

Year-Round Active Mobility

Insights into mobility management approaches

Authors

Ida Lundström (Umeå Kommun)
Josefine Wigström (Umeå Kommun)
Naomi Zerai (Umeå Kommun)
Zein Anani (Umeå Kommun)
Camilla Sandberg (Bax Innovation)
Dennis Martínez-Moro (Bax Innovation)
Juliette Ténart (Bax Innovation)

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How to use this document?

The main objective of this document is to shed light on different mobility management practices aimed at increasing the safety, feasibility and attractiveness of cycling and walking in Baltic Sea climates, no matter the time of the year. All approaches have been implemented by BATS project partners, most of them tested as part of the project itself.

This document consists of **a series of 8 insight sheets**. The first sheet explains the concept of Year-Round Active Mobility in detail, while the remaining 7 dive deep into specific thematics.

You can **read each sheet independently**, browse the sections you are most interested, **or** read the document **as a full insight report**.

The sheets are **also intended for printing,** to be used as inspiration material in workshops or planning meetings.

From the BATS project, we hope this piece helps spread our insights and ensure year-round planning of cycling and walking becomes a regular practice across all geographies with similar climates.

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Contributors

Heike Bunte, Phoebe Schütz (Hamburg-Altona); Thorben Finger (Hamburg-LSBG); Simo Syrman (city of Porvoo); Topi Haapanen (Posintra Ltd); Agata Ludwiczak, Dominika Godlewska, Pawel Kimel (city of Gdynia); Alexander Svejstrup, Stine Bækgaard Pedersen (Kalundborg Kommune); Julius Paulikas, Vytautas Petraitis (Klaipėda Public Transport Agency); Terje Schmidt, Tiina Beldsinsky (Union of Harju County Municipalities); Isabel Scherer, Lukas Junghanns, Miloš Mladenović (Aalto University); Daniel Kaszubowski, Jacek Oskarbski, Konrad Biszko (Gdańsk University of Technology); Anne Pöder, Jaana Merisaar, Liis Ojamäe, Marina Jarvis, Wolfgang Dieter Gerstlberger (Tallinn University of Technology); Ylva Lindqvist (Cykelfrämjandet); Klaus Asbjørn Madsen, Katrine Vollesen (Gate21)

Design

Dennis Martínez-Moro, Mathis Fay (Bax Innovation)



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1 Year-Round Active Mobility explained



Defining Year-Round Active Mobility

Year-Round Active Mobility (YRAM) is a mindset change to ensure cycling and walking is taken into account as a means of transport throughout all four seasons, both by users and city planners.

From a user perspective, it is the **practice of using a physically active mode of transport, such as walking and cycling, consistently throughout all four seasons**, with a special attention to the autumn and winter months. It is not about athletic commitment in extreme weather, but rather about considering active mobility a feasible means of transport almost any day of the year.

From a planner's perspective, YRAM places special attention to **ensuring cycling and walking remain a safe, feasible and attractive transport option in darker, colder (and typically wetter) months**. In the context of the Baltic Sea Region, this may involve managing snowfall on cycling infrastructure or lighting up alleys that stay dark most of the winter day. It represents a transition from treating active mobility as a seasonal recreational activity to supporting it as a resilient, permanent transport mode.

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1 Year-Round Active Mobility explained

Why is the focus on challenging weather conditions relevant?

Current active mobility infrastructure often caters to sunny daylight and mild temperature. When snow, ice, rain or darkness occur, active mode users look for other transport options, often back into private cars. Rather than addressing the full seasonal cycle, **city administrations have often prioritised increasing active mobility during spring and summer**, discarding 6 (or more) months with potentially challenging weather as periods not worth the investment. However, this oversight is often overrated, since active mobility can still be safe, feasible and attractive if properly planned for.

Addressing these barriers is essential for alleviating urban congestion, improving accessibility for many different types of people, enhancing overall public health, achieving carbon neutrality and reaching a Vision Zero in road fatalities. Achieving good levels of YRAM involves **moving beyond a static city design to a model where the active mobility network is managed dynamically to suit weather and darkness changes**. A city may have the perfect cycling infrastructure, but it will become unrideable if snowfall is not removed before rush hour, or if lighting is poor on winter evenings.

The BATS project, co-funded by Interreg Baltic Sea Region, focused efforts on testing cost-effective solutions and governance approaches that contribute to making YRAM a reality. Rather than focusing on one single high-tech solution or infrastructure, BATS partners addressed a diverse range of interventions designed to be applicable to any city. This demonstrates that YRAM can also be fostered without a big budget and by municipalities of all sizes.

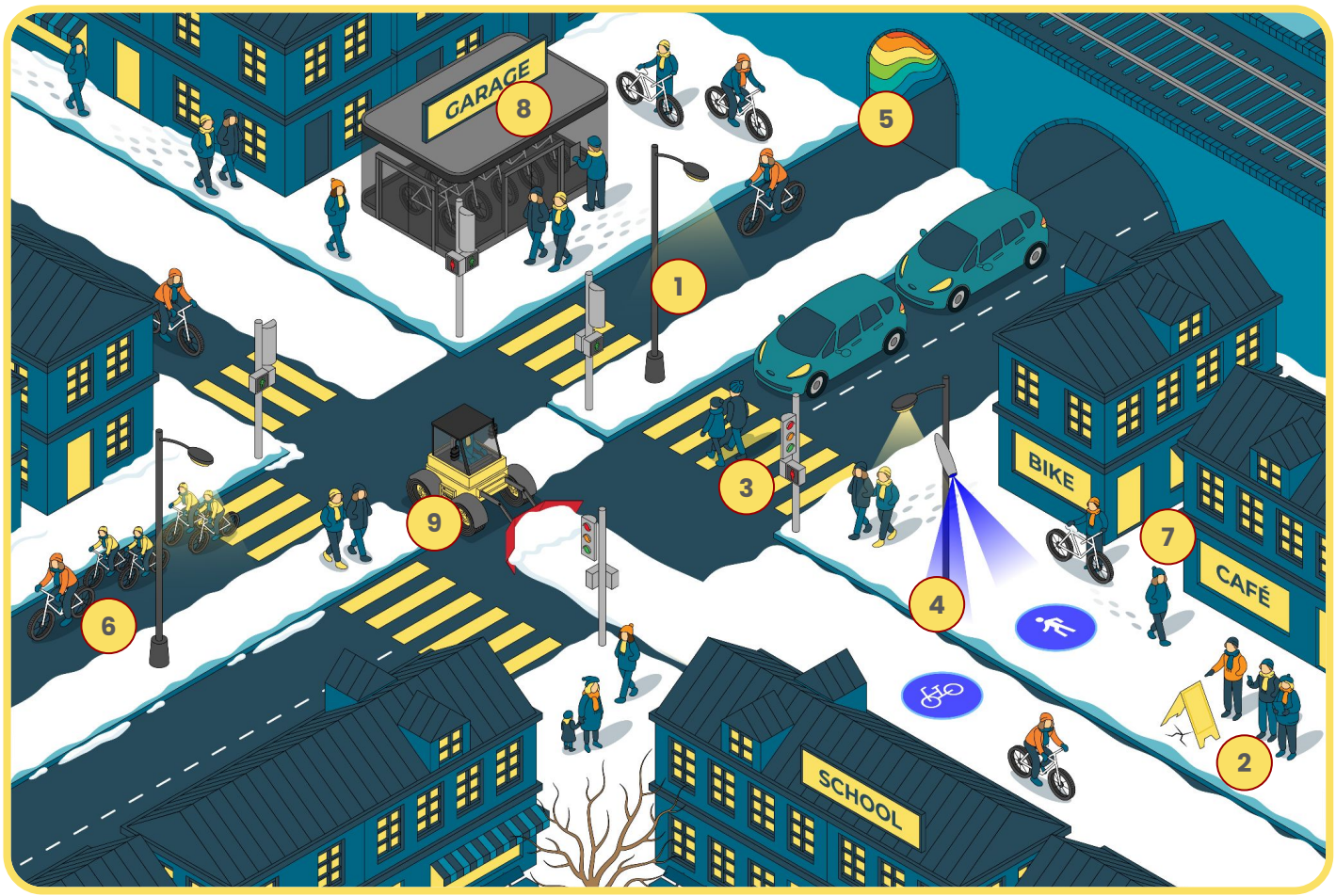
Year-Round Active Mobility in practice

Beyond a base of quality sidewalks and cycling paths, successful **YRAM implementation requires a balance between supplying technical features and managing citizen mobility behaviours**. To achieve this, BATS explored an array of approaches and innovations that contribute towards this goal. This is by no means an extensive list, but it does offer a comprehensive palette of low- to mid-threshold solutions that can generate a lot of impact.



