Transport Telematics

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Executive Summary

Our telematics topic strategy considers telematics issues and current problems, and proposes how we will direct our future investment in telematics to support our key strategies and so deliver our LTP objectives. It illustrates ways in which telematics can influence travel behaviour, both directly and indirectly. It shows, in particular, how telematics can be used to encourage a sensible balance between car use and other transport modes such as buses, trains, walking and cycling in pursuit of a sustainable transport system. Some telematics applications have until recently been used to make life easier for private motorists and maximise vehicle throughput at the expense of other road users. The telematics strategy revises this outlook and prioritises applications favouring public transport, transport safety, air quality and noise reduction. It will start to develop traffic restraint applications. Existing traffic management applications will be reviewed to check that they support the LTP objectives and are not inadvertently generating traffic demand.

The main emphasis of Surrey County Council’s LTP strategy is to reduce traffic growth and to encourage alternative forms of transport to the private car. In the short term, measures which confer priority for buses, cyclists and pedestrians, or which introduce traffic restraint, may exacerbate problems of congestion. However, such measures are an essential part of any sustainable transport strategy and, in the medium to long term, the only effective means of tackling road traffic congestion. This is also the approach advocated by the Road Traffic Reduction Act 1997 and PPG13.

The Motorway and Primary Route Network represents the strategic tier of the highway network and provides the main arteries linking Surrey’s economy to the rest of the UK. In view of this important economic role, telematics and traffic management measures are sought on this part of the network in order to reduce congestion and delays to commercial traffic, buses and coaches. Nevertheless, the main aim on the strategic network is to reduce traffic growth and levels of road traffic, and also to encourage alternative forms of transport to the private car.

This sustainable transport strategy is encapsulated within the following vision for transport telematics in Surrey:

“The County Council will use transport telematics in Surrey to reduce traffic growth, give priority to buses and emergency vehicles and encourage alternative forms of transport to the private car. On the strategic road network, transport telematics will also be promoted to reduce congestion and delays to commercial traffic, buses and coaches.”

The topic strategy discusses the relevant problems identified in the LTP as legacies from previous car-led transport strategies and assesses which telematics applications could make a cost effective contribution to specific elements of the LTP strategy. The five key elements of the Telematics strategy are:

- Transport and travel information
- Route guidance
- Traffic Management and Control
- Monitoring and Surveillance
- Enforcement
The Implementation Programme shows how we propose to prioritise our telematics investment, in order to integrate with and support other topic strategies. Investment criteria are spelt out and evidence of a systematic linkage with other strategy elements given. As far as possible, a clear idea of phasing is given, indicating in which order measures should be implemented to maximise synergy.

Lastly, ‘Monitoring’ describes how planned investment in telematics systems will provide a wealth of quality information and data which will enable us to review and learn from ‘yesterday’, manage ‘today’ and plan for ‘tomorrow’.
1. Introduction

‘Telematics’ is a relatively new word and is a generic term for systems and protocols which involve the long-distance transmission of computerised information. Telematics (often termed Intelligent Transport Systems) provides an extensive ‘toolbox’ of audio/electronic equipment which transport planners can employ in support of their transport objectives. In its broadest context, it includes system hardware, software and operation and communication protocols. However, there are human and organisational interfaces and relationships which need to be put in place in order to achieve the seamless, sustainable transport systems we desire. Telematic applications underpin the support services which:

- provide timely accessible travel information
- give route guidance
- control traffic
- enhance safety
- enforce transport legislation
- enable integrated fare payment

but in order for these services to offer an appropriate level of reliability the fundamental requirements are:

- continuous network and infrastructure monitoring
- ‘real-time’ surveillance
- traffic and travel prediction models.

The Telematics topic strategy sets out how we propose to:

- exploit and build upon existing telematics capabilities
- participate in the development of new systems through UK and EU Research Programmes
- integrate with other network operators (road, rail and air)
- support enforcement agencies.

Telematics will provide the control, monitoring, information and enforcement systems to support transport, safety and network management policies. Developers may be expected to implement and/or fund such measures as a condition of being given planning permission, as an alternative to road building.

