Geofencing recommendations in SUMPs and SULPs

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Introduction

This document is a recommendation list exemplifying how geofencing can be integrated into future Sustainable Urban Mobility Plans (SUMPs) and Sustainable Urban Logistics Plans (SULPs). The document is part of the WP5 *Towards Implementation*, Deliverable (D5.4) in the GeoSence project. The list is based on findings from GeoSence and from other geofencing-related projects.

**About GeoSence
(April 2021 – June 2024)**

The GeoSence project was a JPI Urban Europe project, funded under the ERA-NET Cofund Urban Accessibility and Connectivity call. The project was a collaboration between public authorities and researchers to design, trial and evaluate new geofence concepts and solutions for specific city use cases, and to propose new ways to deploy geofence applications. This was made possible by running tests, demonstrations and evaluations in participating cities. Research focused on user acceptance, stakeholder engagement, policy & regulation, governance and impact assessment. Partners in the project include the City of Gothenburg, The City of Munich, The City of Stockholm, The Norwegian Public Roads Administration, Chalmers University of Technology, RISE, SINTEF, Technical University of Dresden, University of Westminster and CLOSER.

More findings and deliverables are listed in GeoSence website[1], including a

Strategic guideline for implementation of urban geofencing solutions[2].

Image © Lindholmen Science Park

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[1] https://closer.lindholmen.se/geosence

[2]https://closer.lindholmen.se/sites/default/files/2024-06/Geosence%20Case%20study%20report.pdf

Geofencing recommendations into SUMP/SULP

Below is recommendations provided for each of the steps in the Sustainable Urban Mobility/Logistics Planning. Keep in mind that the recommendations list should be viewed as additions and comments to what is already stated in SUMP/SULP guidelines.

Note that this is not a comprehensive list, but rather exemplifies some of the reflections and learnings, mainly from the GeoSence project.

The recommendations are based on the 12 Steps of Sustainable Urban Mobility Planning (2nd edition), as shown in the Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (2nd edition, 2019)[3], and in Topic Guide for Sustainable Urban Logistics Planning (2019)[4], developed in the NOVELOG project[5] .

This document will go through and comment on each of steps and activities included in Figure 1 below.

Figure 1. The 12 Steps of Sustainable Urban Mobility Planing (2nd edition) – A decision maker´s overview

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[3] Rupprecht Consult (editor), Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition, 2019.

[4] Topic Guide - Sustainable Urban Logistics Planning, 2019.
[5] https://civitas.eu/projects/novelog

STEP 1: SET UP WORKING STRUCTURES

1.1: Evaluate capacities and resources

Consider if you have internal capacity in digitalisation and data quality assessment, or if you would need external help. Typical resources needed to be involved are Traffic planners, Transport planners, City planners, System/Service Procurers, Buyers, Lawyers, System architectures, Data quality managers, Data analysists, Information owners, IT security specialists, GIS engineers, etc.

Consider if you have the necessary technological infrastructure internally and, in the city, to support geofencing implementation e.g., GIS software, data management processes, good or bad conditions for the road infrastructure to support.

Assess financial resources available for initial setup and ongoing maintenance. Determine if there are any existing systems that can be integrated with geofencing solutions.

1.2: Create inter-departmental core team

It is important that the coordinator possess strategic and technical knowledge, to be able to set visions and at the same time understand how current system works. The coordinator must be able to communicate with IT/digitalisation specialists.

Not all of the competences mentioned in A1.1 needs to be part of core team. It might be a good idea to have two coordinators, one with technical focus

and one with strategic focus on traffic, transport and city planning.

1.3: Ensure political and institutional ownership

Geofencing can both be seen as a powerful tool to manage traffic and transport and to ensure compliance. But it can also be perceived as a tool to limit personal freedom in traffic. Therefore it is crucial to ensure early communication with politicians and inform/discuss about why this is needed, how the technology works, what risks are involved and what will be done to mitigate risk.