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1 Year-Round Active Mobility explained



1. **Snow maintenance:** the strategic snow removal of pedestrian paths and of priority cycling lanes is essential to ensure a usable infrastructure network.
2. **Winter agents:** integrating citizens in the monitoring of active mobility infrastructure during winter ensures that routes most valued by the community are well kept and prioritised for snow clearing.
3. **ITS for active mobility:** traffic light prioritisation grants pedestrians and cyclists "green waves" during rain or snow to minimise their exposure to challenging weather conditions.
4. **Gobo projectors:** the placement of traffic projections for cyclists and pedestrians ensures that traffic markings remain visible and clear regardless of the time of the day or the season.
5. **Perceived security:** specific lighting and design techniques can make dark environments feel safer and reduce the perceived risk of navigating isolated paths.
6. **School campaigns:** targeted campaigns in education centres establish active mobility habits early, ensuring that walking and cycling remain the default choice for pupils throughout the year and into adulthood.
7. **Year-round cycling:** providing a year-round service in bicycle shops, especially winter-adapted bicycles for citizens to try out, allows them to experience the stability of snow-proof studded tyres or electric assistance without an initial financial burden.
8. **Year-round parking:** running a robust network of year-round bicycle parking and hubs is highly advisable, to keep cycling vehicles dry and secure in all weather conditions.
9. **Winter maintenance:** good coordination with winter maintenance departments prevents accidental damage to snow-covered active mobility installations, like lane separators and floor reflectors.

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1 Year-Round Active Mobility explained

Getting started with YRAM in your municipality

There is no one single solution to increase YRAM. Instead, municipalities should consider gradual and diverse approaches, ranging from technical solutions all the way to organisational changes. BATS partners have developed and experimented with different approaches to ease this process:

7 thematic insight sheets that capture the lessons and recommendations of city partners with different cost-effective mobility management approaches to improve YRAM. Each sheet dives deep into an important aspect of YRAM, either by showcasing how BATS cities approached certain contexts (darkness, snow), or by highlighting experiences with a specific approach.

YRAM Toolkit (strategic planning tool) carefully navigates the many different aspects to take into account when planning for YRAM. It consists of printable canvases to guide the planning process, and a guidance to establish relevant KPIs and monitoring processes. The toolkit adapts to different time availability of planners, offering as short as a 45min solo sprint all the way to a several-day workshop process.

GO TO LINK

Citizen Activation Guide packages all that is needed to plan more effective behavioural interventions, including an applicable method. The method guides planners to better identify a more specific WHY to their ambition, TO WHOM the action is meant for and HOW to go about it with specific actions.

GO TO LINK



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2 Snow maintenance that enables active mobility

Many urban settlements across Europe experience adverse meteorological events during the winter season. In the Baltic Sea Region, many cities deal with regular snowfall that piles up. These situations call for special attention from local governments to ensure urban life can go on with minimal disruption.

Snow removal is an established practice in the realm of motorised traffic. However, active mobility infrastructures have not received the same level of attention in many European cities when it comes to their maintenance over winter.

Adapting snow removal to cycle lanes, pedestrian paths and public spaces is key to ensuring active mobility remains a feasible transport option all year long.

BATS partners Umeå (SE), Porvoo (FI), Hamburg (DE) and Klaipeda (LT) engaged in the topic by collaborating closely with their winter maintenance departments and contractors. Together, they explored how emerging working methods and improved coordination can further refine current practices and unlock new opportunities for the future.

Umeå, Sweden

Sensitising contractors to YRAM maintenance

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Location: city-wide tour
Duration: one day (repeatable with different contractors)
Stakeholders: municipality, winter maintenance contractor

The municipality organised a bike tour bringing together staff from the winter maintenance department and one of the principal winter maintenance contractors. The aim of the activity was to have the contractors experience first hand the results of their labour for YRAM, thus sensibilising them more to the reality of cycling and walking through these infrastructures during winter.

The tour rode throughout the city, stopping at several locations such as main cycle corridors, intersections and areas with known accessibility challenges to discuss specific maintenance practices. The activity also created an opportunity for direct dialogue between planners and operators in on-site locations, enabling specific feedback both ways on what works well and what needs improvement.

Contractor employees were paid by the municipality, to foster participation. Umeå's goal is for insights from the tour to be translated into refined maintenance routines, communication channels, and quality requirements for active mobility.

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2 Snow maintenance that enables active mobility

Porvoo, Finland

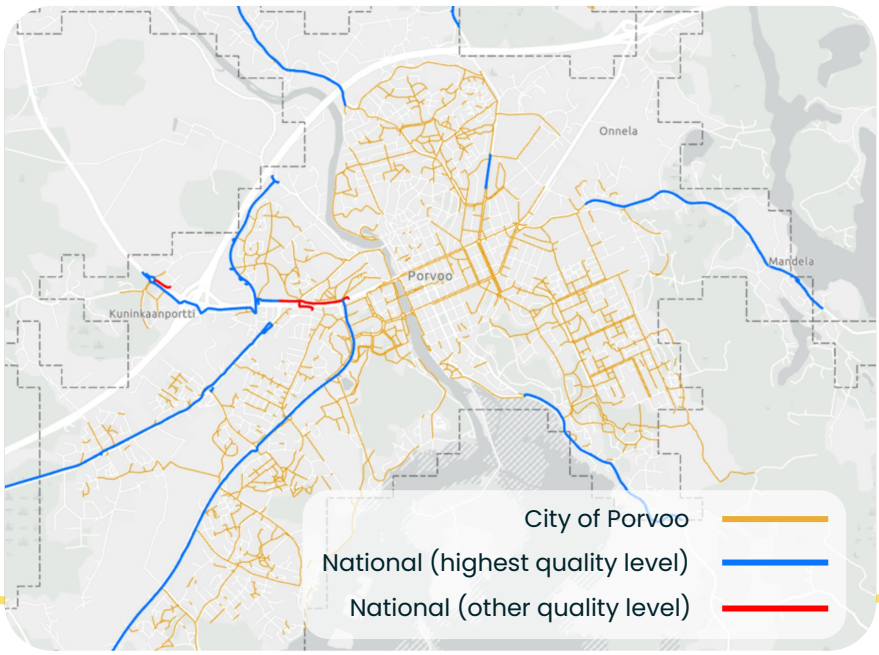
Smoothing out responsibilities of winter maintenance

Location: main routes
Duration: permanent, since 2025
Stakeholders: municipality, national transport authority

The municipality worked out a series of agreements with the Ministry of Economic Development, Transport and the Environment (owners of national roads). The aim was to create a route-based approach to snowfall clearing that would prioritise citizens' mobility needs rather than each organisation's efficiency.

The new plan avoided potential discontinuities in the snow clearance and optimised efforts of machinery, thanks to aligned schedules and agreed prioritisation of certain routes. This meant that, for example, cycling routes that ran through segments managed by different authorities would now be plowed as a continuous path.

BATS EXPERIMENT



Maintenance responsibilities for the pedestrian and bicycle network in the Porvoo city center.

