

2024

INTERTRAFFIC WORLD



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1. Quality Measurements 3M, Germany, sample selected motorways across Germany. Empirical consideration of total costs over a period of 25 years.

2. Park et al. Safety Effects of Wet-Weather.

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“The Intertraffic Award winners are always proud and for two years benefit from additional industry recognition”

Jorrit Weerman, founder and CEO, The Parking Network

“Machine learning algorithms are becoming a bigger part of our decision-making processes, so bias will become and even more important factor going forward. This increases the need for a rigorous set of guidelines to be in place”

Mark Bell, senior statistician, TRL

“We were so excited that we were able to complete the journey completely on the power of the sun, and we even had a lot of energy left in the battery”

Bob van Ginkel, technical manager, Stella Terra solar car project

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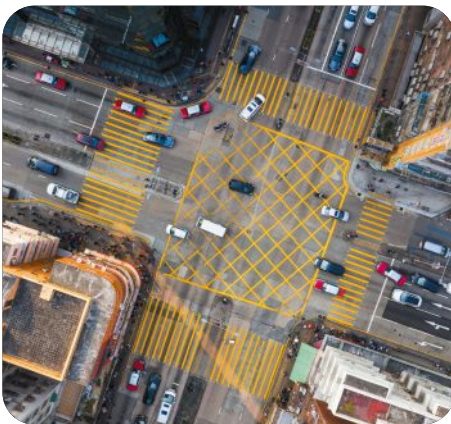
Neomi Jiménez-Redondo, project coordinator for the EU's OMICRON research project gives her tips on creating smarter infrastructure

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“A human can tolerate a collision with a modern car if the maximum speed is around 30km/h. If a higher speed is desired in an urban area, the only viable solution is to adapt the infrastructure by separating pedestrian crossings from traffic”

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Welcome

In recent months there has been an explosion of interest in artificial intelligence (AI). Large language models such as Chat GPT have excited the imaginations of futurists and unsettled the predictions of doomsayers in equal measure. But in the world of smart mobility systems, the advent of AI is not so very new. Many companies have been incorporating AI and machine learning into their products for several years now. It has enabled functions such as road-user classification from video feeds as well as creating advanced, predictive traffic models. That said, it is also true to say that we are now seeing an exponential growth in ITS applications for AI. This is reflected in the pages of this magazine. AI is the most-mentioned acronym you will find. And the Smart Mobility section, which begins on page 136, is the largest it has ever been.

But are there risks in the rapid adoption of AI? I believe there are. But not because super intelligent systems are about to take our jobs. Ask AI to create something from scratch and the results are always mediocre, inaccurate and sometimes just bizarre. But that doesn't stop people doing it. And herein lies the risk. AI is an incredible new tool at our disposal that can assist in providing new creative frameworks, streamlining data analysis, detecting new patterns and so much more. But, like any tool, it must be used correctly and not relied on to do things it cannot. Chat GPT understands language, but that's not the same thing as understanding the world. AI's understanding of the world is limited to what data we train it with. Using this tool in the correct way means not only knowing its limits, but ensuring it does not fall victim to our own data biases (you can read more about this on page 34). The AI debate is sure to continue for years to come and here in the pages of *Intertraffic World*, we'll continue to bring you all the latest on it. Enjoy the issue, and don't forget, if you like, our AI assistant can read it to you in the digital version.

Tom Stone, editor



**INTERTRAFFIC
WORLD**

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MA Business
Part of **Mark Allen**

www.markallengroup.com

Intertraffic World, ISSN 2042-7204 (Print), ISSN 2397-5989 (Online), is published annually by MA Aviation & Auto International, Hawley Mill, Hawley Road, Dartford, Kent, DA2 7TJ, UK
Tel: +44 (0) 1322 221144

Intertraffic World is a partnership with Amsterdam RAI, organizers of the Intertraffic events
Amsterdam RAI, PO Box 77777, NL-1070 MS Amsterdam, Netherlands
Tel: +31 20 549 12 12
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Subscription records are maintained at MA Business Limited Hawley Mill, Hawley Road, Dartford, Kent, DA2 7TJ, United Kingdom. Air Business Ltd is acting as our mailing agent.

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Printed in the UK by Pensord, Pontllanfraith, Blackwood, NP12 2YA

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2024

The big one

It's a massive year for Intertraffic with its flagship Amsterdam show set to be the largest ever. We get the inside story from the organisers

Words | Tom Stone

If 2022 was the Covid comeback year for Intertraffic Amsterdam, 2024 is the year when the event will cement its reputation as the world's largest and most important expo for the mobility sector, with over 35,000 visitors expected at the event, which takes place 16-19 April 2024.

Over recent editions the event has attracted more and more attendees from outside Europe, with 140 different countries predicted to be represented in 2024. This international flavour is also reflected

in the expanding knowledge programme which will feature a host of international speakers, including Tim Haile, executive director of Contra Costa



“We all know our industry is getting more connected and smart... we bring stakeholders together to share their knowledge and case studies

Joyce De Winter, director of Intertraffic Worldwide Events

Transportation Authority, and Ali Mortazavi, senior business development manager at Amazon Web Services, San Francisco.

“We are very proud that Intertraffic Amsterdam 2024 will be our largest event ever with stakeholders coming together from all different disciplines of the traffic technology and mobility industry,” says Joyce De Winter, director of Intertraffic Worldwide Events. “Some countries in the world are further ahead in smart mobility solutions than others, mostly because implementation is done faster and more easily. They are basically in the next phase of the transition and Intertraffic Amsterdam is the place they can share their insights and experiences. We bring all these parties together to speed up the mobility transition around the world.”

The rate of change in the industry is almost mind bogglingly fast, with rapid innovations being seen in automated vehicles, electrification,

artificial intelligence, digital twins and sustainability. Intertraffic events are built to make sense of these changes and ensure attendees stay ahead of the curve.

“We all know our industry is getting more and more connected and smart,” says De Winter. “The ecosystem is changing because of the implementation of new technologies, which brings new stakeholders and new collaborations. At Intertraffic Amsterdam 2024, we bring these stakeholders together to share their knowledge and case studies.”

Looking to the future

But Intertraffic isn't just about making sense of current trends, it's also about predicting what's around the corner and preparing for that future. As we look to the second half of the decade, there are reasons to be optimistic about what technology and innovation will make possible, providing smart, safe, and sustainable mobility for all.

“I believe that by 2030, 70% of all vehicles will be electric,” says de Winter. “City centres will be greener, with reduced car traffic on the streets, making way for smart,

Intertraffic Amsterdam 2024 in numbers:

900+ exhibitors and partners
140+ nationalities expected
120+ content sessions
200+ speakers
35,000 attending professionals
4 Theatres

Amsterdam, the capital city of the Netherlands is Intertraffic's home

for Intertraffic Amsterdam, Esther de Waard. "This will feature presentations organised by exhibitors and stakeholder organizations such as European Parking Association, International Road Federation (IRF), European Cyclists' Federation and the MaaS Alliance."

The MaaS Alliance is planning a workshop on creating an overarching ecosystem for mobility management, while the IRF will host workshops on traffic management and safety, as well as creating smart, climate-adaptive roads.

There is also more knowledge content from the Netherlands than ever before, with Dutch sessions on the Friday. "The Dutch Road operator Rijkswaterstaat will present various road safety projects and will start a discussion on the future role of road authorities in traffic management," says de Waard.

Some of the topics Rijkswaterstaat experts will cover include: data-driven solutions for CCAM; inclusivity; active travel; interoperability in parking; kerbside management; smart cycling infrastructure; and preparing road infrastructure for automated driving

All in all Intertraffic Amsterdam is an essential event for anyone in the mobility sector. "You can keep up-to-date with the latest trends and developments in the worldwide industry on the show floor and in our large free-to-attend summit programme in Hall 7," says De Winter. "The event has everything to offer to both private and public organisations. Meet your peers coming from all around the world. And, of course, enjoy the lovely city of Amsterdam and its spring colours." ■

Below, left to right: Marijke Jansen (senior operations manager), Lena Jacobs (intern), Barbara Tjen (senior business consultant), Ruwengelo Doran (intern), Joyce de Winter (director intertraffic worldwide events), Carola Jansen-Young (senior brand marketing manager), Lars Kloppenburg (business consultant), Touria Abahai (brand marketing manager)

micromobility solutions. There will be more charging stations everywhere, and smart logistics hubs located around city centres. Urban air mobility will be used for the delivery of goods and movement of people. Travellers are already using MaaS apps, and that will only increase, leading to more shared mobility options."

Attendees of Intertraffic Amsterdam, and other Intertraffic events around the world, which in 2024 also includes Intertraffic China in Beijing in May, can not only discuss future focused trends with peers, but also witness the technology of tomorrow up close in live demonstrations. "We have

ITSUP
Start-ups are encouraged to visit the Intertraffic website for more on joining the ITSUP start-up event, powered by Swarco

live demonstrations outside in front of the venue. And some static demonstrations in the summit area," confirms De Winter.

Insider knowledge

Another rapidly growing area of the Amsterdam event is its knowledge programme, which in 2024 features over

100 presentations, workshops and discussions across three theatres during the four days of the event.

"There is also an additional open stage," reveals programme manager



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Meet the jury

At the opening ceremony of each biennial Intertraffic Amsterdam, the Intertraffic Awards are presented to the most groundbreaking new technology to be launched since the last event. We meet the industry insiders who have the difficult task of deciding on the winners, from well over 100 entries to each edition

Words | Jack Roper





Amsterdam
RAI – the venue
for Intertraffic
Amsterdam



PIETER LITJENS,
general director, CROW, and chairman of
the Intertraffic Awards Jury

Despite chairing the jury for the 2024 Intertraffic Awards, Pieter Litjens does not consider himself a traffic expert. But the former Amsterdam alderman is extremely adept in understanding the societal impacts of transport innovation.

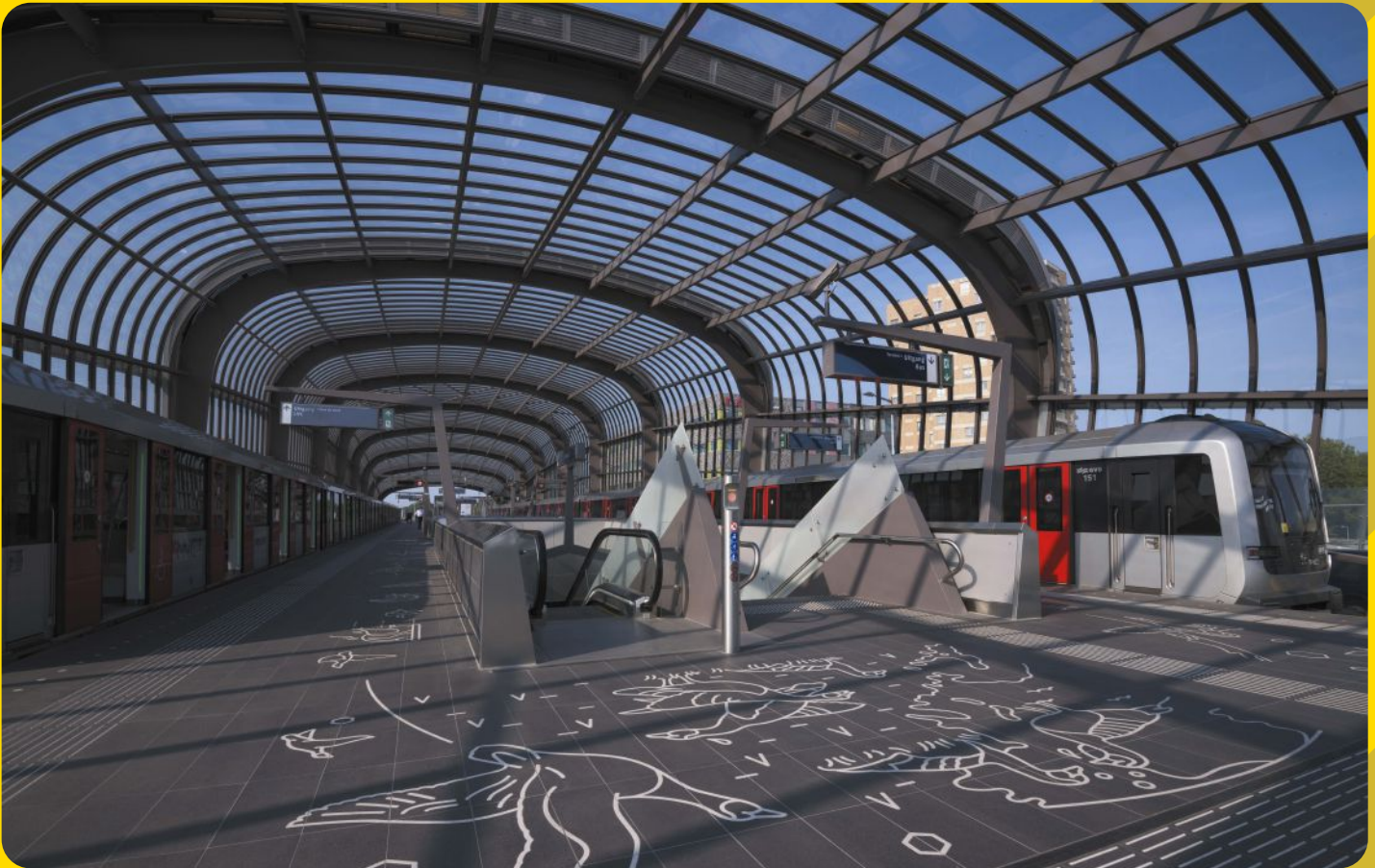
“For 20 years, I was a politician,” says Litjens. “Now, I am general director of CROW, a knowledge platform for infrastructure and mobility – with the emphasis on ‘general’. In many areas, I am no expert. But I see the wider picture and how mobility, sustainability and spatial planning are connected.”

Litjens served in local government, including spells as Mayor of Aalsmeer in the Netherlands and an Alderman of Amsterdam, where he was responsible for construction of the €3.1 billion (US\$3.4 billion) Noord-Zuidlijn subway. For two years, he was a Member of Parliament, but found the work abstract compared to the transformative materiality of mobility and infrastructure.

“The Noord-Zuidlijn was only 10km, but it revitalised northern Amsterdam by connecting it to the city-centre,” says Litjens. “Similarly, the Erasmus Bridge connected lower-income communities in southern Rotterdam, where previously, kids never visited central Rotterdam because crossing the river was too hard. That’s the beauty of infrastructure: it creates physical connections and gives people new possibilities.”

CROW, too, is all about connections. For 40 years, it has served as a repository for collective expertise, enabling better infrastructure. While essentially a national endeavor, CROW publications like the Bicycle Traffic Design Manual inform urban planning far beyond the Netherlands.

“We don’t have an army of researchers,” says Litjens. “We connect engineers, contractors, government representatives and academics and combine their knowledge into guidelines, standards, recommendations and dashboards. We’re independent and neutral,



Above: The Noord station on Amsterdam's newest metro line, 52, which Litjens helped oversee the construction of during his time as an alderman of the city

Right: Thanks to the Noord-Zuidlijn subway line, the RAI now has its own metro stop, Europaplein, creating a fast connection to the city centre



so companies can share knowledge with us without risking their market position."

Litjens takes a broad view of sustainability, which embraces not just emissions and circularity, but the long-term sustainability of whole systems. He speaks passionately of work needed at the intersection of mobility and spatial planning.

"By 2040, building the 240,000 new houses needed in Amsterdam will increase mobility demand by 20%," he says. "Our infrastructure simply can't handle that if we continue doing things as we always have – adding lanes just leads to traffic jams on more lanes. We need new solutions that accommodate growth within sustainable use of public space."

He believes governments are obliged to act when scarcity arises, so that scarcity of public space may justify excluding private cars from

specific parts of cities. Here, data provides a potent tool, for instance informing pedestrianisation of Amsterdam's continually gridlocked

Vijzelgracht, where analysis showed 70% of cars represent avoidable through-traffic.

Litjens believes many people fail to recognise real innovation. Companies often focus on profit, but genuine innovations can be applied and scaled to the wider good of society.

"People who enter the Intertraffic Awards are rarely driven by solely financial reasons," he says. "Usually, they

have a personal drive to contribute to a better mobility system, and thus a better world."

2022 Inspiration Award winner Acusensus provides a case in point. The Australian company developed its Heads Up solution to detect illegal phone use whilst driving after a friend of founder and CEO, Alex Jannink, was killed by a distracted driver.

"His focus wasn't earning big bucks, but preventing other tragedies," says Litjens. "That connection between personal interest and societal good means scaling an invention benefits both the business and society."



“People who enter the Intertraffic Awards are rarely driven by solely financial reasons. Usually, they have a personal drive to contribute to a better mobility system, and thus a better world

Pieter Litjens, general director, CROW, and chairman of the Intertraffic Awards Jury



MARGRIET VAN SCHIJNDEL,
programme director,
Responsible Mobility, TU/e

Words matter to Margriet van Schijndel, because words frame our aspirations. This is why the former Smart Mobility Program she coordinates at Eindhoven University of Technology (TU/e) is now called Responsible Mobility.

“We have people working on sustainable mobility, accessibility and inclusivity,” she says. “How do we make mobility accessible to older people, or those with difficulty reading? How do we make it equally useful for all people? Responsible expresses something beyond smart: not only what we do, but what we really should be doing.”

As manager of the Eindhoven Artificial Intelligence Systems Institute (EAISI) Mobility Lab, van Schijndel works to transition perception technology from sensing towards understanding and actuation. The Lab collaborates closely with NXP, which develops solutions based on semiconductor technology.

“Founded 68 years ago by companies like Philips, our university develops technologies that industry can use,” she explains. “Industry is willing to move towards automated driving – which requires not just sensing an object, but understanding how it will move and affect my path.”

Day-to-day, van Schijndel ensures that collaborations between researchers and industry run smoothly. She is often in Brussels, engaged in identifying the research Europe’s future requires and the words that most optimally frame it.

“Woolly sheep are not focused,” she says. “Sharply-phrased objectives mean our researchers can produce sharply-focused research useful to industry or regional governments.”

The EAISI Mobility Lab’s objective is to speed transition to an accident-free mobility system. “It doesn’t say zero accidents by 2030,

because that’s not achievable,” says van Schijndel. “Faster transition is achievable, but not easy.

It requires work on technology, policy and behaviour, to understand which technologies users may not only accept, but truly adopt.”

For van Schijndel, Intertraffic Amsterdam is an opportunity to see innovations that companies are proud of and compare how they interpret the needs of the industry. It provides a sense of future innovations, since companies are often several steps on in development from the solution they exhibit. She believes the Intertraffic Awards promotes reappraisal of innovations in terms of the value they create.

“A true innovation makes a difference,” she says. “As a jury, we ask: Why is it relevant? It helps the entrants ask themselves: How does it make a difference? What societal, sustainability or safety impact does it have? Is that something I can quantify? It means thinking beyond their market value to consider the societal value of what they’re doing.”

Likewise, van Schijndel encourages academic colleagues to see the broader picture. She mastered in mechanical engineering at TU/e and worked on production technologies at Dutch research institute, TNO. She moved into mobility research, coordinating European projects and serving as European Automotive Research Partners Association (EARPA) secretary-general. She was drawn to a field whose challenges demand multidisciplinary solutions.

“People at TU/e are willing to be surprised by how others’ research could influence their own,” she says. “We have student teams working for a full year on a multidisciplinary challenge, such as developing Eterna, the car which lasts a lifetime.”

Digitalisation can only improve transportation through a systems approach – for example, to vehicle autonomy, where words once more make a difference.

“Autonomous vehicles don’t follow a systems perspective,” says van Schijndel. “In Europe, we work towards automated driving. AVs working just for themselves aren’t that smart. Navigation systems that optimise individual journeys create problems across networks. We must combine my interest with your interest and consider throughput, safety and energy as part of one whole.”

“A true innovation makes a difference. As a jury, we ask: Why is it relevant?... It means thinking beyond market value to consider the societal value

Margriet van Schijndel, programme director, Responsible Mobility, TU/e

Below: The Eterna car is a TU/e project to create a ‘car for life’ thereby reducing the environmental impact of vehicles





JORRIT WEERMAN, founder and CEO, Parking Network

"People typically complain about finding a parking spot, parking charges or fines," says Jorrit Weerman. "But once their needs are met, they rarely consider the business model behind the industry."

As founder and CEO of Parking Network, a leading online platform, Weerman considers it a lot. Founded in 1996 and headquartered in Maastricht, Parking Network reaches 35,000 parking professionals each month.

Parking is always a large part of Intetraffic Amsterdam and in 2022, the Intertraffic User Experience Award went to parking solution provider Toogethr, whose software platform manages parking capacity for employers and allows employees to book a parking spot before they arrive at the office.

"If people are working hybrid or travelling, it allows spots to be reused by other companies," says Weerman. "It means employees know they will have a spot and won't have to pay to park somewhere. It creates better expectations, which is key to a better parking experience."

Weerman regards Intertraffic Amsterdam as the world's leading event in bringing together perspectives from across the whole mobility value-chain. "It's nice to evaluate ideas from outside your own area," he says. "The award

“Apps integrated into cars will find a spot based on your personal profile, stating whether you prefer to pay more or walk further. Everything is becoming integrated and therefore transparent

Jorrit Weerman, founder and CEO, Parking Network

winners are always proud and for two years, benefit from additional industry recognition."

Innovation is prevalent in parking. In the past few years Weerman has seen parking systems quickly transition from hardware to software, enabling a barrierless future where physical assets are redundant. Customer experience is all about apps which offer personalised convenience. An industry once dominated by traditional operators transformed by digitalisation and start-ups in a few short years.

"The traditional players struggled must now compete with small, lean and mean software companies backed by venture capital," says Weerman. "Instead of owning carparks and dealing in 10-year contracts, they offer managed parking based on software and say, "Hey, try it for a month – you can cancel at any point"."

"Apps integrated into cars will find a spot based on your personal profile, stating whether you prefer to pay more or walk further," he continues. "Everything is becoming integrated and therefore transparent."

Consolidation has proceeded in mergers and acquisitions, some illustrative of an



Representing the media...

Last, but not least, Adam Hill (*below*), editor of *ITS International*, and Tom Stone (*pictured overleaf second from left*), editor of *Intertraffic World* and *Traffic Technology International*, take their places on the Intertraffic Awards jury of five.

"The remarkably high standard of Awards reflects the importance and popularity of Intertraffic Amsterdam," says Hill. "Choosing a category winner is often a genuinely difficult task involving much argument and counter-argument."

Each year, over 100 initial entries are assessed by each jury member on a points-based system. Typically, three or four leading scorers are then announced as official nominees in each of the three categories of Green Globe, User Experience and Inspiration.



"The final stage takes a full day at Intertraffic HQ in Amsterdam, with nominees invited to give presentations," says Stone. "Eventually, a winner is chosen in each category, often after heated debate among jurors."

This year's winners will be announced on the opening day of Intertraffic Amsterdam: 16 April 2024. While the editors keep abreast of innovation through their day-jobs, both are animated by the opportunity to engage with the industry's best innovators at first-hand.

"In 2024, I look forward to seeing how entrants embrace newer trends in transportation, such as road user charging," says Hill. "Of course, I expect to read an awful lot about AI this year, too."

"The award winners always become stars of the Intertraffic Amsterdam show," says Stone. "They not only earn extra visitors to their stands, but an increased profile for their offerings far beyond the Amsterdam event."



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INTERTRAFFIC AWARDS

The 2022 Intertraffic Award winners pose with their awards and the members of jury



The 2022 Award winners

Intertraffic Green Globe Award

WINNER: Traffipole by Jenoptik, Germany

The TraffiPole was the winner in the Green Globe category. Its innovative design which enables ITS hardware to function in hot climates without the need for air-conditioning impressed the judges as a simple, easy-to-deploy concept, with instant benefits in reducing energy consumption, and thus CO₂ emissions.

Intertraffic Inspiration Award

WINNER: Acusensus Heads Up by Acusensus, Australia

Acusensus was the first to introduce an automatic detection system that addresses the growing safety problem of mobile phone use at the wheel, and therefore was chosen by the jury as the winner in the Inspiration Award. The jury felt the solution led the field

when it first became commercially available at the start of 2020, providing inspiration for enforcement solutions that is still felt today. It richly deserved recognition in the 2022 awards as they spanned four years' worth of entries, due the cancellation of the 2020 event due to the Covid pandemic.

Intertraffic User Experience Award

WINNER: Toogethr Parking by Toogethr, Netherlands

The easy-to-use interface for parking facility owners and customers alike earned Toogethr Parking the User Experience Award. The jury was particularly impressed by dynamic, demand-responsive interface that can also help to enable multimodal travel and ridesharing. The solution helps organisations and parking operators make more efficient use of existing capacity.

upended world. In October 2023, Metropolis, a startup launched just seven years ago, acquired leading US operator SP-Plus for a reported \$1.5 billion (€1.4 billion).

"How was that possible?" asks Weerman. "Because of outside-the-box thinking and a software platform with venture capital behind it. We once listened to cassettes and CDs; now we all have Spotify. Good solutions often catch on more quickly than anyone could predict."

Existential change may result from vehicle automation and sharing. Weerman considers his own children unlikely to own cars and believes carparks built for private cars (which spend 96% of an average lifecycle parked) may eventually be repurposed.

"People are thinking ahead and building carparks with higher ceilings, which could one day become logistics hubs," he says. "But AVs will still need somewhere to be charged, cleaned and serviced. In future, the parking industry may be less about vehicles than about moving people who no longer pay for parking but for the access to an airport or city." ■



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Green leaders

The Netherlands, host nation for Intertraffic Amsterdam, has long led the world in promoting active travel and multimodality. We take a look at the initiatives now underway in its two largest urban centres in the drive towards net zero, and find out how policy makers are not only focused on improving mobility but enhancing liveability

Words: Eugene Gerden

Amsterdam and Rotterdam, being the first and second largest cities in the Netherlands, are leading the way for urban traffic management in the country. Both benefit from advanced intelligent transportation systems and multimodal infrastructure, promoting active travel and public transport usage in a way that is inspirational to cities all around the world.

Now, as UN emissions targets for net zero by 2050 come into focus, the pressure is on like never before to deliver sustainable mobility, even as populations grow – both Amsterdam and Rotterdam are each now estimated to have over one million residents.

Rotterdam has a track record of inspiring green transportation technology that has been rolled out across Europe. In 2018 it became the first urban centre in the world to test BMW's geofenced eDrive Zones scheme.

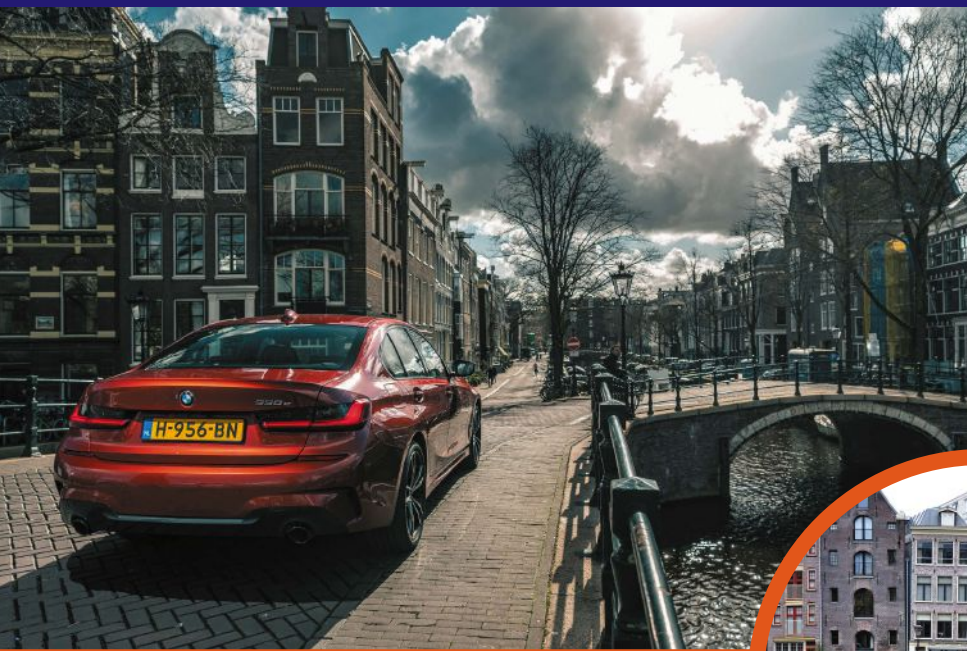
The Electric City Drive pilot, which was conducted in partnership with the city's Erasmus University, used a smartphone app activated by geofencing in the city centre to recommend when drivers of hybrid vehicles should switch to electric-only mode. The pilot was so

The Electric City Drive pilot involved plug-in hybrid BMWs and Minis within a defined area of Rotterdam



“Sustainable urban mobility, the reduction of logistical movements, and the transition to greener transportation are key objectives

Richard van der Wulp, senior urban mobility planner, Municipality of Rotterdam



Above left and right:
BMW's eDrive Zones
function is now available
in cities around the world,
including Amsterdam
Inset: Bicycle parking
in Amsterdam



“All over Europe, we see a paradigm shift towards interoperability and uniform use of tolling schemes, especially as tax fossil fuel tax income decreases
Luís Nunes, CEO, A-to-Be

successful that the technology is now built into BMW hybrid cars, automatically switching them to emissions-free modes when travelling in over 130 European city centres, and more than 20 other cities worldwide.

The partnership with BMW wasn't limited to simply reducing emissions from cars, it also looked at ways of getting citizens out of their cars altogether. “We have explored ways to inform drivers about alternative travel options, such as park-and-ride facilities, encouraging a shift towards more sustainable modes of transportation,” says Richard van der Wulp, senior urban mobility planner at the Municipality

of Rotterdam. “Efforts are being made to provide more space for cyclists, pedestrians, and public transport in the city centre and at transportation hubs.”

As well as the park-and-ride scheme, Rotterdam has deployed other intelligent parking systems within the city centre itself, such as smart sensors that create real-time data to guide drivers to available parking spaces, reducing the time spent searching for parking spots. Additionally, the city has implemented dynamic pricing strategies to incentivise off-peak parking, reducing congestion and encouraging the use of public transportation.

To further encourage modal shift, Rotterdam is facilitating collaboration between public transport operators such as Dutch Railways (NS) and Rotterdam's RET to help provide multimodal travel information through MaaS (mobility as a service) apps.

Rotterdam's public transit network has real-time passenger information systems, enabling commuters to access up-to-date schedules, route options, and estimated arrival times. This helps to encourage public transit usage, meaning more residents opt for sustainable transportation options, thus reducing the overall reliance on private vehicles.

Amsterdam: mobility and beyond

Amsterdam's extensive canal network means small streets are under extreme pressure as the population grows, so there is a great focus not only on managing car and bicycle flows, but also pedestrians.

Robbin van Pelt, spokesperson for the City of Amsterdam, explains: “We have many sophisticated systems in place, such as highly optimised traffic lights and crowd management during big events, such as King's Day [the annual street party to celebrate the King's birthday on 27 April].”



Tolling and RUC in the Netherlands

Outside of urban centres, the Netherlands is increasingly turning to tolling to control vehicle traffic and raise revenues to reinvest in sustainable mobility.

Recently Via Verde has been awarded a contract for the management and collection of tolls on the A24 Blankenburg Connection, a highway that serves the Rotterdam area. As part of this contract, A-to-Be will serve as Via Verde's critical technology partner and provide its MoveBeyond back-office system to RDW, the Netherlands Vehicle Authority National Roads Traffic Agency.

“This project represents a major leap forward towards the possible implementation of tolling schemes in a broader sense in the Netherlands,” says Luís Nunes, chief operating officer at A-to-Be.

“All over Europe, we see a paradigm shift towards interoperability and uniform use of tolling schemes, especially as the means to assure tax revenue by states due to the decrease of fossil fuel tax income.”

With public revenues in mind, traditional tolling schemes can begin to form the groundwork for more extensive pay-per-kilometer road user charging. “The Netherlands has been quite active in developments towards the implementation new tolling schemes for trucks, which will come to all vehicles in the future,” says Nunes. “A-to-Be views the Netherlands market with the utmost interest and sees it as a potentially large market for further development in years to come.”



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“We are actively working with many partners (public and private) on improving how we use the public space”
Robbin van Pelt, spokesperson, City of Amsterdam

Amsterdam has historically organised itself around mobility. But increasingly, impacts of transportation are being assessed not only for how they affect other modes, but also for their impact on other potential uses of urban space such as recreation, parking and utilities.

“We are actively working with many partners (public and private) on improving how we use the public space,” says Van Pelt. “These partners include research institutes, global tech leaders and national industry parties. Recently we’ve seen a shift from mere optimisation of traffic flows, to a more social and ecological approach to traffic management. The focus is on quality-of-life aspects and

futureproofing the city for extreme weather and other ecology related aspects. Here, there is a lot of room for innovative new approaches.”

This means mobility decisions in the city can be highly political. “We’re work closely with local government on making decisions,” says Van Pelt. “We will need to break the silos of organisation around modes and topics and work towards a more holistic approach.”

In Rotterdam promoting active mobility has long been a priority, with cycling lanes equipped with sensors that detect and respond

to the flow of cyclists, optimising traffic light timings and ensuring safe passage for cyclists.

But as with Amsterdam, larger considerations than just modal change are coming into focus.

“Sustainable urban mobility, the reduction of logistical movements, and the transition to greener transportation are key objectives,” says Van der Wulp “Rotterdam aims to enhance its economic potential through improved accessibility to national and international economic sectors and enhanced interconnectivity between areas to boost competitiveness and innovation.”

“Urbanisation within the city and around high-quality public transportation is prioritised to enhance accessibility for a larger population,” continues Van der Wulp. “The city also emphasises the importance of future-proof neighbourhoods, with strong socio-economic foundations and appropriate mobility options. Rotterdam’s major urban challenges from now until 2040 focus on creating a healthy, green, and attractive living, working, and recreational space.” ■



Above main: Since 2020 all BMW hybrids have been equipped with eDrive Zone which switches to all-electric mode in designated urban centres

Above inset: Planners are now carefully considering other uses beyond transport for urban spaces, such as this ice rink in Amsterdam

Right: Bicycle parking facilities in Rotterdam



IMAGES: BMW, ADOBESTOCK.COM

”

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Hazards ahead?

The NordicWay project is proving that safety-improving connected vehicle systems are achievable using just the cellular network, but are all parties equally committed to Vision Zero?

Words: Christopher Court-Dobson

Zero. Nada. That is the number of fatal traffic accidents that the backers of Vision Zero are aiming for. This ambitious aim is backed by the EU and municipalities in the USA and Canada. In Sweden, the birthplace of Vision Zero, it's a matter of principle: the value of human life should not be calculated as part of a cost-benefit analysis, everything possible must be done to prevent deaths on the road.

NordicWay is a network of flagship projects dedicated to bringing connected, C-ITS (Cooperative Intelligent Transport Systems) online throughout Norway, Denmark, Finland and Sweden, currently in its third stage (see NordicWays 1, 2 & 3). As well as improving overall traffic efficiency, a major aim of the initiative is road safety. It's a partnership between traffic authorities such as Sweden's Trafikverket and Norway's Vegvesen, OEMs like Volvo and Scania, roadworks contractors such as Mesta, and software developers like Carmenta Automotive.

"The whole idea with this ecosystem is that there's not one actor that could own the whole process. It is really a collaboration, even in deployment, not only in the project phase. There needs to be private partners, there needs to be public authorities," said Anna Johansson Jacques, senior ITS advisor at Trafikverket.

The vision

C-ITS vehicles communicate with one another (V2V), with roadside infrastructure (V2I), vehicle-to-pedestrian (V2P) and the cloud. After significant debate in the industry about whether cellular data or WLAN (wireless local area network) would be the most appropriate medium for these data flows, the answer appears now to be cellular in most cases, with projects like NordicWay convincingly proving its viability. WLAN (ITS-G5 in Europe) connections may still be used occasionally where safety critical maximum redundancy is required.

Part of the big-picture vision of NordicWay is that drivers and their vehicles should have a host of useful, possibly lifesaving, information at their fingertips. A crashed vehicle or stationary roadworks up ahead can be flagged on the in-vehicle console. If conditions are icy or otherwise hazardous, C-ITS can alert drivers long before they are in danger. It is also intended to enable a variety of streamlined approaches to roadworks management for operators and public traffic authorities.

Use cases

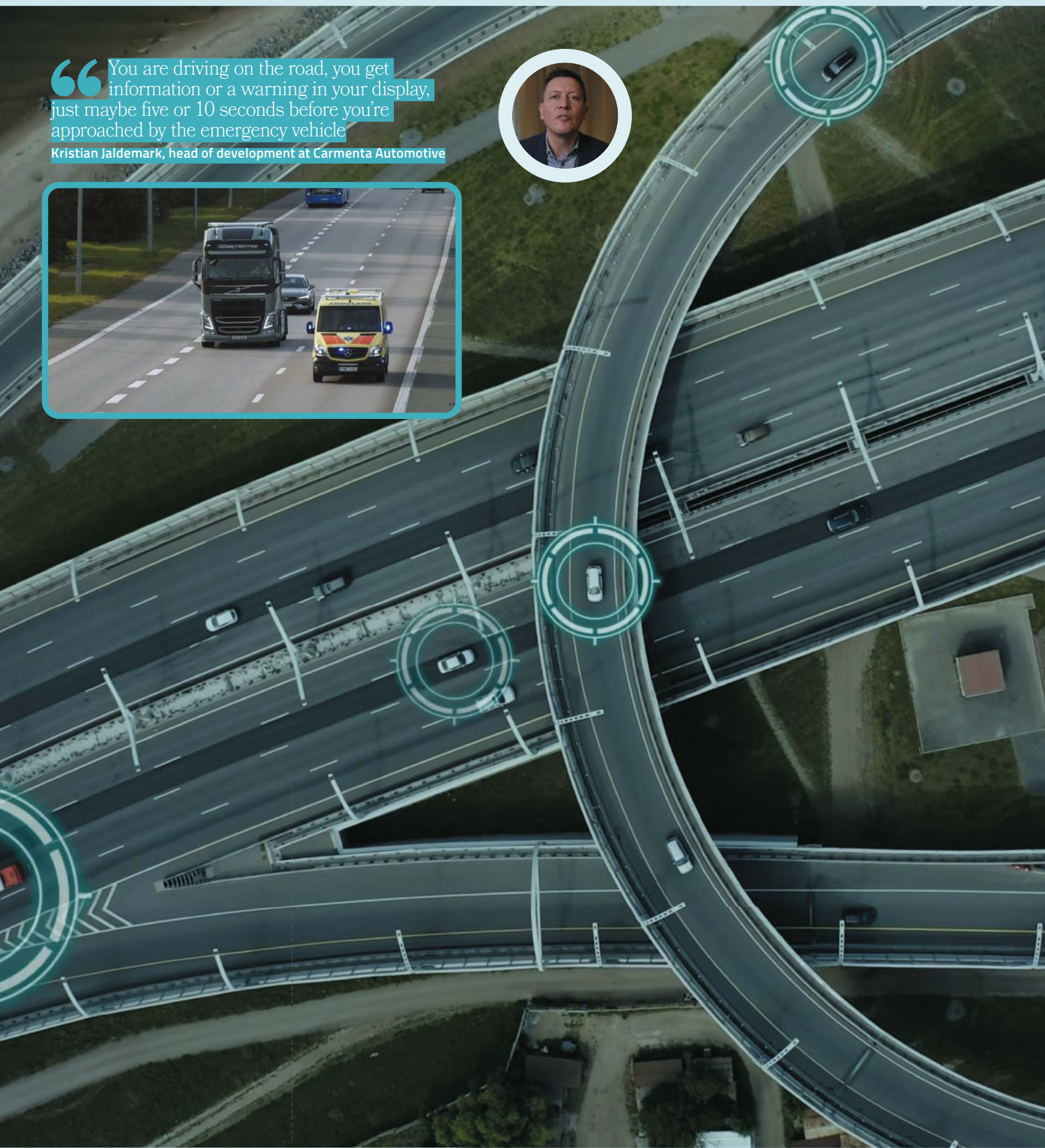
Ketil Dahl is in charge of business development at Mesta, one of Norway's biggest contractors with up to 1,000 workers engaged directly on the roads. They help maintain the country's vast stretches of highway, as well as snow ploughing in winter, and salting operations.

"It's more than a little good or bad luck if it results in personal injuries or

Connected vehicles can exchange vital safety messages

“You are driving on the road, you get information or a warning in your display, just maybe five or 10 seconds before you're approached by the emergency vehicle”

Kristian Jaldemark, head of development at Carmenta Automotive





death. We have had several fatal accidents during the last years,” he says.

Road works warnings (RWW) could help. Today, traffic warning trailers are used to visually alert drivers to upcoming obstructions. However, at high speeds this is, all too often, insufficient. RWW involves a C-ITS transmitter inside the vehicle or signage trailer, that provides data to the cloud. This results in an in-vehicle warning in compatible vehicles.

The situation for large, slow moving, snow ploughs and salting vehicles is, if anything, more dangerous. They do not have the benefit of visual signage, and Dahl believes they too will benefit from RWW technology.

“We have roads of 110km/h, where we are legally required to plough at 40km/h, which means that the traffic from behind is actually moving 70 to 80km/h faster than our vehicles,” he says.

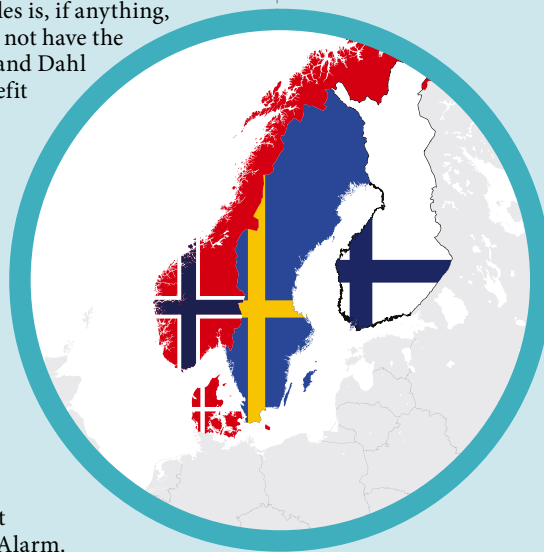
Another beneficial use case is termed emergency vehicle approaching (EVA), which operates on the Swedish National Public Safety Access Point (PSAP) managed by SOS Alarm.

“You are driving on the road, you get information or a warning in your display, just maybe five or 10 seconds before you’re approached by the emergency vehicle. That means that you have the opportunity to be a bit more prepared and plan your actions,” says Kristian Jaldemark, head of development at Carmenta Automotive.

The pilots were conducted throughout the first four months of 2023, and studies have shown that EVA contributes significantly to emergency vehicle response times. Other use cases already proved out include traffic signal priority (TSP) in which emergency, public transport and heavy

Above: Road Works Warning (RWW) aims to enhance traffic safety and flow by reducing accidents and traffic jams caused by road works

Below: The NordicWay countries





Above: The Interchange Node enables information to be shared between stakeholders

freight vehicles can request priority at a signalised intersection. With the TLEX I2V platform installed on signals by NordicWay partner Monotch, two-way communication is established via the cellular network with low enough latency to service these critical use cases and also provide timing information to all drivers to enable riding of ‘green waves’ thereby improving traffic flow.

The Interchange

Each data provider runs a backend for the FCD associated with its products, but these rely on a publicly funded platform – known as the NordicWay Interchange Node – to communicate with other actors in the ecosystem, via the cellular network.

“What we identified was that we needed some type of system where we could share data without having a one-to-one connection between each and every actor involved. We needed some kind of hub-spoke based system,” says Christian Skjetne, senior engineer at the Norwegian Transport Authority.

A federated data approach allows for each data supplier in the network to operate independently, using different protocols. With AMQP, a protocol whose strength is interoperability, the interchange allows these separate databases to be treated as one. Any node on the network can access all the other data, so long as they have the relevant subscriptions.

“I can only speak for Norway,” says Skjetne. “We will keep the servers running. Hopefully other countries will join us as well in maintaining this platform. Private and public actors can trust that this service is something they can rely on to operate continuously in the future, so they can start building services on it.”

The flexibility, interoperability and public authority backing of the platform means that it is likely that it will be used by more jurisdictions as they bring C-ITS on board.

“There will be no one player that has all the data, it will always be a combination of different actors, authorities, companies, that each has a piece of the puzzle, and you need to put that together,” says Jaldemark, at Carmenta.

He emphasises that the Interchange, and the work done by public authorities to maintain it, is the backbone of the entire ecosystem.

The OEM data challenge

Currently NordicWay’s initial use cases – RWW, EVA, TSP and even geofencing – run well, but getting more data direct from vehicles could move it to the next level, creating



NordicWays 1, 2 & 3

The current NordicWay project is the third part in a series that began almost a decade ago in 2015. NordicWay 1, which ran until 2017, tested and demonstrated cellular C-ITS (cooperative ITS), helping to break down interoperability barriers across the borders of Denmark, Finland, Norway and Sweden.

NordicWay 1 followed the policy guidance of the European Commission, and was supported via the Connecting Europe Facility (CEF) programme managed by INEA, receiving €5.2 million (US\$5.7 million) in funding.

NordicWay 2, which ran from 2018–2020, took the project further by looking at specific potential use cases, enabling vehicles, infrastructure and network operators to communicate information from roads in the Nordic countries between different stakeholders. It received €18.9 million (US\$20.6 million) in EU funding.

NordicWay 3 has taken the project to the next level by looking at real-world deployment of technology and services, and including more cities and urban areas. It began in 2019 with €19 million (US\$20.6 million) in funding.



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NordicWay's stated aims

- Enhance traffic safety and fluency and reduce CO₂ emissions
- Scale up existing C-ITS services by supporting cloud to cloud hybrid communication
- To create the potential for C-ITS to reach high penetration without further infrastructure investments
- To contribute to European CCAM (Cooperative, Connected and Automated Mobility) harmonisation through C-ROADS
- To explore the use of existing mobile communication for C-ITS services, including on rural routes with poor cellular connectivity.
- To promote interoperability of C-ITS services
- To assess the infrastructure readiness for connected and automated driving
- To demonstrate and highlight future services and challenges connected to vehicles with higher automation levels (SAE levels)



LOCATIONS: TRONDHEIM, OSLO (NORWAY), GOTHENBURG (SWEDEN), AND TAMPERE (FINLAND)

a highly intelligent and streamlined operation, with all the public benefits that entails.

Floating car data (FCD) is information harvested directly from vehicles. At a most basic level it is time-stamped geolocation and speed data. But it can also include more granular data such as road friction, potentially indicating ice or oil slick, and camera images, which can be automatically assessed to determine weather conditions and visibility or the presence of hazard lights in other vehicles. However, crucially, this is data supplied by OEMs rather than public authorities or road operators.

In 2017, Volvo Cars CEO Håkan Samuelsson appeared to rule out the monetisation of safety data, telling the European Commission: "We think this type of anonymised data sharing should be done for free, for the greater good and to the wider benefit of society. It saves lives, time and taxpayer money."

Samuelsson has since stepped down, and according to multiple sources, the status quo on the sale of FCD safety data has radically shifted. "All OEMs are charging and also they don't share raw data, they will interpret their data before selling it," says Dahl.

What's more, it appears that the pricing is unjustifiably high – especially considering most project partners are in the testing phase. "We can't say today that the economic benefits justify the price they are demanding for their current data," says Dahl.

"I don't think it's sustainable that you need to actually pay for the information, not when it's an accident on the road, or if it's an ambulance that needs to get quick to someone in need," says Jaldemark. "It's a matter of safety. Limiting access to that kind of data could be a big problem. If you do that you don't get the beneficial effects at all,"

It raises the unwelcome possibility that lives might be lost, or long-term injuries sustained, that could otherwise have been prevented had safety data been made available. This is made all the more uncomfortable by the fact that considerable public money has been diverted towards the C-ITS infrastructure, both at the state and EU level, while OEMs make use of it for free.

The current situation raises a variety of ethical and legal questions in terms of the next stage for connected vehicles. Data practices by OEMs are still in their infancy, and the next few years will be a test run for things to come. ■



LOCATION: THROUGHOUT SWEDEN

Above: Traffic signal information on a vehicle display

Left: Vehicles receive a warning when an emergency vehicle is approaching



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Learning from our mistakes?

