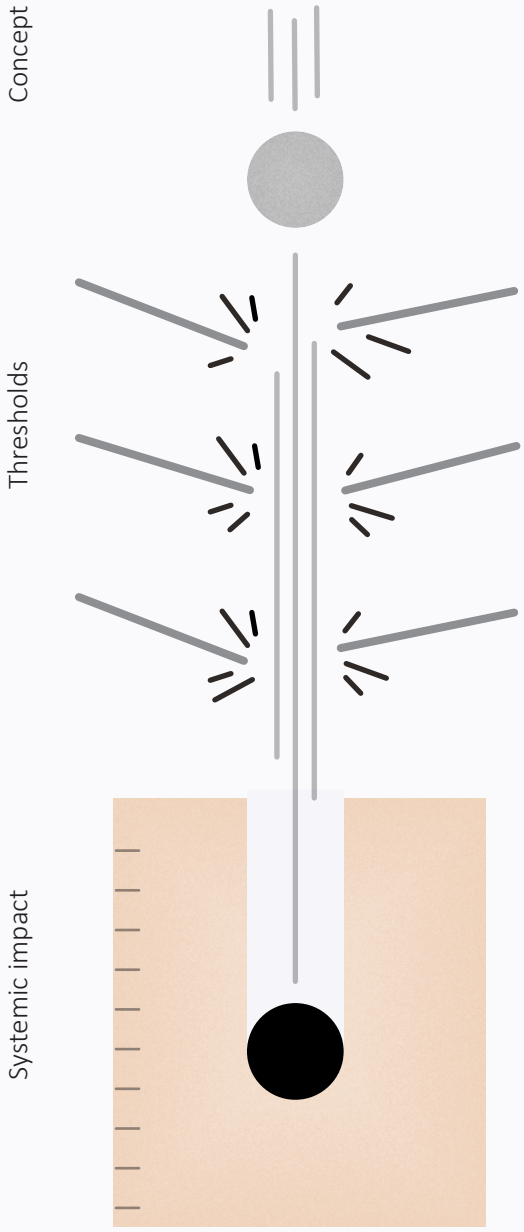
Goal:
To provide emission free, time- and cost-efficient service assignments with high customer satisfaction in the CFLP area.

Facilitate the service journey for craftsmen, taking assignments in the CFLP area to be more cost efficient. The main challenges are:
-Car-using craftsmen, not always being able to park nearby the job site.
-The long distance and poor access to equipment and material in the van if parked far away.
-Valuable time spent on searching for parking and walking back and forth between the parking and job site.
-Changed traffic patterns, making it cumbersome and time consuming to drive in the inner-city.
- To contribute proactively to livability and to decrease emissions.


Proposed solutions
Concept 1
Introducing electric cargo scooters, emission free hardware delivery service and city hubs for craftsmen and equipment and material suppliers.
Concept 2
Introducing daytime commercial parking pockets for craftsmen's vans, placed with a even spread, assuring that craftsmen are offered easy and nearby access to their vehicles. in the inner yard of apartment buildings.
Contribution to system goals
The proposed ideas in concept 1 are aligned with the CFLP goals, creating better city life, urban mobility for cyclist and pedestrians through giving the streets back to the people. In addition, the concept presents services that has the potential to function as a platform for cross-disciplinary collaborations and for future innovations, contributing to car-free livability.
From a craftsmen perspective, the concept functions as an ideal option for the car-using craftsmen, who mean that the current parking situation is untenable. It also presents emission free options to conduct service assignments cost and time efficient. The concept facilitates changes and offers services that lower the treshold and makes it easier to choose other means of transportation than the van.
Contribution to system goals
The concept aims at securing that the service craftsmen have the best possibilities to contribute cost-efficiently with their craftmanship to contribute the CFLP to reach both livability goals and their own profitability goals. This is through making sure that their clients in the CFLP area receives the best service as possible.
This requires acknowledging the importance of an easy nearby access to the service van in addition to identifying it as a needed requisite of the inner-city environment.
This, implying the craftsmen being an important part of the functionality of Oslo and that the service van is a part of the city environment even in the future, even though it counter acts the focus on parking removal and pedestrian mobility. From a craftsmen goal perspective, the concept offers a better cost efficiency, by having the van with tools and material nearby and the monitoring possibility of open parking spots via an application.
Leverage
Leverage
HIGH LEVERAGE
•The power to transcend paradigms
•The mindset or paradigm out of which the system, its goals, structure, rules, delays parameters, arises
•The goals of the system
•The power to add, change, evolve, or self-organize system structure
•The rules of the system (such as incentives, punishments, constraints)
•The structure of information flows (who does and does not have access to information)
•The gain around driving positive feedback loops
•The strength of negative feedback loops, relative to the impacts they are trying to correct against
•The lengths of delays, relative to the rate of system change
•The structure of material stocks and flows (such as transport networks, population, age structures)
•The sizes of buffers and other stabilizing stocks, relative to their flows.
•Constants, parameters, numbers (such as subsidies, taxes, standards)
LOW LEVERAGE

11. Impact and Threshold Analysis

The Impact and Threshold Analysis (IMP) evaluates the impact level and the perceived effects of the concept, as well as the threshold level of realisation. The IMP- analysis results are then utilized to develop the ideas within the concepts further and to filter out the most promising ones (Sevaldson, 2016B).



Concept 1- An Encouragement for Car-Free Mobility

1. Systemic impact (leverage)
Changing the rules, removing constraints, and adding incentives, to alter the system for being beneficial for the craftsmen and the CFLP system goals. It has the potential to interrupt old habits and shift mindsets.

1.1 Radius of ripple effects
-The concept is aligned with this vision and strategy of the CFLP. There is a chance that this type of car-free mobility has possible ripple effect on a macro level, spreading to other bigger cities as Bergen for example.
-The chances for ripple effect are high if the concept offers a competition advantage for companies.
-Creates value by offering variety and wider range options.

1.2 Short term
-Local ripple effect, craftsmen getting used to having cost efficient alternative to the van in CFLP area.
-The concept can also be seen as a good option to using the car in the CFLP area regarding delays. This can incentivize other craftsmen and other businesses to consider car-free alternatives in the CFLP area.
-Removing delays and increasing time efficiency with easily accessible tools nearby and fast travel with cargo scooter.

1.3 Long term
-Possible spread to other cities and other business areas
-Change mindset regarding the use of bicycles in the inner city as a transportation tool.
-Increased cost-efficiency with inner-city jobs, brings a broader supply of craftsmen that are interested in taking jobs in the CFLP area. It promotes car-free transport.
-Initiates an arena for further discussions about service providers role in the system.
-The unlocking mechanism of the electric cargo scooters, being unlocked only by registered craftsmen's companies, can function as an incentive for rogue actors, in the craftsmen trade, to get certifications and getting the company documentation in order.

1.4 Platform effect (to what degree the intervention is creating conditions for further interventions)
The concept can function as a springboard to think

“outside of the box” to facilitate for easier and more accessible car-free options. The concept has a big potential of bridging silos and creating new business relationships that collectively contribute to the system goals. It lifts social, economic, and ecological sustainability.
- Having hubs and could shed light on how city areas could include other trades and businesses in the cityscape, adding richness and diversity to the urban picture.
-The concept functions as a springboard for development and innovation.

2. Thresholds
-General threshold and weakness of the concept is the capacity limitation for some trades as for example the plumbers and carpenters, who usually have a lot of material and equipment that has to be delivered the job site.
-The weather conditions in Oslo.
-The cognitive bias of craftsmen towards the use of vans.
-The rules and laws that can categorize a heavy-duty cargo scooter as a vehicle, preventing it from being categorized as a bicycle.
-The risk of the electric cargo bikes being stolen.

2.1 Economic
The concept has a cost in developing and implementing the whole service. The electric cargo scooters possible price and the rental of space for hubs and the hubs itself, can result in high costs. The use of the scooter can also discourage if the price for using it is too expensive. Not to mention the development and implementation time cost.

2.2 Technological
The concept demands applications to the different services to function optimal. The scooters geo lock limits the use outside of certain boundaries.

