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Learnings from Finland - Proposals for Demand Responsive Transport and Mobility as a Service

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Final Report 12.11.2024

Abstract

As a part of the European Commission initiative Intelligent Cities Challenge (ICC) cities receive one-to-one strategic advice from international experts supporting cities on the green and digital transition and advancing a Local Green Deal (LGD) to accelerate and scale-up a city's green transition. This report synthesizes the insights and experiences derived from a sequence of initiatives and pilot studies focussing on Demand Responsive Transport (DRT) and Mobility-as-a-Service conducted in Finland to identify bast practices but also pit falls, reasons for failure and learnings what to avoid in Trikala.

Key proposals from the report include focus developing open-for-all Demand Responsive Transport and channelling social sector passengers to save costs, and how the existing taxi and public transport services could be developed to facilitate the MaaS-approach and the Local Green Deal principles.

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Introduction and Identified Challenges

Introduction

In Finnish rural areas, organizing mobility services is challenging due to long distances, sparse and fragmented population, as well as thin flows of goods and people. Public transport is heavily subsidized, and supply is often lacking. Mobility services and logistics are often organized separately, for example including school transportation, transport services under the Social Welfare Act (SHL), the Disability Services Act (VPL), and the Health Insurance Act (SVL), as well as municipal freight transportation. Due to urbanization and demographic changes, it is increasingly challenging to provide mobility services efficiently for a decreasing and aging population in sparsely populated areas. Additionally, the public sector's budgetary and environmental goals bring extra challenges to the organization of transport services in rural areas.

Since the year 2000, Finland has undertaken a variety of initiatives to improve transport services especially through demand responsive transport (DRT). Such activities have included for example introducing Travel Coordination Centers for organizing transportation services with the focus on combining separate trips into a single transportation service to reduce costs and environmental impact.

Finland has conducted numerous pilot programs and studies to test the feasibility of different transport consolidation models and DRT services with varying aims, and evaluate their impact on service quality, cost-saving, and environmental sustainability. The following ones are probably the most relevant and famous ones:

- Sampo-traffic was a DRT service tested in late 1990’s in the key municipalities of Keski-Uusimaa—Järvenpää, Kerava, and Tuusula—for over a year. As a form of DRT, Sampo-traffic was not based on a fixed schedule and route like traditional public transport. Instead, passengers could book their trips through a call center or potentially an electronic system, and the routes of the vehicles were dynamically adjusted based on the bookings received.
- Kutsuplus was an innovative ride-pooling service piloted in Helsinki by the Helsinki Regional Transport Authority (HSL) between 2012 and 2015. It allowed users to book rides through a digital platform, with routes and schedules dynamically generated to meet user demand.
- There have been various legislative changes aiming to make transportation services more inclusive and efficient, such as integrating different transportation laws to simplify and homogenize the service across the country.
- Healthcare, social welfare and rescue services has been reformed so that wellbeing services counties (Hyvinvointialue in Finnish) have taken the responsibility to organize services including transport services under SHL and VPL. SVL-based transport services are still organized by the Social Insurance Institution of Finland (Kela).

Introduction

Another mobility-related concept that has been driven from and in Finland is the concept of Mobility-as-a-Service (MaaS). MaaS combines mobility services from various transport service providers and aims to provide holistic travel options by integrating information, booking and payment for travellers.

The effective integration of new mobility services with public transport can strengthen the combined capability of these modes to replace travelling with personal single-passenger cars, and in turn help new mobility make a positive contribution to transport's environmental performance, rather than a detrimental one. The effective integration is exactly the main goal of MaaS to decrease the dependency on private cars and enabling shift towards sustainable modes of traveling.

Finland has been a pioneer in the development and implementation of MaaS and undertaken several initiatives to foster the growth of MaaS:

- Legislative Support: Finland introduced legislation that requires transport service providers to open their APIs for ticket and payment transactions, which promotes interoperability and eases the integration of various transport modes into single MaaS platforms.
- Whim App: The first of its kind, Whim was a notable MaaS application developed by the Finnish company MaaS Global focusing mainly to provide subscription "MaaS Packages", where some of the modes, if not all, are included on an unlimited basis with only a few limitations such as capping the number of trips or length of the trips.
- Pilot Projects: Various pilot projects have been conducted to test and improve MaaS models. These pilots have often been carried out in collaboration with cities, transport agencies, and private sector providers.
- National Collaboration: Finland has encouraged collaboration between cities, businesses, transport authorities, and technology firms to create an ecosystem that supports MaaS development.
- Research and Development: Finnish research institutions have been active in exploring the technical, social, and economic aspects of MaaS, helping to develop innovative solutions and deepen understanding of its implications.

These efforts have positioned Finland as a leader in the MaaS industry, shaping how transportation services can be consumed in the future and providing insights that other countries can learn from in developing their own MaaS solutions.

Identified challenges in DRT

In rural areas, taxis predominantly drive trips funded by the Social Insurance Institution of Finland (Kela) and municipal-subsidized trips including school rides and trips under the Social Welfare Act (SHL) and the Disability Services Act (VPL). An aging population has led to a surge in both the frequency and cost of these services. Municipal budgets are overstretched, which leads to compromises in public transport. This in turn intensifying the dependency on private cars and mopeds.

In the early 2000's, the Finnish Government had ambitions goals to save on costs of transport services under VPL and SHL. This resulted in widespread opposition from customers who were used to monthly individual transportation by taxi paying only the deductible. As a matter of fact, it can be stated that it is difficult to give up the advantages achieved and that achieving savings by combining the transportation of the most severely disabled people is difficult if not impossible.

In South Savo, the initial plan was to pilot a service including VPL- and SHL-based trips and direct fare-paying clients to same transport services. However, enlisting taxi operators for the pilot proved extremely difficult, complicated further by pre-existing contracts that specified operational systems and precluded the use of piloted systems.

Typically, Demand Responsive Transport (DRT) services are planned to cater to the routine errands of the senior population a few times a week (Service Transport), which means often operating with only one or two vehicles during the limited hours between 9 and 16 and serving different regions on alternate days. Even if this suits well the Service Transport and needs of target customers, the limited supply does not meet the needs of commuting or the youth. Furthermore, while the predictable schedule allows for advance planning by Service Transport users, the supply is unequivocally insufficient to attract wider use base.

