This image shows the twin Pléiades satellites recently brought into service by Astrium. They operate in identical orbits enabling twice daily coverage and deliver high resolution imagery with a pixel size of 50 centimetres. This enables new applications in built infrastructure asset management, integrating satellite images with traditional survey methodology. For more information on how TRL is using this satellite technology in transport applications – see page 3.
TRL ACQUIRES APPIA INFRASTRUCTURE SOLUTIONS (APPIA UK)

TRL has recently acquired the full shareholding of Appia Infrastructure Solutions (Appia UK), a Doncaster-based company providing asset management consultancy services to highway authorities, consultants and contractors in the UK.

This agreement strengthens the existing working relationship that the two organisations have developed in recent years, combining TRL’s acknowledged position as world-leading transport research and consultancy experts with Appia’s expertise as a leading highway and pavement management consultancy, and their innovative asset management software “Scheme Engineer”.

Staff from both Appia and TRL will work together to combine skills and experience so that new asset management software tools and services are established to enable better management of roads and transportation infrastructure. “TRL Appia” will develop the Scheme Engineer asset management software into a new suite of asset management solutions – iRoads. These will provide Highways Engineers and Planners around the world with a fresh range of effective tools to help derive maximum value from their infrastructure assets.

Dr Sue Sharland, TRL’s Chief Executive says: “This important and exciting acquisition will provide a platform for innovation, development and growth within the asset management market. The strength of TRL’s infrastructure research and consultancy experience and the specialist software expertise of Appia will combine to develop a suite of powerful asset management tools and services that can be presented to a wider group of customers – particularly highways authorities and international transport organisations.”

The existing Appia UK Doncaster office will be retained and staff will also work out of TRL’s Wokingham headquarters.

Efficient transport systems are critical to secure national economic and social well-being. Technology is an enabler and can deliver significant benefits and cause step changes in the way people and freight move around. Looking ahead, it is clear that rapid technology innovations bring with them enormous opportunities as well as significant emergent challenges.

Improved anticipation of future technological possibilities can better inform the actions needed to incentivise and support appropriate measures to maximise benefits across all modes of the transport system.

On behalf of the Department for Transport (DfT), TRL carried out a meta-analysis of published reviews to identify the existing and emerging technologies that could impact on how transport is used or provided over the next 30 years. Covering all modes of transportation, this analysis identified some of the key drivers and technology themes that could have significant impacts in that timeframe.

It was clear that there are many links and interactions between the identified drivers, technology themes and specific technologies. For example, the widespread adoption of autonomous (self-driving) vehicles, already used in metro rail systems (e.g. the Docklands Light Railway), has the potential to improve energy efficiency directly through more efficient vehicle operation and routing patterns. If these vehicles also demonstrate a reduced likelihood of crashes, it may also be possible to remove secondary safety devices and design lighter-weight vehicle structures, providing an additional indirect energy efficiency improvement.

The project predicted that the near time horizon (0-10 years) is likely to be dominated by the accelerating development and adoption of available technology groups, including vehicle efficiency, data analytics, hybrid electric vehicles and personal communications. In the medium term (10-20 years) evolutionary technologies, building on existing platforms but requiring changes to infrastructure, could become more significant, including biofuels and vehicle-to-vehicle/vehicle-to-infrastructure communication services. Over the longer term (20-30 years), existing early-stage technologies could reach widespread adoption, including autonomous and battery or fuel cell electric vehicles. However, revolutionary technologies are very difficult to predict.

An Academy seminar was held at TRL to discuss the work carried out, giving the project sponsors from the DfT the opportunity to discuss the motivation behind the project as well as broader topics on the future of transport, including the roles of the Department and TRL’s contribution in both adapting to the future and shaping it.

The report “Technology Futures: a horizons scan of transport technologies” (PPR641) is available from the TRL website.

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TRL has recently experienced growing market interest in the use of satellite technologies for transport applications – using new Galileo navigation and positioning applications; new S-band satellite communication channels; higher resolution earth observation imagery; advanced spectroscopy to measure air quality; and millimetric radar measurements from space, including detection of infrastructure movement. This interest is being prompted by the focus on space solutions as one of eight great technologies in the UK national strategy. The Government has recently committed £1.2B investment into the space sector over the next five years, to develop the UK’s national competence and address a global applications market worth over £200B.