2.3 Cultural
-There can be a cultural threshold, having in mind that Oslo is planned around the private car as the primary way of transportation.
- There can also be resistance in transforming iner-city Oslo to a community that requires own mobility concepts, that can be seen as differentiating itself from the rest of Oslo.

2.4 Organizational
-The concept pre-requires that the collaboration of the different services and their stakeholders function together.
- The approval and onboarding of the dominant systems City of Oslo, BYM and the CFLP, functioning as the main facilitators that drives and incentivises the changing process. Without the City of Oslo and possible stimulation and incentive programs the chances are slim.

3. Synergies
The concept offers good possibilities for collaboration. The services facilitate an arena for synergy between stakeholders and stimulating co-creation that leads to possible future innovations.

4. Counter (-intuitive) effects (unwanted and counter intuitive effects)

4.1 Short term
-The negative effect of braking existing patterns and routines that can push the craftsmen and stakeholders away.
-The concept might cause a stronger distinguish between the inner-city as a own community with its own rules.

4.2 Long term
-The risk of the concept failing and having a counter effect on credibility of future car-free livability thinking.
-The purchase of own electric cargo scooters, adding competition to the electric cargo scooter providing company.

4.3 Counter effects between the intervention and existing system
-The possible increase and facilitation for better and more accessible commercial parking for vehicles would have negative effect in the success of gaining many users.
-Possible policies that cause challenges with the implementation of the services, as for instance if a helmet becomes mandatory to use when operating the scooter.
- Not having the dominant system, the city of Oslo onboard
- Without good stimulation programs that incentivizes craftsmen to choose a car-free, it can be difficult
- If City of Oslo increases the number of commercial parking spots
4.4 Counter effects between interventions
-Possible risk for that same rules do not apply for everyone regarding trade and their specific regulations

5. Resilience
5.1 Resilience toward micro-fluctuations
I believe that the concept has the interest and flexibility to adapt to different micro-oscillations.

5.2 Resilience toward macro-fluctuations
-The concept has the flexibility to adapt to general macro fluctuations.

Concept 2- Nearby Commercial Parking

1. Systemic impact (leverage)
Changing the rules, removing constraints and delays, making it easier and more convenient to do assignments in the CFLP area with a van.

1.1 Radius of ripple effects
-Getting craftsmen services faster and without the need to apply a CFLP cost addition to the client, for to cover the parking expenses.
-The possibility to park the van nearby the assignment can have a positive impact, leading to an increased number of craftsmen wanting to do inner-city assignments. The possible rogue actors in the trade will have more competition by certified craftsmen.
- More service and craftsmen vehicles in the inner-city area
-A parking sensor system that registers vehicles by registration plates can have a good effect on keeping private cars away that are not registered to a craftsmen or service company, giving them a parking fine.
-Open a new type of non-permanent city furniture that are easy to mount and dismount, because of the parking spots being rentable by the nearby businesses during evenings.

1.2 Short term
-Better accessibility to the van (material and equipment storage)

1.3 Long term
- Have a preventing effect on the use of bicycles.
- Re-establishing parking spots for craftsmen can be seen as counter-acting towards the CFLP goals regarding car free livability.
- A city that has provides services and good craftsman mobility will contribute efficiently to its inhabitants and companies.

1.4 Platform effect (to what degree the intervention is creating conditions for further interventions)
-Possible future policies regarding the price of charging the electric van as a form for stimulation for replacing the old diesel van to an electric van.
-The idea of having a platform for being able to share thoughts and opinions regarding CFLP can unveil new perspectives and innovations.
- An impact on private parking facilities and their capacity, that can have positive effect on alternative use of the free space in the garages.

2. Thresholds
2.1 Economic
- Planning and creating new commercial parking pockets for craftsmen.
- Investments regarding the parking surveillance system. The camera technology is expensive (interviewee 8, 2021)
- Installing charging points at the parking spots.

2.2 Technological
The concept demands a system that can charge the cars using the parking spots by reading the registration plate.

2.3 Cultural
-The inhabitants of Oslo are culturally familiar with having cars in the inner-city.
-Resistance and frustration from citizens who want the inner-city Oslo to be car-free.

2.4 Organizational
-Implementation of parking surveillance apps and systems
-Co-development with HC parking in the inner-city.

3. Synergies
The concept can reinforce the state of craftsmen and service providers as a important piece for the functionality of the inner-city.
The digital platform for participating in city development can have positive effects on developing the city and giving the craftsmen a possibility to share their thoughts and engage them in planning the future.

4. Counter (-intuitive) effects (unwanted and counter intuitive effects)
- Re-establishing parking spots for craftsmen can be seen as counter-acting towards the CFLP goals regarding car-free livability.
- Increased number of craftsmen vehicles in the inner-city streets
- Have a preventing effect on the use of bicycles.

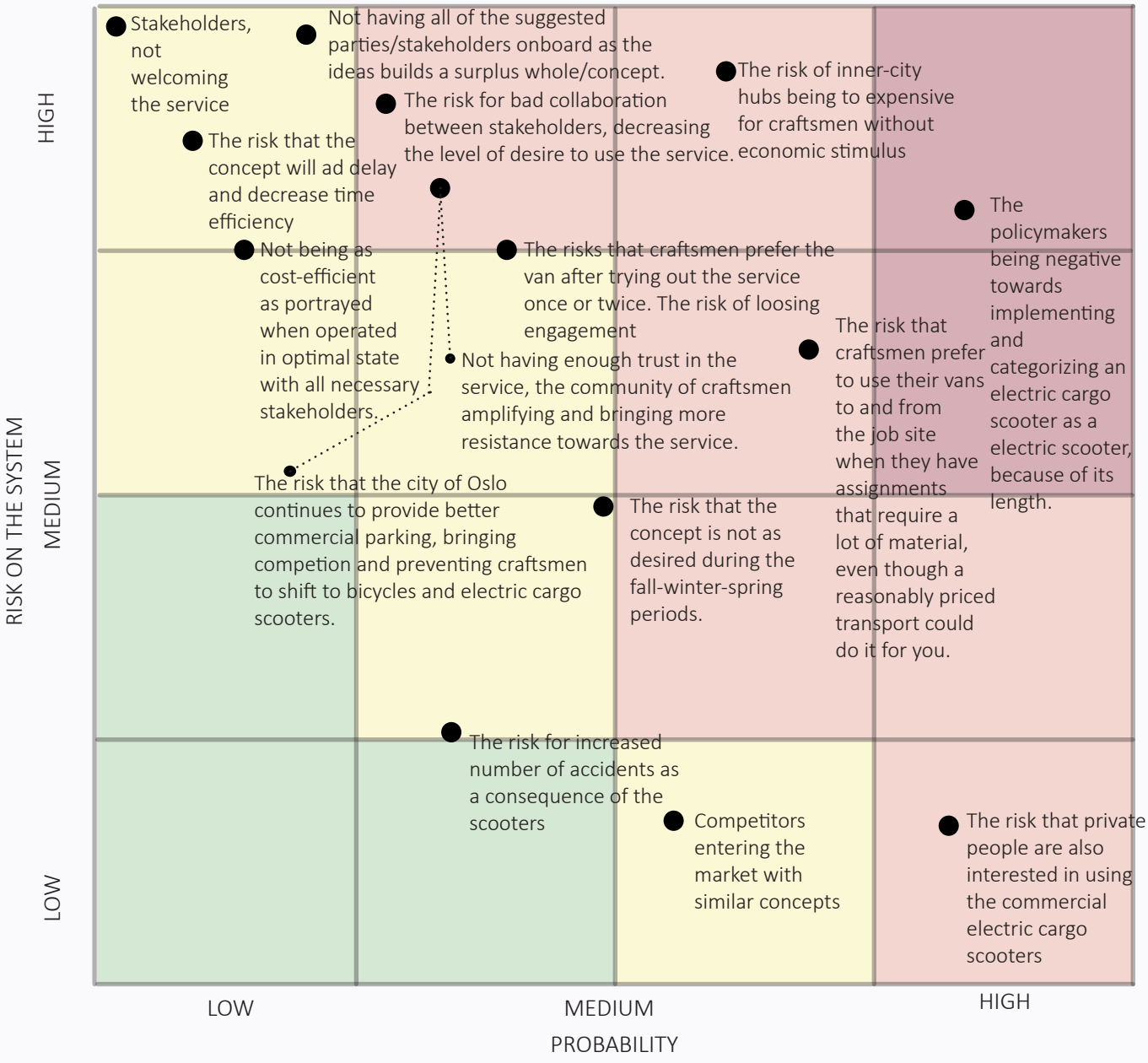
5. Resilience
-The concept has the flexibility to adapt to general macro fluctuations, so long the concept is aligned with politics and visions of the City Council and city of Oslo.

