



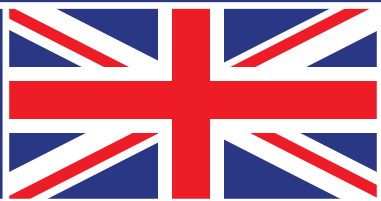
ITS United Kingdom

Better transport through technology

**LOCAL AUTHORITY INTELLIGENT
TRANSPORT SYSTEMS: THE ITS (UK)
GUIDE TO DEPLOYMENT, BUSINESS
CASES AND FUNDING**

2014 EDITION

Keep Calm and Carry On With ITS



www.its-uk.org.uk

INTRODUCTION FROM MATTHEW WILLIAMS OF DORSET COUNTY COUNCIL

I am delighted that ITS (UK) have renewed this guide to help practitioners in local authorities in deploying Intelligent Transport Systems (ITS). Authorities are facing similar pressures to manage their highways by warning and informing the travelling public, reducing car use and promoting sustainable transport, whilst demonstrating increased efficiency from reduced budgets. ITS can help meet these aims, but can at first appear daunting.

In Dorset we have used ITS to deal both with the challenges of managing Games traffic in 2012, and with the day to day challenges every UK authority faces. We have deployed many of the ideas in the guide to give new services to our local residents and visitors, in a challenging rural environment. This guide will be useful to help ITS deployment, and I am very pleased it is now available to newcomers to this field. It will also help update those who have invested in the past and need an update on how social media, big data and apps are impacting on local ITS. It has been written to help overcome the first barriers and shows where more help is available. It also contains ways to reduce risk and also highlights best practice.

ITS makes a real difference to residents and visitors in Dorset – and I hope it will for your Authority.



I ABOUT THIS GUIDE

ITS (UK) have developed this document aims to give officers in Local Authorities direct help in understanding more about deploying ITS. We aim to help you deliver benefits in practice, by:

- Giving more information about ITS (section 2)
- Highlighting benefits it might bring (section 3)
- Showing how ITS systems and services are now being deployed (section 4)
- Outlining how to build a business case (section 5)
- Identifying new sources of funding (section 6)
- Promoting places where more help is available (section 7)
- Giving some golden rules collected from the industry and practitioners (section 8)

We have primarily aimed this guide at people who know little or nothing about ITS, but may have transport, highways or IT knowledge but we also want to help those who know about new ideas and opportunities. We welcome feedback on how well we are hitting these targets.

ITS (UK) would like to acknowledge the many authority staff, suppliers, consultants and other helpful individuals who have contributed to this guide or reviewed its draft stage. Thank you.



ABOVE Desiro Signals in Poole. Photo courtesy of Siemens

2 ABOUT ITS TODAY

ITS is now very wide in scope. It ranges from passenger transport, ticketing, traffic and travel information, car park guidance through to traditional traffic control and now apps and social media. But at its core, ITS offers a toolkit that brings together existing transport technologies, as well as novel leading edge services to tackle transport and environment challenges. New technology and best practice from the mainstream IT industry provides new opportunities including lower costs too.

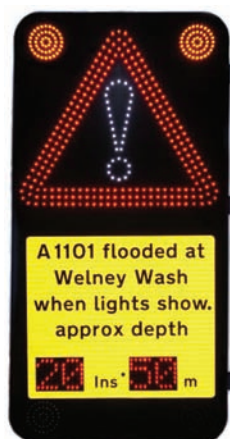
But ITS is not just about new technology, it is also about making traditional techniques work better, faster or at a reduced cost. Social media and crowd sourced data allow new tools for authorities to communicate with travelling customers. "Big data" techniques also show intelligence

about transport networks never before available and making open data available to others helps deliver new services quickly and at low cost. Above all, ITS facilitates the integration and interoperability of technology, to provide improved and “joined up” transport.