2. Objectives and Targets

Surrey’s LTP addresses the specific objectives of Integration, Environment, Safety, Economy and Accessibility. Table 2.1 of the LTP sets out the relationship between our objectives and the targets which quantify these. Since telematics is a toolbox we do not attempt to relate it directly to achieving certain targets. Instead we spell out in the strategy chapter the ways it can, and should, aid the core strategy elements e.g. how expansion of telematics in bus operation such as automatic vehicle location (AVL) and real time passenger information would contribute directly to accessibility and associated targets and indirectly to our objectives on the environment and the economy.

In order to monitor our traffic restraint target and to be capable of reviewing and varying overall strategy, we will need to collect a considerable amount of
traffic flow information. We have identified a number of sites across the county of particular strategic importance and these have been set up as permanent automatic traffic counters (ATC). Other sites are designated on a 'need to know' basis to meet local need, project development or to provide the means by which a vast amount of traffic and travel data may be collected, stored and processed for use in prediction models, such as the Surrey County Traffic Model (SCTM) and the Passenger Transport Accessibility Model (PTAM).

3. Problems and Opportunities

This section focuses on the question 'What is now possible using telematics and which of these applications could make a cost effective contribution to specific elements of the LTP strategy?' The LTP identifies a number of problems which need to be tackled within our overall strategy; these have been grouped into our seven key strategy elements.

- widening travel choices
- managing traffic and restraining travel demand
- producing a more integrated transport system
- planning and managing the highway network
- addressing the transport needs of rural areas
- helping to make freight distribution more sustainable
- integrating transport with other policies.

3.1 Widening Travel Choices

The legacy of previous car-led transport policies is that layouts and traffic levels on many roads and streets inhibit their use by vulnerable modes and so force many people to drive when they would prefer not to. Telematics can help improve safety and convenience for pedestrians and cyclists by:

- permitting new pelican, puffin and toucan crossings
- modifying traffic signal installations, to include pedestrian and cycle crossing phases and facilities
- providing all controlled pedestrian crossings with additional facilities to assist pedestrians with physical and/or sensory impairment.

To assist pedestrians with sensory impairment, all new and existing controlled pedestrian crossings are fitted with tactile and/or audible warning devices. Other devices available to assist the sensory impaired include electronic voice synthesizers for controlled crossings and beacon and tag systems, also using voice synthesizers, to guide blind and partially sighted pedestrians at public transport interchanges. These would be considered on merit in our improvements programme.

3.2 Producing a More Integrated Transport System

For public transport users, telematics can aid integrated ticketing using Smart card technology, fare concessions between rail and bus, and improved public transport information. Systems should be capable of integrating with other communications systems, to transmit information to the home, workplace, transport interchanges, public buildings and shopping centres. Central Government support for integration provides the opportunity, in partnership with operators, to encourage and introduce integrated ticketing systems.
Telematics can also enhance safety and security using:

- MOVa signal strategy
- speed and red-light enforcement cameras
- closed Circuit Television surveillance (particularly town centres and car parks).

### 3.3 Managing Traffic and Restraining Travel Demand

There are opportunities to re-allocate road space to provide priority to walking, cycling and public transport by:

- installing bus priority at Urban Traffic Control (UTC) and isolated traffic signal sites
- providing emergency vehicle priority (green wave) at UTC and non UTC sites
- implementing access control schemes for pedestrian priority in town centres
- running demand-responsive buses
- using bus lane camera enforcement systems (e.g. Peek ‘Guardian’ system).

An expanding signal population places a further maintenance burden on Surrey’s annual maintenance budget. Telematics provides the greatest opportunity to at least stabilise, but hopefully reduce, the maintenance burden. Particular areas are:

- data communications
- electricity (developments in optical and LED technology which save energy)

### 3.4 Addressing the Transport Needs of Rural Areas

New developments in telematics offer an opportunity to develop some appropriate solutions for rural areas with dispersed population and diverse travel patterns. Demand-responsive bus services could be expanded and further improved by speeding up response times through improved fleet management, using AVL systems and in-vehicle route guidance.

