JUNE/JULY 2009

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Box of tricks

The Mercedes-Benz ESF 2009 Experimental Safety Vehicle is the German car-maker's vision of safety in the future – technologies around the corner and 20 years down the line

Main: The braking bag has the effect of an additional crumple zone
Below: Pre-Safe Pulse is an automatic 'nudge in the ribs'

NICK BRADLEY

Stuttgart, Germany When Ulrich Mellinghoff, vice president, Safety, NVH, Testing, Mercedes-Benz talked with *Traffic Technology International*'s sister magazine, *Vision Zero International*, in March, he was tight-lipped about the company's long-term safety plans, although he did allude to something special on the horizon. In June 2009, we got to see it: the ESF 2009 Experimental Safety Vehicle, packed with safety innovations for the next generation… and the one after that. "I am certain that all of the 27 innovations [on the ESF 2009] will make it into production, but some won't be seen on our cars for a long time into the future," says Michael Fehring, project manager for the ESF 2009. "Perhaps the highlight is the 'Braking Bag' – an airbag installed between the front axle carrier and the underbody panelling," Fehring continues. If the sensor system deems an impact is inevitable, the Pre-Safe system not only initiates automatic emergency braking, but activates the Braking Bag at the same time, in doing so supporting the car against the road surface by means of a friction coating. The vehicle's vertical acceleration therefore increases the friction and has an additional braking effect before the impact. In addition, it minimizes the car's 'dive' as it brakes, which

Making progress

London, UK New government statistics revealed by Transport Secretary Lord Adonis show that the number of people killed on UK roads has reached a record low, with 2,538 in 2008 – the lowest annual total since records began in 1926. DfT statistics showed that 28,567 people were killed or seriously injured in 2008, which is 7% fewer than 2007.

275 …million Australian dollars (US$223 million) will be invested into transport infrastructure to help create jobs for Tasmanian families and deliver major infrastructure projects for the state, according to the Minister for Infrastructure, Graeme Sturges. "Funding spent on new road construction or on upgrading existing roads makes a vital contribution both to making travel safer for both Tasmanians and visitors to our state and we are delivering on our plans for major infrastructure upgrades."

Watch your speed

London, UK An Intelligent Speed Adaptation (ISA) trial being carried out by Transport for London is claimed to be the largest such trial ever conducted. The specially equipped fleet – including cars, a bus and a black cab – is set to take to the streets to evaluate the technology's impact on road safety and congestion in a six-month trial. If an ISA-equipped vehicle is driven from a 40mph to a 30mph zone, it is automatically and gradually slowed down.

according to Fehring "improves geometrical compatibility with the other party in an accident". In other words, you'll take a hit on par with the other vehicle, and you won't wedge under, both of which can minimize injury to you and your car. "It is a crazy idea to brake a car with a bag," Fehring admits, "and Mercedes is great to give us the opportunity to develop it. But if you think back to the 1970s, having an airbag in the car to decelerate the occupant was considered crazy. People think active safety is increasing and passive safety is decreasing, but we have shown that this is not the case with ESF 2009."

Another passive gizmo is the restraint system incorporating 'Pre-Safe Pulse' technology – an 'automatic nudge in the ribs', according to Mercedes. "We are no longer waiting until the accident occurs; we are preparing the occupant for impact," Fehring says. The system is also able to reduce the loads acting on the torsos of the occupants by around a third during a side impact by moving them toward the center of the vehicle. "There are more innovations to come," Fehring predicts. "We haven't included them all here, because we are concentrating only on early detection of a crash, collision mitigation, and collision avoidance. The Braking Bag is one step removed from these areas, but we wanted to show it as it proves we still have plenty left in the locker."

Policing the speeding cowboys

Sydney, Australia The New South Wales government is introducing average speed cameras in a bid to catch those truck drivers that it describes as "cowboys". The NSW Roads Minister, Michael Daley, says trucks account for less than 3% of registered vehicles, but they are involved in about 20% of fatal crashes. "The system will time how long it takes a truck to travel between the two cameras and if a driver is too quick, they will be fined," Daley says. "The majority of truck and bus drivers do the right thing, but there are a small number of cowboys who continue to terrorize other road users."

There has been some political opposition and much discussion regarding the fact that the system is only targeting truck drivers, and not all drivers. However, the state government says there are currently no plans to introduce average speed cameras for cars or motorbikes.

FOREWORD

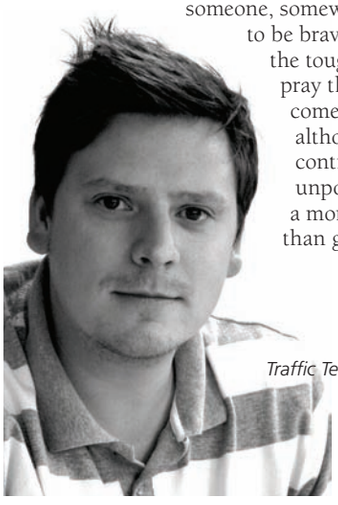
Akin to the ups and downs of a soap opera wedding, the Labour government in the UK seems to have terminated its love affair with road pricing once and for all. Lord Adonis, the new Transport Secretary (who took over from Geoff Hoon at the start of June), recently declared that a pay-per-mile policy would not be part of the government's next manifesto. "This is not the time to be putting this before the British people," he stated following a conference in London, at which he laid out his other plans.

It's one hell of a U-turn from the days of current Chancellor Alistair Darling's reign in transport (2002-2006). He was steadfast in his pursuit of charging for road usage. Darling's successor, Ruth Kelly, distanced herself somewhat from his vision (but did give the thumbs-up to hard shoulder running), suggesting that it's "something for the future". Hoon possibly didn't even have time to familiarize himself with the concept during his eight-month term. Hammer in one hand and nail in the other, however, Adonis has closed the lid on the matter.

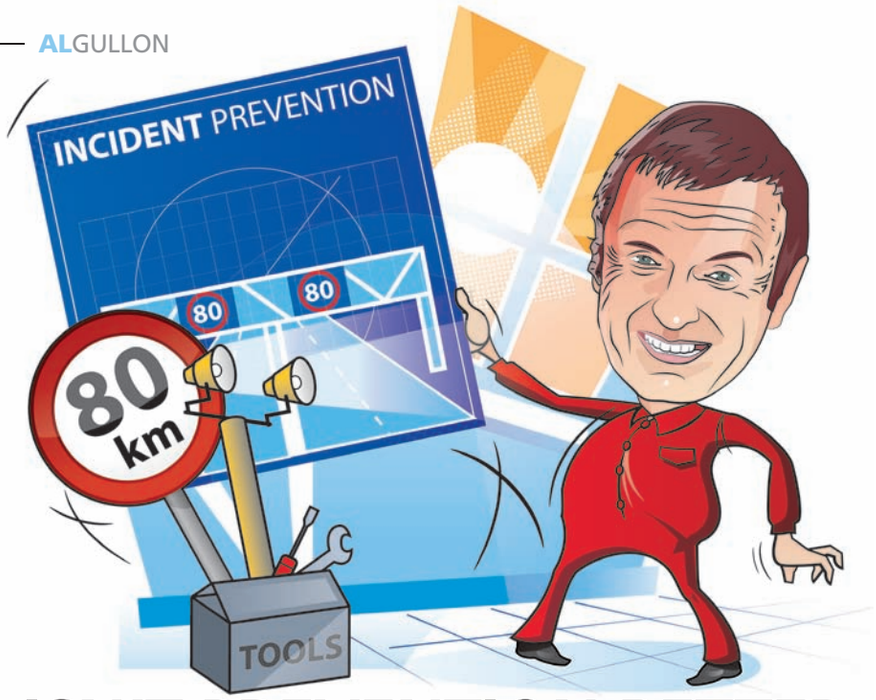
This is not a government doing what it thinks is right for the people, though. What we have seen since Darling's tenure is a government backtracking on an admittedly unpopular policy in the face of declining voting share, to the extent that a necessary policy has been killed off by cowardice.

Tough decisions are going to have to be made eventually. Traffic levels are increasing, stretching capacity even further. Breaking point is on the horizon. Pricing, as has been proved elsewhere (including London), works. It isn't the golden ticket for a dream commute, but it does provide a multitude of benefits: less emissions, extra funding, and congestion reduction. Take Singapore, for instance, where traffic moves at an average of 60km/h, even at peak times. Queues are an infrequent. Rather than sit in traffic, those who need to travel somewhere as a matter of urgency pay a premium for it. Road users are better off: trips that count take less time and are more reliable.

You sense that politicians are coming around to the idea that taxing gas is flawed; someone, somewhere just needs to be brave enough to make the tough decisions and pray that the plaudits come later. PAYD, although radical, controversial, and unpopular, is surely a more attractive option than grinding to a halt.



Nick Bradley
Editor
Traffic Technology International



ISN'T PREVENTION BETTER THAN DETECTION?

Al explains why trying to stop incidents from occurring in the first place – rather than dealing with the aftermath when they do happen – is the key to achieving Vision Zero

by Al Gullon, Automobiles+Concepts+Environments, Canada

Although survival is always improved by earlier alerting of ambulance teams, a 'bare-bones' incident detection system won't much help in getting to Vision Zero. However, to avoid embarrassing myself with suggestions that might be current in the field, I decided to Google 'traffic incident detection'. The first 20 or so links (of 43,900 hits) confirmed the concept was many years older than my 1996 stumble into traffic safety. And Ontario's COMPASS system (see SAE912767) has been in operation since 1991 on Toronto's 401 motorway, and is now used on Ottawa's 417. It became apparent that incident detection originated within traffic management rather than traffic safety. And that even the super-quick reaction developed for the former was inadequate to prevent the follow-on crashes necessary for better safety, let alone the split-second reaction needed to prevent or mitigate the incident itself.

Although incident detection was far from my mind, my last column suggested a 'Vio2Vic' system for controlled suburban intersections, which covered all three functions! A white strobe light warns upstream traffic that the light was about to change (or red already); a radar/CCTV would monitor oncoming traffic to detect vehicles whose speed/distance indicated the driver had not seen the strobe light; and a red/orange strobe (red for the potential violator and orange for the potential victims in the cross-traffic) would attempt to prevent/mitigate the crash. I would now add incident detection to detect a crash in the intersection and prolong the red/orange strobe. Incident detection has just morphed into incident prevention!

Turning incident prevention now to motorways, my SAE2002-01-0760 paper reported on skidmark 'counts' in many countries. Those 'near-misses' were shown to be overwhelmingly (50-90%) the sequelae of badly managed merge operations at junctions. The counts – combined with accident location data provided by the *Verkehrspolizeiinspektion Ingolstadt* – suggested the creation of 'courtesy corridors' (CCs) at motorway junctions. On detecting a vehicle entering the on-ramp, a strobe light pointing upstream and an 80kmh limit sign on the inside lane would be activated, requiring drivers on the inside to exercise courtesy toward incoming vehicles. Alerted in good time, they could move smoothly over to the 'fast' lane or slow down to ensure that the merge does not create an incident.

If such courtesy corridors were to be combined with standard incident detection to warn oncoming vehicles of tailbacks at junctions (fewer with CCs) – and with mobile systems for construction zones – a country should be able to get to Vision Zero on their motorways within a decade. ■

Please email feedback to al@alsaces.ca

A smart move

Tennessee, USA Aldis – the company behind the SmartWay and GridSmart ITS systems – has revealed that former US Secretary of Transportation, Mary E. Peters, has been elected to its board of directors. "She will help raise the profile of the company's next-generation traffic control technology among leading transportation officials," explains Bill Malkes, officer and co-founder of Aldis. "This is a perfect fit for everyone involved. Secretary Peters urged the greater use of technology to fight traffic congestion when she was in Washington, DC, and making our transportation network more efficient and cost-effective, which is what Aldis is all about."

Bright ideas hitting the road

Lippstadt, Germany Best known for its automotive lighting, German electronics manufacturer Hella is now introducing the first prototypes of its new street lighting range. Based on LED technology, the new line should be ready for series production by the end of the year. The newly developed modular Eco StreetLine system is initially being trialed in Hella's Lippstadt home town. Energy consumption can be decreased by up to 50% through the use of the LED technology, and with a service life of around 12 years, the LED modules are designed so that they rarely need to be serviced or replaced, allowing operating costs to be cut. The lamp has a total of four modules, each with eight optical units. Each has a specially developed optical lens and an LED light source located behind it.

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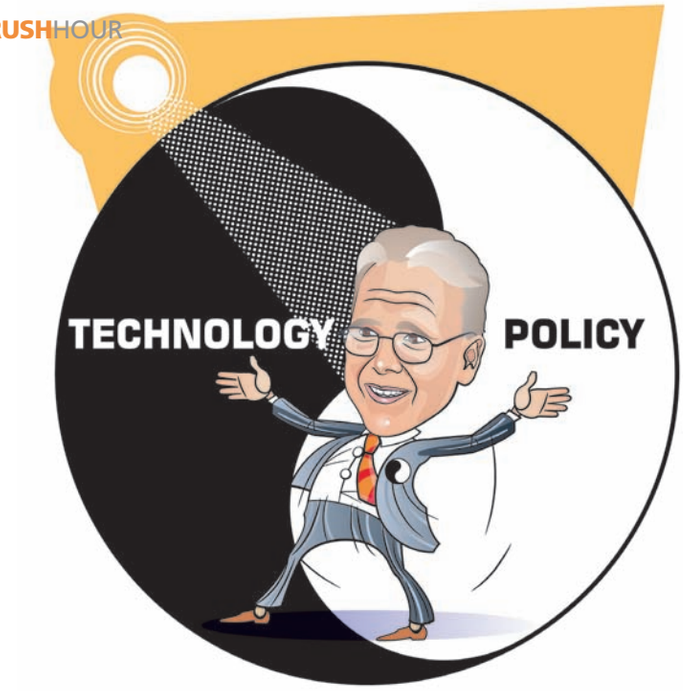

RISING OBERSTAR

Straight-talking from politicians is often surprising – particularly when dealing with sensitive topics such as VMT charging. Grush salutes one refreshingly honest individual

by Bern Grush, www.grushhour.com

There are many influential transport leaders who understand why moving to a vehicle miles traveled (VMT) form of road user charging and away from gas taxes is essentially unavoidable. However, because this is not well understood by the average motorist, few of these political leaders actually speak out about it – fewer still, in fact, if they depend on votes to keep their jobs.

One of those rare people, however, is US Representative James L. Oberstar, a democrat from Minnesota, and House Transportation and Infrastructure Committee chairman, who is currently carrying the torch for VMT charging in the USA. He recently told White House press secretary Robert Gibbs, "…transportation policy isn't going to be written in the press room of the White House" – which I am sure several thousand of us wished we could have said.

The National Surface Transportation Infrastructure Finance Commission (NSTIFC) report *Paying Our Way* and the American Association of State Highway and Transportation Officials (AASHTO) call for VMT charging by 2020, and Representative Earl Blumenauer, a democrat from Oregon, has recommended that pilot programs be included in the upcoming US transportation bill.

But Oberstar asks, "Why do we need a pilot program? Why don't we just phase this in? I'm at a point of impatience with more studies." He asserted, "There are many suggestions it would take five to 10 years. I think it could be done in far less than that, maybe two years."

Oberstar warns, "If we do nothing, [the Highway Trust Fund] will run US$90 billion short within six years." Furthermore, he points out that people spend 40 hours a year in their cars longer than if they could travel at posted speed. "We need to cut that waiting time in half."

The key social issues that he and fellow lawmakers grapple with are related to privacy protection, fair distribution of revenues, and driver equity (there is a general fear that rural drivers could be treated unfairly). That said, Oberstar knows "this has to be done in an open deliberative process" and that "it would take years to install the technology on 253 million vehicles in America."

So, what's the difference between Oberstar's "let's phase it in" and Blumenauer's recommendation for pilots? Courage and commitment. Lawmakers know this change is big – 10 or more years big. But only Oberstar's commitment will meet NSTIFC and AASHTO schedules. I thanked Secretary Mary E. Peters in this column (*February/March 2008*) for talking straight for the previous administration about the failure of the gas tax. I applaud Congressman Oberstar, now, for talking straight for this administration. ■

Any comments to bgrush@skymetercorp.com

Mark IV ready for VMT switchover

Ontario, Canada Richard Turnock, CTO of Mark IV IVHS, recently told the US House of Representatives Committee on Transportation and Infrastructure that the infrastructure in place for the E-ZPass system could easily and cost-effectively be used to implement VMT charging, whenever policy-makers are ready. "VMT may be the application that will propel 5.9GHz forward and deliver the safety and mobility improvements for which it was intended," Turnock noted in his statement. "Our new Janus RFID technology is one example of a high-performance, field-proven RFID system and offers a seamless migration as we move to a 5.9GHz DSRC Federal standard."

Taking charge

Seoul, South Korea Scientists at South Korea's top technology university have developed a plan to power electric cars, such as Chrysler's Peapod (below), through recharging strips embedded in the road surface, using a technology similar to that used in some electric toothbrushes. The scheme is still at the experimental stage and involves placing power strips that will be between 20cm (8in) and 90cm (35in) wide and perhaps several hundred meters long into the road. The recharging strips – which are attached to small electrical substations – would be laid in places such as bus lanes and the roads running up to traffic signals, so that vehicles could power up where traffic slows down. The inductive charging system works by sensor-driven magnetic devices on the underside of a vehicle picking up the current in the strip as they travel over it.

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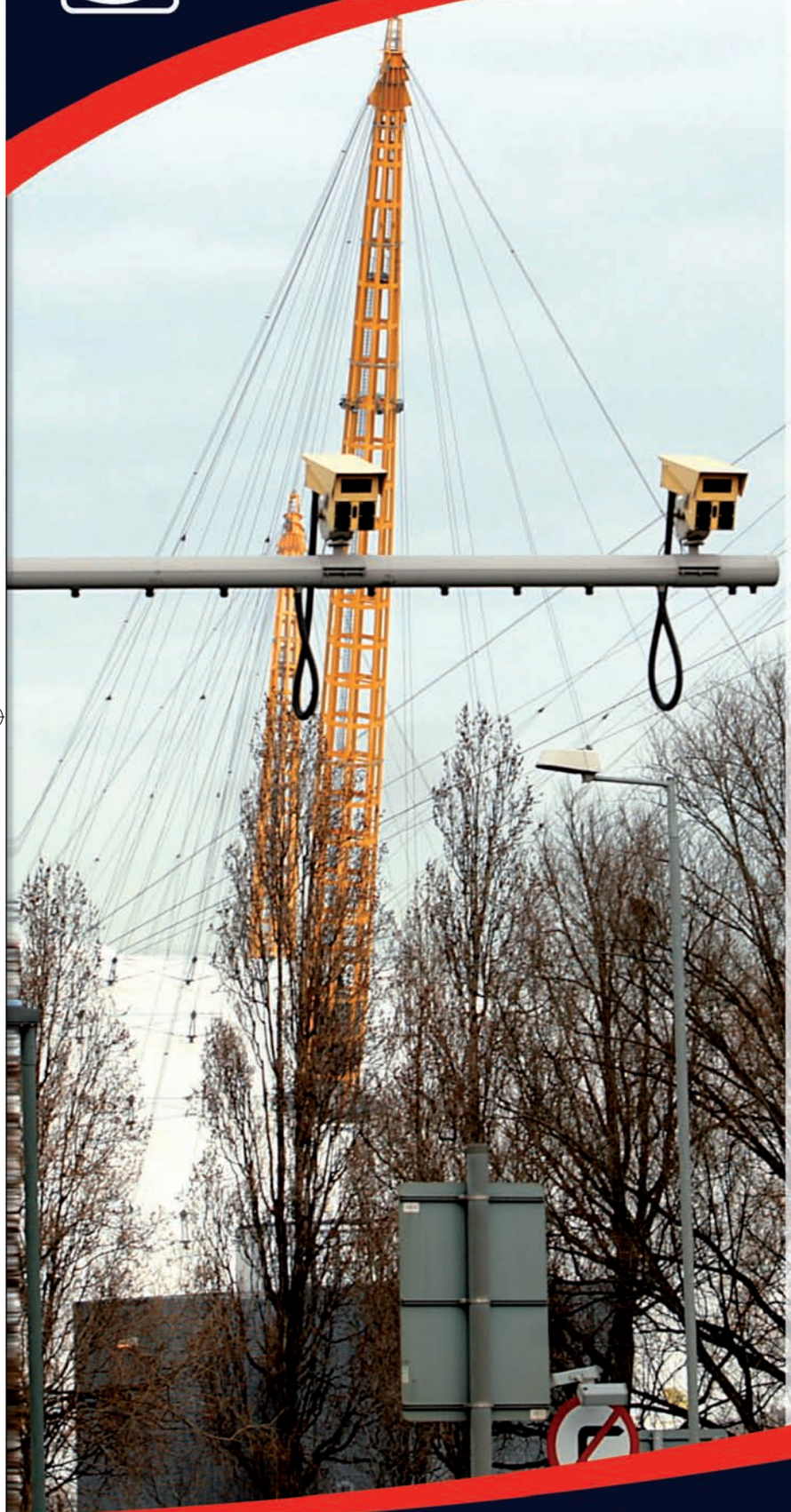

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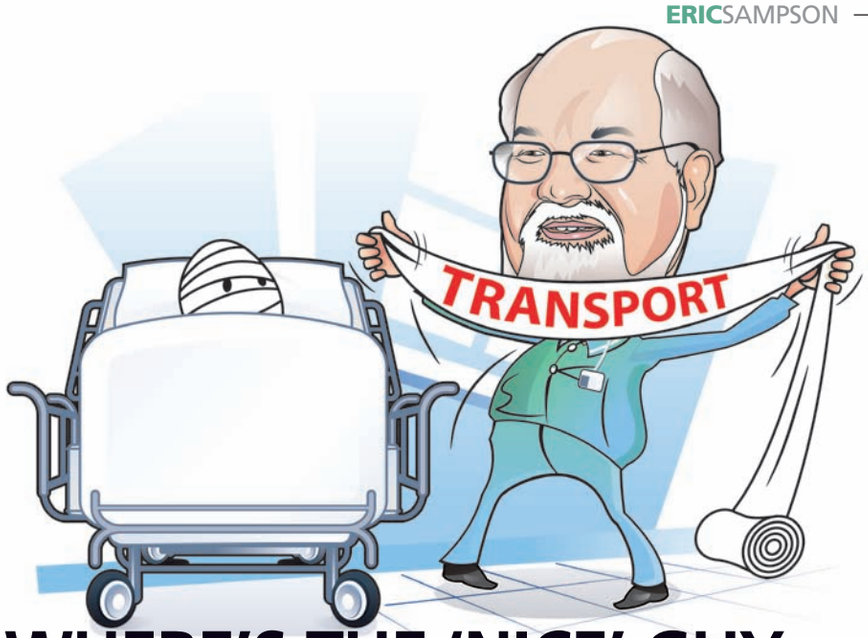


WHERE'S THE 'NICE' GUY WHEN YOU NEED HIM?

by Professor Eric Sampson

Our new columnist draws inspiration from the National Health Service to consider the issue of how the UK's transport network tackles the matter of priority

While traveling with my niece recently, we saw a builder cut his leg badly. With her St John Ambulance training, Kathryn moved in: she produced scissors, turned material from his trousers into a tourniquet, and pushed him into my car to be driven to A&E. A triage nurse assessed him and declared he was 'second priority'. Much later I pondered 'triage'. Wikipedia states that it prioritizes patients based on condition severity, rationing treatment efficiently when resources are insufficient for all to be treated immediately.

Such a rationing of limited resources pointed me to NICE (the National Institute for Clinical Excellence), which advises on the cost-effectiveness of pharmaceuticals, medical devices, surgical procedures, etc. Some of its advice is rather morbid, with talk of a 'Quality-Adjusted Life Year' (QALY) and a guide figure for what might be paid in treatment from the NHS's fixed budget to buy someone an added QALY.

I concluded that health ministers appear to be quite good at setting priorities for the use of resources, whereas transport ministers are not. Yes, ministers decide whether rail should have less and aviation more – or vice versa – but that's not too difficult in terms of overall budgets. Health is prioritizing at the point of delivery and transport doesn't want to do that. The only schemes I can see are ramp metering, which manages the queues similar to triage, except the transport queues crawl along emitting maximum polluting gases.

We can't just turn up and go if we want to put on a train service or fly an aircraft from Gatwick to the Galapagos. Network access is controlled with prioritization. But we can use the national roads network whenever we feel and regardless of what our actions might do to others. What are motorways supposed to be for? In May 1942, the *Hollingshurst Report* set out the need for a basic set of new high-speed roads for transporting goods around the UK. It listed a small number of routes that were intended to connect the main centers of industrial activity to ports, and whose routes were chosen to relieve trunk routes where online improvement would be most difficult. That's not how we use them now.

We all know that on most of the trunk road network, demand regularly exceeds supply. So how about some NICE policies to decide on priorities? Suppose we said that from 07:00-10:00 and 16:00-19:00, the M25, M1, M62, etc, would run primarily as lorry routes with access to all lanes and cars charged £1.00 per mile for access, while outside those times lorries would pay and cars would be free? Would that decongest the network and persuade people to think before driving? I don't know the answer, but sooner or later questions like that one will have to be asked as there's very few techniques left to balance demand and resources. ■

Injury advice

Michigan, USA GM's OnStar has developed an Injury Severity Prediction system, based on the findings of an expert panel from the Centers for Disease Control and Prevention. This will allow OnStar advisors to alert first responders when a vehicle crash is likely to have caused serious injury to the occupants. Using a network of built-in vehicle sensors, the Automatic Crash Response system sends crash data to an advisor if the vehicle is involved in a moderate or severe front, rear or side-impact crash. This information will then be used to automatically calculate the Injury Severity Prediction.

Information revolution

Birmingham, UK England's 'Second City' could be at the forefront of urban technology development if a multimillion-pound transport project goes ahead. The scheme, Intelligent Transport, is claimed to be the UK's first IT-led initiative to address urban issues relating to transport, tourism, security and climate change. The initial phase will combine data on transport areas (e.g. congestion, parking availability and bus scheduling) to provide individual, location-specific tracking information, which could speed up travel times and reduce environmental impact.

Under the initiative, drivers could choose fuel-efficient, less-congested routes and find the nearest car park with available spaces, all via real-time information relayed to in-car systems. Pedestrians and public transport users would be able to use cellphones in the same way as car-based GPS systems and have access to bus and walking routes.

DASHING TO THE FUTURE

According to our Smart Cars expert, when considering the dashboard of a vehicle, its accompanying electro-optical technology, and how this evolves, it's hip to be smart

by Jim Misener, executive director, California PATH, UC Berkeley

Your car's dashboard is literally where the human meets the machine. Consider that at one time your dashboard was monochrome and analog, and then consider its evolution. In your father's car, perhaps various dash gauges lit, and if you're a bit younger, perhaps there were some backlit numbers here and there. And unless you or your father have bought a car recently, the lit part of your dashboard is probably still in monocolor and without a high degree of detail.

Recently, the consumer electronics market has met the automotive supplier market, and in doing so opening the penstock of technology transfer. A plethora of innovations have suddenly found their way to the dashboard, usurping the position, prominence and functionality of your father's relatively humble in-dash driver interface. New cars will have LCD thin-film transistors that can literally and figuratively transform dashboards into full-sized, dynamically reconfigurable screens. And the backlighting has changed to LED, giving unparalleled brightness and quick response. But imagine a programmable dashboard. Better yet, check out the 2008 Toyota Crown Hybrid, which allows a driver to go from economy to night-time driving and sports modes. You'll love it – your father might love it, too.

There are more electro-optical miracles on the horizon, assuming that reliability of these things can go up and costs can go down. The Smart Car of the future might feature microprojectors to allow programmable HUDs with different views, bringing forth dynamic elements and in particular safety alert and warning features as layered projections. Imagine a dash that dynamically extends and places the most important features when needed right in your windshield as you scan the horizon.

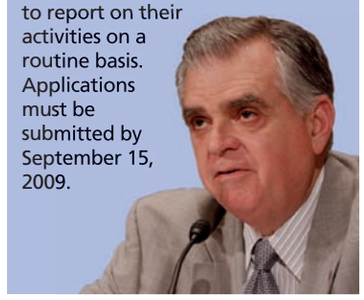
Okay, despite my ministrations above to get you to change your technical specialties, it is doubtful that you or your father are (or will become) electro-optical geeks. Certainly, not all drivers will become electro-optical geeks either. Moreover, not all car drivers are human factors experts. I dare say that the product of electro-optical 'push' and human factors 'pull' will produce the magic result. Drivers need to be presented with a dashboard that is human-centered and is responsive to their needs for safety, efficiency, and convenience.

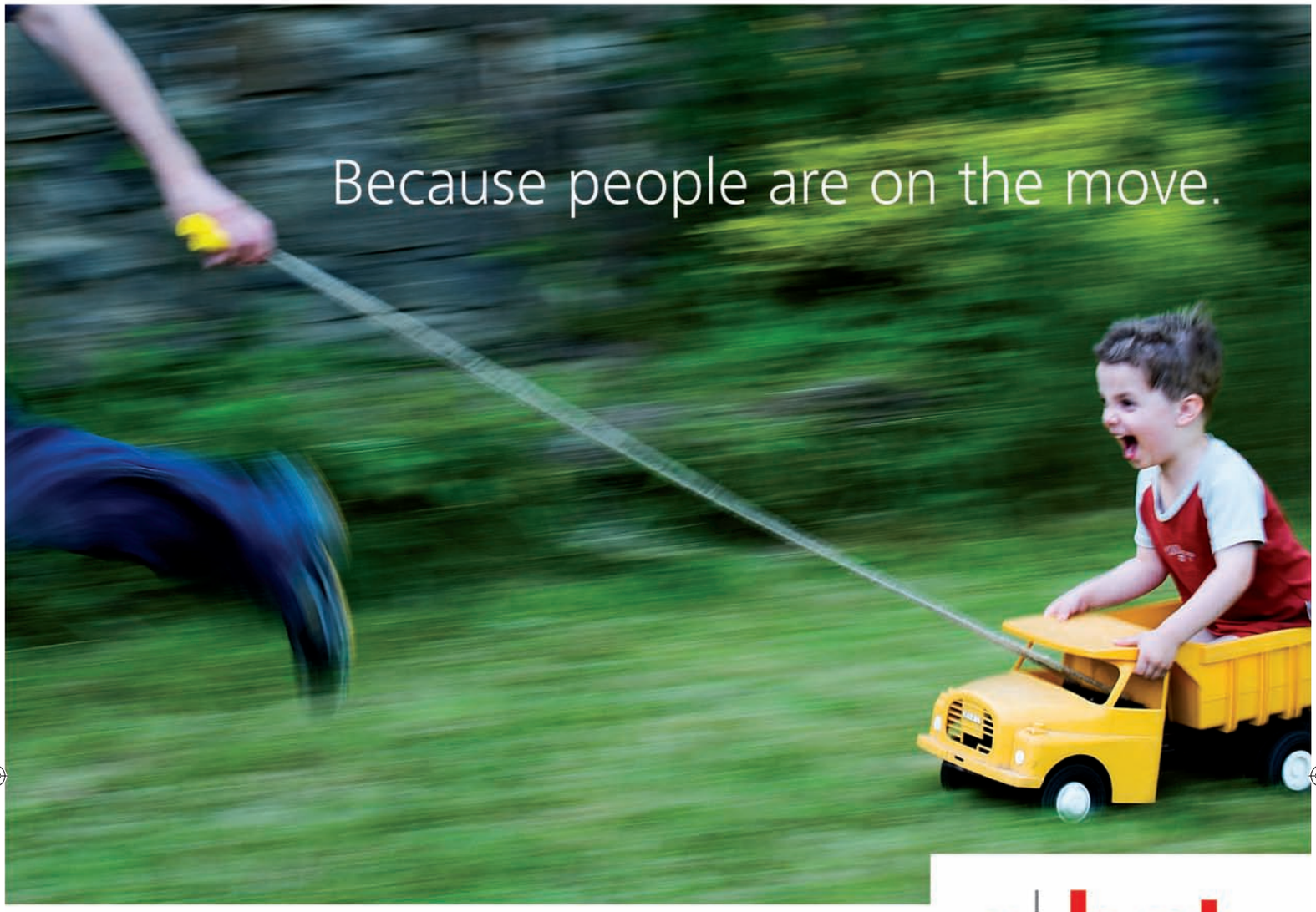
In short, there is an amazing technology push, but how can a Smart Car's dashboard make you a smart driver? By matching the sophistication and functionality allowed by these displays with what can be offered by a Smart Car. Want a salient, bright in-dash alert? It's now covered. Want brightness to be adjusted? It's now covered. Want a transformable dashboard à la the aforementioned Toyota Crown Hybrid? It's covered. Want a Smart Car? Well, I do want a smart dashboard. ■

100 …thousand Autoscope video and RTMS radar systems have now been deployed in more than 60 countries. The Autoscope and RTMS units from Image Sensing Systems help to improve traffic flow and safety in both urban and interurban environments. In urban areas, the technology allows for intersection control management based on real-time conditions. In interurban environments, vehicle traffic data is measured to alert drivers of upcoming queues or to provide travel-time estimates.