The political ownership can be strengthened by showing that relevant stakeholders are being involved in the process, and are in support of the vision and the proposed measures to achieve the vision. Some of the main stakeholders include freight and public transport operators, transport buyers such as public transport authorities and commerce actors, public transport insurance companies, police and other emergency vehicles, branch organisations and unions such as driver´s unions, technology and service providers etc.

1.4: Plan stakeholder and citizen involvement

For geofencing applications, engage stakeholders in ongoing dialogue about city goals and strategies, ensuring a shared understanding and aligning their objectives. Regular meetings, such as quarterly updates, are essential for keeping everyone informed. Avoid promoting geofencing as the sole solution; consider alternative approaches and encourage stakeholder consensus, particularly among mobility

service providers and transport operators. In pilot projects, involve stakeholders early to define objectives, roles, and expectations. Ensure a unified understanding of the purpose of geofencing among all participants, valuing their objectives and contributions. Workshops should allow extensive time for discussion and follow-up, while roundtables and individual dialogues can facilitate equal input and more detailed exchanges. Identify key stakeholders who can effectively incorporate the end-user perspective to enhance acceptability, and minimise intermediaries to ensure direct and efficient communication with end-users.

STEP 2: DETERMINE PLANNING FRAMEWORK

2.1: Assess planning requirements and define geographic scope

Define the geographic scope for geofencing based on functional urban areas and mobility patterns.

Collaborations with neighbouring local road authorities, regional and national road authorities are also encouraged to ensure and maintain high-quality geospatial data (e.g., road data, traffic regulation data etc.) within the functional urban area.

For instance, a public transport bus line between City A to city B will most likely pass through roads governed by different road authorities. A bus operator might want to offer a geofencing-based service e.g., a speed control function, to improve traffic safety. Services like this would be beneficial to be activated during the entire journey, not only within the municipal geographic area.

Also, think about how geofencing could enhance accessibility and provide linkage between e.g., urban and suburban areas. For instance, suburbs may lack commercial micro-mobility services. The city could assess whether it would be beneficial to procure micro-mobility services that cover a larger geographic area beyond what is currently offered. Geofencing can be used to create new dedicated parking areas, and to plan safe linkages/routes from urban to suburban areas.

Similarly, geofencing-application can be used to enhance MaaS, e.g., by triggering location-based real-time information about available mobility options in the vicinity, or by nudging.

2.2: Link with other planning processes

Integrate geofencing initiatives with other urban planning processes, such as land use planning, public transport development, and environmental protection. Talk about the potential of digital services such as geofencing, and how it could be utilised to support broader policy objectives strategies.

Geofencing services could improve air quality, noise, e.g., lower speeds or switch to electric propulsion in hybrid vehicles, and improve traffic safety in certain areas, making it more attractive to live in these neighbourhoods.

Geofencing applications may have significant potential to contribute to a fairer and more inclusive city, for instance by enabling differentiated congestion charging (you pay more if you pollute more), by giving transport priority to a transport mode in certain area, or due to other circumstances such as bad weathers etc.

2.3 Agree timeline and work plan

It is important that both the SUMP and the SULP can see beyond what is possible today, assess, envision and plan for what might be possible in short-term (1-2 years), medium-term (3-5 years) and long-term (6-10 years).

Be realistic with the timeline needed to utilise digital services e.g., geofencing. This is an assessment that should start in *Step 1* and will depend on your current capacity and resources, as well as other factors, such as political willingness, cultural factors, and user acceptance.

Use the GeoSence *Strategic guidelines for implementation of urban geofencing solutions[6]* to assess your city readiness, and to set realistic ambitions of how to promote and utilising digital services such as geofencing in the new SUMP or SULP.

2.4: Consider getting external support

External support might be a necessary first step to explore and integrate digital services such as geofencing in future SUMP and SULP.

Think through what tasks should and can be dealt with by the city, and what task can be delegated externally.

For instance, it is necessary that the city is responsible for stakeholder engagement but on some occasions it might be beneficial to use an external support to design stakeholder interactions, to take part of the meetings and act as a "neutral observer", or even

conduct interviews where a neutral trustee might be needed.