Funding in municipalities is disproportionately allocated across different Service Transport services and specialized transports rather than financing a comprehensive and good quality open-for-all DRT that accommodates wider spectrum of demographics. So, instead of providing the Service Transport, it could be possible to retain viable public transport services in rural areas with the help of DRT.

Learnings and Best Practices in DRT

Learnings and Best practices – DRT and social sector transport services

In the early 2000's, Finnish Government had ambitions goals to save on costs of social sector transport services under the Disability Services Act (VPL) and the Social Welfare Act (SHL). This resulted in widespread opposition from customers who were used to monthly individual transportation by taxi paying only the deductible and disabled rights organizations. As a matter of fact, it can be stated that **it is difficult to give up the advantages achieved and that achieving savings by combining the transportation of the most severely disabled people is difficult if not impossible.**

One approach is to **open rides designated for social sector clients to other passengers**, leveraging the already funded empty seats in these services. While technically feasible, this approach encounters several practical hurdles. For example, if municipalities pay for social transports based on the number of trips and have a known user base with a fixed quota of ride entitlements, opening unrestricted booking to the public would make it challenging for municipalities to forecast costs. This predicament was echoed in the Alpio project, which didn't offer completely unrestricted access to other customers despite the technical capability. Also, real-world trials in Sastamala, Ylöjärvi, and part of Mikkeli hint at technical feasibility, but ingrained habits and protocols pose significant hurdles.

Transport services in accordance with the Disability Services Act and the Social Welfare Act are provided to individuals who are **unable to use public transport services**. Fundamentally, the purpose of these services is to substitute for public transportation, not to provide individual transportation services. We should note that public transport isn't always available 24/7 and it is reasonable to expect that social sector clients do not always require personal transport for medical reasons. Choices remain for those desiring additional comfort, albeit at their own expense.

DRT provides opportunity to offer an accessible public transport alternative, which allows more people to use public transport. **An economic interest arises from the fact that the need to grant more expensive rights can be reduced and deferred.** Thus, what is common to many successful DRT services is that they replace something that is even more expensive.

Achieving these cost saving require **inter-agency coordination** as various public stakeholders (municipalities, welfare region, KELA) are responsible for organizing separate transport services.

Learnings and Best practices – DRT and public transport

In many cases, the only viable option for renewing and enhancing the personal transportation in rural municipalities is to invest in developing open-for-all DRT services. Flexible DRT is probably the backbone of the future public transport systems in sparsely populated regions and allows for viable service levels without a significant increase in costs. DRT opens a possibility to revive public transportation in areas where people have resigned to the fact that there is no real alternative to relying on one or several cars per household. However, to have viable open-for-all DRT system long-term, there needs to be **initial investment to the supply to get it familiar to people and independency from the complexity of social sector transports to have high-enough service quality.** After that it will be easier to start reforming practices to guide different customer groups to it.

When planning a DRT services as an open-for-all public transport service, it is critical to first consider who are the **target client segments**. Is the services aimed for people for constraints in mobility such as the elderly who are typically also independent from family and work dependencies. Or is the aim to provide service for segments that are either family dependent or work dependent or both and have different requirements for the service characteristics.

Maybe a DRT service cannot be relied on for regular activities if the ride is confirmed merely hours beforehand based on if there was need for social sector transports or not. When chaining trips and planning a connection to train services the need is more than just last-minute confirmations. **The assurance of a guaranteed ride is vital.** It is also unreasonable to expect people to abandon private vehicles if public transport options are sporadic and unpredictable.

Rural municipalities must optimize their transit services to maximize existing resources. Affording luxuries to a select few could deny adequate services to others. Currently, inclusive transport services in rural communities are minimal compared to specialized group transport, posing a significant challenge to equal access.

Learnings and Best practices – Service Characteristics

Operational model of the DRT service (free-floating door-to-door, free-floating stop-to-stop, flexible route, fixed route) should be carefully considered and potentially vary depending on the user groups. For example, the public may use stop-to-stop services, while certain special groups could have the privilege of door-to-door reservations.

To enable free-floating operational model in rural areas, one effective approach is to **serve different areas/directions on specific days** of the week ensuring that each area has access to the services of the urban core at least once or twice per week. Often, for the service viability, a minimum of two vehicles during office hours is recommended.

Scheduled stops is a good solution to limit the supply in services with a large service area. For example, in the DRT service in the City of Porvoo, starting and ending the operation in schedules points has proven to be efficient solution.

Some kind of **pre-booking** time is typically needed for DRT services. In the Porvoo service, 5-minute minimum pre-booking was used. Earlier, it was typical to require bookings 2 hours before or even the previous day to enable static optimization (during the nighttime). However, nowadays that long pre-booking times are rarely needed anymore. Typically, it is also good to set a maximum pre-booking time to a month as long pre-bookings easily lead to no-shows that disrupt the service.

Recurring bookings is often requested feature by the clients, but those are typically challenging from the operations point of view, as was also noted already in SAMPO-traffic.

Stop-to-stop model is typically much more efficient than door-to-door. However, especially if open-for-all DRT is aimed to provide service also for special groups, it is probably good to enable door-to-door as a service mode for restricted group of users.

Allowing general user access to book rides only a few hours prior to departure when it is scheduled by a social sector client, is not a sustainable solution. Regular users, such as students needing transport for extracurricular activities, cannot operate on such uncertainty. Similarly, those requiring connection services to train stations must have the assurance of available transportation in advance. The sporadic nature of these services means that personal vehicles remain indispensable for reliable mobility.

When considering the service area, **controlled experiments**, beginning in smaller geographic areas and potentially expanding based on demand and operational capacity, could pave the way for sensible integration. Consideration of the vehicle fleet size, service area boundaries, and connections to long-distance transit are essential.

Learnings and Best practices – Procurement

Social sector transportation procurements often involve substantial volume and therefore require specialized procurement expertise. Bigger geographical areas, such as wellbeing regions, should collaborate in transport service procurement to leverage scale.

When procuring dispatching system and transport operations, separating these services into individual tenders is recommended. This ensures that operators have the motivation to optimize transport efficiency while also potentially reducing conflicts of interest.

Sometimes it is beneficial to separate procurement of the open-for-all DRT system from the procurement of the dispatching system for social sector transport services to avoid limiting technological solutions to the capabilities of current dispatch systems. Social sector transport services also often require phone booking, which is not anymore always a necessity in app-based DRT services.