Decisions based on artificial intelligence could end up being flawed because AI is being taught using biased data. While machine learning algorithms have the potential to enable greater safety, better access to mobility and more effective traffic management, data bias can lead to negative consequences, such as discrimination, unfairness and unreliability of data. We ask the experts how we can avoid unintended consequences in smart data management

Words | Lauren Dyson

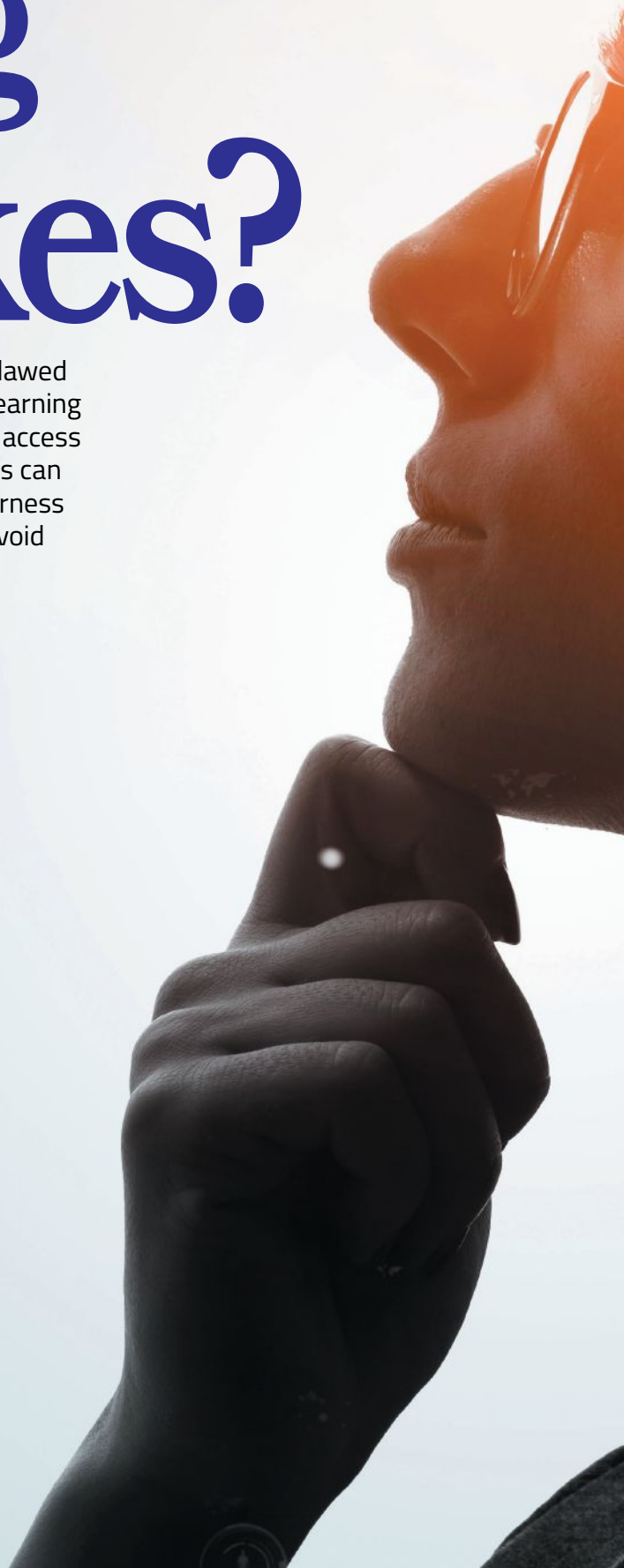
Transportation planning decisions are usually made based on data collected from a variety of sources, such as traffic counts, surveys, and census data. “The transport sector has a long history of using data to formulate travel plans and strategies,” says Peter Lindgren, head of digitisation of transport at TRL. “Data is collected at various points in the transport network, for example at induction loops in the ground, which collect data on the vehicles that drive over them. Transport planners combine this data with other datasets such as the Census data. The transport industry has had to piece together these fragmented datasets for a long time. Strategies have been created to deal with that, but the data is still flawed.

“We are now seeing new datasets that can help plug into existing data, for example mobile networks, which provide data on the movements of people. From this data you can derive insights into where someone might have started and ended a journey, and even the modes of transport used.”

This data can also be used to teach intelligent machines to think for themselves. The machines use algorithms and statistical models to analyse and draw inferences from patterns in data. Most algorithms in transport AI are now based on ‘supervised learning’. This means that the model is trained using data that has already been labelled in some way.

“Computer vision algorithms are a good example of this,” says Lindgren. “The machine is shown millions of images and videos that have already been classified by a human and eventually it learns to classify to object itself. In automated vehicles, these algorithms are being used to identify objects such as pedestrians or other vehicles.”

“Lots of models in machine learning and statistics study data to make certain conclusions,” adds Mark Bell, senior







Above: Journey planning is an area where demographic bias can have a potentially negative effect

statistician, TRL. “We call it training data because the model is looking at the data and trying to work out what relationships are present in this particular data set. There’s a myth that because datasets are getting bigger, bias is becoming less important. It’s actually the opposite. If anything, bias is becoming more important. If the training data has biases in it, the model and the results from the model will carry that bias forward.”

With machine learning, the quality and accuracy of the model is determined by the quality of data that is fed into it. “If the data hasn’t been classified correctly or is weighted towards a particular demographic, the model won’t know that,” says Lindgren. “It will create its inferences based on the data that it is fed. Therefore, it might not be accurate and it might not be fair. Also, these models are constantly learning, so even when actions are taken to minimise these biases, the models are susceptible to becoming biased later on. This is known as model drift.”

Types of data bias

There are several different types of bias that can impact the quality of a

machine learning algorithm. Sampling bias is where training data is not representative of the population or target sample. So, for example, if the training data only includes data from mobile phones, that’s only sampling people who own mobile phones.

Temporal bias is where the training data is skewed by a particular time period. “The census data is a great example of this,” says Lindgren. “It’s only collected once every 10 years and the last census was in 2021, when we were in the middle of the pandemic. The key question within the census is ‘how do you normally travel to work? So, of course, that data set is only going to reflect how people were travelling - if they were travelling at all - when Coronavirus was preventing people from moving around.”

Other biases include measurement bias, where the method of measuring may not be representative, or selection bias, where the training data is not randomly selected, or is biased towards a certain type of data. Geographical bias is also important, where data is skewed towards one particular region, as is demographic bias, where



“Models are constantly learning, so even when actions are taken to minimise these biases, the models are susceptible to becoming biased later on. This is known as model drift

Peter Lindgren, head of digitisation of transport, TRL



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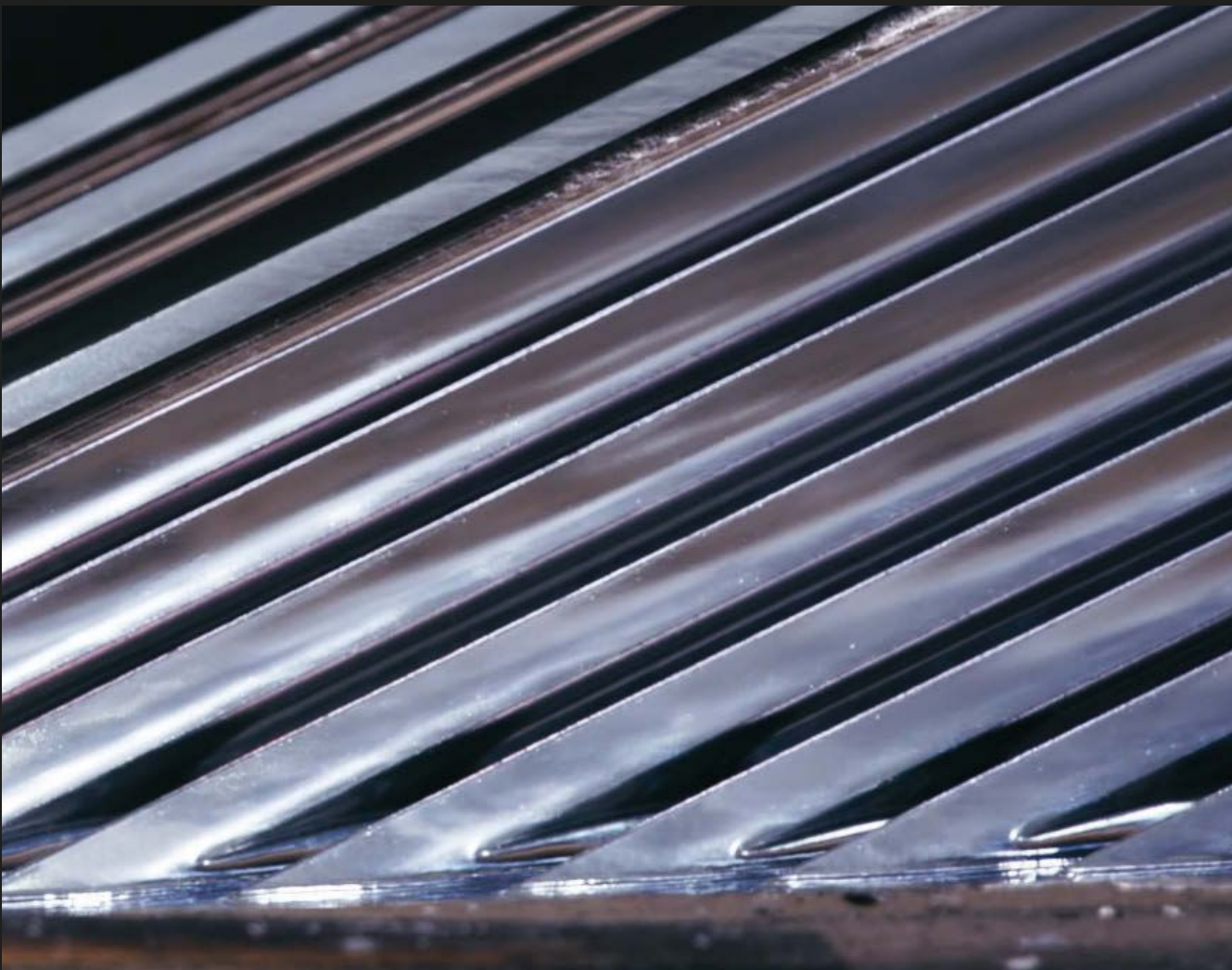
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“We know the model has identified an object as a pedestrian, but we may not know why that is”

Mark Bell, senior statistician, TRL

Above: Correctly identifying the huge variety of road users is vital in order to obtain high quality data



the data doesn't reflect the demographics of the population. Demographic bias includes gender bias, which Bell says is inherent in the transportation industry (For more on gender bias in transport don't miss Intertraffic World 2024).

“If datasets are biased towards one group or another, they may not meet the needs of other groups,” says Lindgren. “If we take journey planning for example, we know that women often feel safer on certain routes, and they'll choose different routes to men. If the systems we're creating don't take these things into account, then the outputs that they suggest may not be suitable for some groups. Therefore, those groups may not adopt those technologies or may have more

resistance to them. Transportation is an enabler in society, so we need to make sure that the outputs of these models and the technologies we are producing are serving the whole of society.”

Mitigating data bias

It is important to be aware of the potential for bias in machine learning models, and to take steps to mitigate it. “It all comes down to ensuring the quality of the data and the approach,” says Lindgren. “It's about making sure that there aren't biases in the data, or that biases are being addressed. And that the people involved aren't willingly — or otherwise — imposing biases in the system through their own subconscious bias.”

There are several ways to do this. The first is to use a diverse training dataset. This will help to ensure that the model is exposed to a wide range of features and experiences. In transportation, the data is not always available, so to address holes in data sets, Lindgren suggests using data augmentation.

This is where you take one real world example and you use other processes to create loads of other plausible examples. “You also need to make sure that you're processing the data correctly, before feeding it into your machine and that you're cleaning it correctly, you're using the right pre-processing techniques,” he says. For more on data augmentation methods don't miss Intertraffic World 2024

“It is also important to use fair evaluation metrics,” adds Bell. “This will help to ensure that the model is not being biased towards certain groups of people. A vital part of this is making sure that you have a lot of diversity within the group of people working on these models to make sure biases don't creep in that way.”

It is essential to be transparent about the model's development process and to monitor the model's performance over time. “It is important to have regular reviews and audits to help identify biases and ensure the model is performing as intended,” says Lindgren. “Even once a model has been trained and has been put into production, it's constantly learning and so can change its inferences and we need to make sure then that biases don't creep in. Consistently applying the best practices, as they evolve, is important as well.”



What is data augmentation?

Let's say you have a sample dataset that contains information about individuals' travel behaviour, including attributes such as destination, mode of transportation, duration, and purpose of travel. To augment this dataset, you can use various techniques to generate new data points that are similar to the existing ones. One common technique is data augmentation through perturbation. For example:

Time perturbation: Modify the departure or arrival times of the trips by adding or subtracting a random duration.

Location perturbation: Create new destination coordinates by introducing random noise or shifting the locations based on a knowledge of places.

Mode perturbation: Change the mode of transportation for a given trip randomly while ensuring that it aligns with the original distribution of transportation modes and plausibility.

Purpose perturbation: Modify the purpose of travel by randomly selecting from a predefined set of purposes, taking into account plausibility.

Data augmentation can also be used to generate new synthetic data points and

expand a data set. For each data point in a sample dataset, randomly select one or more augmentation techniques and apply them to create variations, thereby generating new synthetic data points.

An important step is to validate the augmented data; to evaluate its quality by ensuring it aligns with the original dataset's patterns and distributions. The statistical properties of synthetic data can be compared with the original dataset to confirm the validity and quality of the synthetic data.

Data augmentation is particularly important in computer science when dealing with images or vision, when the sample of images is limited. With the right augmentations, a relatively small dataset of images can be increased considerably in size, and although augmented data is generally not as good as original data, it can still be very useful in training a model. A classic example of this comes from training computers to recognise hand written digits. From a small sample of images of hand written digits, you can create more examples by rotating or shearing the original images slightly.

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Gender bias in transport

Research by TRL shows that women are more likely to be discriminated against by transport AI and machine learning algorithms. This is due to a combination of factors including skewed training data and the biased labelling of training data, which can be due to a lack of diversity in both the transportation and AI/ML industries.

"On average, a male driver will drive more miles in a year than a female driver," says Bell. "So that means that any data we use is inherently biased. Particularly when we think about tracking cars on the road with detector loops, if we have more males driving with greater exposure, driving more miles, then any data from these detector loops carries biases forward."

"Also, commuting is more typical for a man than a woman, who often perform other duties like unpaid care work and

taking children to school," says Lindgren.

"These kinds of responsibilities call for a different way of travelling around than just a commute to an office. So, when a census is asking people 'How do you usually travel to work?', that question is going to capture more data from one part of the community than another."

Transportation decisions are often made by people who are not aware of gender bias in transportation data. This can lead to transportation plans that are not responsive to the needs of women. "According to a 2018 LinkedIn survey, women only make up 22% of the global AI workforce," Bell explains. "They also only make up 20% of the transportation sector workforce. If you've got fewer women working on these algorithms, this means that gender bias can creep in at the coding stage as well."

Above: When we look to the future do we see ourselves? Or a distorted version based on inaccurate data?

Data transparency

Bell believes it's important to note the difference between modern machine learning algorithms and traditional statistical modelling techniques, particularly with regard to transparency.

"A statistical model will usually want to understand the relationships that you have," he says. "For example, if I was asked to model the relationship between the volume of traffic on the roads and the number of KSIs [people killed or seriously injured], the model would be very explainable – if we increase the traffic flow this much, we would expect this many more KSIs. You get a concrete and explainable output from the model in terms of that relationship. You can also validate the model using historical data."

"With machine learning, there's less of a focus on quantifying relationships. Machine learning models are mainly judged on their predictive accuracy. To assess how good that algorithm is, it will be heavily trained and then tested on previously unseen data, and if it performs well on the unseen data, that will be taken as a success."

One of the challenges with machine learning algorithms is that it is difficult to always know

why the model has behaved in a certain way. "They are known as 'black box' algorithms," says Bell. "If we try to look under the hood to explain what's going on, it's not easy. We know that the model has identified an object as a pedestrian, but we may not know why it's saying that. Machine learning can vastly outperform classic statistical approaches. It's an approach that makes sense in lots of ways. But because you can't explain what's going on under the hood, that often makes you less able to quantify and understand any biases that the model may have."

"It's important that we try to understand what the models are doing, and are able to explain and assess this," adds Lindgren. "At the moment engineers write the code, but the models train themselves and create their own connections, which are opaque to everyone else, even to the engineers."

Setting standards

TRL believes there is a need to implement a set of standards in the AI and machine learning industry, to overcome data bias. "A set of standards would allow everyone to benefit from best practice," says Lindgren. "It would mean that entrants to the market have a starting point. It would also help to prevent organisations going down paths that appear to be generating results, but end up being wrong due to biases that they didn't know about."

"A set of guidelines is important now and will become increasingly important as datasets grow and we rely on them more and more," adds Bell. "All of these machine learning algorithms are becoming a bigger part of our decision-making processes, so bias will become an even more important factor going forward. This increases the need for a rigorous set of guidelines to be in place." ■

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Solar Dreams

Stella Terra, Solar Team Eindhoven's (STE's) 4x4 sun-powered concept car has completed road testing in Morocco and is set for a visit to Intertraffic Amsterdam. But are cars powered by the rays of the sun really the future of mobility?

Words | Christopher Court-Dobson



PHOTO: BART VAN OVERBEEK

Stella Terra
overcame
challenging terrain
on a test drive in
the Sahara desert

Stella Terra doesn't look like any vehicle you've ever seen, with a wider, longer bonnet and roof to accommodate greater surface area of solar panels, a lightweight frame and fiberglass chassis, an aerodynamic profile and low ground-hugging design.

STE technical manager, Bob van Ginkel is not long back from the Sahara, where the 4x4 Stella Terra finished its test run over 1,000km (621 miles) of difficult and varied terrain. The team is composed of 22 T/U Eindhoven students who took a year out to work on the Stella Terra, none of whom had built a car before.

"The mood was very good in the team," says van Ginkel. "We were so excited that we were able to complete the journey completely on the power of the sun, and we even had a lot of energy left in the battery."

Next stop for the Stella Terra is Intertraffic Amsterdam, which takes place at Amsterdam RAI exhibition centre in April 2024. It's much closer to home than Morocco – it's just 119km from the T/U Eindhoven campus where the vehicle was built.

Plans are afoot for a VIP to be riding in the car for this auspicious journey, as part of an initiative to raise awareness of the EU's commitment to SEVs and the future of electric mobility.

708km

The daily range of the
Stella Terra on-road,
or 548km off-road
(440/340 miles)



1,200kg

The weight of the Stella Terra, less than half that of BMW's 4x4 EV



“We aim to inspire everyone to accelerate the transition to a sustainable future. We encourage the markets and individuals to accelerate that future

Bob van Ginkel, technical manager, STE

The design

Many of the Stella Terra's components are built from scratch, for optimum performance. For instance, its solar converter is 97%-efficient, with the panels themselves achieving a respectable 24.4% efficiency.

“We needed to make the car very lightweight,” says van Ginkel. “It needed not only a low rolling resistance – the amount of energy you need to go forward – but a minimal amount of drag.”

The low air resistance is achieved by a distinctive aerodynamic design, that tends towards the ideal ‘teardrop’ shape, while balancing the need for as great a surface area as possible available for solar.

Solar panels built in to the bonnet and roof can be further augmented by panels stored within the vehicle and assembled onto the sides and back while stationary. This gives 16m² of solar panel area. The back panels also raise in a pop-out roof, which provides a better angle for capturing sunlight.

Rather than a steel chassis, Stella Terra has a fiberglass frame. The weight savings are immense; fiberglass is about 1,500-1,800kg/m³ versus steel which is 7,850kg/m³.



Camping out

The Stella Terra and its forerunners are designed to compete in the cruiser class for the World Solar Challenge. Other categories tend towards ultra-minimalist SEVs that sacrifice everything for the lightest weight possible.

But the cruiser class was envisioned as a move towards more practical vehicles, and are judged on how many people they can carry and pragmatic amenities. STE and the Stella family has won every challenge event in the category since 2011.

As such, the Stella Terra has a variety of camper van features that would make it suitable for long periods in the wilderness.

"You can live in it, so you can fold the bed down and you can sleep in it," says van Ginkel. "You can cook from the back, so the possibilities are almost unlimited to what you can do with the car. Providing care with it is also an option."

Just prior to reaching Morocco, the country was hit by a significant earthquake, which turned large parts into a disaster zone. There are clear benefits to disaster relief in having infrastructure independent vehicles.



The battery has a mere 60Kwh, a lot less than comparably sized EVs, and this is one of the many elements that helps keep the weight down.

The Stella Terra is less than half the weight of similar sized 4x4 EVs. The BMW Xi for example is approximately 2,500kg, while the Stella Terra weighs in at 1,200kg. Its top speed is 145km/h (90mph) and it has a daily range of 708km (440 miles) on-road, and 548km (341 miles) off.

Watt's in a wheel?

Stella Terra's off-road capability is in large part due to its in-wheel motor design. Rather than a central electric motor running by driveshaft to four wheels, each sports a Protean pd18, which has 80kw of peak power, 1400Nm of

torque, and weighs only 9kg – for a total of 36kg. Each is a very compact 43.3 x 12.5cm.

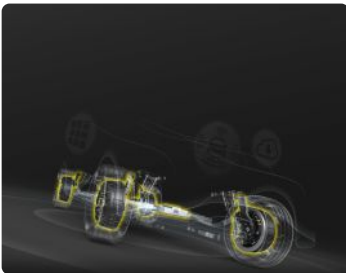
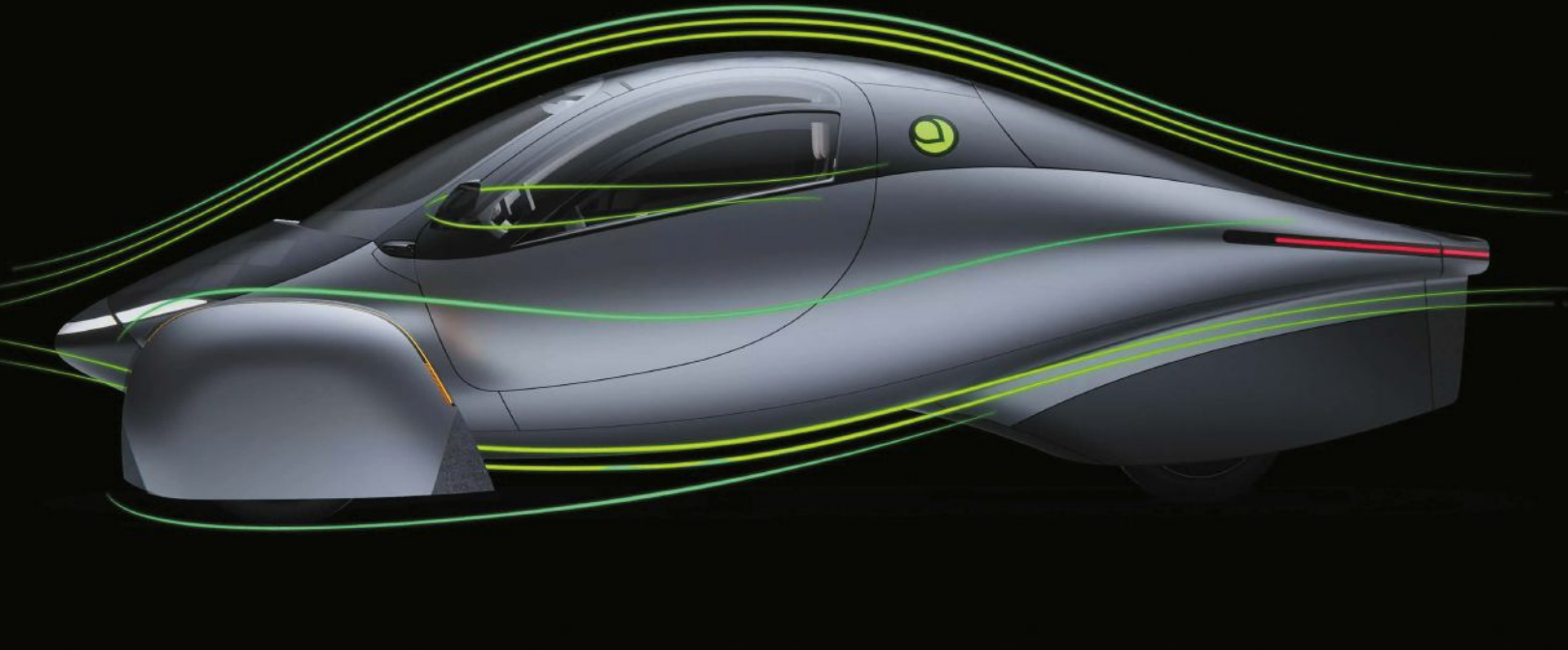
This design gives further weight savings, as it forgoes an extremely heavy component: the driveshaft. The brakes are integrated and it's also direct drive, which means no gears, so yet more weight reductions.

"In-wheel motors really shine for solar vehicles because they reduce the weight of the vehicle," says Luka Ambrozic, chief commercial officer at Elaphe, which supplies in-wheel motors for another Dutch solar car, the Lightyear. "They increase the space available, which helps in making the vehicle more aerodynamic."

"They are also very efficient. Much more so than any ICE equivalent."

Main: Solar panels cover the roof and bonnet of the Stella Terra

Above: The car's rear roof can fold out to provide extra charging area when parked



Main: Aptera three-wheeled solar buggy design concept

Above: Elaphe's vehicle motion-control platform

Below inset: Elaphe builds in-wheel motors for electric vehicles



“Overall, if the vehicle provides good economics, everyone will drive them. It's a simple equation of what's your total cost of ownership in the end

Luka Ambrozic, chief commercial officer, Elaphe

They're much better optimised for long range cruising at highway speeds.”

But there are trade-offs involved. The weight of the motors is not born by the vehicle's suspension, but by the wheels themselves.

“It's unsprung mass, which means you add weight to the wheel,” says Ambrozic. “This means that the ride is, in theory, less comfortable. But that is largely manageable.”

Another issue is the currently higher cost. “It's a new technology,” says Ambrozic. “Typically, we're not dealing with the components that have been cost optimised for the last 50 years.”

The cost of solar

The Lightyear Zero came in at €250,000 (US\$270,000), although as a proof-of-concept this does not necessarily reflect the final cost of SEVs, which might, when fully mature, have a lower overall cost due to the smaller battery.

The Lightyear Zero has a drag coefficient of 0.19, and a 60Kwh battery gives it a range of 625km (388 miles) before the solar element is added, with a further 40-100km range extension per day, dependent on weather.

In the EU, only one in five workers have a commute higher than 30km (19 miles). So this would place charge-free driving in the hands of the majority.

Only a few of the pre-orders made it off the assembly line, and for financial reasons, focus has shifted to the more affordable Lightyear 2, priced at €40,000 (US\$43,000).

“If you're looking to build a solar car for the masses you need a low cost technology,” says Luka.

Teething pains

Arval, owned by BNP Paribas, placed a 10,000 unit order for the Lightyear 2, calling the technology “proven, affordable and environmentally friendly.”

But Atlas Technologies, the operator of the Lightyear startup, was forced to declare bankruptcy in January 2023. Nevertheless, parent Atlas Technologies Holding is still solvent and owns the IP, which has allowed Lightyear to reboot, with the intention of eventually fulfilling preorders. They are now also focusing on manufacturing solar bonnets for mainstream OEMs.

Elsewhere in the burgeoning SEV industry it's a similar shaky picture, with Sono Motors, the

builders of the Sion solar car, filing for insolvency in May 2023; and Aptera, creator of a futuristic three-wheeled solar buggy, only resurrected in 2019 via crowdfunding, having been declared bankrupt in 2011. As of June 2022 Aptera was said to have over 22,000 orders on its books, but still no word on whether production has begun in earnest.

None of these are large, well-funded OEMs, but





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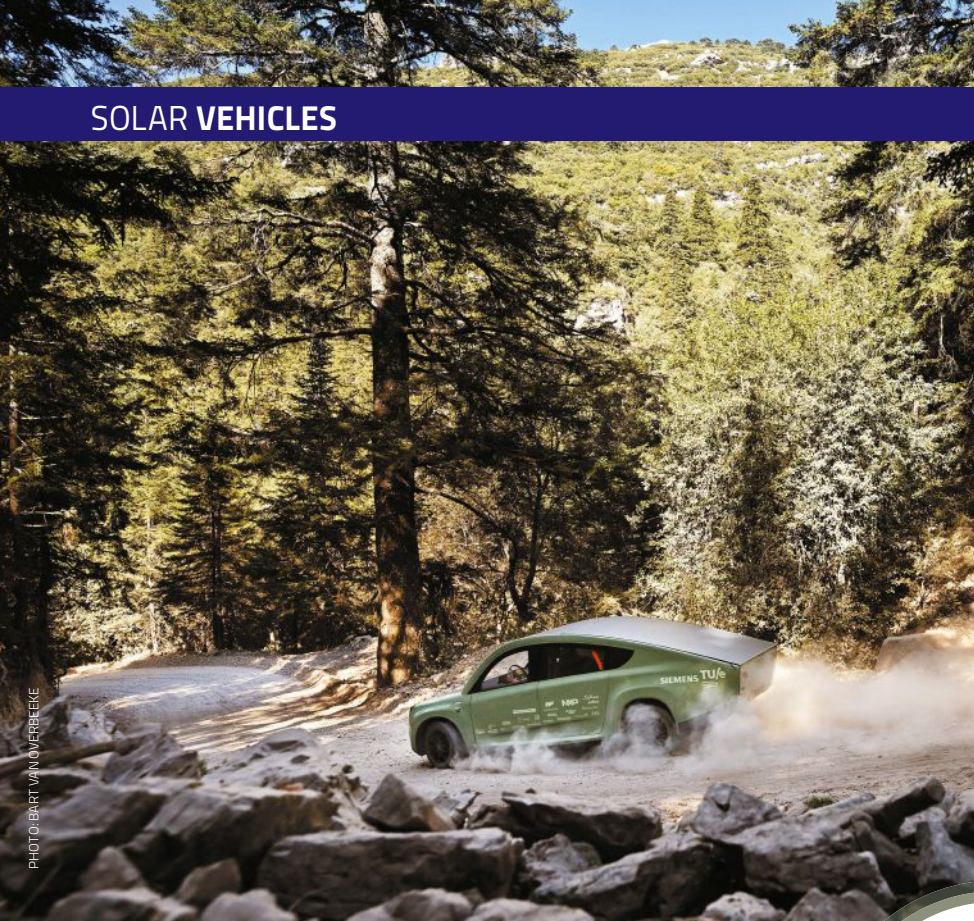
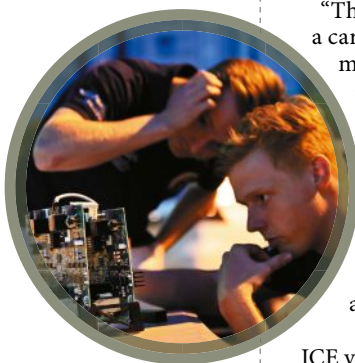


PHOTO: BART VAN OVERBEEK

Above: Stella Terra drove along varied terrain, including dry sandy roads, mountain trails and forest areas on its 1,000km test run

Below: The Stella Terra team working on a converter for the solar panels

Below right: The Stella Terra team drove the car from Northern Morocco to the Sahara



IMAGES: BART VAN OVERBEEK

rather enthusiastic startups attempting a mammoth project, with an extraordinary variety of entirely new parts to manufacture. They rely on angel investors, community crowd funding, and pre-orders as well as conventional finance.

The difficulties haven't been due to any underlying issue with the technology, nor for lack of enthusiasm by backers, but rather the challenges in producing a whole host of novel or underused components without the developed supply chain of the big OEMs.

Future design philosophy

What's clear is that the likes of Stella Terra and Lightyear are not simply EVs fitted with solar panels. Rather, achieving viable SEVs means rethinking the car concept from the ground-up. At each stage of the process, every component has been optimised for weight and efficiency.

"The Stella design philosophy is to build a car that consumes as little energy as possible in manufacturing, but also needs as little energy as possible to drive," says Van Ginkel.

There is already a small and highly motivated network pushing forward this lightweight, energy-efficient paradigm.

"The vehicles really need to be designed in a holistic way," says Ambrozic. And he is certain that this design philosophy has a lot to offer the wider industry.

"What emerges is just how inefficient ICE vehicles, and even the latest EVs are

compared to the ceiling of potential, which is currently being pushed by solar vehicles. The efficiency gains will of course have huge impacts outside the SEV market," says Ambrozic.

Green impact

Concept cars such as Stella Terra show that the solar vehicle project is feasible – but the struggles of the commercial sector illustrate the scale of the task.

"Overall, if the vehicle provides good economics, everyone will drive them. It's a simple equation of what's your total cost of ownership in the end," says Ambrozic.

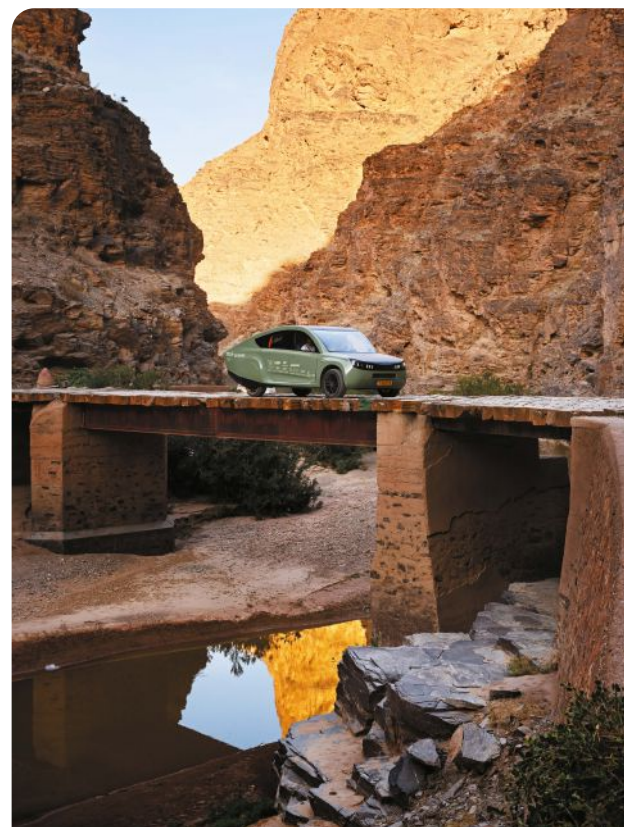
And with fuel costs of zero on a sunny day, the benefits are certainly enticing.

"But it is more of a matter of time. And maybe some integration challenges that arise with increasing use," says Ambrozic.

SEVs have the potential to accelerate the journey to net zero because the availability of charging infrastructure ceases to be a limiting factor, especially important for the most densely populated cities and the most remote rural locations.

"We aim to inspire everyone to accelerate the transition to a sustainable future. We encourage the markets and individuals to accelerate that future," says van Ginkel. And Luka Ambrozic is also emphatic about the importance of the mission. "In reality, we're not saving the planet, we're saving the human race – our children and our children's children." ■

145
The top speed of
Stella Terra in km/h
(90mph)





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Avoiding conflict

Urban air mobility is widely believed to be the next era of transportation – with Intertraffic Amsterdam in April 2024 collocated with Amsterdam Drone Week. But before we can all start zipping around at low altitudes, the challenges of managing this new kind of traffic must be solved

Words | Jack Roper



The drone industry aspires to a future of high-frequency operations in low-altitude airspace shared by multiple operators. Today in Singapore, drone operator Skyports Drone Services relies on an informal daily sharing of flight plans for strategic deconfliction with other operators. However, the company recognises the need for a more automated system to support a scalable commercial ecosystem.

“Well-programmed systems make fewer mistakes than humans,” says Jef Geudens, head of technology at Skyports. “Commercial success will require each pilot to monitor 10-20 aircraft, becoming an airspace manager. We can only reach that scale with a fully automated system for deconfliction. Neither are narrowly segregated operations likely to prove viable. If drones only operate in narrow



Above: Drones are already performing some duties at the Port of Rotterdam, though not goods deliveries, yet

20

The number of drone operators already performing functions in the Port of Rotterdam

corridors, we may as well use delivery vans. Commercial operations require wider areas of airspace controlled by automated systems.”

Hence the development of Unmanned Aircraft System Traffic Management (UTM) systems to deconflict airspace shared by many drones and potentially, manned aviation.

Skyports’ UTM partner is OneSky.

The company’s dynamic UTM system grew out of the same technology used to prevent collisions between commercial satellites. OneSky’s UTM system integrates manned and unmanned aviation by providing an interface between drones and ANSPs [air navigation service providers] that enables the latter to manage drone traffic.

“We help the ANSPs responsible for crewed aviation understand the framework needed to control drones in their airspace,” explains Chris Kucera, head of strategic partnerships at OneSky. “Our UTM system passes authoritative ANSP data to drone operators. It can represent the operator’s flight-plan and get it authorised by the ANSP. It is essentially a broker of data between the drone and air traffic management (ATM).”

OneSky’s Operations Centre meanwhile provides an interface for drone operators to plug into the system. Strategic deconfliction between multiple operators is achieved solely by sharing flight plans over the internet.

“Drones come into a world built for larger aircraft and devoid of infrastructure supporting low-altitude flight,” says Kucera. “NASA invented UTM to avoid building infrastructure everywhere. People who want to fly safely should communicate



their intent. If everything in the sky is networked, we can do strategic deconfliction by sharing that information. In time, that may evolve into tactical deconfliction based on real-time tracking.”

Drone air traffic control

OneSky first flight-tested its system in Australia, then in Singapore for three years. In the USA, it participated in four NASA pilot programmes and further FAA trials to mature the technology. NASA’s advanced tests involved upwards of two dozen drones flying simultaneously, though some are more real than others.

“Early tests had just one or two live vehicles,” says Kucera. “Later, we had eight UTM companies each controlling their own drones and doing strategic deconfliction. But flying drones is costly, so tests usually involve both live and simulated vehicles. After

10 years, our mature systems for strategic deconfliction have been proven in operations.”

The European Union Aviation Safety Agency (EASA) defines U-Space as a set of digital and automated services to enable safe integration of drones and manned aviation in a volume of airspace.

In October 2022, the Port of Rotterdam Authority (PoR) assumed control of its airspace from LNVL, the Dutch ANSP, for a two-year U-Space prototype project using the Airwayz Dynamic UTM system.

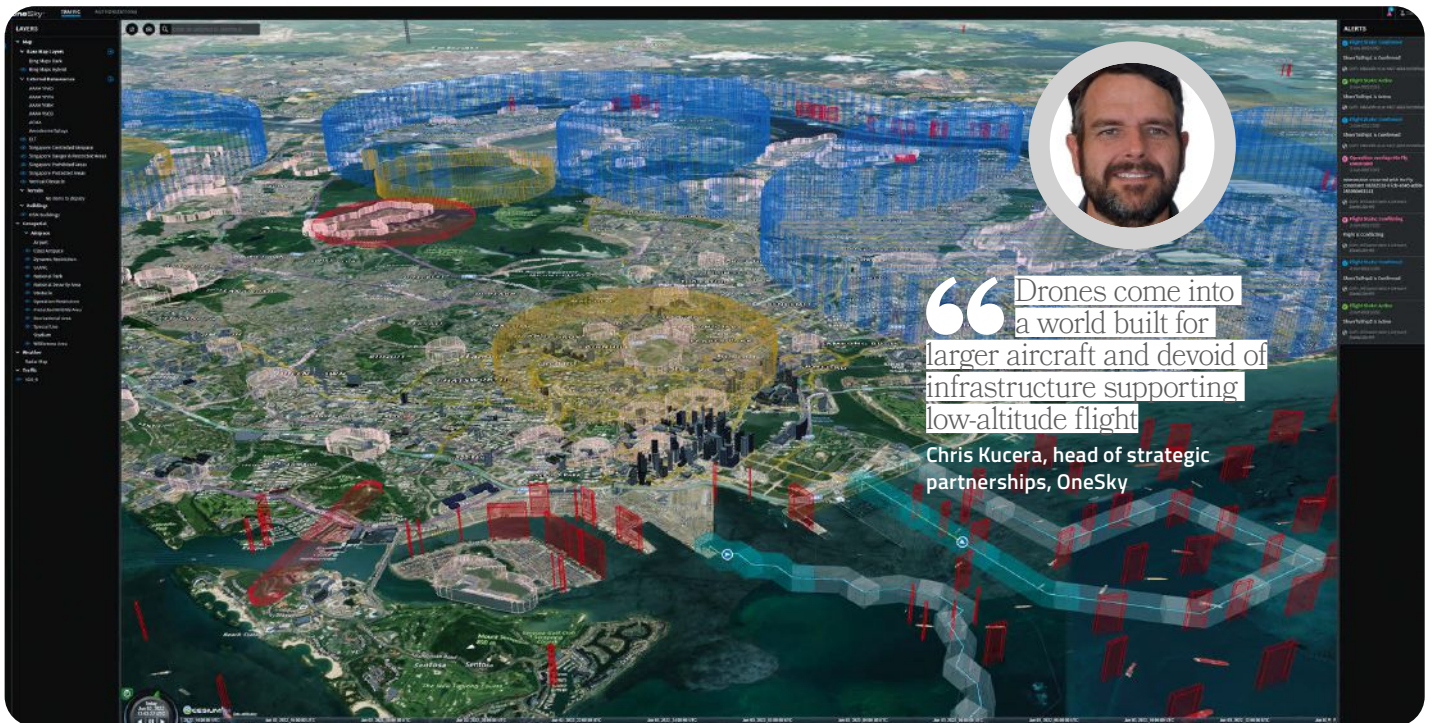
“Rotterdam is the largest seaport in the Western world,” says Airwayz CEO, Eyal Zor. “They already have 20 drone operators doing search and rescue, inspection, asset monitoring and policing. Previously, the approach was segregation and hoping for

Inset: The Airwayz team at the Port of Rotterdam



“ If drones only operate in narrow corridors, we may as well use delivery vans

Jef Geudens, head of technology, Skyports



“Drones come into a world built for larger aircraft and devoid of infrastructure supporting low-altitude flight”

Chris Kucera, head of strategic partnerships, OneSky

Above: OneSky's UTM delivers real-time, dynamic, 4D situational awareness and decision support

Below: BVLOS drone testing in the UK

the best. This project aims to improve safety and enable a greater volume of activities.”

Integration into the Airwayz UTM requires each operator to adopt a software layer called the unmanned aerial vehicle operating system (UAVOS) to manage multiple drones. The UAVOS submits flight plans to the UTM for checking and approval. The UTM also monitors in real time to prevent potential crashes.

“We don't believe in static corridors or segregation, because you quickly run out of airspace,” says Tomer Sorek, business manager at Airwayz. “Dynamic airspace is complex and requires constant monitoring. The UAVOS communicates with our server and we connect to the PoR Robin radar system. If something changes, we recalculate everything in proximity and if necessary reroute one of the parties. It's like a control tower talking to pilots, but with systems talking to each other.”

Shipping opportunities

Airwayz is working with LVNL and the Dutch Aerospace Centre (NLR) on UTM-

ATM integration. In Rotterdam, drones may avoid collisions with helicopters flying at low altitude by dynamic airspace reconfiguration. When a helicopter communicates its intended flight-path, the UTM system will temporarily close that section of airspace to drones until the helicopter has passed.

Planned integration with Harbormaster systems will help the UTM understand the position and movement of ships, not merely as obstacles but as targets for inspection or landing. Airwayz aspires to extend its drone services to anchored ships in the English Channel.

Launched in November 2022, U-Elcome is a European project, involving 51 partners across three countries, aiming to support the implementation of services for the safe and secure integration of drones. It will run for three years. In 2023, it created three national clusters enabling iterative development of local ecosystems and expects flight testing to increase in 2024.

In Spain, U-Elcome has seen flights associated with firefighting, police and harbor applications while in Italy, a flight campaign to include antenna inspections is underway. U-Elcome's end goal is to ensure routine drone operations across Europe by 2026.

Meanwhile in the UK, Project Skyway aims to establish a 165-mile (265km) BVLOS (beyond visual line of sight) drone corridor. It is led by Altitude Angel, whose UTM platform will handle flight approval and deconfliction in conjunction with ground-based sensors to detect and identify drones. UK telecoms provider BT previously led Project Accelerate, a precursor to Skyway, and will explore how its extensive telecoms infrastructure could be leveraged to support U-Space operations.



“It's like a control tower talking to pilots, but with systems talking to each other”

Tomer Sorek, business manager, Airwayz





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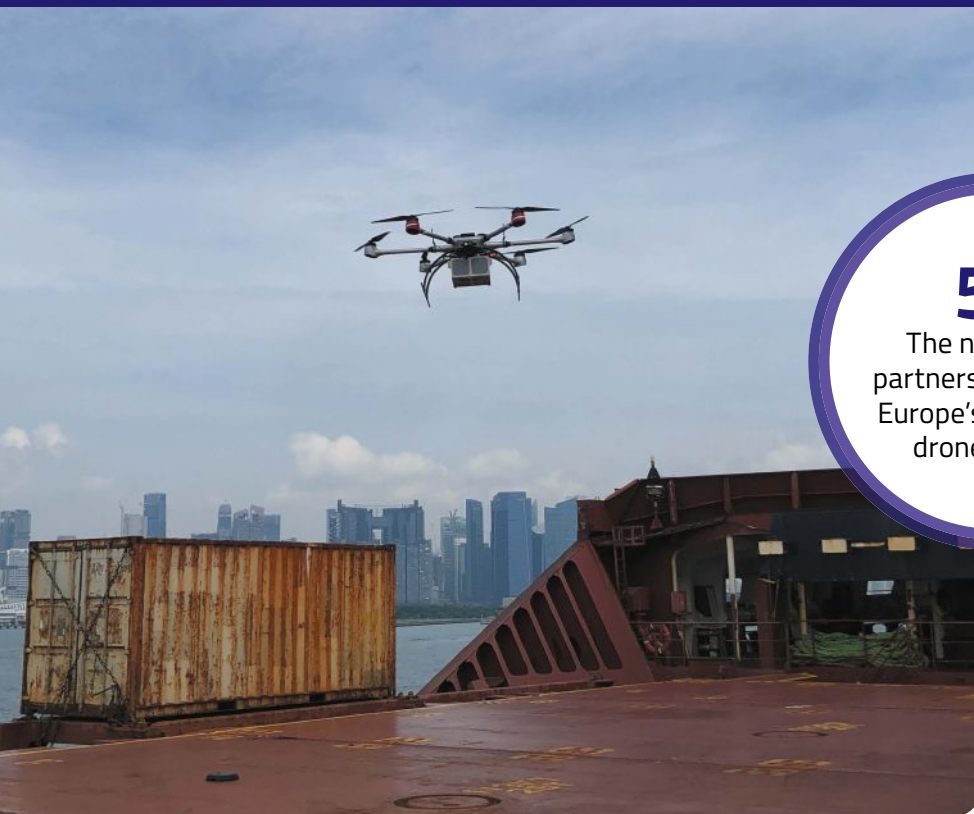
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The number of partners involved in Europe's U-Elcome drone project

"Our masts and structures could carry detection devices looking at the sky to provide situational awareness," says BT's drone director, Dave Pankhurst. "That information could be communicated over our network then ingested and fused with known information by Altitude Angel's platform. "If something has changed, they begin deconflicting flight plans. Our existing mobile network can provide communications to the drones themselves for command and control and returning video imagery." BVLOS flights could be tracked using drone-mounted devices or through software integration between UTM platforms and drone control stations. But another solution is the deployment of ground-based surveillance infrastructure, which has the advantage of detecting non-collaborative vehicles. This could be achieved by radar or so-called sniffers, which detect radio frequency signals from drones.

Above: **Wherever drones fly they must avoid conflicts with other airspace users**

Right: **Skyports drones have been used for medical services**



Interactions with other aircraft

In the UK, BVLOS flights are only permitted for three-month periods in segregated temporary danger areas (TDAs) after an approval process taking many months. Skyports is working with the UK's Civil Aviation Authority (CAA) to transition TDAs to a temporary reserved areas (TRAs) shared by drones and other aircraft, then transponder mandatory zones (TMZ) where any suitably-equipped aircraft may fly. Project Skyway likewise aims to reduce BVLOS entry barriers.

"Once we prove one level of safety, the CAA may consider the depth of detect-and-avoid technology required for given locations," says Pankhurst. "Eventually, operators could obtain approval to fly because they're using a UTM system proven to be safe, rather than gathering two years of safety evidence and building their own ground-based detect-and-avoid systems."

European ATM overseer Eurocontrol notes a need for early collaboration with national authorities usually approving BVLOS corridors for the first time. But often underfunded regulators are trying to chase a fast-evolving drone market. This results in chicken-and-egg roadblocks.

"A drone using UTM solves one side of the problem. But it's hard to fly drones unless we also know where manned aircraft are," says Kucera. "That may require electronic conspicuity mandates stating that any aircraft flying below 400ft must report its position. Not all aviators want that, but it's the only way to ensure safety. Everything is based on assumptions. It's about how we make small steps with a little chicken, a little egg, a little more chicken until eventually, we get there." ■



Real-world use cases

Skyports Drone Services has operated three BVLOS projects for the UK National Health Service (NHS) since 2020. It has collected Covid-19 test samples from Scottish islands, conducted 14,000 BVLOS flights collecting laboratory samples from Scottish hospitals and most recently, transported pathology samples in Newcastle.

"We've trended towards more complex missions," says Skyports' head of technology, Jef Geudens. "In Newcastle, we flew up to 80km with dangerous goods approval. Instead of driving two hours to hospital, it could mean cancer patients can receive chemotherapy at home."

Skyports is also delivering Royal Mail parcels to Scottish Islands in the Orkney I-Ports project. Royal Mail sorts the parcels

into boxes which are flown by Loganair from Aberdeen to Kirkwall, where Skyports puts them on drones for onward delivery to specific islands.

"We've demonstrated we can deliver parcels with a 90% availability rate," says Geudens. "Every Friday, we deliver fish and chips on the islands. We started delivering 2kg and now deliver 20kg every week. Virtually everyone there is having our fish and chips."

The Orkney drones operate under BVLOS with visual mitigation (BVLOS-VM) conditions. "We daisy-chain people on each island to maintain visual contact and see that no one else infringes the airspace," Geudens explains. "BVLOS-VM requires filing an operational safety case, but no operational change."