More and more authorities have invested in ITS to deliver policy objectives and improve local travel. Traditional divisions between traffic control, network management and public transport are disappearing, as authorities see the value of being interconnected. The term ITS applies increasingly now to services that are provided to both traffic managers and travellers and in the future will include connected vehicles of all types. ITS is the key tool in removing “seams” in transport and moving towards “mobility”, by weaving new and emerging technology such as Internet based communications, apps and cloud computing with existing transport infrastructure and services, for example to help authorities:

- **Reduce the cost** of managing and maintaining transport services and networks
- **Better engagement** with local residents and visitors
- Enhance co-ordination for **reliable journeys, improve air quality etc**
- Improve **road safety** for all users
- Allow authorities to **manage and measure their network management performance**
- Not just tell people **when the next bus will arrive** but give it **priority over other vehicles**
- Help **manage travel when things go wrong** (floods, adverse weather or major incidents)
- Provide interoperable **smart cards for easy use of public transport** and other travel

One size does not fit everyone. ITS in an urban authority might be designed for network management but rural areas might use ITS to improve public transport information and services, or deploy intelligent speed signs. The key is to prioritise and tailor to local needs.



ABOVE Flood warning sign. Photo courtesy of Westcotec

There are now many examples of ITS in day to day use in mainstream transport. ITS is no longer a specialism – it is an everyday transport tool and is also key towards smarter travel by:

- **Delivering the information** people and visitors expect in their increasingly connected lives – if they can surf the internet and watch TV on their mobile phone, why can't they find out when their next bus will arrive? The ability to tailor information to a user so they can receive just what they need is a key recent change – with many new local twitter services developing for a single town or village for example
- **Merging travel and life.** Travel apps and other services on smartphones are now integral to people's daily life for presenting information – but rely on good quality data to be trusted
- Helping people to **change travel behaviour** by providing timely and appropriate information before they choose to travel and during their journey. Bus journeys are less daunting when you know where to get off as well as get on
- **Linking to external services** such as in-vehicle systems and payment for integrated travel. These are likely to have an increasing role in the delivery of information direct to vehicles and even future autonomous driving

3 DEMONSTRATING LOCAL BENEFITS FROM ITS

3.1 Outcomes, not systems

Building a business case for ITS is not easy, as the potential benefits are not often clear. As an industry, we have in the past experimented with technology to prove concepts without always having a problem to solve. But we now have many examples of systems with proven, outcome related benefits, such as:

- **Managing travel** in London & Dorset for the Games, changing people's trips via information
- **Delivering tailored information** on bus, tube, cycle and rail nationally
- **Improved public access** – apps support the reporting of potholes direct to the authority
- **Delivering a local sustainability policy** – bus patronage in Bristol increased by 10%
- **Demonstrating best value** – significant saving in York using existing City Council IT networks
- **Safer travel** – Pedestrian Detection reducing accidents by 21% and delay for road users
- **Disaster Management** – reducing the impact of floods by twitter warning of closed roads
- **Managing traffic** – apps for on-street collection of closure information for third party use

- **Improved Accessibility** – new apps helping disabled drivers to find Blue Badge parking
- **Compliance with legislation** – allowing monitoring of Air Quality Management Areas

ITS is unlikely to yield significant benefits if it is planned without thinking of the local policy context and designed without regard to specific local transport problems and your policy objectives. These need to be linked to clear targets such as “reduce unreliable journeys by 10 %”.



ABOVE Bus station information displays. Photo courtesy of AECOM

3.2 Answers, not problems

Your local policies will help identify key objectives and problem areas, as well as measures of success (bus journey time reliability, car parking, safety etc). You then need to:

- Clearly define the objectives – can success (or failure) be measured?
- Identify options - don't reinvent the wheel
- Learn from experience where solutions have already been installed and evaluated – <http://www.its-toolkit.eu> includes much of the previous DfT UK toolkit. There are other foreign resources – search online for “Ertico”, “POLIS”, “PIARC” and “ITS America” as they produce toolkits and guides that may be relevant
- Are the options available suitable for your problem?
- Can you partner with other authorities to increase the benefit and reduce the costs?

You do not have to do everything in one go – deploy ITS systems so that they can be developed and expanded. The flagship ITS authorities in the UK have all built their systems up from modest investment. Clearly determining your future strategy requirements will ensure a platform for future development thus offering best value for money. When you have identified the type of solutions needed, procurement and deployment need addressing.

You do not have to do it all. Newcastle and London, amongst others, make their data available for third parties to use in websites, apps and other services, saving cost and encouraging local tailoring.