Looking for an extensive array of technical solutions to tackle winter maintenance of active mobility? Check out the winter maintenance study performed by Union of Harju County Municipalities (EE). It features 100+ challenge-driven small interventions for both pedestrian and cycling mobility.

GO TO LINK

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2 Snow maintenance that enables active mobility

The challenges of snow and protective elements

Protective elements have become a staple of cost-effective intervention to create safer cycling paths by physically separating them from the parallel motorised traffic lanes and providing reflective features during dark hours. Cost-effective elements are usually made of rubber and come in different forms (e.g. bumps, bollards, planters, etc.).

BATS partners experimented with creating safer cycling spaces by testing different protective elements, mainly rubber-based bumpers. Especially during the harsh 2026 winter, challenges regarding YRAM became very apparent.



Hamburg-Altona, Germany

Snow piles quickly created a layer of dirt that cancelled the reflective features of the installed bollards in Hamburg's district of Altona, obstructing their use case as wayfinders and reflective features during dark hours. This issue led to deeper discussions into the need for vertical cleaning protocols and machinery.



Klaipėda, Lithuania

The municipality's installed protective elements were ripped out by snow cleaning machines, because they became invisible to the contractor's eye and were not pinpointed in any map. This issue flagged the importance of tighter communication between active mobility planners and winter maintenance departments.

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2 Snow maintenance that enables active mobility



Frequently Asked Questions

How to start a YRAM snow removal programme from scratch? Don't reinvent the wheel, take advantage of existing solutions. Many processes are already in place for motorised road maintenance, such as specialised machinery, scheduling methods, and gravelling protocols. Instead of starting from scratch, consider learning from these established systems and adapting them to suit active mobility.

What is the role of procurement for a good snow removal contract? Procurement should be viewed as a tool for data-driven quality control. By conducting detailed infrastructure mapping—identifying the exact locations of bus stops, underpasses, prior to the tender, you can establish much clearer contract conditions for YRAM. Furthermore, it is vital to shift the focus of the procurement process towards quality-based snow removal for active mobility infrastructure, rather than awarding contracts based solely on the lowest raw price.

What is the best way to handle contracting for cycling networks? Explore optimising contracting models for cycle networks. Outsourcing snow removal specifically for main cycling routes can help improve service focus and quality. To encourage contractor investment, it is often helpful to make these contracts large and long-term, starting preparations at least a year in advance.

Are contracts sufficient to ensure the network stays clear? Contracts are not enough, go beyond and consider a culture shift in norms. Snow removal practices also require citizens to be on board. For example, by cleaning front yards or actively flagging deficiencies in snow clearing. Involving citizens to get real-time feedback on the state of infrastructure has proven to be useful for municipalities. You can read more about this citizen science initiative in the Winter agents insight sheet.

How to ensure winter maintenance strategy remains a long-term priority? It could be highly beneficial to create a dedicated winter Sustainable Urban Mobility Plan (SUMP) to anchor your long-term maintenance strategies. Focused winter planning ensures seamless continuity between seasons and the overall resilience of the city's transport network.

How can we reduce the costs of transporting snow away from the city? Consider integrating snow logistics into early urban design. You might avoid the high financial and environmental costs of transporting snow away by designing streets with dedicated local snow storage. This approach often benefits from urban planners and winter maintenance departments collaborating from the very beginning of the design phase.

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3 Winter agents: citizens at the forefront of YRAM maintenance

Winter agents are a municipality-backed group of citizens who monitor and report on the condition of cycling and walking infrastructure during the colder months. By participating in this citizen science approach, residents provide the municipality with live data regarding snow accumulation, ice, and pavement quality.

This data is typically gathered via digital apps, and allows city authorities and maintenance contractors to adapt their operations based on real time information. Citizens (particularly those that mostly cycle or walk) have a clear incentive to participate as they directly influence the prioritisation of maintenance actions and snow clearing.

This practice originated in Oulu, Finland, and has since gained traction across other Nordic cities. BATS partners Umeå (SE) and Porvoo (FI) experimented with the approach in various degrees.



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3 Winter agents: citizens at the forefront of YRAM maintenance

In essence, a winter agents programme is a participatory method with a very direct influence in municipal winter operations of walking and cycling infrastructure.

It is often secured via contractual obligations to ensure contractors act upon the winter agents' reports.

It consists of a reduced and diverse group of champion citizens that make sure to report on a regular basis.



Porvoo, Finland

Launching a "light" winter agents programme

BATS EXPERIMENT

Location: city-wide
Duration: winter months
Stakeholders: municipality, citizens

Porvoo introduced an adapted version of the winter agents model to give citizens a direct voice. The goal was to balance the benefits of integrating user voices into winter maintenance operations with the challenges of contractual obligations or more costly setup of a "full" winter agents programme.

The municipality deployed a series of quick, map-based QR-code surveys for continuous feedback, alongside a broader "profile survey" categorising users by their daily mobility habits. They also ran a citizen panel with the most engaged respondents to serve as the potential start of a more established feedback provision. A key lesson was the need to clearly separate acute maintenance reports from long-term quality monitoring to manage expectations of citizens effectively.

Surveys successfully pinpointed critical local issues, such as severe slipperiness, excessive snow, and disruptive ploughing embankments left at intersections. This data should help drive more targeted winter maintenance, as well as further structural negotiations (e.g. swapping specific winter maintenance contract areas between the city and the state).

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3 Winter agents: citizens at the forefront of YRAM maintenance

Frequently Asked Questions (1 of 2)

Why should I establish a winter agents programme instead of relying on sporadic surveys? While sporadic surveys can be a helpful starting point for gathering feedback, you might consider recruiting dedicated winter agents to obtain a continuous, quality stream of data throughout the entire winter season. It also helps with funneling the amount of potential feedback received (quality VS quantity).

How could a municipality take the first steps to set up this programme? There is no single correct way. Cities might explore adopting the "premium" setups seen in Oulu and Helsinki, or try starting with lighter actions, such as continuous QR-code feedback surveys. We recommend launching a formal programme when general winter maintenance of active mobility is already at a good standard, using the agents' feedback to fine-tune details rather than to address major operational failings.

How do I effectively recruit and retain winter agents? You might want to initially target cycling enthusiasts via communication campaigns, but consider casting a wide net rather than restricting recruitment to specific routes, as participant drop-off is common. To reach broader demographics, consider applying innovative citizen activation methods, such as gamification or mobile alerts.

Should participants be remunerated for their time? While many participate voluntarily to help improve infrastructure, you might consider offering small incentives to maintain long-term motivation. Cities could explore rewarding agents with cycling accessories, gift vouchers, or invitations to end-of-season wrap-up meetings to encourage them to stay active and complete final surveys.

How is feedback collected and efficiently passed to maintenance teams? Digital applications are the usual standard. Instead of developing new software, consider integrating the programme into the municipality's existing fault-reporting systems by adding a dedicated "winter agents" branch that can simply be hidden after the season. Consider also aligning internally beforehand, so that data flows directly to the relevant contractors without creating administrative bottlenecks.

How can the municipality manage the amount of incoming feedback? Consider designing your feedback mechanisms with a priority scale, clearly separating immediate maintenance needs (like sudden slippery patches) from the longer-term quality feedback (like concrete cracks). If response times become difficult to maintain, it may be worth revisiting how the feedback is collected and processed or whether additional staff can help handle it.

Can this programme run all year round? Surely. Agents can assist outside of the winter months by reporting issues like potholes, cracks, or sand removal. But municipalities often choose to run it specifically to keep track of snow and ice maintenance.

How can the city guarantee that contractors act on the agents' feedback? To promote accountability, consider incorporating specific clauses into your winter maintenance procurements. Setting a formal, contractual expectation for contractors is an established practice in several flagship cities like Helsinki.

