The Trust Deficit

Intelligent Transport Systems - Explained

Technologies to operate and manage transport infrastructure

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NO. 5 - WINTER 2025/26

In this edition:

NEW VERSION - ITS1827E Traffic Signal Controller General Specification Forms
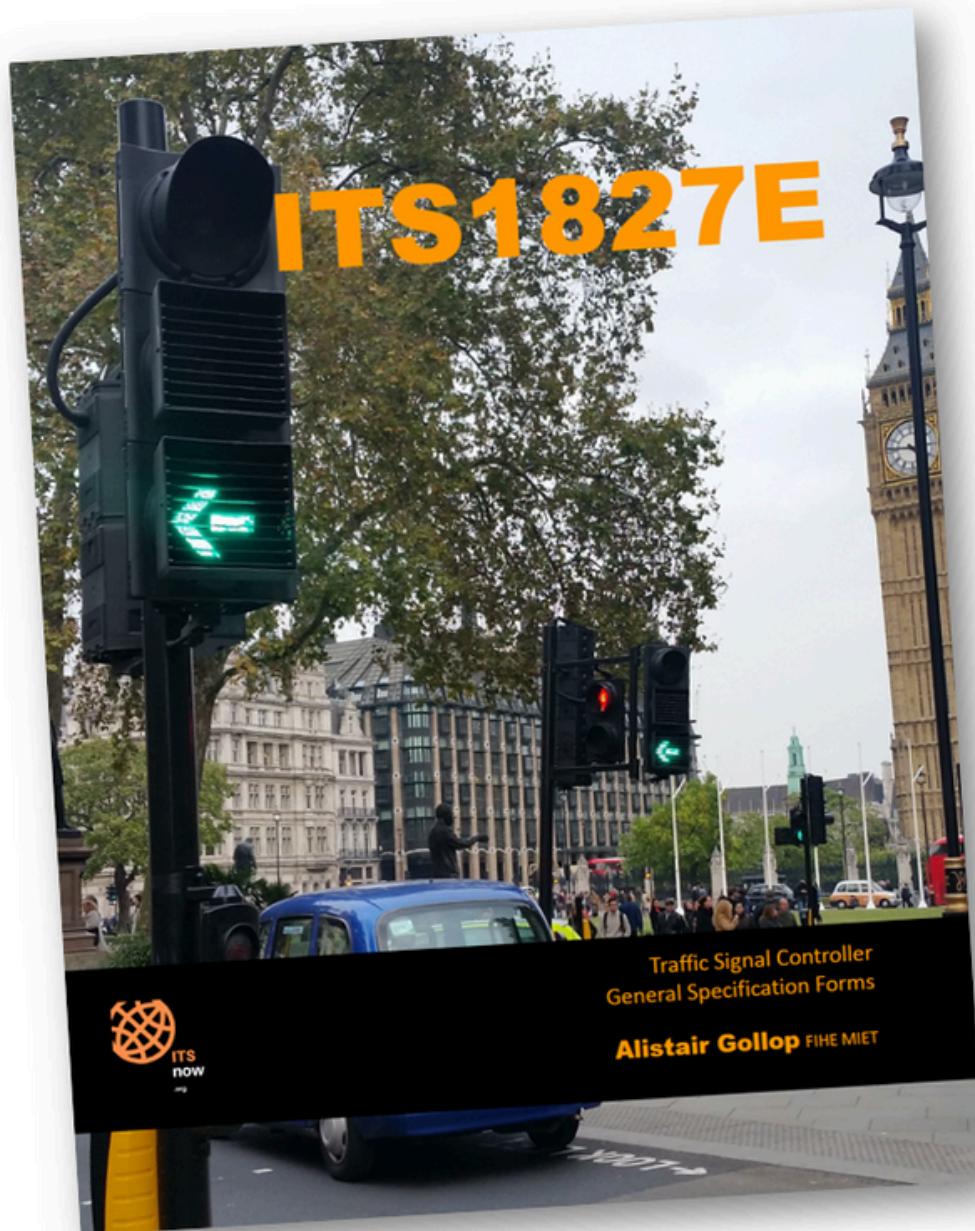
ITS Now are really pleased to announce that the new version of **ITS1827E** is now available for free download from the Publications page of the ITSNow.org website. Version E has been updated to reflect technology advancements and changes to equipment use.

The spreadsheet-based set of forms are used by Traffic Signal Engineers and Transport Planners to originate detailed specifications of the functional requirements expected of traffic signal controllers deployed across the UK's road network.

The forms contained in this publication are used throughout the life cycle of traffic signal installations, from identifying the initial hardware build requirements and software configuration requirements by traffic signal companies when they assemble and install Traffic Signal Controller's, through to maintenance activities and transport assessments once a site has been installed and is operating. During the course of time, sites will also often need to be updated, typically to respond to changing traffic patterns or to add new facilities, again these forms will be used to record the changes made to achieve these new functional requirements.

The ITS1827E specification forms are the accepted standard for traffic signal practitioners to use whilst designing or modifying installations. The forms are deliberately manufacturer agnostic, ensuring compliance with procurement rules and future-proofing documentation to allow sites to be replaced more easily with alternative equipment when it becomes life-expired or if it is damaged.

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WELCOME to ITS EDGE MAGAZINE

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Hey everyone!

In this edition of **ITS Edge**, our feature article welcomes Paula Claytonsmith, who examines the growing Trust Deficit the public is demonstrating toward Intelligent Transport Systems, and why addressing it is becoming mission-critical for the sector. As we build momentum toward the 2026 ITS European Congress in Istanbul, where the event will be hosted in the city for the very first time, this issue marks the beginning of our enhanced Congress coverage as Official Media Partner. With the Congress set to be one of the most significant gatherings of the global ITS community in recent years, we take a closer look at the four principal themes shaping the programme and the wider mobility conversation across Europe: Safety and Resilience, Multimodal Mobility, Smart and Sustainable Logistics, and Enhancing Mobility Beyond the Road. These themes will define the dialogue in Istanbul, reflecting the sector's ambition to deliver integrated, safe and seamless mobility at scale. We also turn our attention to one of the most pressing challenges facing the ITS ecosystem: attracting and retaining the next generation of professionals. At a time when the Congress is highlighting unprecedented innovation, investment and opportunity across the mobility landscape, our article Shoot for the Moon! explores how the sector can inspire new entrants and support them in building meaningful, future-shaping careers. We finish this edition with our **Technology Insight** item where we have worked with **Messagemaker Displays** to look at how MS1 signs have developed to being technology .

5

See you next time,
Alistair

The Trust Deficit in Intelligent Systems and Why It Threatens Safety and Resilience

Paula Claytonsmith looks at why public trust is critical for intelligent systems

Paula Claytonsmith is a leading writer, policy and innovation strategist working at the intersection of transport, advanced technology and policy in the UK. She advises public authorities, industry and policymakers on highways maintenance and good practice, intelligent systems and the real-world adoption and implications of emerging technologies

Across the UK and Europe, we like to think we're doing well when it comes to transport innovation and development of new Intelligent Systems. We run pilots, evaluate innovative technology, set exacting standards and as an industry, talk confidently about intelligent automation and smart mobility.

However, there is a growing disconnect, it is already known, but often not discussed more widely that our technology is racing ahead, while public comfort is lagging. And that gap matters more than we sometimes like to admit.

The future of intelligent systems and transport is not about how clever the systems are. It is about whether people trust them. Right now, trust too often feels like something we will "*deal with later,*" even as smart systems quietly become part of everyday life on our roads.

The Technology–Trust Gap

This pattern shows up again and again. Intelligent transport projects work well in trials, win awards, even attract international attention and then struggle to scale. When that happens, we tend to blame funding, skills shortages, regulation or even technology. Sometimes those things are real barriers. But often the deeper issue is simpler and harder to solve and it's "*ongoing belief and trust*". People are being asked to share space with connected, automated and AI-driven systems they do not fully understand, cannot easily question and do not always feel protected by. When systems feel opaque or unpredictable, they do not feel safe, no matter how advanced those systems are. In Intelligent Systems and transport, public perception does not just follow policy, it shapes it.