If done correctly, this will make the stakeholder engagement process more efficient and bring in new perspectives and insights.

Also consider external consultation with other municipalities and regions that might be ahead regarding digital matureness.

STEP 3: ANALYSE MOBILITY SITUATION

3.1: Identify information sources and cooperate with data owners

The city´s role as data producer and provider is essential to geofencing-applications. The role of data has been touched upon in previous activities.

Identifying and securing access to comprehensive data sources is essential for understanding current mobility patterns and challenges. Accurate and up-to-date data allows for precise analysis and informed decision-making. For example, traffic sensor data can reveal congestion hotspots, while GPS data can track vehicle speeds and movements, providing critical insights for designing effective geofencing zones.

Data audits should be comprehensive and explorative and include data sources from both public and private entities. Use the GeoSence *Strategic guidelines* to get a better understanding of what type of data might be relevant to geofencing-applications.

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[6] https://closer.lindholmen.se/sites/default/files/2024-06/Geosence%20Case%20study%20report.pdf

Begin by identifying the key sources of mobility data relevant to your geofencing initiative. This can include traffic sensors, GNSS (e.g., Galileo or GPS) data from vehicles and smartphones, public transportation usage records, and environmental monitoring systems. Establish partnerships with the owners of these data sources, such as local government agencies, transport operators, and private tech companies. Formalise these partnerships through data-sharing agreements to ensure a steady and reliable flow of data. Additionally, consider leveraging open data platforms and community-sourced data to enhance the breadth and depth of your information.

Ensure data quality by implementing standardised data collection and processing methods. This might involve setting protocols for data validation, cleaning, and integration from multiple sources. Employ data analytics tools to process and visualise this information effectively. Use geographic information systems (GIS) to map mobility patterns and identify areas where geofencing can be most beneficial.

Develop a data management plan that outlines how data will be collected, stored, analysed, and shared. This plan should address data privacy and security concerns, ensuring compliance with relevant regulations such as GDPR. Engage legal experts to draft data-sharing agreements that protect sensitive information and define the responsibilities of all parties involved.

Foster continuous cooperation with data owners through regular communication and joint initiatives. Establish a feedback loop where data owners can provide insights on data trends and anomalies, and where the project team can share

findings and outcomes. Consider setting up a data governance body to oversee data-related activities and ensure alignment with project goals.

Utilise the collected data to perform a detailed analysis of current mobility issues and opportunities. This includes examining traffic patterns, identifying congestion points, assessing the impact of current transportation modes, and exploring environmental effects. Use advanced analytical tools and machine learning techniques to uncover hidden patterns and predict future trends.

3.2: Analyse problems and opportunities (all modes)

3.1 and 3.2 should be done simultaneously. A thorough analysis ensures that problems identified are relevant, and need to be mitigated. Engage stakeholders to discuss and validate your concerns.

A clear problem definition and identification of what needs to be done to solve these issues are key to design user-friendly services. For instance, research indicates a strong relation between vehicle speed and traffic safety. Speed compliance could be set as one performance indicator to improve traffic safety. Typically, services e.g., geofencing speed control has the potential to improve one, or perhaps two performance indicators.

However, if the performance indicators are not identified, or are incorrect, geofencing services will not be able to improve or solve the identified problems e.g., traffic safety. It is usually very complex to analyse the correlation between many performance indicators and also to analyse externalities of deploying specific policies (e.g., lower

speed limits could lead to other unwanted user behaviour that increases safety risk).

This is why it is important to differ whether the geofencing-based service is acting correctly and with high-quality and whether the suggested indicators/proposed measures are what is required to solve the issues.

STEP 4: BUILD AND JOINTLY ASSESS SCENARIOS

4.1. Develop scenarios of potential futures

When developing future scenarios, make sure to consider technological advancements, along with other factors such as policy changes and shifts in mobility patterns.

Engage experts in digital technologies, urban planning, and transportation to provide insights and validate the scenarios.