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3 Winter agents: citizens at the forefront of YRAM maintenance

Frequently Asked Questions (2 of 2)

What if route ownership is fragmented between different authorities? Consider negotiating first structural changes to eliminate disjointed ploughing schedules. Exploring this before launching a winter agents system can help ensure the city has the proper jurisdiction to address the issues agents report. It is also possible to refer users to the responsible road owner when the issue falls on a road not maintained by the municipality.

How can citizen expectations be managed, to avoid potential backlash? Increased engagement could lead to frustration if expectations are unrealistic. Consider educating your agents at the outset about how maintenance operations work, establishing informal communication channels such as online group chats, or providing real-time updates via the digital apps on whether issues have been addressed.

Umeå, Sweden

BATS EXPERIMENT

Scaling a winter agents programme in a Swedish context

Location: city-wide
Duration: winter period (Nov-Mar)
Stakeholders: voluntary citizens (winter agents), municipality, winter maintenance contractors

The municipality recruited 77 agents from various age groups and genders. During the winter season, these agents evaluated the city's digital ploughing map, providing real-world reports to validate digital data and ensuring the map accurately reflected the actual state of the streets. Reports were filed via a specific section in the municipal feedback app.

The feedback provided by the agents led to tangible improvements in maintenance practices, particularly regarding surface quality. For instance, when agents reported that certain road stretches became ridged or grooved after ice scraping, the maintenance teams adjusted their equipment. They began testing different steel blades for ice scrapers to achieve the best possible surface. They found that while toothed blades are necessary to break up solid ice, smoother blades are far more effective for removing compacted snow without leaving an uneven finish.

Activity surveys showed positive feedback from winter agents, with all expressing a desire to continue as agents for the following winter season and highlighting how valuable it was to learn about winter maintenance at the start of the season.

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4 ITS at the service of year-round active mobility traffic

Traffic management across European cities is still widely catered to car transit. Cyclists have different speeds than cars, so they often catch less green lights. Pedestrians are mostly relegated to sidewalks and have to cross car roads multiple times to get to destinations.

When considering the year-round aspect, active mobility users are the most vulnerable to climatic events. Pedestrians have to wait for minutes under rain or snow. In worst cases, they cross when it is red or in a section of street where there is no crossing, increasing safety hazards and potential accidents. A similar case applies to cyclists, as they might rush on a traffic light turning red instead of waiting idle for the next green light.

Intelligent Traffic Solutions (ITS) can play a role in mitigating this issue, allowing pedestrians and cyclists to increase the comfort and safety of their trips no matter the weather. Smart systems can predict green lights, and meteorological sensors can inform traffic systems of different climatic events. BATS partners Gdynia (PL), Klaipeda (LT) and Hamburg (DE) have tested different approaches, their insights explained in this sheet.

Approaches by BATS partners to improve YRAM traffic conditions



Weather-sensitive traffic lights: traffic signal that prioritises pedestrians and cyclists in adverse weather conditions via the integration of a thermal sensor (BATS experiment in Gdynia)

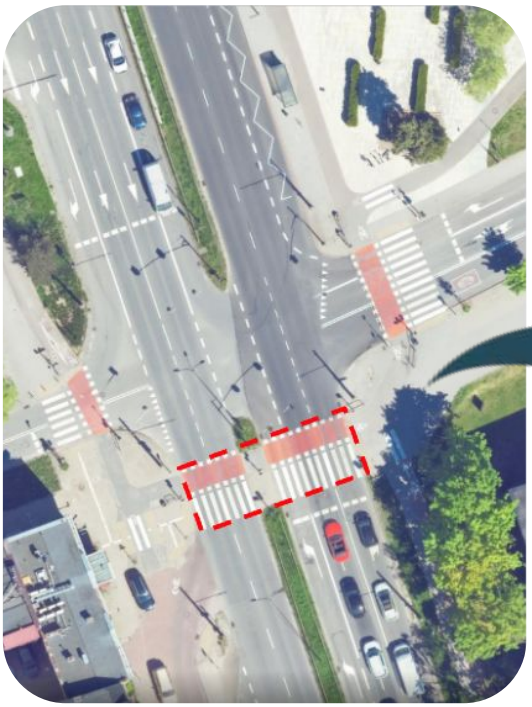
Open data on path/lane status: meteorological sensors that provide real-time data on the "cyclable" state of bicycle lanes (BATS experiment in Klaipėda)

Green wave setup for cyclists: reverse traffic management to have green lights for cyclists and pedestrians as default; motorised traffic must "request" the green light via sensors.
More information.

Speed advisory: physical and digital solutions that predict the traffic light system and provide speed and route recommendations for cyclists to avoid the biggest amount of red lights.
More information.

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4 ITS at the service of year-round active mobility traffic



Top-view location of Gdynia's experiment (left); picture of the installed thermal sensor for pedestrian and cyclist detection (below).



Gdynia, Poland

Testing weather-sensitive crossing intervals for YRAM

Location: intersection Aleja Zwycięstwa/Orłowska
Duration: 1 year of manual experimentation
Stakeholders: municipality, university, traffic authority

BATS EXPERIMENT

Gdynia, in collaboration with GdanskTech, installed a weather-sensitive traffic light setup on a crossing between a busy 5-lane car artery, a Eurovelo cycling lane and the pedestrian sidewalks. The objective was to test out a new interval system in which pedestrians and cyclists have significantly less waiting times during adverse weather conditions (i.e. rain and snow, but also heat), while minimising impact on motorised traffic flow.

The installation consisted of 3 thermal sensors detecting pedestrians and cyclists via body heat, a connection to a meteorological station for real-time climatic conditions, and a new set of traffic light interval systems (up to 8 different programmes tested). Setting up the connection between the sensors, meteorological data and the traffic light itself was the longest process.

Over the course of a year, different signal timings were manually tested to understand behaviour of pedestrians and cyclists. This was crucial to calibrate the setup of new interval programmes, in order to minimise waiting times as much as possible. The setup should run semi-automatically in the long-term.

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4 ITS at the service of year-round active mobility traffic

FAQs on traffic light optimisation for YRAM (1 of 2)

How does weather specifically impact pedestrian and cyclist behavior? Experimental data shows that pedestrian speeds increase during rainfall and snowfall as users seek to minimise exposure to the precipitation, but decrease during extreme heat due to physical discomfort. Cyclist volume and behavior are also highly weather-dependent. Signal timings should be flexible enough to account for these shifts in crossing speeds.

Why did you use thermal sensors as a detection method? Thermal sensors are an optimal choice that fulfills several criteria: they are capable of detecting both pedestrians and cyclists simultaneously due to the heat generation of active mobility users; they are a relatively cost-effective process of detection; and they avoid data protection hurdles because of their less intrusive nature.

How can we ensure public acceptance of automatic detection? To improve trust and diagnostic ease, systems should provide clear call acknowledgement. Even with automatic sensors, triggering a visible feedback light on the physical pushbutton tells the user the system has "seen" them, similar to a traditional manual press.

What are the "must-have" technical features for remote management? The system must support remote configuration and verification. Planners should ensure operators can adjust detection zones and view live operational previews remotely to handle seasonal adjustments or troubleshooting without a site visit.

How should vendor integration be managed to avoid delays? Put controller integration on the critical path immediately. You must define early on how signals are transferred, how detection states translate into phases, and—critically—how the system handles fail-safe behavior (e.g., what happens if communication is lost).



Thermal sensor quick facts

Price Range: €4,500 – €6,000 per unit.

Operational Costs: installation costs of 3 sensors amounted to €31,000.

Durability: 7-10 years under 24/7 operation across all climatic conditions and temperature ranges (from -40 °C to +50°C)

Space requirements: compact sensor head mounted on a pole. In the controller cabinet: potentially additional interface components (if used) and cabling. The main constraint is cable routing and cabinet capacity.

Maintenance: written into procurement, including replacement of sensors if at least 3 malfunctions of the same type occur. Additional costs could include contamination of the lens, vandalism or sensor deviation from optimal angle.