4 HOW ITS IS BEING DEPLOYED

During the mid-1990s the DfT funded the Urban Traffic Management and Control (UTMC) programme. In partnership with industry, this resulted in an expandable ITS approach based on mainstream standards such as the Internet Protocol (IP) for communications. UTMC systems also provide “intelligence” to allow informed decisions, e.g. on the best strategy to tackle traffic problems. From the outset, the focus of UTMC has been on adopting standard data definitions (allowing information to be shared between authorities and organisations).

UTMC uses best practice IT industry approaches to prevent purchasers being “locked in” to a single supplier. It is open and interoperable, and so reduces risk as components can be mixed and solutions built up from separate suppliers over time. UTMC is now very much a mainstream approach to ITS solutions used in UK authorities and key features of UTMC systems are:

- **A common database (CDB)** to store data often needed by several systems – e.g. the same car park count data might be needed by a variable message sign, a website, a smartphone app and a map display. Having a CDB and defined data definitions ensures consistency of data and ease of access for publishing data and export of data to other systems including use by apps developers
- **Communications to link roadside equipment**, like traffic signals or VMS, to a Traffic Management Centre or now a cloud based system. Rather than the historic use of expensive leased lines, utilising IP communications now allows technologies to be mixed and matched. As an example mesh radio used on its own or in conjunction with an authority's corporate network to provide communications to signs, counters, traffic signals etc
- **Strategy Supervisor** This can monitor information in the CDB and take pre-defined actions, for example, implementing a plan that includes information on Variable Message Signs (VMS), modification of signal timings and car park guidance and information during a football match or changing traffic signal operation in response to incidents
- **Data exchange** uses a set of commonly agreed data definitions. Hence, it is easy for example to export data to other traffic systems across boundaries and to introduce new technologies e.g. Bluetooth instead of ANPR, as well as provide data increasingly to third parties.



ABOVE Parking information. Photo courtesy of Siemens

An ITS system built from UTMC can also evolve. An authority could start with simply a car park, a central database and a few variable message signs, or it could group with other authorities and purchase region-wide services for many different systems. Commonly added facilities include:

- Measuring journey times for congestion and reliability
- VMS for information, event management
- Parking information and guidance – now using technology that identifies individual spaces
- Map displays for congestion monitoring
- CCTV – linking cameras and maps and also websites for “traffic cams”
- Emissions monitoring for improving air quality
- Traffic signal control and fault monitoring
- Pedestrian / cyclist detection – to give them as much network access as vehicles
- RealTime Passenger Information for “next bus” information and performance monitoring

Rolling out incrementally allows lessons to be learnt to refine the solution and also can:

- **Reduce perceived risk and** gain elected member support and confidence
- **Spread expenditure** over budget years, whilst achieving set goals and tangible deliverables
- Allow **evaluation of the benefits** delivered against those predicted

As mainstream communications and computing have developed, “cloud based hosting” is now emerging as an alternative to the traditional hardware based approach and authorities can now procure services such as UTC and UTMC instead of hardware and software. This will reduce capital expenditure (but increase revenue) and should increase resilience, but authorities may lose the level of control of the systems that they currently enjoy.

Many people think ITS needs special skills, rather than off the shelf products. But there are over 100 deployments of UTMC in the UK and internationally now – it is a mainstream transport tool. This investment has been due to:

- **Policies continuing to require sophisticated traffic management tools.** For example the duty for managing emissions, a shift towards public transport or more pedestrian friendly solutions
- **Lack of infrastructure alternatives** to reducing congestion or improving journey time reliability.
- **Customer pressure** from freight, car drivers, cyclists and public transport customers who now expect travel information as part of everyday life, not a special service and want websites, up to date travel times and information on bus arrivals as a basic service.
- **Obtaining better value** for example permitting remote access /control of systems from a duty officer's home or

shared centre, rather than 24/7 staffing of a dedicated local control centre

- **Flexibility and expandability** available in UTMC allows changes in road networks to be managed
- **Support for common IT approaches** so that advances in mainstream IT can be readily adopted such as cloud based hosting of UTMC systems



ABOVE Pedestrian and cycling crossing facility. Photo courtesy of Atkins

UTMC also provides robust facilities for:

- **Data security and safety of data transfer** using proven solutions to prevent attack on your UTMC network impacting on traffic while still allowing export of data
- **Making information available** to third parties such as apps developers and big data analysts
- **Exporting data to third party systems**
- **Flexible deployment options** including cloud based hosting to reduce capital costs