Trust Is not a PR Exercise

There is a persistent assumption with the adoption of new innovations or technology, that trust can be fixed with the right messaging once technology is deployed. Experience tells us that this does not work. We have known this for a long time and yet if we think about having resilience and safety in intelligent systems, this means it must be believed and transparent.

Trust must be built in from the very beginning, in regulation, procurement and system design. That means moving beyond tick-box compliance and asking harder questions about transparency, explainability and accountability. But it is not about building it just in the beginning, it needs to continue being a bedrock to build long term trust as newer technologies emerge and become deployed. If AI is influencing traffic management or safety decisions, authorities need to be able to explain those decisions clearly, and radically, discuss failures. If automated systems are introduced, their limits should be obvious, not hidden in technical manuals or unwieldy statements. If data is shared, people need to understand who controls it, how it is protected and what happens when something goes wrong. In the UK and Europe, we are rightly strong on safety and privacy. But rules alone do not create confidence. Trust grows when people feel considered, informed and included continuously, not just during consultation phases.

Predictive Safety Needs Predictable Oversight

One of the big promises of intelligent systems is predictive safety, spotting risks early and preventing incidents before they happen. That is powerful, but only if it is governed well. When safety-critical decisions are made by systems that cannot be explained, people get uneasy. "Black box" technology raises questions about responsibility and liability, and those questions do not stay theoretical for long. They effect insurers, regulators and political support. If we want predictive safety and resilience to scale, we need predictable, transparent governance alongside it.

Design for Real People

Technologies like C-ITS and V2X have enormous potential, but they are often designed with vehicles at the centre, not people. These days, walking and cycling are core parts of transport policy. Yet vulnerable road users such as children, older people and people with disabilities are still too often an afterthought in intelligent system design. If smart mobility only works well for those with the newest cars or devices, trust will quickly erode and uptake will be slow. Local and Municipal authorities have real influence here. They can demand inclusive design, realistic testing and systems that work in messy, everyday conditions, not just ideal scenarios.

Automation and How Safe It Feels

The UK and Europe are often labelled as cautious when it comes to automated vehicles. But that caution reflects something important, people want reassurance, not hype. For a long time to come, automated systems will share roads with human drivers, cyclists and pedestrians. The challenge is not just technical performance, it is behaviour. Systems need to act in ways people find predictable and reasonable. Automation that surprises users, damages trust far faster than a visible, well-handled failure ever could. This is why overpromising marketing is so risky and damaging to public trust. Clear communication about what systems can and cannot do, and what happens when conditions change, is essential if confidence is going to grow.

Trust Is not a Bolt-On

Technology providers are shaping the future of Intelligent Systems, whether they like it or not. But trust cannot be added at the end of development. Too often, safety, cybersecurity and human factors are treated as obstacles to overcome rather than fundamentals to continually design around. In a connected transport ecosystem, that mindset does not hold up. Cybersecurity failures are public safety and resilience issues, not just IT problems. One weak component can ripple across networks and borders. Building resilient systems means ongoing monitoring, sharing threat intelligence and collaborating even when it is uncomfortable.

Trust Is Tested When Things Go Wrong

Extreme weather, infrastructure failures and major incidents are no longer rare. Intelligent systems can help predict disruption and support recovery, but only if they perform under pressure and only if recovery of those systems after the event are quick. People trust systems that fail safely, recover quickly and institutions that communicate clearly when things do not go to plan. That is when confidence is built or lost. We do not need to win a technology race, we need to win an ongoing trust race. That means embedding trust into policy and funding decisions, demanding transparency and inclusion, and designing systems around people rather than performance metrics alone.

The future of intelligent systems and mobility will be smart. But only the systems people believe in will succeed and we are already seeing this played out across social media where *"voices"* are becoming seen as more credible than institutions.

Bridging Innovation, How Four Core Themes Will Shape the ITS European Congress 2026

The **ITS European Congress 2026** arrives at a pivotal moment for the mobility sector. Under the banner Bridging Innovation: Integrated, Safe and Seamless Mobility, the programme is anchored by four themes that capture both the urgency and opportunity facing Europe's transport networks. These topics: Safety and Resilience Through Intelligent Systems; Multimodal Mobility System Management; Smart and Sustainable Logistics in the Digital Era; and Enhancing Transport and Mobility Beyond the Road, form the backbone of this edition of ITS Edge Magazine, where we explore each area in depth through dedicated articles.

Chosen by the European Programme Committee, the four themes reflect the forces reshaping mobility today: environmental pressure, shifting user expectations and accelerating digitalisation. They also align closely with the EU's Sustainable and Smart Mobility Strategy and the ambitions of the Green Deal, including the goal of reducing transport emissions by 90 %. As the Call for Contributions opens, these themes provide a clear framework for evaluating where mobility stands and where it must go next.

Robert Sykora, Director at Ohmio, captures the intent behind this structure, "*These topics were chosen not just for their relevance today, but for their potential to shape mobility policy and practice over the next decades. They reflect the real-world challenges facing cities and networks and the innovations that are gaining traction. This Congress is where we bring those conversations into focus*".

The Congress' host city, Istanbul, offers a compelling backdrop. As **Pelin Alpkökin**, Deputy Secretary General of the Istanbul Metropolitan Municipality notes, "*The four topics resonate deeply with Istanbul's own priorities—from managing complex multimodal networks and securing transport systems, to rethinking urban logistics and integrating non-road modes into a connected landscape. Hosting the ITS European Congress gives us the opportunity to contribute real-world experience and learn from others shaping the future of mobility across Europe and beyond*".

This year's Congress also coincides with the European Commission's proposal to double the Horizon Europe budget and introduce a new European Competitiveness Fund focused on clean transition, digital leadership and resilience. Against this backdrop, the event becomes a timely forum for shaping partnerships and projects that could benefit from these forthcoming programmes.

The ITS European Congress 2026 is more than a showcase of emerging technologies. It is a space for asking better questions, testing ideas, and forging collaborations that move innovation from concept to implementation. In this edition of ITS Edge Magazine, we unpack each of the four Congress topics, offering insight into how they will guide the conversation in Istanbul, and how they will shape the future of mobility.

Safety and Resilience Through Intelligent Systems

Transport networks across the world are entering a period of profound change. As digital technologies become deeply embedded in the fabric of mobility systems, the sector faces a defining challenge: **how to ensure that intelligent innovation delivers safer, more resilient and more inclusive mobility for everyone**.

The answer does not lie in any single breakthrough, but in the thoughtful integration of AI, C-ITS, V2X, automation and cybersecurity into a coherent, human-centred ecosystem. Understanding how these systems can strengthen safety and resilience (and how they can earn and sustain public trust), is now central to the future of mobility.

Alistair Gollop looks at building trustworthy mobility for a complex future

A new generation of intelligent systems is reshaping the way safety is conceived and delivered. Traditional models have long relied on reactive interventions, stepping in only after incidents occur. AI-driven analytics offer a fundamental shift, enabling authorities to identify risks before they escalate. By analysing vast streams of data from sensors, connected vehicles, infrastructure and historical incident records, machine-learning models can detect patterns far beyond human perception. This predictive capability supports everything from early warnings for operators and road users to dynamic traffic management that adapts to emerging hazards, real-time risk scoring across intersections and corridors and maintenance strategies that prevent asset failures before they disrupt the network. Crucially, the value of AI lies not in replacing human judgement, but in augmenting it. When deployed with transparency, explainability and strong governance, AI becomes a powerful safety engine that enhances decision-making without diminishing human oversight.