Future funding

Washington DC, USA The USDOT has announced the availability of US$1.5 billion in Transportation Investment Generating Economic Recovery (TIGER) grants for capital investment in surface transportation projects. "TIGER discretionary funding will open up the door to many new innovative and cutting-edge transportation projects," says USDOT Secretary Ray LaHood. Grants of between US$20 million and US$300 million will be awarded on a competitive basis to projects that have a significant impact on the country, a region or metropolitan area, and can create jobs and benefit economically distressed areas. USDOT will require rigorous economic justifications for projects over US$100 million, and will require all funding recipients to report on their activities on a routine basis. Applications must be submitted by September 15, 2009.





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EYES ON THE PRIZE

In our annual coverage of some of the shining stars of the traffic management sector, **John Challen** talks with the delighted winners of the coveted Best of ITS Awards, presented each year by ITS America

Photography courtesy of Craig Henry Marshall

The past 12 months have witnessed a world in crisis on so many different levels, with widespread job losses, major disruption to the automotive and banking industries, and a more than 50% rise in home repossessions. But in such tough economic times, the world has had to keep on moving, quite literally. In recognition of this fact, ITS America president and CEO Scott Belcher recently paid tribute to the people who have ensured that traffic flows better and streets are safer – even in times of recession. "These awards recognize the individuals – the real heroes of ITS – who perform the research, build the systems, and who now operate and manage these programs as part of the world's finest transportation network." With these words came a sense of pride among the 1,000-strong audience at the Gaylord National Hotel & Resort in National Harbor, Michigan, which played host to ITS America's 2009 Annual Meeting and Exposition at the beginning of June. A sense that everyone can contribute to making a difference, and improving people's lives through meeting their transportation needs was how Belcher read the current situation.

For the winners of the Student Essay Competition, the Best of ITS Awards and Outstanding State Chapter Awards, the event provided a chance to highlight successes – differences that have already been made. Many were determined not to rest on their laurels but raise the bar even further, with the intention of picking up another prize in May 2010, when the ITS America Annual Meeting moves south to Houston, Texas. The world promises to be a very different place by then. But, for now, it is over to the ITS class of 2009…

Best Innovative Practices – Private Sector

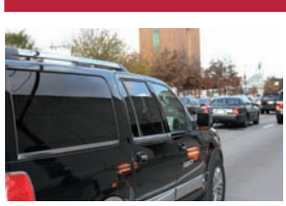
5.9GHz is *the* industry buzzword right now, with Kapsch TrafficCom driving forward development

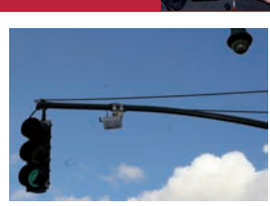
With increased safety and the need to curtail accidents and fatalities paramount in today's society, there is no shortage of vehicle-to-infrastructure innovations in development. With this in mind, the judging panel recognized the efforts of Kapsch TrafficCom in the private sector, rewarding the company's 5.9GHz DSRC smart road technologies, which seek to address the annual six million crashes and 42,000 deaths on US roads.

Kapsch used November 2008's ITS World Congress in New York to demonstrate the capabilities of the system by deploying 40 5.9GHz DSRC roadside units onto city streets. The demonstration signaled the first time that a live 5.9GHz vehicle-to-infrastructure network had been applied in the real world. The units communicated with onboard equipment to enable more than 20 safety, mobility and traveler ITS applications using 5.9GHz technology. "The goal was not just implementation of a live 5.9GHz DSRC research and development network," asserts Justin McNew, Kapsch TrafficCom's CTO (pictured), "it was to show how 5.9GHz solutions and applications will improve infrastructure, safety and mobility, as well as increase productivity in the long term."

Highlighted in the demonstration – which was viewed by many of the 5,000 World Congress attendees – were payment transactions, congestion management, real-time mapping, parking reservations, and multimodal information, all of which was made possible via the 5.9GHz network. Kapsch's short-term view is that transportation professionals can experience the benefits of 5.9GHz DSRC, but further into the future the technology will see safety and mobility increasing via the development of new software and infrastructure. It will also highlight how secure transaction-based technology can provide a revenue stream to support improvements to the current infrastructure.

"It was to show how 5.9GHz solutions and applications will improve infrastructure, safety and mobility, as well as increase productivity in the long term"





McNew continues, "We are pleased that ITS America and the Best of ITS Awards acknowledged Kapsch's performance in demonstrating a 5.9GHz DSRC network for improved safety, mobility and payment applications." ITS America's president, Scott Belcher, was just as enthusiastic: "5.9GHz DSRC adds another dimension to ITS that expands value to consumers. As traveler services continue to increase in the USA, we expect improved transportation infrastructure to bring both safety and value to the marketplace."

Indeed, since the end of the ITS World Congress, the New York State DOT has continued to use the 5.9GHz DSRC infrastructure to support the testing of its Commercial Vehicle Infrastructure Integration (CVII) project, being led by Volvo Trucks.

Best Innovative Practices – Public Sector

In this category, MDOT was delighted to receive the award for the second year in a row

Representatives from Mississippi were on hand at the Gaylord National Hotel & Resort to collect the Best Innovative Practices title for the public sector for the second consecutive year. MDOT's triumph came in the form of an integration project that will help improve survival rates from accidents on the state's highways. The purpose of the project was to work with a new statewide medical emergency response system known as Mississippi MED-COM, the idea being to integrate the rapidly expanding travel information network resources of msTraffic (Mississippi's ITS) with the new response system.

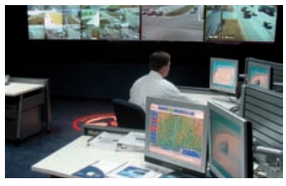
"Directing emergency medical response vehicles through traffic congestion can save lives – minutes matter during life-threatening situations"

The MED-COM center serves as the hub for emergency management information, and has three primary objectives: to improve the efficiency of transporting critical patients; increase access to emergency management and disaster control services; and also to improve the communications between emergency responders, hospitals and inter-hospitals.

To help meet these goals, the center is now integrated with the MDOT state management center, meaning that medical response of all types can benefit from msTraffic information. MED-COM operators can assist and guide emergency vehicles to accident scenes and later to medical facilities as a result of live streaming video of major interstates and intersections, courtesy of msTraffic. The judging panel was impressed by the msTraffic/MED-COM system's ability to improve communications regarding weather information, with emergency alerts being provided to hospitals in the area. There are also links to Jackson, Memphis and Slidell National Weather stations.

Mike Stokes, ITS program manager at MDOT's traffic engineering division was happy to record back-to-back wins. "We are extremely honored. The MSTraffic/MED-COM project/partnership is the only incident management system that MDOT could find in the country that connects to the State Medical Center.

"There is a tangible benefit to the citizens of Mississippi at a time when they need it most. Directing medical emergency response vehicles through traffic congestion can save lives. Minutes matter during life-threatening situations."



Following much investment by MDOT in planning, design and deployment of its ITS, there is a need to make full use of the resources of the msTraffic/MED-COM program to benefit state citizens, businesses and visitors. Stokes believes that the permanent project can meet expectations, and as the first partnership of its kind, expects fellow DOTs to follow the model.

Best Innovative Products/ Services – Private Sector

Considering the needs of the developing world led FreightDesk Technologies to its prize

Traffic congestion has long been a problem in developed countries, but the developing world is also encountering similar challenges. Five years ago, FreightDesk Technologies developed the Truck Control System (TCS) especially for developing countries that had traffic flow concerns. One country turned out to be Jordan, as Dhiren Patel, FreightDesk Technologies' president explains. "Jordan has the right IT infrastructure, political climate and policy objectives to make the TCS work," he says. In 2005 FreightDesk was looking for an application in Jordan and was put in touch with the Aquaba Special Economic Zone. This area has a coastline of just 25km, which the authorities wanted to develop for resort and recreational use. "The area also happens to be their only marine port and the two activities weren't going to mix," Patel details. "They asked us to design a system that could segment the truck traffic going to the port terminal from the general traffic going to the resorts."

"Interest from other areas is growing and hopefully we'll see similar systems implemented in the future"

The TCS performs several functions. It validates truck license and driver security information, ensures the equipment is fit for operation, and checks the readiness of the cargo and documentation. All of these functions are completed through electronic interfaces to the relevant systems. The TCS then assigns a route based on the intended operation. Throughout a truck's journey, the system can monitor the number of other trucks on each section of road, and in doing so further reduced the risk of congestion.

Within three months of the project starting, the system was deployed and the first trucks were using the TCS. By the following March, all trucks going to the terminal were running through the TCS – about 3,000 trucks per day.

Patel now says: "Interest from Africa, South Asia and South America is increasing, and hopefully we'll see the implementation of similar systems in the future.

"One of the most satisfying elements is that Jordan has defied the traditional stance of developing economies that don't normally think of technology as the answer to their congestion problems."

Best Innovative Products/ Services – Public Sector

FDOT's Office of Motor Carrier Compliance was rewarded for its smart weighstation project

Within the public sector, there was one project that stood out in the ITS America awards, as one state attempted to revolutionize what it believed to be an antiquated and inefficient system.

The State of Florida I-4 Weighstation was initially built to ensure the protection of Florida's highways infrastructure, as well as the safety of the traveling public.

Due to the increase of commercial truck traffic in the area over the years, the existing weighstations no longer had the capacity to process the increased volume, so would frequently close. Once closed, trucks traveling the corridor would not be checked for compliance. As a solution to these frequent closures and subsequent evasions, Mettler Toledo developed a system for Florida DOT's Office of Motor Carrier Compliance (OMCC) that includes the integration of weigh-in-motion (WIM) scales, Vehicle Dimension In Motion (VDIM), license plate recognition (LPR), and an overview image of each vehicle. Thinking long term, FDOT designed the facility for projected truck traffic in 2030, while Mettler Toledo based its specifications for the equipment to have a minimum life expectancy of 20 years.

"Not only does the new automated system address the increased traffic, but the system technologies have also increased inspection and enforcement activities by providing high-tech equipment to identify and stop weight overloads, unpermitted loads, overdue citations, and criminal infractions," explains Craig Wilson, the weighstation program manager. "These checks are performed while the vehicle travels through the deceleration ramp and only violators are directed to the static scales and stopped. Non-violators are immediately directed back onto the Interstate, thereby increasing throughput and enforcement."

> "Only violators are directed to the static scales and stopped; non-violators are directed back to the interstate"

The official results of the system's implementation are impressive. OMCC immediately recognized that the system was able to process every vehicle, while weighstation closures due to backlogs are now a thing of the past as there has been a reduction in weighing time of a factor of five (from 15 minutes to three).

Wilson believes the positive effects on various different groups helped the judging panel honor Florida DOT. For the public, the weighstation enables overloaded or unsafe vehicles to be kept away from the road. "For the trucking industry," he adds, "non-violators will pass through with minimal delay and no longer have to wait in line to be weighed by the static scale facility only."

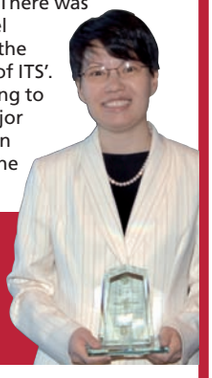
2009 Outstanding State Chapter Award

A legend in the intelligent transportation scene, ITS New York is pleased with its latest accolade

One of the oldest State Chapters in America was voted 'best in class' for 2009, excelling in leadership, deployment, networking and professional development. ITS New York (ITS-NY) has been in operation for more than 16 years and in that time has fostered the enhancement of travel in the state using ITS, encouraged greater participation in ITS America programs, and has created a large public-private-academic professional network for information exchange.

For Joe Tario, president of ITS-NY (above, [ITS-NY's Yuko Nakanishi picked up the award]), recognition of the group's efforts is important. "We are very proud to have received this award. Having been around for 16 years, I think that our continued growth in membership has been recognized as well as the efforts we made this year."

> "I think our continuous growth in membership has been recognized as well as the efforts we made this year"

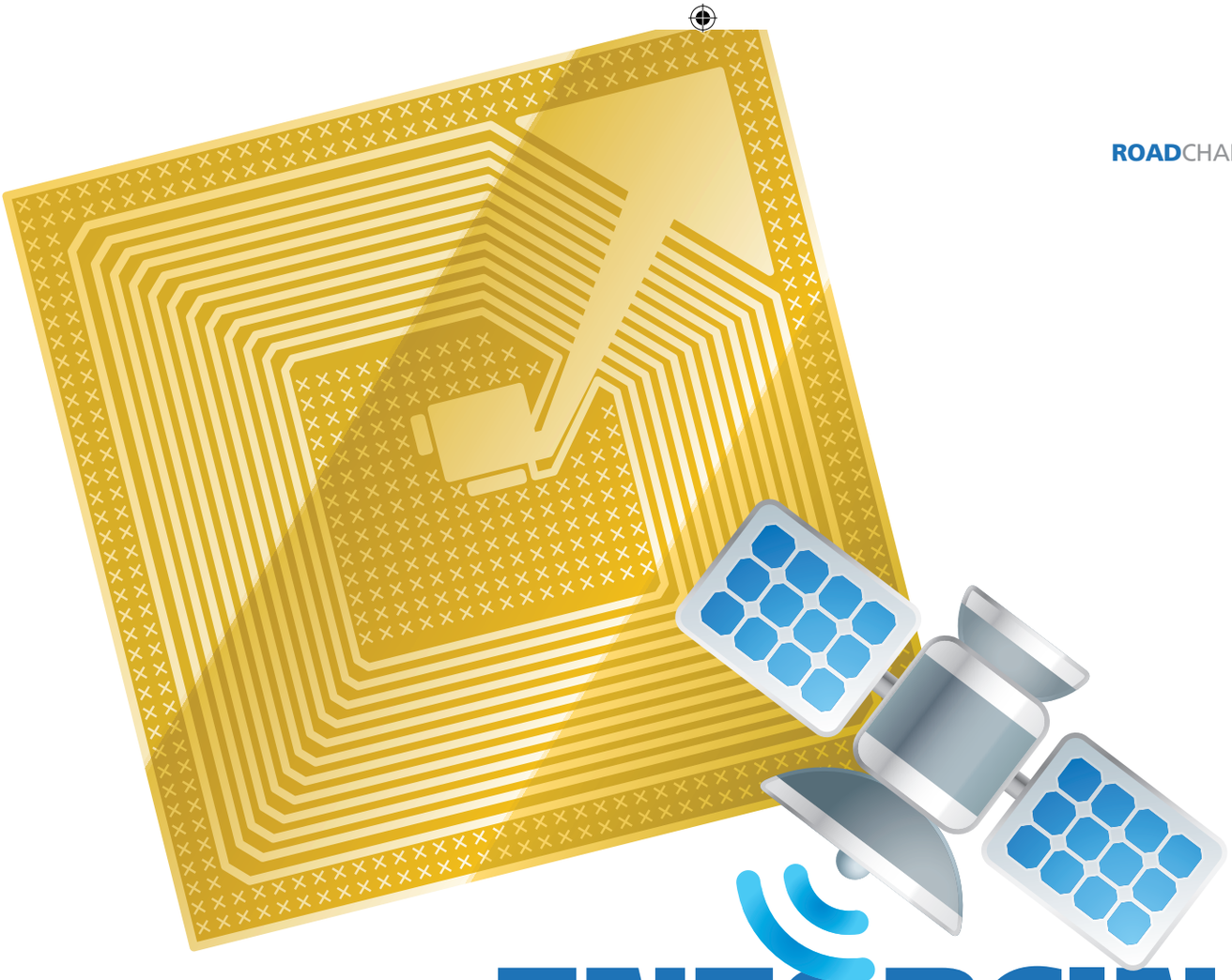


The past 12 months have been especially significant for ITS-NY, given the build-up to the ITS World Congress, which rolled into town in November 2008. "It gave us the opportunity to support it strongly," Tario says. The involvement of ITS-NY included sponsorship of an international reception at the New York Transport Museum.

Addressing the need for professional development, one of the sessions at the event was titled, 'Educating the ITS Professional', conducted by the National Transit Institute, the Consortium for ITS Education, and the City College of New York. There was also a panel session on the 'Greening of ITS'.

According to Tario, a major milestone in 2008 was the formal introduction of NYSDOT's 511NY program. This service uses voice-response telephone, website and email messaging to provide information about surface transportation systems and services operating in the state. The service was initially only available in the Downstate region, but has since been expanded, ensuring the whole state can benefit.

Many ITS-NY members were key to the deployment of the 511NY system, either in technical roles, or partners in information. In addition to NYSDOT, partners included TRANSCOM, Niagara International Transportation Technology Coalition, Federal Highway Administration (NY Division) and Siemens ITS.



ENFORCING THE SWITCH

Should we switch from RFID tolling transponders to GPS-based charging telematics? How would enforcement work? Who should pay switching costs? Our GPS tolling expert, **Bern Grush**, looks outside the box again

Illustration courtesy of Lushik

How new technologies are to be employed is not always well understood – even by their inventors. Most folks think about a new invention within the context of a current paradigm, rather than how it might be used to innovate to a new paradigm. The first television programs broadcasted shows of radio vocalists and radio newscasters. No one knew that TV was really for *I Love Lucy* or *Dr Phil*, because sitcoms and living room therapy hadn't yet been invented.

So, too, with new GPS-based road tolling technology. Some people think the pinnacle of tolling technology hangs over a roadway on huge gantries to ID and photograph cars that are lined up like high-speed cattle at a fixed location in the roadway. And that certainly works for limited access roadways, tunnels and bridges.

A few years ago, Transport for London tested GPS as an entry detector to London's Congestion Charge Zone. Similar to using TV to watch a radio program, it was not encouraging. Using GPS to measure the distance traveled within the zone would have worked, but the goal was to literally replace the camera function rather than to rethink how the toll was assessed – a tech switch rather than a policy fix. The £8 legislated fee could not be disturbed.

Recently, Sweden's ARENA proposed as input to a truck-tolling scheme a list of all Swedish road segments so that each segment could be detected and priced. Rather than distance traveled in a zone (you can imagine one zone or a zillion), ARENA was thinking the way you would think if you were to install gantries over every road segment. True, ARENA's gantries would be virtual

– marks, lines and polygons on a digital map – but this tends to block out solutions that might be simpler, easier to compute or update, cheaper, or easier to understand.

Similarly, the French, who are thinking about tolling their national highway system for trucks (Sweden plans to toll every road), intend to use virtual gantries to detect entry to and exit from chargeable roadways. Don't get me wrong, virtual gantries work, but they just constrain our thinking. Besides forcing unnecessary complexity on our pricemaps, they can also skew thinking about enforcement.

In this vein, I recently criticized the Miami-Dade Expressway Authority (MDX) for preparing to replace 12 gantries with 45 gantries to "plug the leaks of free rides between untolled interchanges". I suggested that they could save a lot of money by using privacy-assured, financial-grade GPS transponders and mobile camera spot-checks instead. The real motivation behind my argument was that if the USA is going to move to GPS-based mileage-based user fees (MBUF), this was one way to start. The longer we wait to move away from RFID to GPS, the more money we waste.

"The more gantries we put up, the more pain we inflict on ourselves when the needed switch from gas tax to user-pay occurs"

Picture by Kirsty Wigglesworth/PA Archive/Press Association Images

The defense offered against my underappreciated criticism was that of the million-plus daily transactions that could be expected from these 45 tolling points, about 80% of those transactions would be handled by transponder, the other 20% – worth perhaps US$40 million per annum – would be captured by license plate reads. And: "You can't get US$40 million with spot-checks. You need license plate recognition for time- and date-stamped location-specific pictures of the vehicle acceptable to a court to be able to collect an open road toll from a driver without a functioning transponder. To get good pictures on a multi-lane expressway you need gantries for cameras as well as vehicle detection and illumination gear. Once you need gantries for enforcement cameras and a data backbone, and you would need this for an enforceable system regardless of the onboard device, the transponders and their readers are relatively cheap add-ons."

How true is this? With RFID, completely. If you replace a US$10 transponder with a US$100 telematics device to manage 45 limited access tolling points while changing nothing else, you should be fired. I see three issues. First, how could payment be enforced if we stopped building RFID gantries? Second, why would an authority such as MDX consider switching? Lastly, who should encourage them to do this?

MOBILE CAMERA ENFORCEMENT

I say you can collect US$40 million using spot-checks. Success at that is related to equipment used, warning signage, frequency of checks, schedule of fines, collection enforcement, and legislation permitting the use of mobile and moveable camera evidence. Some states permit radar speed monitoring, some don't. Many states permit red-light cameras, the rest don't. Any state that wants to collect road-use revenue in a gas tax-diminished future will find a way short of putting up a zillion gantries.

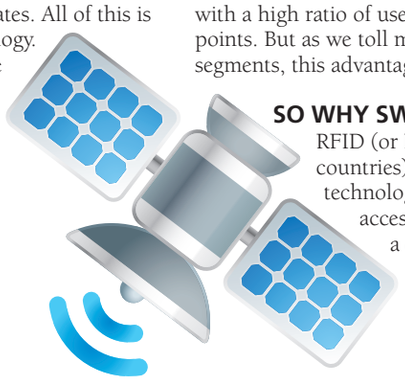
Of course it is not enough to just run an effective program of spot-checks. You need to provide a way to pay without an in-vehicle device. Right now, you usually pay at a booth (except on Toronto's 407, where ALPR takes your plate, sends you a bill and charges you an extra fee for the trouble, but that requires gantries, again). Another way is a time-limited prepurchase, as is the case with the London Congestion Charge. Tied to your plate number, this is coordinated with a 'whitelist' of paid plates. All of this is known, gantry-free technology.

You also need to be sure that the users of GPS telematics units have a working device. There are known ways to check for tamper and failure with a combination of self-checks and data checks, while still preserving privacy. Another way incorporates the same mobile or moveable cameras used for vehicles without a GPS unit. Your license plate is photographed at a random but chargeable time and place. Another process queries your telematics device somewhat later to ask where your vehicle was at that specific time and compare that with its own observation. Handled through an anonymous, automated mediator, this can determine device fraud and still retain full privacy (unless fraud is detected).

ALPR cameras are used in London to enforce the Congestion Charge scheme

Other ideas, described by Mapflow's Harvey Applebe in the 2008 edition of *tolltrans*, include using data methods such as statistical inference to determine best places to set up spot-checks. An example of this would be if MDX, using floating cellular data, noticed a disparity between traffic and tolls calculated on certain segments, then put spot-checks at those locations for increased effectiveness. "Armed with the intelligence provided by analysis of cellular data, it makes sense to deploy cheap ALPR cameras in areas where they are actually required," Applebe wrote at the time.

There is no reason why a US regional tolling authority cannot, today, toll fixed access infrastructure as effectively with GPS and mobile ALPR units as is currently done with fixed infrastructure RFID. The only issue is that once committed to RFID, an authority has a marginal cost advantage to stick with RFID. This is especially true with a high ratio of users to fixed tolling points. But as we toll more and more road segments, this advantage disappears.



SO WHY SWITCH NOW?

RFID (or DSRC in some countries) is the right technology for controlled access infrastructure. As a deployment choice for a regional tolling authority, it is the

The Miami-Dade Expressway Authority plans to convert to ORT and to become a cashless system by 2012

most defensible choice. However, there is a bigger perspective, both statewide and nationwide. We need to switch from gas tax to MBUF, and that is going to be done using privacy-assured, GPS-based telematics. But why should MDX care? After all, it was made very clear to me: MDX has a business to run. The only reason that MDX would switch is if they were to see an investment in new gantry, ID and camera installation as too short-term for a return. That is unlikely in 2009.

The bigger point I am making is that the more gantries we put up, the more pain we inflict on ourselves when the needed switch from gas tax to user-pay occurs. The longer we cling to RFID, the longer we avoid the switch, and the longer we allow heavy traffic congestion in New York City, Atlanta, San Francisco, Miami, Boston and 100 other gagging cities. You can't solve the gas tax to MBUF switch with RFID and you sure don't want multiple systems in operation. GPS is open, non-proprietary, can be absolutely 100% private and can handle any required equity issue in a pricemap.

ENCOURAGING THE SWITCH

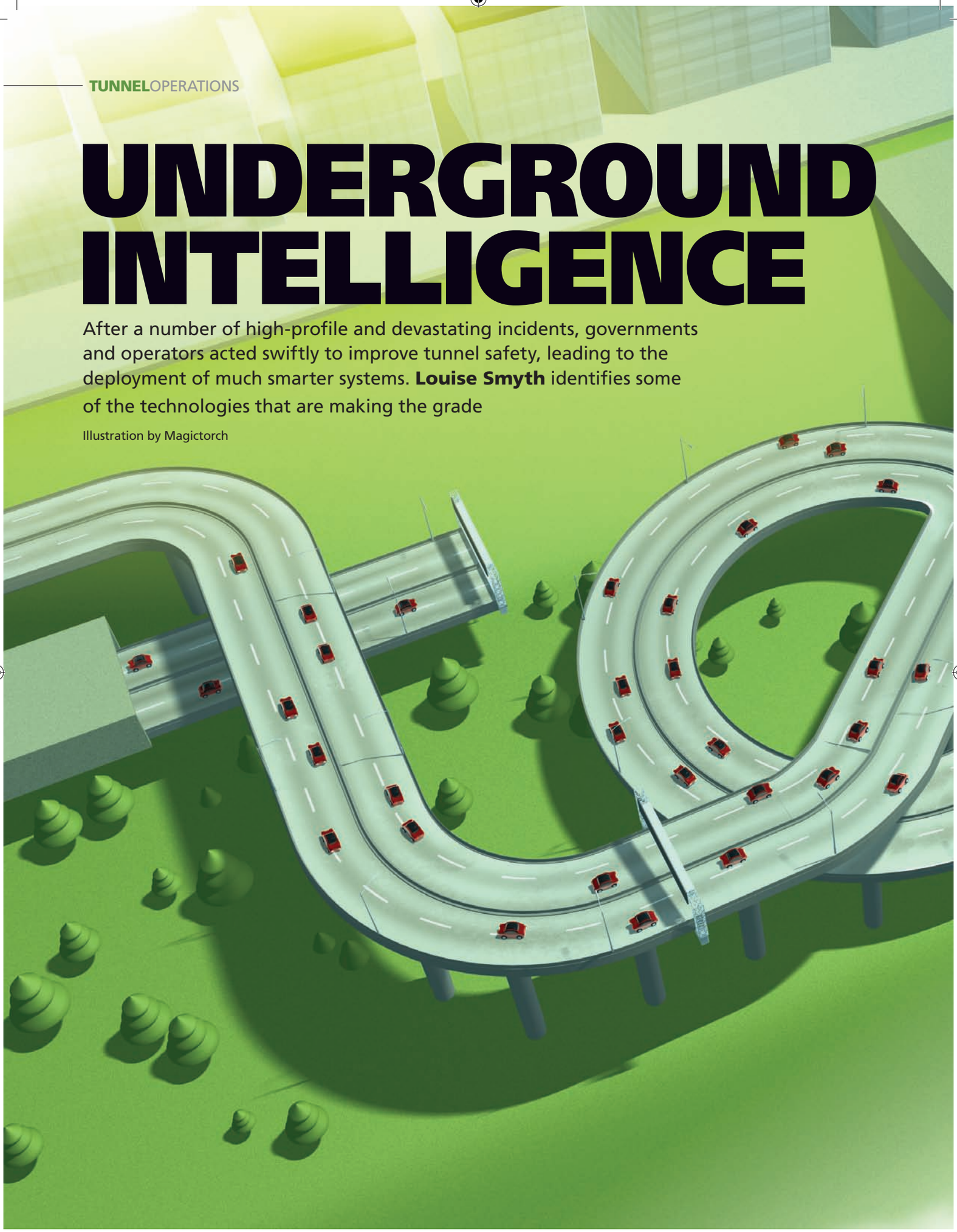
The USDOT and the US Congress both want to see MBUF systems taken seriously. Regional authorities are already tolling and the tolls assessed are related to distance already. Hence existing tolls are a crude, spatially limited form of MBUF. The problem is that RFID is inflexible in that it only makes sense in limited-access environments. If the US Fed offered financial incentives to a couple of regional tolling authorities to operate parallel, volunteer, GPS-based tolling schemes – especially ones that offered additional services and rewards – the experience for US motorists and US tolling authorities would be of critical value to take US surface transport forward toward mileage-based user fees.

Bern Grush is the founder and chief scientist at the Toronto-based Skymeter Corp. If you agree or disagree with his thoughts in the article, feel free to drop him an email at bgrush@skymetercorp.com

UNDERGROUND INTELLIGENCE

After a number of high-profile and devastating incidents, governments and operators acted swiftly to improve tunnel safety, leading to the deployment of much smarter systems. **Louise Smyth** identifies some of the technologies that are making the grade

Illustration by Magictorch



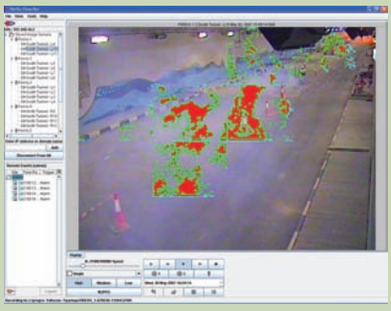
Effectively managing a road tunnel on a continual basis is no mean feat. They are inherently high-risk pieces of infrastructure. Their maintenance and operation is not simple and doesn't come cheap; and due to the obvious fact that they are very confined spaces, safety is an ongoing concern. An incident such as a lost load or broken-down vehicle – something that may barely cause a ripple on an open road – can cause chaos in a tube that may only have one entrance and exit. Similarly, smoke and fire can be far more hazardous.

Tunnels have recently come a long way in terms of safety and general operation, although it has taken some horrific, high-profile incidents to push forward legislation to force operators to maintain their facilities adequately. But the fact that ambitious new tunnel projects are appearing across the globe shows that there is still a place for these structures in the modern world – providing they are constructed and managed efficiently.

Compiling an 'essential' list of components to aid the successful management and operation of tunnels is not easy. A 'Top 20' or even 'Top 30' would not be overstating how complex the various parts that comprise the whole are. The following 10 examples, though, are just some of the shining lights in terms of real-world technologies that make a difference – and make life easier – for operators every day. Something to think about next time you drive through one of these remarkable structures...

There's no smoke without fire

Video Smoke Detection (VSD) is a relatively new application, designed to provide an earlier warning than fire detection. Developing a system that can pick up smoke in dirty environments without generating lots of false alarms has long been a challenge, but now appears to have been solved.



D-Tec's FireVu works in real-time with standard CCTV images that are analyzed by specialized image-processing software. This seeks out the particular pattern that smoke produces by applying detection and known false-alarm algorithms. The software looks for anticipated motion patterns of smoke over a specified area within an image and analyzes pixel changes, meaning VSD has the potential to deliver an exceptionally fast response. Once smoke has been detected, the system can alert the operator, as well as deliver a visual representation on the system's monitor. Of the many benefits, detecting smoke at source means that VSD does not have to rely on the proximity of smoke to the detector, so is unaffected by distance.