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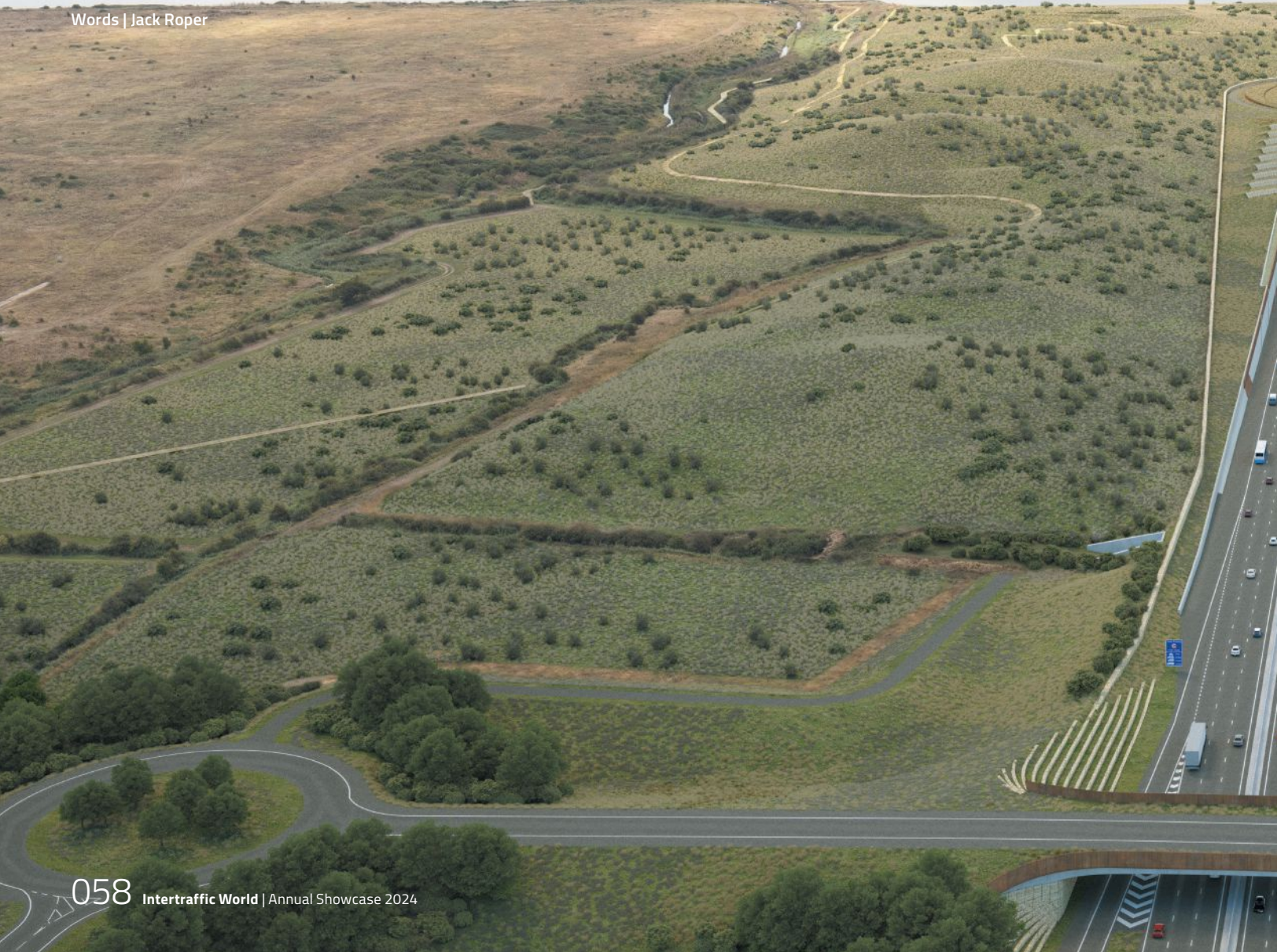
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The road to zero

If it gets the final go-ahead, the Lower Thames Crossing will be the largest road-building scheme in the UK for 30 years, but that's not the most significant thing about it – what really sets it apart is the fact that it is pioneering new low-carbon techniques that can inspire other projects right now, no matter how long we have to wait for construction to begin

Words | Jack Roper



A computer generated image showing how the northern tunnel entrance will look for the Lower Thames Crossing, east of London

The Lower Thames Crossing is Britain's most ambitious road-building scheme in three decades. It will connect Kent and Essex with 14.3 miles of three-lane highway crossing the Thames Estuary in two 2.6-mile (4.2km) tunnels, which will be Britain's longest and among the widest bored tunnels on earth. It will take six years to build, cost an estimated £8.3 billion (€9.7 billion) and be the greenest road-building project ever seen.

"The Lower Thames Crossing is a pathfinder project for the industry," says Lower Thames Crossing sustainability director, Andrew Kidd. "We aim to achieve net zero construction and maintenance emissions by 2040. This £8bn government-funded project has a powerful market signaling effect and will drive commercialisation and scale-up of low-carbon road-building from 2026 to 2030."

The new road will relieve congestion at Dartford, currently the only Thames road crossing east of London, which consists of two tunnels and a cable-stayed bridge. Designed for 135,000 vehicles per day, Dartford carries 180,000 on peak days and sees 3,000 incidents per year, one of the UK network's highest rates. Dartford is subject to perpetual delays, which spill onto local roads and requires a 300-strong team to keep traffic moving.

"We have more people managing one mile of road at Dartford than our whole southwest regional network," says Kidd. "The southbound bridge makes freight susceptible to high winds and we have to



Above: The design for the proposed southern entrance to the crossing

escort certain vehicle-types through the older tunnel. The problem for drivers isn't just the speed of journeys, but their unpredictability. Local journeys, like collecting the kids from school, are continually impacted by problems on the strategic road network."

Because Dartford is on the shortest route linking Britain's channel ports to the Midlands and North, 40% of the 50m vehicles crossing annually are goods vehicles. The Lower Thames Crossing will siphon this traffic off to the east and create growth by connecting Kent and Essex.

"Essex and Kent are sizable regional economies that don't really talk to each other," says Kidd. "Fewer than 1% of people commute across the river today. By taking 13m journeys away from Dartford, the Lower Thames Crossing will make existing journeys more

predictable and enable new and different journeys on a free-flowing 70mph crossing."

Emissions limits

Lower Thames Crossing is the first UK infrastructure project to commit to legal limits on construction emissions in its development consent order. Its procurement asked tenderers to commit to these limits and demonstrate how they would eliminate emissions. Its contracts incentivise them to continue reducing emissions across the project's lifetime.

"We don't have targets, but limits," Kidd explains. "We have a long construction period with technology quickly evolving. If we set a target now, it risks seeming difficult and putting people off, but by 2030, appearing too easy. Our methodology is to set initial limits, then continue driving emissions downwards."

6,000

The metric tons of hydrogen planned to be procured by National Highways to fuel low-carbon construction at the Lower Thames Crossing



Contractually, the project is split into three components: Roads North of the Thames, Tunnels and Kent Roads. Roads North is awarded to Balfour Beatty and Kent Roads to Skanska, with a Tunnels decision shortly expected. Early contractor onboarding maximises opportunities to embed low-carbon technologies and develop local supply-chains.

“The successful tenderers all committed to better limits than we asked,” says Kidd. “That delivers a 50% emissions-reduction versus a conventionally-built equivalent scheme at no extra cost to the taxpayer – just as a starting-point.”

Balfour Beatty will focus on delivering its tender commitment across four carbon-reduction priority areas of design, plant, steel and concrete and expects to adopt alternative fuels including hydrogen.



“With 32 major structures within just 10 miles, the Roads North package presents exciting opportunities to rethink traditional approaches from the outset,” says Balfour Beatty sustainability director, Geri Straine. “We are exploring techniques and solutions such as modular construction to deliver the project with the lowest possible carbon footprint.”

National Highways expects supply-chain engagement and detailed construction-planning to drive emissions down beyond its 50% starting-point, with contractors incentivised to deliver continuous reductions. Balfour Beatty will empower supply-chain partners with tools and guidance and require them to formally quantify their carbon impacts. Fundamentally, savings are achievable in three ways.

Above: Traffic congestion at the Dartford Tunnel, which the Lower Thames Crossing aims to relieve

“The Lower Thames Crossing is a pathfinder project for the industry. We aim to achieve net zero construction and maintenance emissions by 2040

Andrew Kidd, sustainability director, Lower Thames Crossing, National Highways

“We are exploring techniques and solutions such as modular construction to deliver the project with the lowest possible carbon footprint

Geri Straine, sustainability director, Balfour Beatty



Above: The visual impact of roads leading to the crossing is planned to be reduced with extensive landscaping



Low-carbon concrete

After water, concrete is the second most-consumed substance on earth and a major source of emissions. Concrete contains cement, whose production is energy-intensive and emits CO₂ as a chemical by-product.

“Every tonne of cement we produce creates an equivalent tonne of CO₂,” says Mark Connelly, chief engineer for transport at AtkinsRéalis, an international design, engineering and project management organisation. “Moreover, we pay insufficient attention to end-of-life concrete disposal. As rising populations drive construction demand, producing cleaner concrete becomes increasingly critical.”

Cement 2 Zero (C2Z) addresses the twin challenges of decarbonisation and recycling. Led by the UK’s Materials Processing Institute, C2Z is focused on a novel cement

production process invented by University of Cambridge researchers.

“The Cambridge Electric Cement process allows us to recycle cement from demolished buildings, bypass the emissions-heavy calcination process and reclaimer in electric arc furnaces familiar in steel-making,” Connelly explains. “C2Z aims to demonstrate the structural, regulatory and economic viability of recycled concrete.”

Partners include AtkinsRéalis, Balfour Beatty, CELSA and Tarmac. Connelly considers proactive co-ordination vital to overcoming barriers in a risk-averse industry. “The pathway to low-carbon construction is paved with collaboration,” he says. “C2Z shows that shared commitment, cross-sector problem-solving and enterprising leadership can steer construction towards a sustainable future.”

How CO₂ savings are achieved

“One way is to build less of something and thus use less materials,” says Kidd. “Digital design and off-site construction can help deliver really smart engineering and design. Secondly, we can reduce the carbon-intensity of materials, which means attacking steel, concrete and diesel.”

A third important pillar is that National Highways also aims to eliminate diesel machinery from its construction sites within the project’s timescale. Construction equipment consumes far more power than a passenger car and its duties are much more demanding, making it harder to wean off fossil fuels. Essentially, there are three approaches to this...

“One is battery-electric, for smaller, mobile equipment,” says Kidd. “Cable-electric will be more efficient for cranes or piling rigs, whose work is often stationary. They may track across site on a battery, then plug in to work. Finally, for excavators over 20 tonnes and articulated haulers, we expect the solution to be hydrogen.”

Remarkably, National Highways has launched a procurement for 6,000 tonnes of hydrogen to



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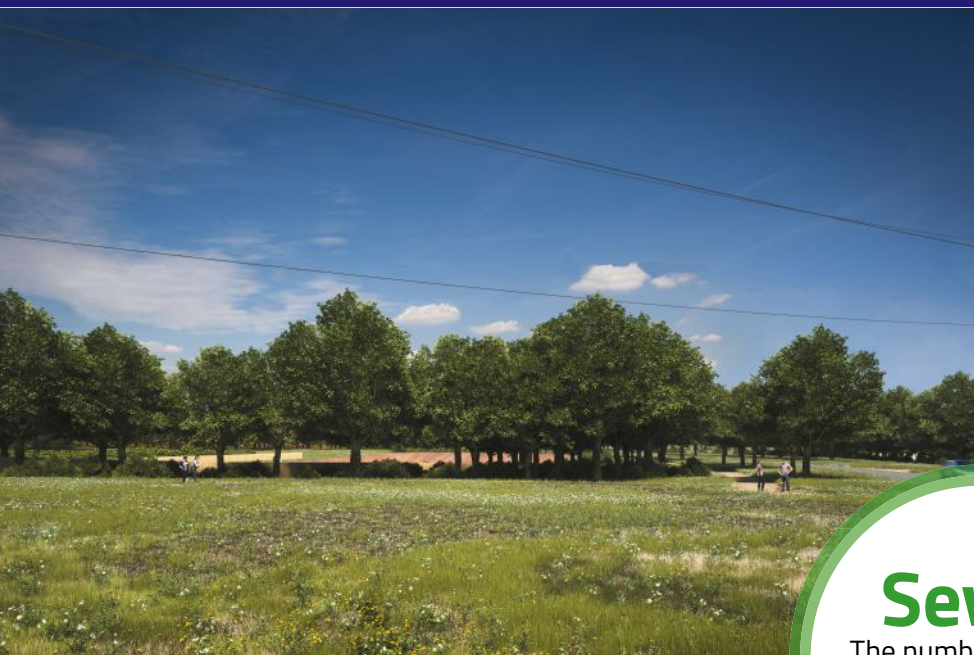
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Above: 'Green bridges' across the new roads will connect wildlife habitats

Below: JCB is one of the construction vehicle OEM's pioneering low-emissions machinery such as this hydrogen combustion excavator

supply its delivery partners and combine demand across all three Lower Thames contracts. In doing so, it aims to create a hydrogen economy across the Thames Estuary and a hydrogen capability across UK construction.

"It's part of what it takes to be a pathfinder," says Kidd. "Going to market early gives hydrogen suppliers time to get in shape, relative to construction. The major equipment manufacturers all have hydrogen programmes. Procuring our own hydrogen takes a major reason not to adopt off the table."

Steel's carbon-intensity depends entirely on how it is manufactured and UK producers are already transitioning from coal-burning blast furnaces to electric arc furnaces. Because the end-product is exactly the same, the only variable to consider is the relative carbon-

Seven

The number of 'green bridges' planned in the Lower Thames Crossing scheme

intensity of steel production. Concrete presents an altogether more complex picture.

"Concrete gets very technical very quickly," says Kidd. "There are millions of recipes, but they all contain cement, which produces about 8% of global emissions. Both the energy consumed and the chemistry itself contribute to emissions from cement production. Fundamentally, we can either reduce the carbon-intensity of cement, or displace it with other materials, which enhance the concrete's binding properties."

Eventually, Kidd foresees the application of carbon capture and storage technology to cement production, though this would inevitably cost more than simply releasing CO₂ up a chimney. In the nearer term, ground granulated blast-furnace slag (GGBS) or calcined clays may offer feasible cement replacements in lower-carbon concretes. Kidd believes cement and concrete producers are awake to challenges they must solve to continue doing business in the coming decades. After all, road-building's green future will not stop at UK shores.

"Globally, Europe is leading the way," says Kidd. "We've looked at how the Netherlands has focused on getting operational emissions to zero.

On embodied carbon, Oslo in Norway has forged ahead with bullish requirements for the construction sector. They have numerous sites using only zero-emissions equipment. Certainly, that provided some inspiration for us."

Protecting nature

Biodiversity is a major focus. The new roads will be 80% underground or behind embankments while building tunnels instead of a bridge will safeguard protected wetlands. Lower Thames Crossing will plant a million trees, create seven green bridges, two public parks,



Low-carbon asphalt

If National Highways is to achieve net zero construction and maintenance operations by 2040, it must decarbonise the asphalt which covers 96% of strategic UK roads.

National Highways thus commissioned AtkinsRéalis to research asphalt incorporating biogenic materials, or bio-binders. Bio-binders absorb atmospheric carbon, which remains locked in even through asphalt recycling, potentially turning roads into carbon sinks.

In February 2023, two asphalts containing polymer modified bitumen bio-binders were installed by project partners Heidelberg Materials on the A30 near Exeter, Devon. This first formal trial

demonstrated a 23% reduction to asphalt's carbon footprint across material extraction, processing and manufacturing.

Given the 77,300 tonnes of asphalt-related CO₂ emitted on Britain's strategic road network in 2020, there is scope for bio-asphalt to deliver substantial carbon savings.

"Construction contributes over 10% of global emissions," says AtkinsRéalis chief engineer for transport, Mark Connelly. "Construction is the backbone of development worldwide, but labyrinthine industry structures, complex supply-chains and long project timelines present formidable obstacles to decarbonisation."



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The proportion of global carbon emissions created by construction



Above: This new 2.9km (1.8 mile) cycling and footpath is planned, completely separate from any of the new roads for the Lower Thames Crossing

22 ponds, 12 miles of hedgerow and a 95-hectare community woodland. Overall, it will create three times more woodland than it removes.

“We’re connecting existing wildlife habitats and providing new ones,” says Kidd. “We’re creating almost 40 miles of footpaths, cycle-paths and bridleways – three miles of new pathway for every mile of road. Alongside strategic infrastructure, we think holistically about the legacy we leave in the landscape.”

Design was shaped by the most extensive consultation exercise ever undertaken for a UK road scheme, eliciting over 90,000 responses. This resulted in moving tunnel entrances further from the river, lowering the level of roads, redesigning junctions, changing most of the route from two to three lanes in both directions and widening tunnels accordingly. But still, the Lower Thames Crossing awaits approval for work to commence in 2026.

A development consent order application was submitted in 2022 with an examination process with the Planning Inspectorate concluding at the end of 2023. “Based on their report, we expect a decision from the Secretary of State next summer,”

says Kidd. “Beyond that, we will just need the green light from government to get started.”

The Lower Thames Crossing will nearly double Thames-crossing road capacity east of London. Based on standardised regional traffic models, National Highways believes it will divert 13 million journeys from Dartford, especially goods vehicles headed north from channel ports. It may reduce emissions from stop-start driving in congestion, though Kidd is cautious on this point.

“Generally, improving traffic flows increases vehicle efficiency and yields a carbon reduction,” he says. “But the Lower Thames Crossing may open in 2032, by which time the vehicle fleet will look quite different. Over the asset’s 60-year accounting or 100-year operational lifespan, the vast majority of journeys will be net-zero journeys.”

The scheme is not without detractors, who claim more roads simply create more traffic, or that the UK would be better-served moving freight by rail, or using northern ports for northern destinations. But National Highways’ remit is limited to making roads as sustainable as possible in supporting the journeys people need to make.

“Even doubling rail network capacity would barely move the dial relative to freight movements by road,” says Kidd. “Extreme congestion at Dartford really makes the case on its own. From an economic or a driving perspective, we haven’t modelled any scenario where you regret building the Lower Thames Crossing.” ■

“We’re connecting existing wildlife habitats and providing new ones. We’re creating almost 40 miles of footpaths, cycle-paths and bridleways – three miles of new pathway for every mile of road

Andrew Kidd, sustainability director, Lower Thames Crossing, National Highways

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Just a few years ago the prospect of being able to catch the drivers of vehicles making excessive noise was remote, with ways of accurately recording and processing such infractions extremely limited. But recently technology has become available to enable authorities to do just that. How does it work? And should it be deployed?

Words | Christopher Court-Dobson



Modified exhausts, overrevved engines, pops, bangs and tyre screeches: all signs of anti-social driving and the excessive noise associated with it. Common complaints for the city dweller, but also increasingly for the residents of normally quiet villages and towns. Now there is a potential solution as 'noise cameras', the sonic equivalent of speed cameras, are being deployed in the US and Europe.

Several big name ITS suppliers are now beginning to offer noise camera technology, but there are also some start-ups in this field, including one based in the UK that is having notable success. Intelligent Instruments was only established in 2019 but is already gaining an international profile with its SoundVue noise camera system, with deployments to Kensington and Chelsea Council in London, Manhattan in New York and the City of Knoxville, Tennessee.

"This technology is used to detect excess sound from nuisance vehicles. So, road vehicles, motorcycles and cars, which may have modified exhausts, or any car really that may be driven aggressively with excess revving," says Reuben Peckham, co-founder of Intelligent Instruments.

Several design challenges emerged in the course of development. The question was not only how to determine with high accuracy if legal sound levels have been breached, but which vehicle in a small area is the source of the offending sound, and what kind of sound is being produced.

"It's a precision noise monitor. So, it measures sound levels very accurately, when combined with three cameras and microphone array. It records video and audio until it triggers. It uses algorithms that trigger on exhaust noise, music and horns," says Reuben.

The microphones are Class 1 accuracy (European IEC 61672-1 Standard rather than the USA's ANSI), which is the highest precision available outside of a laboratory. This is an important feature because only a Class 1 recording is fully reliable as evidence in court.

Currently in on-street applications the algorithm does not trigger for loud music (although that capability has been developed).

"The microphone array also detects the offending vehicle. So if there's multiple vehicles in the video, then the microphone array is able to determine which is the vehicle that has caused the extra sound," says Reuben.

This is known as passive acoustic location and relies on four small microphones set in a dish. Small differences in the timing of the sound are used to determine the position of the sound source.

"And that in turn enables the camera system to read the registration plate of the offending vehicle and that's captured as well," says Reuben. This relies on a straightforward ANPR system, comparable to that used in speed cameras and some tolling applications.

There is a patchwork of laws in different countries governing noise exposure at work, but it is generally agreed, via bodies such as the World Health Organization (WHO), that no one should be exposed to noise above 85dB, even in an industrial setting, during their working day. This is roughly equivalent to what a person would hear while pushing a petrol engine lawnmower. Recommended levels for other settings are lower. The WHO's Environmental Noise Guidelines state that traffic noise in Europe should not exceed 53dB in the daytime and 45dB at night. In general night-time noise should be below 40dB.

Human factors

In the UK, 'boy racers' – a term for nuisance drivers – face public disapproval. Polls conducted by RAC put support for noise cameras at 58% and opposition at 22%. It is estimated that more than 18% of the UK's urban population is exposed to harmful levels of noise.

The Kensington and Chelsea noise camera trial was well received, and the borough now boasts a total of eight cameras issuing £100 (US\$126) fines. Trials in Bradford, Bristol, Great Yarmouth



How does noise affect animals?

When it comes to the effects of noise on wildlife, Dr Martinez admits that research is still in its infancy. "What we know is that when animals are exposed to noise they can change their behaviour, they can change the way they communicate, they can change where they are located," he says.

These effects are, as yet, poorly understood. In some cases the animals adapt, with urban songbirds increasing their pitch so as to be heard above the lower frequency rumble of the traffic. Bats on the other hand need relative quiet to hunt due to echolocation. Noise is bad for them, but good for their prey. In other cases, animals are unable to communicate effectively in the presence of noise. But the most common result is that fauna change their behaviour patterns to avoid noisy areas, resulting in a shrinking habitat.

and Birmingham are underway. However, the system remains under effective human control. Unlike a speed camera, it is not automatic, and the final decision to issue a fine for breached noise ordinances must be made by an enforcement officer, who is asked to discern between anti-social driving and legitimate breaches of the limit.

"When the system triggers it records a clip, uploads it to the cloud, and enables the user to look at the data remotely through a web interface. So, they can look at the video, they can hear the audio, they can look at the noise level," says Reuben.

Part of the reason for keeping humans involved in the decision-making process is that sometimes there is a perfectly good reason for a loud noise, and determining whether this is the case is a very subjective process, not suited to automation. Vehicle noise created at a vintage car event, for example, might be perceived very differently from similar noise on a normal day.



New York City procured its first SoundVue system in the summer of 2021



Can noise affect school grades?

Other research has found evidence of sub-health effects, such as a negative impact on children's academic performance. "The obvious concerns of noise impact on children is loss of concentration, and also actual speech intelligibility. So, the ability for a child to hear what a teacher is saying if there's somebody roaring past in a Ferrari," says Reuben.

The location of the noise cameras can be crucial. Busy intersections, and near areas of particular concern such as schools are the top priorities.

"There is evidence of cognitive impairment due to noise exposure in schools. Some studies find a delay of two months in learning between children in noisy areas compared to children in quiet areas," says Dr Torija-Martinez.

In one study, conducted in Barcelona, researchers found that noise pollution in the classroom was associated with slower development of working memory, complex memory and attentiveness.



1 million

The estimated premature deaths per year in Western Europe due to long term environmental noise exposure

Source: WHO

“If there are multiple vehicles in the video, then the microphone array is able to determine which is the vehicle that has caused the extra sound”

Reuben Peckham, co-founder, Intelligent Instruments



Main: SoundVue camera installed in New York

Below: SoundVue uses algorithms and AI to automatically detect excess noise and identify the vehicle that is making it



“Two subjects might be exposed to the same sound level expressed in decibels, but there are other factors influencing perception

Dr Antonio Torija-Martinez, associate professor of acoustic engineering, Salford University

“Noise could be a Harley Davidson motorbike for you, but not for me,” says Dr Antonio Torija-Martinez, associate professor of acoustic engineering at Salford University. “And that’s both the beauty and the complication of it. Two subjects might be exposed to the same sound level expressed in decibels, but there are other factors influencing perception. That could be acoustic factors such as temporal characteristics, the frequency, and where the source is located; but also non-acoustic factors such as the importance and value of the sound of noise for us.”

Flexibility and human oversight are therefore important. While ordinances are couched in terms of a breaching a certain decibel level, not every loud sound is considered noise, and there are legitimate reasons to exceed sound limits such as sounding a horn to avoid a crash.

Health impacts

“A passing car that’s revving or popping and banging, particularly at night can cause sleep disturbance. And that’s probably

obvious. But what’s slightly less obvious is the health effects from that,” says Reuben.

The WHO has identified noise pollution as the second most harmful environmental cause of ill health; only fine particulate air pollution has greater impact. The EU is actively working to

bring down noise levels as part of the European Green Deal, with the goal of reducing the share of people “chronically disturbed by transport noise” by 30% before 2030. However, initial reports suggest they may fall short of this target.

“We have studies connecting noise with physiological effects such as heart diseases and sleep disturbance. We have quite a lot of solid, robust evidence quantifying health effects due to a noisy environments,” says Dr Torija-Martinez.

The WHO has calculated that there are at least 1 million premature deaths due to long term environmental noise exposure per year in Western Europe alone.

The experience of unwanted noise is one that everyone can relate to. The difference between life in a peaceful and quiet neighbourhood, compared to one that is plagued with unwanted sound is clear.

“So again there’s evidence that in terms of quality of life noise could modify your pattern of activities. For example, it might be the case that in summer time you don’t want to spend time in your garden, because of aircraft flying over you, or you have a railway line nearby; and these noisy events could also affect our sleep creating disturbance,” says Dr Torija-Martinez.

Reuben Peckham explains that to him it’s not just about law enforcement, but about bringing the tangible benefits of peace and quiet to residents. “It’s there to improve the lives of residents living in areas in which this is a problem,” he says. ■

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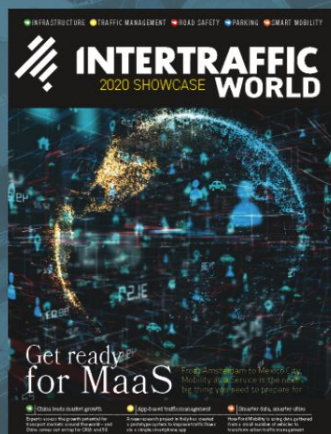
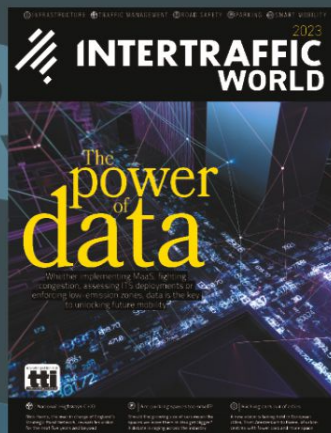
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The mobility sector is harnessing artificial intelligence like never before – find out how you can take control of the new technology supercharging city management and connected systems

Slowly does it

Across Europe, from Spain to the Netherlands, Finland and Wales, there is a growing consensus that lowering speed limits in urban areas to 30km/h, or 20mph, will not only improve road safety, but also reduce air pollution and enhance quality of life. But what evidence is this based on and what are the challenges with the implementation and enforcement of this new thinking?

Words | Lauren Dyson

Every year more than 1.3 million people are killed in road traffic collisions around the world. That is one person every 24 seconds. The World Health Organisation (WHO) says that excessive speed is “at the core of the road traffic injury problem”, revealing that high speeds are responsible for one in three road deaths in high-income countries.

The WHO also says that more than half of all these road deaths and injuries involve vulnerable road users (VRUs), such as pedestrians, cyclists and motorcyclists, and that the most effective way to improve their safety is to reduce the speed of vehicles.

“The higher the vehicle speed, the more likely you are to have serious and fatal injuries especially among vulnerable road users like pedestrians and cyclists,” confirms Shaun Helman, chief scientist for behavioural sciences at TRL. “But higher speeds mean higher injury risk for drivers and passengers in motor vehicles too. Higher speeds bring more risk. It’s as simple as that.”

In 2020, The Stockholm Declaration was put together at the 3rd Global Ministerial Conference on Road Safety to improve global road safety over the next decade. The document calls on member states to contribute to reducing road traffic deaths by at least 50% by 2030, with a focus on speed management, to “mandate a

maximum road travel speed of 30km/h [19mph] in areas where vulnerable road users and vehicles mix in a frequent and planned manner, except where strong evidence exists that higher speeds are safe, noting that efforts to reduce speed in general will have a beneficial impact on air quality and climate change as well as being vital to reduce road traffic deaths and injuries.”

For a long time, 30mph (48km/h) has been considered a safe speed to travel in built-up areas. In the UK, the speed limit on secondary roads has been 30mph since 1934. However, 2022 police force figures show that 51% of collisions happened on 30mph roads. Also, evidence shows that a person is around five times more likely to be killed when hit by a vehicle travelling at 30mph than they are from a vehicle travelling at 20mph.

Time for change

On 17 September 2023, the statutory speed limit in built up areas in Wales was reduced from 30mph to 20mph (32m/h). While 20mph limits have widely been implemented in individual cities and zones for some time, this is the first national scheme in the UK.

The new legislation, which was approved by the Senedd (the Welsh parliament) in July 2022, has been controversial, to say the least. While safety campaigners are praising the



20mph

The new statutory speed limit in built-up areas in Wales (32km/h) reduced from 30mph (48km/h)

Above: The Millennium Stadium sits at the heart of Welsh capital Cardiff, a new 20mph city



“Higher speeds mean higher injury risk for drivers and passengers in motor vehicles too. Higher speeds bring more risk. It’s as simple as that”
Shaun Helman, chief scientist for behavioural sciences, TRL

move, more than 400,000 opposing motorists have signed what has become biggest petition in Senedd history. Meanwhile, the British Prime Minister, Rishi Sunak, has called 20mph zones “a war on motorists” and has pledged to put a stop to such “hair-brained schemes”.

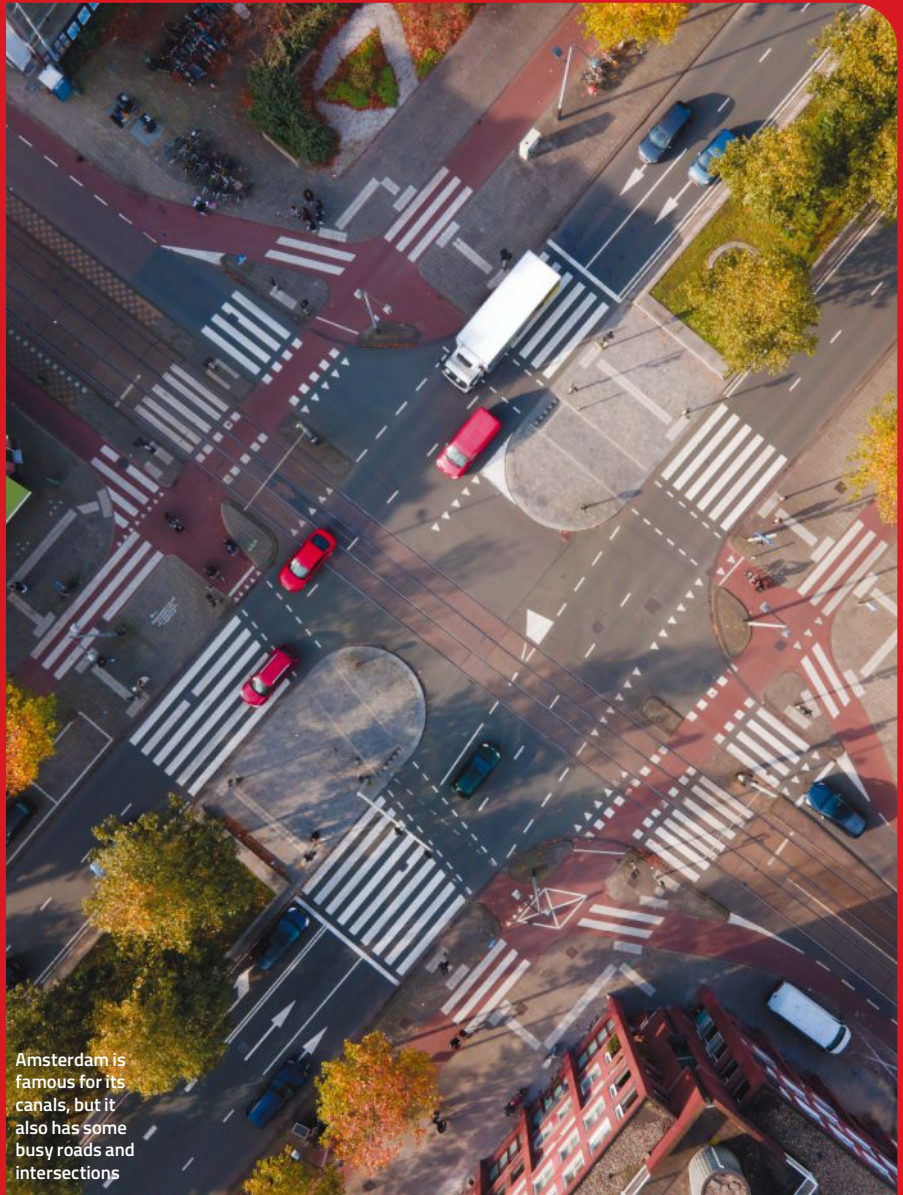
Helman feels that calling lower speed limits ‘a war on motorists’ is deeply misguided and perhaps even offensive. “The only war really is on those people who die or are seriously injured in road collisions,” he says. “By advocating for higher speed limits, politicians are

advocating for more collisions and more severe injury outcomes. By using the

phrase ‘war on motorists’ they not only offend, but they draw attention away from the substantial injury burden imparted by road traffic collisions.”

A public health study has estimated that the 20mph default speed limit in Wales could result in 40% fewer collisions every year, which would mean 1,200 to 2,000 people avoiding injury and six to 10 lives saved. The Senedd says the change will also make urban streets safer for playing, walking and cycling, improve health and wellbeing, reduce noise pollution and encourage more people to walk or cycle.

“There are huge benefits for all road users of lower speed limits in terms of injury reduction,” says Helman. “We know that by introducing lower speed limits in places where you have motor vehicles and other road users mixing, you get big gains in terms of safety, in terms of the liveability of those roads, and big improvements



Amsterdam is famous for its canals, but it also has some busy roads and intersections

in quality of life for those people who live in those areas. The survivability at 15-20 miles an hour, is much, much better than the survivability and injury risk at speeds in the late 20s, early 30s.”

People that oppose slower speed limits say that they will cause more congestion and that the cost of implementing and enforcing them is too high. It has been estimated that the implementation of the 20mph speed limit in Wales is costing around £32 million (US\$39 million) but the Welsh government says that this cost is outweighed by the casualty prevention savings, including the reduced impact on the NHS (National Health Service in the UK). One study estimates these savings could amount to up to £92 million (US\$113 million) every year.

One possible downside to a lower speed limit is a slightly longer travel time for some motorists, however, the Welsh government says that this amounts to an average of only



Amsterdam goes 30km/h

On 8 December 2023, the speed limit on 80% of the roads in Amsterdam was lowered to 30km/h (19mph). The change was accompanied by new road markings and approximately 4,400 new signs. A campaign has also been launched, with the slogan: ‘We drive 30 for each other’.

According to the City of Amsterdam, the braking distance at 30km/h is 13m, which is less than half of that at 50km/h (27m). The city’s authorities say that the new speed limit should result in 20-30% fewer serious accidents. They also say that the probability of a pedestrian surviving an accident where the car was moving at 30km/h is 95%. The

city council is hoping the move will make Amsterdam a quieter and a more pleasant place, with noise pollution cut in half.

As public transport is permitted to continue travelling at 50km/h, the city has installed lane dividers, to separate the public transport lane from the 30km/h lane.

Other cities that have implemented city-wide 30km/h limits include: Graz (Austria); Grenoble (France); Helsinki (Finland); Valencia (Spain); Zurich (Switzerland); Lille (France); Paris (France); Brussels (Belgium) and Brighton (England). London already has many 20mph limit areas, but the scheme is not yet city wide.



Above: Some segregated, dual-lane urban roads like this one in Barcelona are among the very few in the city to still permit travel over 30km/h

one extra minute per journey, and in many cases lowering the speed limit to 20mph will have little or no impact on journey times.

Slower in Spain

The default 20mph speed limit across Wales may seem like an extreme measure, but it is not the first country make this move. Spain has been enforcing a similar limit since 2021.

“On 11 May 2021 the government established a 30km/h [19mph] speed limit in all of Spain,” explains Catherine Perez, researcher at the Barcelona Public Health Agency (ASPB). “But the measure had already been put in place in Barcelona, in two phases beginning in 2020. The limit covers the whole city now, on all secondary roads. This covers around 100km of roads.”

This decision to apply the limit to the whole of Spain came after a study in 2019 revealed that in Spain’s cities, four out of every five people killed in accidents fell into the vulnerable category and that percentage was growing each year.

“We had previous pilot experiences of implementing a 30km/h per speed limit on some streets,” says Perez. “We evaluated this in terms of effectiveness of road safety and we were able to prove

that there was a reduction about 30% of traffic injuries, so it was quite effective.”

Reports in the Spanish media say that the 30km/h speed limit on single-lane urban roads in Spain reduced the number of deaths between May and December last year (2022) by 14%, with 38 fewer deaths than in the same period in 2019.

“The benefits of implementing a 30km/h limit are scientifically proven,” says Perez. “Reducing speed reduces injuries, particularly severe injuries. This is well established and well known.”

Perez says that the slower speed limit has been well accepted in Barcelona, mostly because there are a lot of narrow streets, so it is difficult to drive faster than 30km/h anyway. Meanwhile, Álvaro Gómez, head of the National Road Safety Observatory in Spain, has said that drivers, cyclists and pedestrians across Spain are “very comfortable with the new limit”.

Changing behaviour

The new speed limits in Wales will be monitored and enforced by GoSafe mobile enforcement vehicles and fixed cameras. The Welsh government has also provided additional funding to the GoSafe casualty reduction partnership to support roadside engagement, alongside police and fire service road safety teams.

According to Transport for Wales, enforcement of the 20mph limit is about more than simply reducing traffic speeds. It is also intended to be ‘a major behaviour change programme, which will benefit communities and the wellbeing of people in Wales’.

“The thing you want enforcement to do is convince people of the change in behaviour,”



“We were able to prove that there was a reduction about 30% of traffic injuries [from reducing the speed limit to 30km/h], so it was quite effective

Catherine Perez, researcher, Barcelona Public Health Agency (ASPB)

SAVING LIVES AND IMPROVING QUALITY OF LIFE.

A collage of images related to road safety and construction. It includes a yellow road sweeper, a worker in a safety vest and hard hat using a tool on a road, a hand holding a smartphone displaying a traffic management app, and a yellow and white portable traffic barrier.

Whether we're reconfiguring lanes to mitigate collisions, improving road construction efficiency, or designing innovative barriers that reduce repair time for workers, Lindsay continues to provide sustainable and efficient innovations that make a difference. Together, we can keep roads—and the people on them—moving safely.

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The new 30km/h speed limit on single-lane urban roads in Spain reduced the number of deaths between May and December 2022 by 14% compared to before the limit in 2019



says Helman. “You don’t want people only driving at 20mph when they think they’re going to be caught, you want them to drive at 20mph because they know it is the right thing to do. We need to get to a place where people see inappropriate speed as socially unacceptable.”

Helman says that the best thing you can do to change people’s driving behaviour is to make the system automatically encourage or require the right behaviour. “A very simple way to do that is to adopt a technology called intelligent speed assistance [ISA], in vehicles,” he says. All vehicles now sold in the European Union are fitted with this technology. “ISA technology knows where it is and it won’t let the driver exceed the speed limit,” Helman explains. “The next thing you can do is you can have enforcement that’s effective. We know that helps nudge people in the right direction. And then the least effective thing you can do is just educate people about the risks of speeding. That that might help some people but it’s not going to help many. And it’s not going to change behaviour very much.”

Speed limits are just one pillar of the ‘safe system’ approach to road safety management, which is based on a belief that no one should be killed or seriously injured while using the road network. The Safe System approach comprises five pillars, which are: safe roads, safe speeds, safe vehicles, safe road users and post-crash care.

Ultimately, human error has to be taken into account. “People make mistakes,” says Helman. “Even the most highly skilled drivers with the best intentions will occasionally make mistakes. And we know that when people crash into things at high speeds, anything above about 20mph, they are very likely to be seriously injured or killed. Safe speed is fundamental. You have to keep speeds down to survivable levels if you want to eliminate death and serious injury. If you had really safe vehicles, really safe roadsides and people who are really highly trained and really aware of the risks, but you still allowed everybody to drive at high speeds, you will still have loads and loads of death and serious injury because speed is going to trump everything else.” ■



Carbon factors



Research by Imperial College London into the impact of 20mph speed limits found they do not lead to an increase exhaust emissions. In fact, their results showed clear benefits

in terms of driving style and particulate emissions associated with that. The research showed vehicles tend to move more smoothly, with fewer accelerations and decelerations, in 20mph zones than in 30mph zones.

“One particularly bad thing for emissions is lots of stopping and starting in traffic,” says TRL’s Shaun Helman. “Lower speed limits can keep traffic moving at a steady rate.”

When thinking about emissions, it is also important to consider the carbon cost associated with road collisions. “A road collision

causes a lot of carbon to be released,” says Helman. “The vehicles involved might need to be scrapped, and there’s a carbon cost to that. You might have ambulances and fire engines and police vehicles attending the scene that there’s a carbon cost with that. There are carbon costs associated with people being in hospital having their injuries treated. There are carbon costs associated with people visiting people in hospital... the list goes on. So, by reducing collisions, you’re also saving carbon emissions as well.”

Passion is the fuel that drives us



Our markings safeguard communities and guide people to their destinations, they transform surfaces into colourful, and playful environments. Building on our experience and deep knowledge of the road markings industry, it is our passion to make high-quality materials that guide, inspire, and protect people all over the world.



1 Latin lessons

Brazil, like much of Central and South America, has significant challenges in meeting the mobility needs of citizens in rapidly growing urban areas. But help is at hand in the form intelligent transport systems and smarter public transit

Words | Eugene Gerden

Transport planners are using technology to improve mobility in Rio de Janeiro



“There are plans for more video analytics, AI tools for traffic management and integrated solutions for more effective response to planned events and incidents

Carlos Wiedmaier, vice president of solution consulting for Latin America, Kapsch

Congestion caused by growing use of private cars in the sprawling Brazilian metropolis of Rio de Janeiro demands solutions. There are many possible answers, but two that are being particularly focused on are the roll out of more effective traffic management as well as the upgrading and streamlining of public transport systems.

A major issue for public transit in Brazil is that ridership and therefore revenues have not fully recovered from the Covid pandemic, meaning much of the focus is on encouraging passengers back onto services by improving efficiency, usability and affordability.

The 2016 Olympic Games in Rio marked the beginning of an overhaul of its mass transit system. In order to effectively serve the multiple venues built for the event, a bus rapid transit (BRT) service was created, running on dedicated lanes it transported around 2.2 million passengers over the course of the Games, which were generally agreed to be a huge success.

BRT systems have a huge cost advantage over building underground metro networks, however where their dedicated lanes must cross other roads they can still be subject to delays, moreover in Rio high fares were a disincentive to the use this service over shorter distances. Change required top-level action.

“In 2021 a court agreement between the city government and transport concessionaires resulted in changes to the regulations of the public transport sector,” says Máina Celidonio, transport secretary for the City of Rio de Janeiro. “The calculation of fares is now based on the distance travelled by buses. For this, real-time location information has become essential. As a result, new tools have emerged to monitor compliance with regulations, including pipelines, data lakes, and automatic fine dashboards. These technologies monitor compliance with established trips, irregular route deviations, and other parameters.”

BRT vehicles also now have sensors and embedded technologies that allow remote communication with an operational control centre, transmitting real-time information such as temperature, position, speed, images and audio.

“This abundance of information allows for a variety of applications, including real-time interaction with users through bus loudspeakers and mobile apps,” says Vera Ferreira, of CET-Rio, a leading traffic engineering company in the city. “It also allows drivers to interact with the control centre through audio messages and panic buttons, enabling immediate interaction with security and civil defence agencies.”

There's an app for that

Live location data for public transport doesn't just benefit public authorities, it also has significant advantages for passengers, who are able to access the information via apps, such as Moovit.

“Our app displays the live location of public transit vehicles via icons moving across the map in real time, providing users with greater



Above: Rio's BRT vehicles provide real-time information to an operational control centre



“In 2021 a court agreement between the city government and transport concessionaires resulted in changes to the regulations of the public transport sector

Maína Celidonio, transport secretary, City of Rio de Janeiro

insight into their chosen route's progress,” says Marcelo Tavela, communications manager for Moovit Brazil “Alongside the real-time arrival predictions, this feature decreases uncertainty, enabling the user to choose the best route.”

Available in 30 cities in Brazil, including Rio de Janeiro, live location has proven to be a useful tool for users in places where transit data is not readily available from other sources, but it isn't the last word in route-planning assistance from Moovit. It has also recently rolled out its Smart Cards feature with dynamic and personalised predictions about routes most suitable to a particular user at any given time. “The suggestions follow each person's needs and habits, based on the previous use of the Moovit app,” explains Tavela. “The plan is to keep expanding local partnerships, so more users can benefit from a smart and frictionless commute.”

Upgrading traffic management

For those stuck in gridlock in private cars, however, knowing the live location of local bus services if of little use or comfort.

While city managers would prefer drivers to leave their cars at home, they are not abandoning traffic management, with significant investments being made in ITS.

“Brazil's market is evolving in urban and interurban areas, where we are implementing technology to improve mobility,” says Carlos Wiedmaier, Kapsch's vice president of solution consulting for Latin America “For example, 10 Brazilian cities are integrating ITS field equipment into our EcoTrafix urban traffic control platform for purposes such as traffic optimisation and road monitoring.

“In interurban areas we are currently implementing solutions such as a tunnel

traffic management system to improve the operational processes in southern Brazil. There are also plans for more video analytics, AI tools for traffic management, integrated solutions for more effective response to planned events and incidents, connected vehicle systems, and many other technologies aiming to improve road-user experience and reduce accidents and vehicle emissions.”

Another ITS giant, PTV, has ongoing operations in Brazil and is looking to develop systems alongside academics in the region. “Apart from helping our clients in their daily activities, we are creating a strong, connected, academic network,” says Luisa de Moura Chaves, senior business development manager at PTV. “We support professors, researchers and students studying ITS solutions to improve mobility. Their projects include, among others, prioritisation of pedestrians using intelligent signal controllers, use of driving simulators to predict driving behaviour to improve safety, studies in demand-responsive transit, autonomous vehicles, and big data.”

PTV is also preparing the next generation of transportation professionals via a competition. “The champion of our 2nd Academic Competition in Vissim of Latin America was from Brazil,” says Chaves. “The project, presented by the University of Santa Catarina, uses microsimulation to solve road-rail conflict in the southern city of Joinville.”

Ultimately the mobility solutions for Rio and Brazil's other large cities as they attempt to cater for growing populations in the 21st century will be multimodal. The aim must be to maximise fluidity, comfort, order and safety for pedestrians, cyclists, passengers and drivers alike, with the aim of guaranteeing safe coexistence between all kinds of transportation in urban spaces. ■



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Modern mapping

A new asset management tool contains a digital map of all legal and law-related signs and beacons throughout the Netherlands

Words | **Aliaksandra Pirazhenka, brand manager innovations, HR Groep Streetcare, The Netherlands**

The world of traffic is changing rapidly, with road industry customers increasingly demanding digital and sustainable asset management, smart management and maintenance of public objects. The ideal public space is a safe and comfortable environment that can be managed sustainably in a cost-efficient way. HR Groep Streetcare designed its Intelligent Public Space management (IPSm) tool to help road authorities optimise sustainability, remediation, cost-efficiency, traffic safety and sensory solutions, and to 'bridge the gap' between steel and digital. Through IPSm, HR Groep Streetcare has an up-to-date digital overview of all RVV (Reglement Verkeersregels en Verkeerstekens) and RVV-related signs

Above: The digitalization of public space

and associated information in the Netherlands. The company has digitally mapped signs in the country into the traffic sign database. The location of these signs and related information are visible through the IPSm platform. HR Groep Streetcare offers IPSm as a license or bundled with inventory, inspection, maintenance and management. The tool helps road managers follow EU regulations such as RTTI, ISA and Data Top 15. This way, they save costs and achieve sustainability objectives.

Key applications of IPSm

Management: The IPSm tool provides insights into the location of RVV and RVV-related signs and detailed information via the sign passport. It is possible to record and manage

adjustments in the outdoor environment. IPSm is highly suitable for maintenance processes and insight and is easily integrated with placement services via the mobile version of IPSm.