Market availability: narrow but established market of suppliers and integrators

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4 ITS at the service of year-round active mobility traffic

FAQs on traffic light optimisation for YRAM (2 of 2)

What should be included in the procurement specifications to avoid "grey zones"? Don't just buy the hardware. Bundle the following into the contract: Design documentation and permits; Temporary traffic management during installation; Cabling, ducting, and controller adaptation; Commissioning, acceptance tests, and long-term maintenance.

What are the primary benefits of weather-dependent signal control? Implementing dynamic signal parameters (based on temperature or precipitation) reduces pedestrian delays and improves safety. Simulation data suggests these adjustments are particularly effective at protecting vulnerable road users and encouraging active mobility during challenging weather.

Is Gdynia's experiment scalable to a city-wide network? Partially. While the algorithms and integration of new timing intervals can be fed directly to the centralised traffic management station, the installation of thermal detectors is very specific to each crossing (angle, direction, amount). However, the installation process remains similar for all crossings.

Can I replicate another city's traffic light interval timings setup in my city? Surely. However, each city has specific contextual factors that might affect their pedestrians' and cyclists' behaviours. We recommend running a pilot study first as well.

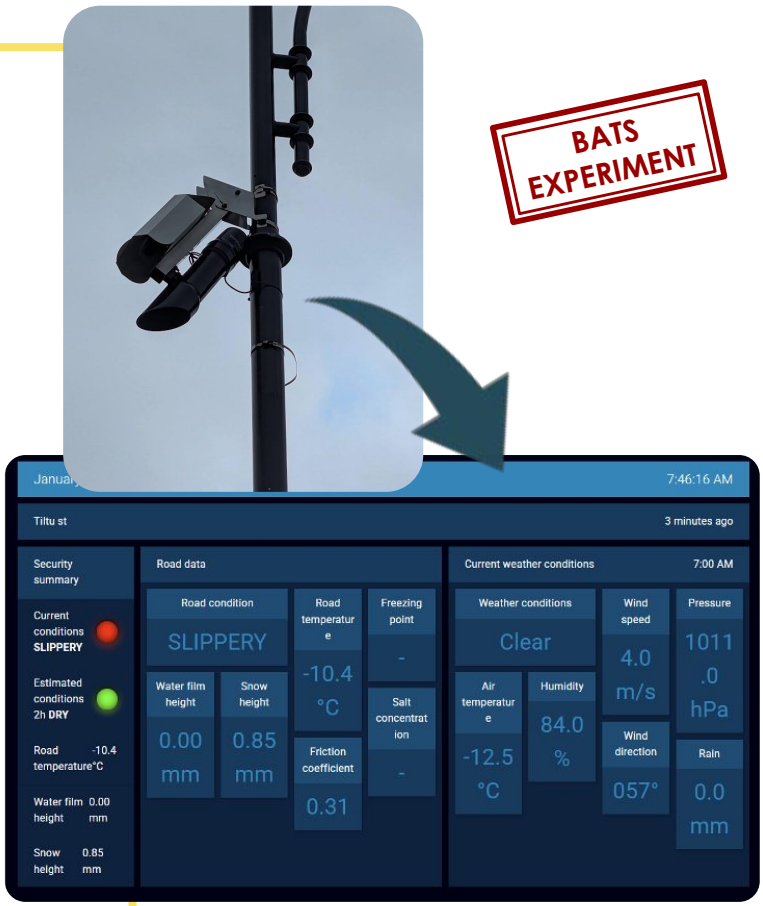
Klaipėda, Lithuania

Open data on cycling infrastructure

Location: Old Town bicycle lane
Duration: permanent, since 2025

Klaipėda's transport agency installed a meteorological sensor directed at the bicycle lane that traverses the Old Town via Tiltų street. The sensor gathers real-time data from the infrastructural and climatic status of the lane, including air temperature, humidity, wind direction, etc. This is translated into clear advice to users (for example, road condition "slippery", weather condition "clear").

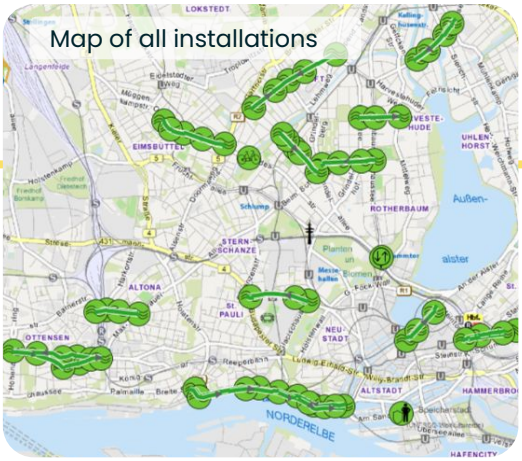
Klaipėda' future plan is to connect this data with winter maintenance operations to perform more effective actions. This test, if proven a success, would be replicated across different bike lane locations in the municipality.



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4 ITS at the service of year-round active mobility traffic

Hamburg, Germany



ITS installations to adapt cycling to the traffic system

Location: city-wide (13 route sections, 3 intersections)
Duration: since 2024, permanent

The primary objective of Hamburg was to make urban cycling safer, faster, and more comfortable by leveraging various Intelligent Transport Systems (ITS) and digital innovations.

Green waves: Traffic light green waves for cyclists were implemented across 13 key route sections, coordinating traffic signal timings to match a standard cycling progression speed of 16 to 22 km/h (depending on the specific conditions of the routes). A reversed priority change in traffic light intervals was also tested at 3 intersections, where pedestrians and cyclists are given a continuous green light by default.

Speed advisory: physical speed advisory pillars and ground-level running lights were installed, communicating to cyclists whether they should maintain, increase, or reduce their speed to catch the next green light. A digital version of this approach brought this feature to users directly, offering real-time traffic light forecasts and optimised cycling routes via a smartphone app.

Following a six-week citizen survey, the green wave measures were the most widely recognised and frequently used interventions, while the physical speed advisory features were much less noticed. While technical innovations are viewed positively, citizens voiced that they cannot replace physical safety. From an operational standpoint, coordinating cyclist green waves with existing public transport and car traffic signals was a complex challenge.



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5 Gobo projectors: YRAM traffic signage for increased visibility

In European cities, traditional horizontal road markings (paint and thermoplastic) face a significant performance gap during the winter months. Snow episodes cover bike lane markings and pedestrian crossings, and the extended darkness of northern winters reduces their visibility. These issues leave vulnerable road users at risk, often discouraging citizens from adopting active mobility modes year-round.

To improve the safety, visibility, and comfort of active travellers, BATS partners Umeå (SE) and Klaipėda (LT) have successfully implemented gobo projectors. These systems ensure that signage remains visible all year long by projecting traffic symbols directly onto the road or snow surface from an elevated position.



Gobo projector quick facts

Price range: €2,000 – €5,000 per unit without installation costs. Price depends on location, size, angle etc., with a higher price for those that require a custom angle. Not all locations need a custom-made gobo pattern.

Operational costs: Minimal. Energy consumption is comparable to a standard LED street lamp (approx. 30W–50W).

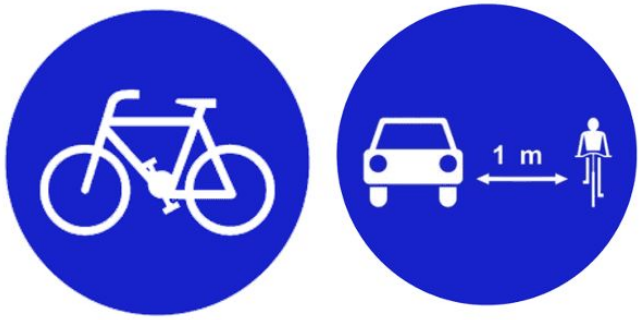
Maintenance: Significantly lower than traditional paint. Virtual signs do not suffer from mechanical wear (tyre friction) or damage from snowploughs.