Idea	Systemic impact	Threshold	Synergies	Counter-effects	Resilience	Total
CONCEPT 1: The electric cargo scooter, hub, delivery service, offering a cost efficient alternative to the van						22
CONCEPT 2: Facilitating for better commercial parking for car using craftsmen						19

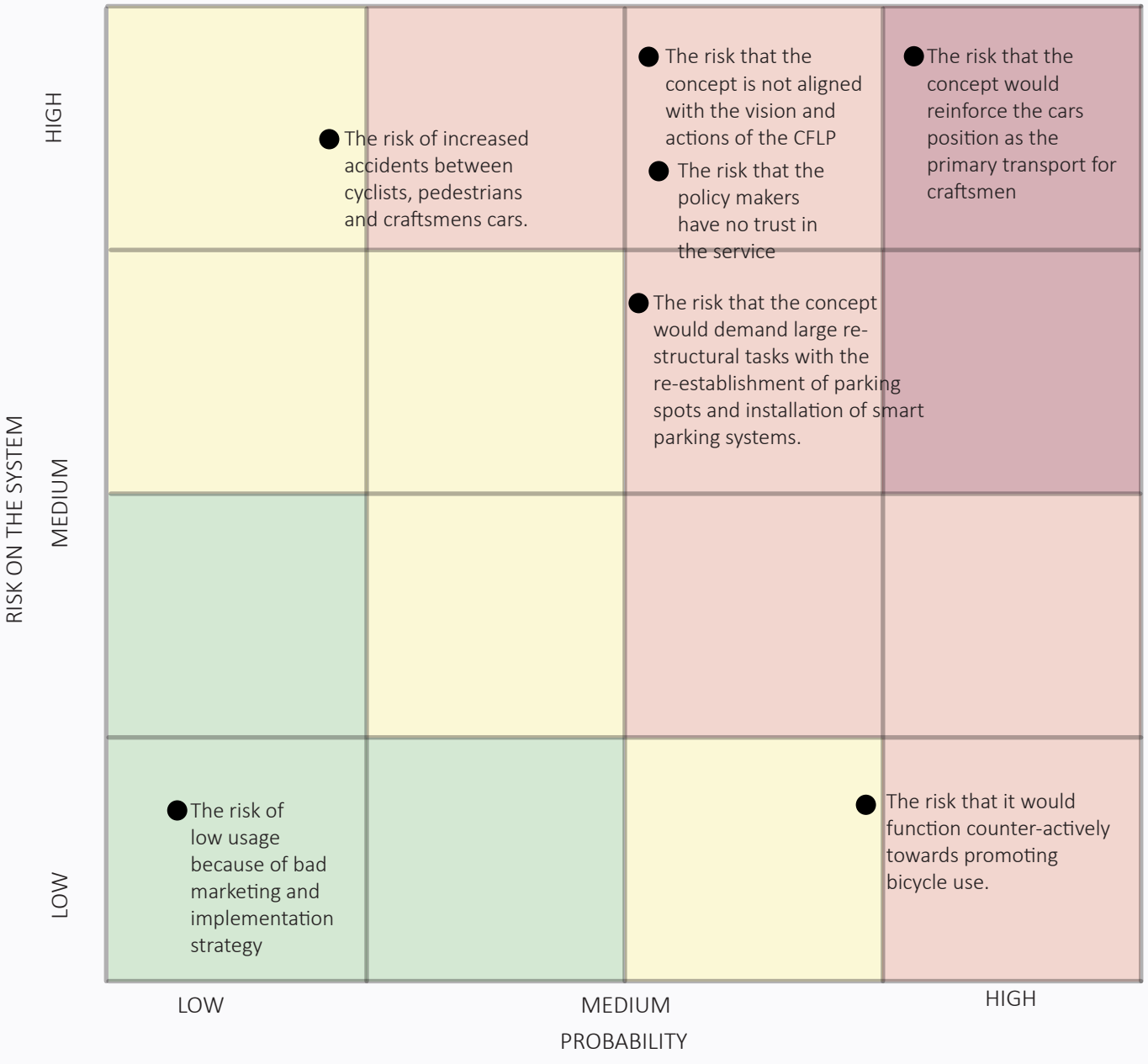
11.1 Impact Risk - Probability Analysis

The Risk Impact-Probability chart help us understand the level of risk and propability. The chart allows you to rate potential risks on these two dimensions. The probability that a risk will occur is represented on one y-axis of the chart and the impact of the risk, if it occurs, on the x-axis (MindTools, N.d).
The analysis is based on subjective perspective and understanding of the points, that are placed on the chart after my best ability, even though assumingly. Therefore, the chart indicative, emphasising more on showcasing the potential risks.