Inspection reports: The digital inspection of signs have cost-saving benefits. Damage and misalignments can be detected, making it easy to have the maintenance plan and budget to get signs in order. The traffic report is based on BABW regulations/CROW specifications. Users of the platform can immediately use the inspection report as a delivery file.

Sustainability: There are often too many signs in a specific area, so reducing the number of signs contributes to both sustainability and safety. With digital analyses, it is possible to detect redundant boards so that they can be recycled or reused.

Intelligent speed assistance: As of January 1, 2025, road authorities must supply crucial data and comply with intelligent speed assistance (ISA) regulations. By 2023, 90% of traffic sign data should be in order. IPSm helps authorities comply with the impending legal regulations. Users receive a ready-made report for crucial data and

any traffic advice. This can then be submitted directly to the ministry (NDW) or can be submitted via HR Groep Streetcare.

Geofencing: The tool provides detailed data on environmental zones and school zones, to enable authorities to properly implement road safety measures and ensure quality of life. Data includes locations, window times, diversions, and environmental and logistics signage. Users receive personalised data to meet specific mobility challenges.

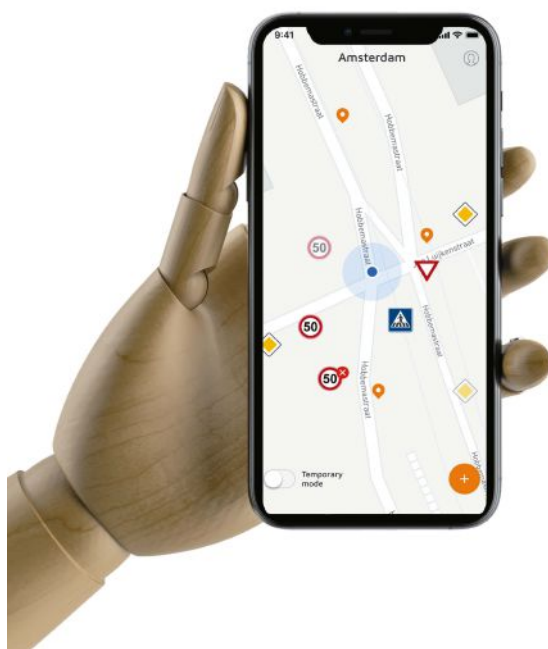
IPSm is unique in the Netherlands. HR Groep Streetcare can provide insight into the current signage area per zone/per client. The IPSm tool can digitally detect signs that are no longer relevant so that those signs can be removed and reused. Many municipalities, such as Amsterdam, Den Bosch, Groningen, Tilburg, Heerlen, and Apeldoorn, already use IPSm services. Using QR codes on the back of the signs, information about the sign, including support design data, ECI (environmental cost indicator) impact and reuse, is registered. Then, HR Groep Streetcare records the exact location of these signs. If a sign is damaged, the sign can be replaced immediately and safely, in a targeted manner and without unnecessary driving. All maintenance activities are recorded through the IPSm app, where policymakers and public organisations can see all signs visualised on the map. Changes can be made directly on the platform via a QR code or manually. The company also provides road managers with added peace of mind by transferring the necessary data to the NDW platform.

Amsterdam

The municipality of Amsterdam has recently replaced 50km/h signs with 30km/h signs on approximately 500 roads. Reducing the speed limit in an area from 50km/h to 30km/h can yield a significant safety gain.

The greater the decrease in actual driving speed, the greater the safety effect. In a study in the early 1990s, when the introduction of 30km/h zones took shape on a larger scale, an average decrease of 22% in the number of injury-causing crashes was found.

It is logical that Amsterdam is the first municipality in the Netherlands to take this step, as the city has the most



traffic and, above all, the most cyclists in the country. The reduction in the maximum speed also makes traffic in the capital quieter, according to the municipality. The board also assumes that the measure will somewhat discourage car use.

The municipality of Amsterdam enlisted the help of HR Group Streetcare to make an inventory of the current sign area and subsequently install the new signs. Using IPSm traffic sign data, the company made a selection of all 50km, 30km

Above: IPSm app showing a screenshot of the selected area

Below: A project with the Municipality of Amsterdam saw speed limits reduced to 30km/h, from 50km/h

4,400
The number of new
30km/h signs in
Amsterdam



(zone) signs and other relevant signs such as priority signs. After installation, the sign is registered in IPSm, and a notification is sent to the national road sign database. Within the database, navigation providers can use the data for smart mobility purposes.

After the inventory, HR Groep Streetcare installed 4,400 new signs and removed 850 signs. The company reused most of the signs in the municipality of Amsterdam or for other projects. Other signs will be refurbished or recycled.

ISA requirements

Before July 2024, new cars in Europe must be equipped with intelligent speed assistance (ISA). ISA is a tool that ensures that the driver does not – unknowingly – exceed the applicable speed limit. Den Bosch has become the first municipality to be ISA-proof, thanks to IPSm traffic sign data.

Research shows that image recognition of signs does not always work. That is why the ISA system works with the help of traffic sign data. The system gets confused when signs are missing (for example, an end 30km zone sign). The technology also does not see that, for example, a residential yard sign is, in fact, also a speed sign. These conflicts can be mapped in IPSm.

Based on the ISA-relevant data from the IPSm dashboard, an analysis could be made of the bottlenecks, and thus, gaps could be uncovered. The municipality then started working on the advice of HR Groep Streetcare about the signage.

The objective was to comply with ISA regulations by October 2023, and this was achieved. Many municipalities are still waiting. They want help from the government to comply with ISA because the desire for digitalisation comes from their side. HR Groep Streetcare thinks that municipalities should look at this differently and should take responsibility for road safety in their region. ISA will help with road safety. IPSm helps to support additional road safety by making explicit situations visible and having an up-to-date digital overview.

Internationally, HR Groep Streetcare offers a collection of images made with 150-megapixel cameras, which can be placed on vehicles. From the images, the company generates attributes and presents object data in the IPSm platform. Linking with other platforms is possible. The company's domain knowledge helps to get projects moving quickly and to deliver quality in time, based on applicable regulations. ■

Safety in visibility

Highly visible retroreflective road marking technology reduces the risk of driving in dark and wet conditions

Words | **Gernot Sauter, senior regulatory affairs specialist,**
3M Commercial Branding and Transportation Division, EMEA, Belgium

The world is slowly recovering from the global Coronavirus pandemic and the related societal and economic consequences such as lockdowns, disrupted supply chains and inflation.

In terms of mobility, we saw reductions in road traffic volume of up to 75% during the Covid-19 lockdown in 2020, and roughly a 30% overall reduction in 2021. Even in the first half of 2023, Germany saw a 9% decrease in traffic on motorways compared to pre-pandemic levels.

Unfortunately, road safety figures are not reflective of these changes. According to the German federal highway research institute BASt, fatality rates (the number of people killed in road traffic accidents in relation to the mileage of motor vehicles) increased in 2022 compared to 2021, despite significantly less overall traffic.¹

Regarding vulnerable road users like pedestrians and cyclists, the road safety data is even more alarming. A February 2023 press release from the European Commission states: "While it is very welcome that the share of cycling in the

Above: **Profiled pavement marking tape for enhanced nighttime visibility during wet and rainy conditions**

mobility mix has increased in many Member States, the trend in the number of cyclists killed on EU roads poses a serious problem. This is the only group of road users where there has been no significant decline in the number of accident victims in the last 10 years - mainly due to the still poorly developed infrastructure. For example, preliminary figures from France for 2022 show that the number of fatal cycling accidents has increased by 30% compared to 2019."²

Further, the European Traffic Safety Council ETSC revealed in its most recent report on Road Safety Performance that there were 20,678 deaths on EU roads in 2022, a collective increase of 4% compared to 2021. It says that to reach the 2030 EU target, road deaths should decrease by 6.1% on average in each year of the 11 years between 2019 and 2030.³

As part of its drive to achieve greater road safety and support the EU target to halve the number of road deaths by 2030 (based the 2019 level), more and more ADAS (advanced driver assistance systems) are mandated for new cars. However, to make ADAS, such as lane-departure-warning and

intelligent-speed-adaptation, work properly, road markings and traffic signs must be designed and maintained at good performance levels. By improving the performance levels of the road infrastructure, ADAS will become more reliable. Drivers will also have greater levels of visibility and higher pre-warning times to safely maneuver their vehicle.

Retroreflective technology and road safety

In France, crash data studies have been carried out over the past 12 years. Adjusted for the average traffic density in France (90% of traffic occurs during the day), the statistical analysis shows that the risk of being involved in an injury-causing crash is 3.5 times higher at night. The risk of a fatal crash is six times higher at night, compared to driving in the daylight. On rainy nights, these numbers increase to 7.7 times and 10 times respectively.⁴

Increasing the visibility of pavement markings, especially in dark or rainy and wet conditions, has been proven to reduce crashes.⁵ 3M is dedicated to

improving road safety and transportation infrastructure so that road users can arrive at their destinations safely. 3M's all weather retroreflective road marking technology is one example of its innovative systems.

Retroreflective markings with proprietary 2.4 index optics provide continuous retroreflectivity and visibility during wetness and rain at night. The high-profile diamond pattern of 3M's pre-formed tape ensures maximum retroreflectivity in rainy conditions. Pre-formed tape offers fast application and is tougher, brighter and longer lasting than conventional road marking materials. A selection of application methods such as in-lay, primer or bitumen offer tailor-made options for various road surfaces and environmental conditions.

In 2015, the US Federal Highway Authority conducted a rigorous, before-and-after evaluation of wet retroreflective markings used in Minnesota, North Carolina and Wisconsin to develop recommended crash modification factors (CMF). The recommended CMF for crashes with injuries on multi-lane roads is 0.595 and on expressways is 0.881, suggesting a 40% and 12% reduction respectively in these types of crashes after implementing wet retroreflective pavement markings.⁵

Likewise, a 2018-2019 study by Texas A&M Transportation Institute evaluated the effectiveness of wet-weather pavement markings in TxDOT's Atlanta District. They looked specifically at rainy, night crashes on approximately 630 miles of roadway where wet-weather pavement markings were installed. The study found implementing wet weather pavement markings on those roads reduced wet night crashes by about 30% and wet night fatalities by about 50%.⁶

Sustainability goals

The European Green Deal will transform the EU into a modern, resource-efficient and competitive economy, with the target of zero net emissions of greenhouse gases by 2050. The transportation infrastructure segment will have to contribute, and the revision of the Construction Product Regulation (CPR) will introduce measures to quantify the environmental impact.

3M, as global corporation, has ambitious sustainability goals that are specific to product design and manufacturing, and often go beyond EU targets.⁷

The Transportation Safety division of 3M has almost fully moved away from manufacturing processes that use VOC

(volatile organic compounds). Even the adhesive used on the backside of reflective sheeting for traffic signs is coated in a solvent-free operation. 3M's innovative production processes bring environmental benefits. In comparison to glass bead retroreflective sheeting, the company's microprismatic reflective sheeting is produced with significantly lower energy consumption, without the use of aluminium and solvents.

3M's high-performance products also offer opportunities for road operators to improve their environmental impact. One example is the Diamond Grade DG³ full-cube retroreflective sign sheeting, which makes external sign lighting obsolete. A case study in Abu Dhabi in the UAE demonstrated that overhead guide signs manufactured with Diamond Grade DG³ sheeting provide excellent nighttime visibility without the need for external sign lighting, saving both energy and maintenance.⁸

Durable pavement marking tape also offers significant sustainability advantages. 3M's Stamark 380 tapes have proven durability of 6-10 years, depending on traffic volume. This often eliminates the need for marking renewal during the life of the asphalt, while conventional markings need to be replaced in one or two-year cycles. On top of savings in material, transport and labour, there are additional benefits for road users such as less frequent traffic jams and reduced risk of accidents during re-marking operations.

Save travels

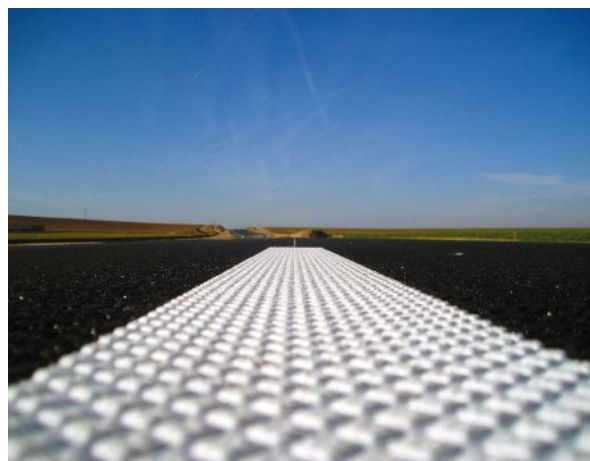
For more than 80 years, 3M has been dedicated to improving transportation infrastructure and mobility so motorists can arrive at their destinations safely. The company's high-performance



Above: **The in-lay application of preformed tapes on new asphalt means roads can be opened for traffic quickly**

50%
The reduction in wet
night fatalities with wet
weather pavement
markings

Below: **Durability for the life of the asphalt with 3M Stamark High Performance Pavement Marking tapes series 380**



materials combine with innovative systems and services to develop the safest and best roadways systems.

3M's retroreflective technology has raised the bar on visibility and durability in road traffic signage for the modern world. As it continuously improves its products, it will evolve with changing modern technology to help keep roads safe, day or night. 3M's high-performance retroreflective sheeting can help efficiently and effectively improve traffic safety by serving more drivers. ■

To find out more about 3M road-marking technology, sign up for its on-demand webinar series at engage.3m.com/en_pm_expand_discover

References:

- (1) Bundesanstalt für Straßenwesen BAST: Voraussichtliche Entwicklung von Unfallzahlen und Jahresfahrleistungen in Deutschland, Ergebnisse 2022
- (2) EU press release 21st Feb 2023: Road safety in the EU: More traffic deaths on Europe's roads again after the pandemic
- (3) European Traffic Safety Council ETSC : RANKING EU PROGRESS ON ROAD SAFETY - 17th Road Safety Performance Index Report - June 2023
- (4) Data collected from BAAC (French road traffic database, government open data)
- (5) US DOT Federal Highway Administration, Safety Evaluation of Wet-Reflective Pavement Markings, Dec. 2015, FHWA-HRT-15-083
- (6) Park, ES., Carlson, P., Pike, A., "Safety Effects of Wet-Weather Pavement Markings." Transportation Research Board 2019 Annual Meeting, Available from: <https://trid.trb.org/view/1572259>
- (7) 3M Global Impact Report 2023
- (8) Gernot Sauter, Khaled Jabbar (3M Company), Nighttime Visibility of Overhead Signs in Abu Dhabi, IRF World Meeting & Exhibition, Dubai, 2021



Pioneering safety, marking the future

From a simple idea to a fundamental road safety tool, road markings continue to play a pivotal role in ensuring safer and smarter roads around the world

Words | Henrik Bøgesvang Basse, business development director, Geveko Markings Group

The invention of road markings can be traced back to a humble incident – a leaky milk wagon leaving a trail down the street. The story goes that this mishap served as inspiration for Edward N. Hines at the dawn of the 20th century. It was this everyday occurrence that sparked the idea of painting a line down the centre of a road to separate traffic moving in opposing directions. This seemingly simple concept has since emerged as one of the most fundamental traffic safety innovations in history.

Not many years after the concept of road markings was first introduced, Gunnar Bergendahl founded the company known today as 'Geveko Markings'. From small beginnings in Gothenburg, Sweden in 1924, many chapters have been added to the company's story, but more importantly to

Above: Made of Geveko Markings' PlastiRoute Rollplast, this red cycle lane lightens up the streets of Frankfurt, Germany. It is a good example of a micromobility measure that makes a big difference in terms of traffic safety

the industry's history in general. As Geveko Markings celebrates its centennial, the company is reflecting on road markings' ever-growing significance.

Markings that are future-proof

To most people, road markings may seem like unassuming lines and symbols on our roads. But that is not how Geveko Markings sees it. The company sees the bigger picture, where markings guide, protect people, and increase safety in traffic.

For the past 100 years, Geveko Markings has put its passion into helping people around the world get safely to where they need to be. Although the landscape of technology and daily life has undergone huge transformations since the first simple line was painted on the road, road users still rely on

horizontal markings. Even today, these markings are the primary source for guiding traffic.

A good example is advanced driver assistance systems (ADAS), which have assumed a central role in contemporary vehicles – a role that is only looking to expand further in the future. For ADAS to perform optimally, relies on clear, highly visible road markings. This puts great demand on the marking material supplied today, which should be tried, tested, and certified so that it is guaranteed to live up to national regulations and performance standards.

Moving ahead with micromobility

Aside from the evolution of technology, the way, or rather where, we choose to live is also changing. As urbanisation continues to surge, cities worldwide are



facing a pressing need to adapt and update their infrastructure to accommodate the increasing amount of traffic in city centres.

One solution is to get more people to switch from cars to smaller, more eco-friendly means of transportation – often referred to as micromobility vehicles. This includes bikes, e-bikes, e-scooters, and other human-powered or lightweight modes of transport.

However, for these types of vehicles to become reliable alternatives to traditional transportation, people must feel safe driving them – and just as importantly, other vulnerable road users including pedestrians should feel safe sharing the streets with these vehicles. The key to achieving this lies in the

implementation of well-defined spaces and dedicated lanes promoting micromobility, and it is well-documented that horizontal markings play a pivotal role in ensuring the feeling of safety among vulnerable road users.

The horizontal potential

Research conducted by the Swedish research institute RISE underscores this argument. According to the researchers studies, cyclists tend to focus a lot of their attention on the road surface – 48% to be precise.¹ This means that when symbols, signs, and guiding markings are placed on the roads as horizontal markings, they are more likely to be noticed by cyclists.

Dedicated micromobility infrastructure including coloured areas, clearly marked routes, and guidance symbols is therefore the most effective way of separating micromobility users from larger vehicles on the roads. This clear separation provides an increased feeling of safety – something that is crucial if we want to encourage more people to choose the bike over the car.

Cycling Industries Europe (CIE) reveals that the feeling of safety is in fact the most significant barrier to cycling, with 70% of respondents stating that unsafe roads keep non-cyclists from taking up cycling. In contrast, 65% of non-cyclists expressed interest in cycling if there were protected cycle lanes, emphasising the importance of dedicated micromobility infrastructure.²

Starting small is the way forward

Another way of ensuring the future generation of cyclists is by encouraging children to take up cycling from an early age. By doing so, we create a habit that will benefit us throughout our lives. Yet, over the years, there has been a significant decline in the number of children cycling to school.³ To reverse this trend, one effective approach is the creation of bicycle playgrounds as they can help any inexperienced cyclist get a safe, fun, and engaging start on their cycling lives.

By using scaled-down versions of well-known facilities for pedestrians and cyclists, children are able to familiarise

themselves with real-world scenarios in complete safety, before having to face real traffic.

The next step is of course to make sure that real streets are safe for them to cycle on. To accommodate this, school streets are being implemented in more and more places. In London, UK more than 383 school streets were implemented by 2021. With some schools reporting over 50% fewer children arriving by car, it has become a key part of the city's strategy to reduce congestion and create better areas. Another example is from the city of Odense, Denmark, where the local municipality has replaced on-street parking with play equipment, traffic calming, and colourful road markings, outside certain schools, and now sees four out of five children cycle, walk, or scoot. Local politicians boast that it has made them the most child-friendly city in Denmark.⁴

The journey continues

There is no doubt that road markings have come a long way since their inception in the early 1900s. As the above examples show, they have evolved from basic functional aids to sophisticated, safety-enhancing tools that cater to the demands of modern transportation systems.

Therefore, when Geveko Markings talks about being passionate about road markings, it is not just about the lines on the road. It is a passion for future-proving traffic with ADAS. A passion for sustainable development with micromobility. A passion for children's safety with traffic playgrounds. Geveko Markings is confident that the journey of road markings continues at full speed, promising a future where safety, efficiency, and sustainability remain in the front seat. ■

65%
The percentage of non-cyclists who would consider taking up cycling if there were defined cycle lanes



Left: Ensuring safety for the future generations: The right markings help children feel safer when taking their bike to school

References:

1. Research Institutes of Sweden (RISE), 2019: "Model for measuring the distribution of vulnerable road users' attention as a function of the design and standard of traffic infrastructure".
2. CIE Consumer Research 2023, 8,319 respondents from eight countries.
3. McDonald, N.C., 2012, *Children and cycling*, p235-257 in *Cycling City*, Pucher, J. and Buehler, R. 2012, *City cycling*, MIT, Cambridge, MA.
4. Guthold, R., et al. (2019) *Global trends in insufficient physical activity among adolescents*, *The Lancet*

Life-saving signs

Energy- and cost-efficient variable message signs from Triplesign swiftly adapt to real-time traffic dynamics, updating within three seconds to provide timely and accurate information

Words | Triplesign System, Sweden



Variable message sign (VMS) solutions are used worldwide to improve traffic flow and increase traffic safety. They can be used to caution drivers about hazardous weather conditions, flooded or slippery roads, heavy traffic congestion, wildlife, or unattended railway crossings. Alternatively, they can also enhance road flexibility by allowing alterations in traffic direction, speed limits, or road use.

Currently, the most widely used VMS system is based on energy-intensive LED technology. The VMS solutions from Triplesign System – a Swedish family-owned company – consumes significantly less power than the LED solutions, and is also more cost-effective, reliable, and robust compared to the electronically powered VMS.

Opting for a Triplesign VMS instead of an LED VMS could lead to savings of up to €60,000 per sign over a 25-year lifespan. How?

The system operates at an incredibly low power consumption of only 1Wh, regardless of the sign's size. This efficiency allows the signs to be powered by solar energy, utilizing a small solar panel and battery seamlessly integrated into the sign's frame. Additionally, wireless communication capabilities enable cable-free operation, eliminating

Above: Highway re-direction ahead of large bridge in Sweden

Below: Traffic flow/direction in Poland

the need for cable excavations (and subsequent CO₂ emissions) while allowing for precise installation at optimal locations.

“Cabling and connectors are the main cause of disruptions for traffic authorities worldwide. With our Solar VMS solution, no cabling is required for the signs, which in turn minimizes maintenance costs. Our VMS signs can also increase safety, prevent accidents, and ultimately save more lives. Imagine signs that are activated when the train arrives at unguarded railway crossings. Reliable and at reasonable costs,” explains Hans-Ivar Olsson, CEO of Triplesign System, which exports its innovative VMS signs to some 40 countries around the world.



Fast updates in changing traffic environments

In today's traffic environment, an increasing amount of information is generated via sensors. Triplesign's prismatic VMS can be integrated with various existing systems. The company's intelligent signs can also in turn be equipped with sensors that collect data on temperature, humidity, current traffic flow, etc. For example, if dangerous flood levels occur, Triplesign's VMS can be updated with flood warning messages in less than three seconds.

“The power consumption to display traffic messages is zero as reflective sheeting is used to display the message. The energy consumption including communication is as low as 1Wh, which corresponds to a fraction of the energy consumption of an LED VMS.

“This gives our VMS a clear competitive advantage over electronic signage systems, which are both significantly more energy-intensive and more sensitive to external influences, such as harsh climatic conditions,” comments Olsson.

Exceptional product lifetime

Triplesign's VMS systems are robust and reliable. They are engineered for enduring performance in challenging climates like extreme heat, strong winds,

or extreme cold. A Triplesign boasts an impressive lifetime, with a minimum life expectancy of 20 years and minimal maintenance requirements. Moreover, employing a straightforward patented method to replace active components can further extend the system's service life for an additional 20 years.

"We are continuously developing our world-leading technology. We are currently developing traffic signs that are even more energy-efficient than their predecessors, which means that the sign's energy supply can be managed using solar panel foil that is integrated in the sign frame," explains Olsson.

Since Triplesign's VMS do not require a stationary power supply, which in turn requires costly wiring, the installation cost is up to 90% lower compared to other traffic sign systems on the market. Due to a short and efficient installation time with limited impact on traffic flow, a new Triplesign VMS can be up and running within a few hours. The innovative solar and battery solution means that a Triplesign is immune to power outages. The low power consumption also minimizes the cost of running the sign.

Sustainable traffic solution

"Information from prismatic VMS contributes to lower environmental impact through fewer accidents and more efficient traffic flows. Since Triplesign's VMS is the most energy efficient, is the easiest to install, requires the least maintenance and has the longest product lifetime, it is the most sustainable product in all aspects," comments Olsson.

"The affordability of both signs and installation combined with a straightforward installation process, provides the opportunity to deploy additional signs with traffic safety information exactly where they are needed. This initiative aims to establish a secure traffic environment, ultimately saving more lives," he adds.

Recent use cases

In Belgium, the local government opted to implement temporary speed limitations during rush hours in specific areas to enhance traffic safety. The client sought a sustainable solution, and Triplesign



Above: A solar-powered variable speed sign installed in Belgium

presented an ideal option that was not only cost-effective but also had a minimal CO2 footprint. While many clients typically request LED VMS, this customer chose the more sustainable Triplesign VMS.

The installed signs operate based on a programmed annual calendar, changing the sign face at specific hours and designated days of the week. Beyond being fully autonomous, these signs offer superior visibility with an extensive viewing angle compared to LED VMS, which has a limited viewing range. Opting for this sustainable solution involves a modest investment that can result in saving numerous lives. ■

0.14Wh

The power consumption of Triplesign's new VMS solution, which is due to launch in 2024

Ensuring Road Safety through sustainable solutions



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STAND NO. 01.519



On/Off application

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Seamless operations

An innovative SaaS solution supports contractors throughout a project's lifecycle, while establishing a transparent and cooperative environment between contractors and clients

Words | **Andreas Gkikas**, president & CEO, Periallos Software Solutions (PSS), Greece

Contractors worldwide encounter a range of challenges and obstacles in their daily operations and project management. In Europe, particularly during economic downturns, companies struggle with securing new tenders and managing cash flow, all while keeping their businesses, workforce, and equipment in optimal condition.

For those involved in road construction activities, such as line marking or asphalt maintenance, working remotely from their headquarters often leads to communication barriers. This can cause delays in relaying vital information between the head office and field operations, resulting in delayed timesheet processing and subsequent payment issues, which can frustrate staff.

Managers frequently grapple with the complexities of material and stock management, as well as with accurately determining the total cost of long-duration projects. Equally challenging is

Above: A fleet of line-marking vehicles equipped with Highway Software for enhanced project management

3

The number of components that make up the Highway Software system

the calculation of overhead costs, particularly when operations are conducted remotely for extended periods, which can lead to outdated equipment maintenance practices.

A significant challenge for many companies lies in effectively monitoring client satisfaction and the corresponding payment processes for completed work. Additionally, disseminating detailed information among the workforce remains a hurdle.

Securing tenders is difficult in itself, but crafting a competitive and accurate project bid is even more challenging, especially when tenders require assurances of quality. Increasingly, authorities demand participants to substantiate and detail their work methods to ensure quality standards.

Newer companies often struggle to identify the most suitable materials and suppliers for their projects. The influx of new professionals in the construction industry, often lacking in business

acumen, leads to costly misjudgements. Despite their eagerness to learn, the lack of specific guidance forces them to turn to online forums for advice, where they often find only generic information.

A software solution

The inception of Highway Software was driven by the ambition to devise a comprehensive solution capable of addressing these challenges.

This software was developed with a dual purpose: to guide new professionals in the highway construction sector, whether they are independent operators or part of larger entities, and to bolster existing companies of any size by addressing ongoing challenges and enhancing various aspects of their operations, including daily management, work quality, and client relationships.

This vision materialised into the creation of a versatile three-way Software as-a-Service (SaaS) system. The software integrates seamlessly across different operational spheres: the company's main office via cloud-based desktop software,



the on-site workforce through a dedicated mobile application, and the clients, who have access to both desktop and mobile app interfaces.

A key feature of this system is the Highway Community, a platform that empowers all users, regardless of their company affiliation, to engage and communicate directly within the software environment, fostering a collaborative and interconnected community.

The best working environment

Highway Software is an innovative three-way SaaS system, encompassing the core Highway Software, the interactive Highway Community Agora, and the Highway Community Lounge.

Highway Software can accommodate an unlimited number of users from each company, with each having access to specific, pre-defined features. This ensures a secure environment, bolstered by robust data protection measures. All data within the system are fully encrypted.

The primary goal of this software is to optimise user experience by

streamlining project planning, enabling precise calculation of daily project costs, and facilitating effective management of machinery and equipment. It also focuses on enhancing client relations and promoting staff development.

The system offers two distinct approaches for project cost estimation, aiding companies in managing staff payments, ordering materials, and calculating overall company expenses. It also serves as a secure platform for disseminating health and safety regulations and company procedure forms to staff, with a built-in mechanism for tracking acknowledgment of these communications.

Each project operates within its own dedicated environment within the system, where every aspect of the project is monitored and controlled in real-time. Users can generate work orders that are automatically dispatched to relevant personnel through the mobile app, ensuring swift information flow to the workforce.

Top: A worker spreads asphalt, while Highway Software streamlines project tracking and coordination in the background

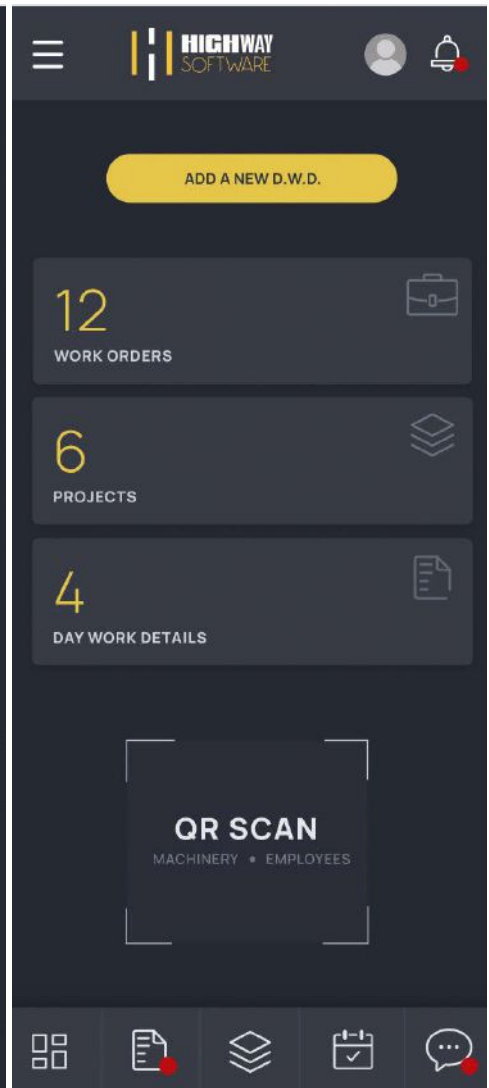
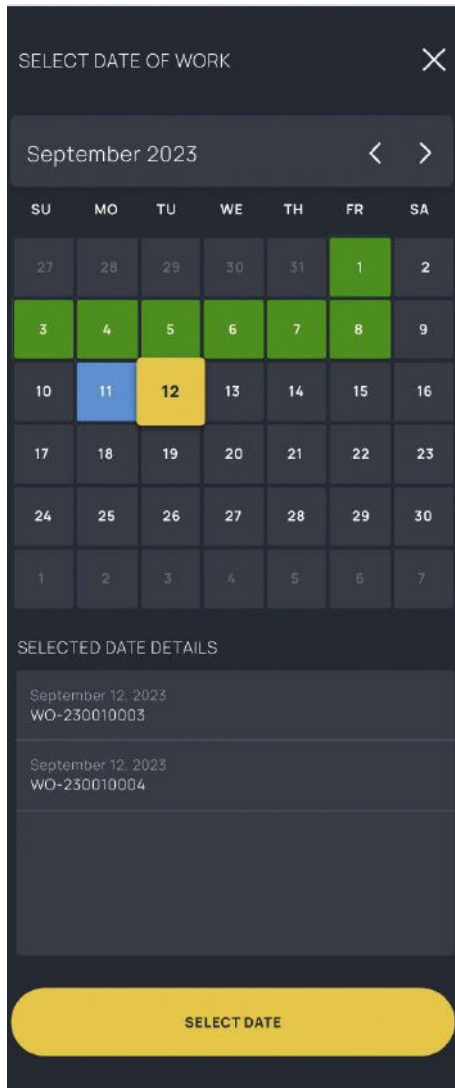
Above: As road workers apply new line markings, Highway Software captures and organises every stripe for quality control and client reporting

Upon completion of work, detailed daily work reports (Day Work Details) are generated and sent to the project manager. These reports include comprehensive data on completed work, material usage, equipment utilisation, daily expenses, personnel timesheets, and visual documentation. This information is then automatically integrated into the project folder, along with maintenance schedules, stock levels, and personnel calendars.

Highway Software excels in providing detailed reports tailored to individual projects, companies, personnel, and equipment, facilitating the creation of comprehensive profiles for companies, staff, and machinery.

Beyond its operational capabilities, Highway Software enriches the highway construction community by offering the Highway Community Lounge. This feature acts as a social media platform exclusive to software users, effectively connecting the global community.

Highway Software also offers the Highway Community Agora, a dynamic



marketplace that serves as a hub for various business activities. This includes purchasing materials and machinery, trading used equipment, and participating in auctions. Additionally, the Agora provides a platform for seeking and creating subcontracts, as well as accessing monitored tender opportunities. This feature represents an invaluable resource for businesses looking to expand their operations and streamline their procurement processes.

In parallel, the software enhances professional development and job opportunities through the Highway Academy and a dedicated job portal. The Academy offers specialised training and educational resources, fostering skill development and career growth in the highway construction sector. Meanwhile, the job portal connects employers and job seekers within the industry,

Above left: A gallery within Highway Software showing photos and videos of road markings

Above centre: Calendar interface of Highway Software, with a user-friendly design for selecting work dates

Above right: Mobile interface of Highway Software, showing current projects and displaying options for adding new Day Work Details

facilitating employment opportunities and aiding in talent acquisition.

Innovative technology

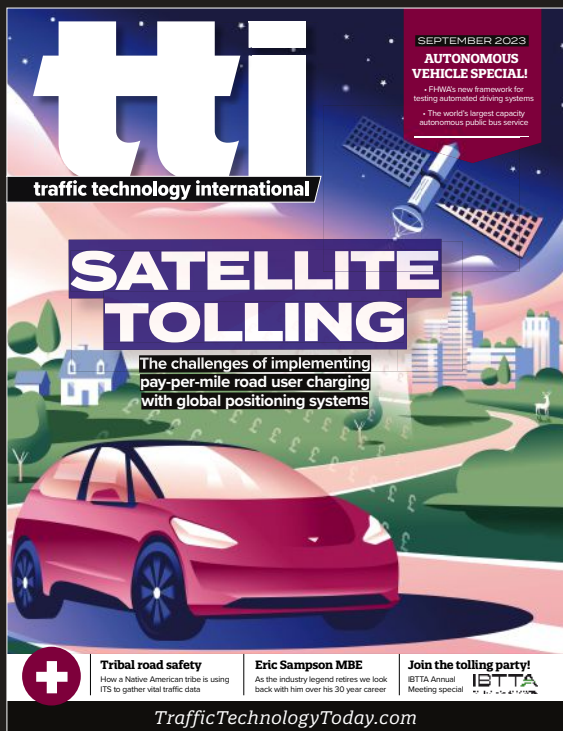
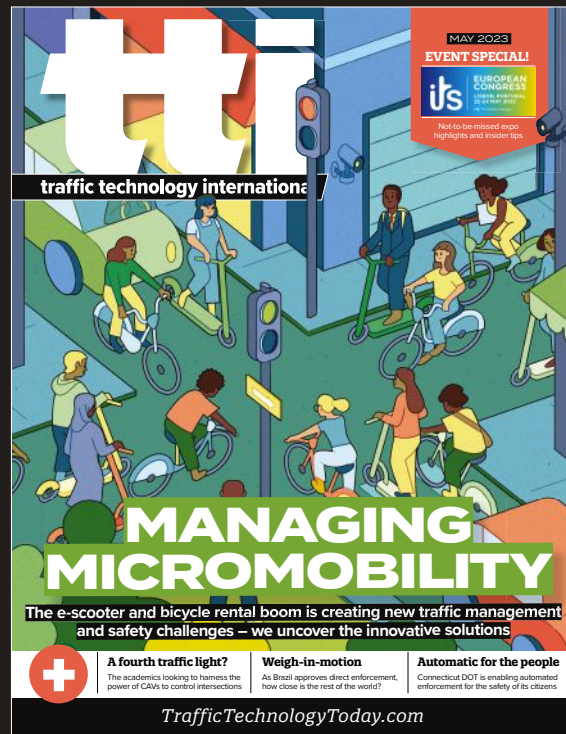
The line marking sector, a notably challenging domain within the highway industry, faces stringent requirements and a vast array of material options. To navigate this complexity, Highway Software has introduced the Material Search Engine (MSE), a cutting-edge feature designed to help users identify the most cost-effective and suitable materials for any given tender.

Furthermore, the software incorporates the Daily Productivity Calculator (DPC), a tool that enables both engineers in the office and machine operators on-site to estimate the potential daily output of their machinery for specific projects. This feature is complemented by the capability to adjust the Paint Speed (PS) through the

Highway Software's Steady Speed Console (HS-SSC). This console effectively overrides the vehicle's autopilot, allowing for controlled movement at the required lower speeds.

Both the MSE and DPC are innovative features with patents pending, reflecting the software's commitment to advancing technology in the line marking industry.

Highway Software is a comprehensive solution that is designed for the highway industry, adeptly addressing every aspect of business management. It brings peace of mind to owners, boosts the company's operational capacity, and also simplifies the complexities of project planning and management. The software's real-time functionality accelerates decision-making processes and shortens payment cycles, contributing to more efficient business operations. ■



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Low cost ANPR

Carrida Technologies' ANPR solutions, including software, smart traffic sensors and a new and affordable camera with onboard data processing, can help cities tackle congestion and better manage resources and space

Author: **Jan-Erik Schmitt, CEO, Carrida Technologies, Germany**

The average London driver lost 156 hours stuck in congestion in 2022, according to the INRIX 2022 Global Traffic Scorecard. Chicago follows with 155 hours, and Paris in third with 138 hours. Looking at Germany, drivers spend an average of 41 hours a year trying to find a parking space, according to the same source. Let's face it – this is way too much wasted time.

We urgently need to find ways for smarter traffic and parking management to effectively reduce waste of time and resources. Nevertheless, the importance of individual mobility is enormous. Achieving this balancing act requires smart technologies and so-called cooperative intelligent transportation systems (C-ITS), which enable vehicles to be networked with each other and with the infrastructure. In addition, this provides comprehensive traffic statistics to be utilized in real time.

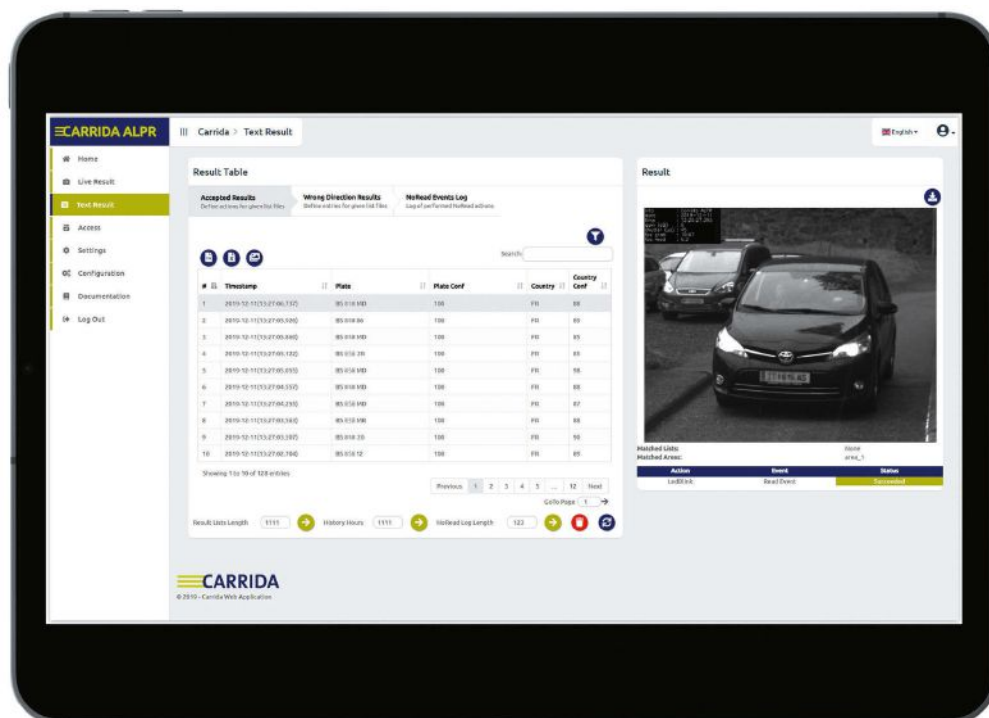
NPR data

Number plate recognition delivers the perfect data for this. The use of time stamps and anonymized license plate data captured by NPR sensors, as well as additional information, for example on vehicle type, make and model, enable us to collect comprehensive data on the actual traffic situation.

However, this procedure is subject to stringent data protection requirements. They can be fulfilled when intelligent NPR cameras detect the license plates of all passing vehicles and then encrypt the sensitive information directly and immediately on the edge device, using a hashing process with a unique, non-reversible identifier. This ensures that the data is stored and processed completely anonymously.

Hashing and MQTT

Carrida has implemented a hashing process in its NPR library from Carrida version 4.8 onwards. The processing takes place directly on the smart sensor running the Carrida software, so that



Above: All Carrida devices feature the powerful Carrida software and utilize the same library, feature set and programming interface, whether edge device, PC or server/cloud application

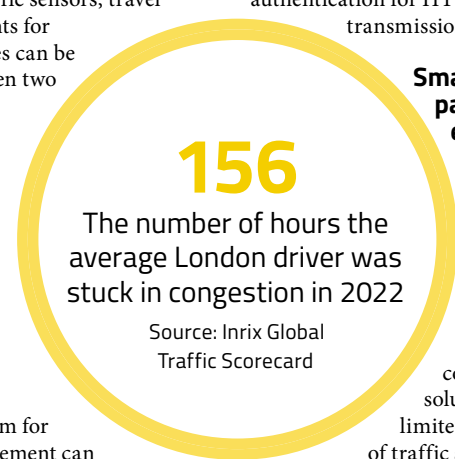
only small amounts of data need to be stored or transmitted. With a network of such smart traffic sensors, travel time measurements for individual vehicles can be performed between two or more sensors.

Especially for this, Carrida supports MQTT for publishing reading results and images. The protocol enables connection to additional IoT devices and integration into networks. A system for path time measurement can also be configured from several NPR sensors or the data can be integrated into complex traffic infrastructure. To further improve

data security, public key authentication for FTP actions and certificate-based authentication for HTTP data transmission are implemented.

Smart cities, tolls, parking, and enforcement

The possibilities and application areas of NPR technology and intelligent vehicle-to-vehicle and vehicle-to-infrastructure communication solutions are not limited to the collection of traffic statistics. NPR and time-stamp recording can be used to detect and process routes taken by individual vehicles, for example, for fully automated calculation of a route toll or to





calculate average speed for law enforcement applications.

Additionally, AI and big data can be used to observe trends and developments and to initiate appropriate measures for traffic planning and management. Number plate recognition can also be used to find, share, and manage parking spaces, with booking of a parking space for a specific time and checking whether the registered vehicle is parked there, etc.

Easy integration on any device

Carrida offers the NPR library as software for easy integration into any stationary or mobile device. It can be implemented easily, quickly, and cost-effectively and supports all common camera types. It can be installed and used on PCs running Windows or Linux as well as on ARM-based devices and mobile devices running Linux and Android. The software recognizes license plates from all countries worldwide.

Low-cost and ready to use

Carrida also offers the software in combination with specially developed

ANPR cameras. They are aimed at OEM partners and available ready-to-use or as an electronics kit for individual designs. Two hardware versions are on offer: The Carrida Dragon+, with high performance and image quality, that reads license plates at car speeds of up to 300km/h. And the new Carrida Plate-i, that has been designed for NPR applications with optimized cost structure.

Above: The Carrida Plate-i is an extremely cost-effective ANPR camera, priced from €389. It reads license plate data onboard and thus requires no external PC for NPR processing

Both NPR cameras can be configured quickly and easily via web GUI or REST API. Image capture, license plate recognition and, for example, license plate list management take place entirely on the camera.

The Plate-i costs from €389 for orders of 1,000 units per year and including a full-featured Carrida software license. It enables standalone applications for parking management, access control with and without barriers, automatic gate openings, as well as for the management and authentication at e-charging stations and other on-street and off-street applications. The camera is designed to capture license plates at a distance of one to seven meters. ■



IoT Applications for Smart Cities

Powered by technologies for number plate and vehicle recognition



Smart Parking

Automate and manage parking facilities more efficiently.

Clean Air Zones

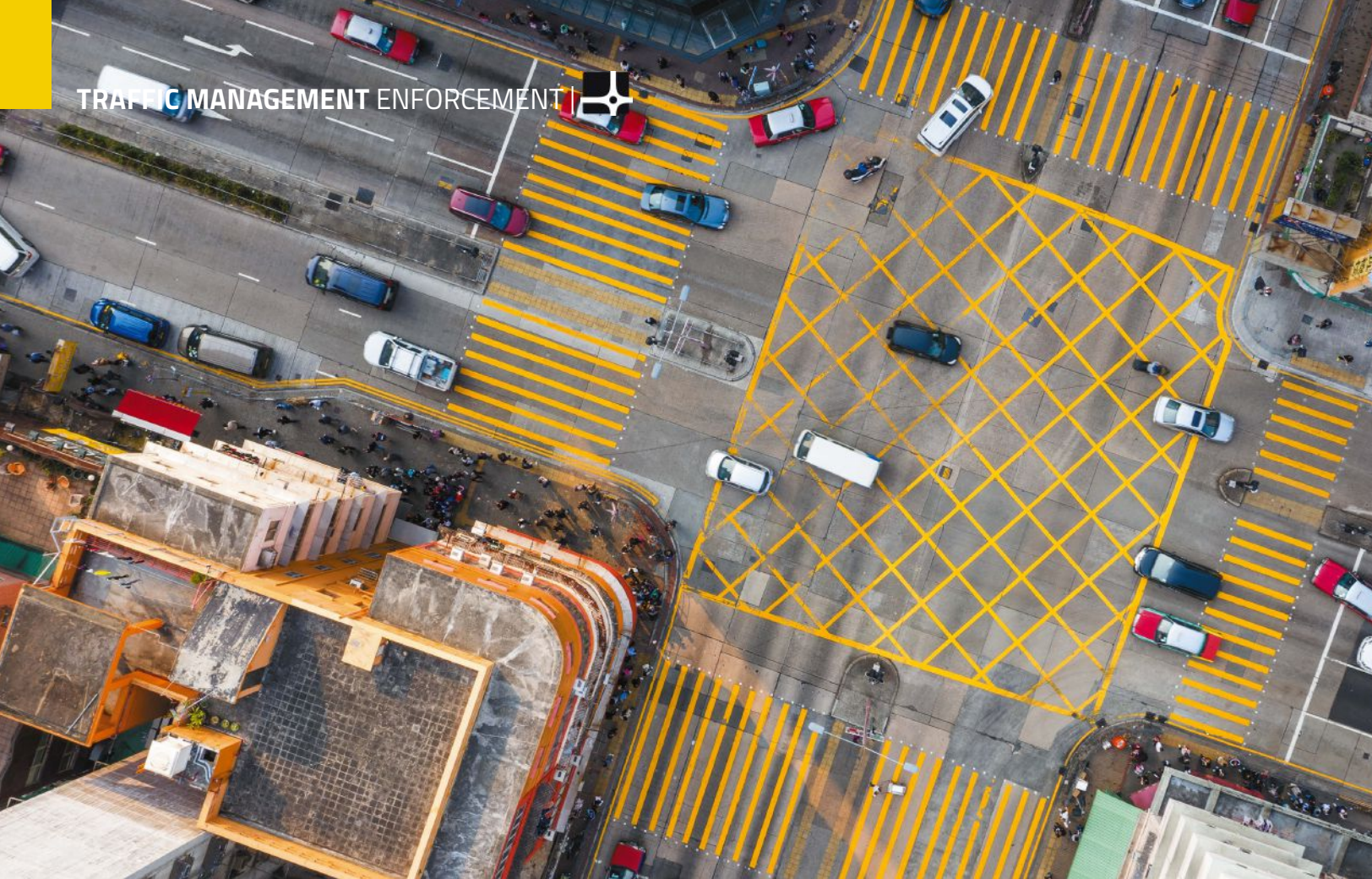
Identify vehicles that do not fulfill emission standards.

Smart Traffic

Control traffic flow to reduce congestion and traffic volume.

Road Safety Management

Recognize and reduce risks on roads for increased safety.



Saving lives

Multifunctional automated traffic enforcement systems can influence driving behaviours and improve road safety

Words | **Jean-Paul Baldacci, senior product manager, IDEMIA, France**

There are currently almost 1.5 billion vehicles in the world and over 250 million of those are used on European roads. The impact of having so many vehicles in circulation is clearly visible. In 2022, 20,600 lives were lost in the European Union alone, where the average driver (depending on the country) is between 35 – 75% over the speed limit. Pedestrians, cyclists, and motorcyclists are among the most vulnerable and represent 70% of fatalities and severe injuries on roads in Europe¹.