Alongside AI, Cooperative Intelligent Transport Systems and V2X communication are redefining how vehicles and infrastructure interact. By enabling real-time data exchange between vehicles, roadside units, traffic signals and even pedestrians' smartphones, these technologies create a shared situational awareness that elevates safety for all road users. Applications such as red-light violation warnings, emergency vehicle priority, pedestrian and cyclist detection, hazardous-location alerts and speed harmonisation illustrate the breadth of their impact. Yet the true promise of C-ITS and V2X extends beyond connected cars, it lies in connected communities. Vulnerable road users (children, older adults, people with disabilities and those using mobility aids), stand to benefit significantly, provided that inclusive design remains at the forefront. Systems must recognise diverse mobility needs if they are to deliver equitable protection. https://youtube.com/shorts/ExtfAw2ZezQ

As automation advances, the deployment of Connected, Cooperative and Automated Mobility introduces new dimensions of safety, both technical and psychological. Public trust becomes as important as engineering precision. Users must feel confident that automated systems behave predictably, transparently and ethically. Achieving this requires clear communication of system capabilities and limitations, intuitive interfaces and behaviours that remain safe even when components fail. It also demands careful attention to human factors, cognitive load and the realities of mixed-traffic environments, where automated and human-driven vehicles will coexist for decades. Automation should complement human behaviour, not override it and must be tested rigorously in diverse, real-world conditions to ensure seamless integration.

As mobility systems become more connected, their exposure to cyber threats inevitably increases. Cybersecurity can no longer be treated as an afterthought; it is a core safety requirement. Connected and automated systems must be protected against data breaches, spoofing, ransomware and interference with safety-critical communications. A single compromised device has the potential to trigger cascading effects across an entire network. Building resilience therefore demands end-to-end encryption, secure credential management, continuous monitoring, redundant communication pathways and strong cross-sector collaboration on standards and incident response. Because cyber threats evolve constantly, defences must evolve with them. A resilient mobility ecosystem requires perpetual vigilance and adaptive security strategies.

The need for harmonisation becomes even more pressing as mobility transcends national borders. Automated vehicles, C-ITS and V2X systems must operate seamlessly across Europe and beyond, which means aligning safety standards, testing protocols, spectrum allocation, data governance frameworks, cybersecurity requirements and operational design domains. Without such alignment, fragmentation threatens interoperability and undermines user trust. Cross-border coordination not only ensures continuity of service but also strengthens industry confidence and accelerates deployment at scale.

Resilience itself is emerging as a defining priority. Transport networks are under increasing strain from climate-related events, ageing infrastructure, population growth and unexpected emergencies. Intelligent systems offer the ability to anticipate, absorb and recover from disruption. Real-time network monitoring, anomaly detection, dynamic rerouting, automated incident coordination and multimodal data integration all contribute to a more adaptive system. Digital twins add another layer of capability, enabling scenario modelling and stress testing that help networks evolve rather than simply endure. **Resilience is no longer about bouncing back, it is about springing forward.**

In emergency scenarios (whether natural disasters, major incidents or infrastructure failures), intelligent systems can dramatically improve outcomes. By predicting high-risk situations using historical and environmental data, coordinating multi-agency responses through shared digital platforms and providing real-time situational awareness to operators and first responders, these technologies support faster, more effective action. They also play a vital role in evacuation planning, crowd management and maintaining continuity of critical services. The integration of AI, C-ITS and automation into emergency management ultimately strengthens society's ability to protect lives.

None of this progress can be achieved in isolation. The future of mobility will be shaped as much by collaboration as by technology. Public authorities, industry, academia, standards bodies, international partners and communities all have a role to play in delivering transport systems that are safe, resilient and inclusive. Intelligent systems hold extraordinary potential, but their success depends on responsible deployment, transparency and a steadfast commitment to human needs.

As digital innovation accelerates, the mobility sector stands at a pivotal moment. Intelligent Transport Systems, powered by AI, C-ITS, V2X, automation and robust cybersecurity, can transform the safety and resilience of transport networks. But technology alone is not enough. Trust, inclusivity and cross-sector collaboration must guide every step. If we embrace this holistic approach, intelligent systems will not only optimise mobility, they will help build a safer, more resilient and more equitable future for all.

<To see the accompanying video, scan the QR code
or go to: **https://youtube.com/shorts/ExtfAw2ZezQ**

Multimodal Mobility, the Future of Transport

Cities and regions across the world are undergoing a profound shift in how people and goods move. Rapid technological change, rising user expectations and the urgent need for sustainable, inclusive transport are reshaping mobility systems at their core. The challenge is no longer simply about improving efficiency within individual modes. It is about orchestrating a seamless, multimodal ecosystem, one that brings together public transport, shared mobility, automated vehicles, active travel and intelligent traffic management into a coherent, user-centred whole. At the heart of this transformation lies a pivotal question: **how can data-driven systems deliver reliable, equitable and integrated travel across all modes?**

Alistair Gollop looks at orchestrating the future of integrated, equitable transport

The answer demands more than technological innovation alone. It requires a blend of policy, governance and design thinking that breaks down long-standing silos and embraces a truly systemic approach. AI, Digital Twins, real-time platforms and emerging technologies are redefining what multimodal mobility system management can achieve, and they are setting the stage for networks that are predictive, resilient and accessible to all. For decades, transport modes have been planned and operated largely in isolation. Public transport authorities, road operators, shared mobility providers and emerging automated vehicle services have often worked with different datasets, priorities and operational frameworks. The services have with different datasets, priorities and operational frameworks. The result has been a fragmented user experience, disconnected journeys, inconsistent information and inefficiencies that erode trust and limit accessibility. The shift toward multimodal mobility system management aims to replace this fragmentation with orchestration. By integrating real-time data from all modes, predicting demand and adjusting services dynamically, coordinating traffic and public transport operations and offering personalised journey options, operators can begin to manage the network as a unified whole. Crucially, this approach also ensures that access is equitable across communities, not just convenient for those already well served.
https://youtube.com/shorts/3EjmqQKxPZE

To see the accompanying video, scan the QR code > or go to: **https://youtube.com/shorts/3EjmqQKxPZE**

A smarter, more user-centric approach is emerging as demand management becomes a cornerstone of modern mobility. Instead of reacting to congestion or overcrowding, operators can now anticipate and influence travel patterns through predictive analytics and behavioural insights. This enables dynamic service allocation based on expected passenger flows, real-time optimisation of traffic signals to support multimodal priorities and targeted incentives that encourage travellers to shift to off-peak times or more sustainable modes. When road, rail, bus and shared mobility capacity is planned in an integrated way, the entire system becomes more reliable, more efficient and more responsive to user needs. For those who depend most on public and shared transport, this shift from reactive to proactive management can be transformative.

Yet a truly multimodal system must serve everyone, not only the digitally connected or physically able. Equity is not an accidental by-product of good design, it is a deliberate outcome of inclusive planning, policy and technology deployment. This means ensuring that Mobility as a Service platforms are accessible to people with disabilities, that affordable mobility options reach underserved communities and that interfaces and services are designed for all ages and abilities. Data must be used to identify and address transport inequalities and automated and connected services must be designed to protect vulnerable road users. Without embedding equity into algorithms, service design and governance frameworks, digital innovation risks widening mobility gaps rather than closing them.

Mobility as a Service has long been heralded as the future of integrated travel, yet widespread adoption remains uneven. The barriers are rarely technological; they are structural. Scaling MaaS requires common data standards, governance models that balance public and private interests, integrated ticketing and payment systems, policy frameworks that that support interoperability and business models that incentivise collaboration rather than competition. MaaS must evolve from a collection of apps into a core component of transport policy, one that enables seamless, reliable and affordable multimodal journeys.

Automated vehicles, too, must be understood within the broader multimodal ecosystem. Their greatest value lies not in operating independently, but in complementing other modes. AVs can strengthen multimodality by providing first- and last-mile connections to public transport, offering on-demand services that fill gaps in fixed-route networks, improving accessibility for people with mobility challenges and enhancing safety by reducing human error. But unmanaged deployment could increase congestion, reduce active travel or draw passengers away from public transport. Strategic integration, guided by data, policy and user needs, is essential.