Transport is widely recognised as the single largest segment in the applications market and, as a result, some of the leading centres of satellite operations and research are now partnering with TRL. TRL is also working actively with governments – most recently as a partner in the launch of the Technology Strategy Board’s Satellite Applications Catapult, which is dedicated to growing the UK’s space sector over the next five years, to develop the UK’s national competence and address a global applications market worth over £200B. TRL is currently helping to develop a wide range of satellite applications:

- The Satellite Applications Catapult commissioned TRL to run a series of workshops which brought together leading figures from highway and rail operators, construction companies, local government and academia. This format encouraged holistic thinking, particularly in terms of multimodal integration – rail, road and pedestrian – to plan for the development of new data architectures and satellite derived analytics which will improve “whole journey” management.
- Robotics and autonomous systems is another of the eight technologies identified as a national priority – and autonomous vehicles were the focus of another satellite application workshop. These vehicles typically use satellite enabled positioning, navigation and supervision. The workshop considered the human factors issues of progressive delegation of driving tasks on road and rail. It also assessed the workforce safety opportunities that might exist for the future maintenance and repair of live roads and rail being undertaken by robotic systems. TRL will provide input to the Roadmap for the UK Robotics and Autonomous Systems Special Interest Group.
- In partnership with Telespazio and NSL, in a project funded by the European Commission, TRL is currently leading a certification review of all transport applications which use the Galileo and Egnos satellite positioning systems.
- TRL’s Network Performance team has recently launched a partnership with TomTom to market city congestion reports using their data analytics expertise to undertake secondary analysis of traffic speed data captured in historical TomTom databases derived from SatNav data. This can be used to identify hotspots and analyse city wide congestion problems without the expense of installing ground based technologies such as inductive loops, cameras or Bluetooth scanners. TRL is also exploiting the use of historical data to analyse traffic patterns during major events and incidents, to improve traffic planning and route diversions in the future.
- In Nigeria, TRL’s international infrastructure team is working with the Satellite Applications Catapult to develop a strategy for the monitoring of highway assets using satellite imagery. Earth observation imagery is available from partners Astrium, which TRL is able to interpret and integrate with other asset databases. Astrium’s new constellation of high resolution satellites, Pléiades, has recently come into service (see front cover) and a sample image of Yas Island, Abu Dhabi (see this page) shows how much detail is visible in imagery using a 50cm pixel size.

• Closer to home, TRL is working with Leicester and De Montfort Universities, to explore a new approach to managing air quality by controlling vehicle emissions with traffic systems. This new work will be based on iTRAQ (Integrated Traffic Management and Air Quality), a feasibility study using satellite derived data, funded by the European Space Agency. The team plans to develop an interface to TRL SCOOT traffic management in the demonstration phase of the project, which will follow later this year.

• In rail, TRL is anticipating an increased uptake of enabling satellite systems for traffic monitoring, automated train movements, integrated timetabling, predictive maintenance and monitoring of surrounding infrastructure such as embankments and trees. Currently, TRL is considering how satellite technologies might improve the safety of level crossings.

• In collaboration with other members of the Forum of European Highway Research Laboratories [FEHRL], TRL is working towards a shared vision for a “Forever Open Road” and “Forever Open Rail”. These initiatives exploit satellite enabled technologies through increased use of automation, remote sensing and robotic working, in order to improve safety and maximise asset availability.

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His Royal Highness the Prince of Wales visited TRL at their offices at the Qatar Science and Technology Park (QSTP) during his three day official tour of the country.

The Prince of Wales was introduced to Akin Adamson, Khaled Hassan and Pamela McDowell from TRL, as well as Dr Al Kuwari, Under Secretary of State at Qatar’s Ministry of the Environment, one of TRL’s closest partners.

The Prince heard about TRL’s research and consultancy work in connection with road safety and sustainability projects in Qatar and learnt that TRL is introducing the world’s best practice in infrastructure recycling to Qatar. The Prince compared TRL’s recycling work favourably to that done in the UK.

This message was further underpinned by Dr Al Kuwari who emphasised the real benefits of bringing TRL’s brand of research led innovation to Qatar and the Gulf region.