FireVu units are presently installed in the Sydney Harbour Tunnel in Australia and the Palm Jumeirah tunnel in Dubai, with more to come as D-Tec's managing director, Ian Moore, reveals: "The positive impact of the FireVu VSD solution at Palm Jumeirah has been underlined by the fact that it has now been specified for a number of additional applications, including the Palm Jebel Ali Island road tunnel. This project – once again being undertaken by our partner, BSS-ME – is due for completion in February 2010.

"The main contractor for both Palm tunnels, Taisie, has also been awarded the design and build contract for the Yas Island project in Abu Dhabi. This ambitious scheme will feature two tunnels, three lanes wide and 1km in length, with 32 cameras connected to eight FireVu units."

When I say stop, I mean stop!

A unique safety warning solution is in place in the Sydney Harbour Tunnel in Australia and is designed to prevent the persistent problem of drivers ignoring more conventional signals to stop.

Laservisions's Shannon Brooks explains how the system works: "The Softstop barrier system produces a pseudo holographic image that appears to float in mid-air, commanding the attention of the motorist and making the 'STOP' message impossible to miss. Unlike alternative safety systems – which only appear within a driver's peripheral field of vision – the Softstop system confronts the driver directly within their prime vision."

Since opening, the tunnel has endured more than 10,500 traffic incidents ranging from accidents and breakdowns to fires. Delays and closures prove costly for the Sydney community as the tunnel is a key access route for the city's business district and eastern suburbs.

"On average, the tunnel's traffic volume is 3,500 vehicles per hour," Brooks details. "An incident within the tunnel or at the portal can cause the closure of the tunnel for a number of hours, if not days. Of the 814 overheight truck incidences at the tunnel over a 12-month period, 18 vehicles ignored all warning signals and only came to a stop once the Softstop barrier system was deployed. Failure to stop these vehicles would have caused infrastructural damage, closure to the tunnel, and further delays on the already busy Sydney Harbour Bridge."

Australian-headquartered Laservision is now setting its sights on a wider market. "We have had numerous enquires from countries such as Turkey, UAE, and Hong Kong. We anticipate the first international sales will occur in the next few months."

We interrupt this service…

The Highways Agency in the UK is refurbishing road tunnels along London's M25 motorway in a bid to comply with the European Directive on Tunnel Safety. Having recently completed commissioning of the radio rebroadcast system in the Holmesdale Tunnel refurbishment (carried out by Costain and its M&E subcontractor VVB), Mine Radio Systems (MRS) has now entered into a contract with Costain to supply the radio rebroadcast system for the Bell Common Tunnel.

The system supplied by MRS to Holmesdale and included in the contract for Bell Common allows rebroadcast into the tunnel of VHF channels for police, fire and ambulance services, UHF channels for fire brigade and maintenance, and TETRA (Terrestrial Trunked Radio) for emergency services.

For all of those services, it is vital that going into a tunnel does not mean losing the ability to communicate.

Stephen Ward, MRS's general manager, explains how the solution works: "The system is based around the proven leaky feeder technology. It has been designed by MRS to provide a redundant, reliable system. But we have also taken future expansion into account in the design, including mobile phone coverage, AM/FM rebroadcast, and the new DAB rebroadcast."

MRS is also involved in tendering for further M25 tunnel installations and refurbishments, where alongside TETRA, UHF and VHF for the emergency services, the systems also cover aspects such as Highways Agency traffic officers' TETRA or UHF, tunnel operators' (for maintenance) TETRA or UHF/VHF, radio rebroadcast, and Voice Break In (VBI) for the radio rebroadcast.

The company also provides health and monitoring systems (local and remote) for the radio rebroadcast systems, in order to identify and repair problems and efficiently maintain these safety-critical systems.

Speed demons

Italian organization Sodi Scientifica has a number of its Autovelox 105 SE units deployed in tunnels around the world, including the Mont Blanc Tunnel in the Alps and the Fréjus tunnel between France and Italy. In both of these deployments, the units are used not just for speed enforcement, but also to enforce the required gap between vehicles.

More recently, Sodi has been assisting the Land Transport Authority (LTA) in Singapore with speed enforcement in the KPL tunnel – the longest expressway tunnel in southeast Asia – which opened in October 2008. Sodi and its partner in Asia, Tyco, created a package tailored to meet the LTA's requirements. The solution deployed is remotely controlled and works continuously, reducing human intervention on site to a bare minimum.

Autovelox technology is based on a pair of laser beams crossing the road at right angles toward the traffic flow. Interruption of the two beams by the passing vehicle (car, motorcycle or truck) allows the speed to be

calculated on the basis of the space/time ratio; the space is the space between the two laser beams and the time is the time that passes between the interruption of the first and the second beam.

The system employs a laser detector to recognize the exact position of the infringing vehicle and immediately moves the camera set to the correct location to capture the event.

Fan support

Ventilation – both for everyday operation and of course for emergency situations – is always a high priority for tunnels. Capita Symonds is one consultancy that is well versed in the intricacies of such systems. The company is employed by Costain (the main contractor) to work on the Bell Common Tunnel on the M25 motorway in the UK near Epping. John

Tomkins is associate director at Capita and project director of the Bell Common Tunnel. "We are essentially re-servicing the tunnel to bring it up to current European standards," he says.

It is an ambitious undertaking, as Tomkins details further: "We've got to gut the whole tunnel. We are making space to put an additional lane of traffic through for future provision, and also to improve safety and access to emergency phones for people with impaired access. At the moment, there are raised walkways, so people have to get up to a step to reach a place of safety. This impacts on the whole design because at the moment the ventilation system has fans within the tunnel, which sit above these raised walkways – if we take them away, there's nowhere to safely position the fans."

Capita solved this challenge by building a fan system on the tunnel roof and designing the system to be based around Saccardo Nozzles. "The system takes air from outside and blows it into the tunnel at one end and the momentum pushes the air all the way through. It's controlled by pollution sensors and can be switched on to control pollution in times of stationary traffic."

So what happens if a fire is detected? "If a fire occurs, the fans can be switched on full blast to disperse the smoke."

Truck stop

ECTN has developed a popular measuring system to help enforce height, width and length limits for trucks to prevent non-compliant vehicles from entering tunnels and causing damage. The HGV Profiler conducts geometric scanning of vehicles via lasers. As well as vehicle dimensions, the system can be used in tandem with WIM scales to detect overweight trucks.

ECTN is also busy adapting the technology for other applications, as Carlo Durrer, managing director, explains: "We are working on a new project for hot-spot detection – to prevent overheating vehicles entering tunnels. It is based on similar technology to the HGV Profiler but uses a new gantry with infrared cameras. Currently this is a pilot project in one of the longest tunnels in Switzerland. The hot-spot detection feature will be brought to market by the end of 2010."

The company has also been working on hazard plate recognition, modifying the HGV profiler to detect hazardous goods plates so that tunnel operators know exactly how many of these vehicles are in their tunnel at any time.

Phone service

Norwegian emergency phone expert Trafsys will soon release a new version of its VoIP-based industrial telephone, which is used as an emergency phone in most new tunnel projects in the western and northern regions of Norway. "The new generation will be available in January 2010," reveals Terje Floor Heggeland, managing director. It has a separate front and back end, which separates the technology from the user interface.

"The Traphone is an industrial-quality VoIP phone with aluminum body and built-in Ethernet switch, optionally featuring two fiber-optic sockets, and can be delivered with or without a keypad," Heggeland explains.

A recent project that Trafsys has been involved with is the Eiksund Tunnel – a subsea road traffic tunnel located in Møre og Romsdal county in Norway. "This is the world's deepest subsea tunnel, measuring 287m at its deepest," Heggeland details. "It is equipped with 86 Traphone units. The system is realized as a gigabit backbone ring, where the phones are set up as internal rings within the backbone ring. The system tolerates at least one – and up to four – cable breakdowns before the connection to a phone is lost."

Let the light guide you

Swareflex is a key player in tunnel lighting and the company's Mario Goldbrich has recently been involved in a project in Munich, Germany: "This is a chain of five bidirectional tunnels around the main ring of Munich East. Tunnel operators usually use the SwaroLine lane guidance modules, which are fixed on both sides of the road, but this model has a height of about 19mm and is intended only for use on walkways – as people tend to run on the road if there is an emergency. However, for this deployment, they had a particular requirement that, in certain circumstances, they may want to allow cars to drive on the walkway paths. So they opted for the flush-mounted module LeveLite, which is installed in the ground and doesn't protrude much. Around 600 LeveLites and 12 control units are now installed." The LeveLite is used in normal circumstances for road guidance (running at approximately 35% brightness) but can be turned up to 100% to provide exit guidance in an emergency.

Swareflex also markets a popular product, SwaroExit, for guidance toward emergency exits within tunnels.

Detect and serve

Jeffrey Wolff, director of systems engineering at Kapsch TrafficCom US describes the incident detection system his company has developed as "a unique camera-based solution for tunnel-based systems". It has a variety of features, such as lost-load detection, notifications for unusual situations, such as no traffic (indicating a delay elsewhere in the network), pedestrian identification, dangerous goods detection, and infrared-based ALPR. But Wolff is most keen about what he regards as the system's USP: smoke detection. "It can distinguish between the smog and fog that's prevalent within tunnels and can show within 10 seconds that there is smoke within the tunnel."

The largest deployment of the Kapsch system is in the Strenger Tunnel in the Tyrol region of Austria, where it is used for

detecting stopped vehicles, traffic jams, lost loads, smoke, and wrong-way drivers.

The latest project is the Hubertustunnel in The Hague, the Netherlands. Demonstrating the variety of uses the Kapsch system has, as well as the usual incident detection tasks, the system is also used for traffic counting and classification.

For an immediate response

A tunnel management system brings together all of the many subsystems and keeps traffic flowing. One expert in this field is Croatia-headquarted Telegra, whose 'topXview' system currently controls more than 80km of tunnels worldwide.

All Croatian two-bore tunnels equipped by Telegra and assessed for their safety by the European Tunnel Assessment Programme (EuroTAP) have received the highest marks. "topXview allows for the implementation of the most complex scenario-based predefined response plans for any emergency, special event or traffic diversion, maintenance and tunnel management situation," explains the company's Robert Ryslavy. "An advanced ergonomic design provides a single operator control over the most complex tunnel systems, such as the 6km long Mala

Kapela and Sveti Rok tunnels in Croatia, or the recently equipped Kagithane-Piyalepasa and Bomonti-Dolmabahçe Tunnels in Istanbul, Turkey," he says.

Although focused on expanding topXview into an overall ITS platform for complete road management, Ryslavy reveals that Telegra will continue to upgrade and improve the existing system.

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SMART ROUTING

As a result of improvements in probe technology and smart modeling techniques, truly intelligent and real-time traffic information has arrived. Inrix's **Dr Christopher Schofield** charts the progress so far

Illustration courtesy of Nishan Sothilingam

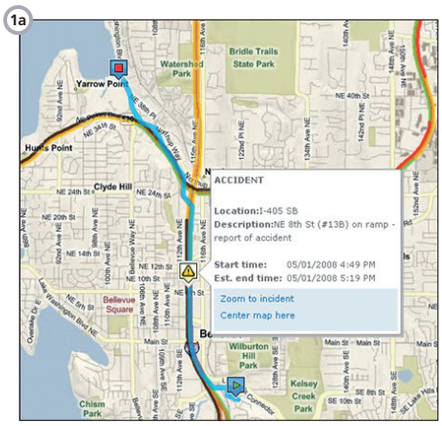
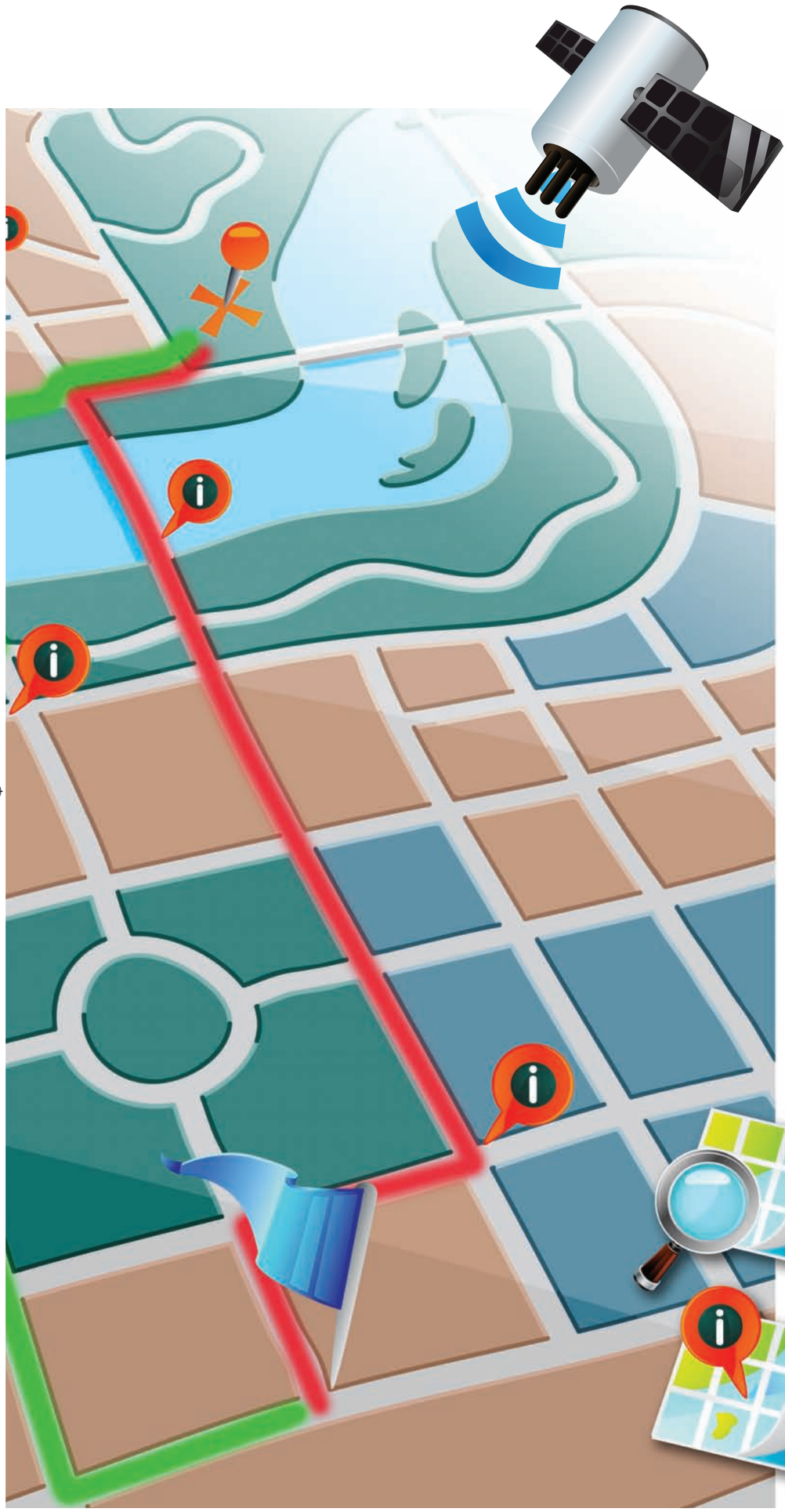


Figure 1a: Route selection identifies a 3.8-mile route, which could be traveled in six minutes at posted speed limits. However, a traffic accident and consequent slower speeds result in a 24-minute trip. **Figure 1b**, meanwhile, demonstrates that route avoidance without knowledge of traffic conditions can actually lead to a longer trip time. An accident along the original route informs the system that an alternate route should be selected. The alternate route is 4.1 miles in length and under ideal conditions would entail a 10-minute trip. However, traffic conditions on this route lead to a true travel time of 28 minutes, four minutes longer than the route with the accident



For nearly two decades, the dream of vehicle route navigation based on real-time traffic data has been anticipated as 'just around the corner'. Today such systems, if not commonplace, are at least present in the market, and squeezing out older, static, speed limit-based routing systems. Drivers can plan their travels, confident that traffic conditions are being used to select the best route and ensure the best travel times. What many do not know, however, is these second-generation systems are already being supplanted by third-generation routing technology that uses predictive traffic information to find the best route given the traffic state in the future.

FIRST-GENERATION ROUTING

First-generation routing technology has been available for some years, providing fleet services with the capability to select the best routes for trucks based on known road speed limits. These systems are largely based on the well-known Dijkstra's algorithm, developed by Dutch computer scientist Edsger Dijkstra in 1959. Dijkstra's algorithm was invented to solve the graph search shortest path problem in computer science. Applied to road networks, the main principle is to treat each road as an edge, and decision points (intersections, freeway ramps, etc) as nodes. The algorithm finds the shortest path tree between a starting node and a destination node. Variants of Dijkstra's algorithm have been invented in the ensuing years, with the most popular being the A* algorithm (pronounced 'A Star'), which takes advantage of constraints on the possible routes. Most applications of first-generation routing technology use commercial map databases to derive speed limits between decision points, or estimate speed limits using the known road class. These static speeds are used to compute the 'cost' for picking a route between two decision points. Unfortunately, speed limits are poor proxies for the true speed experienced on a road, so as a result first-generation routing systems commonly provide travel times that are overly optimistic.

This technology is typically encountered in applications that do not have access to real-time traffic conditions – it is used, for instance, by unconnected embedded navigation systems and Portable Navigation Devices (PNDs). Even some connected devices use static speed limits, but may improve results by offering 'route-around' choices when real-time incident alerts are available. However, as Figure 1 illustrates, incident avoidance can actually lead to longer trip times when real-time traffic is unavailable.

SECOND-GENERATION ROUTING

In May 2006, Inrix announced the Smart Dust Network – a GPS probe network that allows drivers across North America to see real-time traffic information. This data enabled a new class of routing technology, using real-time traffic speeds on route segments rather than static, map-based speeds. You can imagine the huge difference this has made in traffic routing accuracy. Rather than selecting a route that shows the highest speeds (most often freeways), routing engines can choose alternate routes when traffic shows highway congestion.

Second-generation systems depend upon an important evolution in navigation devices: newer PNDs receive real-time updates through wireless services. Updates can include news alerts, traffic incident data and, of course, real-time traffic information. A number of applications now use real-time traffic for routing, including deCarta's Traffic Manager, which overlays traffic and incident data on maps to enable traffic-aware routing.

Although these systems have increased route selection and travel-time accuracy by replacing speed limit data with true real-time traffic conditions, you can imagine that even real-time data does not provide the best information for making routing decisions. Consider that traffic conditions can change quickly, making a route selected at the start of a trip no longer the best choice midway to your destination. Figure 2 below illustrates just such a case.

"Third-generation routing systems have gone further, now providing lookahead estimates of traffic likely to affect a trip, and traffic-influenced alternate routes when incidents occur"

THIRD-GENERATION ROUTING

Inrix Total Fusion combines real-time traffic information from the Smart Dust Network with traffic prediction using Bayesian networks that model how traffic conditions are affected by both local and regional variables. The models take data from numerous sources – including recent conditions on other parts of the road network, weather, road closures, even sporting events – to create a model of expected conditions in the near future. Total Fusion can provide an estimate of what traffic conditions will be like in 15-45 minutes on core roadways.

This is important because traffic conditions on a route may change, making current conditions either overly optimistic or pessimistic when estimating travel times on route segments. Third-generation routing systems estimate what traffic will be like on a road segment when the driver is expected to arrive at it. As an example, consider a driver leaving for his destination at the

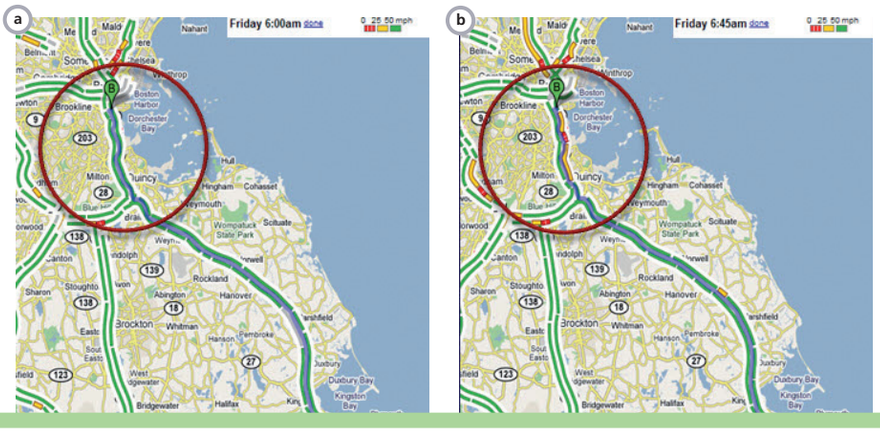


Figure 2: Second-generation routing systems produce traffic-influenced travel-time estimates. For longer routes, however, this may result in inaccurate trip times. The map in a) shows a route from the Sagamore Bridge on Cape Cod to Boston. At 06.00hrs on a Friday morning, the map shows largely free-flowing conditions on the chosen route, and the routing system predicts a 54-minute travel time for this 51-mile trip. However, as b) illustrates, 45 minutes into the trip, the traffic in the vicinity of Boston has become congested, and as a result the original route results in an 85-minute travel time, or two thirds longer than originally planned

IT JUST GOT PERSONAL

Navigation devices have become standard tools for many drivers, but key software and content components remain relatively immature. Unless the software that generates routes and estimates journey times significantly improves in accuracy and begins to deliver on its full potential, there will always be a sense of unfulfilled promise.

The next generation of traffic-speed forecasting technology – predictive traffic – is capable of making a big difference. It understands the normal daily cycle of traffic loading on roads and junctions and uses this information to forecast accurate speeds and speed ranges, for different vehicle types, for every hour of the day and day of the week. This helps navigation devices and web-based journey planners to select the most appropriate route at that time of day.

Providing drivers with timely and accurate information is key in reducing traffic congestion

However, while delivering a major improvement over current systems, predictive traffic forecasting will always be inherently inaccurate due to the very marked difference in vehicle performance and – more significantly – driver behavior.

Key to enhancing routing accuracy is understanding that every driver is different – from the individual driving fast on highways but cautiously in urban areas, to the rural expert driving fast on familiar windy minor roads yet slowly on unknown major roads and highways.

Driver personalization systems need to assess not only how a driver behaves on each road type, but also whether or not the route is regularly traveled – because familiarity has an effect on behavior. It is also essential to take into account

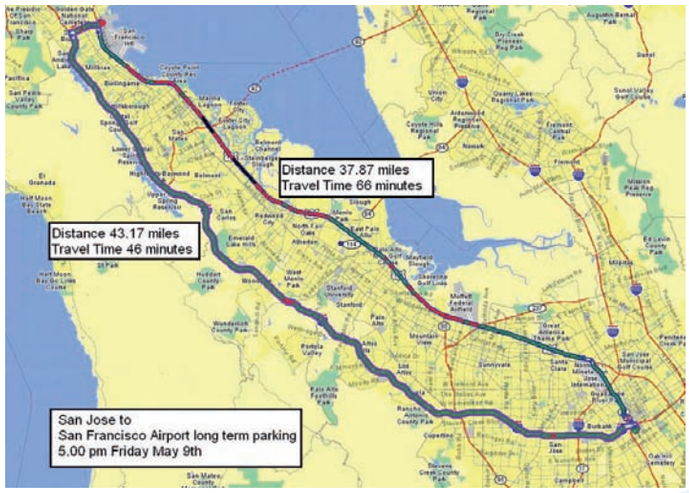
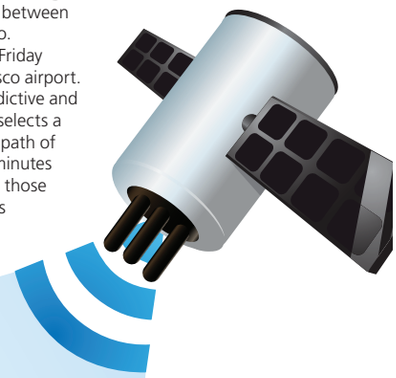


Figure 3: Inrix Total Fusion combines traffic-influenced routing with temporal lookahead. This enables route selection based not only on current traffic conditions, but on what those conditions may evolve to be during the course of the route. This figure shows a map of the San Francisco Bay area between Los Gatos and the outskirts of San Francisco. The traveler would like the best route on a Friday afternoon, from San Jose to the San Francisco airport. Seamlessly blending real-time, historic, predictive and incident data, the Inrix Fusion-based route selects a route of 43.17 miles versus the more direct path of 37.87 miles. The selected route will be 20 minutes faster given both prevailing conditions, and those likely to occur in the subsequent 45 minutes



height of rush-hour. If his route extends beyond the next 15-30 minutes, it may be that current conditions overstate the congestion he will actually encounter in the second half of his trip. The Total Fusion engine can estimate that congestion will subside in the latter half of the trip – offering a route that may currently appear to be heavily congested – as the best overall choice. This non-intuitive result derives from the extensive history used to predict conditions. The system also understands that congestion on a part of the network not included in a route may affect the route in the future. In this way, the impact of accidents peripheral to a trip route can be used to select an alternate route, and improve travel time. Figure 3 shows how the third-generation technology can provide the best route.

In a recent study, ABI Research estimated that 12% of cars will have embedded telematics by 2010. An important distinction among telematics-enabled vehicles are those that possess one-way communications (i.e., receive data) versus those with two-way capabilities. Two-way systems enable the vehicle to both receive up-to-date traffic data and route selections, and deliver current speeds to the traffic data network. An example of this is the new Ford SYNC with Traffic, Directions & Information. Employing the third-generation Routing Engine, it provides the forefront in routing technology: Ford SYNC-enabled cars communicate with Total Fusion to receive current traffic information and routes, and provide updates to the Inrix system.

NAVIGATING THE FUTURE

With the wide availability of accurate real-time traffic flow data in North America, Japan and a few European countries, in-vehicle routing systems have finally come of age. Third-generation routing systems have gone further though, now providing lookahead estimates of traffic likely to affect a road-user's trip, and traffic-influenced alternate routes when incidents occur. Based upon the success of GPS probe network and data fusion technologies, the coverage and quality of real-time and predictive traffic flow data is now rapidly expanding across Europe and some countries in Asia. With the upcoming introductions of two-way connected vehicles and navigation devices, and the growing sophistication of telematics-enabled vehicles, drivers using these new technologies can finally expect to receive accurate turn-by-turn directions, in-city drive-time estimates, and routes optimized for time, distance and fuel efficiency.

Dr Christopher Schofield joined Inrix in October 2008 as principal scientist. He is responsible for the technical vision, new research directions, and fundamental technology of Inrix's products.

time of day: if a driver is on the orbital road of a large city in rush-hour, there is no chance to demonstrate personal driving habits, as the speed is dictated by the surrounding congestion.

However, this accuracy is also dependent upon the validity of the underlying data used for the system. If the speed-forecasting technology is not taking into account all of the complex influences that affect journeys on today's busy roads, then the underlying forecasts cannot achieve the required accuracy and flexibility in the route-planning process, which undermines the relevance of driver personalization.

Taking all these factors into account, driver personalization becomes more precise as it learns each driver's unique habits, increasing estimated journey-time accuracy. For example, if a suggested route is primarily on a highway, the predicted journey time will be proportionately faster for the confident highway driver than for the individual more comfortable on rural lanes.

Leveraging this depth of information and personalization also enables drivers to take more control by accepting a route that reflects their driving style.

Giving a driver good quality information enables them to make the best possible route choices

The significantly improved route accuracy delivered by driver personalization can also transform the financial value of navigation devices, whether portable or line-fit. Car-makers could offer more differentiation by automatically incorporating driver personalization into line-fit devices at the same time as seats and mirrors are adjusted to each driver's settings.

With the accuracy delivered by driver personalization, route acceptance levels increase. Now advertisers can be offered the chance to deliver real-time offers based on a high likelihood that an individual will be taking a specific route at a known time.

Predictive traffic systems are an important step in the maturity of speed forecasting. But only by taking into account the personal factor and incorporating individual driving behavior can navigation devices deliver the accuracy required to meet user expectations and, maximize the potential for targeted location-based advertising.

John Holland is the CEO of UK-based Journey Dynamics

AN IMPROVED VIEW

Developing concepts to make use of CCTV for improved vehicle and incident detection and management. By Cambridge Consultants' **Frances Metcalfe** and **David Thomas** from the UK's Highways Agency

Illustration courtesy of John Woodcock

Experienced CCTV operators can accurately detect incidents but can typically only cope with a small number of videofeeds – and even then only over short periods of time.[1] Conversely, although an Automated Incident Detection (AID) system can monitor many feeds over a long period of time, it is prone to false alerts. Cambridge Consultants has worked with the Highways Agency (HA) in England to develop a number of concepts for making better use of CCTV video information, with the aim of supporting operators in improving incident detection and vehicle management.

TRADITIONAL USE OF CCTV AID

CCTV AID systems have normally been installed on carefully selected fixed cameras that rely on a notable 'system tuning' to be effective. Once installed and configured, these systems can be very effective at improving safety and reducing congestion – indeed some form of automatic incident detection system able to detect stopped vehicles is now mandatory for all new major tunnels within the EU.[2]

Previous studies have shown that such systems are able to reliably detect 50-90% of stopped vehicle incidents and generally achieve false alert rates of one to three per camera per day.[3,4,5] Better performance is possible with careful choice of camera sites and controlled illumination (for example in tunnels), while considerably worse performance can be expected from cameras subjected to significant vibration, wind loading or other external motion.

If dealing with false alerts – caused by significant operator distraction (for example selecting and viewing a camera feed or cancelling an alarm) – the ongoing impact on regional control center (RCC) performance would become unacceptable. It would also be unlikely to improve incident detection times. In the past, studies have shown that when faced with a choice between carrying on with a valuable foreground activity, or switching to dealing with an alert, operators will often ignore all alerts once the fraction of alerts that are genuine and significant drops much below 50%.[4]

A NEW APPROACH

Given the challenges highlighted of using a commercial CCTV AID system in isolation, Cambridge Consultants worked on behalf of the HA to develop a number of concepts for making use of CCTV for improved incident

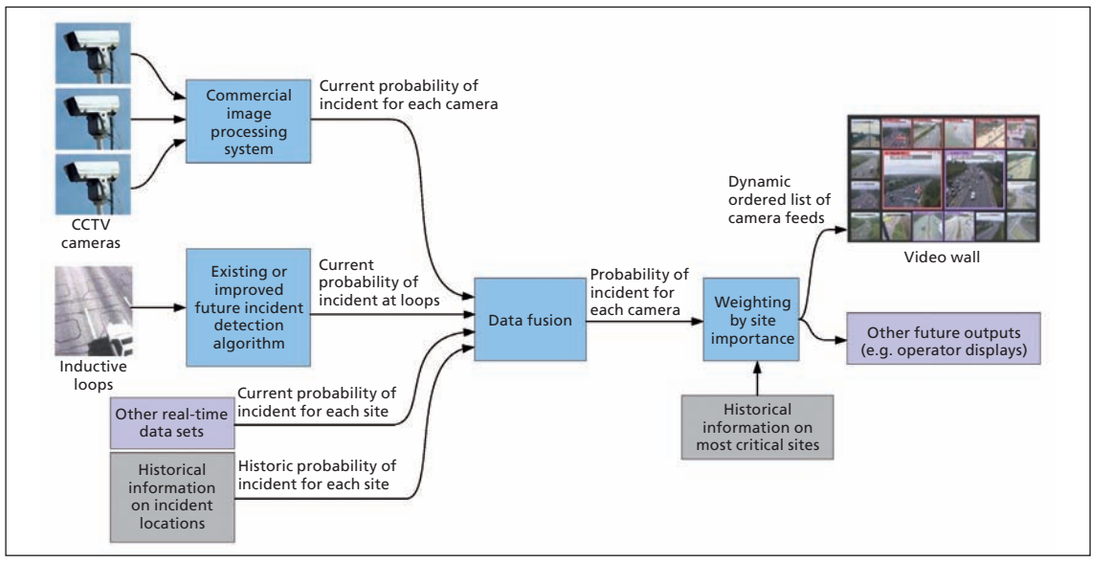


Figure 1: Outline of Adaptive CCTV Display system

Figure 2: Prototype user interfaces for Adaptive CCTV Display system for use when consulting with control room staff

detection. The most promising of the various concepts studied (by which we mean making use of existing or 'off-the-shelf' technologies where possible, and requiring minimal development) resulted directly from discussions with RCC operators.