However, when procuring the dispatching system for the social sector transports, one should include in the contract the booking center activities for DRT at least as a contract option. The dispatching systems can be separate for social sector transports and DRT as it is anyway easier to have one person handling two dispatching systems than one dispatching system handling two different client needs and operations. It should be also noted that in some DRT pilots in Finland there have been challenges to handle two dispatching systems at the same time and especially drivers have had challenges to manage two separate systems, one for regular trips and one for piloted service.

The planning of procurement should be started from the requirements of the open-for-all DRT as an overarching system can then accommodate various user needs efficiently and potentially reduce requirements in the procurement for the social sector transports.

Rural municipalities could consider compensation models for taxi services that ensure vehicle availability, potentially paying for vehicle standby time to guarantee service reliability.

Before committing to substantial transport or system procurements, municipalities would benefit from a strategic pause to simulate integrated transport scenarios. In Finland, there are good examples where such preparatory work have revealed potentials for cost-saving and uncover the nuances of managing a fleet in a unified DRT service. The goal is to extrapolate an optimal service model, balancing the fleet size, service hours, coverage area, and the proportions of trips best served by taxis or other means.

Commercial operators have experience, capabilities and (simulation) systems for planning operational models and service characteristics. However, there are good experiences when public entity has used objective consultant as the middleman between them and commercial operators.

The simulations have also aimed to answer how DRT could be funded with current cumulative budgets or, alternatively, how much could be saved.

Learnings and Best practices – Technology-related notes

Technological barriers no longer stand in the way of implementing an efficient DRT system. Modern applications can bridge the gap between traditional taxis and public transport by offering door-to-door services, real-time tracking, and automated dispatch—key features that enable a DRT system to serve a wider audience efficiently. It is probably impossible to reach wider user groups just by relying on phone bookings.

Technology enables tailoring prices based on client segments and time of day, which might be one key aspects when aiming for viable DRT service provision.

In low demand services, it is important that the dispatching system is able to allocate trips to next available free times if the trip request cannot be served within the certain amount of time, such as 1,5 hours, which has been defined in the service description.

Continuous monitoring and data analysis are essential for optimizing routes, schedules, and overall performance.

Municipalities should consider the benefits of unifying transportation budgets across different services to enable an expansive, modern DRT system that could serve a broader segment of the population more effectively.

What to avoid in Trikala

As Trikala learns from the Finnish experience, the goal will be to avoid pitfalls that impede the seamless incorporation of DRT into the existing transport ecosystem, such as adhering too rigidly to established practices, underestimating the complexities of service integration, and failing to secure stakeholder buy-in. The insights gleaned from Finnish initiatives can guide Trikala in designing a more inclusive, flexible, and optimized transportation network that resonates with both the community's needs and sustainability goals.

Market-driven DRT has been tested in Finland, with varying degrees of success. The challenges often lie in the reluctance of taxi companies to adapt their services to suit the DRT model, which requires significant investment and a shift in business strategy particularly in sparsely populated areas where achieving the necessary scale for operational viability is tough.

When planning a DRT pilot, it is key to **consider existing contracts and limitations they bring**. For example, in South Savo, it was planned to include VPL and SHL trips to the pilot and combine self-paid trips to transports. However, it turned out to be challenging to get taxi drivers to the pilot. Also, existing contracts defined what kind of dispatching system is used for the trips and thus the contract didn’t allow the use of the piloted system.

Especially in recent years, there has been fierce price competition surrounding the operating rights of public services. This has at worst lead to situation where **public services, like transport services under the Social Welfare Act, the Disability Services Act and the Health Insurance Act (SVL), compete against each other with price.** The ordering party that initially seems to have gained an advantage with the lowest prices ends up facing capacity problems since transport operators prioritize services with higher prices.

Separate budgets for transport services in municipalities’ sectors (school, social, transport) might inhibit the integration of services and the development of efficient open-for-all DRT systems.

What to avoid in Trikala - Procurement

As already mentioned in the recommendations, a typical pitfall has been to procure the dispatching system and transport operations from the same provider and thus limiting the provider's incentive to optimize routes and schedules.

Social sector transportation often involve substantial volume and therefore also require specialized procurement expertise. **However, focusing solely on high-volume social sector transportation contracts can overshadow other transport needs like open-for-all DRT and limit the overall efficiency and quality of transport services provided.** Often the procurement experts lack expertise on taking the requirements of DRT into consideration as a part of the procurement.

If the priority of the procurement is to procure a system for social sector transports, a system for social sector transports will be got and typically systems for school transportation and Service Transport will remain in own (procurement) silos. The development of open-for-all DRT gets overlooked, and the system procurement is centred around a booking centre that receives phone orders, enabling conventional taxi bookings and managing travel entitlements.

In open-for-all DRT important aspects are app-based booking, integration with other mobility services and modes, and efficient and automatic ride-pooling or flexible routes. It is very challenging to focus on these elements if the starting point is to procure social sector transports.

Options and benefits of the Mobility-as-a-Service approach

Scoping

Trikala aims to provide a Mobility-as-a-Service layer on top of the existing taxi and public transport services with the aim of reducing private car dependency and increasing the use of sustainable mobility.

Demand Responsive Transport (DRT) in its many forms is one of the key components under the MaaS umbrella with the aim of providing more cost-effective and sustainable service than taxi through shared mobility and at the same time providing higher-quality public transport service than the traditional fixed line and fixed schedule public transport answering better the needs of current private car users. Thus, in Trikala also it is relevant question how the existing taxi and public transport services could be developed to facilitate the MaaS-approach and the Local Green Deal principles.

The section aims to suggest options for accelerating and developing the current services and describe potential benefits.