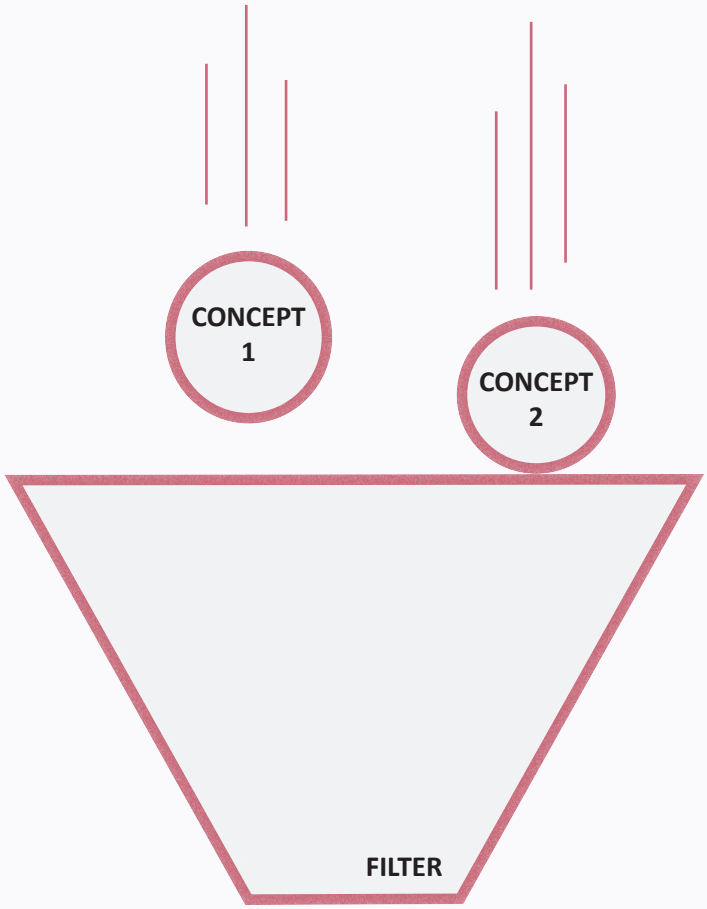
Concept 1

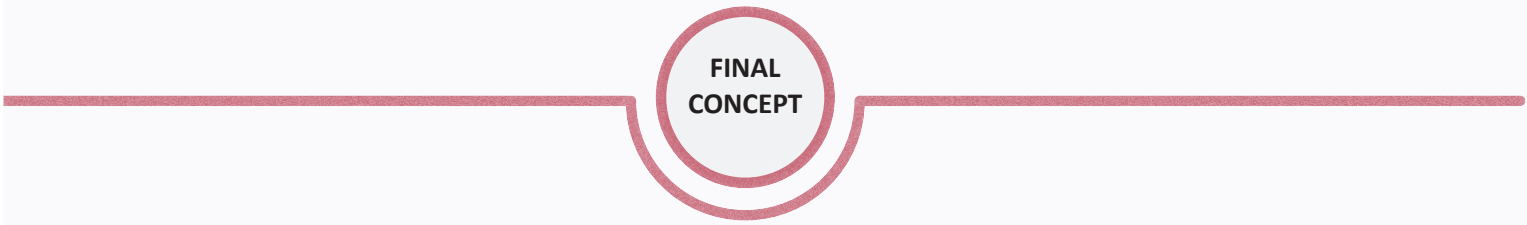


Concept 2


RISK ON THE SYSTEM
HIGH
MEDIUM
LOW
The risk of increased accidents between cyclists, pedestrians and craftsmens cars.
The risk that the concept is not aligned with the vision and actions of the CFLP
The risk that the policy makers have no trust in the service
The risk that the concept would reinforce the cars position as the primary transport for craftsmen
The risk that the concept would demand large re-structural tasks with the re-establishment of parking spots and installation of smart parking systems.
The risk of low usage because of bad marketing and implementation strategy
The risk that it would function counter-actively towards promoting bicycle use.
LOW
MEDIUM
HIGH
PROBABILITY

11.2 Choosing Concept





The filtering process of the concepts has been based on the impact and threshold analysis and the risk management analysis that supplements each other in identifying system impact and possible problems, risks, and weaknesses. The analysis has also taken, reaching the system goals, and answering the challenges into consideration. The analyses have also functioned as a reflection process of the ideas, that has influenced the non-linear process of ideation and development.

Concept 1 does not exclude the existing commercial parking but functions as a supplement to it. The concept gives the craftsmen more options regarding the mobility in the inner-city and increases the interest of taking assignments in the CFLP-area, while contributing proactively to the progress of the CFLP. It gives the craftsmen an opportunity to decide how she wishes to utilize the commercial parking and concept 1 services, combined or not, for to reach optimal cost-efficiency with the current CFLP guidelines. Concept 1 can inspire and initiate new innovations through facilitating for co-creation and connecting different stakeholders and business partners.

Concept 2 has system changing potential, a good cost-efficiency rate for the craftsmen, and would address the majority of the challenges, but would functions counter-actively towards the system goal to increase car-free mobility, by acknowledging the service van as an needed requisite of the inner-city environment. The concept would re-introduce the vans more integrated in the city environment compared to the situation today, where the commercial parking spots are situated in clusters. Concept 2 has positive effects on the economic and social sustainability aspects. The concept revitalizes the desire of taking on jobs in the inner-city. This is positive for the clients, regarding the increased number of possible service providers, and having the nearby access to the van and tool shed can make the difference if a job is profitable or not for a craftsmen company with small margins. The concept 2 does not contribute with same potential as concept 1 in bridging gaps between different stakeholders that might elaborate in new innovations for city development and livability.

The conclusion is that concept 1, despite its number of risks, it has more potential for being a pro-active part to the CFLP transition and contributing to a less car-dependent inner-city from a long-term perspective.

12. Systemic Potential with Concept 1

This chapter supplements the impact and threshold analysis, and immerses deeper in concept 1 system effects.

12.1 From a Macro Perspective

Concept 1 has potential of inspiring and enriching Norway's initiatives to decrease the national and international greenhouse gases and contributing to increased livability with its larger cities.
As being one of the countries in forefront of implementing emission free measures, Norway and Oslo stand as an example for other countries (Oslo kommune, 2019C). Concept 1 presents services that question structural boundaries, regulations and mindsets, and promotes new ways of thinking with a focus on craftsmens service assignments in the CFLP area.

12.2 From a Meso Perspective

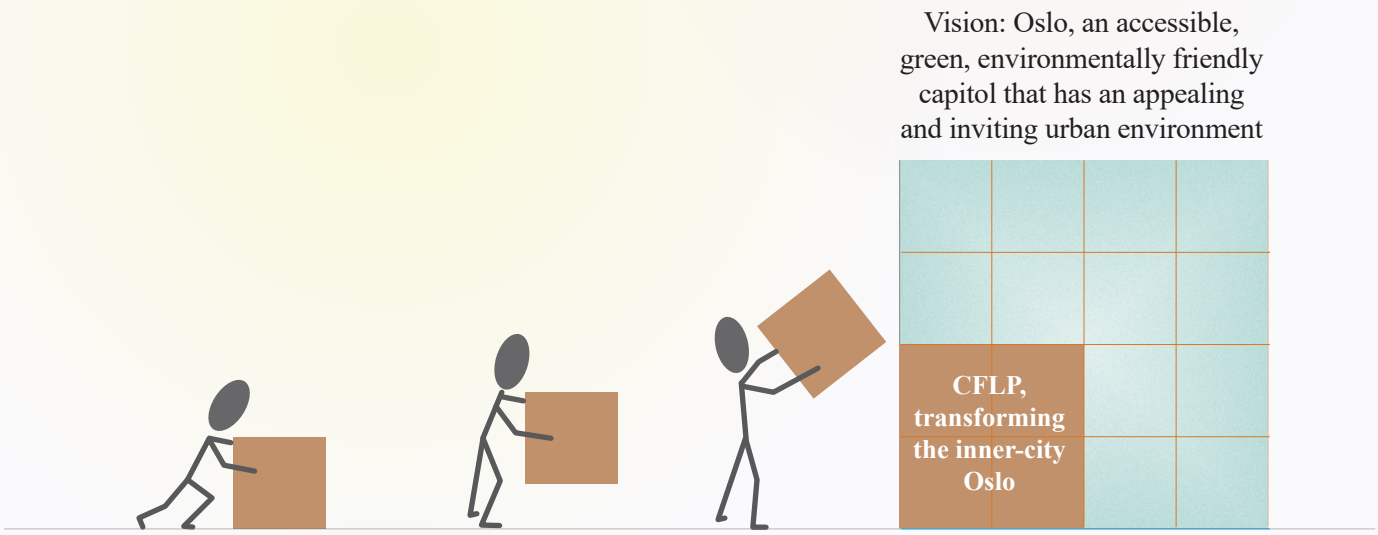
Concept 1 presents new options for both the craftsmen and the City of Oslo in how to address their challenges and reaching their goals.
Concept 1 can change system structure and change both the level and balance of stocks that are interrelated to the systems it affects. The imbalance between the systems is addressed with options that can equilibrate the vibration between the systems. The concept provides the systems an opportunity to align themselves to reach common goals but maintaining their respective system goals.
It presents services that have the potential to benefit both the livability of Oslo and CFLP goals, and the craftsmen's goals by letting the systems be reinforced by the concept, adjusting their balancing and equilibrating structures to a new level, welcoming the changes that has the potential to benefit the system. It can be seen as upgrading the systems with multifunctionality, that can help the systems to reshape and to overcome obstacles. This is connected to flexibility that concept offers and the resilience it can entail. The concept includes a wider range of options, when addressing the everyday challenges as a craftsman, and the CFLP livability. This has the potential of enriching the systems with diversity, adding new interconnections, making them more resilient and flexible. The concept has also the potential to remove some of the constraints, that is functions delaying, as e.g., the traffic pattern and parking of cargo scooters.

However, it is essential to highlight that, as the system interconnections grow in number, the resilience and amount of delay can be negatively influenced due to delays that are caused by the many layers that the system feedback travel through (Meadows, 1999). Therefore, it is important that the tools for streamlining an optimal flow and mitigating the possible information delay and rigidness of a system are utilized. The concept addresses this with offering an application with real time functions that can help plan and coordinate predictable delays in the inner-city movement.