Reducing through-traffic in rural villages and limiting the impact of lorries in rural areas are priorities and the traffic management strategy will utilise telematics tools such as:

- access control systems using ‘rising bollard’ or ‘barrier’ systems to restrict access to authorised vehicles only
- number plate recognition systems (NPR)
- digital communication for data transmission.

### 3.5 Making Freight Distribution More Sustainable

An option is to permit the use of bus lanes for freight traffic at certain times of the day. Bus lane enforcement cameras such as the Peek ‘Guardian’ system could be developed further to give ‘selected vehicle priority’. Research Project UTMC01 ‘Selected Vehicle Priority’, part of the DETR’s Research Programme, is about to move into the ‘demonstration’ phase and will provide valuable guidance on telematics’ ability to deal with different classes of vehicle.
3.6 Privacy Issues

Clearly the roll-out of a telematics programme may be perceived as an intrusion into personal privacy, civil liberty and confidentiality. It is proposed that these issues would be treated with the greatest respect and sensitivity and subject to rigorous public debate and scrutiny. Our Environment Committee system will ensure that, in the first instance, schemes employing transport telematics do not carry any inherent threat to privacy and confidentiality and that the Data Protection Act and Freedom of Information Act are complied with. Many schemes would be subjected to public consultation prior to final design and implementation.

4. Strategy

The Telematics topic strategy is based around providing tools which can be used in the implementation stage to deliver LTP objectives and measure performance against LTP targets. Some telematics applications have until recently been used to make life easier for private motorists and maximise vehicle throughput in congested urban areas. The telematics strategy will revise this outlook and prioritise applications favouring public transport, transport safety, air quality and noise reduction. It will start to develop traffic restraint applications. Existing traffic management applications will be reviewed to check that they support the LTP objectives and are not inadvertently generating traffic demand. There are five key elements to the strategy:

- transport and travel information
- route guidance
- traffic management and control
- monitoring and surveillance
- enforcement.

4.1 Integration With Other Topic Strategies

The telematics ‘tool box’ comprises equipment, techniques and methodologies which can contribute to the successful integration of all the topic strategies. Table 1 indicates the major elements of this strategy and how they relate to the full programme of topic strategies:

Table 1 – Connections between telematics and other topic strategies
4.2 Transport and Travel Information

The passenger transport topic contains specific proposals for use of real time ‘Countdown’ style information at Surrey bus stops on services running into or out of London. This requires funding by Surrey and co-operation with LT buses. We are also considering the potential of this system for use on Surrey-only routes and intend to analyse experience of such systems elsewhere to gain a clearer picture of the potential costs and benefits, and in which order measures should be implemented to maximise synergy with roadspace re-allocation and other bus related measures. There is no preconception that investment in real time information is justified at once; we might conclude that until road space reallocation has substantially eliminated the unreliability of urban bus services Countdown will under-perform and have only limited effect at encouraging bus use. However, in the long run we expect real time information for bus passengers to become as ubiquitous as it is for underground passengers. In combination with other measures to reduce the generalised cost of bus travel this will contribute very strongly to our accessibility objective and associated targets and indirectly to objectives on environment and the economy.

We will continue to improve the quality of, and access to, road and rail public transport through:

In the home:
- interactive service through cable TV networks
- Surrey County Council web site
- TravelWise initiatives (car sharing data-bases etc.).

In the workplace, at interchanges, public buildings and shopping centres:
- interactive travel information terminals
- access to SCC web site
- TravelWise initiatives (car sharing data bases etc.)
- ‘continuous up-date’ display screens for travel news and changes to timetables.

Opportunities will be sought to extend existing dial-a-ride services and develop more enhanced demand responsive public transport, exploiting advanced vehicle location (AVL) and route guidance systems. Innovative methods will be encouraged to integrate systems, to provide robust services able to respond effectively in all motoring conditions, in both the urban and rural environments.