His Royal Highness also met with representatives from other UK organisations, including Virgin Health Bank; the Sustainable Management of Fisheries project; Rolls Royce; Vodafone, and the Cardiovascular Research Centre headed by Sir Magdy Yacoub.
SHARING BEST PRACTICE IN JAMAICA

TRL is currently engaged in a twinning process to share best practices in road safety data systems with stakeholders in Jamaica. The work is supported by the Inter-American Development Bank (IDB) and is part of a wider International Road Traffic Accident Database (IRTAD) twinning programme. To start the process, TRL’s Suzy Charman and John Fletcher spent a week in Kingston, Jamaica working closely with the Road Safety Unit at the Ministry of Transport, Works and Housing. Their Road Safety Unit has been using MAAP for Windows since the late 1990s and they are viewed as leading the way in the region. During the review of crash data systems in Jamaica, John and Suzy met with and interviewed the Jamaican Police Force, Ministry of Health, Ministry of Education, Universities, Maritime Training Institute and the Ministry of National Security, amongst others.

During the review, the team found that the coordination between stakeholders is exemplary and there is a significant commitment to the collection, analysis and use of crash data to inform policy. There is, however, good scope to improve the efficiency of systems and to further exploit data to inform road safety strategy and interventions.

The TRL team received a warm welcome from all stakeholders, with Suzy and her Jamaican colleague, Deidrie Hudson-Sinclair from the Road Safety Unit being fortunate enough to “run into” Usain Bolt, who just happened to be in the car park outside IDB’s offices!

Following the Jamaican review, TRL presented a one day workshop on crash data systems which was transmitted by video to seven Caribbean countries and IDB in Washington. Over 70 participants were able to learn more about evidence-led road safety, leading edge crash data systems and TRL’s iMAAP crash data system.

Suzy and John also engaged with both of the Development Banks in the region and there are plans to establish a Regional Road Safety Observatory, potentially using Jamaica as a hub and model for what can be achieved through the collection and use of high quality crash data.

iMAAP

iMAAP Abu Dhabi

In 2012 the Department of Transport (DoT) in Abu Dhabi, decided to implement a web-based GIS Crash Analysis and Reporting System (CARS). DoT’s aim was to provide its road safety divisions with access to timely, accurate and relevant information on road crashes to assist with the identification of hazardous trends and crash locations. The decision was taken to customise a proven solution rather than develop a bespoke product from scratch to reduce project risks and duration.

The proven solution chosen was iMAAP, TRL’s world-leading flagship road safety management system, which has already been adopted by a significant number of countries. Its innovative and research-driven approach made it a perfect fit for DoT’s requirements.

iMAAP features several advanced crash data analysis capabilities including before-and-after analyses and the economic evaluation of road safety interventions. Analysis outputs can be used in its road safety management function to prioritise and implement road safety action plans. It is also multi-lingual with English and Arabic data input and display.

The implementation of iMAAP involved cross-disciplinary working from different DOT divisions and external stakeholders to develop data interfaces, user requirements and final software acceptance. TRL delivered iMAAP in a sophisticated GIS and IT environment, meeting the stringent DoT IT security requirements.

Rigorous acceptance testing stretched over a period of two months. The system went live exactly on the day specified in the project plan. Upon delivering the hugely flexible, yet customised data analysis system to time and budget, client feedback was excellent, and DoT expressed their delight with the system at the recent launch event in March.

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Intelligent Renewable Optical Advisory System

The INROADS project led by TRL with seven other European partners* will develop intelligent road studs (also known as cat’s eyes) containing lighting, sensors and communication technologies, which will enable enhanced traffic management and road user information. This represents a major innovation over the existing retroreflective studs as not only do they have increased conspicuity, but they will also be able to communicate with each other and with a central control, making the system highly reactive and adaptable. They will also harvest energy from their environment.

Their greater visibility compared to standard retroreflective studs is a significant safety benefit, particularly on unlit roads. In such situations, they offer an extremely attractive and cost-effective solution to traditional street lighting, in that they offer many of the safety benefits, but with a much lower capital and operational cost.