The concept has good ripple potential and can bridge silos, creating new arenas for co-creation amongst stakeholders. The coupling has also the potential of showcasing self-organization and emergence within the systems when the interconnections start their own communication, creating new subsystems. This can be related to the description of innovation, being an experimental and co-creational process that demands openness, boldness, and willingness to take risks to develop and improve urban living (Oslo kommune, 2018B). The concept set an example that progress towards the CFLP goals can be done through new innovations and creating new patterns of behavior. The livability aspect of the CFLP can also be connected to the access and variety of businesses in the inner-city. The concept presents ideas that could have the potential of making the inner-city an appealing and beneficial place to have an office, sales points, and/or other facilities. This would be in line with the urban development and livability perspective in making the inner-city a more diverse place where people want to be and have the essentials nearby. So, the concept can have potential in connecting the outside and inside through initiating processes that brings value and possible synergies.

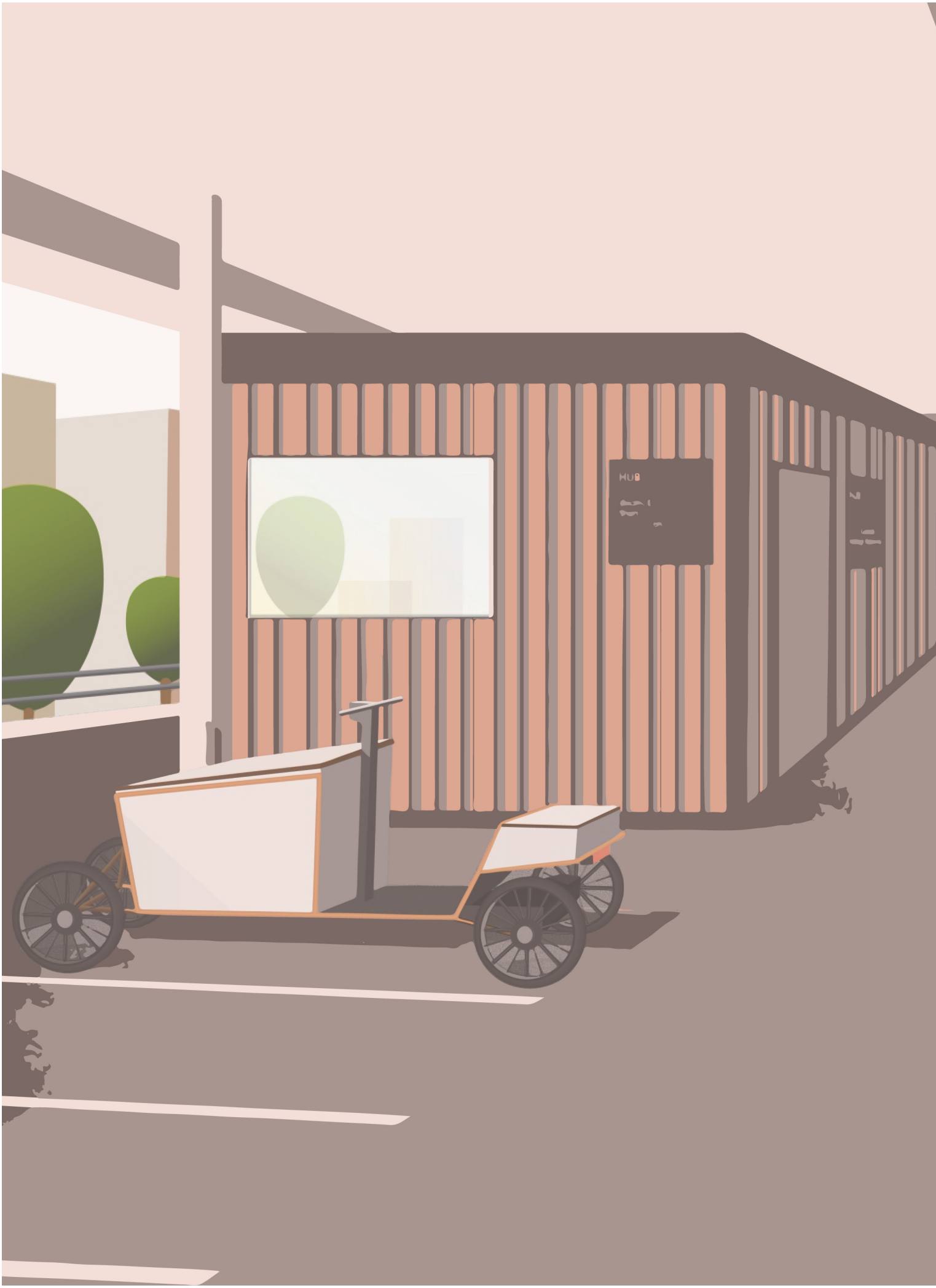
12.3 From a Micro Perspective

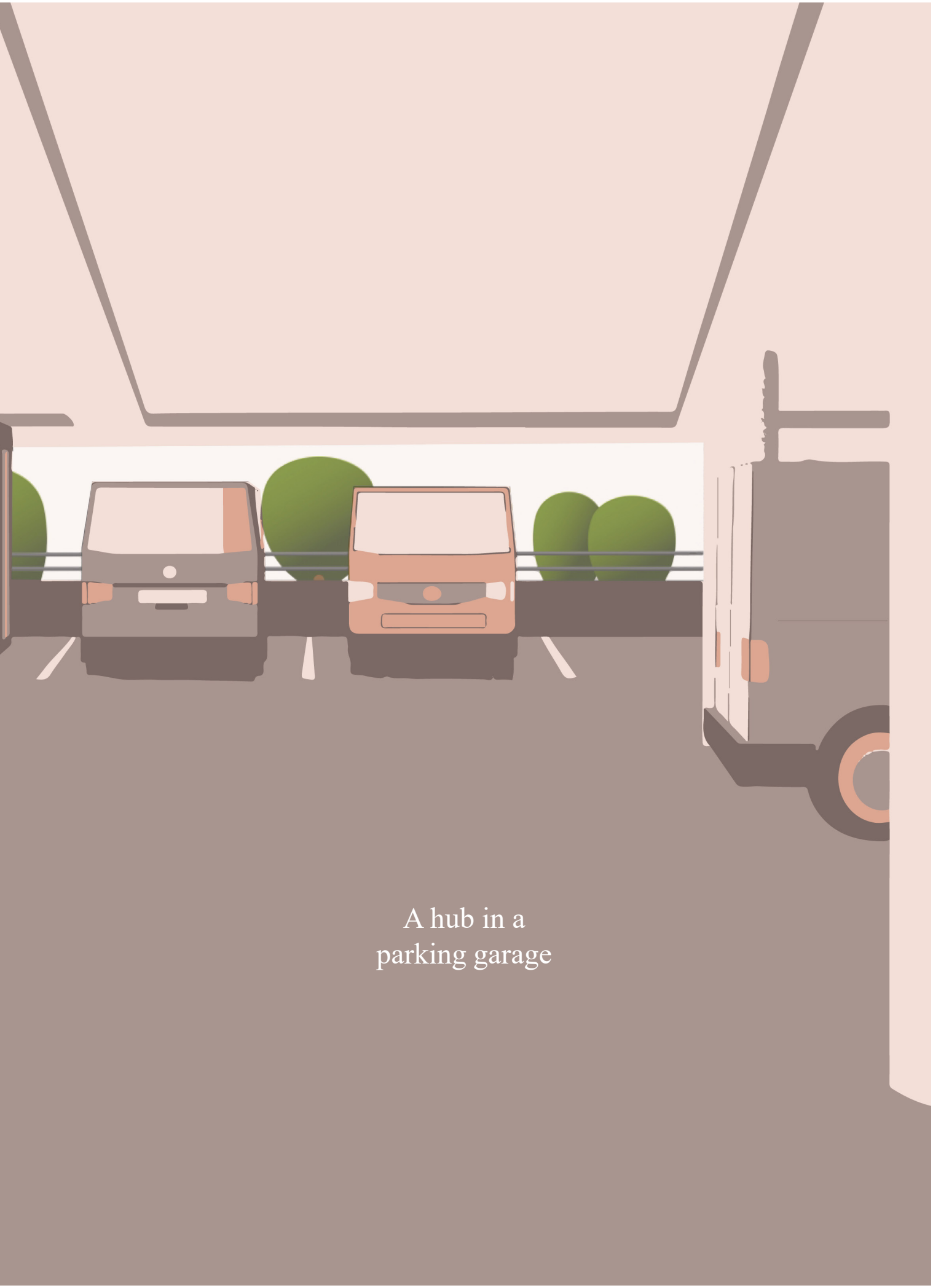
Our desired state is guided and influenced by our current view of reality. It can also be limited by our own view of reality, keeping the field