But not all ITS deployment is based on UTMC. Another key area is public transport – including:

- **Better information** about planning and using existing services such as journey planners
- **Demand responsive provision** in rural areas
- **Real time** passenger information on screens, internet and increasingly apps and mobile phones
- **Integrated ticketing via smart cards**, for both concessions and all travel
- **App based services** using authority provided data, rather than the authority providing the service. There is a great opportunity here to reduce costs and encourage local industry

Integrated ticketing and smart cards offer a way of encouraging modal shift, managing concessionary fares and joining up with paying for other local authority services. Many authorities have adopted the Integrated Transport Smartcard Organisation (ITSO) standard, making one card work across many different operators and others are looking at using bank cards or near field communications (NFC) as payment means too.



ABOVE Information display for bus passengers. Photo courtesy ofTRL

In the past, public transport ITS meant dedicated infrastructure like bus stop / station signs and costly in-vehicle equipment. But the rise of the app and websites that can be shown on big TV screens means public transport information in real time is now available before arriving at the bus stop and in interchanges, retail areas and hospitals. This doesn't replace the need for at stop/ station information, but means people can go to the stop or station knowing the bus or train will run. This is vital in bad weather and during other service interruptions. Twitter is also an excellent way for commuters for example to follow a route or local area with tailored information, and also to share problems rail operators may not yet know about.

Devices for capturing the location of a bus for example have dropped in price, and many apps are available for accessing data from these systems – users can choose the one they like the best. Once again the key is good quality trusted data others can channel.

For many years now, Transport Direct has provided a door to door planner for public transport across all modes, while National Rail Enquiries supports more detail about rail including live departures. These services are seen as exemplars by many other nations yet we perhaps do not do enough to promote them and their use. Transport Direct's planner has been used for a variety of other uses, from making travel plans for hospital appointments (and reducing the "no shows" as a result) to providing car free travel for beer festivals, all to encourage modal shift.

Other innovative uses of ITS in public transport include bike hire schemes, where the availability of bikes and docking stations on line means apps are very popular. Cyclists have a number of apps to report potholes and dangerous roads and are a useful source of on-line data.

The key for public transport ITS is ease of use and remembering that one size does not fit all users. For example, apps are being developed for disabled people, for foreign visitors to tourism sites and to encourage use of the bus for the school run instead of the car.



ABOVE Transport for London's innovative Digital Sign enables organisations to display live bus/river bus arrival information to the public on their premises. Photo courtesy of TfL

5 BUILDING A BUSINESS CASE AND PROCURING YOUR SYSTEM

5.1 Local policy – not just local transport

DfT's Webtag approach shows how to quantify economic benefits for a local area. Typically the highest economic benefits will come from reductions in travel time and improvements in journey reliability, plus safety gains but there are also big potential economic benefits in health, well-being and absenteeism where ITS encourages and support a shift towards more active travel modes. Key areas include benefits of linking signals, reduced lost time looking for parking spaces, better bus journey times etc. But the business case can also take other local factors on board. There are always issues worth including such as retaining retail trade, customer service, ability to demonstrate AQMA targets and assistance for visiting tourists. Jobs may be created in tourism, but also for local app developers and transport providers if access is improved to both data and places.



ABOVE Low power ITS equipment for congestion control. Photo courtesy of AGD Systems

5.2 Financial savings

Financial savings can often be more acceptable and understandable within an authority, e.g. cashable savings from reducing revenue costs for communications. ITS may reduce maintenance costs, allow better use of existing resources or reduced risk allowed for procurement. Procurement and funding must go hand in hand with the business case, as they impact on the overall costs and particularly the capital/ revenue split. For example, implementing wireless communications may be more expensive in capital costs than leased lines but offers longer term revenue cost advantages.