Digital orchestration platforms are emerging as the operating systems of modern mobility. By integrating data from all modes, they give operators a unified, real-time view of the network. They support predictive analytics for disruptions and demand surges, automated decision-making for traffic and service adjustments, cross-agency coordination during incidents and user-facing information that reflects system-wide conditions. This level of orchestration transforms mobility from a collection of independent services into a cohesive, adaptive ecosystem.

Digital Twins add another layer of capability. By creating virtual replicas of transport networks, operators can simulate scenarios, test interventions and optimise performance before implementing changes in the real world. They can evaluate new mobility services, test emergency response strategies, model demand shifts, assess infrastructure investments and support climate adaptation planning. Digital Twins enable evidence-based decision-making at a scale and speed previously impossible.

Looking ahead, emerging technologies such as edge computing, 5G, blockchain, advanced sensors and even quantum computing are poised to enhance multimodal mobility management further. These innovations will not replace existing systems; they will strengthen them, enabling more responsive, efficient and user-centred networks.
Multimodal mobility system management represents a fundamental shift in how we design, operate and experience transport. By harnessing data, embracing emerging technologies and prioritising equity, we can build mobility systems that are not only efficient, but resilient, inclusive and deeply connected. The future of mobility will not be defined by any single mode or technology, but by our ability to orchestrate them into a seamless, intelligent ecosystem that works for everyone.

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Smart and Sustainable Logistics

Freight and logistics are the unseen machinery that keeps modern society functioning. Every product on a shelf, every component that fuels industry and every parcel that lands on a doorstep depends on a vast, interconnected supply chain stretching across cities, regions and continents. Yet this essential system is under growing strain. Climate commitments, urban congestion, rising customer expectations and global disruptions are forcing the logistics sector to rethink how goods move. **The question is no longer simply how to make freight faster or cheaper, but how technology and innovation can reshape logistics to be cleaner, smarter and far more resilient.**

Alistair Gollop looks at how logistics will transform in the digital era.

A new generation of digital tools, AI, automation, IoT, Digital Twins and advanced ITS solutions, is beginning to transform logistics into a connected, sustainable and transparent ecosystem. When combined with forward-looking policy and modernised infrastructure, these technologies offer the foundations of a multimodal, future-ready logistics system capable of serving both dense urban environments and long-haul corridors with equal reliability.

Cities sit at the centre of logistics demand, and they are also where the pressures are most acute. Congestion, emissions, noise and limited kerbside space make last-mile delivery one of the most complex and costly segments of the supply chain. The emerging concept of the 15-minute city reframes urban mobility around proximity and accessibility. For logistics, this means designing freight flows that serve residents and businesses without overwhelming streets, using low-emission vehicles such as electric vans, cargo bikes and autonomous delivery robots and coordinating operations digitally so that routing, loading and kerbside access are guided by real-time data. Smart urban logistics is not simply about efficiency, it is about creating cities where people and goods can coexist harmoniously. Urban consolidation centres and micro-hubs are becoming one of the most promising strategies for sustainable last-mile delivery. By consolidating freight outside city centres and redistributing it using cleaner, smaller and more agile vehicles, these facilities help reduce congestion and emissions while improving delivery predictability.

They support better vehicle utilisation, more effective kerbside management and greater resilience during disruptions. When paired with digital platforms that coordinate arrivals, departures and loading operations, consolidation centres become powerful enablers of low-impact, high-efficiency urban freight.

Decarbonising logistics, however, requires more than cleaner vehicles. It demands a transformation of the infrastructure that supports them. Charging networks for electric freight vehicles, hydrogen refuelling stations for heavy-duty and long-haul transport, shore-side power for ports, high-capacity rail freight corridors and intermodal terminals that enable seamless transfers between modes all form the backbone of a sustainable logistics system. Without this infrastructure readiness, even the most advanced technologies cannot scale.

Closed ecosystems such as ports, airports and rail terminals are proving ideal environments for rapid innovation. Their controlled boundaries, high traffic volumes and operational complexity make them perfect testbeds for advanced ITS solutions. Automated yard management powered by AI and robotics, Digital Twins that optimise operations in real time, IoT-enabled asset tracking for containers and equipment, predictive maintenance for cranes and ground support vehicles and energy management systems that reduce emissions all demonstrate how technology can decarbonise operations while improving throughput, reliability and safety.

The past decade has exposed the fragility of global supply chains. Pandemics, geopolitical tensions, extreme weather and labour shortages have shown how quickly disruptions can cascade across continents. Strengthening resilience has become a necessity rather than a competitive advantage. AI-driven risk forecasting can identify vulnerabilities before they escalate, while real-time visibility platforms provide end-to-end tracking across modes. Digital Twins support scenario modelling and contingency planning, automated decision-support tools help operators respond rapidly to disruptions and distributed logistics networks reduce dependency on single points of failure. Innovation is also reshaping long-haul freight, the backbone of global trade. Autonomous trucking is emerging as a viable option for long-distance corridors, while platooning technologies promise reduced fuel consumption and improved safety.

Smart border crossings equipped with digital customs processes are streamlining international flows, rail digitalisation is enabling higher-capacity freight corridors and maritime automation is enhancing navigation and port efficiency. Cross-border interoperability is essential to realising these benefits. Harmonised standards, shared data frameworks and coordinated regulation ensure that long-haul logistics can operate smoothly across jurisdictions.

As global supply chains grow more complex, automation and optimisation technologies are becoming indispensable. Robotics and AI are transforming warehouse operations, predictive inventory management is reducing waste and stockouts, blockchain-based systems are enabling secure and transparent transactions and dynamic routing algorithms are adapting to real-time conditions. Integrated control towers are emerging as the nerve centres of multimodal logistics, orchestrating flows across networks with unprecedented visibility and precision. These tools create supply chains that are not only more transparent and accountable. Yet technology alone cannot transform ogistics. Policy, regulation and business models must evolve in parallel. Regulatory innovation must focus on establishing standards for data sharing and interoperability, creating incentives for low-emission freight vehicles, defining frameworks for autonomous and automated systems and developing urban freight zoning and kerbside management policies. Cross-border harmonisation remains essential for long-haul freight. At the same time, new business models, from shared logistics platforms to lto subscription-based freight services and collaborative distribution networks, are redefining how goods move and how value is created.

Smart and sustainable logistics is no longer a distant aspiration; it is an urgent priority. As cities expand, climate pressures intensify and global supply chains become more complex, the logistics sector must embrace digital transformation at scale. By integrating AI, automation, IoT, Digital Twins and advanced ITS solutions with forward-thinking policy and robust infrastructure, we can build freight systems that are cleaner, smarter, more resilient, more transparent and more connected. The digital era offers a rare opportunity to reimagine logistics. If we seize it, we can create a freight ecosystem that supports thriving cities, sustainable economies and a healthier planet.

Enhancing Mobility and Transport Beyond the Road

For much of the past century, innovation in transport has been shaped overwhelmingly by road-based systems. Highways, traffic management and automotive technology have dominated investment and public attention. Yet as the world accelerates toward decarbonisation, digitalisation and seamless multimodality, the most transformative opportunities increasingly lie elsewhere. **Rail, air and waterborne transport, long viewed as traditional, slow-moving or resistant to change, are now entering a period of rapid technological renewal.** Emerging digital tools, modernised infrastructure and progressive policy frameworks are reshaping these modes into smarter, greener and more integrated pillars of the mobility ecosystem.

Alistair Gollop looks at how other transport modes will increasingly play an intrinsic part in how we move about in coming years.

The question is no longer whether non-road modes should evolve, but how innovation can accelerate sustainable, connected mobility across rail, air and water. The shift underway is profound, touching everything from operational intelligence to regulatory reform. Together, these developments are laying the foundations for a truly seamless multimodal future.