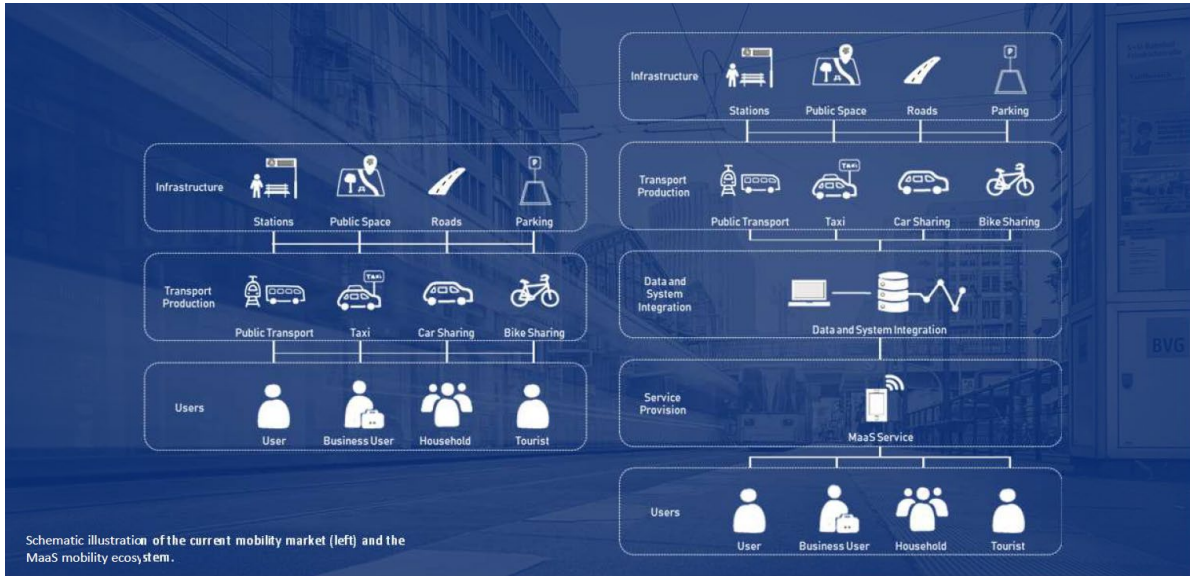
MaaS integration levels:

Integration of policy & control: Incentives and instruments (from the public sector) integrated in agreements and the service. The purpose is to steer towards the city's/public sector's objectives. Conditions for resale of the public sector's services.
Integration of agreements: Offer alternatives to car ownership. Subscription or packaged. Responsibility for the entire service. In relation both to customer and transport service provider. Combined payment for all services. Focus on household mobility requirements.
Integration of booking/ticket/payment: Booking of and payment for services integrated in a service/app. No responsibility for the travel services, but for payment. Focus on individual journey A to B.
Integration of Information: The services integrated at information level (e.g. multimodal travel planners). Users have agreements and relationships with various transport service providers. Separate payment solutions.
No Integration: Separate mobility services. Users have agreements and relationships with various transport service providers. Separate payment solutions.

Developing the MaaS layer

One aspect in MaaS is the operational model, which links to the additional complexity in the market value chain compared to the traditional mobility market (see picture on right and for example EMTA 2019). This value chain includes the five functions of Infrastructure, Transport Supply, Data and Systems Integration, Service Provision and Users, where various public and private stakeholders fulfil these functions together forming the MaaS ecosystem.

As in Trikala the aim is to provide a MaaS layer on top of the existing taxi and public transport services and enable combining other transport modes potentially provided by private mobility service providers such as share e-scooters, shared bikes and car-sharing, most logical MaaS operational model is a partnership model (public infrastructure for open market), in which Trikala as the public entity takes on the data and system integration role, providing a public digital infrastructure enabling commercial service provision for private transport service providers. Trikala either operates the MaaS service itself or licenses operations to a private company for a certain time period. This model can leverage the strengths of both sectors – Trikala as the public sector can establish the goals and framework for MaaS, such as ensuring equitable access and integration across services, while private providers innovate and manage day-to-day transport operations. Trikala oversight ensures that the societal goals of MaaS, such as sustainability and inclusivity, are prioritized within the operations carried out by private entities.



Schematic illustration of the current mobility market (left) and the MaaS mobility ecosystem.

Trikala can use mechanisms in addition to regulation such as subsidies and other incentives to monitor, manage and control mobility services provided through MaaS.

Developing the MaaS layer

Based on the proposed MaaS operation model and the aims for the MaaS, the most important level of integration is the **integration of information**, i.e. the multimodal journey planning functionality in the MaaS service and focus on developing the existing transport services to work well with the integrated information.

Naturally, from the end user point of view, it would be important also to advance the integration of booking, ticketing and payment to have a seamless service in those regards. However, this is still secondary to the integration of information especially if the existing systems of private operators prevent efficient integration.

Data can be one of the most valuable resources when providing tailored high-quality services. Adding **advanced analytics on top of data** provides opportunities to develop prediction, optimization, recommendations and user preference detection systems that improve the service experience. As such, data and analytics should be included as a cross-cutting block in the MaaS architecture. The MaaS platform must have real-time access to numerous data sources including user preferences, trip requests, unusual events during journeys, contextual data, vehicle telematics, etc.

The main technological requirement for MaaS implementation is the provision of Application Programming Interfaces (**APIs**) from transport service providers, but also from other relevant stakeholders such as relevant infrastructure operators.

One potentially relevant component in the MaaS services is to use the collected data to build a **demand prediction system** that would benefit in long term all transport service providers when planning supply in the long-, medium- and short-term.

MaaS service include similar questions that have been mentioned already in the DRT context, such as how to make **pre-bookings** through the MaaS service if pre-bookings are not allowed in the underlying transport services. Can, for example, the MaaS system guarantee a pre-booked taxi ride if there is not guarantee from the taxi operator. This aspect probably prevents ordering recurring trips through the MaaS service.

To have MaaS to contribute to the reduction of negative transport externalities, MaaS should support the reduction of car dependency and enable the effective use of infrastructure, sustainable modes and shared services. The users should be allowed to make their own, well-informed choices based on real-time mobility options and their price. It is, however, still relevant to consider if Trikala has **possibilities to impact the mode choice**. This might include for example subsidising the price based on the efficiency of the mobility solutions or using information and gamification* as a part of the MaaS application to guide users to save mileage or directly emissions.

*) An example of gamification is to add a module to the MaaS applications that motivate users to shift towards greener mobility such as Reward by MotionTag.

Developing taxi

A key focus of the MaaS architecture should be on how to integrate taxi services. This means, for example, that the taxi dispatching systems will need to communicate with the MaaS system to enable dynamic routing based on multiple constraints, adapt to (near) real-time changes and, in the end, provide the best option for trip requests.

One potentially relevant MaaS feature is **trip guarantee**, significantly enhancing user trust in the service. It would ensure that mobility services are not seen as separate entities but as interconnected parts of a single, cohesive, and dependable transportation network. For the guarantee of trips as part of MaaS, taxi could operate as a backup service to ensure that users will reach their destination even if there are disruptions in their planned service using public transport. This means that the MaaS provider would arrange for a taxi to complete the affected portion of the trip, ensuring reliability and maintaining a high level of service continuity. The feature could be also paid by the user in case of missing public transport connection due to being late from the stop.