Ways to save money may now include:

- Making your data available for others to publish and use (in apps and websites etc) rather than providing services directly. UTMC supports this well. Why buy and maintain a website if others will show your data for you?
- Using crowd sourced and other data to complete your network intelligence – sources of data services such as twitter and Facebook direct from users
- Accessing cloud computing services rather than owning and maintaining your own hardware and use of software as a service – to purchase access to for example UTMC rather than software itself
- Buying GPS or mobile phone data rather than installing roadside sensors
- Developing more flexible relationships with neighbouring authorities e.g. as partners or as a local supplier

5.3 Procurement

Ways to procure a system include:

- As a **single authority** from a supplier or suppliers, either as a one off contract or through a framework that will have satisfied EU tender requirements thus simplifying the tender process. The Government Procurement Service has a Traffic Management Technology framework for Local Authority purchase – see <http://www.highways.gov.uk/about-us/procurement/supplier-selection-and-development/model-contract-documents/traffic-technology-service-and-supply-traffic-management-technology-framework/>
- **In partnership with other authorities**, for projects, as in the West Midlands for UTMC, or services as in West Yorkshire for traffic signal maintenance. Another option is one authority asks as the lead and provides services to “partner” authorities as in Tyne and Wear.
- **Buying into an existing system run by another authority**, for example real time passenger information in Yorkshire

In any procurement, you will need to remember:

- EU procurement rules mean you will need to advertise for expenditure over set values, unless a framework approach is followed. This can take far longer than people expect and can delay projects. **Your procurement team should be able to help with these rules and standing orders.**
- **Corporate IT people can help** to get all the various approvals you need to connect your ITS system securely to their network and in procuring systems. They can also advise on hosted systems and how these will connect back into the office as well as equipment on street
- **You will reduce risk** with a clear functional specification with performance targets, some idea of the final scope allowing for future development and avoiding any “input related” design. The more you tailor how a system is built, the less “off the shelf” it becomes. A better way is to let use proven products or services configured to your needs.
- **People in ITS are more than willing to help – not just suppliers but users too.** The ITS (UK) Interest groups represent a large body of expertise and experience that is available to you.
- **Maintenance and upgrades to your ITS once you’ve bought and installed it have a cost** – even if it is simply communications or data updates. This has been an issue in some authorities –so get a clear idea of the ongoing costs of your scheme and who will do the work. Will special skills be needed?

6 SOURCES OF FUNDING

As well as traditional sources of funding from DfT, new sources of funding include:

- **Developers’ funds.** ITS is attractive to developers compared to paying for physical infrastructure as it is cheaper; quicker to implement and often helps add value to their development. VMS in Coventry were used to manage traffic on the opening of a new IKEA. In Kent, a developer installed bus information screens in the lobby of each house. Commercial and Business Parks with public transport designed into them as an integral part of journey planning are looking at ITS as a way of reducing their carbon footprint.
- **Local Enterprise Partnerships (LEPs) and Local Transport Bodies (LTBs).** LEPs / LTBs will play an increasingly important role in major transport schemes when funding is fully devolved to them from April 2015. A key issue will be to establish the role and funding requirement of ITS within the Strategic Economic Plans of the LEPs (most LEPs are currently developing these documents).
- **Technology Strategy Board and Transport Systems Catapult.** These sources are primarily focussed at

innovation and new solutions for mobility in future cities, not funding “more of the same” but have extensive competitions some local authorities have used for example to promote third party use of their data by apps developers.



ABOVE ANPR (Automatic Number Plate Recognition) camera in Buckinghamshire. Photo courtesy of CA Traffic

7 WHERE IS HELP AVAILABLE?

Help to make the task easier is available from many existing information sources:

- **The ITS (UK) Local Authority Interest Group**, a forum for developing good practice for all aspects of ITS in local transport and advising how a business case can be developed. ITS (UK) is a not-for-profit public/private sector association promoting all ITS across all forms transport. <http://www.its-uk.org.uk/interestgroups/group/local-authority--urban>
- **The UTMC Development Group (UDG)**, a representative group led by Local Authority purchasers with active participation of suppliers and national and regional governments. They ensure the UTMC Technical Specifications are maintained and managed, and organise outreach activities such as an annual UTMC conference, workshops and seminars. <http://utmc.uk.com/>
- **Transport KTN**, which has a wide remit in expanding knowledge about all aspects on transport but especially new approaches such as future cities and big data. <https://connect.innovateuk.org/web/transportktn>

- **The Transport Systems Catapult:** This group started at the end of 2013 and is taking a multi modal view to ten challenges in future mobility. <https://ts.catapult.org.uk/>
- **Adept**, which represents local authorities and has started a working group with ITS (UK) on sat nav map issues. <http://www.adeptnet.org.uk/>
- **The Traffic Systems Group** is open to all those interested in traffic control who work for, or on behalf of, highway authorities. <http://theihe.org/tsgforum/>
- **The Real Time Information Group** provides a focus for all those involved in bus related ITS. They have a wide membership from local authorities, bus operators and system suppliers, with representatives from Government and industry. <http://www.rtig.org.uk/>

Get involved in the ITS arenas. There are free ITS (UK) seminars and workshops for example for Local Authority attendees. Use these to talk to other authorities (experienced and new), suppliers, consultants and potential partners.