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5 Gobo projectors: YRAM traffic signage for increased visibility

Projections tested by Klaipėda's public transport agency.



Frequently Asked Questions

Where is the best place to install these units? You should carefully consider the placement of projectors within your network, giving priority to high-conflict zones. These include priority routes with heavy motor traffic or locations where cycle paths intersect with turning vehicles.

What type of signs can I project? The main use case experimented with in BATS was active mobility traffic signs, showcasing the designated lanes of cyclists and pedestrians via silhouette icons of their mobility mode. Klaipeda tested a "maintain the distance" sign, and Hamburg-Altona went even further to test their use case in different context of increasing perceived security.

What infrastructure is required for a successful installation? The units must be mounted on a suitable lamp post or mast with access to a stable power connection. To prevent the projected sign from becoming distorted, the unit must be positioned at an optimal height and angle.

How do I ensure the projection remains visible and of high quality? It is crucial to select a supplier that provides units with high light intensity and projection clarity. This ensures the signs remain visible under orange street lighting or during rainy conditions. Furthermore, you should verify that all equipment is rated for extreme temperatures and includes proper weatherproofing, such as an IP65 or IP67 rating.

What measures should be taken regarding durability and vandalism? While these systems generally require less maintenance than painted road markings, they should be mounted high enough to discourage vandalism. Additionally, it is recommended to clean the lenses once or twice per season to ensure that dust or road salt does not dim the projection.

Can projectors become an issue with traffic regulations? Yes. Since gobo projections do not have a legal status in the traffic code, this can become a barrier to implementation. Consider including the traffic authority in early conversations to make them aware of the many benefits of the projections.

Curious about other use cases of gobo projectors to improve YRAM? Check out how Hamburg-Altona tested projections to increase feelings of perceived safety in dark urban areas, in the Perceived Security sheet.

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5 Gobo projectors: YRAM traffic signage for increased visibility

BATS EXPERIMENT

Umeå, Sweden

Location: 7 streets across the city (Brogatan, Kungsgatan, Akademileden, Hemvägen, Östra Kyrkogatan, Storgatan, Dragongatan)
Duration: ongoing since 2024

Umeå installed seven gobo projectors along commuter roads, near the University campus, and in areas where pedestrians and cyclists often find it difficult to distinguish their respective lanes. In all these locations, the projectors display a clear separation between pedestrian paths and cycle lanes.

Originally, the team intended to make the projectors mobile, allowing them to be relocated as needed. However, the technology has a degree of site dependency as the units must be installed on lamp posts. It is also crucial to ensure the projection's appearance is accurate, which requires careful consideration of the installation height and angle. To ensure that the projection remains circular and undistorted, a "grid-gobo" system was used in one location. This involves mounting and calibrating the spotlight using a grid pattern to guarantee precise placement and shape according to specific site conditions.

To know if the projectors had a positive effect on cyclists and pedestrians's active mobility experience, the Umeå team visited Brogatan during peak hours to interview passersby. Additionally, the municipality used Instagram to gauge public opinion on the new projectors, reaching over 13,500 people. Out of 350 respondents, the feedback was largely positive: 64% confirmed that projected signs clearly or partially demarcated walking and cycling paths. Only 10% felt the signs were unnecessary, with the remainder of the group yet to encounter the projections in person.





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5 Gobo projectors: YRAM traffic signage for increased visibility

Klaipėda, Lithuania

BATS EXPERIMENT

Location: Tiltų g. (both ends of Old Town street), Liepų g. (crossing)
Duration: ongoing since 2025

Klaipėda's public transport agency installed gobo projectors in three locations to experiment with their benefits for traffic safety. Each projector was designed to enhance the safety and visibility of cycling routes in critical points, especially in points of high conflict with bus traffic.

These projectors are considered beneficial throughout the year, not just during snowy conditions. They turn on and off along with the street lighting grid. Their effect is most pronounced during dark hours when visibility is low, or in areas like the Old Town where bicycle lane markings on cobblestones are worn or difficult to see.

Public feedback has been largely positive, with residents and visitors viewing the projectors as a welcome innovation. Interestingly, negative feedback has not been directed at the projectors themselves, but rather at existing shortcomings in the city's broader bicycle infrastructure.

Positive twist to gobo installations: increased awareness and winter maintenance

During the 2025-2026 winter, the gobo projector served as an unexpected catalyst for better winter maintenance. The catchy gobo projection sign prompted a citizen to voice out on social media the poor winter maintenance of the cycling lane (covered in snow and unfit for use). A day later, the maintenance contractor cleared the lane.

This action has also sparked deeper conversations with the municipality on more structural changes to YRAM maintenance.



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6 Perceived security: safeguarding active mobility in dark environments

Darkness exacerbates feelings of insecurity for pedestrians and cyclists, particularly where urban design fails to account for visibility. This issue is amplified in Baltic Sea region cities, where fall and winter seasons have short day- light periods with long dark hours.

Research indicates that vulnerable groups, especially women, frequently avoid specific routes to prevent potential encounters, creating a significant barrier to Year-Round Active Mobility (YRAM). Since active mobility modes are the most exposed, infrastructure must not only be safe but *perceived* as safe to ensure consistent use during the winter months.

While lighting plans are an essential pillar of perceived security, they often overlook specific paths or provide insufficient coverage at critical "choke points" like tunnels. BATS partners Kalundborg (DK) and Hamburg-Altona (DE) have experimented with low-threshold interventions to reduce perceived insecurity and limit opportunities for negative interactions. These approaches ensure walking and cycling keep being an option before sunrise or after sunset.

SECURITY OR SAFETY? In this insight sheet, we acknowledge the interchangeability of the terms in urban planning. We have decided to follow **this study**'s distinction: perceived security - fear of crime, violence and strangers - is the main challenge explored in this insight sheet. Perceived safety - fear of traffic accidents - is not so relevant to this sheet.



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6 Perceived security: safeguarding active mobility in dark environments

Positive distractions

Pedestrians are uniquely vulnerable to perceived insecurity in poorly lit areas, or in confined spaces like tunnels where traditional lighting might not be enough. To mitigate this, environmental psychology (using lighting, colour, and sound as "positive distractions") can play an effective role to deviate the user's focus away from potential danger to the designed environment. These interventions help reclaim critical infrastructure, ensuring that all walking routes remain inviting and perceived as secure.

Hamburg, Germany

BATS EXPERIMENT

Location: 2 tunnels in the borough of Altona
Duration: permanent, since 2025

To mitigate fear in dark, ominous underpasses, Hamburg experimented with positive distraction using light projectors to display cycling- and walking-related phrases on the floor. A QR code was also included in the projection, opening up many digital possibilities. The goal was to shift user attention away from dark ominous architectural features towards dynamic, inviting visuals.

One projector was placed at the Elbschlosstunnel, a heavy active mobility commuter tunnel next to the Elbe river. Three projectors were installed at the Lessingtunnel, a railway underpass road featuring a pedestrian section in the middle. For more information on light projectors, you can check out the Gobo projectors sheet.

The process required extensive negotiations with local institutions and beyond: for example, ownership of the Lessingtunnel is split between the Borough of Altona (owns the ground), Hamburg's Infrastructure Authority (the columns), and the national railway (the ceiling). Meeting with BATS partners and with local stakeholders also proved insightful. For example, Hamburg's inclusivity board noted that projections could be perceived as physical obstacles by the visually impaired.

Feedback from more than 50 users transmitted that the intervention created a sense that the infrastructure was designed for them. Particularly female users reported an increase in "positive feeling" within the space, and left with curiosity for more.