Another possible development path is to use the concept of **Mobility-as-a-Feature** (MaaF) as a part of MaaS, integrating taxi services into other domain services like insurances or hotel bookings (see for example Hensher and Hietanen 2022).

MaaS can promote **transition to a fully electric or hybrid vehicle fleet** to reduce emissions by either prioritizing EV-taxis when presenting taxi options to the user or including information of the EV-taxi availability to promote the use of EVs. The same logic can be applied to provide accessible taxi services to individuals with disabilities, the elderly, and those without smartphones or bank accounts.

MaaS service provides opportunity for providing **shared-taxi** services. In a simple way, without the need for complex dispatching systems, this can be achieved by providing a shared-taxi option for users in high-demand times and locations, for example end of events, and pooling single trips as shared-taxi routes for taxi. Naturally, it is possible to introduce proper shared-ride functionality in taxi dispatching systems to enable more advanced pricing strategies.

If **DRT services** are launched, taxi fleet can be used in the initial launch or piloting phase by purchasing hours from taxi so that they would operate with the operational mode including scheduled points.

Developing Public Transport

As already mentioned, DRT can provide higher-quality public transport service than the traditional fixed line and fixed schedule public transport answering better the needs of current private car users. Thus, logical path for developing public transport is to launch DRT services as a part of the public transport system. Similarly, that with taxi, when flexible DRT services are introduced as a part of the public transport services, the dispatching systems will need to communicate with the MaaS system to enable dynamic routing based on multiple constraints, adapt to (near) real-time changes and, in the end, provide the best option for trip requests.

One focus in developing the public transport is to develop trip chains where public transport is the backbone and **micromobility is used as the feeder service** so that the MaaS service provides information of the efficient trip chains. In this aspect, it could be relevant to advance the integration of booking, ticketing and payment of micromobility services to the public transport systems to have a seamless service when trip chaining.

Public transport season tickets enable **testing the idea of MaaS packages** by bundling other services, especially micromobility and other relevant feeder services, to it.

As the most important level of integration in MaaS is the integration of information, logical improvement to public transport users is the provision of **MaaS-enhanced user information systems** including real-time updates and travel information to improve the user experience and efficiency of the service.

Integrating taxi services closer to the public transport services, enables offering **trip guarantees**, by providing taxi as a backup service to ensure that users will reach their destination even if there are disruptions in their planned service using public transport. The feature could be also paid by the user in case of missing public transport connection due to being late from the stop.

Development of MaaS focuses a lot to the non-physical side of service provision, but similar focus should be put to develop physical spaces. This would mean developing **multi-modal mobility hubs** advancing a seamless flow of traffic between the various modes. Central hubs should be place not only for mobility but also for pleasant and longer dwelling. Thus, hubs could include shopping and gastronomy facilities, but maybe also co-working spaces, day care, etc. with revenue from commercial and retail zones. In rural areas, mobility hubs can be developed to be logistic hubs so that delivery services can deliver their goods form the mobility hub with cargo bikes, electric commercial vehicles or drones.

Connection to LGDs

Connection to Local Green Deals

Trikala's commitment to Local Green Deals (LGDs) — regional pacts that emphasize sustainable, economically viable urban development — can greatly benefit from the learnings and proposals drawn from Finland's experience with DRT. By positioning these insights within the LGD framework, Trikala can craft a forward-thinking transportation policy that not only meets contemporary needs but sets a precedent for sustainable urban development. The integration of Finnish best practices and strategic enhancements into Trikala's LGDs can expedite progression towards a greener, more connected city in line with broader sustainability and liveability goals.

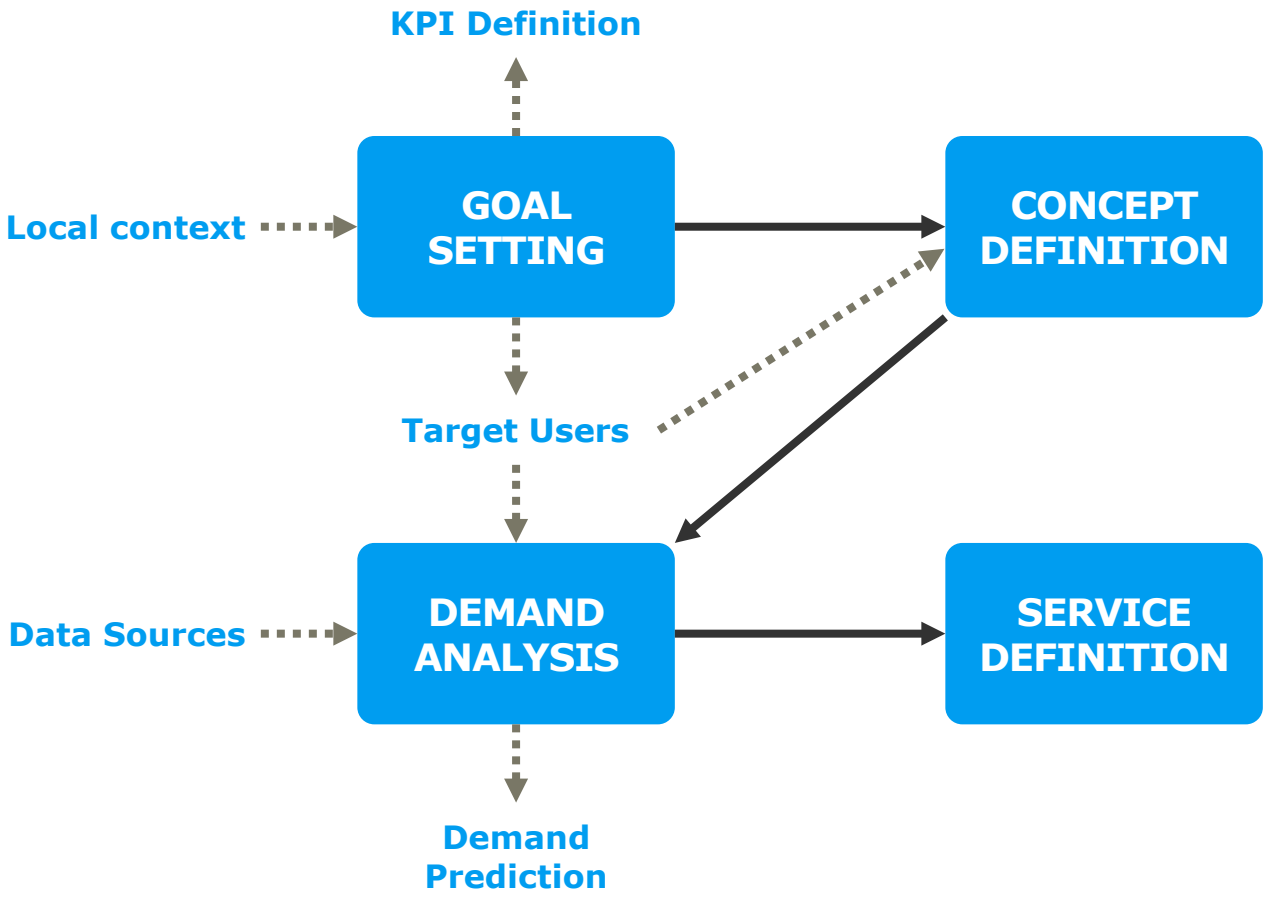
This report aims to tie the experiences and strategic considerations from Finnish DRT projects directly to the principles guiding Local Green Deals in Trikala, outlining a path for innovation in sustainable mobility that aligns with LGD's broader visions for environmentally responsible and economically viable urban development.