The emergence of new driving behaviours

One of the main contributing factors of road accidents is speeding vehicles. However, in recent years, other violations such as red-light running, stop-line crossing, forbidden turns

Above: The ATES of tomorrow will be a versatile and adaptable solution that merges cutting-edge technologies

and not respecting safe distancing have also increased.

This has pushed governments around the globe to apply stricter measures for the safety of drivers, passengers, pedestrians, two-wheelers and other road users through the implementation of automated traffic enforcement systems (ATES). These systems are considered crucial to limit road collisions and prevent traffic-related deaths and injuries.

Multifunctional solution

The increasingly complex road safety landscape necessitates a combination of technologies that work concurrently. These include:

- Doppler radar for precise and reliable speed measurement and tracking
- Lidar and video for short-range detection and tracking

- Video surveillance coupled with image processing and AI for vehicle classification and phone usage detection
- Dual infrared and white-triggered flash illuminators

The new generation of ATES must be able to take ultra sharp photographic evidence to capture license plates and ensure clear in-cabin vision in all weather conditions at any time. They also need to cover multiple lanes at the same time and classify the different types of vehicles.

Addressing new challenges

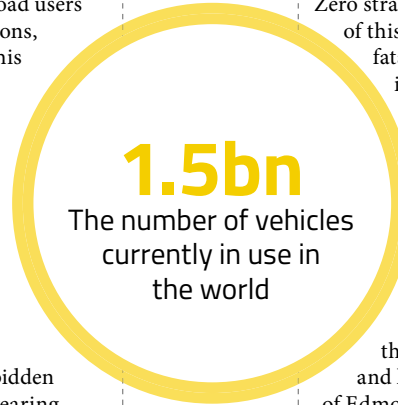
The automated traffic enforcement systems of tomorrow, as envisioned by IDEMIA, is a versatile and adaptable solution that merges cutting-edge technologies. It addresses specific road safety issues depending on the customer's needs and target markets.



IDEMIA's MESTACompact Focus Edition is an all-in-one multi-violation solution. It combines the best available technologies to meet and anticipate ever more dangerous road situations. The advanced capabilities of MESTACompact Focus Edition help to keep all road users safe regardless of traffic conditions, both today and in the future. This solution contains GPU-based video tracking, an FMCW 3D ultra-high-definition Doppler radar, and high-resolution cameras that are unrivalled on the market (equivalent to a 50MP 4/3 sensor).

MESTACompact Focus Edition's platform classifies up to 10 vehicles. It also detects speeding vehicles, red-light running, stop bar crossing, forbidden trajectories at crossroads, not wearing seatbelts/helmets, and phone usage.

This compact solution is easy to install/mount and deploy. Its unique dummy function allows the interchangeable inner modules to be easily moved from one location to another. The automatic alignment of the inner modules means they can be activated in less than 30 minutes.



Zero tolerance

IDEMIA's mission is to make the world a safer place. Its range of Mesta solutions help create a more secure road environment for all users, tying in perfectly with the international Vision Zero strategy. Started in Sweden, the goal of this strategy is to achieve no fatalities or severe injuries involving road traffic. All road collisions can be and must be prevented through better driving behaviours.

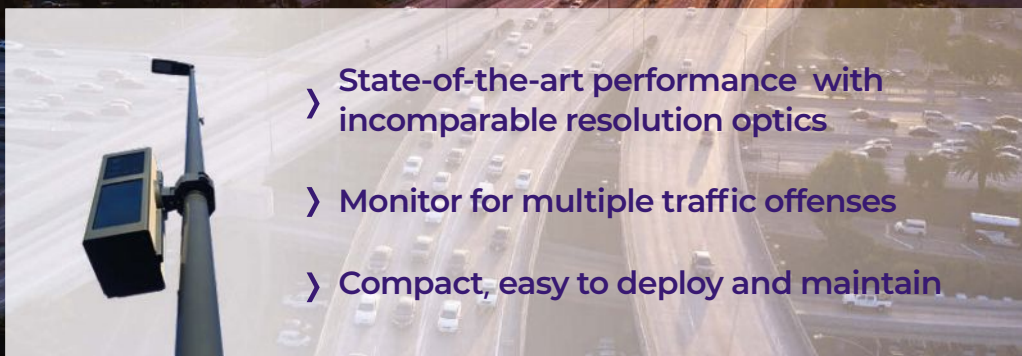
Today, thanks to its vision, Sweden has the lowest rate of traffic fatalities in the world. Edmonton in Canada followed Sweden's footsteps by adopting Vision Zero. In 2006, there were 8,246 people injured and killed in collisions on the streets of Edmonton. Despite the population growth since then, by 2018, there was a 60% decrease with 3,307 people injured or killed. This decrease was largely due to Edmonton's implementation of ATES. ■

Reference

https://ec.europa.eu/commission/presscorner/detail/en/ip_23_953

MESTACompact Focus edition

IDEMIA's latest high-end multi-functional traffic monitoring system
Simple to install and suitable for all environments



- › State-of-the-art performance with incomparable resolution optics
- › Monitor for multiple traffic offenses
- › Compact, easy to deploy and maintain



+50 years
of experience



13,000+ traffic law
enforcement systems
delivered worldwide



60% reduction in road
fatalities with IDEMIA's
safety products since 2003*

*in France

The benefits of lidar

Data from a high performance lidar system can optimise traffic data collection, weigh-in-motion and tolling applications

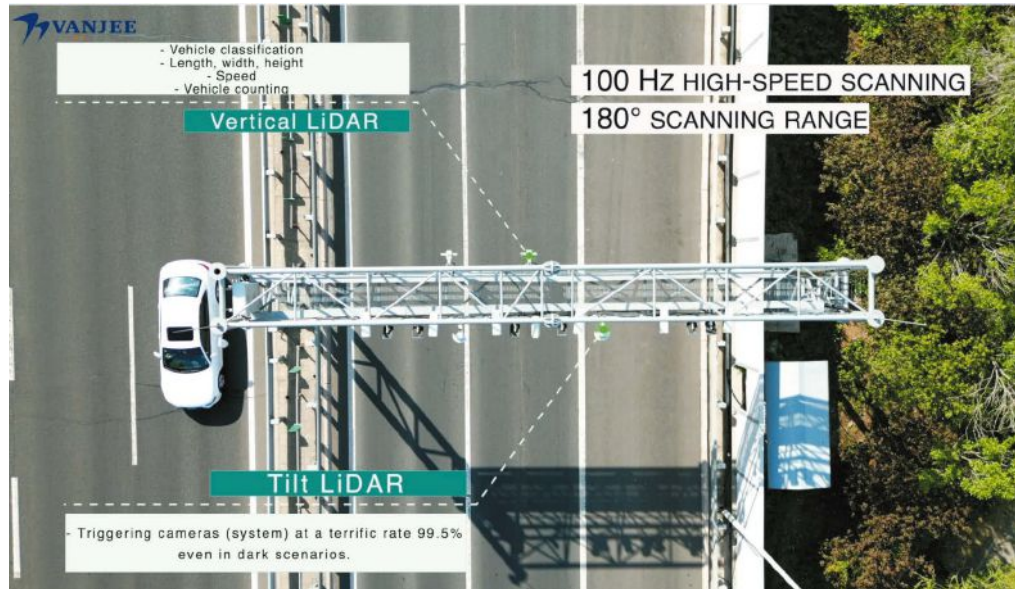
Words | **Zhai Zhao**, director of international business development, VanJee Technology, Beijing, China

For many years, lidar has proven to be invaluable to the ITS industry, providing critical data and performing essential functions, while saving costs, with minimised disruption for installation and maintenance. Lidar outputs high-density point cloud data and realises real-time scanning in complicated traffic scenarios including data collection, multi-lane free-flow (MLFF) systems, weigh-in-motion (WIM) systems, toll plazas and tunnels. Lidar has strong detection capabilities to cover more than four lanes and collect accurate vehicle information in high-speed scenarios.

The VanJee lidar WLR-711 is a high-performance mechanical lidar system. The lidar has a high scanning frequency of 100Hz, a 30m range (10% reflexivity), $\pm 3\text{cm}$ ranging accuracy and IP68 protection class. The lidar has high point density and small divergence to achieve high digital image quality.

In the ITS industry, lidar performs important functions, including vehicle classification for tolling, traffic data collection (vehicle counting, speed and vehicle types), dimension measurement (length, width, and height) and triggering systems. VanJee lidar WLR-711 has been used in many ITS systems including tolling systems, WIM sites and tunnels to guarantee accurate vehicle detection. The lidar has high compatibility, which means it can easily be integrated with existing systems. Additionally, VanJee lidar supports remote software commissioning and upgrading.

It is important to note that lidar is a non-intrusive technology that does not infringe people's privacy. VanJee lidar has



Above: VanJee lidar in a multilane free flow environment can carry out system triggering and vehicle classification, with axle detection level

Below: Lidar 3D point cloud data for vehicle types

been used in several countries around the world, including Mexico, Brazil, Thailand, Saudi Arabia and countries in Europe.

Traffic data collection

Lidar WLR-711 collects different types of traffic data in high-speed scenarios. This data includes traffic volume, vehicle speed, vehicle classification, lane occupancy, and time headway. This data is valuable for traffic research, maintenance planning, monitoring, operation, infrastructure planning and congestion measurement.

Researchers and policy makers use traffic data to study regional economic activities and logistic activities. Furthermore, when used in a multi-lane free flow (MLFF) system, VanJee lidar can

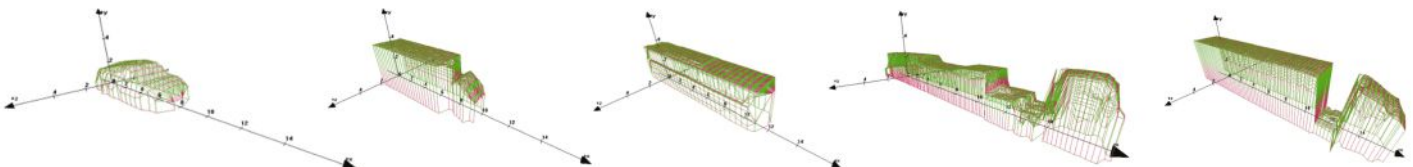
perform system triggering, vehicle counting and vehicle classification with axle detection level.

Automatic vehicle classification for tolling

Toll road operators are losing millions of dollars due to the mischarging of vehicles and revenue leakage. VanJee lidar creates significant business benefits for toll road operators by eliminating cheating behaviour and reducing manpower. This lidar system can achieve vehicle classification with a 99% accuracy rate using a machine learning algorithm, 3D vehicle profiles and key vehicle characteristics.

VanJee lidar can help toll operators to calculate the correct tolling amount with lidar classification, vehicle class rate and mileage. VanJee uses local vehicle class

30m
The range of the
VanJee lidar
WLR-711





standards to develop 3D vehicle models a database, including vans, SUV, sedans, motorcycles, hatchbacks, and various type of trucks with different numbers of axles. When a vehicle passes by the scanning area, lidar acquires a 3D profile of the vehicle and captures key information including axle count and vehicle size and it can distinguish

between single and dual tyre vehicles. VanJee can also integrate lidar with automatic number plate recognition (ANPR) to make sure that no vehicle can cheat the toll system. The lidar maintains the same high level of accuracy in both night-time and daytime, so tolling operators do not need to worry about a higher error rate at night.

Above left: VanJee lidar is used in toll stations to perform vehicle classifications to calculate the toll fee

Above right: VanJee HSWIM lidar



Vehicle dimension detection in WIM

For WIM systems, VanJee lidar can measure vehicle length, width and height. The technology can provide high accuracy for dimensions measurement, with width and height errors of less than 10cm. VanJee lidar is used to regulate oversized trucks, in order to prevent tragic accidents as well as damage to bridges and tunnels. It is an important tool in assisting traffic agencies to guarantee traffic safety and the safety of public assets. ■



Deeper than data

VIDEO
EXTRA

A comprehensive suite of mobility solutions can help transport authorities make informed decisions based on data analytics and simulation

Words | **Aimsun**

What is the value of data analytics in the mobility sector? Historical data is usually the starting place to find mobility recurrences and trends in a transport network, but if you have real-time data feeds, then you can go much deeper. Real-time data processing can help you understand the current traffic situation, detect incidents, and even predict how the traffic will evolve in the future. The real magic happens, however, when we combine historical and real-time data analytics with simulation: this combination helps traffic managers understand how they can intervene most effectively to keep people moving and keep emissions within thresholds.

As we live our lives and travel around, data about our movements comes flowing in from sensors, phones, enforcement cameras and connected devices.

An unprecedented amount of data is now generated every second, which presents immense potential for the mobility sector. However, the raw data only becomes valuable when it is filtered, cleaned, systematised, and then intelligently leveraged to drive decision-making.

Aimsun offers a comprehensive suite of five digital mobility solutions, launched in 2023, that can assist transport authorities at different levels along this process. This is a walk through the 'flow' of the path through the solutions, which form an interconnected ecosystem of AI and simulation technology.

Aimsun Insight

Artificial intelligence (AI) can analyse several months of historical data from different sources to identify patterns and trends. This helps us to understand the recurrent or 'normal' behaviour of travellers on their habitual trips. However, it can also spot recurring problems in the transportation infrastructure or mobility services, and pinpoint where some mid-term

interventions should be planned. This is the focus of Aimsun Insight.

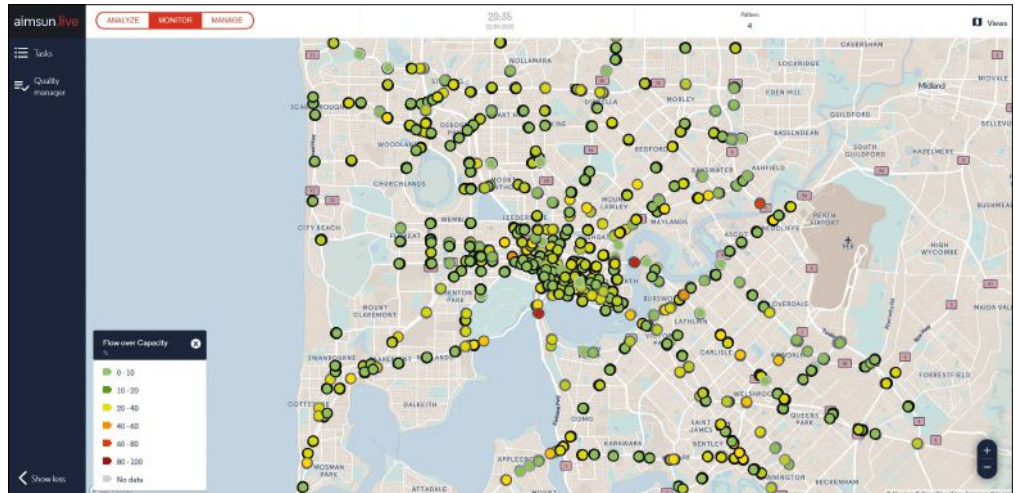
Aimsun Predict

If we use AI to complement the analysis of historical data with real-time processing of the same data, we will go beyond understanding the current traffic situation (also known as 'situational awareness') to being able to see if there is a problem that deserves immediate attention: if there is an abrupt change of conditions at a certain location, chances are that an incident has occurred in the vicinity; if there is a gradual or general

change, it is probably due to a special event affecting the demand. If we add short-term prediction to the mix, we can quickly determine whether that gradual change is going to become a problem later, and - this is the important part - we can prevent it from happening rather than solving it once it has occurred. This is the focus of Aimsun Predict.

Aimsun Plus

Once we have identified a traffic situation where we need to intervene, the following question is, "What do we do?" This is known as "What if" analysis, i.e.,



Above: **Aimsun Live**
model of traffic flow
in Perth

Below: **Model of**
Paris



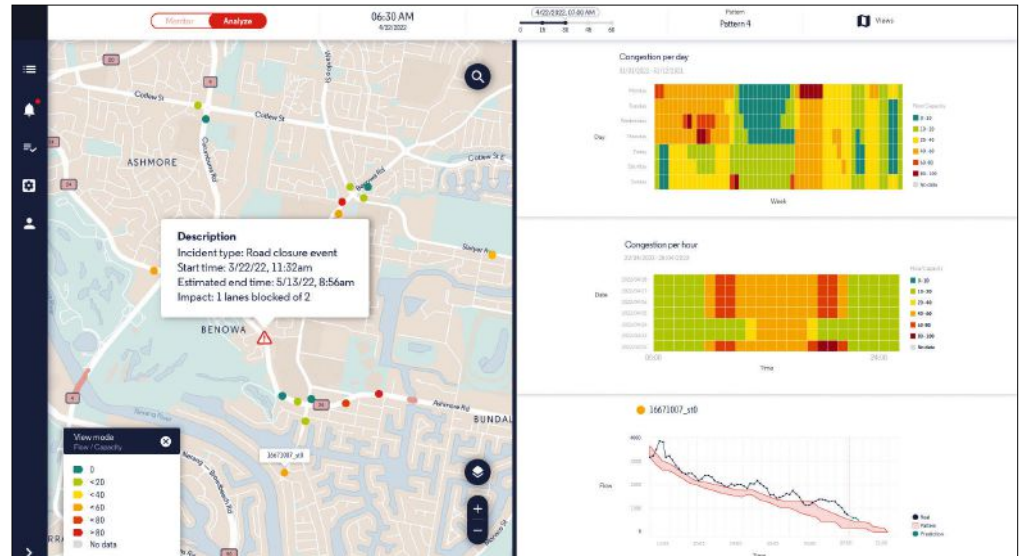
What if I divert traffic? What if I activate a ramp meter? Choosing the best option becomes easier if we know in advance what impact each action will have and which one is more effective.

“What if” analysis is the most typical use case for a mobility model, but it will be a struggle if you are depending solely on AI, because you are unlikely to have enough past observations of exactly this type of situation in this location to understand all the necessary correlations.

If Aimsun Insight has helped you to spot a recurring problem and you want to solve it with a mid-term change in the infrastructure or services, you can run simulations of those situations to assess the effect of different interventions and therefore pick the one that performs the best. This is the focus of Aimsun Plus.

Aimsun Start

What if you don't have any data? Not a problem. There are still some decisions you can make by building a high-level model based on open-source data. For example, you could create a model using publicly available data like OpenStreetMap (OSM) for the network and General Transit Feed



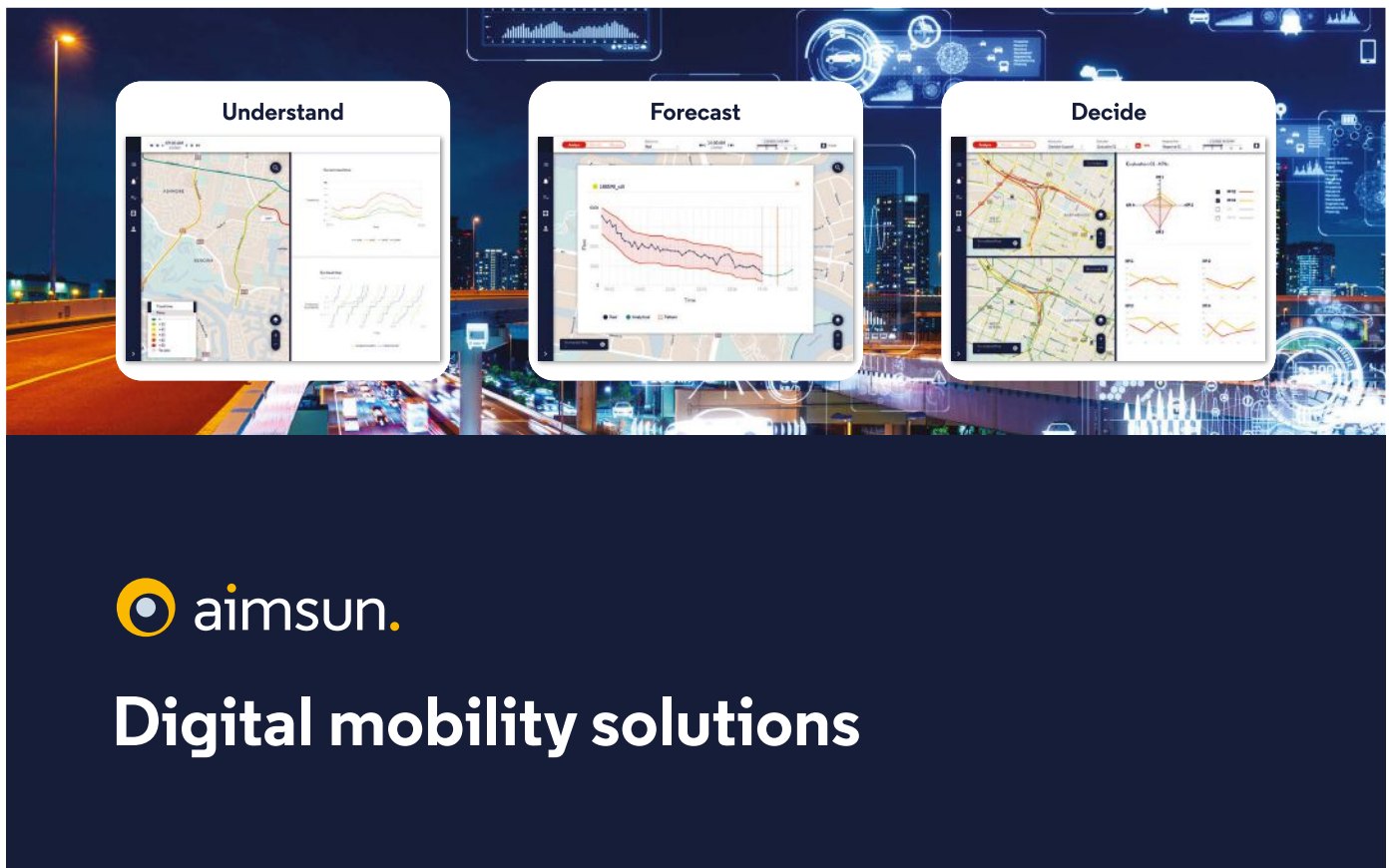
Above: User interface showing traffic congestion

Specification (GTFS) for the public transport services, and then use it to assess the current accessibility of hospitals by public transport.

This model would be fast and economical to build, and able to show us how modifying routes or schedules might improve accessibility. This is the focus of Aimsun Start.

Aimsun Live

Finally, if you combine real-time big data processing using AI with real-time simulation, you get a comprehensive system that allows you to spot both recurrent and unexpected problems, and to find the best way to mitigate them. A true digital twin for the mobility system, which is called Aimsun Live. ■



The banner features a night cityscape background with a futuristic digital overlay. Three white boxes are positioned in the foreground, each containing a different Aimsun interface: 'Understand' (a map with a highlighted route), 'Forecast' (a line graph showing traffic flow over time), and 'Decide' (a map with a highlighted route and a legend). The Aimsun logo is prominently displayed in the bottom left corner, followed by the text 'Digital mobility solutions'.

Why bridges need our attention

Kistler Group's weigh-in-motion and structural health monitoring technology can help protect sensitive infrastructure, such as bridges, extending their service life and, in a worst-case scenario, preventing their collapse

Words | **Christoph Klauser**, business development manager, traffic solutions, Kistler, Switzerland



Bridges connect people. They promote mobility and enable a rapid exchange of goods and services. As part of vibrant arterial routes crossing rivers, valleys, buildings, or estuaries, they stimulate enterprise and prosperity.

Since it became possible to calculate bridges with increasing accuracy in the 19th century and new materials also became available – beginning with cast iron and steel, then reinforced and prestressed concretes – the number of bridges constructed increased all over the world. It is evident today that many of these have aged considerably. This is partially due to their abundance, with five-digit numbers existing in many industrialized countries. It is also due to the fact that, during the construction boom following the Second World War, it was impossible to anticipate the enormity of traffic volumes in the 21st century, volumes that continue to grow in many places.

These conditions often lead to the collapse of bridges, despite regular inspections and repairs. The Fern Hollow Bridge in Pittsburgh, USA,

Above: **The Great Belt Bridge in Denmark is monitored continuously for structural changes with the aid of K-Beam accelerometers**

Below: **WIM for traffic data acquisition and preselection of overloaded vehicles, and Structural Health Monitoring of the bridge**

an approximately 135-meter-long three-span steel bridge over a forest ravine, collapsed on 28 January 2022. Fortunately, no fatalities occurred, although several vehicles, including a bus, were involved in the collapse. How can accidents of this nature be avoided, and which technologies are available to protect bridges more effectively?

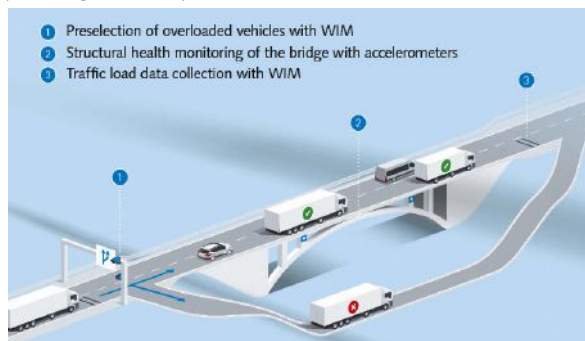
Observing weight limits with WIM

Restrictions relating to velocity and vehicle weight are frequently encountered on bridges, particularly

where heavy traffic is involved. The strain experienced by the structure increases exponentially as vehicles become heavier, with trucks and heavy commercial vehicles in particular causing excessive stress to roads and bridges. However, speed and weight restrictions unfortunately only have a limited effect as they are frequently not observed.

A weigh-in-motion system is particularly effective in ensuring compliance with regulations. In addition to measuring the overall weight of the vehicle, sensors integrated directly in the road surface also determine the real extent of significant axle loads. This is achieved in moving traffic at normal speeds (heavy traffic up to 120km/h, vans up to 140km/h) and in several lanes.

The acquisition of weight-related vehicle data provides an accurate basis for calculating the actual load on the bridge and the remaining service life (instead of estimates). Furthermore, overloaded vehicles that exceed the permissible overall weight can be prevented from crossing the bridge (so-called preselection). The collection





of fees is also possible, depending on domestic legislation in a particular country. Finally, the WIM system can be combined with further sensors and cameras to, for example, detect speed, the condition of tires and vehicle dimensions, thus contributing to increased road safety on the bridge.

WIM for bridge protection

KiTrafic series WIM systems from Kistler are deployed for this reason on many bridges around the world, collecting traffic data and ensuring applicable rules are observed. A WIM system from Kistler has been monitoring the spectacular El Carrizo bridge in Mexico since summer 2018. vehicles are preselected and prevented from crossing the structure that, at 226m meters, is the second-highest bridge in North America.

226m

The height of the El Carrizo bridge in Mexico – North America's second-highest bridge – which is monitored using a WIM system from Kistler

Structural health monitoring

Despite the usefulness of WIM systems in providing modern bridge protection, they cannot provide any



Above: **Weigh-in-motion solutions from Kistler, including sensor technology, data acquisition, a user interface and software, protect bridges against overloading and provide accurate heavy traffic data**

Below: **Installation of Lineas sensors from Kistler for WIM: dynamic axle load measurement in moving traffic enables efficient bridge protection**

information on the actual condition of the structure. Further technologies frequently associated with condition monitoring and structural health monitoring (SHM) therefore play a significant role. This involves the installation of sensors at key positions on the bridge to, for example, record vibrations or changes in the construction material. The quality of data is decisive for reliable condition monitoring.

The entire measuring chain from sensor to software must be examined in this respect to ensure that what is seen on the monitor is as accurate a representation as possible of what is currently happening on and, indeed, "in" the bridge. Regarding real-time monitoring, particular attention must be paid to the achievement of high-quality signal transmission and data acquisition.

In addition to strain sensors and accelerometers as individual components, the Kistler Group also provides complete solutions from sensor to cloud. K-Beam accelerometers from Kistler have been installed in the piers of the Great Belt Bridge in Denmark, a structure which has spanned the Great Belt strait in the Baltic Sea since 1998. These compact sensors continually record changes in natural frequency that could indicate a possible deterioration in the condition of the bridge.

Turnkey systems consisting of sensor technology, the KiDAQ data acquisition system and a customized software dashboard are also increasingly employed. Solutions of this kind enable authorities and bridge owners to monitor the condition of these structures continuously and reliably, and they provide support when planning everything from maintenance management to new constructions. ■





The road safety debate

Paul-Henri Renard, CEO of Parifex, discusses the key causes of fatal accidents in France and looks at how innovative speed measurement and monitoring solutions can help save lives

Author: **Parifex, France**



How urgent is the road safety issue in France?

The Cour des Comptes – the country’s supreme audit institution – recognised that enormous progress has been made over the past few decades in its report on public road safety policy in 2021. Indeed, we have gone from more than 18,000 deaths on France’s roads in 1972 to less than 3,500 today. But the institution warns that the results are stagnating.

Since 2013, the number of deaths has stopped falling and France’s position in relation to its European neighbours has deteriorated, falling from 7th to 14th place in ten years. Some countries, such as Sweden with its “Nollvisionen” Vision Zero project, are well ahead in achieving the goal of “zero deaths, zero serious

Above: Parifex’s Nano-cam mobile speed camera and data collection system

injuries” on the roads. We still have a lot of progress to make in our country. It is therefore an urgent matter in France.

What are the main causes of accidents on French roads?

More than 90% of accidents are the result of a malfunction linked to the user, whether it is a human failure linked to the complexity of the task or a deliberate refusal to respect the rules.

Excessive or inappropriate speed is the leading cause of fatal accidents. The police identify this factor in one in three fatal traffic accidents. For this type of accident, this speed factor occurs more often than average on roads limited to 70km/h, which probably reflects the difficulty for drivers to perceive the specific nature of these sections and to

become aware of the associated dangers. It is less present on motorways where the speed limit is 130km/h.

Driving under the influence of alcohol or drugs is the second most common cause of death on the roads, after speeding. 43% of deaths occur in accidents with at least one driver under the influence of alcohol or drugs. It is a scourge that is difficult to eradicate other than through prevention measures and driver awareness, because we do not currently have a similar technology like automatic speed control. This is evidenced by the number of licence points withdrawn in 2017. 70% of these were lost for speeding, compared with 0.9% for drug use and 5.2% for driving under the influence of alcohol. Finally, driving a vehicle requires the driver to be

highly concentrated on the task in hand to react as quickly as possible and make the right decisions. In France in 2021, "inattention or use of a telephone or technological distractors" is identified as the cause of accidents in 23% of cases.

What are the most important safety measures to take on the roads?

Given that 90% of accidents are generated by a malfunction linked to the user, it is essential to continue to improve behaviour through awareness and prevention operations. Of course, we can continue to communicate on the dangers of excessive speed, alcohol, or drugs at the wheel. But this will not be enough. The evolution of technologies and modes of mobility generates new accident-prone situations. There is, of course, the use of telephones at the wheel, but also multimedia screens in cars, which provide new functionalities for drivers, but which can also generate mental overload in certain cases. As the HMI of some vehicles is particularly complex and overloaded, there is an urgent need to simplify the landscape.

It is also essential to educate drivers about the specificities of the different means of mobility and the measures that are taken to facilitate their coexistence. I am struck by the fact that few people really understand the function of the cycle lane and that many are unaware of the penalty for occupying the zone with a car or truck.

Similarly, limiting the road safety debate to the enforcement of speed limits has become counterproductive. As high speeding has become the exception, we now need to focus our efforts on adapting speed to the context and limits of the human body. For example, a human can tolerate a collision with a modern car if the maximum speed is around 30km/h. If a higher speed is desired in an urban area, the only viable solution is to adapt the infrastructure by separating pedestrian crossings from traffic. And the situation is becoming even more complex with the increasing use of bicycles, scooters, and other soft mobility.

3,500

The number of deaths on France's roads in 2021, down from 18,000 in 1972

Source: Cour des Comptes



How does Parifex help to improve road safety?

Over the past 15 years, Parifex has delivered more than 500 speed cameras to enforce the limits set to ensure the safety of motorists and the flow of traffic. Our innovation activities have made us pioneers, for example with our Vigie speed camera, in new technologies such as the identification of the offending vehicle when the road is multi-lane, the classification of the vehicle to apply the correct speed limit or the taking of pictures from the front and the rear of the vehicle to also identify offending two-wheelers.

More recently, we have developed a multi-infraction Nomad solution capable of monitoring both speed limit compliance and red light

Above: The Parifex Nomad solution is capable of monitoring both speed limit compliance and red-light running

Left: Parifex's Double-Side VIGIE solution, which is used for highway speed monitoring and enforcement

running. This equipment operates non-invasively, without the need to install loops or strips in the roadway of the intersection. The camera visually monitors the signal heads, which means that it is not necessary to physically connect the traffic lights to the monitoring system, which is a significant advantage for towns that want to equip themselves with this system.

All these mature solutions are a daily support to the state's operations to improve compliance with the rules of the road. We are also working on the privacy and energy efficiency of our products. The use of a LiDAR sensor to detect the presence of vehicles allows us to activate our camera and infrared projector only when an offending vehicle is present, which avoids filming and flooding the environment with light at all times.

Similarly, our speed camera cabinets are double walled to allow efficient air circulation, eliminating the need for air conditioning even in very hot climates. This special design specification significantly reduces energy consumption and thus CO₂ emissions. ■

Changing the safety landscape

A range of innovative and versatile safety systems have been designed to make highways safer and more efficient for all road users

Words | **Eisa Al Shamlan, chairman, Alliance Traffic Systems, UAE**

An innovative Solar Intelligent Speed Enforcement Radar (Solar ISER) has recently proven its performance on the streets. This cutting-edge technology, developed by Alliance Traffic Systems engineers, combines solar power generation with advanced speed monitoring capabilities, paving the way for a more sustainable and efficient approach to traffic control. The clever design and features of this new radar system provide increased accuracy, reliability, and versatility, ultimately enhancing road safety and minimising traffic violations.

A notable feature of this radar system is its adaptability and versatility. With its compact design, more than nine different violation detections and recognitions, eight lanes of coverage, a highly accurate 24/7 ANPR (automatic number plate recognition) system, anti-vandalism protection and wireless connectivity, the Solar ISER can be easily installed and deployed in various locations, including highways, residential areas, and school zones. Furthermore, its user-friendly interface and compatibility with existing traffic management systems make integration easy and operation seamless for law enforcement agencies and transportation authorities.

Moreover, the integration of artificial intelligence (AI) algorithms in the radar system enables intelligent data analysis and reporting. This feature provides valuable insights into traffic patterns, identifies hotspots prone to driver speeding violations, and aids in the formulation of targeted enforcement strategies. By utilising this data-driven approach, traffic authorities can optimise their resources, effectively deploy enforcement measures, and improve overall road safety.



Above: Emergency early warning solution

Safety in adverse conditions

In today's fast-paced world, traffic management and safety have become paramount concerns, especially in challenging conditions where visibility is low, traffic jams occur frequently, accidents are a common occurrence, or roadworks disrupt the flow of vehicles.

In such scenarios, Alliance Traffic Systems offers a solution that combines cutting-edge technology with sustainability – the Solar Emergency Warning System. This innovative system

is meticulously designed to enhance safety and traffic management, even in the most adverse conditions.

One of the standout features of the Solar Emergency Warning System is its weather-resistant high-efficiency solar panels. These panels are engineered to withstand a wide range of weather conditions, ensuring optimal energy conversion, even when faced with challenges like rain, snow, or extreme temperatures. This resilience is a crucial factor in the system's ability to reliably function in any situation, providing uninterrupted service and ensuring that safety is never compromised, regardless of the weather.

The Solar Emergency Warning System is not just about physical robustness, it also offers real-time monitoring and control. With built-in 3G/4G/LTE connectivity, users can remotely assess the performance of these systems, making adjustments as needed. This level of remote accessibility not only saves valuable time and resources but also guarantees that the warning systems remain in peak working condition. This constant connectivity ensures they are always ready to deliver crucial safety alerts when they are needed the most.

The integration capabilities of the Solar Emergency Warning System are another aspect worth highlighting. These systems can seamlessly integrate with existing emergency management systems, thereby enhancing overall emergency response capabilities. This integration streamlines coordination between various agencies during emergencies, significantly improving public safety.

Furthermore, these systems operate on clean and renewable solar energy, which not only reduces operational costs but also minimises their environmental footprint. This aligns perfectly with sustainable practices, making them a choice that is both efficient and environmentally responsible.

Flexibility is a key attribute of the Solar Emergency Warning Systems. They are highly scalable, capable of adapting to different locations and needs, making them suitable for a wide range of applications. Their minimal maintenance requirements, primarily periodic cleaning, ensure long-term reliability. By demanding minimal upkeep, these systems are not only cost-effective but also guarantee extended service life, which is an important consideration for those who are responsible for road safety and traffic management.



Left: Traffic safety solution (TOTEM)
Right: Solar Intelligent Speed Enforcement Radar (ISER)



Enforcement and security

In the realm of modern highway safety, the multifaceted challenges of traffic management and security demand highly innovative solutions. Alliance Traffic Systems has designed TOTEM (Traffic Safety and Management Tower), a new multifunctional highway safety system, to comprehensively address these challenges.

TOTEM seamlessly integrates enforcement, security, and alerting into a unified system. This all-encompassing approach ensures that all facets of road safety are meticulously managed and harmonised. TOTEM is not just a standalone solution. It is also a holistic safety ecosystem designed to safeguard busy highways.

At the core of TOTEM's efficacy is its integration of cutting-edge technologies, such as radar, AI cameras, facial recognition, and automatic number plate recognition (ANPR). These advanced technologies bolster enforcement capabilities, enabling the system to detect a wide array of violations, from speeding to reckless driving. The system can also undertake precise vehicle identification. By discouraging unlawful behavior, TOTEM contributes significantly to making roads safer for all.

Efficiency and coordination are at the forefront of TOTEM's design. Administrators can oversee the entire safety infrastructure from a single location, simplifying operations and enhancing coordination. This centralised management approach streamlines the oversight of multiple different safety components, ensuring a swift and effective response to incidents, ultimately leading to safer highways.

One of TOTEM's most compelling features is its adaptability. It offers flexibility in customising security protocols, allowing for tailored access control, delineation of security zones, and setting alarm triggers. This adaptability ensures that the system can be finely tuned to cater to the specific safety needs of different regions and scenarios, reinforcing its effectiveness.

The safety of TOTEM extends beyond enforcement and security to include proactive measures. The system employs strobe lights and messages to warn drivers, actively preventing accidents and traffic congestion, and most importantly, saving lives. These advanced warning tools play a pivotal role in alerting drivers to hazardous conditions, prompting them to take necessary precautions, and ultimately fostering safer road environments.

In critical situations, the importance of seamless coordination cannot be overstated. TOTEM offers the ability to integrate with emergency services, facilitating collaboration during emergencies. This integration ensures a rapid and well-coordinated response when accidents or emergencies occur on the highway, minimising the impact on traffic flow and, most importantly, public safety.

TOTEM employs advanced algorithms and machine learning to identify a wide spectrum of violations. This intelligent violation detection system not only assists in law enforcement but also serves as a powerful deterrent, promoting responsible driving

behavior, and consequently ensuring safer roads for all users.

Driving safety forward

Alliance Traffic Systems is dedicated to creating a safer and more efficient future for road users worldwide. Founded in 2008, the company has evolved from its origins in R&D to become a pioneering force in smart traffic enforcement systems, AI-driven security solutions, solar-powered technologies, and much more. Solar ISER, Solar Emergency Warning Systems and TOTEM represent the company's commitment to innovation and sustainability, all while prioritizing safety on the road. These solutions, designed with precision and advanced technology, address the multifaceted challenges of modern road safety, from enforcement and monitoring to emergency response and sustainable energy use.

Alliance Traffic Systems knows the importance of customisation. The company understands that each region, city, or situation may have unique needs. As a result, its solutions are highly adaptable, ensuring they can be tailored to specific client requirements. This flexibility enables clients to harness the full potential of these cutting-edge technologies, optimizing the impact on safety and efficiency.

As the world faces ever-evolving transportation needs and heightened safety concerns, Alliance Traffic Systems will continue in its efforts to make highways safer and more efficient for all road users. The company believes that road safety is not just a commitment; it's a shared responsibility. ■

99%
The accuracy of the
solar ISER ANPR
system



Direct enforcement

Intercomp explores the benefits of a highly accurate and reliable high-speed weigh-in-motion system developed with Poland's APM Pro, featuring the Strain Gauge Strip Sensors

Author: **Leonardo Guerson**, WIM product manager and application engineer, Intercomp Company, USA

In the realm of road transportation, ensuring compliance with weight regulations is an important concern. High-speed weigh-in-motion (HS-WIM) systems for direct enforcement have emerged as a sophisticated solution, necessitating a harmonious combination of hardware and software. These high-performance systems are meticulously designed to offer the accuracy and reliability necessary to ensure that all WIM data used for vehicle overload control is collected within the specified accuracy parameters.

HS-WIM for direct enforcement, globally

Around the world, governmental bodies and road agencies and authorities have set their sights on implementing HS-WIM for direct enforcement. This visionary approach minimizes physical infrastructure investments while fostering heightened control.

Poland-based ITS integrator, APM Pro, offers a HS-WIM solution, based on Intercomp's Strain Gauge Strip Sensors, which ensures that all valid measurements adhere to stringent tolerances. This is achieved by using WIM sensors that stay accurate over time, along with specific software algorithms that process multiple variables for each vehicle weighing record. These algorithms help identify and confirm the validity of the automatically measured weight. By embracing these reliability strategies, this solution seeks to guarantee that no overloading penalties are wrongly delivered to compliant vehicles.

The pursuit of accuracy and reliability

APM Pro undertook the ambitious task of crafting a robust HS-WIM system for direct enforcement. Rooted in a commitment to reliability, it chose Intercomp Strain Gauge Strip Sensors as the bedrock of its solution. APM Pro's selection was guided by the goal to develop a HS-WIM system that would operate consistently throughout the



Above: At an HS-WIM site in Poland, ANPR and CCTV cameras capture license plates and vehicle images, as trucks drive over Intercomp's Strain Gauge Strip Sensors to record vehicle weights

Right: Strain Gauge Strip Sensors were chosen for their superior ability to hold calibration over time and to deliver consistent output throughout different temperature conditions



different seasons of the year, regardless of external factors such as temperature variations and weather conditions.

Stability in high-speed environments

Existing research underscores the significance of stability across diverse sensor technologies and installations, particularly in high-speed road contexts. APM conducted a comprehensive study, delving into the long-term stability of various HS-WIM sites and technologies. Among these, the HS-WIM sites employing Intercomp Strain Gauge Strip Sensors emerged with the desired levels of stability. The sensors displayed a superior ability to hold calibration over time and delivered consistent output throughout different temperature conditions, solidifying their position as the technology of choice.

Reliable HS-WIM direct enforcement

Besides the certified accuracy of the WIM sensors, the efficacy of HS-WIM for direct enforcement hinges on one pivotal factor: reliability. These systems must yield consistent results across time and varying external conditions. APM's HS-WIM solution with Intercomp Strain Gauge Strip Sensors operates under the premise that enforcement-oriented HS-WIM systems must deliver performances verifiable for imposing overloading penalties. This can be achieved with the implementation of a reliability algorithm that processes multiple variables related to the weight measurements and assigns a reliability rate to each vehicle record.

Performance beyond hardware

In the realm of direct enforcement, the development of real-time WIM-data processing algorithms is an important element. This involves assessing the reliability of vehicle records, critical for enforcement decisions. Beyond hardware stability, APM's HS-WIM solution incorporates an advanced algorithm. This algorithm employs fuzzy logic to assign reliability rates to WIM records, evaluating an array of traffic and environmental variables. The algorithm sheds light on potential measurement



Left: When used for direct enforcement efforts, HS-WIM sites minimize physical infrastructure investments while strengthening weight compliance strategies

comprehensive understanding of each passing vehicle's characteristics.

As vehicles traverse the HS-WIM site, a composition of technologies unfolds. First, variable message signs communicate the speed limits and traffic rules of the weighing area as ANPR and CCTV cameras capture license plates and vehicle images respectively. Meanwhile, a 3D scanner measures vehicle dimensions. Non-compliance triggers alerts on VMS signs, prompting drivers to pull over for administrative weighing. Vehicles within the limits proceed unhindered.

inaccuracies caused by external factors and identifies influencing elements, quantifying confidence levels in a percentage score.

Deploying innovation worldwide

APM's innovative approach to HS-WIM has reverberated globally. Particularly in Europe and the Middle East where more than 100 lanes of high-performance HS-WIM systems have been recently installed. This extensive experience supports its direct enforcement HS-WIM system, enriched by insights garnered from the operation in enforcement-related activities.

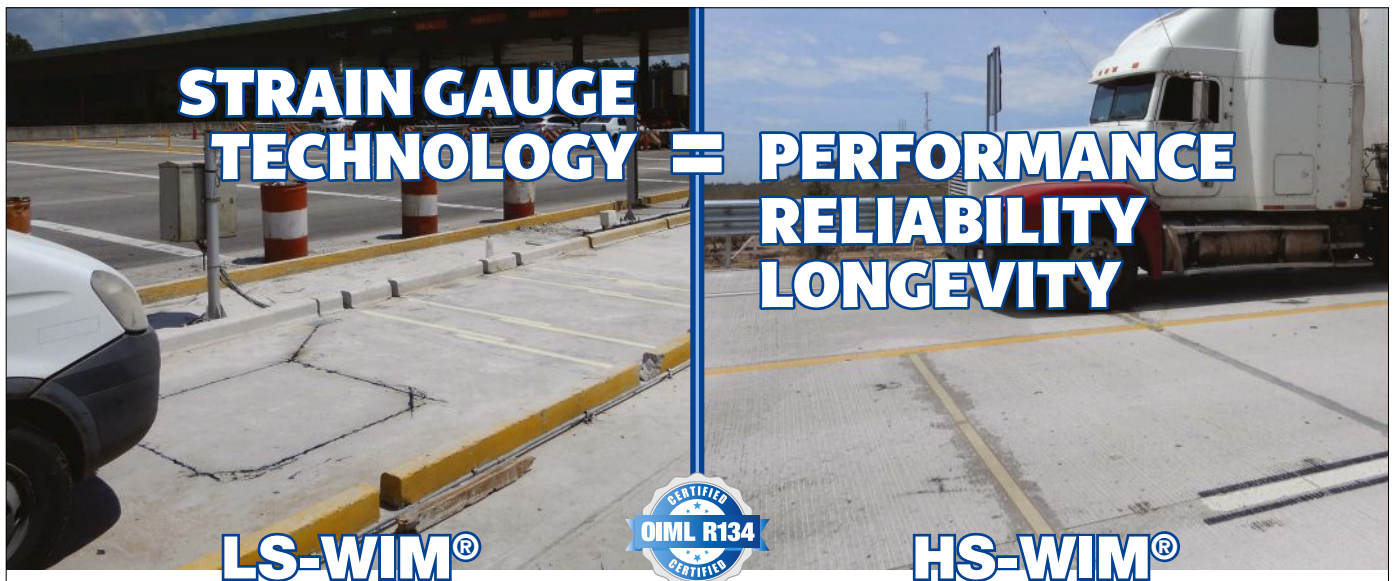
Poland's overload control

In Poland, APM Pro has deployed 44 lanes equipped with HS-WIM systems based on Intercomp Strain Gauge Strip Sensors, which are used as a tool for road transport compliance. These systems not only monitor overloading, but also contribute to preselecting overloaded vehicles for further weighing. The integration of ANPR, CCTV, and 3D scanning technologies yields a

44

The number of lanes APM Pro in Poland has equipped with HS-WIM systems based on Intercomp Strain Gauge Strip Sensors

In the pursuit of high-performance vehicle overload control, APM Pro's dedication to innovation and reliability, coupled with Intercomp Strain Gauge Strip Sensors, arises as a well-established foundation toward effective HS-WIM systems for direct enforcement. The features of these HS-WIM systems can benefit end-users of any HS-WIM application, as they promote higher quality data and lower operating costs of WIM systems. ■



WEIGH-IN-MOTION STRIP SENSORS

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Intelligent synergy

A collaborative effort and combination of expertise led to a successful solution that improves safety and optimises traffic management in Italy

Words | **Roberto Tognacca**, business development and key account manager, Sprinx Technologies, Italy

Safety and efficiency are paramount in Italy, where bustling tunnels and highways are key arteries in both the national and international transportation networks.

Autostrade per l'Italia manages an extensive network of more than 3,000km of highways and 600 tunnels, serving as vital connections between regions within Italy and the rest of Europe, even through challenging landscapes such as mountains. This highway system is one of the busiest in Europe. These tunnels serve as crucial national and international connections, seeing peaks of around 111,000 vehicles per day, with about 32,000 trucks and buses at their busiest hours.

Autostrade per l'Italia turned to Movyon to enhance safety and optimise traffic flow on the network, while also upgrading the CCTV and AID (Automatic Incident Detection) infrastructure in several of the heavily travelled tunnels. With a reputation for its research and innovation in the transportation sector, Movyon's mission was to find the best solution to guarantee high detection rates while minimising false alarms and disruptions to the regular traffic flow.

Unlocking success

Movyon performed an extensive comparative test on leading solutions in the AID technology market. It needed to



Above: Tunnel Santa Lucia in Firenze, Italy

Below: Tunnel Sparvo in Bologna, Italy, is 2,574m long

find a technology that provided top-notch detection capabilities as well as quick response times in order to minimise service disruptions. Following this rigorous benchmarking process, Sprinx's AI-powered video analytics solution emerged in terms of performance, thus inaugurating and establishing a valuable technological collaboration between the two traffic management solutions companies.