Use the scenarios to identify potential challenges and opportunities associated with the implementation of geofencing and other digital solutions. Consider factors such as infrastructure readiness, public acceptance, regulatory requirements, and data privacy concerns. Identifying challenges and opportunities early in the planning process allows for proactive management and strategic decision-making. It helps in developing a clear roadmap for implementing geofencing and other digital solutions, e.g., the need for robust data privacy measures can guide the development of secure data-sharing protocols.

If possible, simulate the impact of promising future solutions, including IOT solutions, geofencing etc.

4.2: Discuss Scenarios with Citizens and Stakeholders

Engaging citizens and stakeholders in the discussion ensures that the scenarios are inclusive and consider diverse perspectives.

However, keep in mind that it might be challenging to communicate about future scenarios, depending on the stakeholder group you interact with.

Consider how you could narrate future scenarios and e.g., visualisation, storytelling etc. It is important to open up the possibilities of alternative scenarios.

STEP 5: DEVELOP VISION AND OBJECTIVES WITH STAKEHOLDERS

5.1: Co-create common vision with citizens and stakeholders

A shared vision creates a unified direction and fosters collaboration among stakeholders. It is important to balance the future you, your citizens and other stakeholder wants, with what future you can realistically create.

As mentioned in 4.2, consider your narration about the future and provide examples of e.g., new potential of digital technologies in transport. Emphasizing the role of digital solutions ensures that future mobility plans are innovative and adaptive to technological advancements.

Broaden your engagement to include other stakeholders that could inspire you

to new solutions e.g., get inspired by other sectors.

5.2: Agree objectives addressing key problems and all modes

It might be fruitful to develop specific underlying objectives not only on mobility related issues, but also on broader objectives such e.g., advancing towards data-driven decision-making governance in the city.

It is crucial that the city set ambitious objectives, although realistic, to be able to provide a governing structure that is capable of supporting the mobility specific objectives. This is also key to be able to monitor and follow up on the indicators and targets set in step 6.

STEP 6: SET INDICATORS AND TARGETS

6.1: Identify indicators for all objectives

Indicators provide a way to track progress and assess the impact of geofencing initiatives. They help in identifying areas for improvement and ensuring accountability. For instance, indicators might include traffic speed, emission levels, and user satisfaction.

Ad mentioned in 3.2, connecting objectives with the right indicators and targets are key. Science-based targets should be set where possible.

Consult with other stakeholders, such researchers, other municipalities etc., to be inspired of what indicators and targets are appropriate to set for each objective.

6.2: Agree measurable targets

It can be beneficial to investigate potential monitoring systems already during this stage. Geofencing-based applications can play an important role to monitor and measure indicators and targets, e.g., traffic flow, and traffic speed.

A strong monitoring framework ensures continuous improvement and helps identify challenges early. Regular reviews of traffic patterns in geofenced areas can help refine strategies and optimise outcomes.

STEP 7: SELECT MEASURE PACKAGES WITH STAKEHOLDERS

7.1: Create and assess long list of measures with stakeholders

Think about both short-term, medium-term and long-term measures. Consider having specific measures on how to support, demonstrate and evaluate innovative solution.

For instance, create sandboxes and test beds with possibilities to engage and co-develop new solutions with stakeholders. There are many potential geofencing-based solutions that could aid future measures such as dynamic pricing schemes, real-time traffic information services, deployment of low-emission zones, priority zones etc.

7.2: Define Integrated Measure Packages

Integrated measure packages maximise the overall impact by leveraging synergies between different initiatives. For example, combining geofencing with improved public transport, e-scooter

management, and cycling infrastructure can reduce car dependency, encourage sustainable transportation modes, and improve overall urban mobility. This comprehensive strategy enhances the effectiveness and efficiency of mobility solutions.

Consider simulation tools simulation of different scenarios, helping planners predict the impact of potential measures and choose the most effective ones.

7.3: Plan measure monitoring and evaluation

If possible, consider dashboards with geofencing capabilities to visualise development of the bundled measures. The dashboard can provide e.g., real-time data on traffic flows, emissions, and compliance. Visualisation can be useful to mobility planners but also to present data to stakeholders, helping them understand the impact of the measures.

