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SMART URBAN TRAFFIC ZONES

**PART OF THE FLEXIBLE CITY WHERE VEHICLES MOVE
ON PEOPLE'S TERMS
EXECUTIVE SUMMARY**



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Executive Summary

The project "Smart Urban Traffic Zones" has demonstrated three smart zones in Stockholm and Gothenburg, Sweden; with the potential to contribute to quieter, safer and healthier urban environments. The smart zone is created using digital tools, such as connected sensors and geofencing. A geofence is a digitally defined area where vehicles are controlled by digitally set rules, allowing control of how a vehicle is driven within the zone, without human intervention.

The demonstration "Innovation Zone Hornsgatan" took place out on Hornsgatan in Stockholm where distribution vehicles, delivering groceries to stores and restaurants in the area, took part in the test by applying smart speed limitation within a geofenced area. The purpose of the smart zone was to increase traffic safety by reducing the speed of the distribution vehicles based on the number of pedestrians moving in the area. As part of this demonstration, a loading zone was also equipped with a smart sensor to generate data and learn more about how and when the zone was in use.

The results show that it is technically feasible to create a smart zone for dynamic speed control of vehicles. The drivers of the participating vehicles had an overall positive view on the system, although there were some minor speed violations within the zone during the demonstration. This could be due to the small size of the zone or the traffic conditions in the chosen area. To achieve a higher level of certainty in the evaluation of the smart zone's impact on road safety, the setup would need to be tested in more locations, as well as with more participating vehicles to collect more data. The information provided by the connected loading zone has given the City of Stockholm new ideas on how to develop planning and use of the street space for a more dynamic allocation. The project has also explored how a smart zone of this kind could be implemented by requiring speed compliance or geofencing in public procurement of goods distribution.

The demonstration "Digitally issued exemptions for construction transports" took place on Södermalm in Stockholm, where a concrete truck was permitted to drive with a heavier weight than normally allowed; thus allowing more concrete to be loaded into the tank. With heavier loads, fewer trips to and from construction sites are required, reducing the total number of heavy mass transports within the city. The counter-requirement of the exemption was that the vehicle maintained a low speed, which was ensured by automatic speed control of the vehicle using geofencing in the areas where the exemption applied. The results show that the smart zone functioned as intended, a future scale-up is not limited by technical challenges, but by how the city may allow heavier vehicles with divisible goods, while relying on the counter-requirement that they can guarantee a low speed. The vibration measurements carried out during the demonstration show that lower speeds result in less vibrations and therefore reduce the risk of damage to the surrounding built environment.

In Gothenburg, a smart zone around a construction exit has been demonstrated to reduce the risk of collision between heavy vehicles and cyclists. The demonstration "Increased safety for vulnerable road users at construction site exits" was set up using smart sensors connected to a warning system. When a cyclist approaches a construction site exit while a heavy vehicle is entering or leaving the construction site, the warning system is activated to alert both the cyclist and the driver of the heavy vehicle.

The results show that the design of the physical environment around the construction site exit, including the positioning of the warning systems, plays an important role in how cyclists and drivers perceive and manage the traffic situation. Both cyclists and drivers felt that the warning system contributed to a safer construction site exit. Potential for improving the design of the warning system was identified to clarify who the information was aimed at, and how road users were expected to act. There is also a need to develop the system design before such a smart zone can be employed at construction site exits. Another lesson learned from the demonstration is a need for development in how variable message signs (VMS) can be used at this type of location.

All three smart zone demonstrations used a central integration platform that processes data from pedestrian flows, the presence of cyclists, the occupancy of loading zones and the position data from

trucks, using integrations with various sensors, road signs, signals, and trucks. This data can be visualised, in real time and historically, on a map and in various graphs via graphical visualisation tools. The integration platform also includes a control engine which performs calculations to decide whether to reduce the speed in the area. The system then sends out the current speed limit in the area to the connected trucks via an integration with the vehicle manufacturer. The geofence area and the various algorithms that perform the calculations can be easily managed in the management tools that are part of the integration platform.

In addition to developing a technical system solution and carrying out demonstrations of smart traffic zones, the project has also investigated the conditions for implementation on a larger scale. To this end, the possibilities of developing business models for services similar to those demonstrated have been analysed from the perspective of different actors, benefits and drivers. The conclusions show that the development of geofencing should first and foremost be based on openness between systems and actors, as access to data and the interconnection of systems enable economies of scale, efficiency, and increased utilisation of existing solutions. The positive effects of openness can be further strengthened if stakeholders actively work on standardisation to create interoperability between solutions. This will counteract the current situation of separate islands of data and rule management solutions. All parties identified a need for increased interaction between policy, administration, and industry to drive developments in areas such as legislation, procurement and packaging of services targeted at road operators. Finally, both the private and public sectors need to work on the design of incentives to increase the attractiveness of geofencing solutions for both customers and suppliers.

In conclusion, the project “Smart Urban Traffic Zones” has shown that it is technically feasible to create smart zones in the urban environment to dynamically regulate different parts of the transport system and street space. There are still some challenges to be met before the smart zones demonstrated in the project are used on a larger scale. However, these challenges are not of a technical nature, areas to address are the development of regulatory frameworks, traffic regulations, standardisation of communication to and between vehicles, data management, and data sharing between different actors. Finally, road authorities, or other actors establishing smart traffic zones, also need to be aware of how these should be designed to achieve the desired effects and enable the use of the information generated within smart zones for planning and monitoring the use of the transport system.

Further reading

The full project report is available in Swedish, with the following appendices available in English:

- System specification – technical document describing the integration platform used in all three demonstrations
- Criteria for recommendation of high/low speed in the demonstration “Innovation Zone Hornsgatan”
- Risk Analysis of an Active Traffic Safety System at a Construction Site, from the demonstration “Increased safety for vulnerable road users at construction site exits”
- Push API from Scania to SMUTZ, describing the API used to integrate with Scania trucks in the demonstrations “Innovation Zone Hornsgatan” and “Digitally issued exemptions for construction transports”