Each RCC is equipped with a large video wall which is typically set to display 10-20 CCTV camera feeds. Currently, the choice of cameras is determined on a static, per-shift basis based on operators' assessments of the most critical sections of the network. Camera feeds are only usually changed in response to reports of an incident. Operators are constantly aware of the images displayed on the video wall and incidents are occasionally detected through this means. However, time pressures prevent operators from undertaking any more proactive monitoring (for example manually stepping through camera feeds). The chance of an as-yet-undetected incident being displayed on the video wall is hence very low. However, this chance – and the corresponding chance that at least one operator notices the incident and takes appropriate action – could be dramatically increased if instead of displaying a fixed selection of 10 feeds, the video wall constantly displayed the 10 feeds most likely to show an incident.

The Adaptive CCTV Display concept builds directly from this principle and is illustrated in Figure 1. Instead of – or as well as – being preset by RCC operators, the camera feeds displayed on the video wall are selected in real-time so that those camera feeds with the greatest probability of displaying an incident are presented to operators at any time. This feed selection takes place through a data fusion process, which currently takes account of the historical likelihood of incidents occurring at any given time and location, live alerts from a commercial CCTV AID system, and the live alerts from the MIDAS inductive loop AID system. Weightings for the importance of particular sites can also be taken into account. An incident occurring at certain key locations is likely to be especially critical and greater priority can therefore be given to suspected incidents at these locations.

This approach has three key advantages over using a commercial CCTV AID system in isolation. Firstly by using a number of data sources and carrying out data fusion in a probabilistic fashion, false alert rates can be dramatically reduced. Secondly by making use of historical data, the system can make educated decisions about how to prioritize alerts. In particular, anomalous congestion resulting from an incident can be distinguished from routine congestion, which occurs in the same location every day. Thirdly, alerts can be presented to operators in a minimally intrusive fashion, making it easy for them to ignore images from false alerts. However, even if most of the images displayed on the video wall result from false alerts, the chance of an incident being displayed is dramatically increased over that at present. The two key components at the heart of the system – data fusion and data presentation – enable the system to realize delivery of benefit for operators.

PROBABILISTIC DATA FUSION

The fusion component combines data from different sources. To be effective it needs to operate in a systematic way that allows

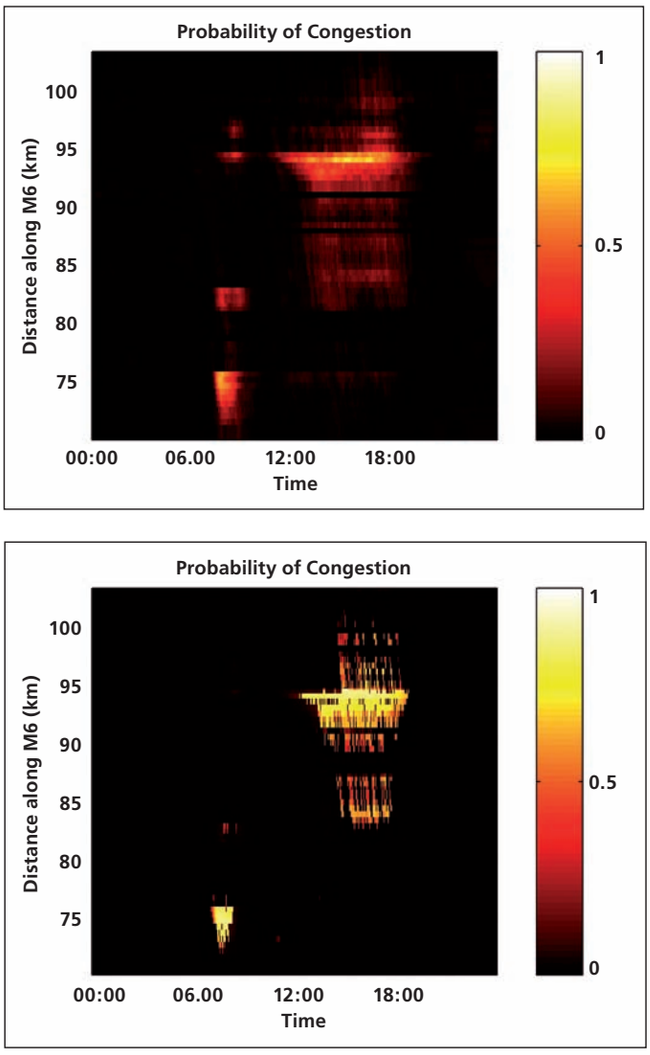


Figure 3: Data fusion process – prior probability of congestion (left) based on historical information, and posterior probability (below) based on historical information and live data

for the level of confidence in each piece of information (such as the expected false alert rate) to be propagated.

This requirement leads to a probabilistic approach for data fusion. Rather than defining various rules – for example, if an inductive loop and a CCTV AID system both detect anomalies within a set period then raise an alert – the system assigns probabilities that each small stretch of road is in one of a number of defined road states.

The core of the data fusion is calculating road state probabilities from each data source and from historical information, and then combining them to give fused road state probabilities as its output. Prior probabilities are assigned to each state for each stretch of road and for each time of day in the absence of live information. These prior probabilities were determined by working jointly with the HA to process a number of historic data sets on traffic flow and incidents to predict probabilities for the various road states at each time and location.

Alerts received in real-time from the CCTV AID system and from inductive loops are processed to give current state likelihoods for each data source and stretch.

"The two key components at the heart of the system – data fusion and data presentation – enable the system to realize delivery of benefit for operators"

A simple form of Bayes' theorem (treating the data sources as independent) is used to update the prior probabilities with the likelihoods, to give posterior probabilities that form the current fused output. The final stage of data fusion is to convert these fused state probabilities into prioritization information to drive the Adaptive CCTV Display. The Data Fusion component has been designed with thought to future incorporation of other data sources and output to other operational tools.

PRESENTATION

For the Adaptive CCTV Display system to be successful, information needs to be presented to control room operators in an effective yet unobtrusive fashion. The user interface for the Adaptive CCTV Display system is therefore being designed in partnership with control room staff to ensure this is the case. To speed up development, a rapid prototyping approach has been adopted, with several mock-up user interfaces being presented for feedback well in advance of full system development. This feedback was used to develop an initial implementation of the Adaptive CCTV Display system, which is being evaluated jointly with the HA.This approach has allowed valuable end-user feedback to be incorporated into the system design at an early stage, rather than the system being presented to control room staff as a *fait accompli*, thereby promoting more effective operator interaction with the system.

THE WAY FORWARD

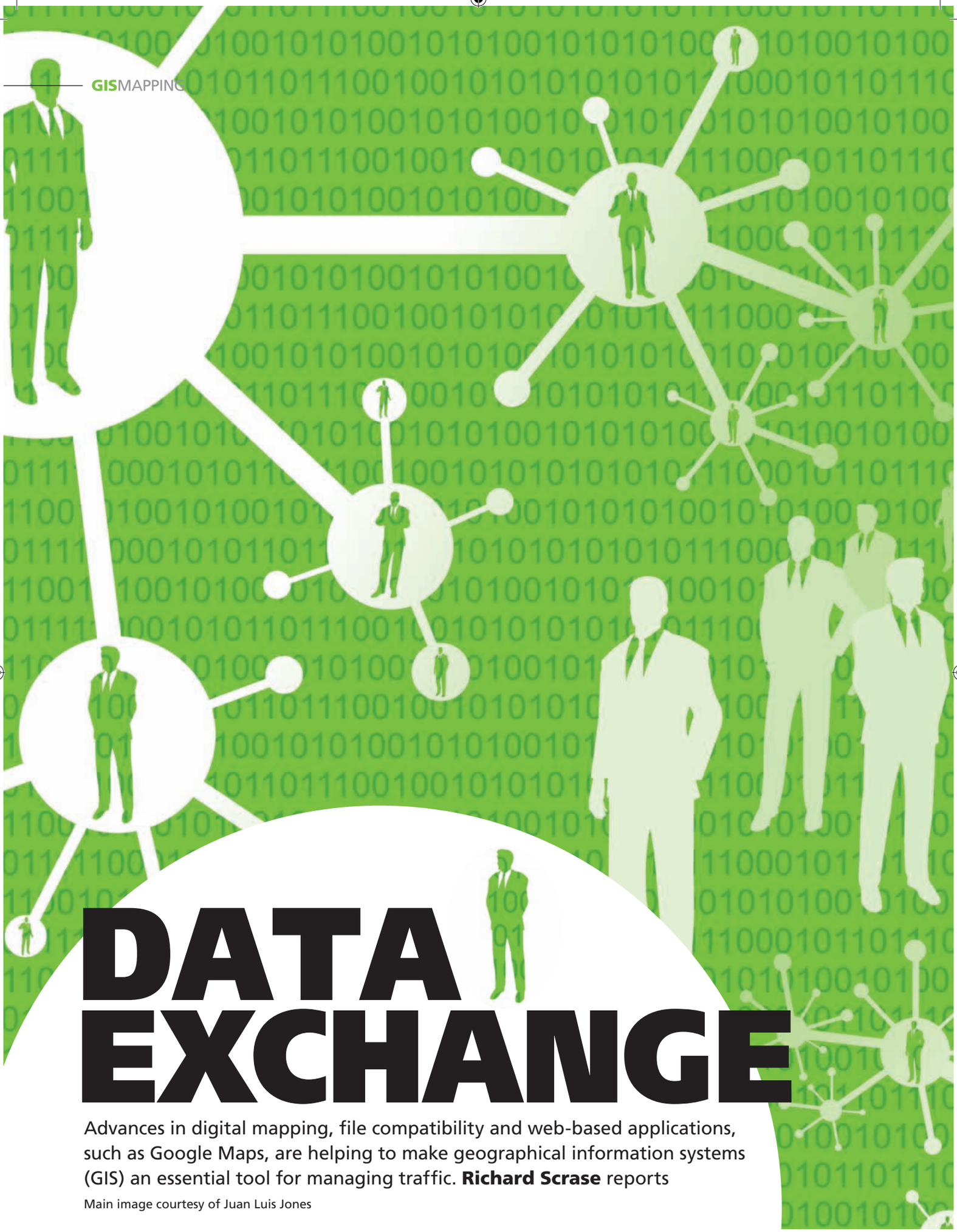
A prototype version of the data collection, analysis and user-presentation service was installed at West Midlands RCC for evaluation purposes in late 2008. Analysis of the underlying system performance to date indicates that the three key features of the system offer benefits in the manner expected: reducing the number of false alerts; prioritizing alerts based on historical data and automatically selecting the CCTV feeds of most current interest; and enabling a clear presentation of information to operators and increasing the likelihood of a real incident being identified. If the success criteria are met, the HA will decide whether to deploy the system on a wider scale.

Initial indications from use by operators are that there is real potential to deliver an overall benefit – via the increased number of incidents identified via CCTV and reduced time to detect these incidents – and deliver them early by means of using existing technology. ■

David Thomas is with the Highways Agency, while Frances Metcalfe is program manager and group leader at Cambridge Consultants in the UK

References

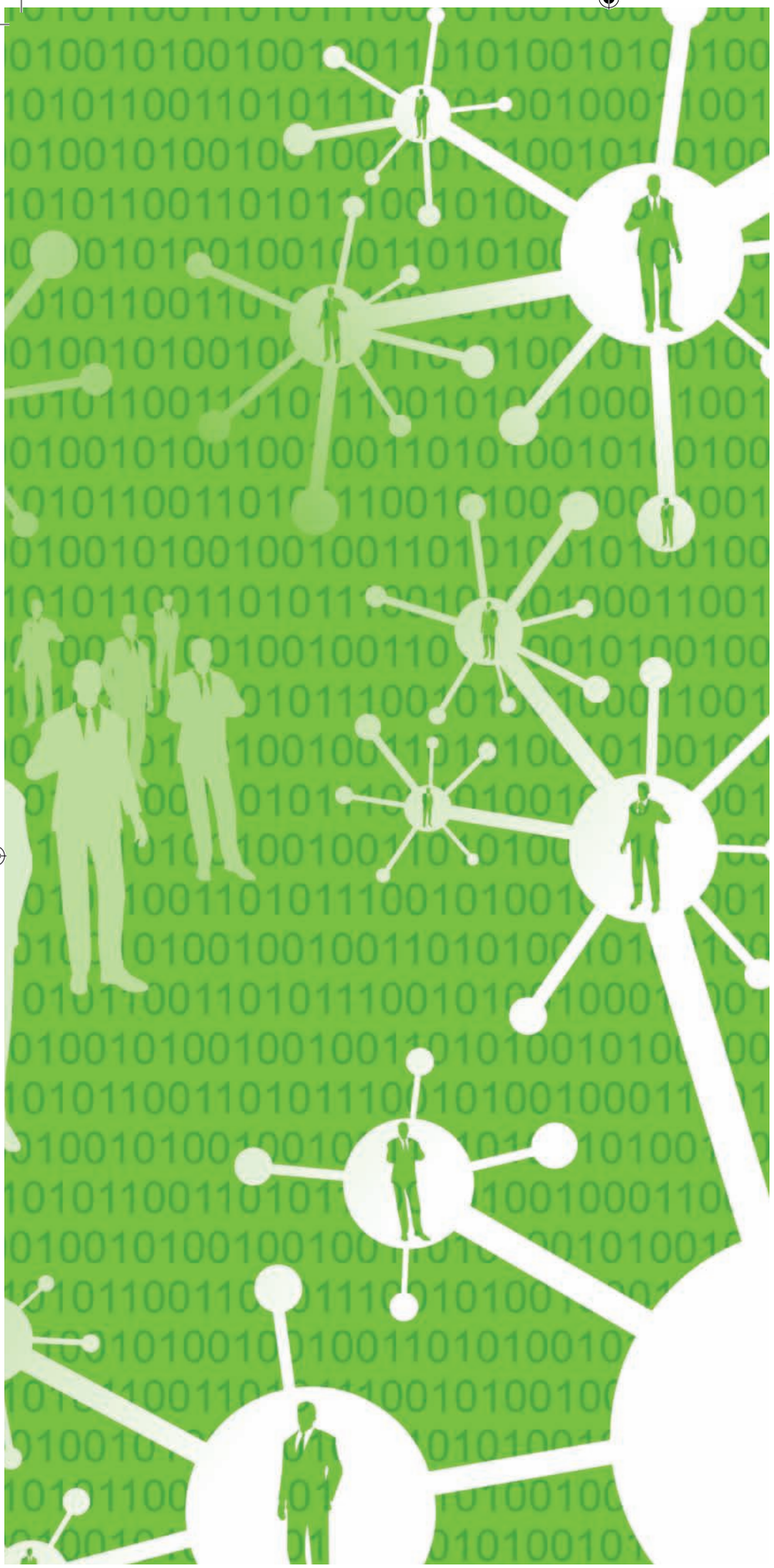
[1] CCTV Operational Requirements Manual, *Publication No17/94, Home Office Police Scientific Development Branch, Sandridge, 1994*
[2] *Directive 2004/54/EC of the European Parliament and of the Council on minimum safety requirements for tunnels in the Trans-European Road Network*
[3] *JD Margulici and B Chiou;* CCIT Task Order 5 Final Report*; California Center for Innovative Transportation; October 2006*
[4] *BM Halkais, K Papandreou, P Kopedlias, V Vegiri, PD Prevedouros;* Tests of Automated Incident Detection with Video Image Processors in Attica Tollway Tunnels*; 9th International Conference on Applications of Advanced Technology in Transportation; 2006*
[5] *A Legrand;* Note d'Information 117: Détection Automatique d'Incidents *("Information note 117: Automatic Incident Detection"); SETRA (Road and Motorway Technical Studies Service, France); April 1999*
[6] *Shlomo Breznitz:* Cry Wolf: The Psychology of False Alarms*, 1984*



DATA EXCHANGE

Advances in digital mapping, file compatibility and web-based applications, such as Google Maps, are helping to make geographical information systems (GIS) an essential tool for managing traffic. **Richard Scrase** reports

Main image courtesy of Juan Luis Jones



Investment in software and new technology is typically one of the first areas to bear the brunt of spending cuts in troubled financial times. But talk to delegates at the recent GIS in Transportation event in Oklahoma City, USA (April 5-8), and you'll find that interest in (and spending on) GIS for transport applications is growing at an unprecedented level. This is confirmed by James E. Mitchell, IT GIS manager at the Louisiana Department of Transportation & Development, who says, "I don't think it [the recession] has much effect. In fact, it might increase the use of GIS as a way to automate many analysis processes and do various workflows more efficiently."

That view is backed by Terry Bills, the San Diego, USA-based global transportation manager at ESRI – one of the world's leading GIS suppliers: "I spend a lot of time traveling and I haven't seen any downturn," he says. "I was in Australia a few months back and – if anything – the market there is accelerating. In Brazil two weeks ago, there was a tremendous amount of interest, while in Moscow last week there was a great deal of activity."

DOWN TO THE PLANNING

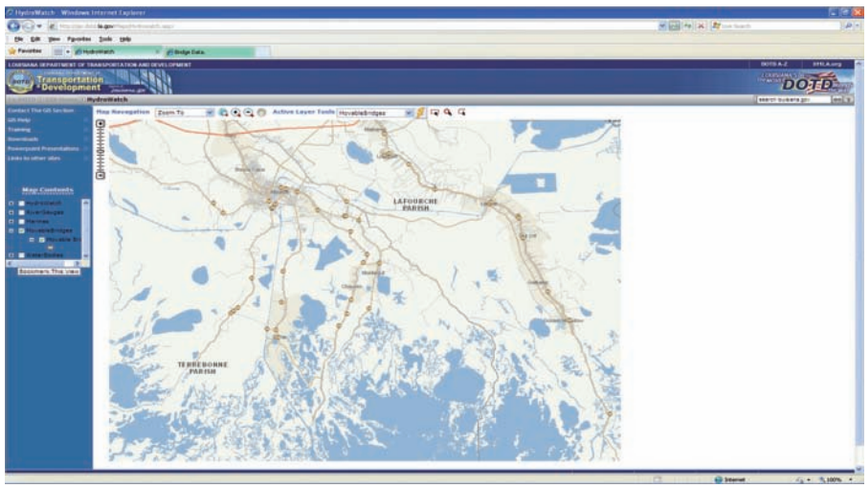
It seems that GIS is proving an increasingly valuable management tool at all stages in the life of transport infrastructure. In Australia, for example, GIS was used to pull together all of the sources of data on the Eastlink Tollway project – the country's largest-ever road scheme (*see sidebar*). By pooling all of the data in digital map form – including CAD files and geological measurements – the project's managers have been able to plan every stage of the development thoroughly, assessing the likely impact of each stage before proceeding, and now the electronic toll road is built, that same GIS can support its efficient operation.

In the USA, the USDOT is using GIS to gather highway data from all 50 states to enable it to track trends and national road statistics. While in Europe, a GIS system supplied by ESRI is providing a convenient means for rail operators to share operational data across national boundaries. So what has occurred to encourage the use of GIS in transport applications and why is it proving

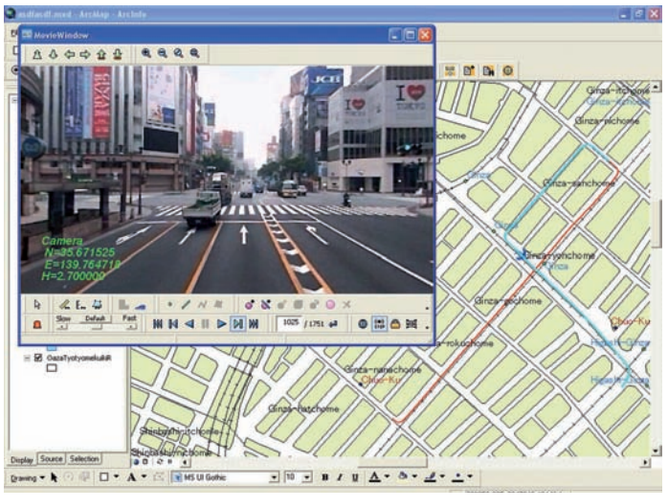
an increasingly valuable tool in major transport projects? One major factor derives from the increasing use of ITS. In their presentation to the GIS in Transportation event in April this year, Matt Schiemer and Connie Gurchiek of GeoDecisions showed that ITS technologies generate vast quantities of data. GIS systems provide a means to share, interpret and monitor that information in a timely manner crucial to the effective operation of traffic management centers. "Over the years we've seen the steady increase of the amount of information being managed within TMCs," explains Schiemer. "The use of GIS to manage this information has proven to be critical in maintaining both efficient and effective operations in the TMC environment."

"In North America, Europe and parts of Asia, there has been much investment in ITS equipment in the field, such as CCTV and sensors," continues ESRI's Bills. "There is a very dense network of valuable equipment generating data, and GIS provides a way to organize that, present it in an easily understandable visual form and quickly analyze it to identify any significant issues."

Schiemer and Gurchiek believe that GIS is helping support the evolution of traffic and transport management from a largely reactive to a proactive role, enabling TMC operators to monitor the operation of the transport network to optimize flow at all times. This allows them to provide timely, customer-oriented traffic and incident management and traveler information services to transport users, compared with the traditional service of construction and maintenance.



Showing movable bridges in the state of Louisiana, used to tell if a bridge is operational. During evacuations this is vital information



ALV stands for Active Link Vision, which is an add-on value for existing GIS users

GIS cuts Eastlink's costs

Eastlink Tollway is Australia's largest road project to date, providing a 45km link between the Eastern Freeway and the Frankston Freeway to the south and east of Melbourne.

The electronic tollway was constructed in a joint venture by Thiess and John Holland. They invested in a GIS from ESRI to host all of the location-based and textual data relating to design, survey, the environment, construction, community feedback, and planning for the project.

The GIS solution was chosen to provide high-quality cartographic capabilities, supply timely and accurate data to stakeholders, and to integrate with other corporate systems. It also had to be simple to use, so it could be put into service by existing staff, and be interoperable with CAD files used for designing and engineering the Eastlink infrastructure.

Thiess and John Holland's GIS strategy generated estimated savings of around 4% of the total Aus$3.5 billion Eastlink Tollway budget, and helped cut the construction time from 48 months to 42 months.

GIS is an ideal solution to host the myriad of location-based and textual data produced by a project such as EastLink's size

OPEN IT STANDARDS

Undoubtedly one of the major factors behind the increasing adoption of GIS is the development of open IT standards that allow for the easy sharing of data from different sources. Some of this progress is the result of standards work, such as the INSPIRE initiative in Europe, and the work of the Federal Geospatial Data Committee in the USA. The latter was formed following the devastation wrought by Hurricane Katrina in the southern states of the USA in 2005, when efforts to handle the crisis were hampered by a lack of interoperability between agency computer systems. These difficulties spurred a major effort to agree to interoperable standards for spatial data.

Today, the state of California is benefiting from the introduction of these standards. It monitors environmental performance, drawing upon data from a host of different agencies, including DOTs, and all of this information is pulled together and interpreted using GIS. Of course, open standards also enable the easy sharing of data within – as well as between – organizations. Steve Cox, head of customer service at software specialist Cadcorp, says that DOTs are beginning to realize the benefit of integrating their data

with their back-office systems. "Transport and traffic data can be different in structure from traditional GIS data, but needs to reside centrally and be accessible in the same manner as other data. We are seeing a trend to centralize data through spatial data warehousing, but it's not yet common to have DOTs included in this. The data can be structured to be open and accessible by a number of GIS, including specialist transport planning applications. For historical reasons, many DOTs have used CAD-based systems, and they can continue to do this, but should share their data through data warehousing."

Bills says that open standards enable DOTs to develop what he describes as "engineering information systems" that combine location information, CAD designs and other sources of data on one system. "GIS is not a design tool," he says, "but GIS data can enrich the design process, perhaps by including elevation data in a CAD design, for example. Once a design is loaded into the GIS, it can be easily updated or tested to assess its impact in its chosen location."

In the past GIS was typically acquired by a department within a transport agency to perform a particular role, and so was usually purchased by a department head, such as a traffic safety officer. Now that GIS is increasingly used across transport agencies, the acquisition takes on a more strategic significance – and is usually handled by an IT director. "To be effective, DOTs need to make more of an investment in IT staff than in the past," Bills says.

Adoption of GIS has also been boosted by the development of GPS-based technologies that simplify the gathering of spatial data. "The ease with which users can now capture their own data makes the inclusion of accurate, relevant data straightforward," says Steve Cox. "Any GPS can be used to capture traffic locations and network information which is easily read into the GIS."

Street network data from digital mapping suppliers such as NAVTEQ and Tele Atlas is widely available in most developed countries. Interestingly, some developing countries and Native American reservations in the USA are adopting GIS to manage their nascent road networks, even when these include dirt tracks. "Brunei has paved and unpaved roads in its network, all included in its GIS," confirms Terry Bills. "The government there recognizes that it can use GIS to make best use of existing resources."

INTERNET-BASED SUCCESS?

The third major factor boosting the take-up of GIS in transport is the development of digital mapping on the internet. "The advent of visualization tools such as Microsoft Virtual Earth and Google Earth has set a new standard for performance and rendering of maps on the web," suggests James E. Mitchell. "In turn, GIS vendors have worked to improve performance of their products." DOTs now have a ready means to provide relevant data to their transport users, and expectations of what information can and should be provided are rising.

"Web-based services such as Google Maps have helped to make people aware of what maps can do," agrees Bills. "Key user requirements are ease of use and speed, and we have had to respond in kind to make our technology faster and easier to use – I take my hat off to Google for that."

These latest solutions are enabling DOTs to meet the demand for fast, accurate and relevant transport information from users. "More general adoption of web-based GIS allows agencies to include traffic and transport data in their generic web offering," explains Cox. "A common 'Find My Nearest' query is used by many customers to tell their users information about facilities near their house. As traffic and transport data becomes part of the generic data holding, the nearest station, bus stop and workzone can all be included in this query."

Although demand for GIS at present is strong, the prospects for the market are rosier still. "In many ways this industry is in its very early stages," Bills insists. "Many transport professionals are only just beginning to discover how GIS can help us do a better job in transportation."

James E. Mitchell agrees. "Engineers and planners have hardly scratched the surface of the analytical capabilities of GIS," he says. "The real strength of this technology is released when trained professionals apply it to their problems. They need to learn to adopt the technology and use it just as they use Microsoft Office or CAD, or other tools. However, this is not just how to push the buttons in the software and make maps. It involves an understanding of the spatial nature of the data they use."

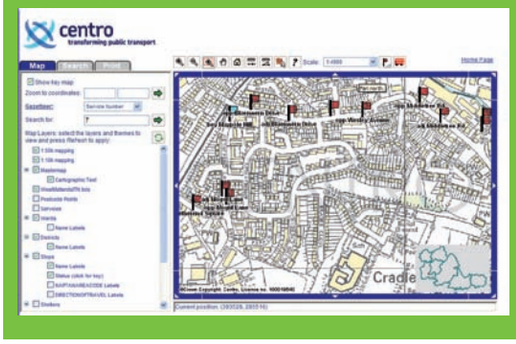
Centro pools GIS benefits

Public transport operator Centro is trying to encourage motorists in the English West Midlands to use its services in preference to their cars. Centro and the local passenger transport authority already operate a number of GIS from different vendors, but these have been developed in isolation from each other to meet specific, individual needs.

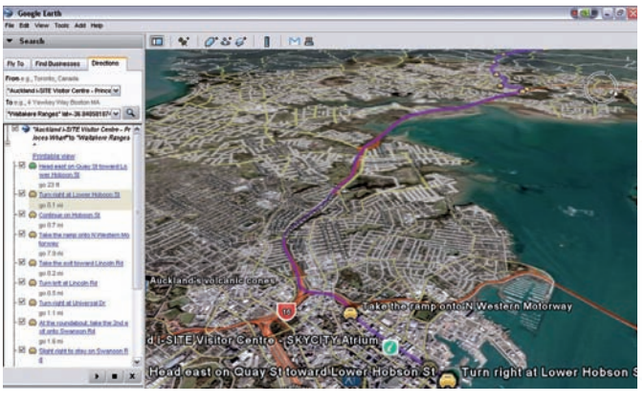
In order to consolidate the information, Centro has opted for Cadcorp software that can read and display and/or write to over 160 GIS, CAD, graphic and database file formats.

The new corporate GIS from Cadcorp will consolidate the information from these previous systems, ensuring that accurate public transport data and spatial information is readily available throughout the organization.

"Centro/WMPTA is developing a 21st century public transport system for the West Midlands and we are proud that it selected Cadcorp Spatial Information System (SIS) as the basis of a new corporate GIS that will help the organization achieve its aims," says Mike O'Neil, managing director, Cadcorp.



Cadcorp SIS desktop software will be used by Centro's GIS development team to develop a range of end-user applications



Google Earth now has full road network and route-finding capabilities

DISASTER ZONE

The old adage 'fail to prepare, prepare to fail' is particularly apt in the case of emergency transportation operations. When lives are at stake, the swift, safe and efficient evacuation of citizens is of paramount importance. By **Laurel J. Radow**

Illustration by Magictorch

When disaster strikes, people move. As people move or evacuate away from the disaster – especially hurricanes, tropical storms and wildfires – first responders move into the affected area to rescue the injured. At the same time, medical personnel, engineers, and other subject matter experts are brought in to assess damage and initiate response and recovery activities. To ensure that the movement of the groups leaving and entering the site is conducted safely and in a timely manner, transportation plays a pivotal role in evacuations.

Evacuations occur in the USA with great frequency. According to the Nuclear Regulatory Commission's 2005 report, *Identification and Analysis of Factors Affecting Emergency Evacuations: Main Report*, somewhere in the USA an evacuation of 1,000 or more people occurs at least once every two to three weeks. Whether it's a flood, hazardous material spill, or the possibility of a dam breaking, state and local agencies must act, must act swiftly, and must be agile enough to adapt their response to meet the needs of the specific disaster.

TAKING ACTION

The frequency of these events and the vital role transportation plays to ensure safe, timely evacuations were just some of the reasons why the FHWA's Office of Operations established the Emergency Transportation Operations Team. The team is designed to ensure that transportation professionals are familiar with all of the phases of an evacuation, that they have what they need to know, and are prepared to act.

The FHWA's Office of Operations' Emergency Transportation Operations team manages three interrelated programs: Emergency Transportation Operations (ETO) for Disasters; Traffic Planning for Special Events (PSE); and Traffic Incident Management (TIM). These are viewed as a continuum that is defined by the 'Probability an Event will Occur' and the 'Severity of the Impact and Complexity of Response'.

The FHWA addresses the primary ETO activities as follows. First, the high-probability/low-severity traffic incident through its Traffic Incident Management (or TIM) program. Second, Planned Special Events (PSE), which is the platform for community preparedness and response-readiness for events, ranging from parades through town and subsequent street closings and a focus on traffic management to events that might attract malevolent acts that cause a potential emergency response (such as the Super Bowl, for example). Finally, the low probability but high impact of a catastrophic event is covered through the Evacuation Planning/Emergency Transportation program. With regard to evacuation planning/emergency transportation, the ETO team works with local, state and federal officials to address special movement coordination operations, particularly in the area of evacuations.

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Through its ETO programs, the FHWA provides tools, guidance, capacity building and good practices that aid local and state DOTs and partners in their efforts to improve transportation network efficiency and public/responder safety when a non-recurring event either interrupts or overwhelms transportation operations.

Non-recurring events range from traffic incidents and traffic planning for special events (PSE) to disaster or emergency transportation operations (disaster ETO). Work in ETO program areas focuses on using highway-operational tools to enhance mobility and motorist and responder safety.