Rail remains one of the most energy-efficient and high-capacity modes of transport, yet its potential has often been constrained by legacy systems and fragmented operations. Digitalisation is now unlocking that potential. Automation, AI-driven traffic management and advanced signalling systems are enabling higher capacity on existing lines by optimising headways and reducing bottlenecks. Predictive maintenance is improving punctuality and reliability, while real-time monitoring and automated protection systems are strengthening safety. Freight operations are becoming more flexible, able to respond dynamically to demand and long-distance travel is being reimagined through high-speed and even autonomous rail concepts. But the real power of digital rail lies in integration. When rail systems communicate seamlessly with ports, airports and urban mobility networks, they become the backbone of a connected, low-carbon transport ecosystem.

Beyond the rail network, intelligence is extending across all non-road modes. Air, maritime and inland waterway transport increasingly rely on advanced data ecosystems to operate safely and efficiently. Satellite-based services, AI analytics and high-precision positioning technologies are enabling

new capabilities that were unimaginable a decade ago. GNSS-based train control supports precise localisation, satellite-enabled maritime navigation enhances vessel tracking and AI-powered air traffic management allows dynamic routing that reduces delays and emissions. Environmental monitoring tools are helping operators minimise ecological impact, while predictive analytics are transforming port logistics and freight flows. Together, these technologies create a shared digital layer across modes, improving situational awareness and enabling more coordinated multimodal operations.

Yet the full promise of multimodality depends on something more fundamental: the free flow of data. Today, operators, authorities and private providers often work within closed ecosystems, limiting interoperability and constraining innovation. To unlock the full value of integrated mobility, the sector must embrace common data standards across rail, air and maritime domains, supported by incentives for data sharing at local, national and global levels. Governance frameworks must balance openness with security, while trusted data spaces protect privacy without stifling progress. Aviation and maritime transport, where international standards have long supported cross-border operations, offer valuable lessons for emerging mobility ecosystems seeking to build similar levels of interoperability.

A new dimension of transport is also emerging above our cities. Urban air mobility (UAM), once the realm of science fiction, is rapidly transitioning into reality. Air taxis, drone logistics and low-altitude air corridors promise to add a fast, flexible and increasingly automated layer to urban and regional mobility. Electric vertical take-off and landing aircraft are advancing quickly, drone-based delivery networks are expanding and integrated airspace management systems are being designed to safely coordinate low-altitude operations. Vertiports and multimodal hubs are beginning to take shape, connecting air mobility with ground transport. Yet UAM must be deployed responsibly. Noise, safety, privacy and public acceptance will determine its success. Air mobility must complement existing systems, not compete with them.

Across all non-road modes, the shift toward sustainable, connected mobility requires a new generation of infrastructure, both physical and digital. Electrification and alternative fuels such as hydrogen, ammonia and sustainable aviation fuel are reshaping fleets. Charging and refuelling networks must expand to support electric and hybrid vehicles, while smart ports and logistics hubs are adopting automated operations and digital control centres to manage multimodal flows. Resilient energy systems capable of supporting high-demand transport corridors are becoming essential as mobility systems electrify and digitalise. Infrastructure investment must be strategic, future-proof and aligned with climate goals.

Technology alone, however, cannot deliver seamless multimodal mobility. Business models and operational frameworks must evolve to support interworking between modes and across borders. Integrated ticketing and payment solutions, shared operational data, aligned incentives for collaboration and cross-border regulatory harmonisation are all essential. Public-private partnerships will play a central role in scaling innovation. Freight transport already offers strong examples of intermodal success, particularly in rail-to-port and rail-to-inland-waterway operations. Passenger mobility now has the opportunity to follow suit, supported by Mobility as a Service platforms and digital orchestration tools.

Regulation remains both a challenge and an enabler. Non-road modes often operate within long-established regulatory frameworks designed for safety and stability. Integrating new technologies, automation, AI, drones, digital twins, requires careful alignment with these legacy systems. Certification of automated systems, integration of drones into controlled airspace, cross-border interoperability for rail and maritime operations, cybersecurity requirements for critical infrastructure and data governance compliance all demand thoughtful, adaptive regulation. The goal is to evolve at the pace of innovation while maintaining the highest safety standards.

Ultimately, the success of mobility innovation depends on people. Whether it is a passenger boarding a high-speed train, a commuter using an air taxi or a business relying on port logistics, solutions must be user-friendly, accessible, inclusive, affordable and trustworthy. Technology should simplify mobility, not complicate it. A user-centred approach ensures that innovation enhances the human experience rather than overshadowing it.

Enhancing transport and mobility beyond the road is not a niche ambition, it is a strategic imperative. Rail, air and waterborne modes are essential to achieving climate goals, supporting economic growth and delivering seamless, resilient mobility for decades to come. By embracing digitalisation, fostering data sharing, modernising infrastructure and aligning regulation with innovation, we can build a transport ecosystem that is smarter, greener and more connected than ever. The future of mobility is undeniably multimodal and its most exciting transformations are happening beyond the road.