Craftsmen contributing to car-free livability in Oslo

of interest areas narrow, which might keep important, viewpoint broadening information hidden (Meadows, 1999). Concept 1 has the potential of interrupting the current view of reality and remove the blindfolds, as it offers and places the craftsmen in a situation of consideration, questioning assumptions. One of the situations is the consideration of the cost-benefit ratio in using for example the electric cargo scooter. What are all the things I can gain/ loose using it when doing service jobs in the CFLP area? This can be related with Hermsen (2015), who pointed out that attitude change and change in automatic behavior is not likely to happen through only providing new information. The cognitive biases and own subjective realities counteract the change processes. Therefore, does the reflective behavior, motivation, opportunity, and ability, play a key role in achieving the change (Hermsen, 2015), which concept 1 presents through its services when having the craftsmen questioning assumptions and reflect on their options regarding assignments in the CFLP area.





A hub in a
parking garage

12.4 System Dynamics with Concept 1

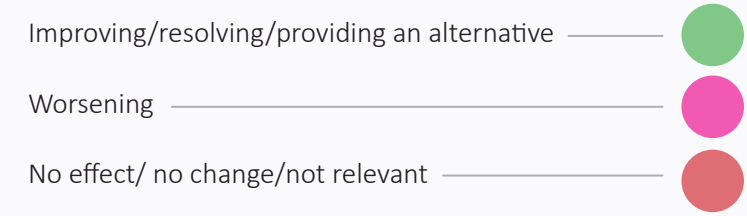
This chapter supplements the impact and threshold analysis, and immerses deeper in concept 1 system effects.

Possible system effects with Concept 1, if succesfully implemented in the CFLP system.

Improving/resolving/providing an alternative

Worsening

No effect/ no change/not relevant



- Increase flexibility in the craftsmen's system and the CFLP system
- Contribute to fixing the delays in the system regarding traffic and parking.
- Create "we" spirit and let the interested craftsmen in on the planning process.
- Bridge silos. Facilitate new arenas that generates emergent and new fruitful interrelations, both physical and relational, to solve or obsolete the parking and mobility issues for craftsmen in the CFLP area. Brake cognitive bias, through differentiating the relationships, opening for new things and relationships.
- Facilitate easy accessibility to tools and material under CFLP area assignments.
- Incentivize behavior and thinking that promotes new ways to achieve craftsmen's goals in the CFLP area.
- Create interest by demonstrating value. New resources from people, money, knowledge and/or technology.
- Interrupt the current view of reality and question assumptions and beliefs. Shed light on alternative ways. Expose craftsmen for situations of compromise.
- Facilitate for better framing and communication channels between craftsmen and the City of Oslo/CFLP to make the invisible, visible, mitigate possible frustration and promote pro-activity amongst the craftsmen.

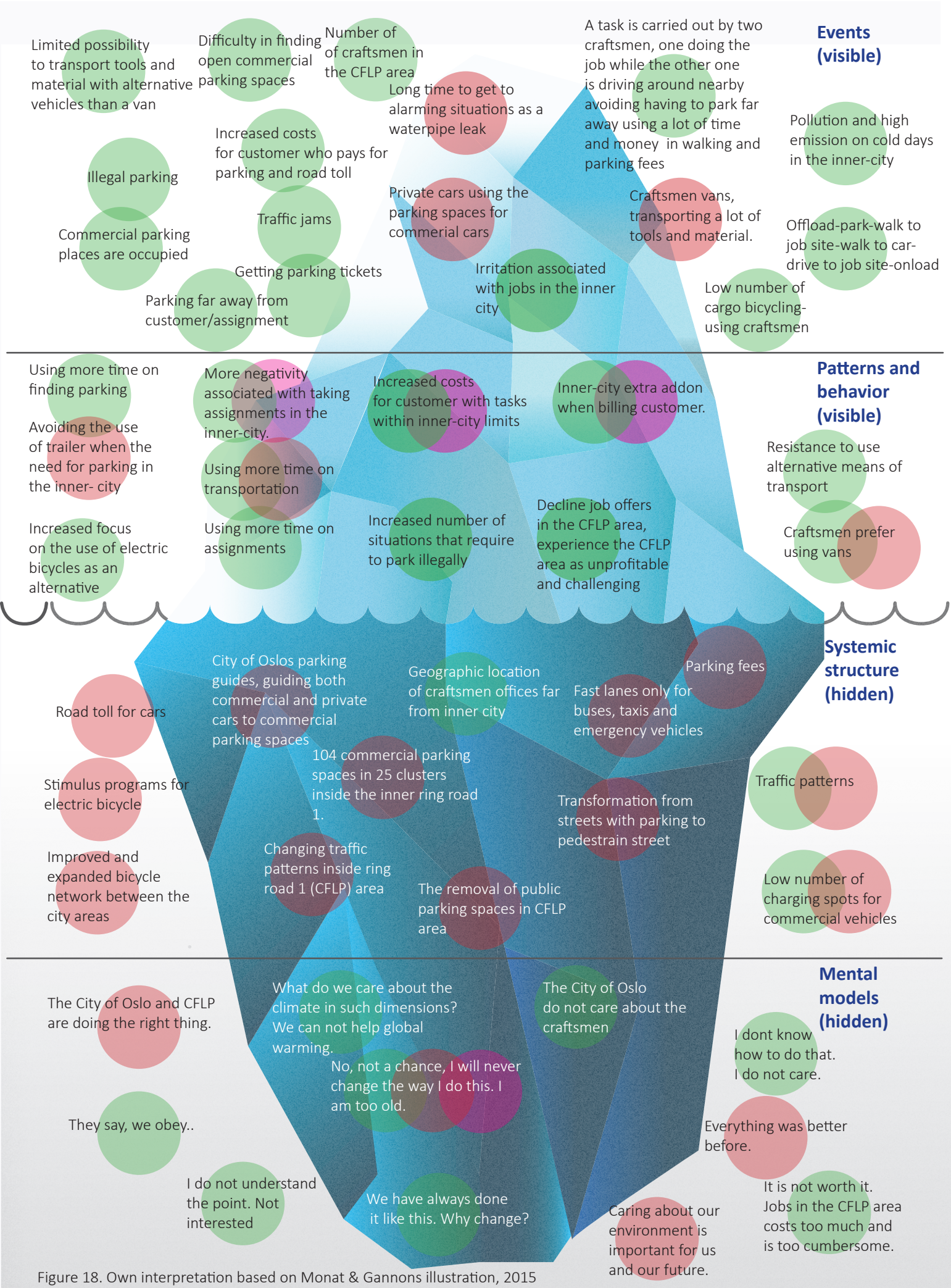


Figure 18. Own interpretation based on Monat & Gannons illustration, 2015

12.5 Concept of Operations Analysis

In addition to the impact and threshold map and impact risk-probability map, presented in the concept filtering process, it has been conducted a Concept of Operations Analysis (CONOPS). A possible realization of the concept can be jeopardized if aspects regarding stakeholders and the operational needs have not been considered or evaluated. Therefore, is an initial identification is done to get a better overview over the needs and possible challenges. The purpose of a CONOPS is to describe the proposed concepts operational needs, desires, visions, and expectations of the user without being overly technical or formal (Mitre, n.d). A CONOPS also describes the user organization, mission, and objectives from an integrated systems point of view and is used to communicate overall quantitative and qualitative system characteristics to stakeholders (IEEE, 1998).

Why:
Why this service is needed.

To offer craftsmen alternative mobility options to the van in the CFLP area that can be more cost efficient.

Offering the possibility to have the tools shed outside the assignment.