The project is now sixteen months into a three year programme, with efforts so far being concentrated on the selection of applications and completion of a system design. Key aspects include: physical dimensions; operational temperatures; communication protocol; and power consumption. After consultation with industry and research experts, the project team chose to focus on the most technically challenging applications, and to demonstrate the feasibility of other simpler ones either by analogy or simulation. The chosen applications are:

- **Active lane delineation on unlit roads** where nodes detecting approaching vehicles send a command to illuminate the pavement and road edge on the section ahead.
- **Smart pedestrian crossing** where a system enhancing the visibility of the crossing is activated when pedestrians are about to cross.
- **Advanced hazard warning** where sensors detecting the presence of obstacles on the pavement trigger a warning to road users.
- **Pavement embedded signage** which consists of an array of lights forming in-pavement signs or displaying fixed/scrolling messages.

A key task of the project is human factors research. Psycho-visual evaluation of road user response to the embedded LEDs is being undertaken in a simulator experiment, and user acceptance of the different coloured applications will be evaluated by a number of volunteers who will be shown video clips.

Later this year, prototype studs will be installed and tested in TRL’s accelerated Pavement Test Facility to assess the robustness of the nodes and the performance of its energy harvesting properties. Then, towards the end of the year, a full scale field trial will commence in Israel, where the studs will be monitored for a period of six months. When the project finishes in 2014, a report will be published, which will essentially be a handbook for the installation, use and maintenance of the studs.

* Project partners are: Austrian Institute of Technology; CIDUUT – Spain; DSTA – Spain; NETIVEI – Israel; INNOWATECH – Israel; IFSTTAR – France; and Siemens

For more information on the INROADS project visit [www.fehrl.org/inroads](http://www.fehrl.org/inroads)

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THE FOREVER OPEN ROAD – three Roadmaps published

Three Forever Open Road (FOR) Roadmaps are now available for each of the FOR elements – Adaptable, Automated and Resilient.

Conceived by TRL in 2009, the FOR programme works towards a next generation of advanced and affordable roads that can be adopted both for maintaining the existing network and building new roads. The programme will enable future road operators to adopt emerging innovations, whilst overcoming the increasing constraints on capacity, sustainability, reliability and integration. The Forever Open Road will also contribute substantially to the way the road transport sector addresses societal challenges.

During 2010, a Research and Development plan was prepared outlining the technologies required to realise the concept, with proposed demonstration projects. In 2011, draft Roadmaps for each of the three elements (Adaptable, Automated and Resilient) were prepared. During 2012, these Roadmaps were further refined with expert involvement from both FEHRL partners and external organisations. Final drafts were delivered and approved by the FEHRL General Assembly and are now at the core of FEHRL’s 5th Strategic European Road Research Programme (SERRP V).

Each Roadmap identifies priorities for future research actions up to 2030. These are broken down into ‘innovation themes’ which outline the steps and predicted timelines required for:

- **Research and development**
- **Demonstration**
- **Regulatory framework**
- **Market introduction**

Specific ‘innovation themes’ within each element will be further developed as required. Implementation of the Roadmaps will ultimately lead to a comprehensive portfolio of proven solutions that build on state-of-the-art practices.

All three Roadmaps are available for download from [www.foreveropenroad.eu](http://www.foreveropenroad.eu)

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Ageing is one of today's great challenges in many western countries, including the UK.

The rising number of older road users is associated with an increasing diversity in lifestyles, health, socio-economic circumstances and mobility needs. Transport policies that do not recognise the considerable variability that characterises the ageing process are unlikely to cater adequately for the mobility needs of this growing proportion of the population. Research has consistently shown that the loss of mobility in older people is associated with a loss of autonomy and a decrease in quality of life; therefore the importance of maintaining the safe mobility of older road users for as long as possible is immediately apparent.

TRL is involved in a variety of activities to support the mobility of older road users. Andrew Parkes, Chief Scientist and Britta Lang, Principal Psychologist in TRLs Road Safety Group, recently presented the findings of an international review on self-assessment tools for older drivers at an RAC Foundation seminar in London. The work brought together a review of the scientific literature on age-related changes in driver capabilities and a review of existing voluntary self-assessment tools that aim to facilitate older people’s adjustment of driving patterns and driving choices to any health concerns, or difficulties they may experience. Such tools require the older driver to either self-report the extent of existing concerns related to driving, or to complete a number of tests that measure the performance of capabilities known to be essential for safe driving performance.