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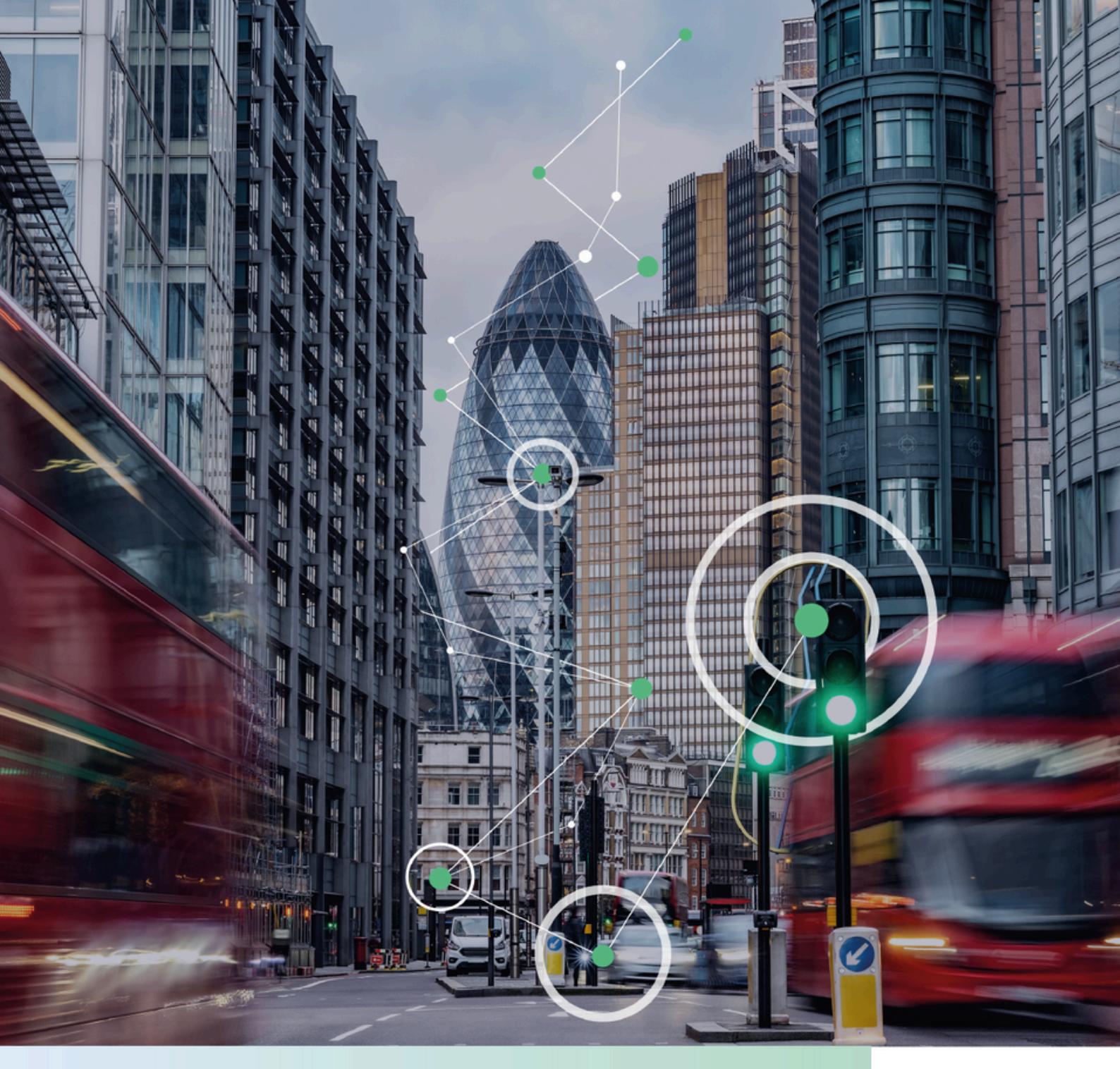
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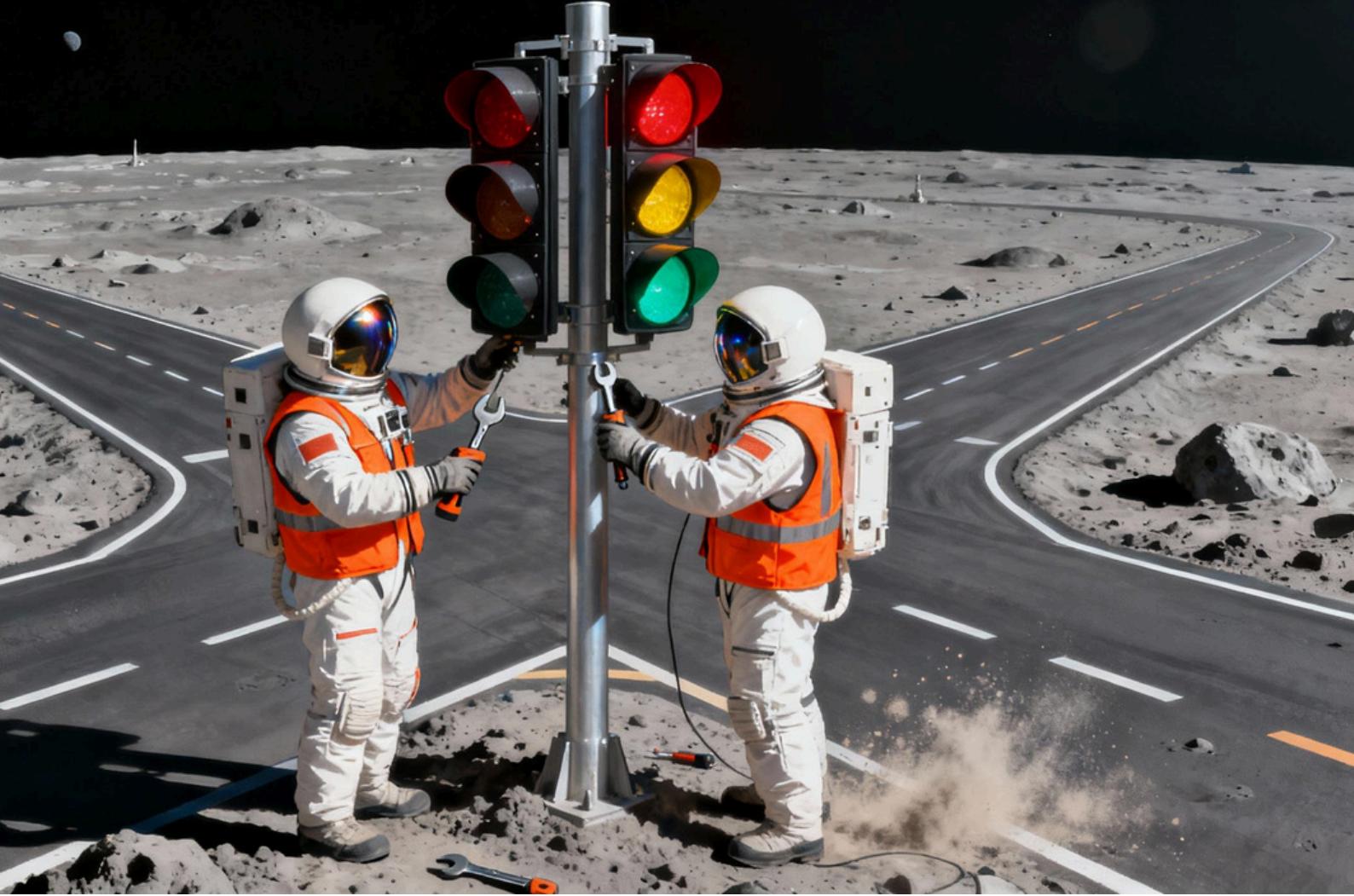
Let's Shoot for the Moon!

ATTRACTING THE NEXT GENERATION OF ITS TALENT

Alistair Gollop looks at how the ITS sector is undergoing a profound transformation.

What was once the domain of civil engineering now sits at the intersection of data science, artificial intelligence and cybersecurity. Yet, despite this evolution the industry faces a significant challenge, a deepening talent shortage. The traditional image of highways engineering, with its focus on physical infrastructure, fails to capture the high-tech nature of modern ITS work, leaving it struggling to compete with tech giants for the brightest graduates.

To secure a sustainable future, ITS must embark on a strategic reinvention. This means a concerted effort to rebrand its image, engage deeply with educational institutions and offer compelling career propositions that resonate with today's skilled professionals.

Rebranding for a digital age

The first and most critical step is to change perceptions. For too long highways engineering has been seen through the lens of concrete, tarmac and manual labour. This vision is not only outdated but actively repels the kind of digitally fluent talent the industry desperately needs. ITS is a world of smart sensors, integrated networks and predictive analytics. It is a field defined by innovation, not by old fashioned construction.

ITS organisations must tell a new story, one that emphasises the technological frontiers being explored. We need to promote roles that involve software development cybersecurity network engineering and systems integration. The language of our recruitment drives must shift from civil engineering to smart technology. Job descriptions should highlight opportunities to work with machine learning, big data and the Internet of Things. These are all essential to building the transport networks of tomorrow.

Beyond technology, ITS offers something many pure technology roles lack, a tangible social purpose. The work we do makes a direct impact on people's lives. It improves safety, reduces congestion and creates more sustainable transport solutions. This purpose led aspect is a powerful motivator for a new generation of professionals who prioritise meaningful work.

By framing ITS careers in terms of their societal contribution we can tap into a deeper well of ambition and attract individuals who want to build a better world not just a better app.

Finally, the industry must actively champion diversity. An inclusive environment is more innovative and dynamic. By showcasing women and other underrepresented groups in our promotional materials we can challenge stereotypes and signal to a wider talent pool that this is a welcoming and progressive sector. A diverse workforce brings a range of perspectives and skills vital for solving the complex multifaceted challenges of modern transport.

Building the talent pipeline from the ground up
Long term success hinges on building a robust and continuous talent pipeline. This requires moving beyond reactive recruitment and establishing proactive partnerships with educational institutions.

We need to work directly with universities, colleges and vocational schools to embed ITS modules into their curricula. This means ensuring engineering and computer science programmes cover topics such as digital design, building information modelling (BIM), data analysis (GIS) and advanced traffic modelling. By integrating these skills into formal education, we produce graduates who are already equipped with the knowledge the industry needs.

Apprenticeships and internships are vital for providing practical hands-on experience. ITS organisations should develop high-quality specialised apprenticeship programmes that offer clear career pathways from entry level positions to senior roles. These schemes not only provide essential on the job training but also give companies an early look at potential future employees. For students, internships offer invaluable insight into the sector helping them make informed career decisions and sparking their interest in ITS.

Sponsoring academic research and innovation challenges is another way to engage with the next generation. By funding university projects ITS companies can foster a culture of innovation and gain access to fresh perspectives. These projects can be a proving ground for new ideas and a source of early-stage recruitment with students who have demonstrated a passion for the field.