To make it more appealing to take jobs in the inner-city of Oslo for all craftsmen, increasing the diversity and range of craftsmen.

Make it easier to be car-free as a craftsman in the CFLP area.

To transport oneself quicker in the inner-city.

To promote car-free options as measure to decrease emissions, as well as contributing to car-free livability.

Presenting new ways of achieving value that benefit different stakeholders and the City of Oslo.

Who:
Who are the stakeholders involved in the system?

Decision makers
- City of Oslo
- Private parking facility owners
- Hardware suppliers and other possible suppliers
- Ruter
- Electric cargo scooters provider
- Craftsmen and potentially other service providers
- Transport businesses
- Investors

Users
- Craftsmen and service providers
- Hardware suppliers
- Transport businesses
- General public, using hubs to pickup their hardware that they have ordered online.
-General public who can visit different craftsmen or other trade representative at their inner-city hubs if they have for example a showroom showcasing different options of an item.

Potential other users if opened for access
General public who are in need of electric cargo scooters (extended grocery shopping, transporting large and heavy things)

Developing, creating the services
- Stakeholders
- UX, UI and graphic designers
- System, frontend & backend developers
-Investors and business partners
-Project coordinators and managers
- Service designers, product designers
- Business people/designers
- Legal experts
- Technology experts
- Marketing experts
- Urban development experts
- Architects
- Mobility experts

How:
What resources do we need to design and build the services?

- The approval and onboarding of the dominant systems City of Oslo, BYM and the CFLP, functioning as the main facilitators that drives and incentivises the changing process
- Stimulus program that can incentivize the use of the services. Tax reduction, number of commercial parking spots in the inner-city etc.
- Cost efficient alternatives that promote car-free livability
- Information from stakeholders
- Investors
- Facilities with good geographical locations to cover the CFLP area
- Charging points for electric cargo scooters nearby hubs and commercial parking
- Anti theft and geo block systems on cargo scooters
- Zoning plans and other permits regarding use of parking facilities and other inner-city areas as temporary offices facilities.
- The electric cargo scooters dimension approved as "micro mobility."
- People for design and development and building the physical constructions in addition to the list of people, see who
- Good collaboration and co-creation with different stakeholders
- Transport systems and service that supply the hubs and micro stores with supplies
-Marketing campaigns
- Electric cargo scooter suppliers who offer heavy duty scooters with good loading capacity.
- The transformation of several Metro carts (removal of benches)
- Digital application for the scooters, their rental and parking status and placement.
-A system over registered service/craftsmen companies that are eligible for renting electric cargo scooters.
- Digital applications for the facilities and companies that provide services for the craftsmen (and general public).

What:
What are the known elements and the high-level capabilities of the system?

The concept functions as a promotor for car-free livability and can incentivise craftsmen to be a part of the transformation, rather than a barrier against it

To offer car-free options that can be more cost-efficient in addition to the existing clustered commercial parking spaces. The craftsmen have therefore still the possibility to choose the most preferable way of transporting oneself.

To offer inner-city locations for craftsmen and hardware suppliers as an effort to "reintroduce" them in the urban landscape as a livability measure.

Capable of being a springboard to new innovations, collaborations and development.

Being and option for the companies that have not replaced their diesel vans before the suggested emission free areas are possible introduced in 2023 (Klimaetaten, 2021).

When:
What is the time sequence of activities that will be performed?

As the services promotes each other's offerings, it is preferable if the services are launched as close to each other possible.

Activities revolving the services involved in the concept are performed according to the respective service providers regulations.

Where: What are the geographical and physical locations of the system?

Inner-city Oslo and the Car-Free Livability area

Facilities that can offer a good capacity of parking that are situated geographically near the CFLP area with electric cargo scooter friendly distances.

13. Getting the Craftsmen Onboard

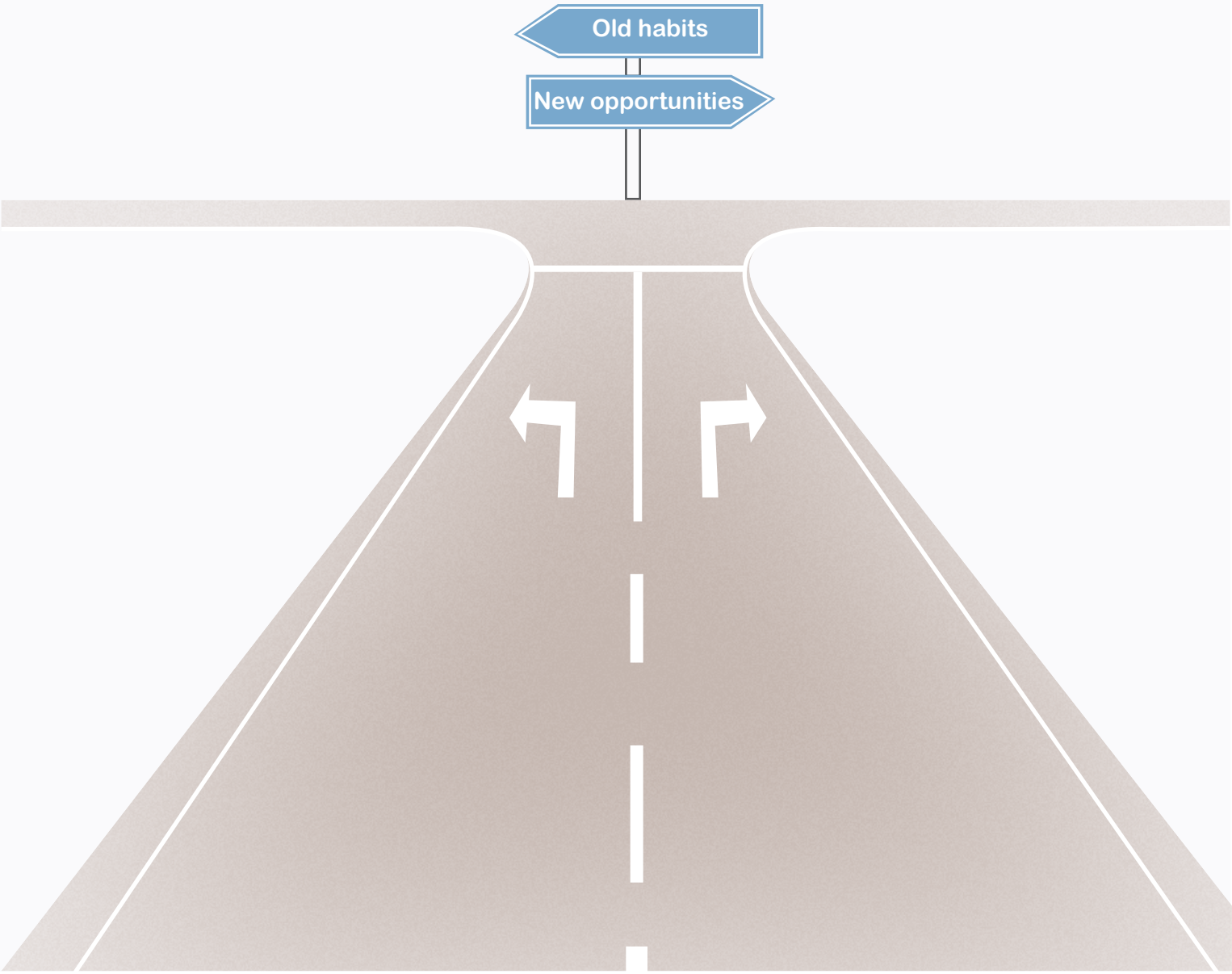
This part can be seen as a continuation to the **how** from the Concept of Operations analysis, that focus on how craftsmen and other stakeholders could gain interest in using the services. The aim is to showcase different qualities that can be utilized to persuade stakeholders.