Best Practices and proposals linked to the LGDs:

- Integration Across Services: Finnish initiatives have demonstrated the efficacy of integrating transport services from various sectors like school, social services, and healthcare logistics into a unified DRT system, which ensures better resource utilization, directly supporting LGD's aim of sustainable resource management.
- Technological Implementation: Adoption of technological solutions for booking, dispatching and routing proved beneficial in Finland. Orienting DRT towards digital solutions will advance LGDs through intelligent resource allocation and emission reductions.
- Legislative Framework Adaptation: Amendments in transportation laws facilitated a harmonious and inclusive service landscape. Trikala can derive from this the necessity of legislative support to ensure LGD policies are effectively implemented at the transport level.
- The Finnish experience underlined the importance of flexible, demand-responsive services tailored to the needs of various population segments, a principle that goes hand in hand with the personalized solutions envisioned by LGDs.
- Inclusive Utilization of DRT: Maximizing the use of DRT not only for special services but for the general population boosts communal mobility while serving LGD economic and environmental targets.
- Budget Optimization for DRT: Investing existing transport budgets into DRT might deliver more extensive service with the current financial resources, mirroring the LGD's efficiency-focused methodology.

Guideline for DRT Service Planning

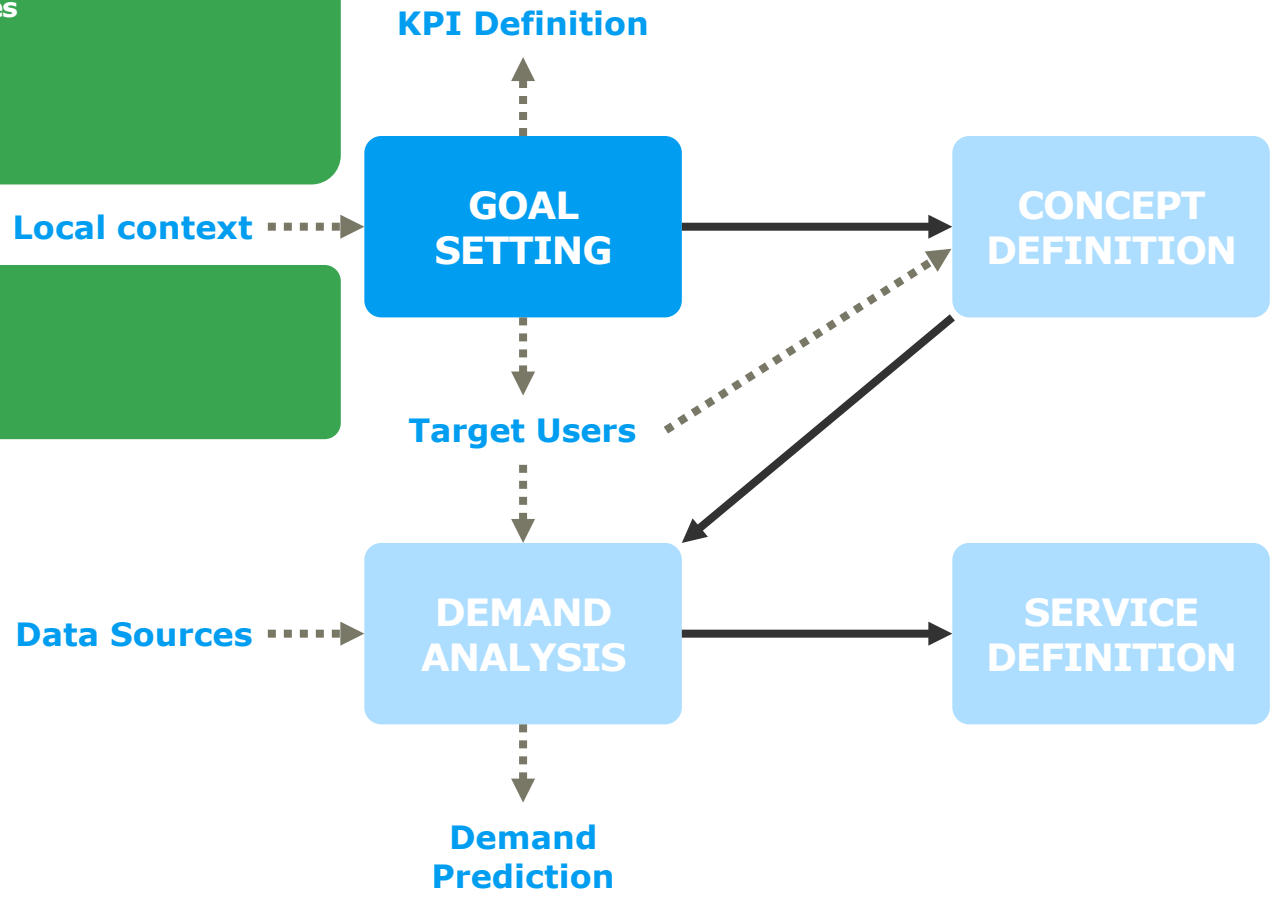
Objective, Service and concept definition