TEAMWORK

Timely responses succeed when two critical components work together. These are well-established working relationships among a range of institutions, including transportation, emergency management, public safety and emergency medical services at a local, state, regional and federal level, as well as with the private sector, and the deployment of integrated technology. For transportation, the use of ITS is critical if evacuations are to succeed. When these components are not used together, the likelihood of success decreases. The work of the ETO team stresses the importance of the material and training it provides.

How to sustain these institutional relationships is a key part of the ETO program. Partnerships in ETO program areas involve non-traditional transportation stakeholders, as ETO programs involve transportation, public safety (fire, rescue, emergency medical service [EMS], law enforcement) and emergency management communities. As a discipline, ETO spans a full range of activities, from transportation-centric (fender benders) to those where transportation is a critical response component (e.g. hurricane evacuations). Through these efforts, the FHWA encourages an operations policy that can manage the system through the use of good technology and reliable, real-time data combined with long-standing institutional relationships with key partners, such as emergency managers, public safety agencies, emergency medical services and the private sector including the towing industry.

A forthcoming FHWA publication highlights the importance of coordination. The study, *The Integration of Transportation Management Centers (TMC), Emergency Operations Centers (EOC) and Fusion Centers (FC)*, provides recommendations on how to integrate TMC and emergency management information/system processes and looks at how information can be integrated to support decision-making in both emergency and security settings.

EVACUATION PRIMERS

That transportation planning be undertaken in concert with the emergency management agencies is stressed in the FHWA series of evacuation primers. Two of the three evacuation primers, 'Routes to Effective Evacuation Primers Series: Using Highways during Evacuations Operations for Events with Advance Notice' and 'Routes to Effective Evacuation Primers Series: Using Highways for No-Notice Evacuations' were written to inform both transportation and emergency management planners about all aspects of transportation portion of evacuations. The emphasis of the first primer is on highway evacuations triggered by events that give advance warning, while the second primer has as its focus highway evacuations resulting from no-notice events. The third primer is 'Evacuating Populations with Special Transportation Needs' which focuses on the special needs population who require assistance during a local or multi-jurisdictional emergency evacuation. These and other FHWA emergency transportation operations publications are available.[3]

The use of ITS is a primary reason why transportation can now play a crucial, real-time role in evacuation operations. Through the deployment of integrated technology, staff at TMCs can monitor the system to provide real-time traveler information to their counterparts at Emergency Operations Centers (EOC) and to the travelers.

GETTING THE MESSAGE ACROSS

An example of the key role ITS can play during disasters is evident in the 2007 FHWA publication, *Communicating with the Public Using ATIS during Disasters: A Guide for Practitioners*.[4] The report found that advanced traveler information systems (ATIS) can play a vital part in communicating essential information to the public during disasters. VMS, 511, highway advisory radio (HAR), and websites are some of the dissemination devices that collect, process, and disseminate information about travel conditions for day-to-day operations, and these same systems need to be effectively used during disaster situations.

The document provides advice on the use of ATIS during disasters. As with the Evacuation Primers, it was written for state and local transportation agencies, as well as for their partners in public safety and emergency management agencies. The ATIS report offers practical guidance to managers of transportation management centers and emergency operations centers and to public information officers who

"To ensure that the movement of the groups leaving and entering the site is conducted safely and in a timely manner, transportation plays a pivotal role in evacuations"

Picture courtesy of Todd Yates/AP/Press Association Images

'Mandatory Hurricane Evacuation' highway sign on the JFK Causeway, Texas, as Hurricane Rita approaches

may be called on to staff joint information centers during disasters.

When disaster strikes, individuals at risk need to be informed and protected. The ATIS report focuses on the intersection of two key elements in emergency planning and response: the transportation system and communication with the public. Transportation agencies throughout the country are increasingly equipped to help the public during disasters due to the deployment of technologies such as ATIS. The technologies include VMS along roadways, automated telephone systems such as 511, websites, email alerts, and HAR. Intended primarily as information tools to assist travelers during 'normal' travel, these tools can be quickly adapted to disaster conditions and can be an integral part of an overall approach for communicating emergency information to the public. The rest of the document examines the role of ATIS in communicating with the public during disaster situations.

State DOTs continue to look at additional ways to communicate, including the use of social networks. In April of this year, the Mississippi DOT announced that it had created six separate Twitter feeds that will provide route-specific traffic information to evacuees traveling on various Interstates. Evacuees will receive information such as traffic delays, contraflow information, fuel availability, and roadway openings on a real-time basis.

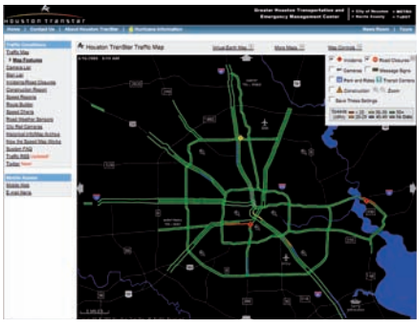
EXPERIENCE COUNTS

No state wishes to be in the eye of a storm. For those that have felt the repeated brunt of extreme weather, both the planners and operators have taken those first-hand experiences from earlier storms and have spent the time between improving both their plans and their response. Beginning in 2005, Texas has had to respond to five major storms. The following brief summary shows how all levels of government in Texas shared information among the various agencies and how these agencies used ITS to provide real-time traveler information. The synopsis shows how responders at both the state and the local level adjusted their response as they learned from each of the hurricanes and built on those lessons.

The integral role of the Texas Department of Transportation in evacuations is evident in the actions they've undertaken in the past few years. Following Hurricane Rita and before Hurricane Ike struck in September 2008, a number of steps were undertaken at the state and local level in Texas to ensure a safer evacuation. Such procedures included

Picture by Dan Steinberg/AP/Press Association Images

"The need to coordinate among agencies and the value of ITS may be even more important during the next few years as local and state governments struggle during these difficult economic times"



When emergency conditions arise such as hurricanes, floods, industrial explosions or terrorist attacks, the Emergency Operations Center (EOC) at Houston TranStar is activated

SIMULATE TO EVACUATE

Imagine a disaster occurring in Southern California and 700,000 vehicles heading for the Arizona border. How would you generate the best traffic management strategy to cope with the consequent congestion? One option would be a computer simulation model that Yi-Chang Chiu from the University of Arizona's (UA) Department of Civil Engineering and Engineering Mechanics has developed. An assistant professor in the department, Chiu has been developing the model since 1995, when he was a graduate student at the University of Texas in Austin. "Solving large-scale evacuation problems is overwhelming," he explains. "We're not focusing | on a script because a disaster scenario is very unpredictable. You can't have one plan that fits all situations, and you can't evaluate hundreds of scenarios, or your plan will end up looking like a phonebook."

Disaster simulation software can evacuate millions of vehicles

Instead, Chiu and his colleagues have focused on developing software that reacts in real-time, adjusting as conditions change. "If we're reacting to a hurricane, we have 72 hours to plan," he continues. "But what if an unforeseen disaster occurs? We need to make a decision in 15 minutes."

Chiu's software package depends on detailed traffic census data collected by state and city DOTs in conjunction with real-time traffic surveillance data. "The cars aren't just randomly placed on the streets in our simulations," he adds. "We know where every car has come from, where it's at, and where it's headed, and vehicle movements follow rigorous traffic flow theories."

The software considers decisions each driver might make

a Statewide Interoperability Mandate and a 211 Database Registry for Special Needs (211 refers to a three-digit number that can be called). Other steps encompassed the definition of special needs, such as medically fragile/elderly/disabled residing in a home setting, or indeed any individuals without evacuation means, due to lack of vehicle or even lack of finances. A plan specific to fuel was also among the accomplishments, and fuel tanks now contain far more fuel than prior to Hurricane Rita. Additionally, Sister City Point-to-Point Evacuation was set up, so once buses are filled, they are driven to predetermined cities. Related to this, evacuation bus drivers are now allowed and/or encouraged to take their own family on the bus. Comfort stations are liberally placed along routes, while pet evacuation plans are now also part of the public education. Included in the pet evacuation are refitted buses for the sole purpose of moving only the pets of the evacuees who are being moved in an accompanying bus.

During a 2009 TRB Conference session, 'Information for Special Circumstances & People with Special Needs', Toribio Garza, deputy director, maintenance division, Texas DOT (TxDOT) in his presentation, 'Paving the Road to Successful Evacuations: the Texas Experience',[5] noted in the general things they learned as a result of Hurricane Ike that because each storm is different, as important as plans are, the plans must be flexible. As Davis noted, fuel and the availability of fuel is key. In addition to the need to practice, practice, practice and that fast purchasing rules are needed, the key to keeping people safe is the critical need for fast, reliable communication.

To ensure real-time communication was available to the public, the TxDOT had in place good internal communications. Some of the ways that TxDOT communicated with travelers, though, included Dynamic Message Signs, TxDOT's website, working closely with the media, on-road assistance, and also call center assistance.

Picture by Dave Martin/AP/Press Association Images

Thousands of New Orleans residents gather at an evacuation staging area along I-10 in Metarie, Louisiana in the wake of Hurricane Katrina

The TxDOT's website included a range of information, including Hurricane Ike information, Hurricane Ike clean-up and recovery, planning for and evacuation, mandatory evacuation information, as well as links to other Texas agency sites.

Houston, Texas's TranStar is the Greater Houston transportation and emergency management center. In addition to having these two critical functions co-located in the same center, the Metropolitan Transit Authority of Harris County has a seat at the center. With these and other key agencies located at TranStar, response can be better coordinated. In a presentation given by Jack Steele, executive director, Houston-Galveston Area Council (National Association of Regional Councils meeting, February 24, 2009, FHWA Transportation and Planning Workshop), he noted that during recent hurricanes, the TranStar Interactive Transportation Map was used to allow those at the TMC to view traffic signals and other control devices. With that information, the operators at the TMC could make appropriate decisions regarding when to retime traffic signals that could improve the traffic flow.

The need to coordinate among agencies and the value of ITS may be even more important during the next few years as local and state governments struggle during these difficult economic times. It doesn't matter whether the economy is strong or weak, disasters will continue to occur. ■

Laurel J. Radow is the evacuations and planned special events program manager within the ETO Team at the FHWA's Office of Operations, Washington DC

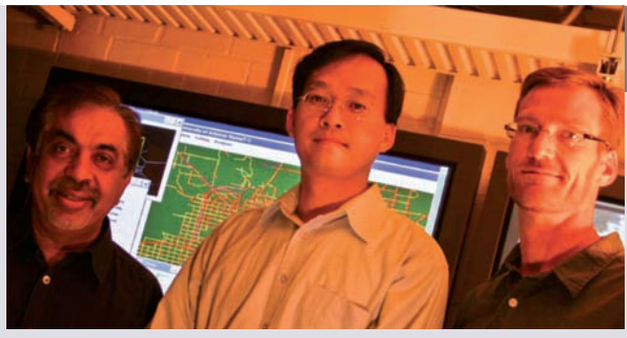
References

[1] *Sandia National Laboratories, US Nuclear Regulatory Commission, Division of Preparedness and Response, Office of Nuclear Security and Incident Response, Washington, DC 20555-0001;* Identification and Analysis of Factors Affecting Emergency Evacuations Main Report, *Published: January 2005, NUREG/CR-6864, Volume 1 SAND2004-5901, p14*
[2] *Ibid.*
[3] *http://ops.fhwa.dot.gov/publications/publications.htm#eto*
[4] *http://ops.fhwa.dot.gov/publications/atis/index.htm*
[5] *http://trbuis.tamu.edu/presentations.asp?id=356_Garza*

about factors such as when they leave, which route to take, if they listen to radio reports and change their routes, or if they react to freeway message boards that carry routing advisories.

The model can also be combined with an air-plume dispersion model to predict how traffic will respond to airborne hazardous material. "We have a scenario in which a refinery has caught fire, and every 30 minutes the wind plume is progressing according to the wind speed and temperature," Chiu details. "We can calculate the health risk. In the case of an extremely toxic substance, we can also calculate the number of casualties and where they will occur."

The model isn't finished when the disaster ends, though – it has post-disaster applications. For instance, Chiu and his colleagues analyzed a high-rise, multi-level interchange in El Paso, Texas, where I-10 and US 54 meet. If that interchange was completely destroyed, what would be the immediate and long-term impact to the city and what would be the best scenario for recovery? Chiu adds, "If you only have limited funds or time, which project will do the most good for recovery? Do you open I-10 first or US 54? The model allows us to make those kinds of recovery decisions based on the detailed, day-to-day traffic-flow data that has been collected by the City of El Paso and the projected traffic patterns from the model."



From left to right: Professor Pitu Michandani, Professor Yi-Chang Chiu and Professor Mark Hickman

In a real-world application, the FHWA asked Chiu to use his simulation model to help reroute traffic in Minneapolis following the collapse of I-35W bridge.

So what's next? Further funding has been secured, meaning the next generation of the software is now under development with Professor Pitu Mirchandani of the Department of Systems and Industrial Engineering, and Mark Hickman, an associate professor of civil engineering. To be known as MALTA (Multi-Resolution Assignment and Loading of Traffic Activities), it is being designed to run even faster, to handle networks with much larger sizes, and to respond minute by minute to real-time emergencies. Instead of running on a single computer, it employs parallel processing, so several computers share the load.

POWER AID

You can have all the high-tech intelligent transportation systems that money can buy, but when the power goes down, life still has to keep moving. **Nick Bradley** talks with some of the UPS and BBS suppliers in the field providing much-needed valuable assistance

Illustration by Anna Davie

The events of August 14, 2003 are still fresh in the minds of many. As the largest power outage in US history cascaded across much of the Northeast – affecting states from Michigan to Vermont – life quite literally ground to a halt for millions. Traffic signals, cameras, loop detectors, VMS, toll collection and even TMCs were crippled without the electricity necessary to keep them on-stream.

On the streets of New York, all 11,600 traffic signals went down, leading to the kind of gridlock that even the most hardened New Yorker would find infuriating. Without air conditioning and with temperatures rising to 90°F (32°C), subway trains simply stopped, leaving 400,000 passengers stranded in darkness. Six North American airports closed completely. Four nuclear plants shut down, while workers in Detroit's car plants just had to abandon their production lines. The chaotic scenes were broadcast worldwide and the only relief was that it wasn't related to terrorism – a brush fire in Ohio triggered a domino effect of outages, resulting in transmission lines failing one after the other.

MOVING FORWARD

Many lessons were learned from that 2003 blackout, not least pertaining to the need for emergency power backup in critical areas, such as traffic intersections. There has since been a great deal of investment in ensuring that such networks are kept operational in the event of a repeat, with uninterruptible power supplies (UPS) and battery backup systems (BBS) pivotal. That said, only 8-10% of intersections in the USA feature the fail-safe technology.

Suppliers in the field maintain that events such as the 2003 blackout are extremely rare, although power outages at a local level are much more common. They cite

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using backup for reasons such as safety, the need to keep traffic on the move during outages, as well as cost savings. "Liability is also a big issue in the USA," suggests Dennis Bennett, national sales manager for Alpha Technologies – one of the leading authorities in the area. "DOTs get called into court a lot as a result of accidents that occur at intersections, with involved parties challenging whether or not the signaling equipment was operational."

LEDs, he goes on to say, have superseded incandescent lamps for traffic control in recent times, and as they consume up to 85% less power, much smaller backup or UPS enclosures can now be employed more cost effectively – either as standalone units, piggy-backing existing controller cabinets, or even mounted above ground on poles. "Whereas in the days of incandescent lamps it would have been too expensive to integrate backup power – between US$15,000-US$20,000 per intersection, with multiple battery streams, and enclosures taking up valuable space at the intersection – it's got to such a stage now where the legal industry is so aware of how a black intersection can cause an accident (possibly leading to injuries and even death), *not* having have some form of backup supply poses a liability issue in itself."

As well as the safety implications, agencies generally send out crews to investigate reported failures, and most will have a policy of doing so even if the signals return to action. "The police are also usually pulled in to direct traffic in the event of an outage, which costs money," adds Bennett. "Although no budgets are going to allow the installation of backup supplies at all intersections overnight, the key is to have a plan to prioritize where you fit them first.

"You would look at intersections with known power problems, or large intersections with high rates of accidents, and intersections where traffic is severely snarled if they do go 'black'," Bennett advises. "You also have to look at the needs of the emergency services and how a black intersection would affect them." In time, he expects all intersections to feature some form of emergency power supply. "It makes sense to do so," he says. "They *do* prevent accidents, they *are* cost-effective, and they also reduce wear and tear on the controller equipment resulting from power surges. Even if your controller equipment remains operational during a 'brownout' or high-voltage condition, your components will still be stressed by the load. In stressing them, their life expectancy can be shortened, so a BBS that prevents your controller and peripherals from being stressed will ensure you get more life out of your equipment."

Picture courtesy of Frank Franklin II/AP/Press Association Images

Cars try to navigate their way through New York City during a blackout that hit steamy US and Canadian cities in August 2003

"They *do* prevent accidents, they *are* cost-effective and they also reduce wear and tear on controller equipment caused by power surges"

RISE OF THE MACHINES

The City of Shreveport in Louisiana is a recent convert to UPS. According to assistant city engineer, Robert E. Westerman, there are 347 traffic signals within the jurisdiction. "Most experience several minor power outages a year (10-90 minutes)," he says. "Roughly 30% of the system will experience medium-level outages annually (two to five hours), and every few years we experience a catastrophic event, such as ice storms or tornadoes, which leaves vast sections of the city without power for several days." It is these events that are most troubling. "During such times, resources are limited, law enforcement demand is at its highest, and roadway conditions are at their worst," adds Westerman's colleague, Michael Erlund, city traffic engineer.

What was needed in Shreveport was a system that would address the safety needs

The green line

There are two options to bring power to off-grid traffic sites, says Tobias Himmelreich from Germany's Smart Fuel Cell (SFC). "The operator could buy electrical power from the cities or towns alongside the road, which is costly, or bring power to the road or motorway in the form of mobile power sources.

"Batteries are heavy and their energy density is low, so they need to be replaced regularly," he explains. In addition, battery exchanges are also frequent and labor-intensive, and sometimes a logistical challenge. Also, a trailer carrying traffic signals will only operate for eight hours, and then needs another eight hours to recharge. And although generators can recharge batteries on-site, they are noisy, produce emissions, require regular refills, and are maintenance-intensive.

Direct methanol fuel cells, however, have been in use since 2006 to continuously power traffic applications over long periods – up to 17 days compared to the eight hours of a normal battery. For instance, SFC's EFOY Pro fuel cell is connected to the battery that powers the signal, while its automatic charge control constantly monitors the battery's charge state. If the voltage drops below a predefined level, it automatically switches on and recharges the battery. Once recharged, it switches back to standby mode. The system can also be used for alternating traffic signs, directional signals, speed-limit signs, blinkers in series, beacons, and numerous other applications, such as electronic parking guidance, surveillance, etc. As well as being an ideal off-grid supply, they are also an ideal 'green' option.

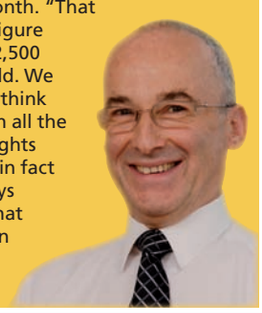
Supporting the ITS customer

Rob Tanzer has been involved in a number of UPS topologies over the past 30 years, with various organizations. But in UK-based Chloride he's feels he's now at a company with a very strong position in the market, producing all types of UPS for all applications.

One of the more recent trends he has noted is a concern about energy losses. "They are very expensive, they hurt the environment, and we have responded to such needs. As an example, we are now producing UPSs that halve the losses we experienced just two years ago.

"We're achieving 96% efficiency on a regular basis, compared to 91% or 92% previously," he adds. Power supply efficiency tends to drop off quite substantially as loads get lighter, Tanzer explains, and very few power supply systems run at 100% load (normally, they run at 40%, 50% or 60%). "We're achieving these very high efficiency figures right the way down to 50% and even 25% load. So we're really saving the customer a huge amount of energy. It may only look like 5kW or 6kW per system but if you consider that every kilowatt costs around £1,000 (US$1,645) a year, we're talking real money here, because these systems are running 24/7.

"Wherever we have a UPS, we effectively have continuous feedback because it actually records any power disturbances. A remote monitoring system dials out to our control center once a day to report performance." On average, Tanzer states, each UPS is protecting the system load from transience, spikes, and outages 200 times every month. "That is an average figure spread across 2,500 units in the field. We may, as a user, think the power is on all the time and the lights shine, etc, but in fact there are always disturbances that still can have an adverse effect on systems."



and relieve some of the demand for police over an extended period. In 2006, the City researched the availability of power backup systems and discovered that one of the available options was BBS. "However, we determined that it [BBS] had certain deficiencies that we were unwilling to test on our intersections," Westerman recalls. "It only ran for four hours on steady burn and then two hours of 'flash-time'," explains Erlund. "During the runtime, the systems we looked at were also incapable of running our cameras and other peripheral equipment needed to keep our ITS viable." In addition, even though some of the newer systems are "pushing eight hours full operation with an additional two hours of flash", Erlund insists that they would still not address the catastrophic-level events witnessed in Shreveport every couple of years or so.

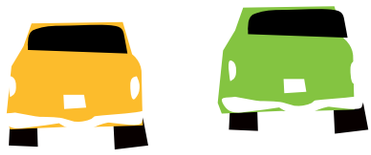
Temperature variations in the city range from below freezing to above 100°F (38°C), which in Westerman's opinion severely affect the shelf life of the batteries, as well as the runtime of the BBS. With outside air temperatures well above 100°F, cabinet temperatures could exceed 120°F (49°C) for extended periods. Additionally, there were concerns regarding battery storage, disposal, and the potential for battery leaks in the systems. Shreveport then researched generators as a potential backup solution, without success. "We ran into roadblocks because no generator supplier produced generators with automatic on-off switches for 5-6kV generators," Westerman reveals.

"The City had several meetings with a local company, PowerUp Electric, which had experience in providing backup systems to commercial customers." As a result, PowerUp Electric developed a system that fit the bill perfectly – the forerunner of a product that is nowadays marketed as 'Auto Traffic Cop'. "It had to be built to adapt to the traffic system without modification to the existing facilities at the intersections," Westerman says. "We also wanted to build in some kind of monitoring system to notify us when the signals were out and the unit was running. And we also needed some form of notification of tampering."

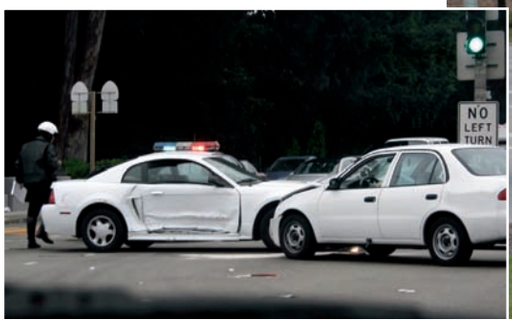
Three units were initially installed, followed later by another 17. "In the two-and-a-half years that they have been running, there has only been one fouled plug on one single unit, which required very minor repair," reports Erlund. "In two instances, the units actually ran in excess of 37 hours as a result of power outages. There is no other backup system that can provide this length of uninterrupted usage, monitoring, and so forth. This includes (but is not limited to) temporary backup systems. They all have to be maintained on an interim basis, for fuel, batteries, etc."

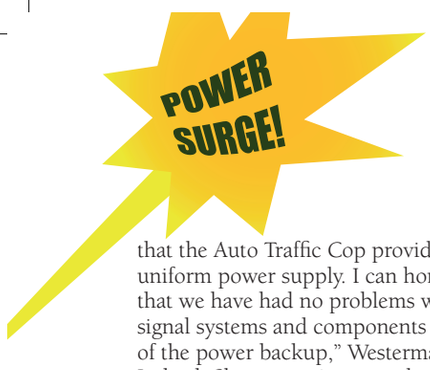
"As with any computerized systems, the signal controllers and signal systems are very sensitive to power surges, so it is imperative

"Every few years we experience a catastrophic event that leaves vast sections of the city without power for several days"



Auto Traffic Cop is a self-contained natural gas system that provides continuous backup power at traffic intersections





that the Auto Traffic Cop provides a steady uniform power supply. I can honestly say that we have had no problems with any signal systems and components as a result of the power backup," Westerman says. Indeed, Shreveport is currently in the process of deploying a further 50 units.

ON THE MOVE

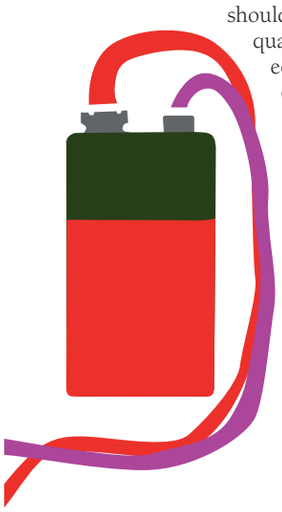
Randy Smith is the CEO of Auto Traffic Cop, and explains how a mobile version of the system materialized last year. "We had two hurricanes hit the Louisiana coast, one of which was Gustav. We knew the damage was extensive in Baton Rouge and that at one time 150 intersections were down, so we called the DOT down there and asked them if some mobile versions of Auto Traffic Cop would help. In 36 hours we put together five units, took them down there, and hooked them up to their critical intersections."

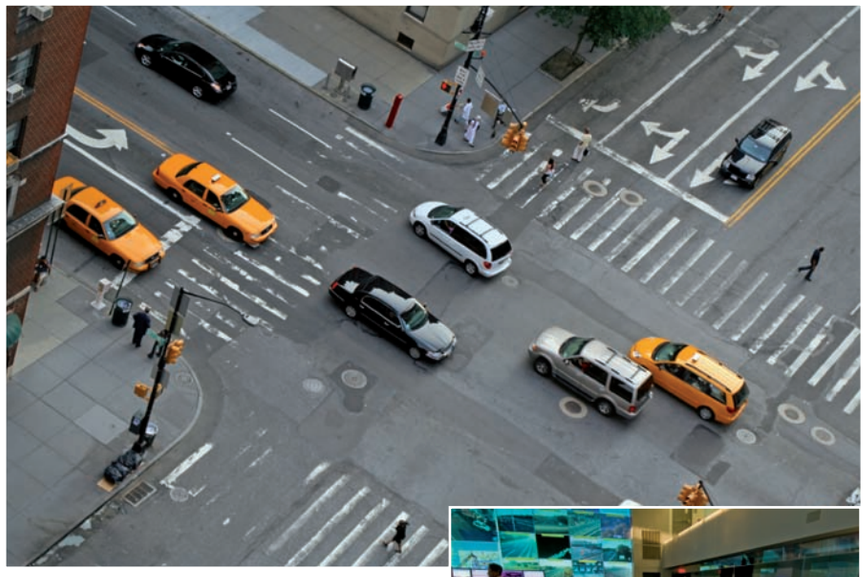
Capable of running on natural gas or propane (in this instance propane), rather than designing them to run off one large gas bottle, it was adapted for four smaller bottles, which are more readily available and run for around four hours each. Smith stresses these were 'makeshift' designs, created for an emergency, although a fully fledged product is now available. "After Baton Rouge, we realized there could be a demand for a mobile version. Rather than deploy backup at 100% of intersections, DOTs could have mobile units that are sent out as and when they are needed."

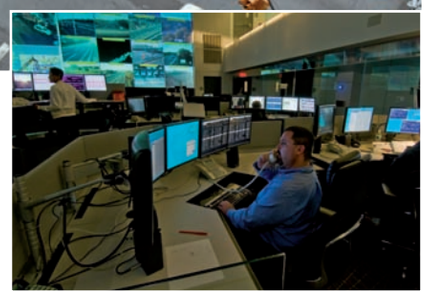
Similar to the static older brother, the units also integrate GPS, while a further enhancement is the incorporation of an anti-theft device, as Smith details. "Once it's set up and armed, if the unit moves more than 50-75ft from its armed location, it sends an alarm and it keeps sending that alarm until the unit remains stationary for five minutes, before transmitting its GPS location. We want to help cities protect their investment."

INTERNAL INVESTIGATION

Of course, backup power is not solely about the intersection, and is equally critical for VMS and monitoring equipment (for example, on disaster routes and important corridors), as well as in the control center. The latter in particular is why Rob Morris from Powervar in the UK feels that DOTs should consider the issue of power quality carefully. "Such sensitive equipment relies on state-of-the-art microprocessors and high-technology components, which are susceptible to a variety of common power quality issues," he says. Facilities with numerous traditional power loads often generate objectionable power disturbances that result in a 'low-technology' environment supporting high-technology systems.







The estimated economic impact of the August 2003 blackout was US$6 billion, with an estimated annual power interruption cost to the USA of US$80 billion

"Facilities with numerous traditional power loads often generate objectionable power disturbances that result in a low-technology environment supporting high-technology systems"

"When problems arise, the answer is usually some form of power conditioning or protection device, most commonly a UPS." But Morris suggests users often fail to realize the full benefit of their investment in power-protection equipment, as it is not selected, applied or even installed correctly: "This can come from a misunderstanding of the basic power quality needs of the modern IT environment," he adds.

"Billions of dollars are spent on power-protection solutions every year, from transient voltage suppressors (TVSS) to power-line filters, voltage regulators and UPS products." Morris reveals the global UPS market is the largest single market for power-protection products, which creates an often false perception that a UPS is the most important solution for any power problem. "Yet in between a simple, inexpensive surge protector and an expensive online UPS is a range of products to address most power quality issues," he says.

"The latest electronic systems need a new approach to their power quality needs – yet all too often the first protection device is the one that worked 20 years ago. Proper selection and application of power quality solutions begins with an understanding of the technology being protected." Moreover, he continues, money, time and productivity are easily wasted when incorrect power-protection devices are installed. "Understanding the power quality needs of modern systems is an important step, but understanding basic power quality problems and solutions is vital."

However, as power supply in general is predicted to become a more widespread problem in the future, perhaps a complete rethink is in order. "There's not enough power generation," Chloride's Rob Tanzer concludes, "and over the next few years the availability of power is going to be more difficult, simply because power stations are being shut down. This means that ultimately we won't be able to expect such a high reliability of AC power as we have in the past." If such a future unfolds, companies such as Auto Traffic Cop, Powervar and Alpha Technologies will be faced with an altogether different conundrum.

MORE ONLINE

To read Rob Tanzer's article on 'Power-protection designs for maximum availability', log on to **www.traffictechnologytoday.com**

TRAFFIC BUSTER

No longer a flight of fancy, the first Transition Roadable Aircraft – or 'flying car' – has made its inaugural flight. **Christopher Hounsfield** reports on this milestone

Images courtesy of Terrafugia

March 2009: the first Transition Roadable Aircraft left the road and rose into the air for its inaugural flight. A two-seater aircraft, the Transition is designed to take off and land at local airports, and drive on any road. Transforming from aircraft to car takes the pilot less than 30 seconds.

A historic milestone for aviation, the flight comes after six months of static, road, and taxi testing. The potential traffic-beater can cruise up to 450 miles at more than 115mph, yet can also drive at highway speeds on the road, and it fits into a standard household garage. The vehicle has front-wheel drive on the road and a propeller for flight. Both modes are powered by unleaded gasoline from a regular roadside fuel station. "This breakthrough changes the world of personal mobility," explains Carl Dietrich, CEO of Terrafugia – the company behind the craft. "Travel now becomes a hassle-free, integrated, land-air experience."

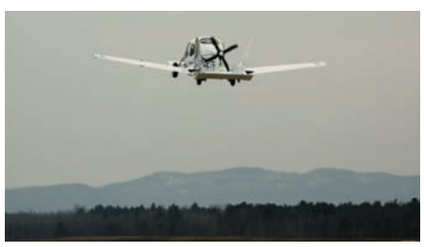
Categorized as a light sport aircraft, the Transition requires a sport pilot license to fly. The proof-of-concept will undergo additional advanced flight and drive testing, and a preproduction prototype will be built and certified before first delivery.

Terrafugia comprises a team of award-winning engineers who have been developing personal aircraft since 2006. Founded by five pilots who are graduates of the Massachusetts Institute of Technology (MIT) and supported by a network of advisors and private investors, Terrafugia's mission is the innovative expansion of personal mobility.