<To see the accompanying video, scan the QR code or go to: **https://youtube.com/shorts/gulfCXJ-DxY**

Crafting a compelling employee value proposition
To compete with the tech sector ITS employers must modernise their offering. Today's professionals expect more than just a competitive salary. They seek flexibility, development opportunities and a supportive work culture.

Flexible and hybrid working models are now standard in many industries and ITS must embrace this trend. Offering flexible hours and remote work options demonstrates that the sector is adaptable and trusts its employees. This is particularly appealing to skilled professionals who value work life balance.

Professional development should be a career long commitment, not just a one-off training course. ITS is a rapidly evolving field, so highlighting opportunities for continuous learning through certifications, training programmes and advanced qualifications is crucial. This shows employees that the company is invested in their growth, keeping their skills relevant and their careers progressing.

The employee value proposition must also address workplace culture. Beyond good pay and benefits, organisations need to emphasise a supportive collaborative and inclusive environment. This can be achieved through mentorship programmes, team building activities and a clear commitment to fostering a positive workplace.

Simplifying the recruitment process
Finally, the recruitment process itself needs to be streamlined and modernised. Many ITS organisations still rely on traditional recruitment methods that fail to reach the right candidates.

We must expand our recruitment channels. This means moving beyond conventional job boards to use social media platforms, professional networking sites and industry specific forums, where skilled professionals gather. Advertising the wide variety of ITS roles available from data scientists to traffic signal engineers and systems designers, helps candidates understand where their specific skills fit and how they can contribute.

The adoption of new technology can also enhance the recruitment process. AI powered platforms can help match applicants with suitable roles, more efficiently improving the candidate experience and ensuring the best fit.

The ITS sector in highways engineering stands at a crossroads. It can continue to face a talent shortage compounded by an outdated image or it can embrace a new identity as a dynamic high-tech industry that offers a powerful social purpose. By proactively rebranding, engaging with education, offering modern career paths and simplifying recruitment, ITS can attract the next generation of innovators and secure a bright future for transport systems.

The path forward is clear, ITS is a career without limits, let's shoot for the moon!

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# The humble MS1 comes of age!

For more than half a century, electronic roadside signs have played a quiet but essential role in keeping the UK's Strategic Road Network moving. From the earliest fixed-message boards to today's dynamic, data-driven displays, these signs have evolved in step with the increasing complexity of the roads they serve. Among them, MS1 signs, simple, reliable, text-based variable message signs, have become a familiar sight to millions of drivers. Now, with a new generation of MS1s being developed and manufactured in the UK by Messagemaker Displays, this trusted technology is entering a new era of performance, sustainability and digital capability.

The origins of electronic message signs on UK motorways date back to the 1960s and 70s, when the first illuminated boards were installed to warn drivers of fog, accidents and congestion. These early systems were rudimentary by modern standards, offering limited flexibility and requiring significant manual intervention. By the 1990s, the introduction of the MS1 format, monochrome, text-only signs capable of displaying short, high-visibility messages, marked a major step forward. They provided a standardised, easily recognisable method for National Highways (then the Highways Agency) to communicate essential information quickly and consistently.

Over the years, MS1 signs have become a cornerstone of motorway operations. Their simplicity is their strength: clear, concise messages delivered in a format that drivers can read and understand in seconds. While more advanced MS4 signs now offer full-colour graphics and pictograms, MS1s remain vital for routine messaging, speed advisories and incident management. Their reliability and low maintenance requirements have ensured their continued use across the network. There are three variants of the signs: Type 211 – Usually found in central reservations, Type 212 – These are optimised for gantry mounting, and Type 213 – A slightly wider variant for use on entry slips.

Today, however, the demands placed on roadside technology are changing. The Strategic Road Network is becoming more digitally integrated, with real-time data flowing between control centres, roadside systems and connected vehicles. Signs must be more energy-efficient, more resilient and easier to maintain. This is where the latest generation of MS1 signs from Messagemaker Displays is making a significant impact.

UK-based Messagemaker Displays, with a strong track record in LED signage, has developed a new MS1 platform designed specifically to meet National Highways' modern requirements. These next-generation signs combine robust engineering with cutting-edge LED technology, delivering higher clarity, improved legibility and lower power consumption. Their modular design allows for easier installation and maintenance, reducing whole-life costs and minimising disruption during upgrades or repairs being designed to be installed in less than 15-minutes.
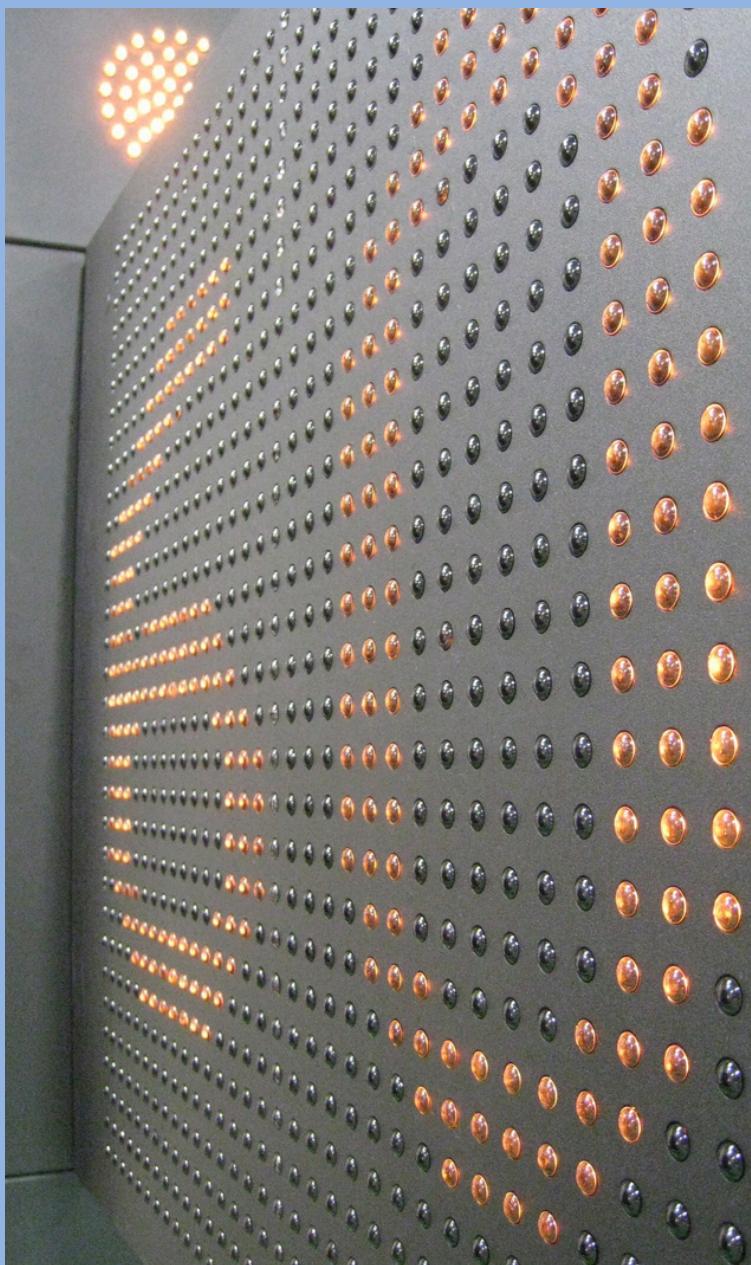
The Messagemaker Displays MS1 SRN VMS sign product line uses a common Central Matrix Display (CMD) with three sets of Lantern/Target Board Modules (LTBM) to implement the Type 211, 212 and 213 variants. The equipment is contained in a rugged aluminium housing, the CMD features a 32x32 matrix display on the front, electrical and communications connections on the rear and the electronic systems are located within the unit. These are accessed via the front panel, which is hinged along the lefthand edge and equipped with a door strut to hold the door open for maintenance and inspection activities. The LTBM's house the dual-colour (Red and Amber) flashing lanterns and are accessed from doors on the rear. The display configuration parameters are preprogrammed into the Messagemaker Displays MS1 SRN VMS sign in compliance with the requirements specified in Table C2 of National Highways. TR2655, 'Requirements for Discontinuous Variable Message Signs – MS1'. This defines the symbols displayed on the sign along with the required operation and colour of the flashing lanterns. NB: All displays are full RGB, so colours and symbols could be modified for non-Strategic Road Network applications.