This transparency fosters trust and collaboration which is key for successful measures. Make sure to set up a communication plan with stakeholders such as transport operators and establish good relation with them to assess the progress, and follow up on potential issues.

Experiences from geofencing trials reveal that direct communication with road users e.g., drivers, is critical to receive instant feedback regarding practical issues in implementing the proposed measure. These need to be corrected immediately, otherwise there is a risk of the drivers losing faith and trust in the solution used.

STEP 8: AGREE ACTIONS AND RESPONSIBILITIES

ACTIVITY 8.1: Describe all actions

Clear and detailed descriptions of actions ensure that all stakeholders understand their roles and responsibilities, reducing the risk of miscommunication and delays. For example, assigning specific tasks to traffic management authorities and technology providers ensures a coordinated effort towards effective geofencing implementation.

Consider developing and describing specific actions related to enhancing the city´s governance capabilities, for instance to improve monitoring and evaluation.

As mentioned in 7.3, be aware of the key stakeholders needed to be engaged for successful implementation of the actions. Their top priority may not align with yours. For instance, traffic safety may be the main reason for a city to promote speed control in vehicles. The transport operator might have other priorities and concerns, such as if drivers and drivers´ union will perceive this measure as driver surveillance. The transport operator might also see other business opportunities, such as fuel saving if the action was to be implemented.

Finding actions that promote win-win collaborations will be key.

8.2: Identify funding sources and assess financial capacities

Accurate cost estimation and secured funding are crucial for the sustainable

implementation of geofencing initiatives. For instance, understanding the financial requirements and securing commitments from stakeholders can prevent budget shortfalls and ensure continuous operation and maintenance of the geofencing systems.

Conduct a thorough cost analysis for implementing and maintaining geofencing measures. Include costs for technology, infrastructure, training, and ongoing operations. Identify potential funding sources such as local government budgets, grants, and public-private partnerships.

As mentioned in 8.1, finding win-win solutions can enable more public-private partnerships and a willingness to share an initial investment cost, e.g., to invest in hardware and software in vehicles, in infrastructure, or to other systems, in training etc.

Digital solutions are usually a lot cheaper in the end compared to e.g., building new roads. However, more focus need to be made to evaluate the value these type of digital solutions, such as geofencing, might bring.

8.3: Agree Priorities, Responsibilities, and Timeline

Prioritising actions and defining a clear timeline ensures systematic and efficient implementation. For example, starting with pilot projects in high-impact areas can demonstrate the benefits of geofencing and build momentum for broader adoption.

Focus on what actions need to be taken care of firstly, e.g., could be low hanging fruits, or actions that are time consuming to do and need to be dealt with immediately, or actions that need to be done to enable other actions.

Focus also on what things the city can do internally. For instance, could the city become a role model by applying geofencing-based applications in their own fleets?

Be aware that things takes time, especially if it requires new solutions beyond common practices.

For instance, procurement processes of new systems and services can take time, and you need to identify and analyse when it is the right time to start. You might need a few months up to a year just to be able to develop good requirements e.g., to procure new digital solutions, that could be included in the procurement process.

8.4: Ensure wide political and public support

Political and public support is essential for the success of geofencing measures. Demonstrating the positive impacts through data can build trust and acceptance. For instance, showing a reduction in traffic congestion in geofenced zones can garner public approval and political backing, ensuring sustained support for the initiative.

However, it is crucial to understand that this require preparation and a clear plan on how to enable and/or develop high-quality geofencing-based services. It is equally as important to send a realistic message to politicians and the public about what the technologies can do.

Otherwise, there is a risk that technologies such as "geofencing", "autonomous vehicles" can be seen merely as buzzwords and clichés.

It is also important to be clear that the technologies, and digital services are only there as a mean to support stakeholders.

Geofencing might be a feasible solution but it could be very hard to deploy due to misconceptions or misunderstanding of what is actually is. For instance, some might say that "geofencing is a surveillance technology that will control road users and limit their freedom".