For its first flight, the Transition was flown by USAF Colonel Phil Meteer (now retired) at Plattsburgh International Airport in Plattsburgh, New York. "It was kind of a wahoo moment," he says. "It [the Transition] has all of the controls of a car so that any driver can drive it… in the air it has all the controls of a normal airplane so that any pilot can fly it."

BEHIND THE SCENES

Anna Mracek Dietrich is Terrafugia's COO and co-founder. "Safety is of course the primary driver for our testing program," she says. "The goal of the POC vehicle was to demonstrate the capability of driving, flying, and transitioning smoothly between the two in the same aircraft. After the successful completion of our first phases of drive and flight testing, that goal has been met. We are now looking at what should be done to further inform the optimization and refinement of the next prototype."



Mracek Dietrich is keen to point out that the Transition is not actually a 'flying car'. "It is a roadable aircraft, designed to be used by trained pilots in and out of the existing airport infrastructure. We're building relationships with the necessary regulators, and look forward to continuing to work with them to bring a new level of safety and innovation to general aviation."

Regardless of this, the Transition's development is undeniably important progress toward a potential future vision of traffic-busting 'flying cars', used to help relieve congestion on gridlocked roads.

So, what happens next? "We plan to build at least one more prototype, most likely two, and conduct the appropriate level of testing on each. The next design is already well under way and will include optimization and refinements based on what we have learned over the course of the proof-of-concept development and testing, but it looks like it will be largely the same design." And the cost? You only need to put down US$10,000 deposit to reserve the US$194,000 Transition. While not cheap, for a flying car it's not bad!

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AT ERTICO'S HELM, HERMANN MEYER IS A BELIEVER WHO COMPARES ITS'S POTENTIAL TO THAT OF THE INTERNET, AND IS STEERING A COURSE TOWARD A STANDARD EUROPEAN ITS ARCHITECTURE

Interviewed by Max Glaskin/Photography by Alexis Kembery

Approachable, dapper, considered and focused, Ertico's chief executive Hermann Meyer is not easily provoked – except by delayed buses, about which more later – or lured into criticizing anyone or anything. These attributes have seen him through a career that began with an economics degree in Germany, to a Masters from the State University of New York, advanced studies at Kiel, Germany, a doctorate at Cambridge and teaching at three Edinburgh universities.

As we talk, he slips adroitly from academia into industry. "I decided to see if I could use my environmental economics expertise for companies because I thought I could have a great impact on their environmental performances," he explains. VW snapped him up to develop its sustainability strategy, before seconding him to the German Federal Ministry of Transport to research its mobility strategy.

ENVIRONMENTAL IMPACT

After presenting a paper on a similar topic on behalf of an auto-industry group at the 2003 World Economic Forum at Davos, Meyer was offered work at ACEA, Europe's auto-makers' association. His task was to develop an integrated approach for reducing CO_2 emissions. Then he became head of VW's Brussels office. When Ertico, a nearby neighbor, sought a new CEO, he made a successful application and moved from the clear-cut commercial world to the balancing act that is needed to harness business and political partners so that they pull together. "I applied because I believe intelligent transport systems can make substantial improvements to the environmental and safety performance of vehicles and to mobility in general," he says. "I see my life from the end and I want – at the end – to have something that I can be proud of. Here was an opportunity to contribute substantially to the welfare of society and this, for me, is very gratifying."

He's pleased to have such "motivated, highly educated and confident" staff, especially as there are just 36 of them carrying out Ertico's role in moving forward the deployment of ITS, the complexity of which is a challenge in itself. However, the task is made easier, in Meyer's view, because the European Commission (EC) has been part of the organization since it was founded in 1991 and all of its other partners have subscribed to the same vision.

"This means we can ask our partners to go the extra mile, pushing them to do a bit more than they might otherwise," he says. "I also have an advantage because I know many people from the car OEMs and suppliers. This personal relationship certainly helps. There's an environment of trust so you can speak very openly."

The diversity of the 27 member states of the European Union (EU) – with their different economies, social geography and transport infrastructure – is sometimes seen as a massive barrier to the deployment of ITS. Hermann Meyer, however, recognizes this diversity actually defines Ertico's task.

> "The instant that stakeholders can see that an ITS business model can be profitable, there will be a completely new dynamic"

"It's of utmost importance that we develop a European architecture for ITS," he explains. "Wherever necessary, services and technology will be standardized, at least on an EU level, if not on a global level. We have to achieve services and technologies that are interoperable across countries."

"ITS will be used, it will be on the market and the main issue is that we have an architecture that ensures it is most effective – particularly when everything is connected," he says. The architecture must ensure that ITS is interoperable not just across countries but also across different modes of transport.

"For this to happen, everybody must work together," says Meyer. He believes that Europe's politicians and commercial organizations all understand this, something that consequently adds strength to Ertico.

THE POTENTIAL OF ITS

Although he is convinced that more ITS will be deployed sooner or later, its potential continues to surprise him. "Everyday I see it can offer more and more," Meyer says. "When you look at cooperative systems, such as car-to-car and car-to-infrastructure communication, this will open up opportunities we cannot even imagine, to industry, to politics and also to the citizen."

At this point, he draws a comparison with the blossoming of the internet. "I think we're in a similar situation to that which existed with the internet, which still holds miracles for us for the future," Meyer states.

"We'll have a similar situation with ITS. At the moment one of the major issues for ITS – and particularly for the development of cooperative systems – is to create a business model. The instant that stakeholders can see that an ITS business model can be profitable there will be a completely new dynamic. Ertico, together with the EC, will play a role to help our partners to define this business model so that we can really move these systems onto the market, to get them deployed, because this is our ultimate goal."

Getting a clue from the economist as to when this will happen is not so easy. "I believe that, in just a few years, the real dimension and the profitability of these systems will be seen," he says.

"When you look at the internet, at the beginning people thought it was nice but that nobody could earn any money from it. Now it's shown that this is not the case. With ITS it will be the same because you also have to look at how much time people spend in transport and all the things you can do. It's quite amazing."

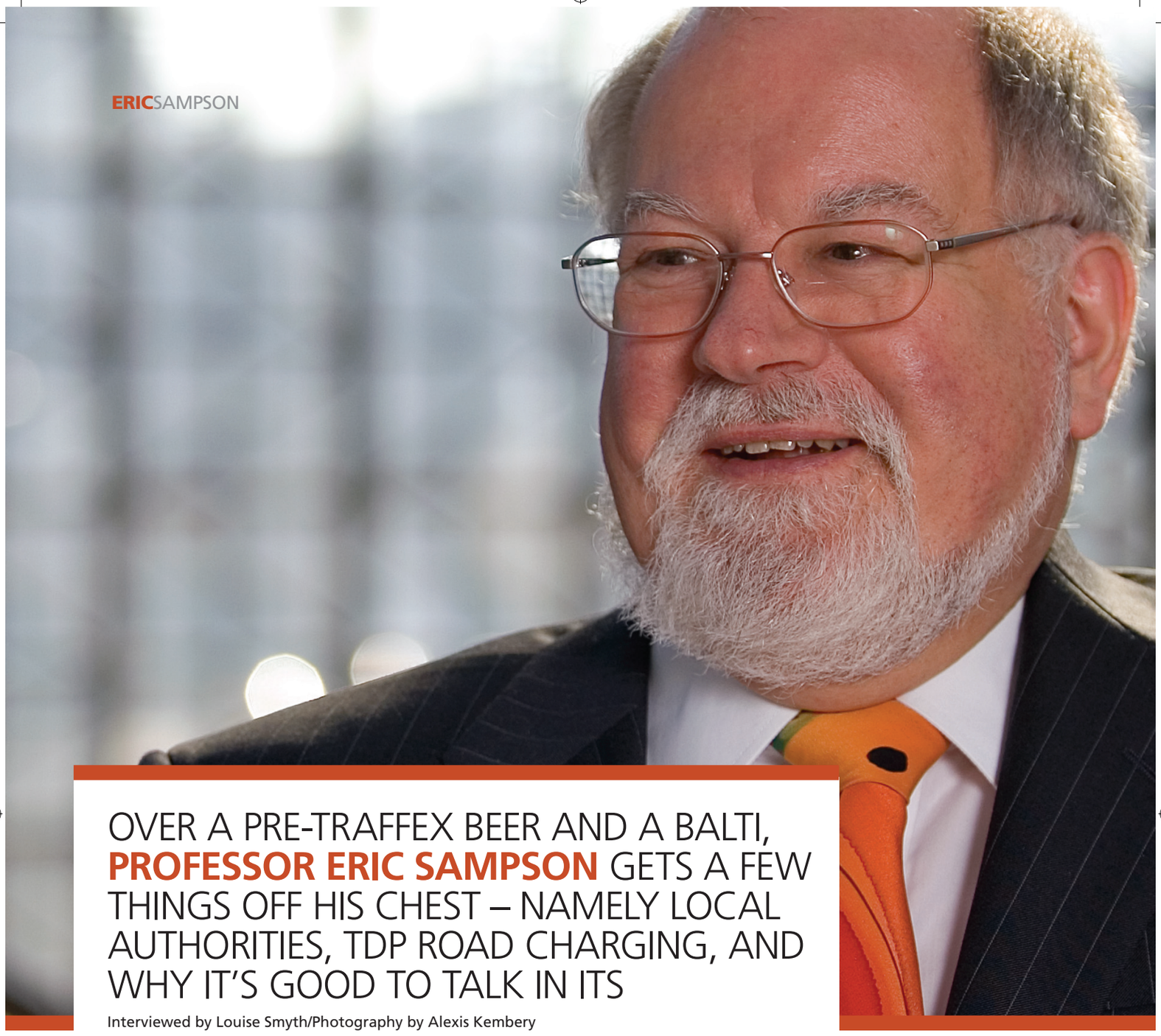
He hints strongly that the turning point is just around the corner. "At the 2008 World Congress on ITS in New York, we were not only just talking about deployment; there was deployment! I believe we will be very positively surprised about the speed of getting these technologies into the market."

So, if we are so close to an epiphany when governments realize that the solution to several problems can be provided by ITS, what is holding them back? "In my view the reason is that most of these technologies are complex. It's not that the materials we use are expensive but it's the complexity, it's the software that we need, it's the brainpower we need," Meyer says. "When ITS is deployed more widely, that's when you will get into the real economies of scale. They will be interesting for us and we will see synergies between the different technologies."

With the architecture in place to ensure interoperability and the crafting of a sound business model, ITS will spread like the 21st century version of wildfire, otherwise known as the internet, in Meyer's opinion. That day can't come soon enough for him and he would certainly have welcomed its deployment more than 15 years ago when he was teaching environmental economics in Edinburgh. "I used to get so angry when I had to wait for a bus for half an hour, hoping that each one that came into view would be mine and getting colder and colder when it wasn't," he recalls. "I think that ITS will have the greatest impact on public transport because it will give people the information they need to make their journey decisions. The moment that information about real-time bus departure times and interconnections is available then people will start to use public transport more."

It's not a problem at the moment for Hermann Meyer. He learned from his Edinburgh experience and now lives within walking distance of his Brussels office, at which he is clearly totally immersed in driving ITS forward.

"One day last year I came home from work and my family was singing 'Happy Birthday' to me, which was very nice but surprising," he says, unintentionally revealing his utter focus on ITS. "I had totally forgotten my own birthday!" ■



OVER A PRE-TRAFFEX BEER AND A BALTI, **PROFESSOR ERIC SAMPSON** GETS A FEW THINGS OFF HIS CHEST – NAMELY LOCAL AUTHORITIES, TDP ROAD CHARGING, AND WHY IT'S GOOD TO TALK IN ITS

Interviewed by Louise Smyth/Photography by Alexis Kembery

When Eric Sampson reveals his birthday is on St George's Day, it is rather tempting to conjure up some metaphor that heralds him slaying the dragon of poor traffic management – but you get the impression he wouldn't appreciate such pretentious rhetoric. Widely proclaimed as being both visionary and pioneer, he remains straight-talking, friendly and down-to-earth. Besides, before he can celebrate his birthday, the new ambassador and recently retired chairman of ITS (UK) must fulfil a number of official conference duties at Traffex 2009. "The papers are presented by people with something to say that is worth listening to," he says of the line-up. "One of the reasons Traffex and ITS (UK) collaborated is that it suits us both to build something that's bigger than either of us."

Such sharing of knowledge forms the essence of many of Sampson's anecdotes spanning his 21 years in various roles with the Department for Transport (DfT) and his previous career in science administration. A hard-headed, ruthless businessman he is not. He is instead generous and proactive in the dissemination of knowledge. "One of the things I've always tried to do is to open up the advice," he says. "Nobody has a monopoly of wisdom, certainly not in anything that is technological and academic."

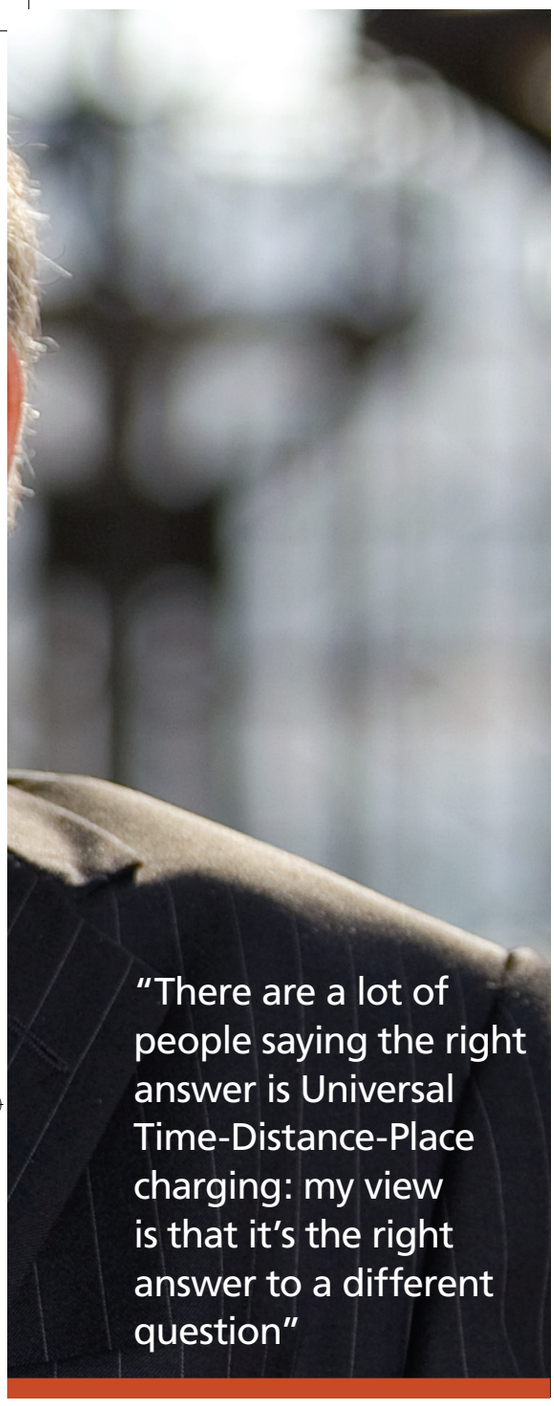
This approach has led to many fruitful collaborations. In one instance, around 10 years ago, Sampson arranged a DfT meeting with representatives from various British universities. In attendance were a number of people who caught his eye as being "innovative and energetic" – one of whom was Newcastle University's Phil Blythe. "That was the start of a very good and productive working relationship," Sampson says.

Although he retired from the DfT shortly after the 2006 ITS World Congress in London, Sampson is presently a visiting professor at Newcastle University – a role he is proud of, "enjoys hugely" and which enables him to maintain that relationship with Blythe and his team.

MULTIMODAL EXPERTISE

The students who Sampson talks with can certainly learn a lot from his experience across multiple modes of transport and the various issues affecting them. He has worked on projects in sectors as diverse as marine, bus, rail, pedestrian and cyclist (and even canals), as well as spending several years running the DfT's Transport Technology and Standards division.

This vast experience coupled with the desire to communicate innovations to wider circles is something that fully qualifies him to discuss one of his current bugbears – the role of Local Authorities (LAs). "Dealing with transport nowadays is very, very difficult," he insists. "At one extreme there is Transport for London (TfL), which is trying to wrestle with fiendishly difficult



"There are a lot of people saying the right answer is Universal Time-Distance-Place charging: my view is that it's the right answer to a different question"

problems. For example, if two cars collide in Trafalgar Square, within 30 minutes an enormous area of London feels the impact. So they need instant analytical tools to tell them what might happen next and then instant management tools to work out the best ways to redirect the cars and buses, and so on. And London, with its resources, is finding it hard to do this, so what hope have Bath or Durham or Norwich got? They are secondary players in the game and I think what is making me sad is there isn't a lot of expertise in this area and it's spread thinly."

Sampson observes that one rarely sees groups of LAs from similar locations getting together and collaborating to share knowledge and experience. This is indeed 'sad', as he is not the only one who is in favor of such a scenario. For every Eric Sampson, there is another highway engineer or traffic manager in Devon, Portsmouth or Liverpool saying the same thing. To ensure a more cohesive future for LAs, he feels that much transport technology work should be conducted by grouping the individual authorities into regional areas. Indeed, Sampson suggests that one area is heading this way already: "The LAs in the North East are realizing that, for example, if Northumbria opts to specialize in town planning, Durham does traffic and Newcastle does environment, they can all come together to bring something to the pot and also take something from it."

ITS (UK) is also keen to contribute, and Sampson is proud of two new publications written for LAs to talk them through schemes in layman's terms: "We've sweated blood getting all the techie words out!" he says. "This is a series of English language examples, cross-referenced to their own hopes. So instead of quoting a dry academic, it quotes someone from York saying 'We did this and this was the result'. These are documents written by the membership, of value to the membership and to any LA."

Transport economists are another of Sampson's pet peeves – again, because they are unable to look at the wider picture. He puts this down to a system that is good at initial costs assessments but poor at considering more expansive thinking: "If you go to France, for example, when they lay out the route for a new TGV line, the medium-sized city that isn't on the route goes berserk and starts lobbying to get a station. In the UK, it's the total opposite – we don't want the station! Just look at Lille as it was 20 years ago and look at it today; it's the crossroads of Europe. It's the old saw; the Treasury knows the price of everything and the value of nothing. And if we're not careful they will make a mistake with high-speed rail lines in the UK. The assessment will be a cost-benefit appraisal of putting in a railway line from A to B without any thought about the regeneration and the fact that if you build something, a lot of people get work – there's a lot of spill-over. The Treasury's economic rulebook just doesn't take enough account of that".

Politics is also at the heart of the issue of road user charging in the UK, with Sampson feeling that more consideration needs to be given to the issue of what any potential schemes are actually hoping to achieve: "If you want to attack congestion, then looking at 15 or 20 metropolitan areas and 15 or 20 chokepoints on the trunk road network and hitting them hard will, in effect, 'solve' congestion – it will push it right back. There are a lot of people saying the right answer is Universal Time-Distance-Place (TDP) charging: my view is that it's the right answer to a different question. If you want to change the motoring taxation scheme so that it is fairer and people actually pay as they go, then Universal TDP charging is probably the answer. However, fuel tax and vehicle excise duty are extremely cheap to collect. If people want to replace those with something that is generally reckoned to be between £500 million (US$801 million) and £1 billion (US$1.6 billion) a year in operating costs, all of a sudden there is a hole in the accounts. If you want to deal with congestion, do it the easy and cheap way – use the microwave technology that we are already using in places such as the M6 Toll and the Dartford Crossing."

Specific to London, Sampson also feels that microwave charging on a slightly larger scale than either the existing central zone or the Western Extension is the "sensible" thing to do. "The Western Extension is flawed but it's not as flawed as stopping it for dogmatic political reasons," he says. "There is a team of half a dozen people in TfL frantically working out how to undo the Western Extension as it's not a question of just stopping the charges. The flows across London will change instantly and I don't think Boris Johnson has worked that out."

COME TOGETHER

One final issue that Sampson is keen to highlight focuses once again on taking a more cohesive, structured approach, as well as looking at the bigger picture – the need for a National Systems Architecture Framework. He compares the initiative that started around five years ago to buying a new music system: "You can go to a shop and say, 'I like those loudspeakers, I'll have those. I'll have that amplifier and a digital broadcasting system for radio signal'. You take it all home, plug the wires together and it all works, because underneath the specifications there's an architecture that says the physical connections all look like this, the electrical connections all look like that, and so on. That doesn't really exist in the world of transport technology, so the idea is that we've laid out this framework for plug and play. It began in the DfT and we published a document on the first phase, saying what we ought to do."

For a number of political reasons things then ground to a halt, but the EC ITS Action Plan Directive – which dictates that every country should have a Framework Architecture – now means the DfT will need to get working on it again very soon. "The good news is that the Highways Agency (HA) needs a framework because it's in the plug-and-play business on its network. TfL needs one. The Manchester consortium looking into road pricing wanted one. Many LAs need one but haven't yet realized why. But it's going to happen; it's just a shame that so much time has been lost."

He believes that the bonuses of such a system are apparent: "LAs spend somewhere in the region of £300 million (US$480 million) annually on hardware for transport, and the HA spends about £200 million (US$320 million). So if we were to get maybe a 5% per annum gain, we'd be looking at around +£25 million (US$40 million) annually for something that's going to cost between £1 and £2 million. My dear friends the transport economists will be delighted with that cost benefit!" ■

Quality assurance

Video streaming doesn't just enable you to watch your favorite film – it makes it possible to safely open moveable bridges from a control center and to secure the streets via traffic cameras. Now, a new compression standard is further improving video quality

by Kate Huber, Peter de Konink & Piet Nieuwets, Optelecom-NKF, the Netherlands

Since 1995, the video streaming standard of choice for TV broadcasting and DVD video has been MPEG-2. Its successor, MPEG-4 part 2, expanded the possibilities of MPEG-2 in 1998, creating a streaming standard that has largely been adopted by the computer industry. But the buzzword in the video streaming world today is H.264, also known as MPEG-4 part 10. All companies developing or distributing codecs either already support it, or will do so very soon. But just what exactly is H.264, and what is so special about it?

H.264 is a video compression standard. For more than 100 years, the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunication Union – Telecommunication Standardization Sector (ITU-T) have created international standards for an array of new technologies. In recent decades, these organizations have worked together to define the basic criteria for streaming technologies, making it possible to compress and transmit media globally.

H.264 is a product of this cooperation. Members of ISO and IEC formed a workgroup in May 1988 called the Moving Picture Experts Group (MPEG), which is known for the MPEG-2 and MPEG-4 part 2 video and audio compression and transmission standards, published in the 1990s. In 2001, MPEG and a subgroup of ITU-T, the Video Coding Experts Group (VCEG), founded a new workgroup called the Joint Video Team (JVT). Basing their work on the MPEG-2/4 standards, JVT created the H.264 video compression standard, first published in 2003.

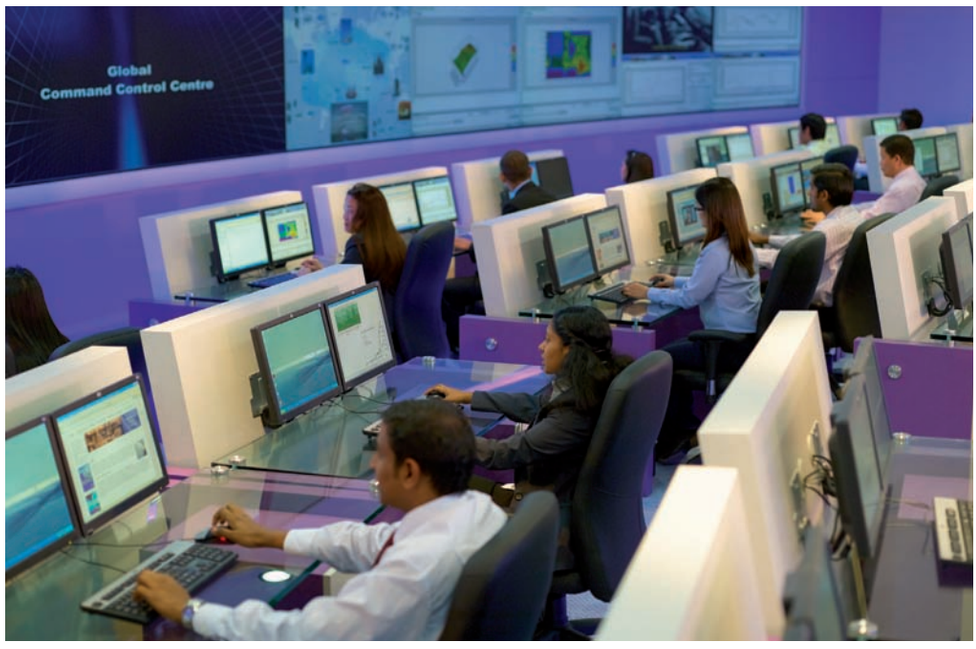
The H.264 standard sets the requirements for formatting compressed video to provide improved video quality at lower bit rates than preceding standards. However, it defines only how decoders should function and the tools and mechanisms that may be used in encoding. This gives the standard unparalleled flexibility and enables developers to contend for the most efficient encoding.

Still, H.264 isn't all that different from its predecessors. Like MPEG-2/4, H.264 also uses block-based encoding. This means that it employs motion estimation, transform, quantization, and entropy encoding to compress video, and it inverses these processes to decode image data for viewing.

MOTION ESTIMATION

H.264 mainly distinguishes itself from the other MPEG standards during motion estimation. Motion estimation is the process by which image information is assessed for similarities that can be reused in subsequent frames. Only the dissimilarities between image blocks are encoded, and redundant aspects of images are recycled, reducing the amount of data that is encoded and, therefore, also the bit rate.

In contrast to MPEG-2/4, H.264 uses variable block sizes and multiple reference frames to calculate the difference between image data. Adjusting the block sizes as necessary improves the efficiency as well as the perceived quality of the image. By scanning several reference frames, H.264 possesses the potential to reprocess even more image data than the preceding MPEG



Optelecom-NKF's Siqura range takes advantage of the capabilities of the H.264 standard

standards. It also goes further than MPEG-2/4 SP (simple profile) in how best to situate reused image information by repositioning image data with a quarter-pixel precision.

Decreasing the bit stream comes at a cost, however. It results in increased computational complexity and, therefore, higher processing power requirements. Engineers have to carefully implement statistical mechanisms to analyze the dataflow and determine the most efficient way of using the tools and enhancements made possible with H.264. Therefore, an H.264 encoder's quality can be judged by how well it carries out motion estimation.

RECOGNIZE & REDUCE REPETITION

H.264 also offers more varied and advanced entropy encoder options than MPEG-2/4. Entropy encoding is the process that prepares data for transmission in such a way that it can be reconstructed in its entirety by the decoder, also known as lossless encoding. Entropy encoding works with the help of a variable length coder (VLC), which condenses the bit rate by recognizing recurring data patterns and replacing them with simplified instructions or codewords.

H.264 offers more varied and advanced entropy encoder options than MPEG-2/4, allowing for two types of VLC: the Context-Adaptive Variable-Length Coding (CAVLC) and the Context-Based Adaptive Binary Arithmetic Coding (CABAC). CAVLC compresses only the residual data information into codewords; CABAC compresses all data streamed to the decoder.

One problem plaguing MPEG-2/4 encoders is errors in the image data, initiated in motion estimation and caused by block edges that are incongruous with adjacent blocks. These errors are disruptive to the viewer and can hinder subsequent motion estimation searches because the reference frames retain these block-edge errors.

Although MPEG-2/4 use a deblocking filter to erase jarring borders for the viewer, H.264 provides a solution for the visual effects as well as the implications these block edges can have for motion estimation. By applying in-loop deblocking, H.264 motion estimation uses reconstructed reference frames rather than the initial frames from the camera, reducing the residual differences and improving encoding efficiency.

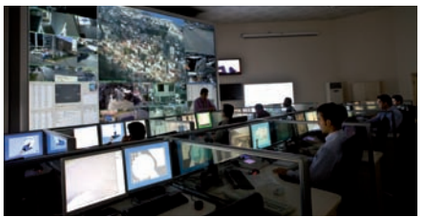
THE SIQURA SOLUTION

After researching the ideal way to implement H.264, Optelecom-NKF engineers have incorporated a dedicated hardware encoder chip to optimize CPU rates and maximize bit rate reduction, while still providing premium video quality. Yet the real successes have been won in the creation of an expert motion estimation process that cleverly chooses appropriate block sizes, correctly calculates the residual difference using multiple reference frames, and accurately repositions data with quarter-pixel resolution, cumulatively compensating not only for linear motion but also for rotation. The Siqura solution is consequently perfect for any surveillance application.

In conclusion, H.264 reveals itself as the up-and-coming superior standard through its streamlining of motion estimation with variable block sizes, multiple reference frames, quarter-pixel resolution, and in-loop deblocking as well as its advances in VLC. That's why it is expanding into an array of SD and HD video streaming applications. Even if an upgrade increases costs, implementing H.264 will save a great deal of streaming stress in the long run. ■

Contact Optelecom-NKF by calling +31 182 592 470, emailing jmedendorp@optelecom-nkf.com, or visit the company's website at www.optelecom-nkf.com

Any type of surveillance application can benefit from H.264 standard



Old dog, new tricks

This new video analytics software helps to generate real-time traffic maps using the full potential of existing surveillance camera networks, and in doing so allowing traffic managers to get much more for their investment

by Dr Denis Boulanger, RealTraffic Technologies, Canada

According to a study from Quebec Department of Transportation (MTQ), the recurring cost of congestion on the highways and main arterial roads in the Montreal area is more than CA$1.4 billion (US$1.24 billion) a year – an increase of 50% over the past five years. This results in drivers losing more than 76.8 million hours from being stuck in jams.

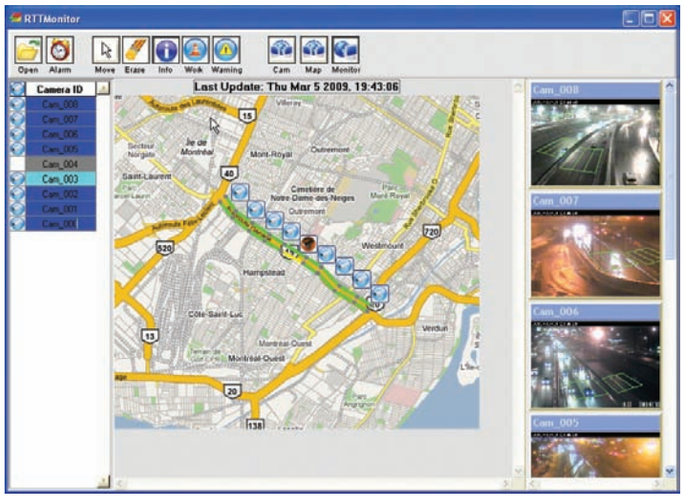
Everybody knows that in cities such as New York or Los Angeles traffic is already a major problem. What this study shows is that in less dense areas, congestion problems also occur and are continuing to increase, leading to more vehicle emissions and wasted commuting time. One solution to this problem is to offer road users real-time information about the traffic situation, allowing them to reroute around jams, and in doing so minimizing delays. But such technologies have often been assigned a low priority when the time came to fund the renewal of the transportation infrastructure.

For many years, sensor-based technology – inductive loops, radar, acoustic sensors and video analytics, etc – has been relied upon to gather real-time traffic data. These technologies have the advantage of being accurate to a certain extent, as well as giving additional information such as vehicle classification and traffic count. However, they are often very expensive to install and maintain, and as is well known, necessitate partial road closings for installation.

In recent years, probe-based technologies have been introduced. These track the position of GPS or cell phones and estimate traffic speed using complex statistical methods. These technologies have the main advantage of covering a broader range of urban arterials and highways, while avoiding the costly installation of hardware on the road network. However, poor accuracy of the probe's location and the non-uniformity of probe sampling causes a degraded traffic speed estimate in certain situations.

MAKE USE OF EXISTING NETWORKS

One of the first traffic management tools that agencies install when building or improving roads are networks of video surveillance cameras. Although these do not provide a global traffic view, such infrastructure is usually deemed essential for monitoring traffic, informing drivers, and ensuring the safety of road users. Camera networks are installed in almost all major cities and are constantly monitored by agencies.