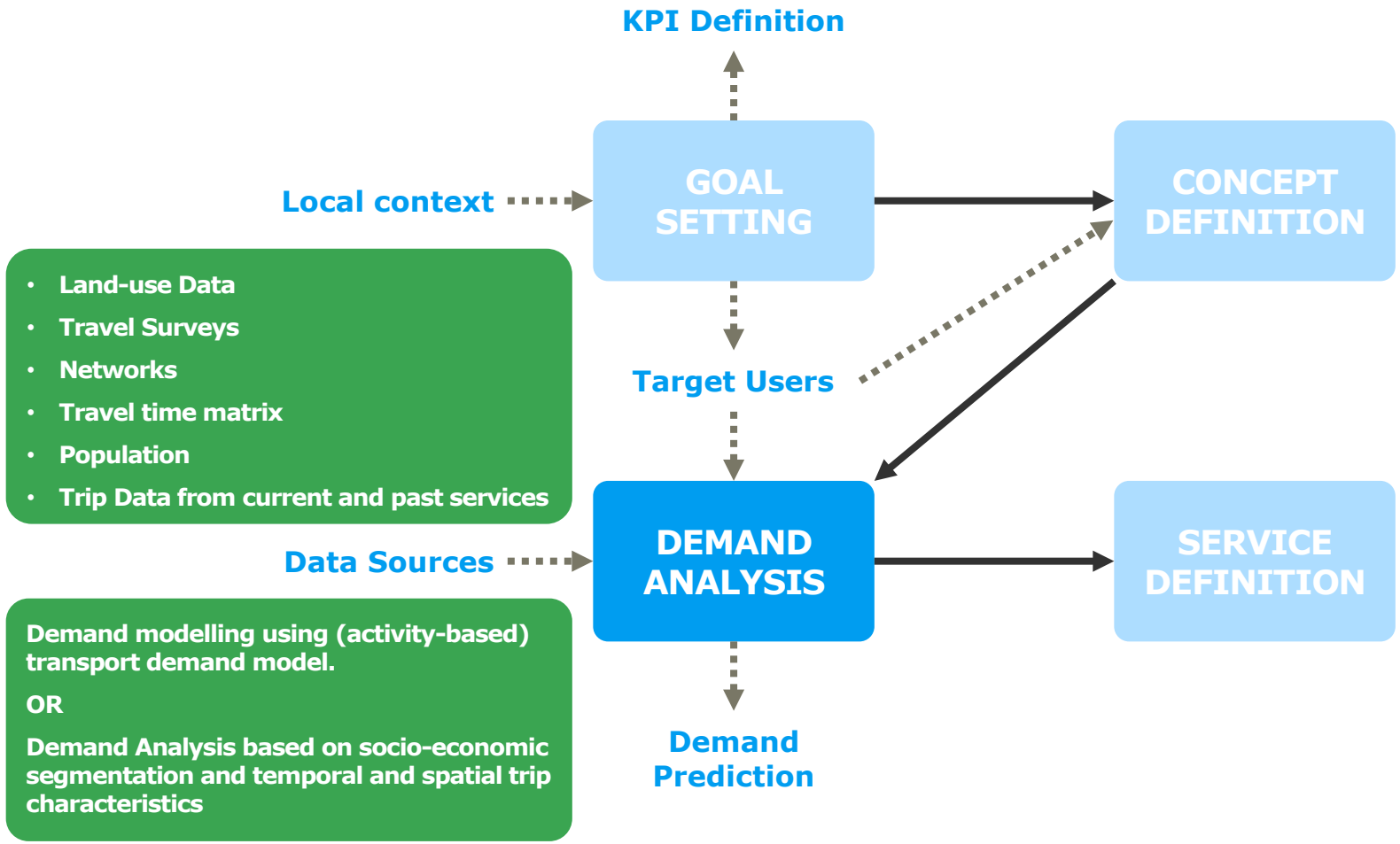
Objective, Service and concept definition

- Alternative to private cars
- First and Last mile
- Replace fixed lines
- Service Routes
- Paratransit
- …