4.3 Network Travel Information

There are a number of services from which travel information could usefully be obtained. For example most of our urban areas and large interchanges are controlled by Surrey’s Urban Traffic Control (UTC) System, which is located in the Systems Control Centre. The system is continually monitoring and responding to traffic flow, traffic demand and congestion information, in order to co-ordinate traffic signal sequences for safe and efficient traffic flow.

We propose to widen the use of this information by making available appropriate data received at the centre which might be converted to give valuable ‘real time’ route condition. This information could be accessed by agencies for broadcasting but would also be developed for adding to Surrey’s Web Site.
The UTC system is also capable of communicating data on weather and road surface conditions, typically snow, ice and fog, as well as air quality, from monitors located on the transport network. We propose to examine and promote use of the UTC system as an effective means of enhancing the quality of travel information which we provide to aid travel planning. We will utilise car-park occupancy data, used by the UTC system to change car park VMS, as part of our proposed travel information system.

### 4.4 Route Guidance

In-vehicle route guidance systems are becoming more popular and AVL, based on satellite tracking systems and beacon based systems, can plot journeys and guide motorists on the shortest road route. This could threaten our traffic management strategy and we will ensure that travel information we control is used to influence modal and route choice in line with LTP objectives. With this proviso, we propose to explore with other public and private sector operators how our respective travel information databases might be merged to our mutual advantage.

### 4.5 Traffic Management and Control

Route guidance systems can be used to aid the traffic management strategy and further details are to be found there. Existing traffic control systems will undergo quality audit to assess the need for:

- additional safety features (pedestrian facilities)
- improved control methods and performance.

All traffic control systems will be remotely monitored at the systems Centre for electronic and signal timing faults, to improve reliability in the interests of:

- safety
- amenity and accessibility
- movement of all traffic modes.

### 4.6 Urban Traffic Control (UTC)

The UTC system will be configured and operated to control traffic in a manner which promotes:

- safety of vulnerable road users
- accessibility for non-car modes
- bus priority
- emergency vehicle priority.

The system will be developed and enhanced to provide control, monitoring and information to:

- control traffic
- support safety schemes
- provide bus priority
- give emergency vehicle priority
- control variable message signs for car parks and route guidance systems
- provide network data for information systems and travel broadcasts
provide infrastructure and environment data to aid infrastructure and network maintenance and improvements.

provide air quality data for the development of air quality related transport strategies.

Urban Traffic Management and Control (UTMC).

We are committed to supporting this DETR research initiative and will develop our intelligent transport systems to:

- migrate our existing UTC systems towards the UTMC standard
- ensure new systems are installed compatible with emerging UTMC standards and specifications
- support monitoring, analysis and transport strategy development
- encourage use of open protocols which maximise the opportunity for sharing information between systems, organisations and the public.

We can participate in the research programme, if required, by providing a ‘live’ urban traffic control system which might be used in the demonstration phase of UTMC directed research projects.

4.7 Monitoring and Surveillance

Monitoring

Monitoring is an essential but frequently under-resourced component of managing and planning the transport network and infrastructure. Telematics applications now provide many systems which will collect, assimilate, transmit and store information in various formats.

Network Monitoring

We propose to enhance our network intelligence by:

- increasing our population of permanent automatic traffic counters (ATC)
- exploiting facilities integral to our UTC System by using Scoot loops for the dual purpose of also counting traffic
- installing additional count loops connected to the UTC system where cost effective
- examining the feasibility of using the PSTN/digital telephone network for transmission from count sites to a central data base.

We will work in partnership with the Highways Agency, to integrate and share information concerning the motorway, trunk road and Surrey’s road network. Preliminary discussions as part of the HA’s Regional Traffic Control Centre (RTCC) initiative have taken place and we have indicated our willingness to participate in the creation of the Traffic Information Highway (TIH) which would be operated under the RTCC initiative.

We will seek to include Traffic Broadcast agencies, such as AA Roadwatch, in our planning in order to ensure travel news is brought to as wide an audience as possible through developments such as Radio Digital Signals – Traffic Management Channel (RD–TMC) and conventional radio and television traffic broadcasts.