One distinctive feature of Sprinx's technology is its use of AI deep learning inference in the initial phase of video analytics, setting it apart from the companies that rely on validation tools, which can slow down response times. This approach paved the way for a massive revamping project, involving thousands of cameras inside the tunnels.

Optimising safety and efficiency

Movyon had a two-fold mission: to improve AID system performance by reducing false alarms and to minimise the impact of the revamping process on the tunnels' level of service. With such high traffic volumes, achieving these objectives was challenging but crucial to ensuring safe and

smooth circulation, while minimising inconveniences and service interruptions.

In certain situations, there may be a need to utilise the existing infrastructure temporarily. This includes using equipment like CCTV cameras, video analysers, and servers already in place. This approach also saves valuable time and costs. Moreover, it allows for more efficient resource utilisation and can serve as a temporary solution while other more extensive infrastructure investments are being implemented.

The solution

A combination of Sprinx's field-proven AI algorithms and Movyon's traffic management expertise created a unique solution. Sprinx addressed the challenges with traffix.ai, a software platform for AID and traffic data collection. This AI-driven platform incorporates custom features developed in collaboration with Movyon to meet the specific needs of Autostrade per l'Italia.

The Sprinx AID analysis in the traffix.ai software platform relies on advanced and pioneering algorithms that combine 3D object tracking technology





Left: At 7,724m Tunnel Santa Lucia in Firenze, Italy is the longest three-lane tunnel ever built in Europe

Below: Calibration and configuration client interface of the AID software

and a deep learning module. This approach dramatically improves detection performance, reducing false alarms. It also minimises system configuration and calibration times.

The neural network, designed for smart road and smart tunnel applications, enhances recognition capabilities, even in challenging environments, further reducing false alarms while maintaining high detection rates. This is even more advantageous when working with existing cameras whose image quality and field of view may impact non-AI-based systems.

The system is highly flexible and can run on standard hardware platforms, enabling even the utilisation of existing servers and expediting the upgrade process. Another noteworthy feature

of Sprinx's solution is its ability to run artificial intelligence algorithms on standard hardware platforms and even on existing servers. This allowed the reutilisation of the servers already on-site, a crucial time-saving measure.

The ease of configuration has played a crucial role in optimising the implementation process, ensuring minimal disruption to tunnel operations during the revamping of the AID system.

Improved traffic safety

The collaboration between Sprinx and Movyon has proven to be highly successful in rapidly creating and

111,000

The vehicles monitored each day with Sprinx and Movyon's traffic analysis on the Autostrade per l'Italia network

deploying the innovative AID solution. The synergy has yielded remarkable results by combining Sprinx's AI technology with Movyon's extensive knowledge in traffic management. Movyon's exceptional organisational skills and meticulous planning have played a crucial role in maximising the effectiveness of Sprinx's technology. Integrating the advanced AI into Movyon's ITS solution has been seamlessly executed, causing minimal inconvenience for drivers on the highway. Together, Sprinx and Movyon have created a solution that enhances traffic management and ensures a smooth and uninterrupted experience for all highway users.

The project's success was marked by a series of remarkable outcomes.

Performance enhancements: The system was modernised with the latest generation AI technology, significantly improving the performance, reducing false alarms and ensuring robust, future-proof infrastructure.

Streamlined and efficient implementation:

Implementing new technology on existing servers and cameras expedited the upgrade process, saving time and resources.

Hardware infrastructure optimisation:

The use of AI algorithms on standard hardware platforms, even with existing servers, streamlined the process and the investment.

This ambitious project raises the bar for safety in Italian tunnels and paves the way for a brighter, safer future on the roadways of Italy and beyond. With AI at the helm, the possibilities are endless, and the road ahead is clearer and safer than ever.

"The collaboration with Sprinx will undoubtedly strengthen our capabilities in delivering efficient and intelligent tunnel management solutions," says Lorenzo Maraia, head of traffic and safety management systems at Movyon. "By incorporating Sprinx's advanced algorithms into our ITS platforms, we have full confidence in optimising traffic flow, alleviating congestion, and ultimately enhancing overall transportation efficiency. This project represents an additional milestone in our ongoing mission to revolutionise traffic management practices and to improve the safety and efficiency of mobility infrastructure." ■



Providing precision weighing in France

Haenni Instruments discusses the growing challenge of heavy load vehicles on aging infrastructure and shares details on a recent project in France which required meticulous weight control measures

Author: **Sukaina Osman**, export and sales assistant, Haenni Instruments, Switzerland



In recent years, the steady rise in heavy load vehicles traversing our roads has posed significant challenges to our aging infrastructure. The wear and tear caused by these oversized vehicles has become a pressing concern for transportation authorities and communities alike. The increase is attributed to various factors, including expanding global trade, urbanization, and a growing demand for bulk transportation. These vehicles, ranging from construction trucks to cargo haulers, often carry loads that push the limits of existing road regulations.

Law enforcement requires precise measurements to prevent incorrect conclusions from tolerance differences. The effectiveness of mobile weighing system sites depends on factors such as road shape, pavement qualities, and careful setup of the system. These factors are important for reducing differences between axle impact forces and static

Above: Haenni weighed 100 axles, as part of a convoy of vehicles in France, in just three minutes

loads, maintaining accuracy standards. In this context, Haenni Instruments shines brightly as a beacon of hope, presenting accurate and dependable weighing systems that effectively tackle the repercussions arising from the presence of oversized vehicles.

Extreme weighing challenge

An extremely impressive demonstration of Haenni Instruments' flexibility and prowess came to light in France, as the company was enlisted by a French public agency, which sought expert assistance in managing a substantial convoy of heavy-load vehicles, which necessitated meticulous weight control measures.

In the face of this challenge, Haenni swiftly assembled a skilled team dedicated to executing this intricate project. Confronted by significant risks posed by the bustling dual carriageway, strict time limitations for rapid

equipment setup and teardown, and precise material requirements, with individual components weighing no more than 20kg each, Haenni demonstrated adeptness in streamlining the process effectively and efficiently.

The heavy load convoy was skilfully measured using the WL 104 portable system, operated in dynamic mode. Seven WL 104 scales were intricately connected, forming a seamless weighing strip spanning the lane. Levelling mats ensured uniform wheel placement on solid ground, guaranteeing consistent measurements. The recorded values were promptly accessible via an intuitive interface, while further processing, visualization, and printouts were facilitated by a connected personal laptop equipped with the EC 200 processing software.

With a total of four trucks dedicated to the transportation task, each of these heavy-duty vehicles boasted a configuration of four axles. Laden with a weight of around 33 tons per truck, they formed the backbone of the vehicle convoy responsible for moving a turbine.

However, the complexity of the operation didn't stop there. Two 14x3 axle wheeled platforms were also integrated into the arrangement, playing a pivotal role in supporting the weight of the colossal turbine. These platforms utilized a hydraulic beam mechanism to distribute the load as evenly as possible and ensure the stability of the entire structure during transportation.

Understanding the magnitude of the figures associated with this project is of utmost importance. The collective weight of the convoy alone stood at a staggering 870 tonnes. In terms of size, the convoy stretched across approximately 110m in length, 6m in



height and spanned nearly 7m in width. Impressively, the entire measurement procedure concluded within a mere three minutes, encompassing all 100 axles of the convoy, that is an average of two seconds per axle. These statistics truly highlight the immense scale of the logistical hurdles that were overcome.

870

The collective weight in tonnes of the heavy-load vehicle convoy transporting a turbine in France

Haenni's weighing system was pivotal in orchestrating this remarkable achievement, demonstrating how meticulous planning and technological ingenuity can overcome even the most daunting of challenges in the realm of heavy-load weight measurement. The speed and ease at which the system can be set up, with minimal labour resources at a

Below: Each piece of the portable WIM system weighs no more than 20kg

fraction of the cost of large weigh bridges, these scales are an efficient solution for weighing vehicles at various checkpoints, reducing congestion and delays, making them a versatile tool for monitoring weight compliance across different routes.

As the influx of heavy-load vehicles continues its unrelenting surge on our roads, embracing a simple, cost effective and lightweight solution, such as Haenni's wheel load scales assumes paramount importance in securing the sustainability of our transportation systems and fostering the endurance of our road infrastructure. ■

Accurate measurements

Amidst these awe-inspiring dimensions, the role of Haenni scales became paramount. These precision instruments provided accurate weight measurements, which were undoubtedly a critical factor in determining the suitability of each vehicle for bearing its assigned load. The Haenni scales not only ensured that each truck was within its weight-bearing limits, but they also ensured that the turbine's weight was distributed optimally across the axles, preventing uneven strain and potential structural instability during transport.



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The safety of society

Complex, ever-changing surroundings can be managed with intelligent transport systems from Jenoptik that tackle speeding, distracted driving, tolling challenges and intersection safety

Author: **Felix Watermeyer**, marketing and content manager, Jenoptik Smart Mobility Solutions Division



The world is changing continuously. Mobility, connectivity, urbanization, and security are some of the megatrends that will shape all societies around the globe and influence our everyday lives. Governments and municipalities must cope with and prepare for an ever-changing environment. One initiative that has evolved over time is Vision Zero. The goal is to establish preventive measures in the road safety area to make roads and means of transportation so safe that there are no more traffic fatalities and serious injuries.

"It is an ambitious, yet very important global objective. Having in mind that about 1.3 million people die each year because of traffic accidents, which

Above: **Distracted driver program in Victoria, Australia**

Below left: **Current scenario: Complexity of intersections and detections of illegal driver behaviour**

Below right: **Future scenario: Increased complexity of intersections and intelligent traffic mobility applications**

translates to about 3,800 fatalities every day [according to the World Health Organization], this is a number which is too high. The UN General Assembly set a target to halve the number by 2030. With our technology, we contribute to this goal, make roads safer and help bring people home safely all over the world. We are committed to developing new solutions to continue this path," says Tobias Deubel, vice president of global sales and service in Jenoptik's Smart Mobility Solutions division.

Distracted driving and speeding

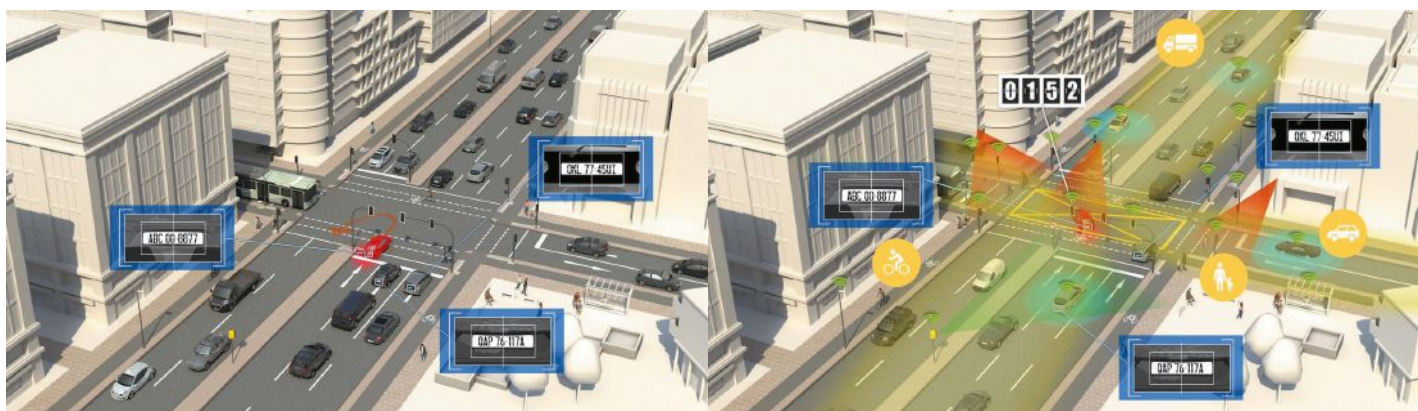
One of the leading causes of fatal accidents is still speeding. However, with the rise of the smart phone and other devices, distracted driving is a growing concern. According to the WHO, drivers

that use their mobile devices are four times more likely to be involved in an accident than non-distracted drivers.

In 2023, Jenoptik rolled out one of the world's first distracted driver programs in Victoria, Australia. The relocatable trailers are highly efficient, 24/7 self-operating and contain all the necessary enforcement camera equipment to detect in-car mobile phone use as well as seat belt violations. The company further supports Victoria's Department of Justice and Community Safety by providing an offences verification system. The trailers are fitted with solar panels so that they are self-sufficient at any given location and thus make use of local conditions.

The award-winning TraffiPole

For Jenoptik, it is essential to develop





Left: Jenoptik's TrafficPole in Twinhead version

1.35m

The number of people who lose their lives each year in road crashes worldwide

Source: WHO

specific systems for a region or to adapt existing ones to local environments. In this way, the company can address the different needs and demands of its markets. One example of such development is Jenoptik's TrafficPole. The housing that won Intertraffic's Green Globe Award in 2022 has a modern design, is sustainable and quick to set up.

One special feature is its oval head design with double walls, which render the use of an air conditioning due to an efficient air ventilation system and thus, makes it perfect for hot climates. It can be easily integrated into modern architecture design. By offering a one head and a twin head version, traffic can be monitored over multiple lanes in both directions, making use of the latest traffic monitoring technologies.

Intersection safety using radar

Surroundings in cities become increasingly complicated to manage. With urbanization, more people live in cities. As a result, complex traffic scenarios arise due to the volume and variation of vehicles and road users. New mobility solutions, such as e-bikes, pedelecs and e-scooters add to today's traffic. Therefore, intersections, in particular, tend to be congestion and collision hot spots. Data from the US Federal Highway Administration shows that more than 50% of the combined total of fatal and injury crashes occur at or close to intersections.



Left: Mobile installation in West Africa

Below: One of the first installations of new ANPR camera GardoVia

To make those safer, road authorities limit driving behaviours. Sometimes, these are ignored, resulting in dangerous situations and even collisions. To cope with this challenge, new radar-based systems are developed which can detect illegal driver behaviour next to red lights and speed violations.

Tackling speeding in West Africa

Governments all over the world have been tackling the complexity and security concerns in cities over the past years. Both developed and emerging countries are interested in contributing to Vision Zero and thus, support its citizens. Jenoptik recently delivered systems to several countries in West Africa. With an expanding infrastructure and a new road network, speeding is one of the main concerns

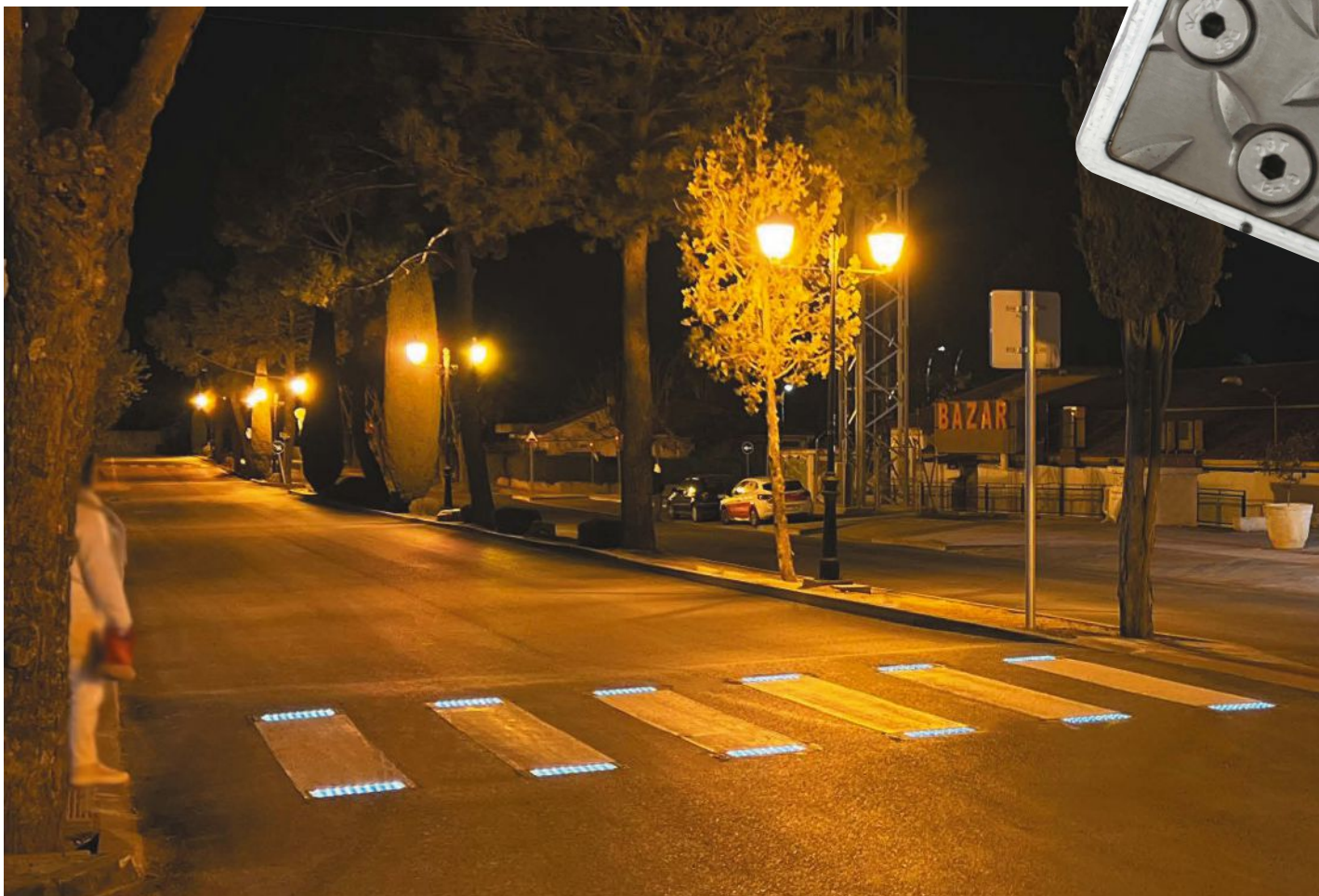
which the states want to address. Next to the hardware delivery, staff of the local authorities were trained by Jenoptik to be proficient with the equipment.

Cost-effective ANPR

To maintain an established road network, some governments impose tolls. A Jenoptik system which is used for monitoring whether tolls are paid is the ANPR camera GardoVia. Introduced at Intertraffic 2022, it is a cost-effective camera that can be equipped with a zoom, is suited for fixed and mobile installations and complements Jenoptik's ANPR portfolio. The first projects and installations making use of the system have already been carried out. It can be utilized for a variety of tasks such as road monitoring, clean air surveillance, or car parking management.

"We have different solutions in place to help governments create safer environments with intelligent traffic safety systems. Our services include the installation, maintenance, training, operation, and several financing options so that governments can better plan and contribute to Vision Zero. Our service offerings are in line with our overall strategy of increasing recurring revenues," said Danuta Eberle, vice president of global sales services, strategy, and product management of Jenoptik's Smart Mobility Solutions division. "Our purpose is to contribute to the safety of societies, and we will continue developing state-of-the-art products and offering end-to-end solutions to Governments, based on their needs," Eberle concluded. ■





Urban crossings

A new, smaller road stud has been designed to improve crosswalk safety, whilst enabling easy installation and minimised impact on the environment

Words: **Fernando Afonso, CEO, Sernis, Portugal**

The urban mobility paradigm is changing and smart cities have to keep up with this change. The new mobility paradigm in urban areas sees a lot of people distracted, talking with others or looking at their phones instead of paying attention to their surroundings.

Although fatal car accidents have declined in recent years, pedestrian deaths are actually on the rise. The fact that pedestrians and drivers are overly confident in their ability to multitask is the principal reason for this increase. You cannot drive safely unless you give

Above: The **SR-CROSSED-150** is smaller in size but with the same visual impact. The reduced size allows easier installation. This model can be installed in crosswalk entries and zebra crossings

your full attention to the task of driving. Any non-driving activity is a possible distraction and raises your chances of a road accident.

Most individuals are aware that distracted driving is a serious issue, but distracted walking is increasingly becoming a cause of significant personal injury. Distracted walking accidents are so widespread that the National Safety Council in America included them for the first time in its annual injury statistics report in 2015.

Another unexpected impact of distracted walking was revealed in

research conducted by the University of British Columbia. It warned that driverless automobiles may be misled by distracted pedestrians' actions and so be less able to stop and avoid a pedestrian.

The SR-Crossled range – a new kind of road stud



developed by Sernis – may be the most promising technology to reduce crosswalk accidents related to distractions.

Urban design

The company has recently developed its SR-Crossled-150 product: it is smaller in size than the SR-Crossled-S and Crossled-L road studs, but provides the same visual impact. The reduced size allows for easier installation. This model can be installed in crosswalk entries and zebra crossings. It is effective in alerting distracted drivers and pedestrians when they are approaching the crosswalk. The large lighted area makes it almost impossible for oncoming drivers and pedestrians to overlook them. SR-Crossled-150 has a low profile (flat on the surface), ensuring that it will not disturb circulation.

The SR-Crossled-150 was engineered with urban design in mind, to have a minimal effect on the aesthetic of the road scheme/urban design. Its application in old historic towns and city centres increases the safety and visibility of crosswalks at night while also conserving the scenic character of the streets. Its simple design blends very well with the urban environment. The SR-Crossled-150 may also be used as a decorative street lighting fixture for urban illumination, enhancing the surrounding landscape.

Ready for the road

This solution features a robust and long-lasting structure with high strength, as proven by a complete certification process for: LVD, EMC, photobiological safety tests, EN124 class D400, including the most demanding certification approval that is ENEC certification. ENEC is the high quality European mark for electrical products that demonstrates compliance with European standards and its commitment to the highest safety levels. The SR-Crossled-150 has a protection index IP68 and IK10. The anti-skidding treatment on the surface will avoid slipping accidents on motorcycles and bikes. This road safety solution is completely waterproof, with gel that protects inside elements.

Easy maintenance

The installation procedure is straightforward, and maintenance is less expensive and time-

ENEC
certification
LVD, EMC,
photobiological safety
tests, EN124 class
D400

Above: The large lighted area has a great visual impact, making it almost impossible to overlook them

Below: Low profile (flat on the surface) ensures that it will not disturb circulation

consuming than other alternatives on the market, minimising disruptions to circulation throughout this process. The structure of the SR-Crossled-150 enables easy and rapid maintenance and replacement of the electronic module in the crosswalk, without the need to drill holes and remove the entire device from the ground. This is extremely critical in this sort of application since it eliminates the need for roadworks and the associated expenditures.

The SR-Crossled-150 has robust construction, with a top made of stainless steel alloy and polycarbonate. The road stud exhibits high strength, allowing it to be used in any type of traffic application.

Intensive LEDs

The SR-Crossled-150 is available with white or RGB LEDs. The RGB version will work according to traffic lights. The wired system can be powered by electric or solar energy. It has a very low power consumption. ■



PHOTO: FRANK SKARE | WIKIDATA

Powerful investments

Technology is the driving force behind innovation and progress in the road safety industry

Words | Sara Sørli, communications manager and Bernd Frühwald, CEO, Saferoad Group, Norway

Technology stands as the catalyst of change, propelling us beyond the constraints of conventional methods, ushering us into an era where innovation meets legacy. Artificial intelligence (AI), robotics, sensors and automation have breathed new life into an age-old industry.

As a representative of the traditional road safety industry, boasting a rich legacy of manufacturing robust steel barriers, resilient guardrails, sturdy poles, and signposts, Saferoad Group's work contributes to Vision Zero. The aim: no fatalities or injuries caused in road traffic. In this, it acknowledges the transformative power of technology and believes that embracing it is not a choice but a necessity.

Tech-powered innovations

In the realm where road safety meets intelligent traffic systems, technology is not just a tool but a visionary lens. Sensor

Above: Robotic welding cell

technology and data-driven analysis have become instrumental in enhancing road safety. Real-time data collection and analysis enable us to predict traffic flows and identify patterns, fostering more efficient, safer, and sustainable transportation networks.

Specialising in LED signs tailored for various applications, Saferoad delivers variable messaging signs including sensors, traffic cameras and control software for efficient operation and monitoring. A game-changer in the realm of mobile messaging signs is a solar powered energy system, which removes the need for battery change and benefits the environment. The equipment and systems help manage congestion, speed and routing of traffic.

The industry can go further. As an example, in addition to illuminating streets and communities, Saferoad's multifunctional light poles can provide practical benefits like charging, wi-fi, 5G,

surveillance and sensors. Increasing the value and societal benefits of necessary safety equipment gives urban landscapers and architects opportunities to enhance their projects.

Laser precision

Technology empowers manufacturers to streamline production lines, minimise waste, and significantly enhance overall efficiency in production. At Saferoad, the conventional techniques of cutting, welding and handling light poles experienced a profound revolution when automated facilities were introduced in 2016. The integration of laser technology and robotics facilitated seamless integration and automation of the operations into a singular, highly efficient process. The company experienced a remarkable reduction in welding time per light pole, a convincing case that set a benchmark for efficiency and productivity. But Saferoad says that



Top left: Mobile LED variable message sign from Saferoad

Bottom left: Overlooking automated production facilities at Saferoad



PHOTO: SAFEROAD

PHOTO: SAFEROAD

efficiency is just the beginning; sustainability is its commitment.

Automation and robotics have streamlined the labour-intensive aspects of production, ensuring consistent quality and safety. However, automation and robotics do more than just streamline labour-intensive tasks; they also pave the way for environmentally friendly practices. They enable renewable energy utilisation and waste reduction, ultimately lowering carbon emissions.

By weaving sustainability into the fabric of its operations, Saferoad demonstrates how technology can drive not just progress, but responsible progress. The future of production is a harmonious blend of tradition and innovation, poised for greater efficiency and environmental responsibility.

Electrifying equipment

Advances in technology are making operations both more efficient and more

environmentally friendly. A notable shift is the transition from traditional diesel-powered equipment to electric equipment. For Saferoad, the shift to electric trailers for tasks like road marking has shown clear benefits. They produce much less CO₂ compared to diesel ones, helping the company to reduce its environmental impact. Plus, workers appreciate that these electric trailers are quieter, reducing noise and making their jobs more pleasant. Local communities also benefit as they no longer have to deal with the loud sounds of traditional machinery. This move towards electric equipment shows how companies can be efficient, environmentally responsible, and attentive to the wellbeing of their workforce and communities.

2,500+
Saferoad employees,
in 13 countries
across Europe

Empowering road safety

Roadworks often involve individuals standing precariously close to moving vehicles, presenting a significant safety risk. The peril arises from the human factor, both from the individuals working on the roads and the drivers navigating them.

In this age of advanced technology, solutions to mitigate the risks faced by road workers exist. The potential for innovative technologies to replace or augment the human presence near moving vehicles is immense. Yet, despite these advancements, the widespread implementation of such technologies remains a challenge in some markets. It is not a lack of technological prowess but rather the need for concerted efforts from contractors, governments, and stakeholders to integrate these solutions effectively.

The transportation industry stands at a pivotal juncture where embracing technology is not just an option but a moral imperative. Technology is already at our fingertips, waiting to be harnessed to ensure the safety of those who work tirelessly to maintain our roads.

Empowering people

Amidst the whirlwind of technological evolution, the focus at Saferoad remains on its people. The company firmly believes that technology is a medium to empower the workforce. In light of this, Saferoad has launched an extensive AI training programme tailored for its employees. This initiative is not just about acquiring new skills; it's about instilling confidence.

Saferoad sees that the technology landscape is evolving at an unprecedented pace, and it remains steadfast in its commitment to embrace technology to improve road safety. There will be a future where safety, efficiency, sustainability, and human ingenuity converge. Saferoad believes that its journey is not just a testament to its past, but a roadmap to a future where tradition harmonises seamlessly with innovation, ensuring safer roads for many generations to come.

Future transportation industry leaders will be those who embrace the opportunities technology brings, focus on continuous product development, possess a high degree of flexibility, have expertise in creating innovative solutions, and have the ability to produce sustainable processes, to safeguard lives on roads and beyond. ■



Safety first

Expertly engineered steel guiding systems are proven to improve safety around road infrastructure, such as bridges and tunnels

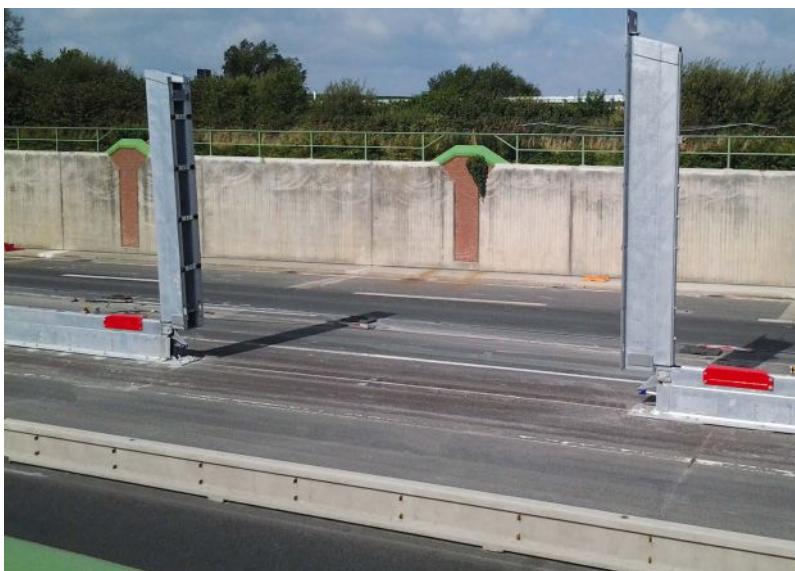
Words | **Joerg Zimmermann, Heintzmann Traffic Systems, Germany**

Heintzmann's VLS traffic control barriers comply with the 'Guideline for passive protective devices' (RPS) in road areas and can be brought into the desired blocking position through remote switching operated by the central control panel. Depending on the requirements and available space, the barrier can be moved horizontally or vertically, blocking one or several lanes. The

There are, in general, four factors that can be defined to significantly influence safety in tunnels: road users, their vehicles, the infrastructure of tunnels and prescient security measures inside and outside the tunnel.

Safety measures begin at the tunnel approach, where preventive elements with automatic closure systems using traffic lights and barriers at the portals can mitigate a severe impact. The Heintzmann Group offers a range of solutions for this area, with functional traffic control barriers as well as emergency openings with horizontal or vertical operation. These products can be placed in front of the tunnel so that tunnel sections can be closed in the event of an accident or technical malfunction.

Above: **Vertically opened VLS barrier**
Right: **Median gate with vertical opening (9m)**





Left: Median barrier with colour-highlighted emergency gate

maximum width achieved has been 18m across an entire road. The compact barrier comprises a power unit in a weatherproof case and the barrier boom. A laser device for identifying obstacles permanently monitors the entire area while the barrier boom is swivelling. This helps to optimise traffic flow.

With its origins in vehicle restraint technology, the Duo-Gate barrier offers an emergency opening with vertical movement. Tunnel portals on motorways

are a classic example for the use of these barriers. In its closed position, the barrier fulfils containment level H2, which is required on motorways, but it can be opened quickly in the event of an accident in the tunnel, thus enabling emergency services such as police and fire brigades to quickly change lanes. This means maximum flexibility at the highest level of security.

18m
The maximum width of the VLS traffic control barrier

Duo-Gate can be delivered with manual control performance or fully automated, with one or two barrier booms. Duo-Gate is a further development of the proven central reservation system Gate-Guard. If necessary, Gate-Guard can be opened within a few minutes without any special tools, thanks to its integrated horizontal emergency opening.

Typical installations are in front of and behind tunnels, or bridges where there is a high demand for flexibility. In addition to safety, Gate-Guard also helps with traffic management when there is maintenance work in these areas. By optimising traffic flow, it thus helps to reduce CO₂ emissions.

The Heintzmann Group, with its roots in German and international mining, has been providing security solutions for 170 years and protects the world's most sensitive areas - both underground and above ground. The company is a creator of system solutions for safety not only related to road barrier systems but also in the field of anti-terror. ■



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A smart solution

Innovative moveable road barriers improve safety and mobility in tunnel work zones

Words | **Smita Sharma**, senior manager, application engineering, Lindsay, USA

Timely rehabilitation and maintenance of tunnels is imperative to ensure safety of road users, but the mobility and safety impacts of such work zones can be challenging. Work zone-related traffic consolidation in conduits like tunnels on major roadways can cause congestion, freight delays and safety concerns.

Strategic traffic management planning and flexible interventions can help avoid gridlock and community outage. A maintenance of traffic (MOT) plan and construction sequencing for high-volume, high-speed tunnel projects address the work zone impacts of the project. This plan includes minimising traffic delays, maintaining motorist and worker safety, conforming to project schedules, maintaining access for businesses and residents, while also insuring safe access to/from the work zone for workers and construction equipment with minimal impact on road users.

Non-peak lane closures or directional traffic crossovers using Road Zipper moveable barriers reduce user delay costs by quickly establishing lane reconfiguration, with the benefit of providing protection to increase traffic safety.

Innovation in Italy

Lindsay is pleased to share its recent partnership with Autostrade per l'Italia (ASPI) and Amplia. The companies will work together to enhance traffic management and work zone safety on the A26 highway tunnel rehabilitation project. ASPI is committed to implementing innovative solutions that streamline traffic flow and ensure safer journeys for all road users. Showcasing this commitment, Lindsay has announced two tunnel rehabilitation projects in Italy. Projects in both Manfredia and Lagoscuro will use the Road Zipper to optimise traffic mobility and improve overall traffic and work zone safety.



Above: The barrier transfer machine transferring the barrier by one lane

Below: Bi-directional lane configuration created using the Road Zipper system to maximise tunnel capacity

Compared to channelising device lane closures, the Road Zipper provides flexible, positive protection and additional safety measures, while still allowing quick lane reconfiguration. Additional benefits include reducing the risk of traffic queues during peak travel times, compared to a static barrier lane closure and potentially providing increased workspace for contractors. In the past, the Road Zipper-based

MOT solution has been combined with accelerated construction methods in tunnel and bridge work zones to reduce project staging and duration. This combination also minimises mobility and safety concerns. The Road Zipper system is a crash-tested alternative for flexible lane management (or dynamic reconfiguration of travel lanes), which enhances safety measures for motorists and construction workers. The Road



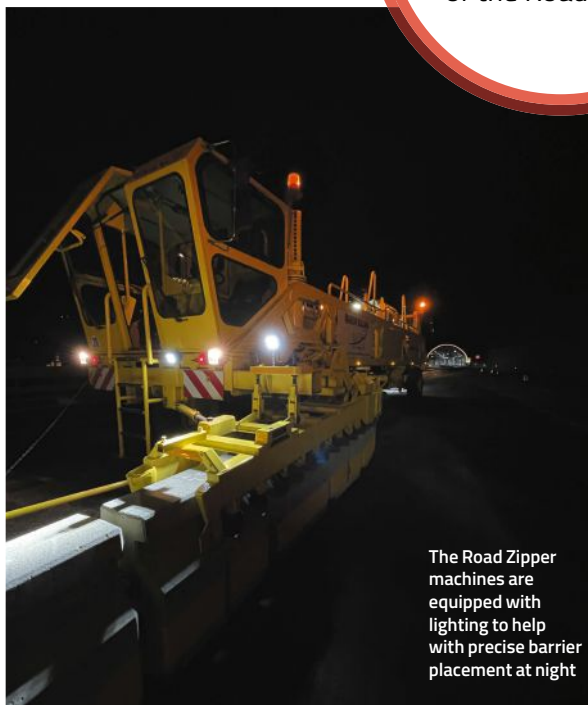
**VIDEO
EXTRA**


8km/h

The top transfer speed
of the Road Zipper

Zipper barriers are crash-tested to MASH TL 3, NCHRP350 and EN 1317 H2 standards.

Both the Manfreda and Lagoscuro tunnel projects are located on the A26 Highway between Milan and the port of Genoa in Italy. This A26 corridor is critical to both commercial and noncommercial traffic. Taking away active travel lanes for tunnel work zones would likely create massive traffic queues and freight delays. When planning for these tunnel rehabilitation projects, ASPI's top priority was to ensure the mobility and safety for all road users and workers when tunnel work zones are active. In line with ASPI's priorities, the Road Zipper was selected as an innovative MOT solution to minimise the impacts of work zones to road users. As part of the project planning, critical sections of the A26 highway were identified for strategic use of the Road Zipper to maximise existing roadway capacity. These projects showcase ASPI's forward-thinking approach to traffic



The Road Zipper machines are equipped with lighting to help with precise barrier placement at night

management and highlight the importance of institution-based initiatives to strategically address safety and mobility concerns in construction projects.

Data-driven approach

Both projects include a full closure of the roadway or tunnel in one direction for a complete separation of work zone and moving traffic. This not only increases overall work zone safety, but also makes the work zone more efficient for workers and equipment. The other bound of the roadway is used for bi-directional traffic using the Road Zipper system as a moveable median. Using a data-driven approach, the travel lanes are reconfigured to maximise the throughput during peak travel times. With a top transfer speed of 8km/h (5mph), the Road Zipper machine helps reconfigure travel lanes quickly to address daily travel pattern changes.

Lindsay and ASPI worked together to identify the strategic locations and applications of the Road Zipper solution to develop a tailored solution to seamless traffic management. The Manfreda project used 2km (1.2 miles) of moveable barrier wall to change travel lane configuration four to five days per week while Lagoscuro project uses 8km (5 miles) of moveable barrier wall reconfigured four to five times a week. The Manfreda project will be live until February 2024 and the Lagoscuro project will continue until May 2024.

"We are excited to be part of these groundbreaking projects with Autostrade per l'Italia, as they exemplify Lindsay's shared commitment to innovation and excellence," says Fernando Ribeiro, VP and general manager – infrastructure, Lindsay. "Stay tuned for further updates as we continue to make strides in revolutionising road traffic solutions."

"Tunnels and bridges offer additional challenges for maintaining traffic mobility and safety during road work," adds Smita Sharma, senior manager – applications engineering, Lindsay. "Typically, there is very little additional space so a work zone must be created from active traffic lanes. Flexible lane management using the Road Zipper is a crash-tested alternative to help reduce work zone impacts to road users and improve the overall safety of construction projects." ■

Installation made easy

A vacuum-powered lifting machine makes light work of roadside guardrail installation

Words | **Optimas, Germany**

Guardrail installation has traditionally been a labour-intensive process, with several workers needing to physically lift and move 80kg box profiles, adding up to many tonnes per week.

The Optimas Vacu-Pallet-Mobile GI has a vacuum lifting arm that lifts any type of guardrail, moves it to the installation site and holds it there until it is secured. No physical effort is required from workers. All required power is provided by the vacuum lifting unit of this mobile machine.

The machine combines vacuum tube lifting technology with a chassis that has two rubber chains. Between the chains there is a pallet fork, which can be used to transport the crash barriers or auxiliary material to be installed. A separate trolley can be towed.

Below: Crash barriers are lifted with the vacuum lifting unit of the Optimas Vacu-Pallet-Mobil GI and then moved to the installation site with the 3m long articulated arm



The boom swivels 360 degrees and has a working radius of 3m. It can lift, move and hold up to 140kg within this radius. A range of suction pads are available for the tube lifter to suit any crash barrier profile and length. It does not matter whether the crash barriers are to be removed from the truck, from the escort vehicle, from the ground or from the mobile unit itself.

The Vacu-Pallet-Mobile GI itself weighs 1,290kg and is powered by a Hatz Silent Pack diesel engine with 13 hp/9.6 kW EU Stage V. The transport dimensions of 2.26m, 1.85m and 2.10m are such that the Vacu-Pallet-Mobile GI is easy to transport.

Save energy

One decisive advantage of the Optimas Vacu-Pallet-Mobile GI is that it greatly reduces the physical effort required of workers. The effect is that workers remain productive for much longer.

VSB Infra, based in Herne, Germany, is active in the fields of in-situ concrete crash barriers, slipforming, concrete carriageways and steel protection systems. The company is currently using the Vacu-Pallet-Mobile GI to install several kilometres of steel crash barriers A1 motorway south of Münster. "We have been using the Vacu-Pallet-Mobile GI for some time now," confirms Kay Petersen, managing director of VSB Infra. "It has noticeably reduced the workload for our employees." ■

VIDEO
EXTRA



Guardrail installation easier than ever before!

NEW! Optimas Vacu-Pallet-Mobil GI

...lifts and moves any profile as light as a feather.

The vacuum lifting arm of the Optimas Vacu-Pallet-Mobile GI lifts any type of guardrail, moves it to the installation site and holds it there until it is secured – without any physical effort from the worker!



More Information:

Optimas®

Guardrail installation machines

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Plastic protection

A robust and versatile plastic road curb improves safety for all types of road users, while being fully recycled and recyclable

Words | **Ecolsystems, Italy**

Ecolsystems offers a range of high-quality road curbs suitable for the construction of road safety infrastructure. Made from recycled and recyclable plastic material, the company's road curbs are designed to ensure maximum safety and durability, finished with a special coating that protects from all weather conditions and the impact of traffic.

Ecolsystems was founded on deep respect for the environment and nature. With more than a decade of experience in plastic material recovery, the development of circular curbs is a natural step in expanding the company's expertise.

Practical, sustainable and safe

The curbs are easily fixed to the ground through an installation process that does not require the use of mechanical means, allowing for significant cost savings.

They are made entirely of recycled and recyclable material, derived, for example, from the covering of electrical cables.

The innovative linking system, with interlocking between the base and the upper element, allows for greater structural rigidity compared to normal curbs. Variable heights from 15-25cm are ideal for protecting bike and pedestrian paths or areas restricted to traffic. Rounded external profiles minimise potential bodily trauma in the case of accidental falls by cyclists or pedestrians.



Above: The EPO patented road curbs prevent collisions between vehicles and pedestrians

Simultaneously, the high resistance to impact allows for the redirection of a vehicle accidentally colliding with a curb back onto the road.

Versatile and hardwearing

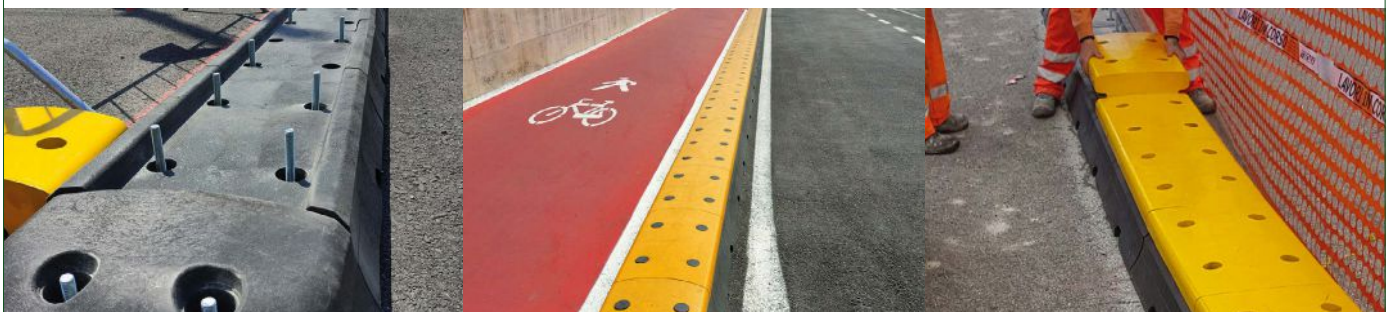
The unique geometric configuration allows for the longitudinal crossing of cables, service networks, pipes, or other elements. The curbs are also designed for the insertion of vertical signage, such as poles, traffic lights, and signalling systems, and have a wide transverse slit to allow for the drainage of rainwater. The curbs have exceptional resistance to UV rays, salt, acids, ice, heat, and remains maintenance-free for years. ■



ECOLSYSTEMS offers road safety infrastructure specialists a range of sustainable road curbs of the highest quality.

Made of recycled - and in turn recyclable - plastic material, the curbs are composed of high-strength aggregates.

ECOLSYSTEMS modular curbs are designed to guarantee maximum safety and durability with different road safety functions.



www.ecolsystems.it | info@ecolsystems.it | +39734 340247

The future is now

Navigating the transition to ticketless parking solutions using a flexible approach to entry, exit and payment by Designa

Words: **Maxi Heese, content editor, and Phillip Veldten, CMO, Designa, Germany**



Agility is a critical element influencing both our modern society and the technology-driven parking industry. The parking landscape faces significant challenges due to technological advancements and evolving individual requirements. Staying agile and ahead of these demands can be challenging. Designa, with over 70 years of specialization, has consistently prioritized customer needs while strengthening the company's proficiency in parking solutions.

According to Designa, two invaluable insights have emerged over the past decades, emphasizing effective parking management solutions. Firstly, flexibility and agility are crucial factors for success. Secondly, it is always imperative to consider or anticipate future requirements today.

Future-proof parking

Designa presents a visionary approach to addressing the challenge of versatility in

Above: The Designa Group has implemented a fast, high-traffic hybrid solution at the terminals of Hamburg Airport in Germany. The recently established "Kiss and Fly Zone" offers a 10-minute grace period for free drop-offs and ensures smooth entry and exit through license plate recognition detection. It is also already equipped for full ticketless options, ready for future advancements

parking, especially in complex environments such as airports, hospitals, shopping centres, and city garages. As the parking industry continually evolves, Designa offers a modular and flexible approach that enables the company to grow with its customers' needs. Its commitment to flexibility ensures that the systems remain relevant in a rapidly changing landscape.

For example, Designa's scalable and future-driven Connect systems are open to change and offer unmatched flexibility for upgrades and emerging technologies. With Connect, customers can choose between ticket and ticketless solutions for gated, semi-gated, free-flow, or hybrid environments. Furthermore, various payment options are available, including cash or card, pay in-lane, and mobile payments. Moreover, multiple software add-ons, such as pre-booking, validation, LPR features, or unmatched third-party integrations, are available to further customise each parking management environment.

Ticketless parking

For Designa, the future of parking is ticketless. With ticketless solutions, paper tickets become obsolete. This transition brings numerous benefits for both customers and operators, eliminating concerns about losing a parking ticket and reducing paper waste and ticket costs.

Moreover, it enhances efficiency during entry to parking facilities, eliminating the need to open a window and pull a physical ticket, for example. Multiple software add-ons, such as pre-booking, validation, discount features, or unmatched third-party integrations, are available to customise the ticketless parking environment further. The aim is to provide a frictionless experience for parking customers with minimal hardware involvement.

In ticketless parking, an integrated license plate recognition system (LPR) at the entrance point captures the license plate and entrance data, ensuring a contactless entry – with or without a



barrier. The license plate then serves as an identification medium for payment at the automatic pay station or the exit. Customers can also opt for digital payment via a smartphone. At the exit, the camera recognises the license plate, and after verification, the parking system opens the car park barrier upon detecting a payment event (for gated variants).

Ticketless solutions eliminate the hassle of physical tickets, ensuring seamless entry and exit for visitors, reducing hardware while increasing flexibility. Designa offers different variants and adaptations, aiming to find the perfect fit for every customer.

Ticketless variants

Hybrid mode: Only some environments are ready to change to a completely ticketless system. However, Designa recognizes that the “now” for parking lies in hybrid solutions, seamlessly blending modern technologies with traditional practices. Designa’s hybrid mode solution caters to a diverse range of customers and ensures a streamlined parking process for

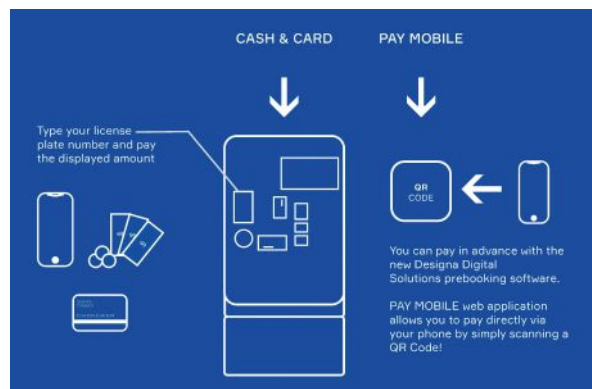
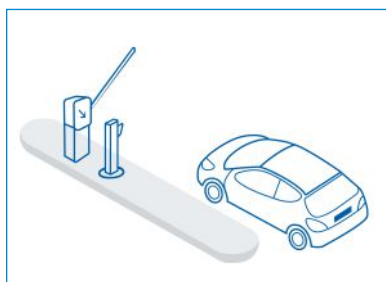
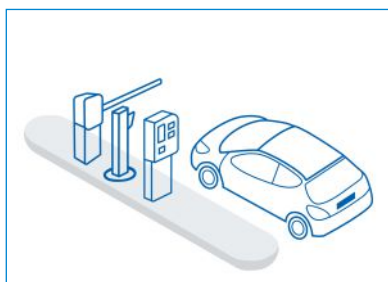
everyone, even in the most complex settings. Customers can effortlessly enter, pay, and exit a car park, with or without a ticket. Another benefit of the hybrid mode is that it is perfect for managing the change to ticketless. Since both modes are already installed, deactivating the paper ticket option is no hassle; when the time is right, a fluid transition into full ticketless is possible.

Gated mode: Gated ticketless is perfect for parking professionals who want to get rid of paper tickets but still want to guard the parking space with gates. The gates still give the customer the feeling of a closed area.

Semi-gated mode: This option offers open access to the parking system, with no gate at the entrance.