In the review TRL showed that self-assessment tools could make a useful contribution by facilitating conversations about driving concerns with family members. They can also increase awareness for age-related declines that should be addressed by the older driver. However, the review also emphasised that further UK based validation work is necessary into the links between assessment outcomes and measures of driving performance. Furthermore, research needs to explore the impact of the feedback from the tool on subsequent driving decisions and driving patterns. Whilst showing potential for improving driver decisions, self-assessment tools cannot replace formal assessments of fitness to drive and are, as voluntary tools, subject to self-selection.

On a European level, a team of TRL researchers is involved in older road user safety through a current EU project, CONSOL. The research brings together partners from seven European countries to identify CONCerns and SOLutions regarding older road users. Within the two-year project, three completed work packages have already addressed demographic change, current mobility patterns of older transport users and casualty trends for older people using private as well as public transport. Two current work packages map transport policy stakeholders and existing practices regarding age-based controls for older drivers and present case studies of urban infrastructures that promote the safe mobility of the older transport user.

CONSOL has revealed differential practices and trends across the European Union member countries despite general improvements regarding the safety of the older transport user. Recommendations include the push for the development and implementation of national older road user safety strategies; the standardisation of collision record templates and casualty definitions across Europe, and the greater differentiation of older age groups in national travel surveys.
PEDESTRIAN SAFETY SEMINAR

TRL has joined forces with Road Safety GB to offer a not-for-profit training opportunity for road safety practitioners focusing on the UN Road Safety Week 2013 theme – pedestrian safety.

In 2011 the number of pedestrian deaths in the UK rose by 12% in comparison to 2010, with 453 people killed. This seminar has been designed to highlight recent work and innovation for pedestrian safety, and a number of well-respected industry experts will offer delegates some useful tools and practical advice. These include Professor Nick Tyler CBE and Dr Catherine Holloway from University College London; Lucy Saunders, Transport for London and Greater London Authority; and Professor John Wann from Royal Holloway.

The seminar will be held at TRL’s headquarters in Wokingham, Berkshire on Wednesday 8 May 2013. There is a small charge of £75 per delegate which will cover refreshments and basic costs – any surplus will be donated to the Global Road Safety Fund. All transport practitioners engaged in bringing about reductions in road casualties are invited to attend and registration can be made via the TRL website at www.trl.co.uk/trl-news-hub/events

TRL supports the Decade of Action for Road Safety 2011-2020

– A NEW CLOUD-BASED COLLISION ANALYSIS SYSTEM

TRL has just launched its brand new cloud-based collision analysis system, MAAPcloud to an audience of UK road safety professionals at an event entitled “Innovations in Collision Mapping and Analysis.”

MAAPcloud is the new generation version of MAAP, the world’s most widely used road traffic collision data software which TRL has supplied in the UK and around the world since the 1980’s. This new version provides a better fit with today’s technological environments, and offers additional capabilities for the road safety professionals who use it.

Cloud computing represents a radical change in the way organisations use and pay for ICT. Instead of hosting applications and data on an individual desktop computer, everything is hosted in the “cloud” – a collection of computers and servers accessed securely via the internet or a private network. With the UK Government committed to expanding the use of “cloud” technologies in the public sector, authorities are increasingly planning a future, free from the usual constraints of local IT infrastructures, and are considering how this new way of working provides opportunities for collaboration with partners.

MAAPcloud has been designed to allow flexible deployment – police forces, local authorities and other road safety stakeholders can share a system and so reduce costs. This creates opportunities for cross-border and regional collaboration, further reducing costs to individual authorities and enabling data sharing. Data can be made available to all members of a relevant road safety partnership, including the latest collision and casualty figures, as soon as they are released into the system.

MAAPcloud is designed and developed by TRL experts and hosted on secure servers. However, TRL has teamed up with Road Safety Analysis (RSA) who have the responsibility for the UK distribution of MAAPcloud. RSA already supply MAST Online, a web-based road risk analysis tool, to a large number of highway authorities in Great Britain.

To learn more about MAAPcloud, visit www.maapcloud.co.uk

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