Of course, geofencing services could be used for that purpose, but it could also be used to many other purpose that would enable provide road users with more control and freedom, e.g., by improving traffic information and provide tailored information giving the road user more option to avoid accidents, congestions etc.

STEP 9 PREPARE FOR ADOPTION AND FINANCING

9.1: Develop financial plans and agree cost sharing

Similar to what was stated in 8.1 and 8.2, aim for win-win solutions that opens up both risk sharing and cost sharing between the city and other stakeholders.

Digital solutions are relatively cheap compared to investment in physical infrastructure. However, it might be tricky to design and develop new digital solutions, especially if there is no clear mission or resources dedicated to do so. New systems also require training of staff, comprehensive plan to integrate into existing procedures, plan to phase out legacy systems and so on. Financial plan should be comprehensive and it might be good to involve relevant stakeholders to estimate the required funding.

Ask other leading municipalities for lessons learned to ensure that you have covered all aspects.

9.2: Finalise and assure quality of 'Sustainable Urban Mobility Plan' document

We are still on the verge of utilising the potential of digital solutions in mobility plans. It is important to be brave, although realistic since a well-documented SUMP can serve as a reference for future projects and help secure funding by demonstrating a comprehensive and feasible plan.

It might be easier to rely on the other stakeholders to come up with smart innovative solutions, but it is important to realise that all stakeholders, including the city, can help this development forward.

For a city, a starting point could be to set up quality assurance plans and act on them to ensure high-quality data management, and monitoring procedures to produce, share, and continuously improve mobility related data. This could at least enable others to build new services with the potential to improve mobility in the city.

STEP 10: MANAGE IMPLEMENTATION

10.1: Coordinate implementation of actions

Establish a dedicated project management team to oversee the implementation the measures. Ensure this team coordinates closely with all relevant stakeholders, including transport operators, technology providers, and enforcement agencies. Develop a detailed implementation

schedule and hold regular progress meetings to address any issues promptly.

As mentioned in step 1, it is preferred if the management team also have capabilities and knowledge regarding enabling technologies such as digital tools e.g., geofencing, AI, etc. It is understandable that the management team cannot possess all the expertise needed, but understanding data management process, being able to grasp how technologies work etc. should be seen as one of the core capabilities needed.

10.2: Procure goods and services

Selecting the right technology and service providers is crucial for the success of the proposed actions. High-quality equipment and reliable support services ensure the e.g., geofencing system operates effectively and sustainably.

As exemplified in step 8, procurement processes of new systems and services can take time, and you need to identify and analyse when it is the right time to start. You need be able to collect information regarding the commercial products/services on the market, and be able to assess alternative market solutions that could solve your problem.

Be aware that functional procurement can sometimes be more beneficial than procuring based on technological requirements, since it is very difficult for the procurer to evaluate which technology should be preferred.

Also procurements can also be used to enable innovation, e.g., by explicitly mentioning that the technology/service provider should be open to test and demonstrate new technologies/services during the contract period.

You can read more about procurement in the GeoSence report *"Public Procurement and Geofencing – lessons learned from a pilot with geofencing of service trips."* [7]

STEP 11: MONITOR, ADAPT AND COMMUNICATE

11.1: Monitor progress and adapt

Continuous monitoring and adaptation ensure that measures remain effective and responsive to changing conditions. For instance, if data shows unexpected traffic patterns, adjustments can be made to e.g., geofence boundaries or enforcement strategies.

As mentioned earlier, establish a good relationship with those stakeholders that can provide you with insight in the monitoring process e.g., transport operators. Find ways that works for all of the stakeholders in how you should interact and provide feedback.

For instance, in GeoSence, the city of Munich used geofence-based application with capabilities to visualise real-time parking data on the location of parked e-scooters, create geofence zones, create rules/policies connected to these zones (e.g., no go zone, parking-zone etc.), communicate the rules/policies to the e-scooter operators, and to continuously monitor

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[7] https://closer.lindholmen.se/sites/default/files/2024-07/Final%20report%20GeoSence%20Go%CC%88teborg_0.pdf

the performance of parking policies they had provided to the e-scooter operators.