Again, the car’s license plate will be scanned and remains the only distinctive feature during the parking journey. The exit gate remains the sole guardian of the parking space and remains closed if a customer doesn’t pay. Perfect for anyone who wants to spare the entrance gate but

70
The number of years
Designa has been active
in the parking
management sector



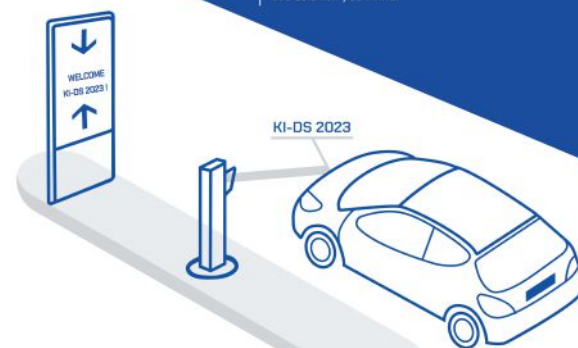
FULL FREEFLOW

GATELESS ENTRY

Designa CONNECT FOCUS LPR
Designa DIGITAL SIGNAGE

Upon entering, the Designa CONNECT FOCUS LPR Camera reads the license plate, links it with the time of entry and stores these data safely until the car exits! That's what we call a «freelway» entry.

This configurations guarantees a smooth entry/exit. Perfect for cities, shopping malls and airports the free-flow mode really is the smoothest and the most innovative solution you'll find.



Top left: **Fast and efficient payment capabilities** at one of the award-winning PAY “pay on foot” checkout stations (with touch screen and plate search technology)

Top right: **Congestion at the barriers, either on external roads or inside the parking garages, are things of the past with the Designa free-flow solution**

Far left: **A hybrid ticketless car park solution**

Left: **A gated ticketless solution**

still wants safety. It also gives customers a feeling of following a strict process. They must pay to leave.

Free flow mode: There is no gate at all with free flow. Visitors can enter and exit the parking space without stopping at any entrance or exit. Still, they will be registered by license plate recognition and are greeted by a digital information board, for instance. A digital information board is mandatory in this environment, showing that the customer’s license plate has been registered at the entrance and that the payment is completed at the exit. Free flow reduces the use of hardware components to a minimum, but there might be a need for a payment enforcement provider if customers drive out without payment. However, operators and car park customers benefit from faster and smoother parking processes.

According to Designa, customers should use the variant that fits best with their needs and combine them with other features from the company’s software and hardware range to create the customised solution that perfectly matches their parking vision. ■

Parking and powering

Investing in modern EV charging infrastructure and smart car park management tech is a must for parking facility owners if they want to reduce costs, drive revenues and attract new customers, Circontrol reports

Words: **Roger Terricabras**, communications specialist, Circontrol, Spain

The proliferation of electric vehicles (EVs) presents a significant infrastructure challenge for cities and municipalities. In the constantly evolving urban mobility landscape, the number of EVs on the roads is rapidly growing and they are poised to become a majority in the coming years. The public and domestic charging infrastructures alone could be insufficient for growing demand. In this context, parking infrastructures and operators are essential for the future of the electric charging infrastructure.

Following its ongoing challenge of innovation, Circontrol, as a specialist both in e-mobility, manufacturing EV chargers with its own technology since 2008, and efficient solutions for car parks, can integrate both worlds in one platform, offering an intuitive, efficient, and easy to manage solution. The fusion of two worlds, efficient parking and EV charging presents several benefits.

Adding value

For parking owners, incorporating EV chargers represents not only a new revenue stream but also a strategic means to attract new customers, specifically EV drivers. This move can significantly enhance the reputation of the car park, making it more appealing to environmentally conscious customers and contributing to the car park's overall image improvement.

Furthermore, the adoption of electric cars, being zero emission vehicles, brings about cost savings in ventilation systems,



Above: A Circontrol EV charging installation within a car park in Stockholm, Sweden

Below: The KSensor smart parking device features high-resolution image resolution and licence plate recognition technology that can record up to six parking places via live streaming

especially in indoor parking infrastructures. This dual benefit of environmental appeal and operational efficiency makes investing in EV chargers a smart and sustainable choice for parking facility owners.

For those parking owners who have already invested in Circontrol's efficient parking infrastructure, the integration of EV chargers becomes a quick and easy process, thanks to their compatibility with the CirPark platform. Furthermore, Circontrol's versatility and extensive range of chargers, allow operators to choose the ideal solution that perfectly aligns with their specific requirements. Whether it's a post or wall box, fast or semi-fast charging, single or double charging points, or installations in indoor or outdoor facilities, Circontrol provides a tailored approach to meet the operator's unique needs and preferences.

Finally, EV charge points are ready to be integrated with Parking Management Systems (PMS) to use their own payment system, such as with OCPP.

Improving the customer experience

Parking EV charging points provide flexibility for drivers. They can conveniently select the most suitable location based on their needs,

eliminating the frustrating hunt for public chargers. This not only enhances convenience but also optimizes time management, as EVs can charge while parked, ensuring they're always ready to go whenever required.

The integration of EV charging infrastructure with parking facilities offers the convenience of a ticketless payment system for electric vehicle users. Thanks to license plate automatic reading and recognition, EV drivers can charge their vehicles without the necessity of generating any additional tickets. This streamlined process makes EV charging both easy and user-friendly.

Smart management

In addition to EV chargers (EVPark), from home charge solutions and ultra-fast chargers, Circontrol also offers different smart devices for vehicle parking facilities, such as intelligent guidance (iPark) and efficient LED lighting (LEDPark). These solutions seamlessly integrate into Circontrol's CirPark, bolstered by the integration of the company's software solutions, such as its Dynamic Load Management (DLM). The combination of all these solutions ensures the future-proofness of any parking infrastructure while meeting the challenges of e-mobility.



DLM is designed for managing energy in multiple EV charging infrastructures working simultaneously and it is easily integrable with CirPark Platform.

The system ensures that only the available power of the installation is used, and it will distribute the remaining power in an equitable manner or prioritize one or several charging points, according to parking needs. This solution is compatible with Building Management Systems (BMS), enabling comprehensive energy management and optimization within the existing infrastructure, avoiding, at the same time, grid overloads.

A 360° solution

Circontrol iPark solutions optimise the traffic in car parks and provide a better user experience. Thanks to its different products, it can offer a real smart experience. Smart guidance systems manage the occupancy and the traffic of

15-30%
The improvement in parking occupancy rates following the roll out of smart guidance systems



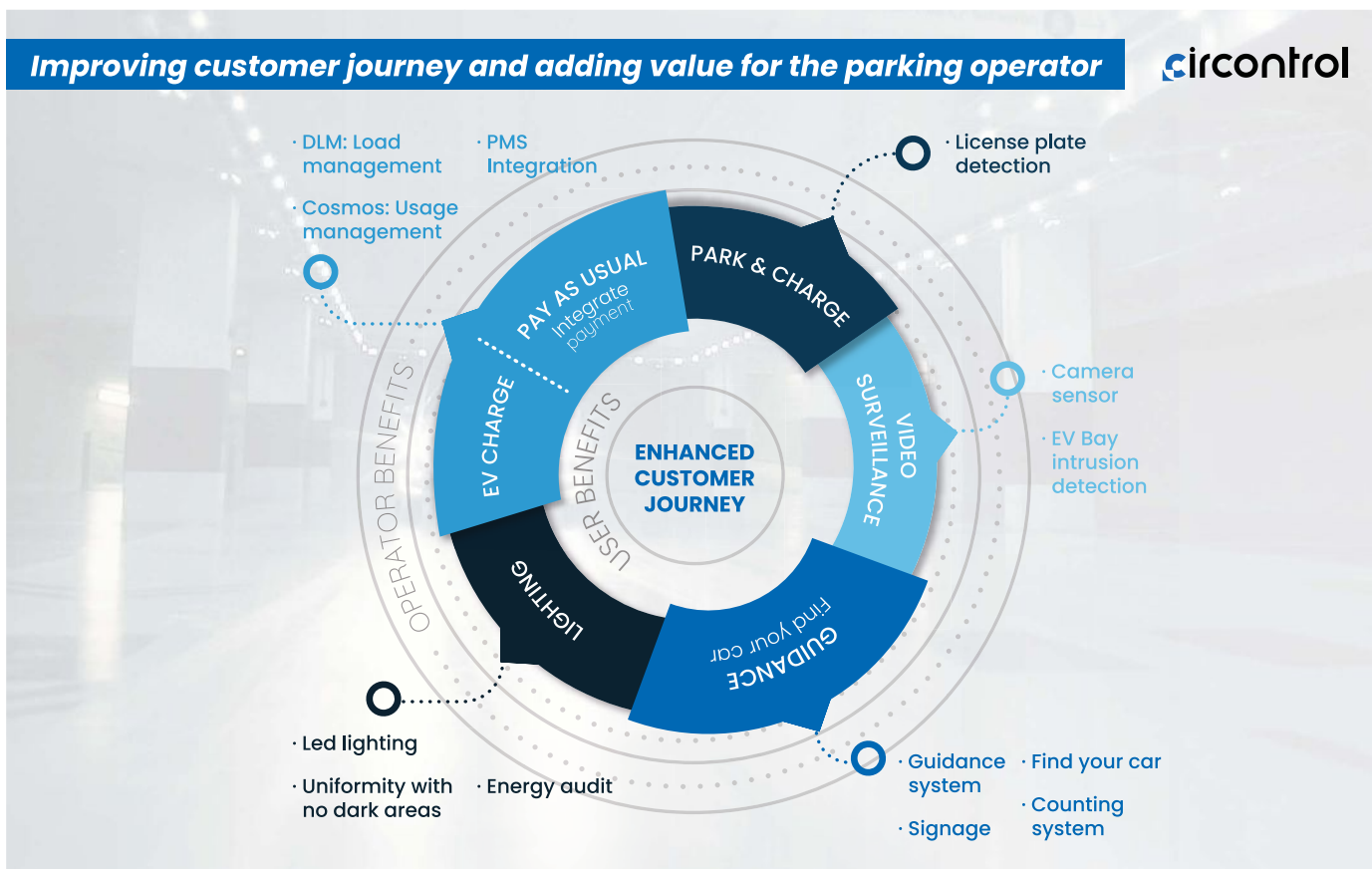
the parking, reducing the time it takes drivers to find parking spots by 50%. Moreover, they contribute to a significant improvement in parking occupancy rates with gains between 15% and 30%.

Beyond conventional guidance sensors, camera sensors, such as the Circontrol KSensor, provide more features and benefits for parking owners and customers. These sensors serve dual purposes, doubling as surveillance cameras and license plate readers. Furthermore, they provide real-time occupancy monitoring. This technology opens doors to a host of intelligent

Above: The Circontrol semi-fast EV charger eVolve Smart in use in Barcelona, Spain

features, like for example the option of “Find your Car”. It not only enhances security and occupancy management but also elevates the overall parking experience for users.

On the other hand, LEDPark products contribute to reducing energy consumption and improving the efficiency of the installation. Their low power consumption and long-lasting equipment not only optimise operational costs but also lead to reduced installation and maintenance costs. All these solutions combined with EV charging offer a 360° future-proofed solution. ■





Trend radar

A glimpse into the future: the key technologies and trends shaping the ITS industry

Words: **Johanna Boellmann-Thraen**, head of marketing and communications, Yunex Traffic, Germany

Nearly halfway through this eventful decade, the world has undergone significant changes – wars, pandemics, economic upheaval, and shifts in political power. The global landscape looks very different from its 2020 version. And the same is true for mobility in cities around the world: urbanisation, digitalisation, and technological change are presenting cities with new challenges while opening new opportunities to orchestrate today's transportation to meet tomorrow's challenges. Four trends are hereby at the forefront and deserve a closer look.

Paving the way for holistic traffic management

When tackling the many challenges of traffic management, ranging from reducing emissions to getting infrastructure ready for autonomous driving, traffic managers often resort to individual solutions. This fragmented approach not only costs a lot of time, but

Above: Intelligent solutions play a crucial role in minimising the risk of accidents and enhancing the safety of the most vulnerable road users

also neglects untapped potential. By connecting traffic management data points, decision makers in cities can anticipate and respond to situations and tailor solutions to meet the specific needs of residents.

By providing comprehensive, all-in-one traffic management systems, industry leaders such as Yunex Traffic offer solutions for cities to keep the traffic flowing and thus help to reduce congestion-related emissions. With its comprehensive traffic management platform Yutrafic Symphony, Yunex Traffic enables cities of all sizes to solve their individual traffic challenges in one place – from urban traffic control to multimodal traffic management. The system supports operators to make better and more sustainable decisions, from simple tasks such as monitoring and maintaining field devices to complex solutions such as traffic management involving environmental data, simulations, or even connected vehicles.

While central management platforms like this will remain critical, customers will increasingly expect traffic management service providers to offer additional control capabilities, such as environmental monitoring and predictive analytics.

Joining forces for more sustainable mobility

A long-standing trend in mobility is the ongoing shift toward more sustainable practices. The urgency is underscored by the state of traffic in global cities: congested roads and air pollution from exhaust emissions. Despite ongoing efforts to address these issues, the environmental impact of mobility remains significant, contributing to almost a fifth of global emissions.

The encouraging news is that technology enables cities to mitigate the ecological footprint of mobility, a contribution already in action today. Yunex Traffic, for instance, has been at the forefront of efforts to curtail traffic-related emissions and enhance air quality. With its GoGreen portfolio, Yunex Traffic offers a wide range of customized traffic management solutions to help cities and traffic operators worldwide to minimize the environmental damages and air pollution caused by road traffic.

"We cannot lose any time to master the transition to more sustainable



Left: Connected traffic management data points

Below: Intelligent controlling of green waves with Yuttraffic awareAI

2040

The year Yunex Traffic is committed to achieving net zero carbon emissions within its own operations

mobility,” says Markus Schlitt, CEO of Yunex Traffic. “That is why we have developed a dedicated portfolio to equip cities and transport managers with all the tools they need to reduce transport-related emissions. And ultimately, to protect our planet.”

The GoGreen portfolio encompasses a 360-degree approach, including solutions to decrease the energy consumption of utilised traffic infrastructure, such as traffic lights, strengthen greener modes of transport and orchestrate mobility based on environmental parameters.

As part of this portfolio, the Environmental Traffic Management (ETM) system serves as a single point of contact, providing customers with all the data and tools they need to manage and optimise their traffic flow for the benefit of the environment by combining real-time traffic and environmental monitoring, traffic anomaly detection, air pollution forecasting, and traffic/air pollution relationships.

Real-world AI use cases

Like the substantial integration of generative AI solutions such as ChatGPT into our daily lives, an increasing surge in AI investment is anticipated as companies transition from experimental phases to practical applications. The ITS industry is already witnessing a proliferation of sophisticated solutions leveraging AI’s capabilities. As mobility becomes increasingly prevalent, these solutions play a crucial role in minimizing the risk of accidents and enhancing the safety of the most vulnerable road users.

One example is Yunex Traffic’s AI-driven detection system Yuttraffic awareAI, which anonymously analyses the movements of all road users in the live image of intersections. By using AI

to detect, classify, and track everyone involved, green lights at intersections can be extended for larger groups of pedestrians, wheelchair users or elderly people. Additionally, this system alerts motorized vehicles about vulnerable road users to increase safety.

The insights allow traffic operators to adjust their strategies and improve existing traffic management systems. Furthermore, solutions like this can support autonomous driving vehicles by gathering environmental data from the road infrastructure perspective, and thereby providing an extra layer of safety and predictability.

The role of AI will extend from simulate scenarios to predict traffic trends. These predictions can be integrated into adaptive traffic control applications such as Yuttraffic Fusion. This system uses data from multiple sources and with this, new advanced decision-making approaches control and optimise road networks and transport infrastructure for all road users. The system is adaptable and suitable for applications of any size and enables cities to manage their complex road transport networks and to optimise traffic flow, supported by AI.

Improved data connectivity fuels new business models

By analysing massive real-time data sets and connecting IoT devices with comprehensive traffic management platforms, the ITS sector will increasingly offer tailored predictive analytics services, and a shift towards subscription-based business models can be expected. The power of data will provide additional monetisation opportunities, for example, by offering valuable insights from IoT-generated data to third parties. Faster digital

connections, powered by 5G and the IoT, will unleash the full power of this new data economy era. To fully realize this potential, seamless communication between disparate data sources is key. The revised EU ITS Directive (October 2023) is an important milestone in this matter serving as a framework for connecting vehicles, roads, assets, and other devices. The directive advocates for increased data availability and interoperability among various mobility services, including multimodal journey planners and navigation services.

As digital and physical infrastructure increasingly converge, cybersecurity will be an elementary success factor to ensure the critical infrastructure is secured. Cyberattacks and vulnerabilities in one area can have a cascading effect on numerous other areas. If they’re not already doing so, cities should embed cybersecurity as an integrated approach throughout the whole smart city development process, from the planning, design, and transformation stages, considering industry standards, legal and regulatory requirements.

Ultimately, the interplay of these advancements will redefine business models and reshape the mobility landscape. Collaborative ecosystems in which disparate businesses share data and insights through interconnected platforms will flourish, fostering new opportunities and reshaping traditional industry boundaries.

Key players in the ITS industry have already underscored collaborations with other market entities, industry leaders, or start-ups, with the anticipation of more such partnerships in the future.

The future has arrived

The technological solutions and opportunities are now all available and in place to shape a more sustainable mobility. The future of transportation has already arrived, and it is now up to the decision makers of city and road infrastructures to actively engage. ■

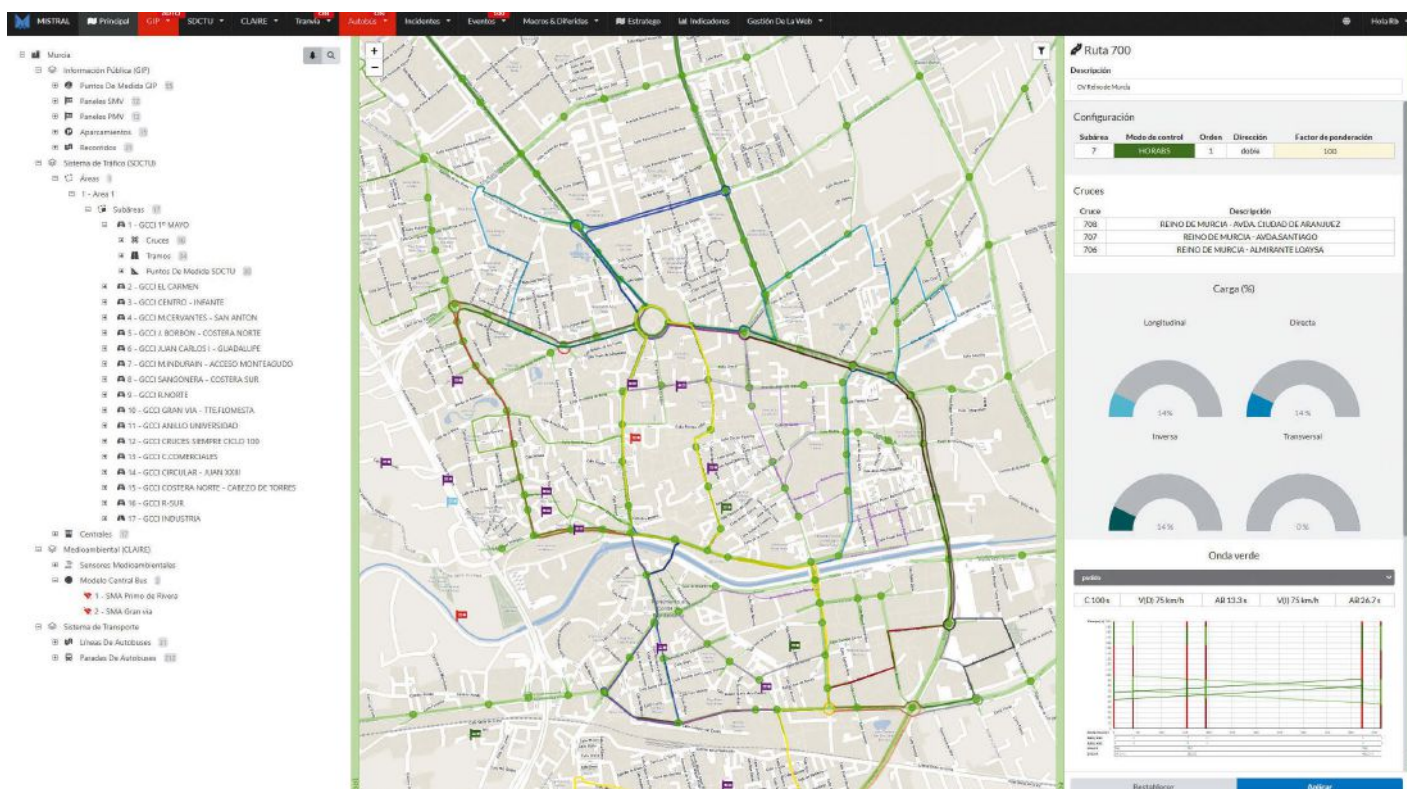
VIDEO EXTRA



Sustainability toolbox

Electric and automated mobility technologies are powerful tools in the mission to improve road safety and reduce transport-related emissions

Words: **Antonio J Ortín López**, general manager, ETRA I+D, Spain



The mobility of people and goods is a basic requirement for economic and social development. Studies suggest that a 10% decrease in journey times can boost productivity by 2.9% and that, in highly congested regions, free-flowing traffic could mean productivity gains of up to 30%.¹ This requirement for mobility contrasts with the negative side effects it can have, such as traffic accidents, pollution and the emission of greenhouse gases. Each year, 1.35 million people are killed on roadways around the world.² Air pollution causes over 6.5 million deaths each year globally, and road transport generates 12% of greenhouse gases.^{3,4}

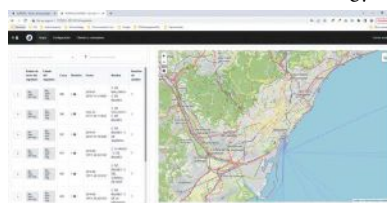
To tackle these important challenges, two powerful tools can be used: electric mobility, and autonomous and connected vehicles (CAVs). The large-scale adoption of electric vehicles (EVs) will reduce

Above: The Mistral platform web interface

Below: The web interface for the vehicle communications manager Aurora

pollution and greenhouse gas emissions. Obviously, this is not a silver bullet. Simply replacing ICE vehicles with electric vehicles will not solve all mobility challenges. However, at this point it has become abundantly clear that the electric vehicle is an indispensable building block within the wider picture of greener, safer mobility.

CAVs are expected to make mobility safer. Their potential to save lives and reduce injuries is rooted in one critical fact: 94% of serious crashes are due to human error.⁵ However, in the current state of autonomous vehicle technology,



it is necessary to expand the operational design domain (ODD) through additional physical and digital infrastructure (PDI). In other words, smart mobility infrastructure must be able to embrace the automated vehicle in a bidirectional, symbiotic interaction. Just like EVs, CAVs are a very powerful building block that need to be adequately integrated in the right framework to deliver all their potential.

The Mistral platform is a good example of how the right building blocks can be integrated in a common framework and managed optimally to achieve the goal of safer, greener, more sustainable mobility. Mistral incorporates specific functionalities for the management of EVs and CAVs. For EVs, Mistral integrates the management of charging infrastructure – both for private vehicles and for public transport busses. For CAVs, it integrates the PDI

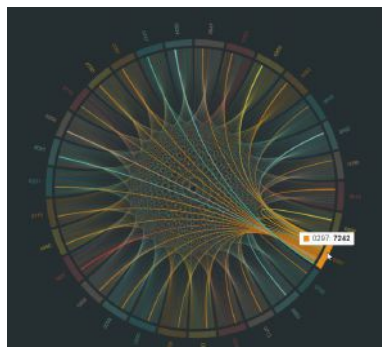


that allows for the extension of their ODD. This includes sensors associated with infrastructure, communications networks, traffic light signalling, virtual signals, roadside units (RSUs), on-board units (OBUs), information shared by CAVs, information from vulnerable road users (VRUs) and high definition (HD) maps. Furthermore, Mistral offers specific aid for the management of autonomous buses, improving the safety of VRUs and managing the interaction of CAVs with emergency vehicles.

Mistral manages all this information, relying on its digital twin of the road network and all its actors. For example, Mistral includes a vehicle communications manager called Aurora that manages the information related to cooperative intelligent transport systems (C-ITS) ETSI protocols.

Mistral enables mobility managers and traffic authorities to apply the most appropriate policies to each case so that the correct management of CAVs leads to advantages to the whole of society, not only to the users of CAVs. Mistral not only provides aid to CAVs but also uses all the information generated by connected vehicles for

Right: A graphical representation of the origin/destination matrix that Mistral can generate using big data and AI



mobility management at tactical and strategic levels. At a tactical level, Mistral uses algorithms that favour the circulation of certain types of road network users, such as public transport buses, high occupancy vehicles, emergency vehicles, micromobility and pedestrians. At a strategic level, it considers the dynamic information of the OD matrices to select the most appropriate strategies for each demand situation. Mistral, in addition to managing supply, can manage demand, recommending the most appropriate routes for connected vehicles and guiding - or even prescribing - the behaviour of autonomous vehicles.

94%

The number of serious crashes due to human error

C-ITS systems were implemented within the Compass4D project, which served as the basis for the generation of a specific component for C-ITS communications, Aurora. C-ITS is also the basis for V2I communications in the EU-supported Podium and Augmented CCAM projects. Soon, Mistral will have new functionalities to help CAVs navigate roadworks, areas with poor GNSS coverage, adverse environmental conditions, with the aim of enabling the safe, green, mobility of the future, today. ■

References

1. https://www.eca.europa.eu/lists/ecadocuments/ap19_07/ap_urban_mobility_en.pdf
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10154805/#:~:text=Across%20the%20world%2C%20traffic%20accidents%20cause%20majorhealth%20problems%20and%20are,motorcyclists%2C%20or%20pedestrians%2C%20as%20vulnerable>
3. [https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196\(22\)00090-0.pdf](https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196(22)00090-0.pdf)
4. <https://www.statista.com/topics/7476/transportation-emissions-worldwide/#topicOverview>
5. <https://pursuit.unimelb.edu.au/articles/tackling-human-error-to-stop-vehicle-accidents>

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How AI and CVs are transforming ITS

Artificial intelligence and connected vehicles are making roads safer, greener, and more efficient

Words | **Trond Christensen**, Group CEO/CFO, **Fredrik Nordh**, tolling and AI, and **Dan Skiffington**, ATMS/traffic management, Q-Free, Norway

If you're part of the ITS industry, you're accustomed to three key themes: safety, sustainability, and efficiency. That's the ultimate goal the entire industry works towards: safe, uncongested travel with reduced emissions.

Using innovative technologies to improve these aspects of traffic and transport is not a novel idea; it is something Q-Free has been doing since entering the ITS industry in 1984. Back then, artificial intelligence (AI) and connected vehicles (CVs) were science fiction. Today, AI and CVs in transport are a reality thanks to intelligent tolling systems and advanced traffic management.

AI and machine learning

AI, or the simulation of human intelligence by computers, and machine learning, the ability for software to train itself for better outcomes, are popular buzzwords in tech circles for a good reason—they represent a level of technology almost unimaginable in power and function. With increasing amounts of data and data sources

Above: AI and machine learning are transforming traffic management
Below: **Frederik Nordh**

generated today, intelligent transport must rely on AI and machine learning to handle the significant amounts of data and decisions happening every second.

Enhancing vehicle classification

"We use AI in a focused way that allows it to be really great at its job," says Fredrik Nordh, Q-Free's EVP of tolling. "AI is built into our Intrada Insight image review software for extreme accuracy when identifying vehicles and license plates. The results are so precise agencies use them for tolling, billing, and enforcement."

"With this technology, there's no longer a need for drivers to stop at a toll booth, keeping traffic moving and enhancing road safety," Nordh adds. "We can accurately scan an in-vehicle tolling tag, read license plates from the road, or use AI to identify vehicles with a digital fingerprint, an image unique to each

vehicle based on shape, plate numbers, colour, and more. It's seamless as the vehicle moves at normal speeds."

The major hurdle to enforcing road-use charging (RUC), where road users are automatically billed tolls for using a roadway, has traditionally been accuracy.

With AI, vehicle classification exceeds benchmarks for billing and enforcement. In addition to identifying a vehicle by plate or fingerprint, AI has improved RUC by classifying electric vs fossil fuel vehicles, the number of axles, rare setups including towing, or even identifying hazardous materials placards.

AI-driven, intelligent systems even use machine learning to improve further. The systems use collected data and human verification input to train algorithms for better accuracy, efficiency, and decision-making processes.

349

The number of employees that Q-Free has in 15 countries





Data-driven connectivity

Advanced traffic management systems (ATMS) can connect city centres, highways, and regions, allowing them to operate as one complete system. ATMS solutions, including Q-Free's Kinetic Mobility, can manage systemwide data gathering, processing, and sharing across multiple devices and uses. This large-scale data aggregation and dissemination also has an additional benefit—it enables data sharing and connected vehicle-to-everything (CV2X) deployments, which serve as backbones for smart corridors, regions, or cities.

The near future holds limitless possibilities for transportation, including intelligent, self-driving vehicles that communicate with surrounding vehicles and infrastructure.

A morning commute in a connected city could involve little input from a driver, as your vehicle and navigation software automatically react to input from local traffic controllers. Routing around an accident or responding to

congestion or weather alerts could be fully automated.

"We are at a unique time in ITS, where we are applying today's technology and building the framework for smart cities," says Dan Skiffington, EVP of traffic management for Q-Free. "There are huge volumes of data available from various sources, such as sensors, cameras, signals, and vehicles, that traffic management can use to make smarter decisions, whether manually by an operator or automatically through an ATMS system like Kinetic Mobility. Smarter decisions improve traffic flow, reduce congestion and emissions, and enhance safety for all road users, including cyclists and pedestrians."

How CVs are transforming transportation

In Georgia, USA, a connected vehicle hotspot, the Georgia Department of Transportation uses cellular signals to communicate in CV2X systems that make up the Gwinnett County Smart

Above: Q-Free's Kinetic Mobility system unifies local, intercity, and regional traffic operations in a single platform

Bottom left: AI-based tolling technology in use in Slovenia

Below: Dan Skiffington



Corridor project. The ambitious project features thousands of connected vehicle intersections that run Q-Free's Maxtime software at the intersection. These systems work together to improve emergency vehicle response times, prioritise green lights, and regulate traffic flow across an entire transportation corridor.

Connected vehicle technology isn't just for morning commutes. In Europe, the MODI Project will enhance goods transport and logistics by supporting the implementation of connected, automated mobility solutions. Electric, driverless, fully automatic transport trucks leverage a network of sensors, data, and connected vehicle technology to demonstrate the future of automated transport, delivering goods from Rotterdam to Oslo in ways that human drivers cannot.

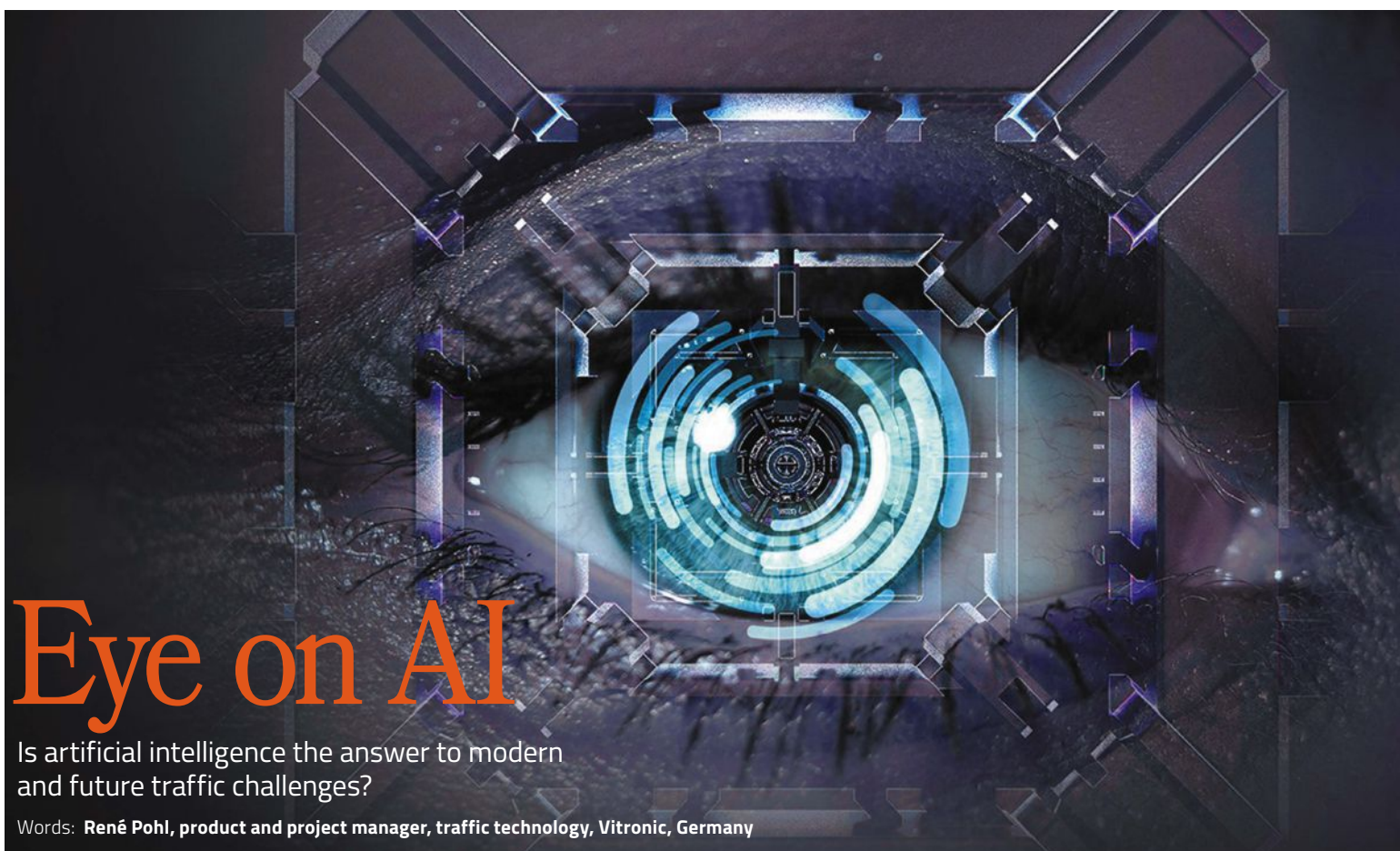
The future of ITS

Innovation in intelligent transport systems is a constant force driving the industry forward. The industry delivers on the shared goals of sustainable, safe, uncongested transport everywhere by actively participating in innovation, including ongoing collaboration with agencies, industry partners, and even among competitors.

"Today's tech is shaking up the global ITS industry," Nordh says. "When Q-Free started 40 years ago, the tech we see today didn't seem attainable. Now, it's a reality; we're using AI right now. The thought of, 'What will the next 40 years bring?' is almost unimaginable."

We look forward to 40 more years of industry-wide innovation and collaboration to deliver on the ultimate goals of intelligent transport: the safe, clean, free-flowing movements of data, goods, and people. ■





Eye on AI

Is artificial intelligence the answer to modern and future traffic challenges?

Words: **René Pohl**, product and project manager, traffic technology, Vitronic, Germany

Advances in AI and its use are a driver in almost every aspect of modern life, one might even say a game changer in many settings. And this is especially true in mobility, where AI is enabling new applications that support and fuel the traffic transition.

The vehicle for the performance of AI in traffic applications is easy access to more powerful hardware. This includes, on the one hand, faster, more compact, and performant processors, which increasingly enable more processing capacity in a small space, and, on the other hand, advanced camera technology, which has made a huge leap in recent years.

Industrial cameras today have more capabilities than the human eye – from colour recognition and a wide field of view to “seeing” very small details and vision in the infrared spectrum. Furthermore, they allow very good images to be taken even in poor visibility conditions, for example at night or in bad weather. With this hardware available, it is above all the software that determines the possibilities of the resulting video-

Above: AI-based cameras for traffic control have almost the same capabilities as a human eye

based traffic enforcement. It decides what content can be processed, analysed, and utilized, in other words, how excellent vision is transferred into applications. Intelligent solutions are the key. And what provides particularly promising approaches in this regard are neural networks such as CNNs (Convolutional Neural Networks), which are used at Vitronic. These networks can be trained with image material and deliver superior performance to algorithms for detection and identification. Straight to the point, they can capture objects more differentiated or more effective within milliseconds.

Road safety in view

To illustrate the benefits of AI for traffic, two areas can be looked at. The first is traffic safety or, more precisely, accident prevention. For example, intersections and junctions already account for nearly half of all road users injured or killed in urban settings. As a result of the traffic transition, road scenarios are becoming even more complex, especially at these traffic points, and increasingly diverse road users, including micromobility, are

encountering each other. This further amplifies the risk of accidents.

Video-based enforcement systems using AI keep up with this change, as they allow the monitoring of more complex situations with various road users. They can, as a prime example, automatically distinguish between pedestrians, cyclists and motorized vehicles and thus detect when the right of way at crosswalks is not being complied with. This option significantly improves the safety of vulnerable road users (VRU). In addition, different violations can be captured simultaneously, which addresses several accident causers at once. Possible applications in traffic enforcement include the already highlighted surveillance of crosswalks, red light enforcement, documentation of turning violations and many more.

Mobile phone distraction

One innovation in this sector is a fully automated enforcement system using AI-based software that detects the use of a smartphone while driving. This is the answer to a very modern problem because this behaviour is widespread and



extremely dangerous. Recent research shows that the risk of accidents increases twofold when talking on the phone, sixfold when texting, and twelvefold when typing a phone number. Many road users underestimate this risk, and since enforcement has been extremely costly in terms of manpower and virtually impossible to implement across the board, there has been little deterrent effect.

The new system changes this by its mobile as well as semi-stationary applicability and autonomous functionality. In this application, the AI is trained using images so that it recognizes when the driver of a vehicle is holding a mobile phone – replacing the time-consuming manual evaluation of image recordings. Therefore, the monitoring of mobile phone distractions is now possible anytime, anywhere and can change the behaviour of drivers in the medium and long term.

And the AI-based system has another application that contributes to road safety. It can be operated to detect seat belt violations. While this does not prevent accidents, it can significantly influence the severity of their outcome. A seat belt worn reduces the risk of fatal injury by at least 50%, and about one in four drivers or passengers killed in a traffic accident were not wearing a seatbelt or were not wearing it correctly. Soon, this AI-based system or similar ones could be deployed to capture even

more distracted driving offenses and thus improve safety even further.

Advanced traffic management

The second area that highlights the progress AI brings to the table is the optimization of traffic in urban settings. Cities face the challenge of better managing traffic, making it more sustainable and reducing it. The following figures show how necessary this is. In 2022, drivers in major German cities spent an average of 40 hours stuck in traffic jams. And 96% of the urban population in the EU was exposed to air pollution levels higher than the WHO limits in 2020.

One way to make a difference here is through driveway regulations and restrictions. This involves, for example, low emission zones, lanes for public transport or high-occupancy vehicle

40
The number of hours drivers in major German cities spent stuck in traffic jams in 2022

Above left: Using a mobile phone while driving is one of the violations which can be detected by AI-based technology

Above right: An installation of an AI-based red-light enforcement system in a pilot project in the US

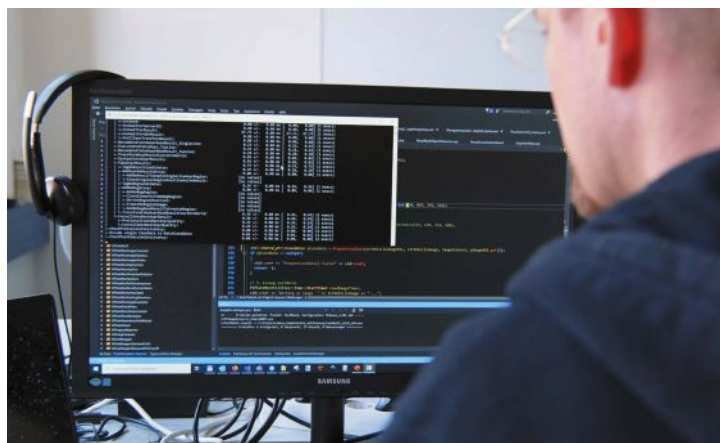
Below: Software development and training of Convolutional Neural Networks (CNNs) is carried out at Vitronic

lanes. Here, too, enforcement is often the challenge: How can we ensure that drivers do not use the bus lane? How can it be made sure that only authorized vehicles enter an environmental zone? Or even more difficult: how can it be detected that drivers are not traveling alone in a high-occupancy vehicle lane? Once again, AI provides a solution. Not only can it read license plates, but it is furthermore capable of capturing other information about a vehicle – from the type of automobile to the number of passengers. This creates a data basis that helps to implement effective measures.

A technology of the future

Looking at all this, it becomes clear why AI- and video-based traffic systems can be the facilitators of the traffic transition. But their application diversity and performance are not the only reasons. Two others are worth highlighting. First, their innovation potential. For developers, it is an affordable technology with lower entry barriers compared to others, which stimulates creative problem solving and further development. Second, the comparatively

low investment they require for acquisition and implementation, coupled with the resulting faster ROI. This is particularly interesting for smaller municipalities, that previously had difficulties to refinance. Due to this new affordability of effective traffic systems more states and municipalities can utilize them, and in turn support a comprehensive realization of the traffic transition. ■





Urban solutions

Lidar technology can facilitate safer, smarter transportation in city centres

Words | **Julie Bourdinot**, marketing manager, Outsight, France

The rapid expansion of urban populations is exerting pressure on city infrastructures, leading to increased traffic, more frequent accidents and higher levels of pollution. Europe's congestion costs amount to approximately €110 billion (US\$120 billion) each year, and the USA faces an US\$87 billion (€79.5 billion) cost, highlighting the urgency for smarter transportation solutions.

With the automotive industry expected to grow by 2% annually until 2030, according to McKinsey, the need for intelligent transportation systems (ITS) becomes even more pressing. These systems are essential for transforming cities into safer and more intelligent communities.

Monitoring the flow of vehicles and pedestrians is key to creating smarter, safer cities. This process helps in the efficient allocation of resources, reduction of emissions, and prevention of accidents.

Lidar technology stands out for its ability to provide precise and detailed 3D spatial measurements, functioning

Above: 3D lidar data, when processed with real-time software, delivers unique insight at intersections

Below: Conflict count at Bellevue: before and after Outsight's solution deployment

effectively in various lighting conditions, and respecting the privacy of citizens by not capturing identifiable information.

In ITS, lidar technology is valuable for traffic monitoring, enhancing the safety of intersections, identifying at-risk road users, and preventing potential accidents. However, the complexity of lidar data, particularly when integrating multiple devices, can be a challenge, especially for real-time traffic management applications.

Outsight's 3D lidar data software solutions are designed to tackle these challenges. They process large volumes of data at the source, converting it into a more manageable form that requires less bandwidth, facilitating low-power wireless communication.

Safety applications

A prime example of this technology in action is in Belleville, Washington, where Outsight's systems have been

	Before	After	Difference
Adjacent-Approaches	119	10	-91.60%
Opposing-Approaches	12	1	-91.67%
Rear-End	149	35	-76.51%
Side-Swipe	45	6	-86.67%
Pedestrian	128	16	-87.5%
Bicycle	16	0	-100%



implemented to manage traffic intersections with the goal of eliminating traffic-related deaths and serious injuries.

Bellevue's collaboration with Outsight is more than a traffic reduction effort; it's a life-saving mission. Although pedestrians and cyclists account for only 5% of traffic incidents, they make up 55% of fatal and serious injuries, with 41% of these severe cases being due to failure to yield.

The outcomes of implementing the technology and improving the intersection's markings and layout are astounding, including a reduction of 91.6% in adjacent-approaches events and 0 occurrences involving bicycles, vs 16 previously (see table).

The collaboration between Bellevue and Outsight exemplifies ITS's transformational potential. Cities can better manage resources, lower pollution,

and prevent accidents by combining ITS with lidar technologies.

The added benefit of protecting citizens' privacy makes these solutions even more appealing.

In conclusion, the integration of ITS and lidar technology is proving to be an

Below: **People walking and cycling represent just 5% of all crashes, however, they account for 55% of all fatal and serious crashes**

effective solution for the challenges faced by modern urban centers. As cities continue to grow, the need for efficient, safe, and environmentally friendly transportation becomes paramount. The ability of lidar to provide accurate data without compromising privacy is a game-changer, offering a blueprint for cities worldwide to follow. With the reduction of accidents and the optimisation of urban flow, ITS stands out as a beacon of innovation, guiding us towards a more sustainable and secure urban future. ■

€110bn

The cost of congestion in Europe each year

Vulnerable road users
5%



Total crashes

Vulnerable road users
55%



Fatal and serious crashes

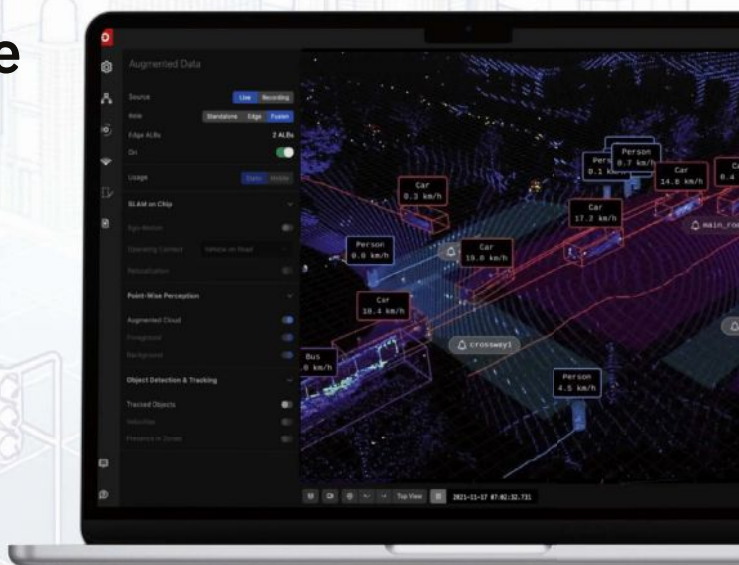
Failing to yield
41%



Pedestrian fatalities and serious injuries

outsight

Lidar-Based Software Solutions for ITS



Learn more at outsight.ai



Joint forces

An interview with Christian U Haas, CEO of PTV Group and Econolite, reveals how collaborative technology can play a crucial role in simplifying the complexity of mobility

Words | **Stefanie Schmidt, PTV Group, Germany**

It has been about a year since PTV Group and Econolite unveiled their new joint umbrella brand, Umovity. Over this time, the two companies, have been actively harnessing the synergies of their technologies for traffic planning and management.

Mr Haas, how would you characterise the past year?

The past year has been incredibly exciting for all of us at PTV Group and Econolite. We had to reorganise our operations, adapt our strategy, and enhance the collaboration between our teams. I take great pride in what we have accomplished so far. However, it hasn't

Above: Christian U. Haas, CEO of PTV and Econolite

Right: Last autumn, PTV and Econolite presented their integrated Mobility Tech Suite, which enable cities and organizations to improve the efficiency, safety, and sustainability of transportation networks



been too challenging because we share a common mission: to enhance mobility by delivering innovative technology that makes it safer, more sustainable and more efficient.

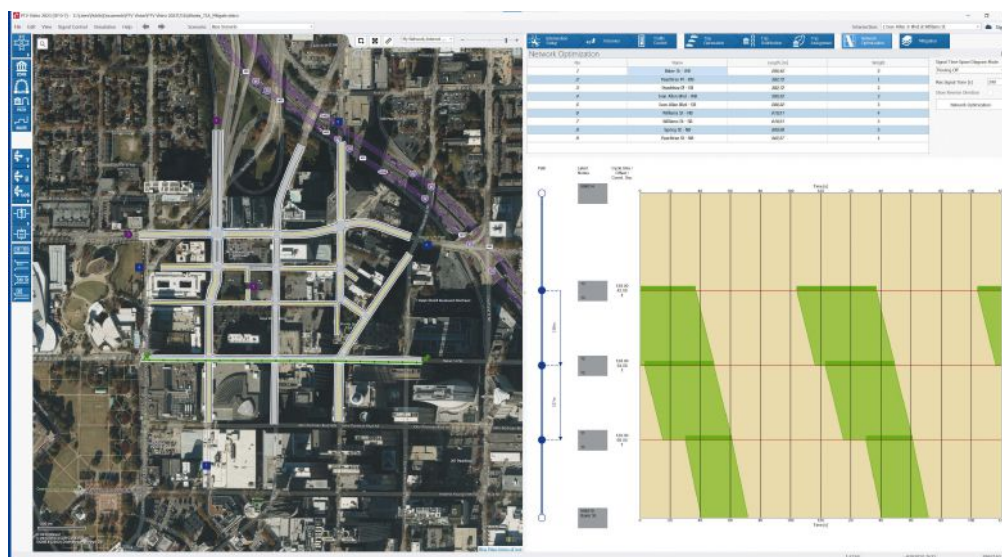
The journey we embarked on is full of new opportunities. Econolite is a leading provider of traffic management solutions in the USA, while PTV's software solutions for traffic modelling and simulation are recognised as global standards. The synergy between our solutions is abundant.