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6 Perceived security: safeguarding active mobility in dark environments

Umeå, Sweden

Location: Sara Lindman tunnel (railway underpass)
Duration: permanent

To address a dark and unsafe connection between the Haga district and the city centre, Umeå redeveloped this passage under the railway with a focus on "light" and visibility. The design prioritises perceived safety by widening the profile and rounding corners to ensure unobstructed sightlines and eliminate blind spots.

To counter the feeling of confinement, the tunnel features a large glass artwork with white mosaics and backlit panels depicting local nature, maximising ambient brightness. The integration of transparent superstructures, literary quotes, and ambient soundscapes transforms a functional transit corridor into a welcoming destination, significantly reducing perceived insecurity for pedestrians and cyclists.



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6 Perceived security: safeguarding active mobility in dark environments

Wayfinding

Active mobility networks frequently traverse off-grid environments such as parks and residential zones, where standard signage becomes ineffective in low-light conditions. To mitigate user uncertainty and feelings of insecurity, strategic lighting serves as a high-impact solution that simultaneously ensures visibility and acts as an intuitive wayfinding mechanism to guide cyclists seamlessly along the route.

Kalundborg, Denmark

BATS EXPERIMENT

Location: 1km stretch along Rynkevangen
Duration: 1-year experiment, since 2025

To improve perceived security on unlit secondary cycle links, Kalundborg tested a flexible, off-grid lighting solution. The primary objective was to guide cyclists away from an accident-prone car-shared roundabout through a corridor along residential areas. However, this new side-route presented many dark, non-inviting areas to cycle through.

Instead of installing expensive, grid-connected infrastructure, the municipality utilised 26 movable, solar-powered light poles, each costing about 500€, which allow for rapid deployment and can be easily relocated to test different routes.

Cyclists reported that the lighting made them feel significantly more secure from car traffic, and helped them navigate the route during dark hours. However, It did initially require clear communication of the wayfinding function to users. Another unforeseen challenge was vandalism: 1 lighting pole appeared broken one day, but good communication with the contractor allowed for quick replacement, and used as feedback to create sturdier designs.







Strip of lighting poles guiding the way during dark hours (top). Light pollution from regular street lighting dimmed their intended effect. Vandalised lighting pole in Kalundborg (left)

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6 Perceived security: safeguarding active mobility in dark environments

Frequently Asked Questions

How can we secure political buy-in for lighting interventions in non-standard locations? Frame the intervention as a street security measure, not a mobility measure. Street security is often a non-partisan issue, thus ensuring a greenlight. Finance-wise, it's useful to frame them as low-risk "proof of concepts" using temporary equipment to gather user feedback before committing to permanent investments.

Are these measures costly? In general, no. Costs vary significantly by intervention type: lighting poles are relatively affordable at €500–600 per unit, while projector installations range at €2,000-5,000 per unit installed. Even so, these sums are negligible compared to the budgets needed to change infrastructure (ranging usually in the millions of euros).

How do I install interventions in shared infrastructure (e.g. underpasses) with multiple owners? Early and transparent coordination is crucial. Planners in charge of the initiative must map out ownership responsibilities (e.g. floor, railway, columns) and involve every authority in regular meetings to secure necessary mandates on time and align on technical details.

Can these interventions improve crime statistics? While lighting or distractions alone may not alter crime statistics, interventions like positive distractions can help reduce the feeling of insecurity for active mobility users, creating a psychological sense that the infrastructure is designed specifically for them.

Are off-grid lighting poles a reliable alternative for dark winter climates? While they have proven a reliable method of wayfinding even in dark winters, offering a cost-effective solution that avoids expensive grid connections when testing new cycling or walking routes, we do not recommend them as lighting solutions per se. The luminous intensity is low compared to traditional lighting.

Do these solutions work as city-wide methods? These interventions are best deployed as targeted measures to patch specific "choke points" of the active mobility network, complementing rather than substituting standard public lighting.

What technical specifications are crucial when using light projectors? Avoid low-resolution hardware to ensure projections remain readable, and scannable in the case of QR codes, rather than appearing as blurry or confusing shapes. For more detailed information, check out the Gobo projectors sheet.



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7 Campaigns in education centres: engaging children and youth in YRAM

Behavior change initiatives are a key ingredient for building a resilient, year-round active mobility culture. Campaigning is a low-cost and effective vehicle to achieve this on different behavioural levels: from raising awareness, changing the attitudes and preconceptions, all the way to actually seeing a behavioural change in citizens choosing cycling or walking throughout all four seasons.

Why focus on schoolgoers (ages 3–18)? As non-drivers, students are naturally inclined toward active modes. Encouraging year-round active mobility habits early in life ensures that walking and cycling remain their default choice throughout the year and into adulthood.

While general cycling/walking campaigns are common, they often overlook the specific challenges of sub-optimal climatic scenarios. This sheet highlights the approaches experimented with by Gdynia (PL) and Kiili (EE) to promote year-round active mobility in different educational institutions.

Set of activities for campaigns

Gamification events: competitions for teenagers, adding stickers to a poster for pre-schoolers when commute is done by active mode

Fun education: thematically relevant theatre plays, storytelling for children, inviting influencers to tell their story and promote, cycling lessons

(Social) Media use: publications in local newspapers, instagram page of school, group chats with parents, promotional videos

Feedback: Surveys and meetings with students, parents, teachers

Winter-related events: bicycle winter maintenance workshop, free winter tyre replacements

Walking/Cycling tour: have a group excursion to truly experience active mobility in sub-optimal conditions

YRAM incentives/rewards: hardy breakfasts for school cyclists, reflective gear to encourage walking at night

~6,000

Pupils participating in the YRAM campaign activities across both municipalities

3

Education centre types tested

+4.1%*

Pupils choosing to walk during the fall/winter period in Gdynia

+4%*

Pupils cycling during the fall/winter period in Kiili

***Disclaimer:** percentages used are percentage point increases, showing the absolute increase of the modal split between the start and the end of the campaign experiments.

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7 Campaigns in education centres: engaging children and youth in YRAM

Kiili, Estonia

BATS EXPERIMENT

Fostering year-round cycling habits in Kiili's municipal school

Location/s: Kiili Gymnasium (1st to 12th grade)
Duration: 2-3 months per year, single day events

Kiili, a small municipality next to Tallinn, is home to around 7,500 inhabitants. The municipality understood that changing the mobility behavior of schoolgoers can have a great impact in such a small settlement. Its highschool experienced a high level of parent-taxis, despite the short distances for teenagers to commute independently.

The municipality, together with Kiili Gymnasium, designed a campaign package mixing cycling hikes with students, day events featuring cycling lessons and competitions, a powerful local media campaign, bicycle maintenance workshops and a pop-up winter tyre installation. The municipality also installed special flashing-light markings at the school road crossing.

These efforts combined resulted in an exponential increase of bicycle users during the fall/winter season, going from practically none (5 parked bicycles out of 1000 students in Jan 2024, with an average of 0°C) to several dozen cyclists (about 50 parked bicycles in Jan 2026, with an average of -15°C).









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7 Campaigns in education centres: engaging children and youth in YRAM







Gdynia, Poland

BATS EXPERIMENT

Testing a fall/winter school campaign for active mobility

Location/s: 48 pre-schools, 20 schools over 2 years
Duration: 3-4 months per year

Gdynia is an experienced partner with running school campaigns for active mobility. In the BATS project, Gdynia adapted their usual campaign method to the Fall/Winter period, with the objective to foster more walking and cycling during this period.

The municipality developed a rich implementation package. They carefully split activities depending on the age group they were targeting: pre-schoolers had very visual and practical actions to take part in, schoolgoers received creative education and gamification actions; teenagers were a new target group, which they successfully engaged via influencer-mediated events and competitions.

In BATS, Gdynia focused on pre-schoolers and elementary school students. The campaign ran its course between October and mid-December. It consisted of multiple actions, such as encouraging pupils to come to and leave their centre via active mobility modes, teaching them traffic education for dark and cold situations, and running a series of 1-day events to frame cycling and walking as a desirable mode of daily transportation.