Screenshot showing RTTNet's control interface and the real-time data it displays

Any video surveillance camera can be used as a traffic sensor via this new software

In order to harness this potential infrastructure to generate valid traffic data, RealTraffic Technologies has introduced new technology that allows any video surveillance camera to function as an accurate and reliable traffic sensor. This new video analytics software, called RTTNet, integrates easily into any camera network and measures speed and flow on a lane-by-lane basis.

One of the main challenges in developing this technology was to adapt to PTZ camera movements. The new technology not only detects the camera's movement, but also automatically relocates the predefined detection zones in the image when the operator returns it near its initial position.

Tests conducted with live video feeds coming from traffic cameras in the Montreal area and near Washington DC showed that this new technology can measure speed and flow in most visibility conditions, regardless of night, day, rain, snow and even fog.

The need for a good traffic information source has never been greater. In urban and many suburban areas, the constraints of limited space, environmental issues and the cost of building more roads are forcing agencies to make tough choices about how to spend their resources. Hence, an efficient and cost-effective tool, such as RTTNet, can provide numerous benefits. ■

To find out more, contact RealTraffic Technologies by emailing info@realtraffictech.com, calling +1 418 455 0201, or log on to www.realtraffictech.com

Informed decisions

Acquiring accurate, dynamic traffic and travel data is undoubtedly important, but of more significance to our daily commutes is how that information is used. Intelligent software plays a crucial role in analyzing and disseminating real-time, real-world information

by Peter Möhl, PTV, Germany

Photo courtesy of Siemens

TrafficPlatform relies on real-time data taken from actual activity out on the roads network

Regular readers of *Traffic Technology International* will more than likely be familiar with the work of the Karlsruhe, Germany-headquartered organization, PTV. Although its efforts in the traffic simulation and modeling field are frequently showcased in these pages, another facet of PTV's business – its capabilities in the ITS/traffic information field – has received much less publicity.

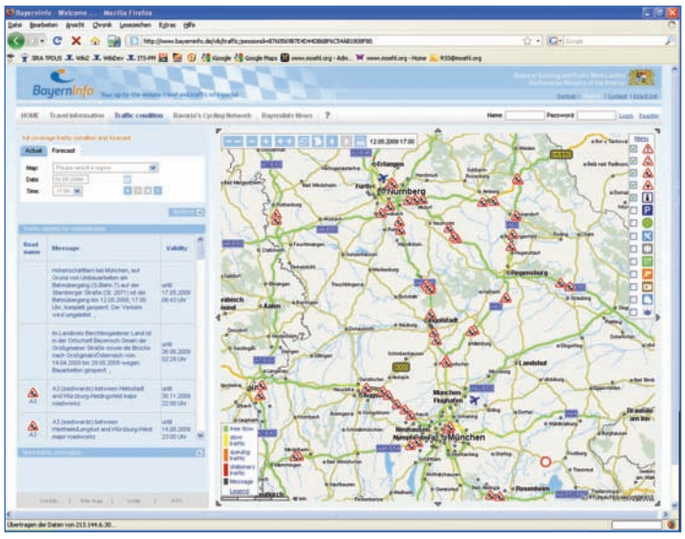
Around 10 years ago, the company decided to invest some of its expertise in transportation planning into the burgeoning online traffic market. Following a number of evolutions, the core product in this field today is the PTV TrafficPlatform – a specialized tool for traffic analysis and forecasting. The platform calls upon real-time data to accurately and dynamically model current and expected traffic conditions.

Used by a number of parties, including TMCs, companies that generate traffic data, and service providers that offer traffic management and mobility services, PTV's TrafficPlatform is also the core component in a number of sophisticated traveler information systems. It allows users to access real-time information that is gleaned from a number of sources, such as loop/video/radar detector data, floating car data and traffic count data. The data is then collated into the PTV TrafficPlatform, at which point simulations generate further information – even in areas where there is no actual measurement (the system simply fills in the gaps in measurements via simulation). Going beyond simply recording data, PTV TrafficPlatform focuses on the valuable tasks that data can be used for.

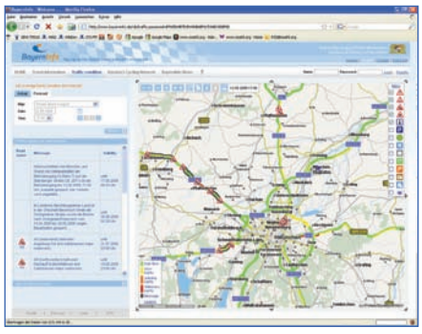
Short-, medium- and long-term traffic forecasts can be created. But what is appealing to users is that the platform uses a combination of the planning approach and the online approach. Naturally, PTV offers a loop between the two, in that the platform can be used to supplement PTV Vision – the software suite for transportation planning and traffic engineering. This is a particularly harmonious relationship, as a good transportation planning model's data can be used in the online world for prediction purposes. Likewise, online data allows the user to learn what typically happens on the road – the real-world measurements – which can subsequently be transferred back into the offline, planning world.

COHESIVE APPROACH

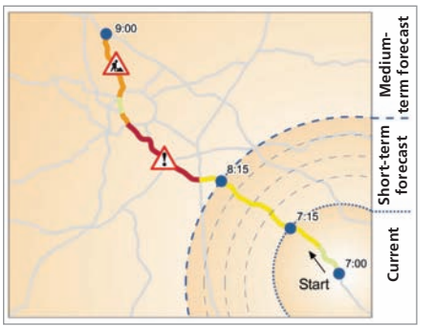
The two main applications for the PTV TrafficPlatform are traffic information and traffic control. An essential part of the strategy is to bring these two fields closer together. For instance, in a scenario where change-of-route information is provided to motorists via DMS, if that information isn't also sent to in-vehicle navigation devices (which people often rely on more), then it is not as widely disseminated as it could be. There is a definite need to bring



Screenshot of the entire area covered by Bayerninfo



Screenshot of Munich area



Dynamic routing based on different forecast horizons

together these two sectors. As a result, PTV is heavily involved in various research projects (including CVIS) and hopes that its platform will play a key role in the emerging Car-to-X communications activities. After all, both simulating certain processes and also predicting reactions to them will remain valuable in traffic control decision-making for a long time to come.

NEW BAVARIAN MOBILITY PORTAL

In the meantime, one of the most recent applications of the PTV TrafficPlatform is within a new mobility portal for the latest version of a website that went live in February 2009. The Bayerninfo (www.bayerninfo.de) portal is operated by VIB – a joint venture company established by Siemens and PTV. The website was commissioned in 2006 by the Bavarian Ministry of the Interior and it underwent rigorous testing and revision before going live. PTV is responsible for the portal's set-up, maintenance and technical operations.

There are a number of features on the site, including dynamic information on level of service on all major roads in the Bavarian area, traffic reports, and information on roadworks. Of particular interest is a dynamic route planner that employs predictive approaches. Added intelligence means the system considers the predicted traffic state that the user will face when hitting particular road sections along their route. The ability to conduct long-term forecasts is another clever tool, and allows users to plan journeys for dates of their choosing, taking into account factors such as roadworks or holiday traffic.

The most interesting and technically complex element of the site is that it is fully multimodal, combining car routes, public transport routes, cycle routes and pedestrian information. This is an incredibly useful function for busy metropolitan areas, where people often change modes of transport during one journey – for instance, cycle to train station, take train, and then take taxi to final destination. The challenge for PTV in this scenario is to offer a service based on data from the various different systems – those from public transport experts, those from private experts and so on – and to do so in a seamless manner. It is an ambitious undertaking. The statewide travel information agency provides traffic information on a transportation network that covers approximately 193,000km of road, 7,500km of the German rail network, and all light-rail and underground lines, as well as 8,700km of cycle paths.

All that end-users need to do is type in their start and end point. Behind the scenes, the software processes different requests to different systems, and collates all of the different data to provide one seamless answer to the user. Although other travel information portals provide information on expected travel times, Bayerninfo is the first portal that calculates the precise journey time for a specific day and automatically verifies the expected mobility behavior. The user then receives an itinerary that is based on their specific needs.

The portal has proved hugely popular with users. Over the course of February and March 2009, the site had between 140,000 and 170,000 visits a month. Plans are now under way to expand the geographical area covered by the site and to encourage more cities to become partners in the project.

PTV is also exploring the potential for algorithms to calculate emissions level of service. This is partly for users who want to make eco-conscious decisions ('green routes' can be displayed), but also because Germany's sustainable transportation efforts mean that it already has emissions zones that polluting vehicles are restricted from entering – for drivers of such cars, a route that omitted these zones would be most useful.

The company will also soon be announcing developments in the PTV TrafficPlatform that will allow more urban solutions to be devised. This involves important steps such as the ability to 'talk' to traffic signal programs. Once the current signal program and its underlying strategies at an intersection are known, these can be incorporated into TrafficPlatform's calculations and forecasts, and a large project looking at this is currently ongoing in the town of Dusseldorf, Germany. ■

Please contact PTV by telephoning +49 721 9651 0, emailing its@ptv.de, or alternatively visit the company's website by logging on to www.ptvag.com

Supporting role

The part that battery backup systems play in providing power during outages should not be underestimated. As well as improving highway safety and keeping traffic on the move, reduced ownership costs and minimized liability are among the other benefits

by Audey Korpus, Alpha Technologies, Canada

With money now flowing for infrastructure projects in many countries, a big challenge lies in deciding how best to allocate the cash. In the USA, for example, the Federal Stimulus Package has put funds into the hands of each state's DOT, allowing them to move ahead with projects and distribute funds to cities, towns and counties for their own transportation improvements.

But what type of challenges might be faced? Projects presented for infrastructure funding – for instance, installing battery backup systems at traffic intersections or railway crossings – may have been planned a few years prior. Costs and priorities may have changed since, making some jurisdictions question which infrastructure should be tackled first. Also, there may not be enough money to support battery backup systems at every location that may have been identified on the initial lists. In such cases, is there a process for prioritizing which intersections are to receive the systems?

Including a battery backup system to support traffic and railway signal controls in the event of a power disruption or power outage is now becoming standard practice in many areas of North America. Although available for some time, it was not until the introduction of LED signal lamps that these backup systems were recognized as a viable solution. With a much lower power draw than incandescent signal lamps, LED lamps allow for cost-effective solutions to be deployed. Lower power requirements mean smaller power supplies and fewer batteries are needed to offer backup power run-times of eight hours or more.

Jurisdictions know that including a battery backup not only improves intersection safety and protects the system owner from liability, it also reduces costs associated with traffic disruptions caused by power losses. Resources to control traffic at intersections that have lost power are not necessary and the costs of installing and maintaining backup generators are saved.

LOCATION, LOCATION, LOCATION

There are several considerations when looking at prioritizing locations for deployment of battery backup systems. The traffic volume at each location is a factor, as is the number of accidents that occur at each location, and what locations are on disaster response routes, or identified within emergency preparedness plans.

In cities and towns, seamless traffic control system operation at high-volume intersections or railway crossings is vital to efficient traffic flow. Whether it's allowing for a train to move through a community and deliver its load on time, or for commuters to move across town during rush-hour, traffic control signals need to operate effectively in all circumstances. Should there be a power failure, disruptions are certain to occur. Battery backup systems therefore provide power to control signals and help keep traffic moving. Identifying these intersections can help determine the priority of locations receiving the systems.

Intersections and railway crossings that experience a high number of accidents are also important locations to consider. Using intersection statistics, high accident locations can be identified and a case can be made for using a backup system to ensure power is uninterrupted at these locations. Providing continuous power can keep intersections safer and can protect system owners from accident liability.

Disaster response routes should also be identified and considered a priority. Power is often disrupted during power outages, storms, and disasters. At these times, it is essential for these routes to be clear of traffic problems. Battery backup systems should be a high priority along these routes to prevent access problems and to keep traffic moving.

With Federal funds now available and project lists in place, each location requiring a system can be prioritized by traffic volume, accident rate and disaster response routes. DOTs, cities and towns can therefore start identifying the locations that will receive battery backup systems to keep traffic moving, keep intersections safe, and keep disaster response routes clear. ■

To find out more information, please contact Alpha Technologies by calling +1 604 430 1476, emailing akorpus@alpha.ca, or alternatively visit the company's website at www.alpha.com/traffic

Keeping intersections operating safely and effectively during power disturbances is critical to preventing accidents, keeping traffic flowing, and allowing emergency vehicles to move through critical areas

Crash course in safety

Startling statistics regarding accidents at intersections are prompting experts to take action and deploy sophisticated technologies geared toward reducing the number of collisions – or possibly even avoiding them altogether

by Dave Miller, Siemens Traffic Solutions, USA

Almost 25% of the annual +40,000 traffic-related fatalities in the USA occur at intersections. The causes of this include red light violations, excessive speed, driver distraction, obscured visibility, bad weather conditions, and the dilemma of an unanticipated change of traffic signal while driving at high speed.

Modern vehicles already sport an array of computers, controlling everything from engine dynamics to automatic braking and driver navigation screens. Likewise, modern signalized intersections are being equipped with Advanced Transportation Controllers (ATC) with the necessary computing power to perform many additional tasks at the same time as signal control.

A number of successful projects connecting the technologies of the vehicle to the technologies of the intersection have been successfully applied to improve the safety of the driving public. A notable example is the Cooperative Intersection Collision Avoidance System for Violations (CICAS-V) program, which involves collaboration between the USDOT, auto manufacturers and state and local DOTs. The CICAS-V system utilizes wireless communications and global positioning to warn the driver that a stop sign or traffic signal violation is about to occur.

THE CAMP PROJECT

Another noteworthy scheme kickstarted in 1995 when Ford and GM formed the Crash Avoidance Metrics Partnership (CAMP) to accelerate the implementation of active safety and crash avoidance technologies. Under CAMP, various consortia have been created, to include other OEMs and to collaborate with the USDOT on pre-competitive development of advanced safety systems. In 2007, CAMP coordinated the formation of the Vehicle Safety Communications 2 consortium (VSC2), comprising Ford, GM, Honda, Mercedes-Benz and Toyota, and collaborated with Siemens Traffic Solutions and the Road Commission for Oakland County (RCOC, Michigan) to successfully deploy a fully functional prototype CICAS-V system in Farmington Hills, Michigan. The system was deployed using a live signalized intersection with Siemens signal control software transmitting Signal Phase and Timing (SPaT) information to consortium test vehicles.

The CICAS-V system works using DSRC and Differential GPS (DGPS). The infrastructure equipment used provides a number of capabilities, including intersection-based local differential correction service (provided by wireless communications), lane-level mapping of intersection geometry (including lane centers and stop-node locations), and signal phase and timing service, including all current traffic signal phases and time-to-phase change. Similarly, the CICAS-V in-vehicle equipment provides various capabilities. For instance, map-matching algorithms are used to determine current lane location and distance-to-stop node based on DGPS. Traffic signal phase determination is also conducted (red, yellow or green) based on current lane location, while traffic signal time-to-phase change is determined with a better than 50ms accuracy. A number of warnings can be provided, including audible, visual and haptic for potential signalized intersection violations, based on approach speed, acceleration, and distance and time to red phase. Similar warnings for potential stop sign intersection violations can also be provided. Another feature is the ability to send a wireless message from vehicle to infrastructure during a potential violation.

Although today the key safety benefits are the warnings provided to inattentive drivers before signal violation, there are a whole host of potential future safety features. Automatic braking to prevent intersection violations or vehicle collisions is just one example, while the extension of the 'all-red' phase at signalized intersections to allow safe passage of intersection violators is another. In addition, warnings to approaching vehicles of possible intersection violations by other approaching vehicles would also be highly valuable, as of course would be the use of in-vehicle traffic signal information to combat inattentive drivers, and in-vehicle notification of obstacles (including pedestrians).

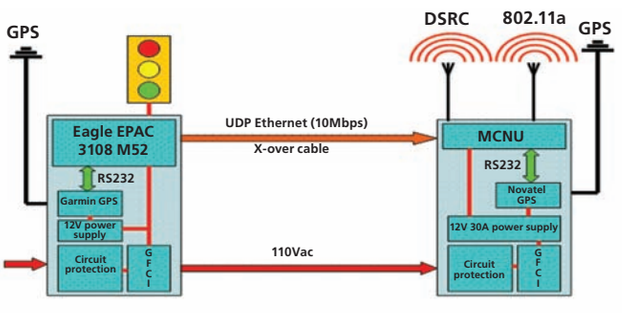
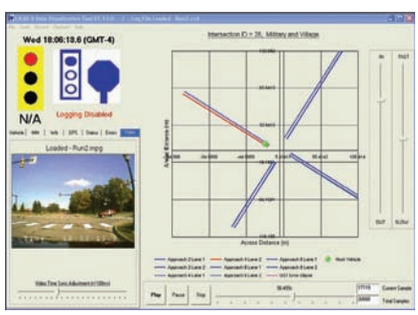
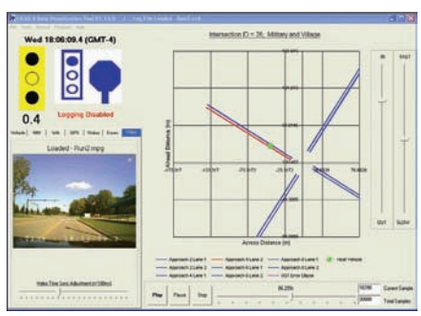


Diagram showing the wiring set-up of the CICAS-V system





Navigation screenshots showing the same intersection a few seconds apart

EFFECT ON TRAFFIC CONTROL STRATEGIES

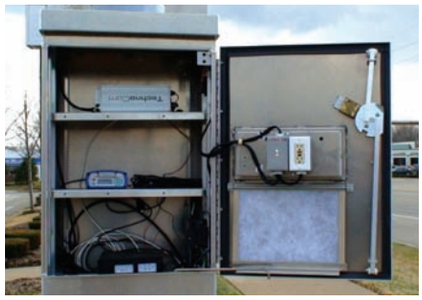
DSRC offers a low-overhead, low-latency medium for wireless communications that allows infrastructure equipment to provide many in-vehicle services for safety and ancillary benefits. For CICAS-V, a SPaT service was developed using Siemens traffic control equipment to provide real-time traffic signal information. Using DSRC, traffic signal phase and phase timing can be provided to CICAS-V-equipped vehicles with timing latencies less than 50ms. The negligible delay introduced by measurement and wireless communication latencies was calculated by comparing the timing of actual and reported in-vehicle phase-change events using a GPS synchronized clock. Infrastructure measurements were taken by monitoring signal phases using GPS time-stamped high-speed video aimed at the traffic signal, while in-vehicle measurements were reported as the GPS time that the SPaT information became available to vehicle subsystems.

Pre-timed signal control strategy was successfully used in the first deployments, meaning that the signals changed state by time cycles without vehicle detection, such as video detection or inductive loops. Also, the initial intersections did not include left-turn lanes, so all of the vehicles traveling in a given direction obeyed the same set of traffic signals, such that the signal phase could be easily matched to the appropriate vehicles by travel direction from the onboard GPS.

Later test deployments incorporate actuated signal control, whereby the signal is set to green by an approaching vehicle, instead of relying on timing patterns. The added difficulty here is that the signal control software is the last to know when the signal will be set to green by an approaching vehicle, but still must provide countdown time to red to drivers approaching on the opposing signal phase. The Siemens signal control software includes an algorithm that accurately predicts the signal change based on the vehicle approach and then provides the driver with the countdown time on opposing red approaches in order to avoid the dilemma zone.

RCOC signal controller/CICAS-V roadside cabinets

CICAS-V cabinet with GPS and roadside equipment



DSRC, roadside GPS and RCOC signal controller GPS antennae

For cities using coordinated control where several intersections are controlled to allow the free-flow of platoons of multiple cars, the control software adds a simple mathematical term to the well-known coordinated control methods used by traffic engineers. This added term compensates for the countdown time as a function of average approach speed.

For intersection approaches with different visible signal phases, such as countdown for a left-turn arrow plus a countdown for a through lane, the driver receives the proper signal information based on the vehicle's current lane position based on global positioning. Lane-level position determination using GPS requires an absolute accuracy of less than 1m and may require an infrastructure basestation or other correction service to achieve the required measurement accuracy. In this case, the CICAS-V roadside equipment provides a GPS correction service using DSRC, which allows less expensive in-vehicle GPS devices to maintain the required accuracies. In the case of a through-lane signal and a left-turn signal, the vehicle receives signal countdown information for both signals, but displays the correct signal color and countdown based on lane location.

SUSTAINABILITY AND MAINTAINABILITY

Sustainability and maintainability are important aspects of the deployments. As the team had substantial experience and expertise in the installation and maintenance of NEMA Standard control equipment, this project was adapted to a typical NEMA control system. Specifically, the traditional NEMA cabinet and wiring was retained, with the existing NEMA controller at the test site upgraded to Siemens SEPAC signal control software that provides SPaT data via a standard front panel RJ-45 Ethernet port to the wireless data gear housed in a small separate cabinet. That way, the only connection required to equip an existing intersection is a Cat 5 Ethernet cable and power. Using this approach, the signal control cabinet and equipment is unaffected, with the wireless gear and GPRS mounted in a small auxiliary cabinet. The same technology can be applied just as easily to Caltrans 332, 336 and ITS cabinets, as the same software is available for these controller types as well. ■

To find out more, please contact Siemens by calling +1 512 837 8363, emailing lloyd.lisa@siemens.com, or visit the company's website at www.siemens.com

From vision to reality

In this latest addition to a well-established family of video detection systems, the focus is on ensuring that installation and operation is as user-friendly as possible, in doing so improving all manner of surveillance operations for traffic managers

by Greg McKhann, Iteris, USA

Video detection technology helps traffic managers monitor signal timing, or detect incidents quickly, thereby reducing roadway congestion

Despite the challenging economic conditions, one sector of the traffic market is flourishing right now. Video detection, a proven, well-understood and well-documented technology, is dominating in the global detection market, with hundreds of thousands of cameras out on the road being put to good use each and every day. Intersection management and incident detection are common applications of the technology, both of which are challenging tasks for traffic managers.

The most notable advantage of video over alternative methods is that it gets detection out of the pavement. When a detector is embedded – whether an inductive loop or a magnetometer – that lane must be closed during installation. Once installed, it is then subjected to the same forces that cause potholes and pavement damage – forces that can lead to sensor failure.

As well as removing the need for costly lane closures and roadworks, video detection offers a technical advantage that in-pavement sensors just cannot compete with – a very wide detection area. At an intersection, for instance, one of today's breed of sophisticated cameras can cover up to 24 independent

A modified connection eliminates the need for special connection tools

detection zones. For a loop or magnetometer to achieve the same feat, 24 individual sensors would be needed.

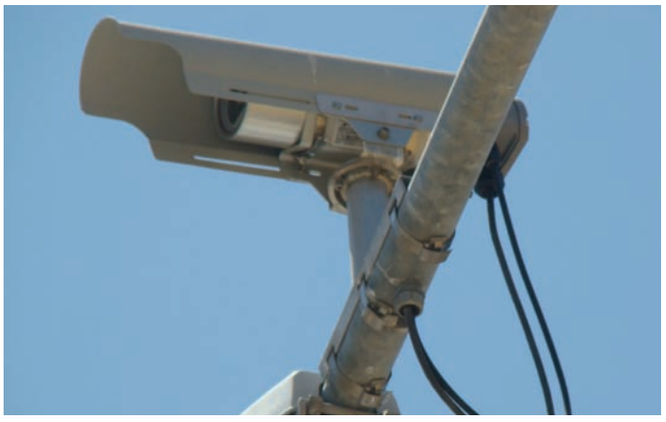
In the past, advocates of in-road technologies have attacked video detection for supposedly being too expensive. Today, though, this view is outmoded. As the cost of the roadworks and lane closures necessary for the installation of in-pavement solutions is so high, the installed cost of video detection is less costly at most locations. It is also worth noting that as the cameras and their various components evolve over time, and as the systems become globally popular, their price also reduces.

Another reason that video detection is so popular with end-users is a result of the visual data that the systems provide. Of course, there are human factors at play here. We tend to believe and rely on what our eyes tell us, and the simple reassurance that video images provide should not be underestimated. Also critical is the flexibility of video solutions. The video image and data provided can be relayed from the field (over a wired or wireless connection) to wherever it is needed – whether that is a central location, or to the laptop of a field engineer. A particular benefit is realized by traffic managers wanting to monitor the effect of various strategies. For instance, if they make a change to the signal timing at an intersection, they can pull up the video images to show the resultant effect.

DETECTION MARKETPLACE

There are a number of companies active in the field of video detection, but few that

The installer can zoom and focus cameras from the roadside cabinet as opposed to in the air from a 'bucket' truck



RZ4 Advanced provides what is claimed to be superior video vehicle detection, while notably reducing installation and maintenance costs

design, manufacture and engineer every aspect of their end product. The California-headquartered company Iteris designs its own camera hardware, electronic hardware for the roadside cabinet, software algorithms and operating system. This level of vertical integration is important for any camera-based application, where the adage 'garbage in, garbage out' holds true. Video detection is only as good as the sensor (in this case, the camera), and although the processor may be extraordinarily sophisticated software that analyzes video images, if the incoming image is poor, that will hinder the detection capabilities. Iteris believes that those looking to invest in video detection systems should seek to get the camera and processor from the same organization. Indeed, the company's extensive experience shows that delivering a total solution – rather than just part of a solution – is key to being successful in this market.

THE END USER IN MIND

Ensuring that any solutions it does bring to market are user-friendly is also a high priority. This has long been an integral part of the Iteris ethos – that the most sophisticated technology in the world will not be widely adopted if it is difficult for the user to set up and install.

Ease of use is aptly demonstrated in the most recent launch from the company, the RZ-4 Advanced camera, which is the latest incarnation of an established camera range. One of the improvements made was to modify the connection approach to eliminate the need for special connection tools, so that installation of its Vantage video detection systems is even easier than before.

Able to detect vehicles in all lighting and weather conditions, in contrast to other CCTV-type cameras, the RZ-4 Advanced delivers a video signal that is optimized for processing by the Vantage video detection systems. Another feature that users will appreciate is the ability to zoom and focus the camera from the ground. Previously, a technician in a 'bucket' truck above the road would have performed zooming and focusing – which is a more challenging situation, especially in poor weather. Now, though, a communications-over-coaxial cable technology allows the installer to zoom and focus cameras from the roadside cabinet.

Perhaps the most appealing innovation of video detection is the flexibility it offers when it comes to configuration. Traffic engineers can more readily perform zone modification 'on the fly' by simply clicking the mouse. And when combined with Iteris's EdgeConnect quad-view communications module and an Ethernet connection, an engineer situated in a control room is able to modify detection zones. Given the changeable nature of roads and traffic, this is a very important tool. One scenario where this functionality comes into its own is when road projects involve moving lanes by a couple of feet and restriping them. The new lane positioning means that any camera detectors are now in the wrong location (as are any in-road sensors, incidentally). So, the capability to modify detection zones from the control room is undoubtedly a boon for time-pressed traffic managers.

What Iteris has set out to achieve with this product is, more than ever, to present advanced technology in a format that is easy to use. With demand for the cameras from existing customers who are upgrading older systems or installing video detection at new intersections, as well as from new customers around the world, the uptake of the RZ-4 Advanced has exceeded expectations.

The launch of the RZ-4 Advanced also came hot on the heels of the release of EdgeConnect and VersiCam, an integrated camera and processor system designed for smaller intersections. As well as expanding its video detection product line, Iteris is branching out into new application areas and evidence of this can be found in the recent acquisition of Hamilton Signal and its Abacus product line. The data-capturing capabilities of Abacus strengthen Iteris's incident detection offerings. ■

To find out more, please contact Iteris by calling +1 949 270 9400, emailing ksm@iteris.com, or visit the company's website at www.iteris.com

A look ahead

This European case study demonstrates how an integrated and smart approach that always considers the end-user can go a long way to improving strategic transportation forecast modeling

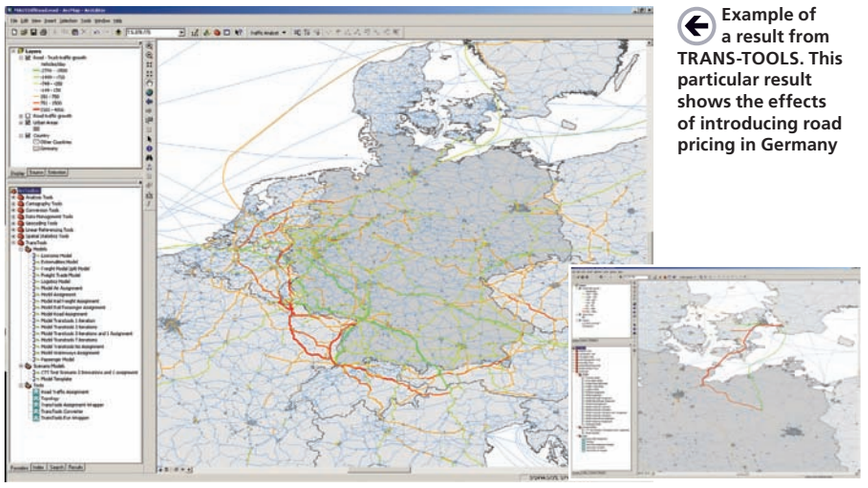
by Rasmus Dyhr Frederiksen, Rapidis, Denmark

The European Commission's TRANS-TOOLS forecasting model has reaped the benefits of a new approach to building and using advanced GIS-integrated transportation forecasting models, made possible by Model Builder in ArcGIS and the ArcGIS extension, Traffic Analyst.

The TRANS-TOOLS forecasting model is designed to predict the consequences of different transport policies at a European level, in order to support decision-making processes. The model is well suited to evaluating new investments in large-scale infrastructure projects (for the Trans-European Network), such as bridges, tunnels, motorways, high-speed rail, or rail freight. It is also valuable for work on fiscal instruments, such as road pricing or fuel taxes, and being truly multimodal covers projects such as changes in airline networks.

A consortium of European consultants and universities has recently completed and delivered its work on the project to build the TRANS-TOOLS model (undertaken for the Directorate-General for Energy and Transport of the European Commission). The aim was to improve the previously available models, making them easier to use and modify, and to refine data and calculation models. The use of ArcGIS and Traffic Analyst as central components helped realize these goals in a reasonable timeframe and within budget.

Previous models had many qualities and represented a significant investment, so it made good sense to leverage their qualities into the new model. The task for the consortium was to improve some of the existing models, build new models, and integrate them on a common platform, encompassing a logical and a physical data model. A further task was to find a way of executing all of the different components in the right order and to devise a common user interface in which planners could edit scenario data, execute models and create high-quality results and presentations.



Example of a result from TRANS-TOOLS. This particular result shows the effects of introducing road pricing in Germany

ACHIEVING THE GOALS

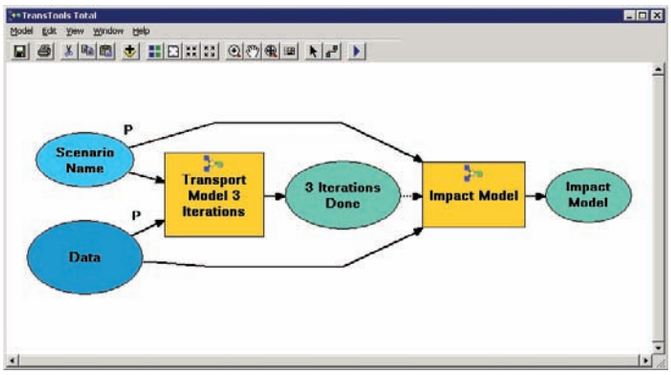
The consortium decided on the user-friendly ArcGIS and Traffic Analyst extension for the platform. Model Builder in ArcGIS allows a user to easily compose a transport model from a set of tasks without the need for any programming. The consortium was able to rework its existing models so that they could be controlled by Model Builder. Concurrently, the consortium was able to quickly build new models from the generic transportation modeling tools available in Traffic Analyst. The pre-existing models were improved and integrated with Model Builder, while route choice and traffic assignment models from Traffic Analyst were used for network-related calculations.