4.9 Car Park Occupancy

We will continue to configure Surrey’s UTC system to control and monitor ‘real time’ car park occupancy and direction signing. Where more appropriate to do
so, we will encourage our Borough and District Councils to incorporate occupancy monitoring as part of systems specifications, to ensure that future monitoring needs are catered for.

4.10 Air Quality and Weather Monitoring

We will work in partnership with our Borough and District Councils to develop systems which provide continuous monitoring of defined pollution ‘hot spots’ and ambient levels. Information would be stored locally on ‘WORM’ (write once read many times) drivers to be downloaded to a central database or manually retrieved at appropriate intervals. The information would be used, in conjunction with the SCTM, to develop Air Quality Maps and data for the formulation of Air Quality Management Areas and Plans.

Weather and climate have direct links with the susceptibility to, and degree of, pollution. We propose to explore the implementation of a Weather Information network with dedicated on-street monitors which are able to connect with other sources through rented data lines or PSTN telephone network.

4.11 Surveillance

A number of Surrey’s towns have closed circuit television (CCTV) surveillance jointly funded through local business partnerships and the DETR’s Safe Towns initiative. We propose to explore the opportunity for linking these systems to the Traffic Systems Centre, to provide ‘real time’ images in the control centre to enhance our network management capability, subject to other priority needs shared by the systems.

4.12 Enforcement

Enforcement of traffic regulation orders can be achieved by physical means such as access control systems, incorporating rising barriers or bollards, or passively through camera enforcement systems such as speed and red light violation cameras. We will complement camera systems with number plate recognition (NPR) equipment to assist the police and/or trading standards in processing prosecutions.

We will introduce systems from which information (suitably encrypted) may be downloaded to a central database for processing. The skills and knowledge of the Metropolitan and Surrey Police will be sought in developing and implementing systems. We will work with the Association of Chief Police Officers (ACPO), to create auditable, secure computer systems and procedures which can process information retrieved from the National database of vehicle registrations held by the Driving and Vehicle Licensing Agency. We will work with these agencies to overcome issues arising from the need to adhere to the Data Protection and Freedom of Information Acts.

4.13 Opportunities for Partnership

Areas suitable for partnership include:

- Regional Traffic Control Centre initiative
- Passenger Transport (scheduled and demand responsive service)
- Airport transport forums (London Heathrow and Gatwick already in progress)
- Freight Transport
- Town Centre Area Management
4.14 Cross Boundary Issues

We are working closely with neighbouring local authorities and the Highways Agency, to ensure that our respective transport strategies and telematics applications can migrate and be developed towards systems which communicate through common protocols, using complementary system hardware and software.

Because of our position relative to London and its orbital and radial routes, we have a particular interest in working with the Highways Agency through the Regional Traffic Control Centres initiative to meet the challenges presented at the national and local highway interchanges.

5. Implementation Priorities

Applications that deliver known benefits which support the LTP objectives in a rapid and cost effective fashion are our priority. When Surrey County Council finalises an appraisal system based on the NATA approach but suitable for lower value schemes it will enable alternative investments across the different strategy elements to be compared. The appraisal will consider the benefits in terms of their contribution to LTP targets rather than placing undue weight on those benefits that can be given a monetary value.

By way of example, Surrey’s Urban Traffic Control system represents the greatest single investment in telematics since its installation in 1988. Primarily intended for use in maximising the capacity of Surrey’s road network in its more congested areas, its use now has a much broader base in restraining inappropriate car use and encouraging the use of public transport, cycling and walking. Our priorities for achieving this are:

- implement strategies which penalise the inappropriate use of the private motor car
- expand our bus priority network
- implement pollution minimising strategies and tactics
- focus on strategies which preserve and enhance the safety of vulnerable road users
- improved car park information signing as part of town centre safety and access initiatives.

Similarly we will develop existing systems and introduce new systems consistent with our priorities for:

- maximising returns on our investment in infrastructure improvements, operations and maintenance
- discouraging the inappropriate and anti-social use of the private motor car
- dynamically managing all forms of travel
- providing timely, quality information to give as wide a travel choice as possible.