One of the most notable advancements is the enhanced optical performance. The new MS1s use high-efficiency LEDs and precision optics to ensure messages remain crisp and readable in all weather conditions, from bright sunlight to heavy rain. Improved contrast ratios and anti-glare features help reduce driver distraction while maintaining compliance with strict visibility standards.

Sustainability has also been a key focus. The latest MS1s consume significantly less energy than previous generations, supporting National Highways' commitment to reducing carbon emissions across its operations. Their durable construction and long-life components further contribute to environmental goals by reducing waste and extending service intervals.
Crucially, these new signs are built with digital integration in mind. They support modern communication protocols, remote diagnostics and real-time monitoring, enabling more responsive network management. As the UK moves toward increasingly connected and automated mobility, roadside infrastructure like MS1s will play an important role in bridging today's roads with tomorrow's intelligent transport systems.

From their origins as simple illuminated boards to their role in a sophisticated digital ecosystem, MS1 signs have come a long way. With Messagemaker Displays' new generation, they are set to remain a vital part of the Strategic Road Network, clear, reliable and ready for the future.

Opposite page: Type 211 illuminated; Top: Types 211, 212 & 213; Left: Rear of Central Matrix Display (CMD):

To find out more, visit Messagemaker Displays at:
https://www.messagemaker.co.uk/

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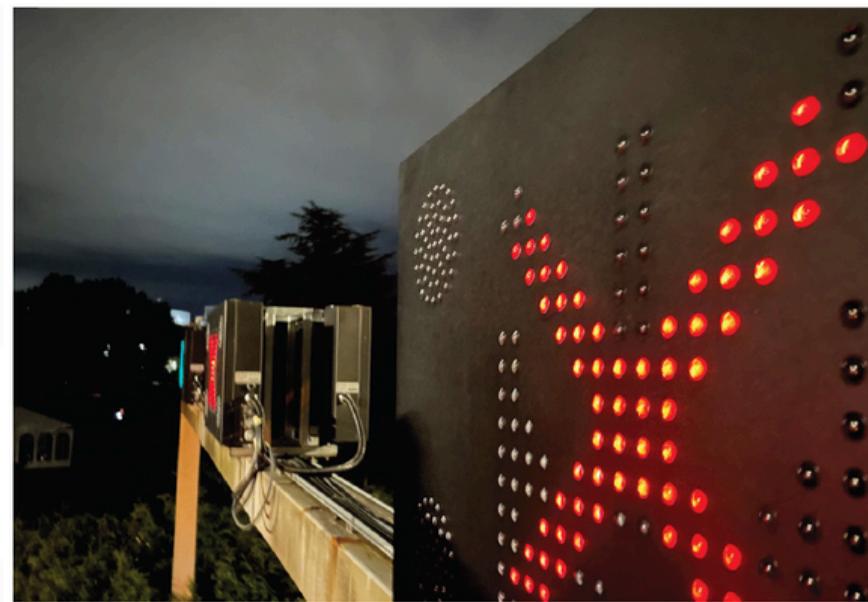
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In today's world, our transport networks are complex ecosystems, undergoing a profound transformation driven by technology. Creating infrastructure that is safer, more efficient and sustainable requires more than just new hardware or software. It demands deep expertise, strategic foresight and a clear understanding of how technology translates into real-world value.

As a highly experienced and respected freelance consultant, I provide a comprehensive range of Intelligent Transport Systems (ITS) and Traffic Signal consultancy services to navigate this complex landscape. My mission is to be the critical link between technological potential and practical implementation, ensuring innovation delivers meaningful outcomes.

I work with a diverse client base, including **highway authorities**, **engineering / management consultancies** and **commercial technology firms** to deliver expert guidance, innovative solutions and tangible results for transport infrastructure projects. The common thread in my work is bridging the critical gap that often exists between different stakeholders. Public authorities need to procure effective, future-proof solutions; technology companies need to align their products with genuine market needs; and engineering consultancies require specialist knowledge to deliver robust project designs. I operate at the nexus of these requirements, speaking the language of public policy, commercial strategy and technical engineering with equal fluency.

For my **public sector clients**, I provide independent, expert advice on everything from strategy development and systems specification to procurement support and project assurance. My guidance ensures that investments in new technology are sound, deliver maximum public benefit and avoid costly pitfalls. When partnering with other **consultancies**, I act as a specialist extension of their team, bringing niche expertise in advanced traffic signal control, ITS architecture and emerging mobility trends to enhance their project delivery capabilities.

For commercial **technology firms**, both established players and market entrants, I provide the strategic insight needed to succeed. This includes critical guidance on product localisation for the UK market, identifying the most appropriate applications for new solutions, facilitating strategic introductions to key industry players and providing technical business development support. By aligning your innovative technology with the specific challenges and procurement frameworks of the transport sector, I help accelerate your path to commercial success and impactful deployment.

Ultimately, my work as a technologist, author and speaker is driven by a passion for creating better transport systems. Whether I'm designing an advanced traffic signal strategy, advising a company on market entry or speaking at an industry conference, my goal remains the same: "*to apply deep technical knowledge and strategic thinking to solve real-world problems*".

I invite you to explore my services and learn how we can work together to shape the future of mobility on my **newly updated website**, I look forward to hearing from you.
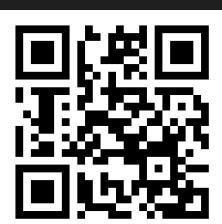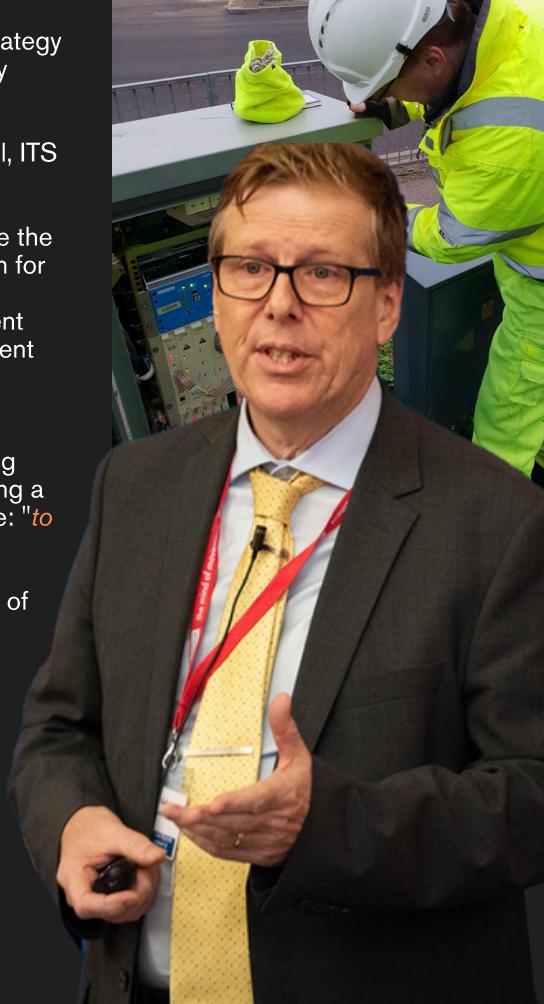
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ITS Now exists to provide informative and educational resources about Intelligent Transport Systems (ITS), and should be of interest to technology practitioners in highways and mobility, along with people working in other engineering disciplines and for anyone who has an interest in transport generally.

Resources include our website - **ITSNow.org**, YouTube channel **@ITSNow** and **ITS Edge** magazine, along with our original books and articles on a broad range of related topics.

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