The use of Model Builder not only cut down on the development time needed, but also allows future users of the model to carry out modifications and reconfigurations, in doing so enabling it to reliably handle a much wider set of different scenarios.

A number of major submodels to the TRANS-TOOLS model exist, including:

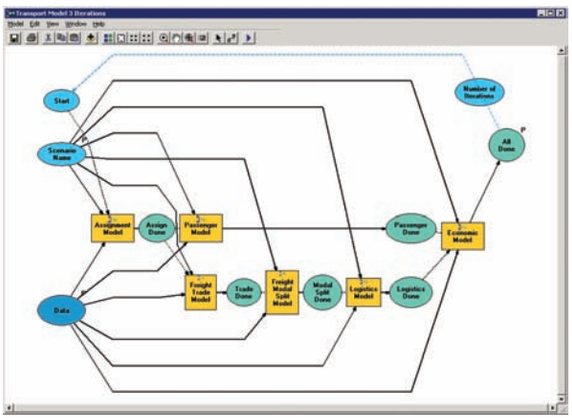
Traffic assignment – All of the information on freight and passenger trip volumes between origin and destinations zones produced by the logistics and passenger models is used in a route choice model, so that these trips can be assigned to all the individual segments in the networks of the model (taking congestion effects into account where appropriate). The results are loads for each individual street segment, rail segment, air leg, and inland waterway segment.

Passenger model – This model predicts the number of trips by each transport mode (road, rail, air and bus), as well as trip frequency and destination choice.



Model Builder provides a visual interface for constructing and executing models and calculations

Freight trade model – This predicts total trade flows between origins and destinations for a number of different commodity groups.
Freight modal split model – This calculates the share of each of the four freight modes (road, rail, sea, and inland waterways).
Freight logistics model – The freight logistics model predicts the likely location and usage of distribution centers along a trip.
Economic model – A general equilibrium model, which predicts real GDP growth for each zone in the model based on the changes in transport costs imposed by the different model scenarios.
Environmental impact model – When the calculations in the transport model are completed, the environmental impact model is executed. Based mainly on the network



loads, this model predicts impacts on the environment, such as pollution, energy consumption, and number of fatalities caused by traffic accidents.

TRANS-TOOLS combines all of these models, while ArcGIS and the Traffic Analyst extension turns all of these models into an operational framework that can be used and extended by the client. By using these new tools, the EC can create new scenarios and run the model to see its effects. Furthermore, the TRANS-TOOLS model is freely available to any party interested in using it. ■

To find out more, please contact Rapidis by calling +45 39 96 59 60, emailing info@rapidis.com, or visiting the company's website at www.rapidis.com

Screenshot shows how the European Commission's TRANS-TOOLS model has been built by integrating a number of separate submodels

Emergency backup

Thunderstorms, ice storms, tornadoes, blown transformers, downed power lines, sags, swells and many other power disturbances are all a reality. The truly important issue, however, is whether your equipment keeps running during any of these incidents

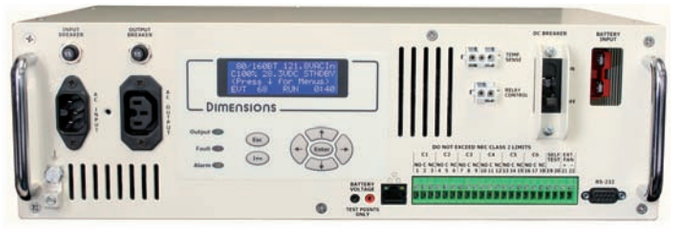
by Mike Olsen, Sensata Technologies, USA

Traffic control equipment today is increasingly feature-rich, yet all of that value is lost when the power to that equipment goes awry. Of course, an immediate concern is the safety of the general public. Blacked-out intersections, for instance, are undoubtedly dangerous, and the best features in the world are rendered useless without power.

Power problems can be many and they vary by location, with common problems being outages, sags, and swell. The average power outage lasts for two hours and occurs two to three times a year. Sags are voltage drops and are more prevalent in their occurrence than outages or swells. The average location could see 70 sags a year with the line voltage dropping to 90% or less of the nominal voltage. Of the 70 sags, 23 will drop below 70% of the nominal voltage. For a 120V line, that is a drop to 84V. Drops of that magnitude will either cause hiccups in systems or the systems will stop working altogether for the duration of the sag. Swells are over-voltages and although less common, can damage equipment depending on their size and duration. A line-interactive battery backup system (BBS) corrects all of these problems and provides traffic management equipment with safe and regulated power.

AT A JUNCTION

Intersection power consumption dropped dramatically with the advent of LED signal technology, consequently making it affordable and logical to back up the power of an intersection with a BBS. If there were to be a blackout, a typical BBS installation can provide power to an average intersection load of 500W for around five hours of full automatic operation.



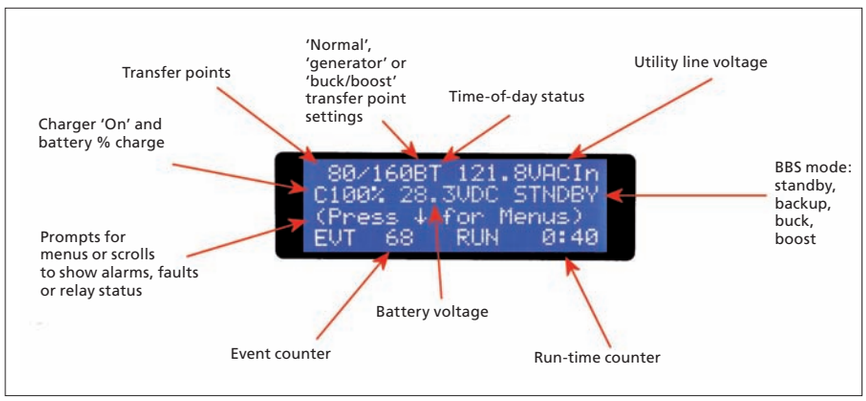
Sensata Technologies' model 24M11-WBE Battery Backup System

There are several key features to look for when considering a BBS, including line interactive (buck/boost), LCD display, Ethernet that is user IP-configurable, web browser interface, and four-stage charger.

The line-interactive (buck/boost) feature regulates the incoming voltage to a safe level for the equipment. Any line-input voltage between 80-160VAC will be automatically regulated to a safe output voltage for the equipment. If the voltage drops below 80VAC or goes over 160VAC, the system will go into backup mode and the unit will generate AC power by drawing from the batteries.

The LCD display should be packed full of important status and configuration information. A sample of these items is shown in the image below. An important feature to look for is the scrolling alarm/fault/relay status line. This line will scroll if there are any alarms, faults, or dry-contact relay information that the user should be aware of. This line saves the user from having to navigate through the menu system to find out important information.

Detailing the information shown on the LCD screen



The Ethernet feature is timely, as more intersections are now being wired for Ethernet communications. The IP address needs to be user-configurable, while there should also be a built-in web browser interface, so users can work with their favorite browser to monitor the system and easily make changes to the configuration. Additionally, the BBS needs to be able to generate emails to notify relevant parties about user-selected operating conditions.

Charging is another important aspect of the BBS. It should have a charger with four steps, comprising 'zero volt start', 'bulk', 'accept', and 'float'. Even though a BBS has built-in protection to prevent destructive discharge to the battery, the battery can self-discharge on extended outages to very low voltages. The zero volt start step is used to properly charge batteries in this low state of charge. The charger needs to be temperature-compensated and designed to charge either AGM or gel-type batteries.

Selecting an established manufacturer with experience of the traffic market is essential. With more than 6,000 of its Dimensions BBS on the roads today – and models such as the 24M11-WBE (above) in its portfolio – Sensata Technologies' products come equipped with all of the necessary features to succeed in the ITS field. ■

To find out more, contact Sensata Technologies by calling +1 800 553 6418, or visit the company's website at dimensions.sensata.com

Park and guide

One region in Italy is reaping the benefits of an integrated system that incorporates driver information and parking guidance with traffic and weather monitoring to provide a smoother journey for locals and tourists alike

by Mariano Salvaterra, Famas System, Italy

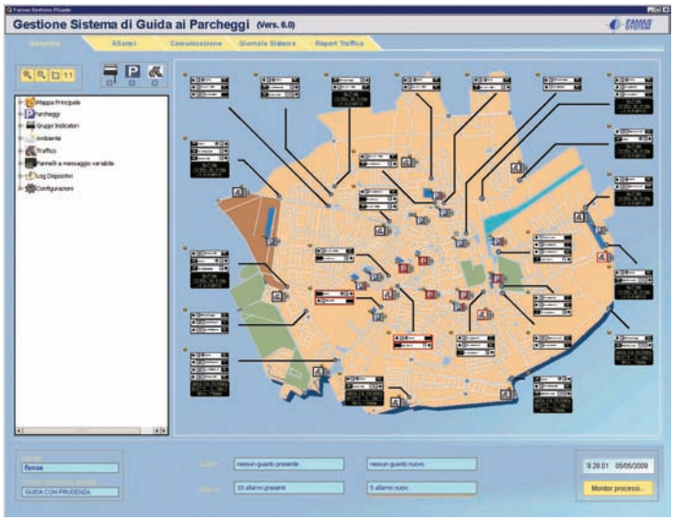
Situated on the Adriatic Coast in the Emilia Romagna region, Ravenna is an Italian city with more than 135,000 inhabitants. Rich in history and culture, it guards Dante's Tomb and keeps his memory alive by staging cultural events. As well as being a prominent city of art, Ravenna has also been innovative in the application of new technologies. In 2005, the town council called for European tenders for the installation of an integrated system for driver information and parking guidance, and for traffic and weather monitoring. The tender was won by Famas System and the system is now fully installed.

Although more than 20 cities in Italy now have similar systems supplied by Famas, the Ravenna installation – as a result of the strong integration of various technologies – is the most important example of its type.

Ravenna's road system is characterized by a city center that is closed to traffic. To travel from zone to zone in the city, a driver must use the outer roads (often for long stretches) to reach a destination. To reduce needless driving around and its resultant noise and pollution, the Ravenna Municipality opted to install a network of message panels with continuous information updates, to signal the available parking areas and to guide drivers to the parking lots nearest to the sites of their intended visits. Approximately 70 panels inform drivers in real-time about the availability of parking places in the 16 city parking lots, which combined provide approximately 6,000 parking bays.

One of the panels installed in the town of Ravenna

The system went live in 2006 and was later extended to Marina di Ravenna – a seaside resort that in summer has many visitors, not only from Ravenna but also from other cities further inland.



User interface showing in real-time the situation relating to Ravenna's parking lots and the messages displayed

The parking lot guidance panels are integrated with graphic variable message panels that can supply further information to road users on both traffic conditions and any special events that may be in progress.

DATA ANALYSIS TOOLS

In terms of types of traffic, Ravenna is an interesting model for analysis. As well as local vehicles, there is often a large amount of tourist traffic. Additionally, local traffic is characterized on fine days by the wide use of bicycles, representing around 30% of vehicles overall. In order to incentivize the use of this alternative means of transport, the cycling path to the local beaches has an information portal with a message panel that offers information specifically for cyclists (number of bicycles in transit, time, temperature, wind direction, and so on).

To estimate the city's traffic flow in real-time, the traffic control system includes 29 detector stations (placed along access routes and inside the city) that can both count vehicles in transit and classify them according to nine different types. All traffic and parking site usage data is correlated with information from a weather station. The system's control center is situated at the main city police station, and some terminals are also available for access at relevant Ravenna municipality offices.

When in-depth analysis of the system is conducted, it will show how traffic varies with tourist flows and with weather conditions – including the effects of the residents' use of bicycles on fine days. It will also be possible to estimate reductions in travel times and in the traffic generated by drivers searching for parking spaces. This will enable the relevant authorities to check that expected targets have been reached.

As the system uses real-time information and models deriving from historic data, its ultimate aim is to better update the messages being displayed, providing improved traffic control and encouraging better use of parking spaces. ■

To find out more, please contact Famas System by calling +39 0471 827100, emailing info@famas-system.it, or alternatively log on to the company's website at www.famassystem.it

Dial for emergency

Tunnels are complex environments, in which the risk of tragedy is ever present. Among the many technologies deployed to improve safety, advanced fault-reporting telephone systems allow users to report incidents to operators to avert any potential disaster

by Nicole Ireland, GAI-Tronics, UK

During a crash or breakdown in road tunnels, the situation can quickly deteriorate. Entering vehicles may be unaware of the situation ahead, while fires in such confined spaces can be lethal. The safety measures that are deployed can have a huge impact on survival rates.

The fatal fires in the Mont Blanc, Tauern and Gotthard tunnels led to the establishment of a European Directive to ensure standardized minimum safety levels for road tunnels across Europe. EuroTAP (European Tunnel Assessment Programme) was created to monitor and test tunnels to ensure movement toward compliance.

Emergency Telephones (ETs) are used by the public to alert tunnel operators that something is wrong so that they can act accordingly. The EU Directive states that ETs should be placed no further than 150m apart in new tunnels and 250m in existing tunnels, which allows motorists the best chance of reaching a phone in the event of an incident.

Simply installing ETs in tunnels does not guarantee their value though. In its audit, EuroTAP reported that some of the tunnels tested had ETs that were out of order. Knowing that the phones are fit for purpose and working at all times is vital and can mean the difference between saving or losing lives. Remote fault-reporting phones can communicate status to tunnel operators, meaning they do not have to physically travel out to check them, while enhanced monitoring features can help toward being fully prepared for any incident.

GAI-Tronics' VoIP and analog tunnel ETs include powerful remote-monitoring facilities. The integrated software linked to the ETs checks their health status, programs their functions and logs and reports their statistics – all from the control center. These features ensure that the ETs remain fully operational with minimal manpower.

Due to the confined nature of tunnels, emergency telephones are crucial to enable incidents to be reported before they can escalate

A CASE IN POINT

An example of this in practice is in Norway, where GAI-Tronics ETs were supplied through the company's distributor, Norex. "The Norwegian Road Authority needs to have confidence that their ETs are working at all times," confirms Willy Hauge at Norex. "They still do physical inspections of the ETs when the tunnels are closed to traffic for general inspection and maintenance, but TMA (GAI-Tronics' Windows-based Telephone Management Application) automatically polls each ET daily so any problems are picked up immediately. The ETs can be re-tested from the office and then, if necessary, the maintenance crew can go to the roadside to inspect them."

Automatic poll maintenance checks can identify faults and check for stuck buttons, handset integrity, phone tilt, or line conditions (current levels). A number of alarm inputs and outputs are also available where indications can be transmitted back to control via line or fiber network. Inputs can be triggered by other equipment, such as tunnel extraction fans or power system failures, to call from the phone back to the control center. Outputs can be set to activate external devices such as beacons or SCADA inputs and can be triggered by different events – such as ringing, emergency call in progress, or availability for use.

The analog ETs work over a standard phone line and can therefore also highlight possible problems across the network. Automatic reports can flag up areas where vandalism or network problems exist.

The VoIP ETs use 'syslog' for reporting, together with an appropriate syslog server (in most cases, this will already exist on the network), which can filter and process these messages to give appropriate information to system operators and administrators. Syslog servers are available that can interface to command and control systems, link to external databases, raise audible alarms, etc.

GAI-Tronics' remote monitoring tunnel ETs provide measurable results with features that ensure they remain fully operational at all times. In addition, they help to maintain effective management of both the phone network and manpower. ■

To find out more, contact GAI-Tronics by telephoning +44 1283 500 500, emailing sales@gai-tronics.co.uk, or alternatively log on to www.gai-tronics.co.uk

GAI-Tronics' ETs can be remotely polled to check their functionality – saving a notable amount in maintenance costs

Tunnel manager

On the surface, tunnel management and real-time traffic information do not have much in common. But as one player in both sectors is keen to point out, what they do share is the fact that reliability is a defining aspect of their successful operation

by Vicente Sebastián Alapont, Grupo Etra, Spain

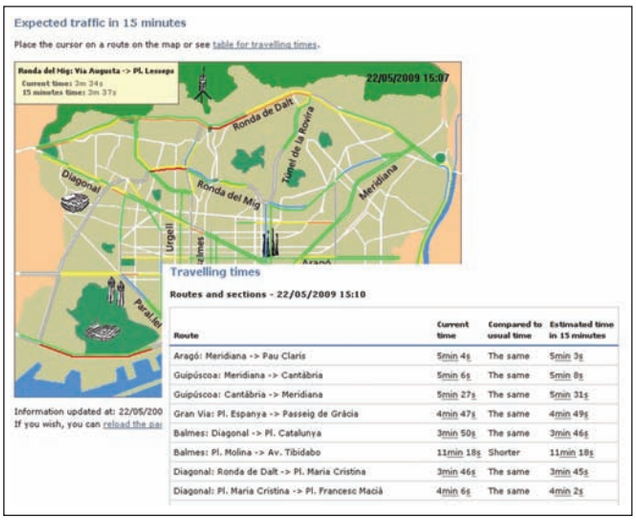
The technology employed in ITS develops continuously to match the operational, social and economic demands requested by various players in the sector – a fact to which Spanish company Grupo Etra can testify. Developing solutions for tunnel management and real-time traffic information according to evolving user demand, the company prides itself on enabling authorities, decision-makers and road users to reap the benefits of added-value features in terms of safety and information. Safety management in tunnels must be a high priority, from inception and construction, as well as once the structures are up and running, with many systems and subsystems to be integrated.

With various user requirements in mind, Grupo Etra has developed SIVA-TUN – an advanced tool for tunnel management. It is a reliable application that enables all of the tunnel safety systems in the EU Directive 2004/54/CE to be managed. An open tool, SIVA-TUN works against a model of the tunnel, where for each control device there is a generic model that is configured according to the specific characteristics of the installed device. This enables the customization of the application to the characteristics of each tunnel. In addition, its distributed and multi-user architecture permits different users to interact (depending on their profiles) with the system – and from different places.

The system's reliability is down to the incorporation of advanced algorithms to control and manage safety in case of incidents. Because it is so important to reduce incident detection and classification times, the system uses information from several sources to manage redundant and complementary information.

An example of this procedure being used is for fire detection. Information provided by the lineal detection system is complemented with information received from traffic sensors and the Automatic Incident Detection (AID) system, to accurately identify where the fire is occurring. With this data and information relating to other parameters (such as wind speed inside the tunnel), a plan is proposed based on those defined in the tunnel's emergency strategies. SIVA-TUN incorporates a decision-support engine that will start proposing more dynamically controlled actions as safety indicators increase in severity.

The human factor is also relevant here. Operator skill is a key issue in emergency situations as decisions that will affect incident severity and resolution have to be made quickly. A tool is therefore included for simulating different scenarios to train operators to cope with such situations. With this, operators can be provided with different scenarios to be managed using the same graphical user interface (GUI) as the actual control system. The operator is trained to solve critical scenarios and becomes familiar with accessing areas of the GUI that are not used in daily operations.



Route	Current time	Compared to usual time	Estimated time in 15 minutes
Aragó: Meridiana -> Pau Claris	5min 4s	The same	5min 3s
Guipúscoa: Meridiana -> Cantàbria	5min 6s	The same	5min 8s
Guipúscoa: Cantàbria -> Meridiana	5min 27s	The same	5min 31s
Gran Via: Pl. Espanya -> Passeig de Gràcia	4min 47s	The same	4min 49s
Balmes: Diagonal -> Pl. Catalunya	3min 50s	The same	3min 46s
Balmes: Pl. Molina -> Av. Tibidabo	11min 18s	Shorter	11min 18s
Diagonal: Ronda de Dalt -> Pl. Maria Cristina	3min 46s	The same	3min 45s
Diagonal: Pl. Maria Cristina -> Pl. Francesc Macià	4min 6s	The same	4min 2s

Etra tunnel and traffic information management systems

Traveling times at the Barcelona traffic information website

REAL-TIME TRAFFIC INFORMATION

The effectiveness of real-time traffic information is determined by the reliability of the data given to users. Inaccurate information is not only useless, but can actually cause problems on the network. A reliable and efficient real-time information system, such as the new one developed by Grupo Etra, is based on three main elements – a solid infrastructure of traffic information gathering, advanced algorithms for information processing, and a network of channels and devices for broadcasting that allows information to be personalized for users according to their individual needs.

Algorithms merge data from sensors and 'translate' it into comprehensible information for road users – for instance, estimated time to cover a set route. Most real-time traffic information systems can do this. But taking into account that traffic flow changes in real-time, this new system complements the itinerary time-estimation feature with information on traffic conditions along the route over a 15-minute timeframe. It also provides qualitative information, and compares the estimated timeframe with the time required to cover the same trajectory at the same time on a different day. ■

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Intelligence built in

Using technology to streamline efficiencies, improve traffic flow and reduce carbon footprints is a vital step to creating the fully intelligent, connected cities that are both desirable and necessary to keep today's travelers moving

by Angela Hill, McCain Inc, USA

Every decade introduces a new technology that changes the way we view the world, from the first car or aircraft, to pagers, cell phones and the internet. But as we adapt to such advances in technology, our expectations and demands for convenience and real-time information also increase. Today, more than ever, people expect accurate, up-to-the-minute information about events that affect their daily lives, be it checking freeway traffic from their cell phone or reserving a parking space at the local mall from the convenience of their home. To keep up with a continually evolving, technology-driven world, the traffic industry is tasked with evaluating and enhancing its current infrastructure to better move people from point A to point B, while keeping travelers informed along the way.

The solution is simple: a truly connected intelligent city that puts the motorist in control by keeping them informed of real-time traffic conditions before leaving their home and while en route, in doing so giving them ample time and information to get to their destination safely and promptly. An intelligent city provides its citizens with a stress-free driving experience and smarter roads through means of visual communication signs on the roadside. It provides efficient public transit and convenient parking with access to real-time schedules and reservation systems from the convenience of a cell phone. It allows agencies to expand on their current infrastructure to better manage and control traffic flow and traffic systems within and around the city from a single control room.

Such a solution not only provides a means to move people around the city more efficiently, but it also provides measurable environmental benefits to reduce the city's carbon footprint. As cited in USDOT's 2008 update on Intelligent Transportation Systems (ITS), coordinated signal controllers can reduce vehicle emissions by up to 22%, while transit signal priority along heavily traveled corridors can reduce bus fuel consumption by 2 to 3%. Additionally, changed traveler behavior resulting from better pretravel information has yielded around a 33% decrease in CO emissions.

McCain Inc specializes in the design and manufacture of programmable VMS signs

SO HOW CAN IT BE DONE?

Effectively building an intelligent city involves combining intelligent hardware and central software based on ITS and National Transportation Communications for ITS Protocol (NTCIP) standards. Through employing compliant product, it is possible to create the beginning stages of an intelligent city utilizing existing infrastructure by adopting a central control software system. Products such as McCain's 'Transparity' software do just that by providing a single user interface for the city's entire network of applications and components, enabling control of the entire infrastructure from a central control. Transparity software disseminates accurate information pertaining to traffic, freeway incidents, parking and transit to the public in real-time through the internet or VMS strategically located throughout the city. The VMS push out relevant information from the control center to inform drivers of traffic delays, alternative routes, special events and available parking.

Creating and implementing intelligent cities means thinking differently about how agencies design, build and maintain their infrastructure. It means considering the environment and their resources. It means merging the gap between vehicles and infrastructure and uniting jurisdictions. ITS is a key initiative in the USA and abroad, providing strategies to increase safety, reduce congestion and increase overall productivity and efficiency. However, although global, ITS initiatives start at a local level, with your city, your goals, and your initiatives. ■

To find out more, contact Angela Hill at McCain Inc by calling +1 760 727 8100, emailing info@mccain-inc.com, or visit the company's website at www.mccain-inc.com

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Mike Poursartip, Founder and CEO of InfoTek and **Sebastian Gutierrez**, President of CASE Systems Inc (formerly known as Comarco-Call Boxes) announce that they have combined their cutting-edge technologies, experience and expertise in the Intelligent Transportation industry to develop and market the state-of-the-art Solar Wizard™. The Solar Wizard™ is a unique, solar-powered, loop-based, integrated and intelligent traffic monitoring solution, recognized and trusted as one of the best in the market.

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The magnificent '7'

501 TRL has announced its next generation roundabout design software, ARCADY 7. Available to transportation professionals worldwide, it is fast, modern and easy to use, and this new version offers an array of time-saving features, with a new user interface having the same look and feel as TRANSYT 13.1 and OSCADY PRO.

Already demonstrated at this year's Traffex and the Transport Modelling Forum, its new features are designed to make working with multiple files as easy as possible. Traffic flow entry has been simplified and is more flexible, and the smart new user interface provides a task list, window management tools, data grids and much more. Units can be customized, allowing the user to define specific vehicle classes. With the international market in mind, ARCADY 7 can be adapted for drive-on-the-left or drive-on-the-right scenarios. Level of service indicators and a US terminology option have been included.

ARCADY 7 is the latest addition to TRL's expanding range of software solutions to plan, design, control and evaluate traffic management tasks.

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Safety to be the winner

502 Robot Visual Systems has received an order for 35 stationary units in addition to other mobile radar and laser devices. The contract was signed in Cape Town in April between Syntell (the local Robot representatives) and the City of Cape Town. Delivery of the speed-monitoring technology will be completed by the end of 2009.

Around 14,000 deaths are recorded in South Africa every year due to road traffic accidents. The first successes in reversing this trend have already been scored.

As early as 1997, the 'Arrive Alive' campaign (a South African Ministry of Transport initiative) has aimed to enhance road safety. The need for an increase in such endeavors still exists – not least because of the 2010 soccer World Cup.

For this reason, units of the TraffiStar SR 520, equipped with the latest Robot digital camera, are now being deployed. The TraffiStar SR 520 is claimed among the most modern and compact traffic surveillance systems around.

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> "To ensure that the movement of the groups leaving and entering the site is conducted safely and in a timely manner, transportation plays a pivotal role in evacuations"
>
> see page 40

All-in-one approach

503 Traficon has launched a new product to collect traffic data, detect queues and emulate or simulate loops on highways and inter-urban roads. TrafiCam Collect-R is a cost-effective and reliable solution that combines the benefits of video detection with state-of-the-art CMOS sensor technology.

"With this all-in-one sensor you don't need to buy a dedicated camera and you still get the benefits of intelligent video detection technology," explains Dieter Cosaert, product manager at Traficon in Belgium.

TrafiCam Collect-R provides all relevant traffic data, such as volume, speed, occupancy and classification on multiple lanes, in the day or night as well as in all types of weather conditions. Depending on the sensor positioning, it has the capability to cover up to four lanes. Data is provided for each lane and each vehicle class, and can be retrieved locally or remotely.

In terms of queue detection – via the flow speed and the zone occupancy – the sensor automatically distinguishes between five levels of service: normal, dense, delayed, stop-and-go, and congested. Alarms can be generated on the outputs for each of these service levels,

or can be transmitted to the traffic management system. In addition, TrafiCam Collect-R can be used to trigger third-party systems such as flashing lights, barriers, CCD cameras and VMS when traffic flow exceeds a certain predefined level.

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New mapping launch

504 StreetMapper – billed by its developers as 'the world's most accurate mobile mapping system' – has been specifically designed for the rapid 3D mapping of highways, runways, railways, infrastructure and buildings using vehicle-mounted lasers. Traveling at normal road speeds, StreetMapper offers a 360° field-of-view with high-precision mapping to a range of 300m. Capturing every detail along the highway corridor – including barriers, gulleys and overhead wires – surveyors can create highly accurate 3D computer models for planning, maintenance, wide-load route assessment, and post-incident investigations.

The system has already been proved in some of the world's harshest environments, capturing subcentimeter-accurate measurements for clients including the Danish Road Directorate, National Grid, Cambridgeshire Police, Microsoft, Halcrow, WSP in Sweden, and the Strategic Research Cluster in Advanced Geotechnologies (StratAG) based at the University of Ireland. Independent testing of the system has resulted in subcentimeter-accurate measurements while

traveling at normal traffic speeds, delivering real benefits in terms of both safety of the survey team and speed of data collection.

The system has been developed by 3D Laser Mapping alongside German guidance and navigation specialist IGI and technology company Riegl. It employs the latest laser-scanning technology for improved field performance and accuracy, precision navigation, and includes a solution for reduced GPS coverage in urban areas, combined with a flexible, modular configuration and increased ease of use and deployment.

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Q In this issue we ask, how can the deployment of intelligent transportation systems assist in emergency evacuation operations?

A "During a man-made or natural disaster, dynamic message signs (DMS) provide impartial, en route information to all motorists traveling into or away from an area – the only equitable method of communication to motorists. Travelers don't need to have cell phones or know specific radio stations to get current emergency information. Effective DMS messages not only warn drivers of disasters ahead and redirect them, but also communicate evacuation routes for vehicles within the disaster area. The reversal of traffic lanes is made possible with a system of DMS, allowing for faster evacuations. In short, evacuation procedures are enhanced when DMS are deployed during emergencies."

Casey Crabtree
national ITS market manager, Daktronics, USA

A "ITS provides a reliable source for information during emergencies. In the USA, QTT promotes its Highway Advisory Radio (HAR) systems, which broadcast messages to travelers using AM radio frequencies. HAR systems are perfect for providing information during evacuations, such as hurricanes or terrorist attacks, and they can be updated quickly. In fact, Washington DC has deployed these stations throughout the city in case of terrorist activity. At critical times, operations personnel have to react quickly, they need reliable equipment, and they need to get information to the public quickly. ITS meets these demands."

Melanie Scott
marketing communications manager, QTT, USA

A "The use of ITS is a primary reason why transportation can now play a crucial, real-time role in evacuation operations. Through integrated technology, staff at TMCs can monitor systems to provide real-time traveler information to their counterparts at EOCs and to travelers. The FHWA study, *Integration of TMCs, EOCs and Fusion Centers* seeks to provide recommendations on how to integrate TMC and emergency management information/system processes, and looks at how information can be integrated to support decision-making in emergency environments."

Laurel J. Radow,
evacuations and planned special events program manager, ETO, FHWA, USA

A "Over the past several years, Econolite and our partners at ISS have seen first-hand the vital role intelligent transportation systems can play in assisting during emergency evacuation situations. In 2005, when Hurricane Katrina hit Louisiana, workers were able to view up-to-the-minute traffic and weather conditions along their roadways on line through the images captured from the Autoscope video detection system, and because of their earlier deployment of DCMS, an online data collection and management system. Having these 'eyes on the road' in this way allowed transportation officials to make well-informed decisions in directing evacuation traffic out of New Orleans."

Daniella Donovan
marketing specialist, Econolite, USA

A "ITS is an essential component of effective public safety today… but only if the driver can get the message. Telegra provides numerous products that support traveler information in emergencies, such as topXview (our traffic management software), VMS/DMS, our trailer-mounted VMS, and prismatic VMS. However, key data elements can be collected and public safety officials may need to know where to be, but all becomes irrelevant if those messages cannot be relayed effectively to the public. Therefore, our permanent installations are supported by backup power systems. If power fails, our trailer-mounted VMS boards are powered by fuel cells, which besides being eco-friendly, do not require refueling for a month. Our prismatic VMS, meanwhile, can be positioned to display an evacuation route message until the crisis is over, completely non-reliant on fuel once set. Public safety is our top priority."

John Kasik
CEO, Telegra Inc, USA

A "Uninterruptible power supplies (UPS) are used at critical intersections – that cross a bridge, for instance – to allow intelligent transportation systems to keep travelers moving. The last thing you want when thousands of people are evacuating due to a hurricane or other emergency is to have them get stuck on a bridge. And if you are trying to feed traffic onto a bridge to try and get it across to the mainland, that intersection must remain operational for as long as possible. UPS enables ITS to work efficiently in such situations."

Dennis Bennett
national sales manager, Alpha Technologies, Canada

***TTi* READERS ARE INVITED TO ANSWER THE BURNING QUESTION FOR THE AUG/SEPT ISSUE:**

How are you investing in intelligent transportation systems with your Federal Stimulus cash?

email answers to traffic@ukintpress.com

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