By calculating a baseline of the modal split of people reaching the school, they were able to track modal split changes at campaign's end. The amount of kindergarteners reaching the school by foot rose by 4.5% and those using public transport rose by 0.4%. Bicycle use dropped significantly (6.1 percentual points), but car use only rose a moderate 2.6%. For a first campaign, Gdynia considered this a success.

> "Kids can be very persistent, successfully convincing parents to switch transport modes to reach their school"
> - Gdynia

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7 Campaigns in education centres: engaging children and youth in YRAM

Frequently Asked Questions

I have never done campaigns. How do I get started? Consider starting with the basics: for example, a flexible strategy that includes several types of activities that don't rely on each other, and tracking simple success indicators like bike counts or hand-raising surveys. We recommend taking the initiative at municipal level, ensuring the agreed collaboration of the education centers in question.

How do I ensure the campaign gets attention and traction? Being in constant dialogue via surveys or focus groups can help address local barriers. Also, we recommend framing the campaign as a positive, fun social activity, using creative, relatable methods for schoolgoers (e.g., theatre, local student videos).

Is there a one-action-fits-all approach? In short, no. Consider segmenting approaches by age (e.g. visual gamification for young kids, independent incentives for teens). Also, we suggest mixing different types of activities to make a comprehensive campaign; you can take inspiration from the activities implemented in our BATS cases.

Why run more than one campaign if the first was successful? Periodic repetition is vital to normalise year-round active mobility (YRAM) and prevent backsliding. Pilot successes also provide evidence to scale initiatives to more educational centres, building a city-wide YRAM culture.

What actions are most effective to promote YRAM specifically? Practical winter maintenance workshops (tyre changes, gear cleaning) are an effective activity that helps build confidence in riding bikes on snowy, slippery days. Consider also offering tangible incentives like "bicycle breakfasts" and high-quality reflective safety gear to address parental concerns.

How do I convince political leaders to invest? Try tailoring the argument: use data to show it's a cost-effective tool to reduce "parent taxi" congestion/pollution, or a valuable investment in student health and autonomy, even in adverse weather.



Cycling day event at Kiili Gymnasium ©Maaris Tölp

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8 Year-round cycling: enabling the bicycle as a feasible vehicle

Unlike walking, cycling relies on a physical vehicle that requires care and adaptation to different climates. In Baltic Sea region cities, the practical challenges of winter riding and maintenance can deter citizens from choosing cycling. However, by smoothing the rough edges of daily bicycle use, municipalities can effectively remove these barriers.

This thematic insight highlights practical approaches from BATS partners Umeå (SE), Kiili (EE) and Klaipėda (LT), demonstrating how small, targeted actions and support services in bicycle upkeep can significantly increase the comfort, convenience, and likelihood of residents cycling in all seasons.

Approaches by BATS partners to improve bicycle use

Lending trial e-bikes in the fall/winter period. E-bikes are quicker than traditional bicycles, requiring significantly less effort to pedal. These characteristics can become assets during cold, dark winter periods. A lending service can help people familiarise with the electric version of the bicycles and consider purchasing one afterwards (BATS experiment in Umeå).

Offering pop-up winter tyre and repairs shops. Services of bicycle maintenance are key to keep a cycle-ready vehicle all year round, including a proper prep for the winter months. Offering pop-up services at education centres or workplaces significantly reduces the effort of dedicating time to go to a physical repair shop (BATS experiment in Kiili).

Providing year-round covered parking. A big barrier to bicycle use tends to be parking. Cities can offer covered, secured facilities to store bicycles inside. These can offer either a community space to store private ones (Klaipėda) or a fleet of shared vehicles for people to rent (Umeå).





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8 Year-round cycling: enabling the bicycle as a feasible vehicle

Umeå, Sweden



Testing an e-bike lending trial programme

Location: city-wide (available at 3 bike shops)
Duration: 1-year period
Stakeholders: municipality, bicycle shops as operators

The city launched this activity to offer residents the chance to borrow an e-bike for free. Participants could test an e-bike for a period of two and a half weeks to experience this new mode of transport. The 17 municipally-owned bicycles were distributed across different local bike shops that took care of bookings and the maintenance of the e-bikes .

The pilot successfully engaged a balanced demographic, with a mix of cyclists and car-users and predominantly those aged 25 to 35. Every participant was asked to respond to a follow-up survey where at least one third of all participants stated that they plan to buy an e-bike, the second third expressed interest in wanting to but were currently unable to.

BATS EXPERIMENT

Frequently Asked Questions on e-bike lending

How can municipalities effectively partner with local bike shops? Consider establishing clear, upfront agreements detailing spatial requirements, spare parts provisioning and booking operations. A clear division of tasks and how much effort each takes is key to reduce the amount of time spent planning.

What logistical preparations are necessary before launching the programme? It requires thorough upfront planning to successfully engage and inspire bike shops to join, establish delivery routines for batteries and winter tyres, standardising chargers to prevent technical mix-ups and create an efficient booking system. Furthermore, there can be a drop in bookings during the winter season compared to the summer season; thus, consider marketing strategies during winter to encourage more bookings.

How should the booking and user communication process be managed? Consider dedicating sufficient time to selecting and configuring a robust, user-friendly customised booking system before launch. Also, an accessible FAQ section can drastically reduce repetitive inquiries.

Who owns the electric bicycles? In Umeå's case, they are owned by the municipality. This allowed for full ownership of decisions on the details of the pilot: duration of lease, conditions, price (or lack thereof), booking system, etc.

Any issues with providing e-bikes for free? There have been no issues of vandalism nor theft. However, some leasers returned the e-bikes later than their loaning period. There have also been instances of lost keys, sometimes requiring a full replacement of the lock system. To address this, consider introducing a cost-reflective fee in case of late returns and misuse in future iterations of the activity.

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8 Year-round cycling: enabling the bicycle as a feasible vehicle

Kiili, Estonia

BATS EXPERIMENT

Running pop-up winter tyre and bicycle repair services

Location: Kiili Gymnasium
Duration: 1 day
Stakeholders: school administration, municipality, Veloplus local company

As part of a winter cycling school campaign, the municipality of Kiili ran a "bike tuning day" in which students could buy bicycle winter tyres with a discount and get them installed on the spot. A total of 55 winter tyres for bicycles were purchased, benefiting from an approximate 50% discount.

The feedback was mostly positive, not only from students but also from the parents, who appreciated the direct communication efforts of the school. Among many other factors related to the overall campaign, providing easy access to this service significantly increased the number of students using their bicycles to commute to and from school during the snowy 2025-2026 winter.



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8 Year-round cycling: enabling the bicycle as a feasible vehicle

Permanent infrastructure: the U-bike cargo garage

Umeå established U-bike, a permanent cargo bike pool aimed at replacing short education-related car journeys performed by many parents. Originally a pilot, its popularity led to the creation of 2 dedicated hubs: one on the university campus and another in the city centre.

These facilities are heated indoor garages, which solve two primary winter barriers: they ensure optimal battery performance in freezing temperatures and allow snow to thaw from the frames overnight. In 2025, the scheme recorded nearly 4,000 bookings, with families and residents using the robust cargo models for grocery shopping and trips to recycling centres.



GO TO LINK



Klaipėda, Lithuania

Community bicycle parking sheds

Location: residential areas
Duration: permanent, since 2023
Stakeholders: public transport agency, municipality

Klaipėda has implemented a set of community bike sheds, offering neighbours a practical solution to keep their bikes dry and safe from theft. These 10-20m^2 spaces are placed strategically among dense residential areas, and can only be accessed by its users via a code system.

These sheds have proven a success, reaching full capacity quickly. A main issue with this system is neighbours storing their bikes indefinitely, cluttering the capacity for potential new users that would make daily use of their bicycles. A symbolic subscription scheme is being considered to tackle this issue.

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