Previously, the city had made a rigorous effort to establish a good relationship with the operators and had an agreement on data-sharing. This setting allowed the city to set *observe and understand*, *setting new rules/policies/regulations*, *enforcing the rules, discuss solutions and improvement with the stakeholders, monitoring the progress and evaluating*, and *adapting rules/policies/regulations*.

11.2: Inform and engage citizens and stakeholders

Keeping the public and stakeholders informed and engaged fosters support and compliance. For example, showing tangible benefits such as improved air quality can enhance public acceptance and participation.

Citizens are also road users. Consider establishing a process that facilitate how citizens can provide feedback regarding their experiences of the proposed actions. Investigate what communication channel is needed to interact with stakeholders such as citizens. For instance, geo-based services can be used to enable this type of communication, in which citizens can pinpoint exact location where improvements can be made e.g., detecting errors in the transport infrastructure.

Experiences in GeoSence also suggest that the city should have direct contact with the users, not only discussing with entities such as transport operators. Promote and incentives users to take part in e.g. innovative demonstrations, and to provide feedback.

If possible, it is advisable if the core management team also test the proposed actions. You will always detect new things that can be improved to enhance user experience.

STEP 12: REVIEW AND LEARN LESSONS

12.1: Analyse successes and failures

This is something that needs to be established in the earlier step, by having good stakeholder engagement, clear indicators and targets, clear measures and actions, a monitoring structure and capacity to analyse and evaluate.

As mentioned in step 11, consider using geofencing-based applications as part of the analyses. These tool can help visualise and enable stakeholders to be more precise of where problems might occur.

It is also important to look beyond what has been implemented to analyse success factors due to the SUMP/SULP. For instance, being able to take one step further in the digitalisation journey and convince that more resources should be dedicated for data management, system architecture, investment in new enabling solution e.g., geofencing, etc. is a success of its own. Take it with you and build on it during the next SUMP/SULP period.

Be open to learn and criticize your own process during the SUMP/SULP. For example, it might be challenging to be explorative and open to new ideas, whilst being pressured with timelines and budget limitations. There are always more solutions to your problems than you have time to embrace.

Another example, geofencing has been seen as a promising enabler to e.g., improve traffic safety in Sweden since a few years back. Once you dig deeper into the meaning of the word, you realise that people involved describe many different aspects such as data quality of traffic regulations, availability of data, communication standards, positioning of vehicles, Human-Machine Interface (HMI), informing vs enforcing policies, acceptance and driver behaviour, the amount of commercial products/service available, operators willingness to pay, the lack of supportive digital infrastructure, cybersecurity, and so on. There are many aspects to consider, and the majority of aspects are not unique to geofencing.

There are also many reasons for why a proposed action failed to be implemented. This does not mean that It was a failure. The point is to try to be as objective as possible when conducting the analyse and try to distinguish between what has been established, and improved, and what is needed to be dealt with during the next steps.

12.2: Share results and lessons learned

Know your target audience and create communication and dissemination content that make it easier for them to understand the result and the lessons learned. The city should have dedicated resources working with communication and it is advisable that you involve these resources already in step 1 and throughout the SUMP/SULP process.

Don´t be afraid with being open about the lessons learned and try to be as specific as possible. It might be wise to think twice about the message you want to send. What is it exactly that you have learned and that you need to solve?

12.3: Consider new challenges and solutions

Enabling technologies such as AI, digitalisation, blockchain etc. are being developed and improved in a rapid pace. New solutions might mature during the duration of your SUMP/SULP. This is why it is encouraged to develop sandboxes and test beds to test and explore new solutions. These solutions could have matured enough to be used for larger scale deployment during the next SUMP/SULP.

The ambition of a SUMP/SULP may be high, but in the end, the city has a limited budget and resources. This is also one of the main reasons to invest more in cost-effective solutions that can improve mobility and create user-friendly mobility services. Digital solutions such as geofencing could be one of those solutions. You will not know until you explore it yourself.