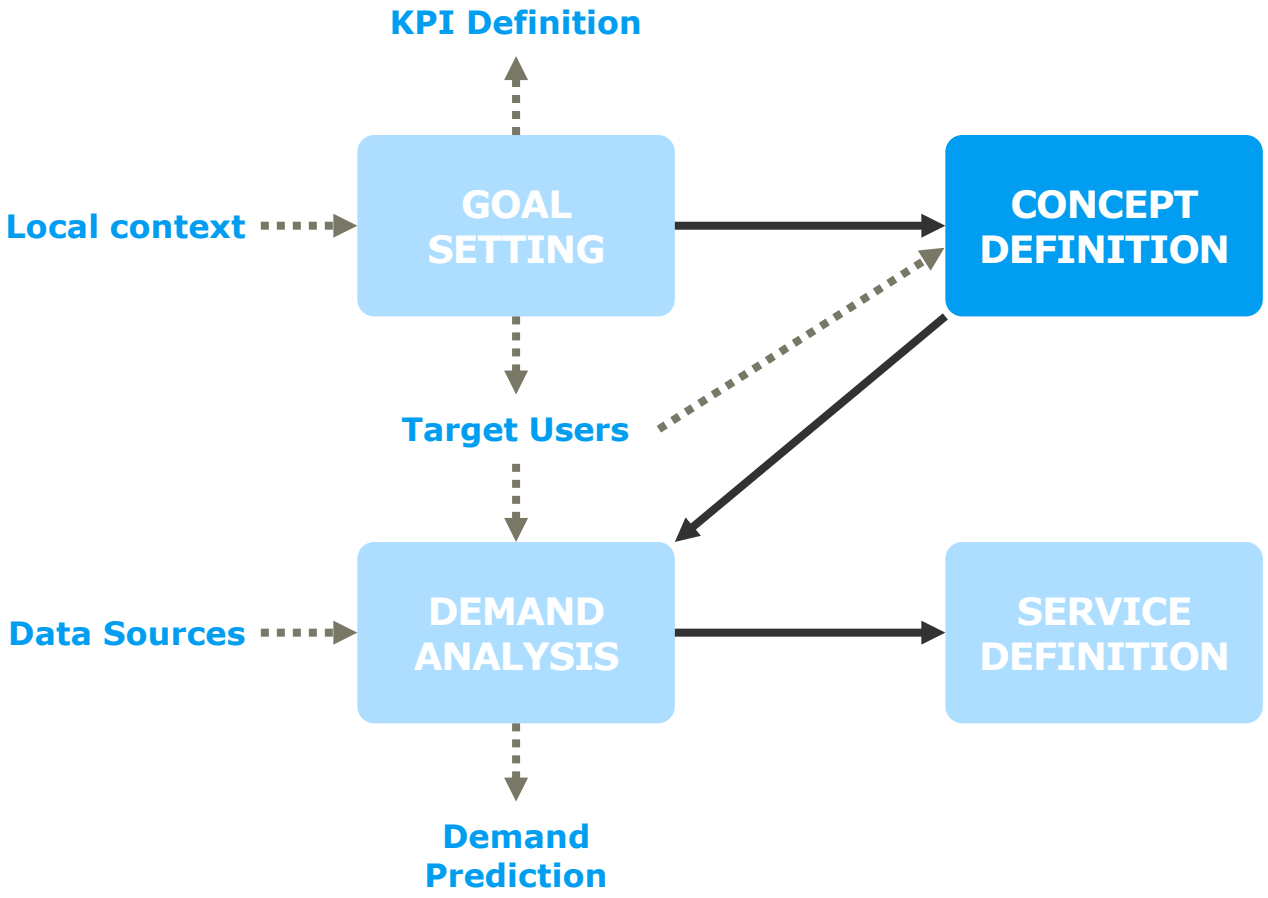
- Urban core
- Sub-urban
- Rural



Objective, Service and concept definition



Objective, Service and concept definition



Service characteristics

- **Pooling**
- **Human-driven, autonomous**

User Interaction

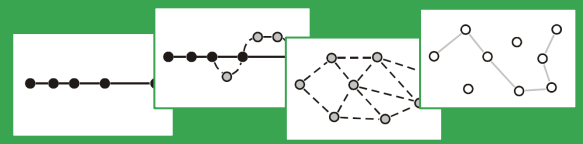
- **Booking methods**
- **Pre-booking**
- **Temporal parameters**

Payment and Pricing and integration to PT

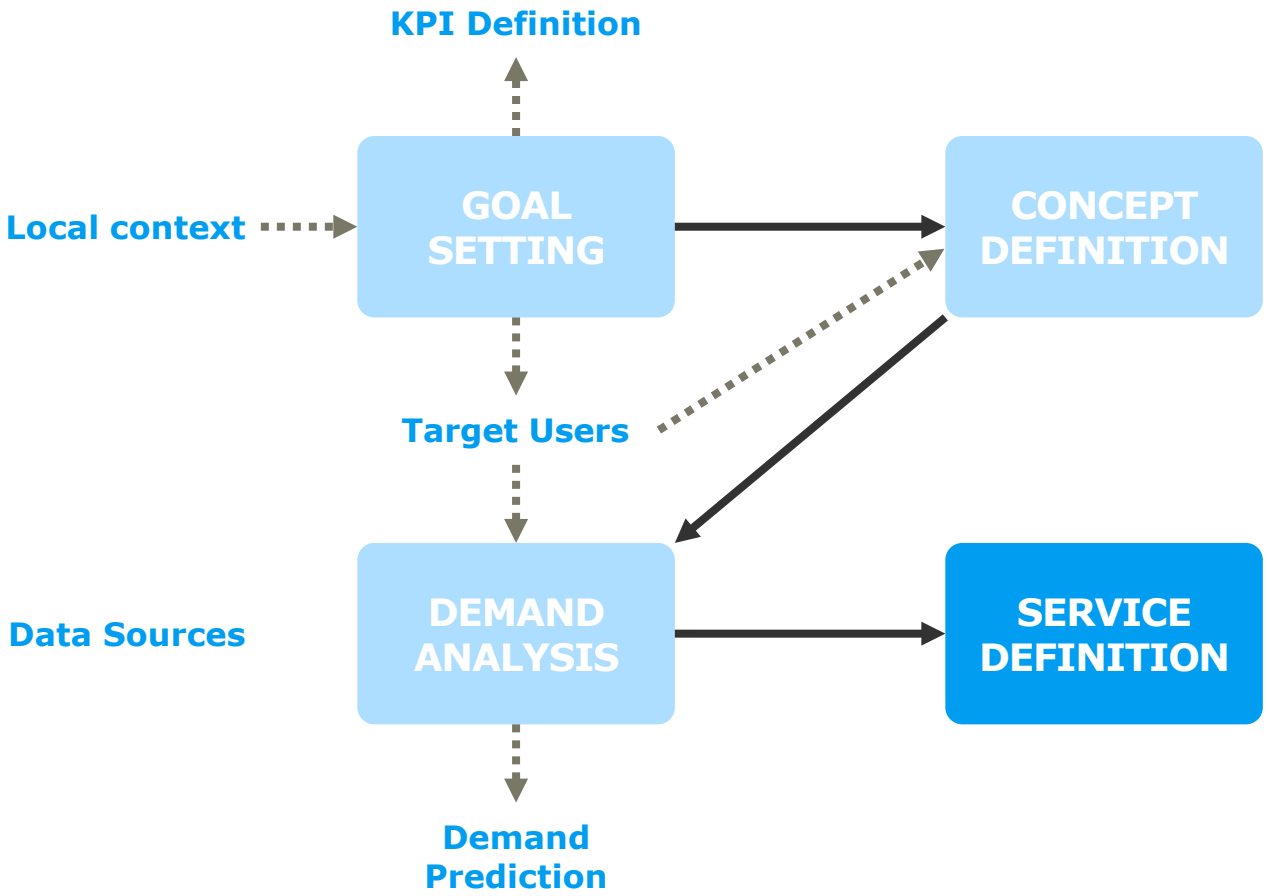
Fleet size, vehicle capacity and vehicle characteristics such as accessibility

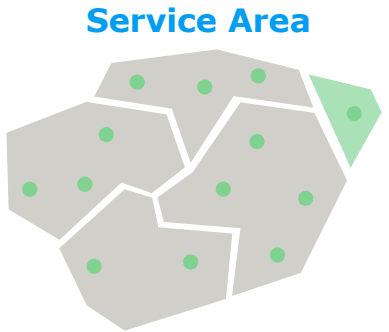
Dispatching policy

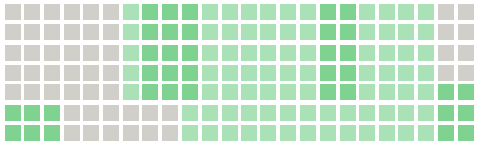
etc.



Objective, Service and concept definition







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