Importantly:

- **Communicate your plans to your authority, stakeholders and the public.**
- Tell local people what **benefits they can expect** in clear words.
- Get your procurement and IT people **on your side**
- **Manage expectations.** ITS will make a difference but it is not the “traffic super brain” that journalists sometimes make it out to be! You need to work with your elected members and media to explain what ITS means for them.

8 AND FINALLY THE GOLDEN RULES FOR SUCCESSFUL ITS

- 1 ITS doesn't exist on its own and **is not a solution in itself** – it must link to our life and business as an everyday service we use and adapt our travel as a result. Think about the people, the businesses and their operations that need your idea and how it can be integrated with other services, to make it easy to use. What will people actually see? **Don't talk about technology** but the benefits it will bring. Will it reduce delays? Will it save cash? Will it increase tourism and save jobs?
- 2 Look at the many transport services already in the market and **make sure you're making the most of them.** As examples:
 - a Sat navs are already available for HGVs. ITS (UK) has started along with Adept and DfT as Sat Nav working group to help exchange map information. Our website <http://www.its-uk.org.uk/interestgroups/group/satellite-navigation> has links direct to map suppliers for local authorities to report

mapping issues, and some local authorities have provided contact points for map makers there too

- b** Transport Direct already provides a door to door UK journey planner and a link to ticket sales
 - c** Do you know who in your local university may be interested in big data projects using your traffic or travel information? They have skills and local knowledge – and want interesting student projects
- 3** Are you applying technology to address a policy issue influencing mobility or a real customer need, or is it **just technology looking for a problem to solve?** What's the added value over what exists now? How does it integrate with what is there already? Will it support your future plans?
- 4** There is already a **great deal of knowledge in data exchange between transport systems**. The community has much knowledge to share! Use existing international standards for data exchange (DATEX, TPEG, and SIRI) to source data from machines directly. Remember, institutions are often key here, not technology.
- 5** The UK has developed a modular approach to urban traffic control and monitoring systems, UTMC, which over 100 local authorities' systems already use. UTMC offers **immediate access to markets and to local authority data** and ways to export data as well as "future proofing"
- 6** **You don't have to do it all**. Many authorities are questioning if they need to build and operate their own websites when there are many third parties sites looking for data. You can impose simple terms and conditions on the data (and turn the feed off if they are not complied with). Transport for London for example has over twenty developers using data from its Cycle Hire Scheme.
- 7** **Think services not systems**. Do you really need to install roadside equipment for journey time monitoring on busy arterials when GPS data is available from several suppliers as a service? Do you need a system for collecting and distributing roadworks information when again services are available to do this? Do you really need a computer centre and staff to run traffic control hardware when this too is now available as a cloud service? You need to think about your local needs, the service level you need and revenue vs capital implications, but it's always worth considering.
- 8** **Data is everything but you need intelligence**. In the past we were data poor as a profession. But GPS data from vehicles, data collected from apps, mobile phone data and in the future data from vehicles themselves means we now have many sources that aren't easily compatible with traditional sensors as they measure different things. But when the various data sources are combined and a big data approach is used, we start to get real intelligence about the network. So spend as much time thinking about your tools for analysis as your sensors.
- 9** **Ask for help**. The ITS industry and Local Authorities in the UK are a friendly bunch of people who love talking about their projects and helping others, as well as of course enlarging the market. There is more than likely an off the shelf solution to your problem – or one that has been tailored by someone else who can save you time and risk.
- 10** **It's better with friends**. Many authorities are working together to provide procure and provide systems and services because of the financial and operational benefits this can bring.

If you can "tick the above boxes" then you can keep calm and carry on with ITS!



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