A success criteria and essentiality for the concept to be implemented with success is that the craftsmen and stakeholders show willingness and interest in implementing and accepting the requirements of the concept.
As mentioned in the prior chapters, offering potentially cost-efficient alternatives can function intriguing and determine how craftsmen welcome and accept new services. Furthermore, can the own environmental footprint and decresing it through utilizing other options be a incentive. However, strongly rooted habits and mindsets can demand other persuasive measures to interrupt one's outlook on things. With referencing to Kahneman (2011), the risk is that the craftsmen go on "autopilot", using system 1 with a blindfolding effect that prevents her seeing new options. To start the reflective, system 2, one can have an advantage of persuasion. As Gulden & Moestue (2011) describes, "Persuasion principles can be understood as cognitive shortcuts that release a person to consider behavior in a certain context. Shortcuts are useful when important choices have to be made in an instant of time".
The ideal experience of stakeholders using the concept would be associated with pleasure and profitability while unawarely changing mindsets from deeply rooted habits. Norman's (2018) description touches this from an educational perspective by "people learn many things, if only they care about the topic. People are hungry for learning, as long as it isn't called education".
This could be interpreted as the craftsmen latent desire to learn, but both the situational context and the subjective self can frame it uninteresting or as Norman (2018) expressed it "education" if the craftsmen do not care about the topic.

There are some persuasion principles that can be utilized in a possible implementation phase.
One of the principles is the exclusivity and being scarce when for example there is only a limited number of a product (Cialdini, 2009). The electric cargo scooters are exclusively meant for service and craftsmen only. This could elicit a sense of exclusivity and pride being craftsmen and being highlighted in such manner. The persuasion could also be utilized through authority. It can for example be the compliance to authority figures even if people are asked to perform against their own will (S.Milgram, as cited in Moestue & Gulden, 2011). The authority can be portrayed as for example an owner of a plumbing business that forces his employees to use cargo bicycle.

"Once we make a choice or take a stand, we will encounter personal and interpersonal pressures to behave consistently with that commitment "(Cialdini, 2009). This presents commitment. It could for example be if CFLP and the City of Oslo did reward the craftsmen for having committed themselves in the transformation towards becoming more car-free. The reward in this context can be seen as a handling of reciprocity. The City of Oslo can feel obligated to give back and return a favor by for example offering electric cargo scooters for free in a time period.
One of the aims with the concept is that it would be easy to use and access the services, both physically and digitally application. This presents the persuasion of convenience, that can be connected with easiness, and simplicity (Fogg, 2003). Lowering the threshold for using the services are important, which means having easy digital applications and easily accessible locations and systems regarding the electric cargo scooters, parking, and hubs.

Other important persuasion principles are social proof and liking. We tend to examine each other to get social confirmation that we are doing as "normal". Cialdini (2009) explains, "we view a behavior as correct in a given situation to the degree that we see others performing it".
The power of liking can also be a determinant for our actions (Cialdini, 2009). Liking is connected to the we ourselves in others, the similarity, or the desire to be as others (Cialdini, 2009). When put into play, the stakeholders could through marketing campaigns and piloting projects have craftsmen participate in the services offered through the concept to attract and create an interest for the other craftsmen through social proof and liking principles.


Old habits
New opportunities

14. Conclusion

Through the Car-Free Livability Program, policy makers set the frames and systemic structure that influence the craftsmen's trade. The CFLP strategy, working towards increasing the urban livability in Oslo city, has turned the philosophy of city planning upside down, decreasing the significance of cars in the urban environment. This has led to new systemic settings, even if the elements and interconnections are the same as before. It is especially the changed traffic patterns, removal of public parking possibilities, and limited commercial parking situated nearby the assignments, that has influenced the craftsmen. The CFLP transition has caused an oscillation between the subsystem (the craftsmen) and CFLP system. The craftsmen's system structure, mindset, accustomed way of handling and desired level of convenience, are not in line with the dominant CFLP system. However, craftsmen are forced to finding ways to integrate and adapt, decreasing the vibration, and getting in line with the dominating CFLP rules if they wish to conduct assignments within the CFLP area.

The situation is cumbersome. Both systems are focusing on their desired system states and goals. The CFLP focuses on car-free livability, whereas the craftsmen on serving their clients in the CFLP area in the best possible way, while making a profit. The systemic structure of CFLP has prolonged the craftsmen's assignment in the CFLP area due to the increased time used in traffic and searching for parking. This has resulted in increased costs for the clients and lower profit for the craftsmen. Many of the craftsmen interviewed reported that conducting assignments in the inner-city area has become worse after the CFLP initiation. Several car-using craftsmen's businesses have decided to decline assignments in the inner-city due to its troublesomeness regarding profitability, time use, efficiency, parking and nearby access to tools and equipment.

Many of the car-using craftsmen imply that the City of Oslo's facilitation for sufficient commercial parking in the CFLP area is inadequate. The craftsmen need to have their van nearby. The van is synonym to their tool shed for most craftsmen. Allowing this would imply reintroducing commercial parking in a more systematic manner, placing parking spots throughout the inner-city, in addition to the parking clusters, as the situation is today. This is not in line with the car-free livability perspective, where removing parking is essential for giving space to urban activity.

Mitigating the negative consequences as for example the "added inner-city cost" and the possibility that CFLP becomes an area where only some craftsmen offer their services, is important. The profitability and livability are aspects in respective systems that are reliant of each other and are important system entities for reaching a functioning and sustainable inner-city Oslo. It is highly beneficial if CFLP and the craftsmen could be more forthcoming in achieving a common goal maintaining their respective system goals.

In this master's project I have addressed this issue from a systemic perspective, using a system-oriented design approach. I have focused on gaining knowledge of the matter through identifying and analyzing systemic structure, levers, and intervention points in the first part. In the second part of the thesis, I have utilized the gathered insights in developing ideas. The systemic potential of the concepts was analyzed, in addition to shedding light on initial risks and on persuasion principles. Furthermore, I have identified the interconnected systems and stakeholders that has the power and can influence the concepts future success or failure. This project shows that the key player in the system is the City of Oslo/BYM/CFLP, that creates the context in the CFLP area by setting the systemic structure for reaching the CFLP goal. This indicates that having the City of Oslo onboard regarding future development is crucial on a systemic level for the success.

The proposed concept focuses on changing the system structure for craftsmen. The concept includes ideas that revolves around facilitating car-free mobility, using hubs, electric cargo

scooters, delivery services, and a designated craftsmen's cart on the metro as means to decrease the reliance of the van in the CFLP area. One of the main targets is that the concept would facilitate for making it easier and more appealing to choose car-free alternatives when conducting assignments in the CFLP area. The concept and its services provides a platform for reshaping the systems to benefit the craftsmen's profitability and their contribution to Oslo's livability and environmental footprint. The concept offers flexibility to the craftsmen's system, providing a greater range of options when conducting assignments in the CFLP area. In addition, the concept and its services can function also as a platform to potential cross-disciplinary collaborations, presented e.g., in the hub, micro-terminal, micro-office in parking facility service. This includes bridging silos, creating supportive relationships, and planting a seed for future ventures, that potentially increases the system resilience, in being a flexible and dynamic system, especially as the CFLP area is expanding, creating a need for new innovations.

The main contribution of the project is to present the systemic challenges, possible intervention points and concepts, through which the systems can be altered to benefit both the craftsmen and the CFLP transformation. The proposed concept, even though its hypothetical nature, can appeal to the City of Oslo, the craftsmen, and other stakeholders as an interesting option to take a part in the CFLP transformation.

Suggestions for Further Research

A natural point of entry for further investigation would be to study the feasibility of the concept and its services. Putting the concept into practice would demand approval, onboarding thorough preparation and "groundwork" from all the interconnected stakeholders. A task as such would include co-creation and the involvement of cross-disciplinary stakeholders that represents the different trades regarding the various services. The cross-disciplinary verification and further development would address the concepts constraints and feasibility from different perspectives. Other suggestions connected to the implementation strategy are the utilization of anticipation and participation strategies and customer product attachment and engagement.

As the framework for this project included only three craftsmen's trades, it could also be interesting to investigate the entanglement and complexity regarding the CFLP and its subsystems from a wider perspective. I believe that there are latent and hidden system properties that have the potential to stress the systems additionally as the number of trades increase and the CFLP area expands.

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