By harnessing the strengths of both companies, we can offer a comprehensive approach to managing the entire mobility value chain, encompassing both software and hardware. This positions Umovity as a one-stop-shop for end-to-end technology and services, dedicated to realising smart, safe, and sustainable transportation.

Last autumn, you introduced the new collaborative Mobility Tech Suite under the Umovity brand...

I'm highly enthusiastic about this joint endeavor. Historically, at PTV, we unveiled our software's new features in October. In 2023, for the first time, PTV and Econolite presented their latest developments together within the Mobility Tech Update.

A key highlight of this presentation was the introduction of the integrated Mobility Tech Suite. This suite seamlessly incorporates powerful expert products, including our industry-leading modelling, simulation, and traffic operations software, as well as new, streamlined software as a service (SaaS) offerings, designed for specific use cases. Additionally, it also includes our innovative cabinets, controllers, video and radar sensor technologies and most reliable field maintenance and professional services.



With the Mobility Tech Suite we empower our customers to address a wide spectrum of needs, ranging from strategic mobility planning and traffic management and prediction to on-site traffic operations and optimisation, regardless of the project's scale, scope, or timeline.

Can you provide more details on some of the suite's key features?

The Mobility Tech Suite opens completely new opportunities to connect products and use cases.

One noteworthy example is the seamless integration of Econolite's industry-leading EOS Controller with PTV Vissim. This integration allows for the replication of controller logic within traffic simulations, simplifying signalisation testing across various scenarios and providing valuable simulation-driven insights.

Another compelling feature is the integration between Econolite's advanced transportation management system, Centrac, and PTV's transportation engineering software, Vistro. This integration streamlines traffic signal timing analysis and traffic impact studies, eliminating the need for complex setups and fragmented analyses. With this connection, users no longer have to manually input signal timing parameters into the software. Instead, the Centrac-Vistro integration effortlessly provides a wide range of traffic signal time-of-day patterns and timings to Vistro, and vice versa, ensuring the highest quality in traffic signal management.

Furthermore, we have combined Econolite's SaaS product Centrac Mobility with PTV's SaaS prediction and

optimisation tool, PTV Flows, and are continuously working on enabling advanced prediction and control within the same operational environment. This continuous development underscores our commitment to providing comprehensive and cutting-edge solutions for our customers.

Has the union between PTV and Econolite led to collaborative projects?

Certainly. We are continuously focused on harnessing our synergies and delivering enhanced value to our customers. Just a few months ago, we celebrated a significant milestone for Umovity. The installation and successful use of Econolite's Evo Radar sensor in South Gloucestershire, UK marked a pivotal moment. This was not only the first time that PTV piloted a piece of traffic detection hardware but also the first deployment of an Econolite product in Europe. The data gathered by the sensor can then be ingested into PTV modelling software and analysed to simulate any potential changes that could improve traffic flow. There is also more in the pipeline, which will be revealed at Intertraffic Amsterdam.

Could you share some innovation highlights with us?

One of the most remarkable developments in the field of city and transportation management has been the introduction of PTV Model2Go. This groundbreaking tool leverages smart automation technology to create fundamental transportation models for

Above: The integration of PTV Vistro 2024 with Econolite's Centrac streamlines traffic signal timing analysis and traffic impact studies

Below: The Evo Radar sensor in South Gloucestershire is the first deployment of an Econolite product in Europe

110°
The Econolite Evo Radar's field of view



any city or region worldwide in just one week. This is a remarkable advancement from the previous manual process, which could take several months to complete. In the latest version, PTV Model2Go Demand, we have incorporated traffic demand data, enabling users to directly execute a wide range of common traffic and mobility analyses.

At PTV Group, we are on a mission to deliver more advanced SaaS products, constantly building new web-first solutions. In addition to our renowned flagship expert products like PTV Visum and PTV Vissim, we are committed to offering lightweight tools that simplify the daily work of traffic planners. For instance, we recently launched PTV Lines, an intuitive cloud tool designed to streamline public transport sketch-planning.

Another great example is PTV Flows, our data-driven SaaS tool for real-time traffic management. Using machine learning and state-of-the-art algorithms, it enables users to monitor and proactively manage traffic flows. By identifying patterns and trends, the self-learning system visualises incidents in the road network and forecasts unexpected congestion up to two hours in advance. We have designed it with cities and road authorities in mind that don't have the time or the resources to set up and maintain an advanced traffic management infrastructure. No access to traffic management infrastructures or detectors is required.

What motivates you personally to strive for improved mobility?

I must admit that before I joined PTV Group four years ago, I didn't realise the profound impact that mobility has on our lives, as I do today. We often take it for granted, yet ensuring accessibility and maintaining smooth and safe traffic flow for everyone is a significant undertaking. Simultaneously, mobility is a fundamental need for all of us, granting us the freedom to go to work, meet with others, and access essential services like education, healthcare, culture, and new perspectives. Technology plays a crucial role in simplifying the complexity of mobility and adapting it to the various needs of people worldwide. The idea that our advanced software and hardware solutions contribute to increased efficiency, accessibility, safety and sustainability by minimising congestion, accidents, and pollution is a source of motivation for me every day. ■



Let's make Europe green

Swarco has embarked on a tour of Europe to showcase, using virtual reality technology, how its traffic technology solutions can help cities reduce emissions and achieve the key goals of the European Green Deal

Author: **Richard Neumann, senior manager of communications and events, Swarco Group, Austria**

What do cities like Rotterdam, Dublin, Malmö, Dortmund, Lisbon, Paris, Milan, and Krakow have in common? Like 100 other European cities, they all are committed to the European Green Deal. This means they want to become climate neutral by 2050 and reduce greenhouse gas emissions by 55% compared to 1990

Above: An interactive VR user experience: A glimpse at Swarco's Virtual MetaCity

values by the year 2030. The cities must develop a program of measures over several sectors to reach these ambitious goals. One sector to consider is transport.

In 2021, fuel combustion-related emissions from the transport sector accounted for 23% of global emissions, according to the International Energy Agency. This constitutes a major point of departure for improvement.

And this is where the Austrian-based, international traffic technology corporation Swarco offers support for the cities. At the ITS European Congress in Lisbon in May 2023 the company kicked off its GoGreen initiative aimed at such cities, under the motto, "Let's make Europe green. Deal?" The official ribbon-cutting of this Swarco initiative took place in the presence of deputy



director-general Herald Ruijters from DG Move/European Commission, ERTICO chairman Angelos Amditis, ERTICO CEO Joost Vantomme, and Swarco CEO Michael Schuch.

“Between May 2023 and Intertraffic Amsterdam in April 2024, we will follow a collaborative Swarco approach to deliver an innovative experience for all Green Deal cities in Europe,” comments Swarco CEO Michael Schuch. “As a major player in ITS, we would like to formally engage with them, obtain a better understanding of their actual challenges and provide support with know-how and technology available today in overcoming such challenges.”

From virtual reality to real implementation

Urban mobility management solutions play a significant role in the decarbonization of transportation and reduction of greenhouse gases. “We have created a special virtual reality experience where city stakeholders can delve into a very realistic urban environment to understand how Swarco’s offerings help tackle challenges such as air pollution, traffic congestion, micro mobility inclusion, pedestrian safety, parking space management, data-driven traffic management and modal shift,” explains Itir Coskun, innovation engineer with Swarco’s ITS Division. “VR takes into account different levels of political and technical responsibility and presents city pain points and our solutions with a little gamification in an easy-to-understand and vivid way,” Coskun adds.

City experiences

The new VR experience was already present at congresses and fairs in Portugal, Italy, Spain, Poland, Germany, the UK, and the Netherlands. Many more appointments have been made with Green Deal cities for the fourth quarter of 2023 and the first quarter of 2024.

“Independently of the location, we just need a 3x3m space,” Coskun explains. “You put on the goggles and off you go in a 3D world introducing you to major city pain points like air pollution, congestion, scarce parking spaces and insufficient safety for VRUs. As the mayor or the traffic engineer of a city, you get useful information how to tackle such pain points by means of intelligent transport systems and tailored solutions from the Swarco portfolio.”

The pain points may vary from city to city as will their special focus. That is why the VR experience proposes solutions that involve little investment in road infrastructure. Cities may choose between a basic solution or a full-fledged end-to-end package. Traffic flow can be improved by making better use of the existing infrastructure. Intelligent parking guidance will lead people quicker to a free parking space. This avoids longer cruising to find a parking space, thus reducing emissions, fuel consumption, and stress.

Air quality is another focal point largely influencing our quality of life.

23%
The percentage of global emissions accounted for by fuel combustion-related emissions from the transport sector

Source: International Energy Agency

Below: At the ITS European Congress 2023 in Lisbon, Swarco launched a VR experience to show stakeholders how its offerings can help tackle challenges such as traffic congestion and pedestrian safety

According to the UNEP Pollution Action note, air pollution is the greatest environmental threat to public health globally and accounts for an estimated seven million premature deaths every year. Keeping traffic flowing, avoiding stopping and congestion, riding on the “Green Wave” are measures to reduce emissions and their negative impact on the environment and air quality.

A practical aid in knowing what the air quality is like can be a smart traffic light. Swarco’s AirDec add-on for the Combia traffic light generation measures environmental parameters such as CO₂, NO_x, ozone, particulate matter, humidity, and noise directly at the intersection. Traffic managers can retrieve the measured information from the cloud and introduce strategic counteractions to improve air quality by rerouting traffic or encouraging the use of public transport.

Safer micro mobility

Walking, cycling, and using e-scooters are advantageous “green” modes of transport in urban areas. However, the people using these modes are considered vulnerable road users. Road markings are an adequate means to improve the safety of these road users. Cycle path markings in green or red colour clearly separate the cyclists from the lanes of motorised traffic. Durable and functional preformed tactile markings for the visually impaired or blind can be retrofitted to the pavement, so there is no need for planning expensive raised concrete or stone structures for orientation purposes.

SafeLight, as part of a traffic light, shines a red light onto the pavement to alert distracted smartphone users from risking to run a red light.

Furthermore, high-performance road markings are key to enabling automated driving. High contrast, high retro reflectivity, and cross-border uniformity of lane markings are prerequisites for modern lane-keep-assist technologies with cameras and Lidar, as Swarco tests have shown at the Digitrans test centre in Lower Austria.

At Intertraffic Amsterdam in April 2024 Swarco will summarize its experiences with the cities and the achievements made. The fair will be the finish line for the tour of European Green Deal cities. Interested stakeholders can register for an appointment any time at www.swarco.com/gogreen. ■





Smart intersections

Artificial intelligence is paving the way for a more data-driven approach to intersection control

Words | Teledyne FLIR Systems

Traffic is still increasing worldwide. Despite high fuel prices and changing telecommuting habits, the majority of urban areas saw increasing travel demand in 2022. Across the globe, 58% of urban areas saw increased traffic delays compared to 2021.¹ Adding more roads no longer seems to be an option. Instead, we must be smarter with our currently available road infrastructure and city space.

The traffic scene is becoming more complex as well. Many cities are now launching initiatives to give city streets back to pedestrians. Also, the use of bicycles is stimulated to foster environmentally friendly and healthy mobility. All these initiatives will require new safety measures and new ways of organising intersection traffic.

In the coming decades, we can expect an even more complex traffic picture with the addition of connected vehicles (CVs) and connected autonomous vehicles (CAVs). To mitigate congestion

Above: Teledyne FLIR's thermal and visible sensors are equipped with AI to detect approaching vehicles, cyclists, and pedestrians without the need for pre-configured zones

and safety risks and to contribute to a more livable city, we will need intersections that cope with this variety of traffic streams in a smart way. Teledyne FLIR Systems is committed to remaining focused and abreast of the latest technological developments. From artificial intelligence to V2X, the company is dedicated to ensuring the safest and most efficient road networks around the globe.

Many intersections are already equipped with some kind of smart technology. Traffic lights no longer change based on fixed time intervals; they work dynamically, using smart presence detection of approaching traffic users provided by sensors and cameras installed at intersections.

Some technologies, like Teledyne FLIR's thermal traffic sensors can even distinguish between different traffic users, such as motorists, cyclists and pedestrians. This dynamic way of controlling traffic lights has already resulted in reduced delays and queues,

reduced car emissions, and more safety for vulnerable road users.

AI for optimised control and awareness

Of course, technology is evolving. Just like in many other industries, artificial intelligence (AI) is making its way into ITS as well. Hardware processing power has increased incessantly over the past decade and new ways to collect data (through wi-fi or Internet of Things sensors) are paving the way for a more data-driven approach in signalised intersection control.

Instead of analysing pixel information, AI-driven traffic cameras are now analysing the entire camera picture, providing traffic planners and controllers with total 'situational awareness' and they are doing a much better job of detecting and distinguishing between a variety of traffic users and objects. Detectors from Teledyne FLIR, for example, will easily distinguish between a car and a van, or between

58%

The proportion of urban areas with increased traffic delays in 2022 compared to 2021

VIDEO
EXTRA



a small and a large truck. The detector can even be taught to recognise customised classes. It only needs to be fed with new data and trained. With detectors having become so smart, installers nowadays are more flexible in installing their equipment. The position of the camera is no longer limited to a certain height. Even in less ideal camera positions, the detection performance of AI-based systems is high. AI-powered systems are also able to handle much more complex situations.

But the big difference with previous generations, is that AI systems have the capability to learn from their data and to get more effective over time. The software algorithms inside the detectors are trained on a large dataset of images, which then evolve and learn how to recognise objects by adjusting internal parameters. Teledyne FLIR cameras and sensors also use a proprietary method of data collection giving advantages such as reduced false alarms and customised classifications for individual customers.

Predicting trajectories

AI detectors are better in predicting trajectories. Based on vehicle parameters such as speed and direction, they can easily see where a car is going, even if for part of that trajectory the view on that car is occluded by other traffic. This makes detection much faster and more accurate, and makes it possible to control traffic signals much more dynamically. Based on this information, AI detectors also make it possible to develop heat maps of high-risk accident hotspots, enabling traffic planners to understand traffic patterns, analyse possible conflict areas, and even see which road users are causing which types of conflicts.

Digital twins

AI detectors provide all the information that is required to build a digital twin of the intersection, a virtual, real-time representation of the intersection. Digital twins can help traffic managers and urban planners to simulate traffic and congestion conditions and test mitigation strategies.

Streamlining traffic

With city congestion and car usage on the rise worldwide, traffic managers will need to get smarter in their control of signalised intersections. AI detectors definitely have the capability to streamline traffic at intersections like never before. We may be at the very beginning of this evolution, but the good news is that AI systems continuously learn from new data, collected from road sensors and traffic users. This will enable them to provide more accurate and more extensive data on the behavior of vehicles, cyclists, pedestrians, in all shapes and forms.

Teledyne FLIR already offers thermal and visible sensors equipped with AI to detect approaching vehicles, cyclists, and pedestrians without the need for pre-configured zones. Traffic managers can use this technology to reliably control our road networks and gather valuable positioning, speed, and heading data for a comprehensive, continuous view of their roadways. ■

Overcoming challenges

The ability of traffic systems to process raw data and create valuable insight with low latency for drivers and fleets are gaining critical importance

Words: **Volodymyr Zavadko**, senior delivery director, head of transportation, Intellias, Ukraine

Imagine an ambulance rushing through busy traffic on a mission to save lives. Drivers require immediate alerts about the approaching ambulance to slow down, stop, or move their vehicle to a sidewalk. Or let's take an accident on a highway. The traffic system must distribute information about the event to nearby drivers in the shortest possible time to help them avoid collisions and reduce the risk of further accidents. In these conditions, the ability to turn raw data into valuable insights for drivers and distribute it to relevant traffic participants with low latency gains critical importance.



Challenges of low latency in traffic systems

Despite the high demand for instant road events delivery, the implementation of low latency traffic systems entails a lot of challenges. Traffic systems regularly handle vast amounts of data from multiple sources and operate under peak loads. Their mission-critical components are often written in low-level programming languages or require careful tuning of high-level platforms to achieve the desired performance.

These systems process hundreds of millions of data points hourly and require parallel computing to minimise latency. This is achievable by distributing road events across multiple processing units, ensuring optimal performance and fast scalability.

Traffic systems follow cyclic load patterns, peaking during rush hours and diminishing at night. This provides cost-saving opportunities through automated

Above: Intellias has built an advanced business intelligence platform offering rich data collection, processing, and reporting capabilities

Below: **Figure 1:** Push message delivery for low latency traffic systems

scaling using advanced cloud technology and AI load prediction tools.

A minor latency surge from a cyberattack can disrupt the entire traffic system. Code inspection tools, penetration tests, strong encryption mechanisms, rate limiters, and strict incident response protocols can be applied to reduce security risks.

To ensure the system remains available and efficient, it's essential to rigorously monitor latency across multiple components, use geographical redundancy, implement fast recovery procedures, and perform zero-downtime deployments.

Innovative technologies

For more than two decades, the Intellias mobility team has been providing engineering services to global clients from mobility and transportation segments. Traffic data providers and OEMs require efficient and

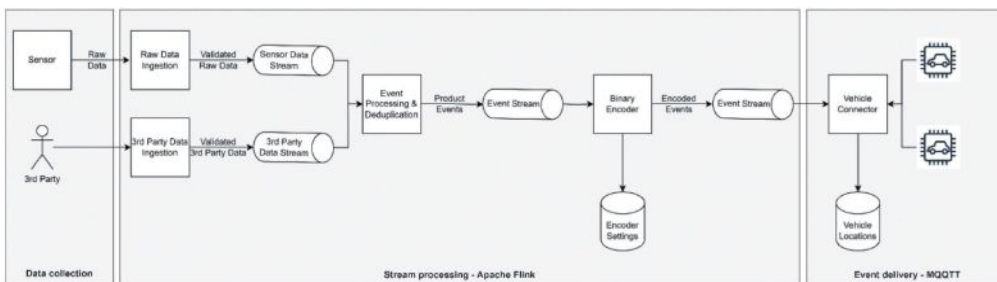
well-structured processing of traffic flow and incident data fetched on a specific schedule (once per minute or once per 30 seconds). However, this approach entails bottlenecks, which require innovative technological solutions to tackle the challenge of low latency implementation.

Vehicle-to-everything (V2X) technology is one of the most promising innovations in connectivity. V2X can revolutionise low latency traffic systems by enabling single-digit milliseconds latency. It takes advantage of direct vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, eliminating the need for an intermediate cloud server in the data exchange.

However, V2X technology is only available for the newest vehicle models and in limited geographical areas, which complicates its applications to large fleets on the road. Considering these limitations, cloud-based push notifications delivery seems a more realistic way to impact road safety today.

Telecom providers already adopt push notifications to distribute software updates, messages, and alerts right to users' mobile devices. The technology is proven in practice and has common acceptance among a wider audience.

Figure 1 shows a high-level push notification delivery system for connected vehicles developed by the Intellias mobility team. In this example,





Left: HMI systems are evolving from mere control panels to vast central hubs with multiple options, bringing together data, personalization, and advanced connectivity features that enrich the driving experience

Data Standards (NDS), Live may be chosen specifically for traffic data encoding, or Google Protobuf as a more flexible and widely supported option.

At event delivery stage, the traffic events are transferred into a MQTT-based vehicle connector that maintains live connection to vehicles. This protocol is designed for IoT and real-time applications, offering low overheads, asynchronous communication, scalability, and low-power consumption.

These benefits set MQTT apart from alternatives like HTTP long polling or WebSockets, which are less optimised for constrained devices and can be unreliable networks.

the backend infrastructure decides which events to send to particular vehicles. This method eliminates the delay caused by periodic updates and enables a single-digit second latency for traffic events distribution.

The message delivery process is divided into three stages:

At the data collection stage, data ingestion APIs gather raw data from different sensors and third-party services. At the stream processing stage, the system feeds the collected data into a

stream processing pipeline. The pipeline transforms multiple data inputs from connected sensors into actionable events. Apache Flink is ideal for advanced event time processing, low latency, support for stateful stream processing and high throughput. Then a binary encoder transforms events into vehicle-specific and network efficient format. Depending on OEM's requirements, Transport Protocol Experts Group (TPEG) and Navigation

+20
The number of years' experience Intellias has in the mobility domain

Safety and efficiency

Low latency is becoming crucial for safety and efficiency in vehicular traffic processing systems. Intellias engineers use their software engineering expertise and experience to overcome ever-present low latency challenges, from network constraints to scalability and security issues. Their goal is a future where every moment on the road counts and every life is safe. ■

intellias

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The future of V2X

An interview with Alfredo Escribá Gallego, chief technology officer, Kapsch TrafficCom, reveals how use cases for C-ITS and V2X are growing, amidst new technologies such as AI for traffic management

Words | **Kapsch TrafficCom, Austria**



Previously you have said that the industry needs to get everybody on board to make substantial progress on increasing V2X coverage. Is that still the case?

“Yes, that is still the case. When we talk about what is needed for V2X, we are talking about the whole ecosystem, from infrastructure to OEMs, and that is still not moving as it should. Deployment without users is useless. From a use case perspective, we are still waiting for more deployments – here, the industry is still dragging its feet a little bit.

“However, we can report some good news. Just a few weeks ago, the European Union made a massive step towards consolidating the regulatory ecosystem for C-ITS even further by adopting the ITS directive that codifies the security credential management system for C-ITS

Above: Alfredo Escribá Gallego, chief technology officer, Kapsch TrafficCom

applications. We believe that this is definitely a step forward.”

What does that mean?

It means that relevant European stakeholders – OEMs, road operators, and companies like Kapsch – have a reliable framework for implementing use cases on a wider scale, because there is an agreed-upon security credential management and ample bandwidth for safety-related use cases. Basically, we have a circle of trust where even if you don’t know who you are communicating with, you can rest assured that they are a trustworthy actor within the system. It is not possible to overstate the importance of that step. This has been something we have all been working towards for years, and I am glad the EU succeeded in approving this crucial piece of legislation.

The directive is clearly important, but what about implementation? Are there any actual projects that show that the market is moving forward?

We recently announced a massive project for the German Autobahn. Here, mobile barrier boards indicating limited-time work sites will be equipped with so-called ITS roadside stations (IRS), which send warning messages directly to approaching vehicles.

This can reduce the risk of accidents in dangerous road works areas, as drivers are informed more quickly and directly about road works. Additionally, we are providing our Connected Mobility Control Center, controlling the IRS and also interfacing with other traffic management systems, allowing for comprehensive insights and control of road traffic on German highways.

Germany is a country of drivers – what does that mean in numbers?

We are covering two thirds of all German highways with our equipment – that is over 8,600km (5,344 miles) of roads. As far as we know, this is one of the largest projects of its kind globally, so it definitely acts as an important lighthouse project and we expect to see more European countries and roadway operators to follow suit, particularly now the regulatory framework has been set.

What is the situation in other regions?

We are currently implementing an Orchestrated Connected Corridor across 19 intersections in the city centre of Montreal in Canada. Urban areas are the other big piece of the traffic safety puzzle. In Montreal, we give traffic operators a clearer picture of what is happening on their streets and send warnings about vulnerable road users directly into vehicles. The benefits are clear: fewer accidents, fewer traffic jams.

We also announced distributorship agreements in North America, bringing our hardware and software to even more potential clients. And in Australia, we are involved in several projects as well,



both in urban and interurban areas. There are projects coming in almost all regions. Generally, this shows that the market is becoming more active.

Where do you still see roadblocks?

The roadblocks continue to be a chicken and egg problem. Not enough deployments mean that use cases are not enabled in connected vehicles, which results in deployments not yet having attractive ROIs to justify investments. But at some point, the loop needs to be broken. That is why initiatives like the one in Germany are great. Now we need OEMs in Germany to enable the use cases on their vehicles.

How do you ensure interoperability between different systems and countries, given the international nature of C-ITS and V2X?

Ensuring interoperability is a central aspect of our work. We adhere to international specifications to guarantee that systems can communicate across borders and manufacturers, because that is the only way of creating reliable coverage for users. Additionally, we collaborate closely with industry partners and participate in international forums to align our technologies. This allows us to make CV implementations from Australia to the USA. This is essential in a global industry like ours, where fragmented solutions will not suffice to bring value to customers.

What role does sustainability play?

Sustainability is at the heart of our projects and our strategy. Since we started many years ago in traffic management, we have always been committed to not only improving emissions and air quality but also quality of life. By improving traffic flow and reducing congestion, we directly contribute to lower emissions. For

instance, in urban settings like Montreal, smoother traffic means fewer stops and starts, which in turn lowers fuel consumption and emissions.

Also, by promoting safety and reducing accidents, we help in decreasing the environmental impact often associated with traffic incidents.

How are you integrating emerging technologies like AI and machine learning in C-ITS and V2X systems?

The integration of AI and machine learning is a significant advancement in our field. These technologies allow our systems to predict and adapt to traffic patterns more efficiently. For example, AI algorithms

Left: In cities, use cases such as public transport priority, red light warning, pedestrian awareness, and more can be implemented to enhance safety and ease congestion

Below: By connecting transport infrastructure and road users in real-time, mobility information and safety warnings can be communicated instantly to drivers

can analyse vast amounts of data from various sensors and vehicles, enabling predictive traffic management. With AI we can predict the likelihood of accidents to happen. Or determine how busy downtown parking facilities will be. This not only enhances road safety but also improves traffic flow.

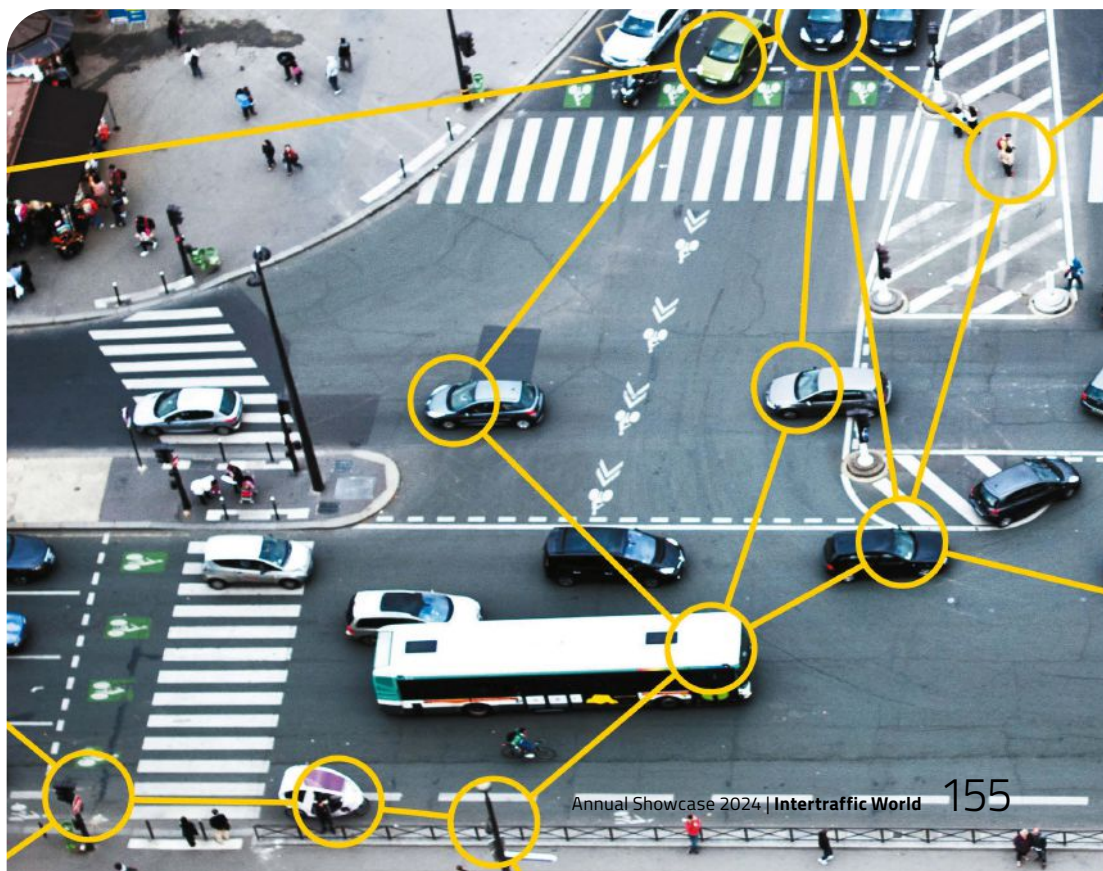
Additionally, machine learning helps in fine-tuning our warning systems, making them more accurate and more timely, which is crucial for driver and pedestrian safety. Kapsch has been using AI for decades to read license plates and to identify vehicles as part of our tolling offering. We have expanded it to detect vulnerable road users at intersections. AI is clearly a technology of the future, but as always, the big question is how to use it in a way that grows value instead of just reducing costs.

50

The number of countries where Kapsch Trafficom has delivered successful projects

What is your personal vision for how we will experience mobility in 15 years?

It is difficult to make predictions in this field as it is in a phase of transition, but I expect mobility to pivot around everything that connected vehicles technology enables, from road-based traffic management to mobility demand management to tolling. We are seeing important use cases now, but there is still a long way ahead of us when it comes to connected vehicle technology. I am excited to explore it. ■



Index to advertisers

Find out more about the companies in this issue



3M Transportation Safety Division (inside front cover)

Every day 3M Transportation Safety Division works to maximise roadway visibility and reduce long-term costs all while conforming to some of the most rigorous government standards. For 80 years, the company has been applying its science to push the boundaries of traffic safety. The mission at 3M Transportation Safety Division is to help bring families home safely. The company is committed to improving road safety, protecting vulnerable road users, and also driving positive impacts on the environment. It is proud to design the systems, services and high-performance materials that will help create a safer future for drivers everywhere.

Contact details:

Tel: +49 2131 14 2428
Email: trafficsafety.uk@mmm.com
Web: www.3m.co.uk/3M/en_GB/roadsafety-uk/roads-highways/reflective-road-markings/

intelligence security solutions, solar smart radars, tolling, and traffic telematics, consultancy, and training services. Alliance produces future-oriented and efficient traffic and motor solutions and transportation systems that are reliable, economical, and environmentally conscious.

Contact details:

Tel: +971 (2) 444-7677
Email: info@alliance.ae
Web: www.alliance.ae



Avery Dennison (pages 7 and 57)

Avery Dennison reflective technology has been making highway and street safety solutions bright with prismatic signs for nearly 100 years. It is one of the preferred suppliers to professional sign shops worldwide and services the traffic and safety market with one of the industry's most comprehensive ranges of reflective sheeting. The pursuit of its vision has aligned its businesses into a focused, customer-driven company that specialises in materials science. Its in-depth pool of expertise and global scale enable it to deliver insights, innovative products, and intelligent solutions to customers all over the world.

Contact details:

Tel: +1 877 214 0909
Email: reflective.orders@averydennison.com
Web: <https://reflectives.averydennison.com/en/home.html>



Aimsun (page 107)

Aimsun is an international leader in digital mobility solutions for transport authorities, highway agencies, public transport operators and consultancies. Aimsun's simulation and predictive data analytics help customers to understand transportation network performance, to predict its future evolution, and to support decision making.

Contact details:

Tel: +34 933 171 693
Email: info@aimsun.com
Web: www.aimsun.com



Carrida Technologies (page 101)

Carrida Technologies is a provider of ANPR software and solutions. Its product portfolio ranges from Carrida SDK, a hardware-independent software library that runs on any PC, edge device or server/cloud to edge solutions with onboard data processing. The company was founded in 2017 and is based in Germany and Austria.

Contact details:

Tel: +49 6331 259 9795
Email: info@carrida-technologies.com
Web: www.carrida-technologies.com



Alliance Traffic Systems (page 63)

Founded in 2008, Alliance Traffic Systems is a market leader in intelligent traffic systems (ITS), smart traffic enforcement, artificial



Circontrol (page 135)

Circontrol is a company with its own technology in which innovation is an ongoing challenge. Based in Barcelona, it was founded in 1997, as part of Circutor Group, to provide efficient solutions to the world of mobility and the field of EV recharging. Circontrol launched its first charger in 2008, when nobody was talking about EVs, becoming a pioneer in the industry. Since it was founded, it has devoted a major part of its resources to R&D, manufacturing high-quality products, which has enabled it to become a leader in standard solutions, but also in the most specific solutions required by the electromobility market. It offers a wide range of products, based on their application in the different market needs, from home charge solutions to ultra-fast chargers, charging hubs, car parks or service stations.

Contact details:

Tel: +34 937 36 29 40
Email: marketing@circontrol.com
Web: www.circontrol.com



DESIGNA

Designa (page 49)

Designa Verkehrsleittechnik is a world market leader in fully automated parking systems and is represented in more than 60 countries. With a holistic product concept, Designa offers smart solutions for complex parking management requirements, from classic large systems with hundreds of devices to free-flow and cloud software for the smart city. Each system is carefully tailored to specific needs – for airports, hotels, shopping centres, universities, hospitals, or even entire cities.

Contact details:

Tel: +49 (0) 431 5336-0
Email: info@designa.com
Web: www.designa.com



Geveko Markings (page 81)

Geveko Markings develops, manufactures, and distributes horizontal markings in any size, material, colour, or form that meet the requirements of the segments it serves. The company mainly focuses on areas of application where its products must perform to either strict performance, durability and safety standards, decorative requirements or under demanding circumstances. Celebrating its 100-year anniversary in 2024, Geveko Markings continues to mark the future with materials that enable safe, sustainable, and efficient mobility in more than 80 countries around the world.

Contact details:

Tel: +45 63 51 71 71
Email: sales@gevekomarkings.com
Web: www.geveko-markings.com



Ecolsystems (page 131)

Ecolsystems offers road safety infrastructure specialists a range of sustainable road curbs of the highest quality. Made of recycled - and in turn recyclable - plastic material, the curbs are composed of high-strength aggregates, Ecolsystems modular curbs are designed to guarantee maximum safety and durability with different road safety functions.

Contact details:

Tel: +39 734 340247
Email: info@ecolsystems.it
Web: www.ecolsystems.it



Grupo Etra (page 139)

Etra is an international industrial group providing turnkey solutions and services in the fields of traffic, transportation, smart lighting, energy efficiency, security, water management and communications. The company covers the whole value chain, from technological research and innovation, to development, manufacturing, installation, commissioning, and operation. Etra combines innovative technologies with a pragmatic approach, providing advanced, environmentally friendly solutions and services for both smart cities and technological infrastructures.

Contact details:

Tel: +34 9631 34082
Email: grupoetra@grupoetra.com
Web: www.grupoetra.com



Haenni Instruments (page 119)

Haenni Instruments is a leading supplier of mobile wheel load scales, with more than 50,000 units sold worldwide. Haenni scales are thin, light, robust and reliable, which makes them the ideal solution for mobile weight enforcement. The variety of types, sizes and ranges enables their use in different applications.

Contact details:

Tel: +41 31 506 5400
Email: info@haenni-scales.com
Web: www.haenni-scales.com



Heintzmann Group (page 127)

The Heintzmann Group, with its roots in German and international mining, has been providing security for 170 years. It is a leader in the development, production and sales of road equipment, traffic technology and safety systems.

Contact details

Tel: +49 6851 93 99 32
Email: info@heintzmann-traffic-systems.de
Web: www.heintzmann-traffic-systems.de



HR Groep Streetcare (page 86)

HR Groep Streetcare is engaged in the production, delivery, and installation, as well as the registration, analysis, and management of traffic signs and related facilities in public places. HR Groep Streetcare is in line with legislation, standards, and global goals. The company helps road managers move towards smart mobility and reach their climate goals.

Contact details

Tel: +31(0)70 399 85 11
Email: info@hrgroep.nl
Web: www.hrgroep.nl



IDEMIA (page 103)

For more than 40 years, IDEMIA's technology has supported governments in keeping their citizens safe. As a world-leading provider of traffic law enforcement technology, IDEMIA has taken on the challenge to make roads safer. Its long-standing partnerships with its clients around the world prove the reliability and accuracy of the company's technology.

Contact details:

Tel: +33 01 73 60 20 20
E-mail: psi.contact@idemia.com
Web: www.idemia.com



Intellias (page 153)

Intellias is a global technology partner with more than 20 years of experience delivering product engineering and consulting services to Fortune 500 companies. Leading automotive OEMs, Tier 1 suppliers, transportation, and mobility service providers, including Here

Technologies, Elmos, Joynext, NNG, DKV, and Rand McNally, rely on Intellias to co-create custom solutions and digitally transform their businesses. Intellias answers mobility challenges with deep expertise in connectivity, infotainment systems, autonomous driving, e-mobility, and intelligent transport proven by the highest industry certifications (ASPICE and TISAX) and global partnerships (AUTOSAR, COVESA, NDS).

Contact details:

Tel: +49 8001800992
Email: mobility@intellias.com
Web: www.intellias.com



Intercomp (page 115)

For more than 45 years, Intercomp has provided superior-quality portable and in-ground weighing systems, along with the highest levels of customer satisfaction, for a wide range of industries. Its static wheel and axle scales, and dynamic weigh-in-motion systems are designed with the most innovative technology in the world.

Contact details:

Tel: +1 763 476 2531 | +1 800 328 3336
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Web: www.intercompcompany.com



MORE LIGHT

Jenoptik (page 19)

Jenoptik's Smart Mobility Solutions division provides photonics-based, innovative, and sustainable solutions, including technology and services for road safety, public security, and road user charging. As an end-to-end solution provider, Jenoptik supports its customers with the provision of roadside equipment and software, including integration, installation, maintenance, and financing models through to full-service operation of its solutions. The company's strong global presence and installation base is supported by a reliable partner network. With innovation as its driving force, Jenoptik is a world-leading enabler for smart mobility, with intelligent solutions and services constantly evolving to help make roads, journeys, communities, and the environment safer around the globe.

Contact details:

Tel: +49 2173 3940-0
Email: traffic-solutions@jenoptik.com
Web: www.jenoptik.com/traffic-solutions



Kapsch TrafficCom (page 33)

Kapsch TrafficCom is a globally renowned provider of transportation solutions for sustainable mobility with successful projects in

more than 50 countries. Innovative solutions in the application fields of tolling, tolling services, traffic management and demand management contribute to a healthy world without congestion.

Contact Details:

Tel: +43 664 6281705
Email: johannes.rogi@kapsch.net
Web: www.kapsch.net

KISTLER

measure. analyze. innovate.

Kistler (page 31)

Kistler is the global market leader for dynamic pressure, force, torque, and acceleration measurement technology. The company has more than 20 years experience in weigh-in-motion quartz technology, based on piezoelectric measurement, which Kistler first applied in its invention of the charge amplifier 60 years ago. Today, Kistler employs around 2,200 employees at more than 60 locations worldwide.

Contact details:

Tel: +42 1232 272 655
Email: kristina.palfy@kistler.com
Web: www.kistler.com

LINDSAY™

Lindsay (page 79)

Lindsay Corporation is a leading global manufacturer and distributor of irrigation and infrastructure equipment. Established in 1955, Lindsay proudly manufactures equipment to improve road safety and keep traffic moving on the world's roads, bridges and tunnels with its full line of crash cushions, moveable barriers and Road Zipper brands.

Contact details

Tel: +39 02 90 99 61
Email: info@snoline.com
Web: www.lindsay.com

MOVYON

Tech the Future

Movyon (page 17)

MOVYON is a leader in the development and integration of Intelligent Transport Systems and center of excellence for research and innovation of the Autostrade per l'Italia Group. It offers a wide range of end-to-end solutions and high-performance technologies for tolling, road traffic and safety management, infrastructures management, smart cities and smart roads

Contact details:

Tel: +39 055 420 2111
Email: info@movyon.com
Web: www.movyon.com

Optimas®

Optimas (page 130)

Optimas GmbH, founded in 1978, has been an innovation leader in the field of 'machines for rationalising and humanising construction sites' for many years. Optimas develops and produces machines and equipment for paving, kerbing and guardrail installation in Germany and distributes them worldwide. All Optimas products are designed to make work easier, more efficient and of a higher quality.

Contact details:

Tel: +49 4498 9242 0 | +49 171 999 11 52
Email: info@optimas.de
Web: www.optimas.de

outsight

Outsight (page 145)

Outsight's Shift Perception software leverages 3D traffic lidar data to anonymously detect, classify, and track pedestrians and vehicles in real time. Operators can apply it in endless smart city cases, such as monitoring VRUs, performing crowd analytics, and creating smart intersections.

Contact details:

Email: julie.bourdinot@outsight.tech
Web: www.outsight.ai

PARIFEX

Parifex (page 47)

Parifex designs innovative transportation systems, and especially speed and red-light running cameras, to improve road safety. The French company's cutting-edge solutions allow vehicle identification, speed measurement, traffic light detection, automatic number plate recognition, intelligent counting, etc., using 3D lidar technology and artificial intelligence (AI).

Contact details:

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Email: info@parifex.com
Web: www.parifex.com



Periallos Software Solutions (PSS) (page 10)

Periallos Software Solutions (PSS) has developed the first comprehensive, three-way SaaS (Software as a Service) management solution specifically designed for companies related to highways. The app and online system boosts productivity, streamlines project operations, and enhances communication with teams and clients, saving users time and money.

Contact details:

Email: mike.wilson@highway.software
Tel: +30 210 8015465
Web: highway.software



PTV Group, part of Umovity (page 39)

PTV Group is a leading global software company providing software products based on proprietary algorithms ranging from microscopic and macroscopic modeling and simulation of traffic to real-time traffic management, benefiting more than 2,500 cities and municipalities. Since 2023 PTV Group and Econolite are united under the brand Umovity.

Contact details:

Tel: +49 (0) 721 9651 0
Email: info@ptvgroup.com
Web: www.ptvgroup.com



Q-Free (page 23)

Q-Free is a global leader in intelligent transportation systems, delivering solutions for tolling, traffic management and connected vehicles. Q-Free creates sustainable smart cities where people, goods, and data travel safely and efficiently. A 40-year veteran of transportation innovation, Q-Free has offices and projects across Europe, Asia, Australia, and the Americas.

Contact details:

Email: info@q-free.com
Web: www.q-free.com



Saferoad Group (page 37)

Saferoad Group is a leading road safety supplier in Europe with more than 75 years of experience within the road safety industry. The group

offers a broad range of innovative and high-quality products and solutions tailored to contribute to a safer life on the road.

Contact details:

Tel: +47 70 06 40 00
Email: mail@saferoad.com
Web: www.saferoad.com



Sernis - Soluções Tecnológicas (page 67)

Sernis is a Portuguese company that manufactures and supplies a wide range of high-quality road safety solutions. Its efforts in continuous research and development have been recognised and awarded several times worldwide. It is a world-leading road studs specialist and develops and manufactures flexible bollards, ITS, LED signs, controllers and VMS.

Contact details:

Tel: +351 253 300 440
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Web: www.sernis.com



Sprinx (page 55)

Sprinx is an independent software vendor expert in designing and providing video intelligent software platforms based on artificial intelligence to analyse vehicles and people mobility. Sprinx's value is its expertise in the ITS market, with more than 25,000 video analytics channels provided in the past 14 years. Sprinx's solutions are available worldwide thanks to certified partners.

Contact details:

Tel: +39 0362 341040
Email: marketing@sprinx.ai
Web: www.sprinx.ai



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Swarco (outside back cover)

Swarco improves quality of life by making the travel experience safer, quicker, more convenient, and environmentally sound. The Austrian traffic technology corporation provides a large range of products, systems, services, and turnkey solutions in road marking, urban and interurban traffic control, parking, public transport, e-mobility, CCAM, and offers an integrated software suite for the Livable City.

Contact details:

Tel: +43 5224 5877 0
Email: office.ag@swarco.com
Web: www.swarco.com



Teledyne FLIR (page 41)

Teledyne FLIR is constantly looking at new ways to enhance safety and efficiency around the world and protect vulnerable road users. To find out more about its transportation and public safety solutions including the latest innovative developments for 2024, use the contact details below.

Contact details:

Email: benjamin.schiereck@teledyne.com
Web: www.flir.co.uk/its/ai



Triplesign (page 95)

Triplesign is a market leading manufacturer of sustainable variable message signs (VMS). The company has provided prismatic sign solutions globally since 1998. The Triplesign is the ideal solution when requiring reliable and sustainable VMS in traffic environments, at low cost. For example, they can be used for traffic re-direction on highways and bridges, warning signs at roadworks, tunnels open or closed, variable speed signs, etc. The solar standalone sign consumes as little power as 1W. Without the need for cables, no excavations are required. At a cost of 70-90% of that of an LED sign, more lifesaving information points can be installed, exactly where needed.

Contact Details:

Tel: +46 8 6267350
Email: info@triplesign.com
Web: www.triplesign.com



VanJee Technology (page 105)

VanJee Technology is a world leading Intelligent Transport System (ITS) and lidar company, with headquarters in Beijing. VanJee is also a publicly traded company in the Shenzhen Stock Exchange (SZSE:300552). Its mission is to protect road assets worldwide, guarantee traffic safety and improve traffic efficiency. VanJee has four prominent products: lidar, weigh-in-motion (WIM), electronic toll collection (ETC), and connected vehicles (C-V2X). Founded in 1994, VanJee is dedicated to consistently providing the best customer service and the best ITS technologies. Today VanJee has representatives in six countries and has been building strong connections with many transportation authorities. VanJee has 1,700 motivated employees and everyone desires to provide the best traffic service all over the world.

Contact details:

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Web: www.vanjee.net



Vitronic (page 25)

Vitronic's core competency in the traffic technology sector is to monitor vehicles. With more than 30 years of expertise in traffic technology, Vitronic is the ideal partner for customised solutions on an international scale. For future mobility concepts Vitronic is working on using existing traffic infrastructure to control and optimise traffic flows as well as increasing road safety.

Contact details:

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Email: sales@vitronic.com
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Yunex Traffic (page 5)

Yunex Traffic is a separately managed company of the Mundys Group. It is a global leader in the field of intelligent traffic systems, offering the widest end-to-end portfolio of solutions for adaptive traffic control and management, highway, and tunnel automation, as well as smart solutions for V2X and road user charging tolling. Yunex Traffic has 3,500 employees from 62 nations and is active in more than 40 countries worldwide. Its intelligent mobility solutions are currently being used in major cities across the world, including Dubai, London, Berlin, Bogota, and Miami. Yunex Traffic has successfully concentrated its efforts on mastering technologies in the three segments of hardware, software, and service, and is subsequently the only supplier who can meet all major regional standards in Europe, UK, Asia, and America, such as OCIT, SCOOT, SCATS.

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Smart thinking

Noemi Jiménez-Redondo is project coordinator for EU research project OMICRON, associate professor at University of Málaga and director of research and innovation at the Spanish civil engineering firm CEMOSA. She explains how 'smart infrastructure' can help coordinate our energy use and transportation systems

“With digital twins we can test different strategies for refurbishing infrastructure and maintenance. Those strategies are assessed by indicators that may be driven by a combination of cost, recycling and reuse of materials, energy savings

Can you give an example of what is meant by 'smart infrastructure'?

It's about using technology to enable more efficient management of our assets, including in transport such as our roads and railway systems. For example, in the EU's OMICRON project, we use digital twins to develop a decision support system for maintaining road networks. We first create an accurate digital model of the roads, including bridges and tunnels. Integrated in the model are real-time monitoring systems as well as information from inspections.

Our digital model is a virtual replica of our infrastructure. We can assess the condition of the infrastructure and run simulations on our virtual replica in order to test different maintenance strategies. This facilitates better decision-making and keeps our infrastructure in better condition.

How can digital twins help with sustainability?

With digital twins we can test different strategies for maintenance and refurbishing infrastructure. Those strategies are assessed by indicators that may be driven by a combination of cost, recycling and reuse of materials, energy savings, etc. For example, a better maintained road means that the car will consume less energy to travel along it.

How might digital twins be used to improve maintenance in the future?

There are many old bridges in Europe that are reaching their end-of-life design. We have had some tragic accidents not long ago for example, the 2018 collapse of the Morandi bridge in Italy. The monitoring and development of digital twins of old bridges is an expensive task. However, for new bridges, we should design them including these types of real-time embedded monitoring systems. This will allow engineers to have a clear assessment of the infrastructure condition and to maintain it properly avoiding tragic accidents

How might the general public benefit from smart infrastructure?

This digital monitoring technology can help drivers use the best maintained – and therefore most fuel-efficient – routes to travel in their cars. We are seeing early signs of these types of options on travel apps, for example Google Maps.

Is there a good business case for providing digital twin data to the public?

I think we have the technologies to provide this information, though I don't know if the business case is ready or not. I think that regulation always goes behind the technology, not only in the energy sector, but also in other sectors. And that's why politicians need to put money and interest to work the necessary steps.

1972

The year that civil engineering firm CEMOSA was founded in Málaga, Spain.

Do you see an increase in concern about environmental issues?

In CEMOSA, we've been motivated by sustainability issues since the beginning of the company over 50 years ago, long before modern environmental and sustainability trends. But now, as it has become clearer our direction towards risking environmental disaster, I can see people have gotten much more concerned.

For example, years ago people did not do much recycling in my home country of Spain, though now everyone is taking a lot more care to separate their rubbish for recycling. ■

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The cities committed to the European Green Deal lead by example. Mitigating climate change, reducing emissions and pollution, and transforming energy and mobility systems are challenging tasks for the cities on their way to become climate neutral by 2050.

SWARCO is ready to lend support when it comes to reshaping urban mobility with ITS technologies. Together, we can make big steps towards reaching the Green Deal goals and improving quality of life for us and future generations.

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