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GETTING THE MOST FROM YOUR UTMC SYSTEM

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Executive summary

Traffic managers and operators today must manage information on the current status of the road network from a variety of disparate sources, analyse the data received and then implement a coordinated strategic response. All of this is undertaken under continual pressure on budgets and resources to demonstrate maximum efficiency of public expenditure. The range of traffic control and information systems available to manage the network offers many benefits but also demand effort in maintenance to ensure effective network management.

The continued deployment of advanced UTMC system can dramatically reduce the workload of the operator in the traffic control centre and in turn allows the authority to improve the quality of service provided to the travelling public. This is supported by using more of the automated facilities available within the latest generation of UTMC solutions and the richer sources of data available from the street. This paper explores the opportunities available to increase automation within UTMC systems for greater efficiency and considers some of the issues which must be considered to maximise the benefits of UTMC solutions.

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Introduction

From the very early research projects, one of the key goals of UTMC was facilitating the integration of data from different systems using open specifications to increase flexibility – and competition in the market – in the delivery of traffic management solutions. In parallel the explosion in communications bandwidth available as a result of the wide scale usage of internet applications in daily life has opened opportunities for gathering richer strands of data from the roadside. These developments over recent years have allowed the implementation of new ITS systems which in many cases may be able to offer much greater capabilities than currently being used.

The wide range of UTMC systems available today – PC SCOOT, VMS, Car park management, Journey time monitoring – each in turn offers solutions to specific elements of the overall network management problem. In some cases, historical development has led to multiple elements being included in a single system, especially within SCOOT where for many years, the urban traffic control system was the single system installed. Many of these functions are now better performed by specific systems or modules within a UTMC solution with richer data sources providing better quality of data for network management.

It is often straightforward to implement a central UTMC system such as Comet with links to multiple sub-systems supplying data and information which in turn can quickly fill the database with information which in many cases is not being used to best effect. Consideration of this information availability and combination with options now available in the latest UTMC systems can bring benefits in more effective operation with minimal or no operator involvement – an integrated solution offering more than the sum of the individual components.

What benefits can integration into UTMC bring?

The integration of data from diverse systems into a single UTMC solution offers several key benefits around data fusion and reduced operational requirements. Data fusion combines all the information available to an operator or service provider in one single location. From this it is now possible to obtain the complete network status in a coordinated view, but also to provide a single reference source of information for dissemination to other authorities, value added service providers and the general public.

By integrating all data sources in the UTMC environment, opportunities are available to reduce operational requirements – either by the sharing of a single communications link or the sharing of data between systems in the control centre to maximise the benefits of existing links to on street devices. Additionally the richer sources of data available offer greater possibilities for automated operation with confidence.

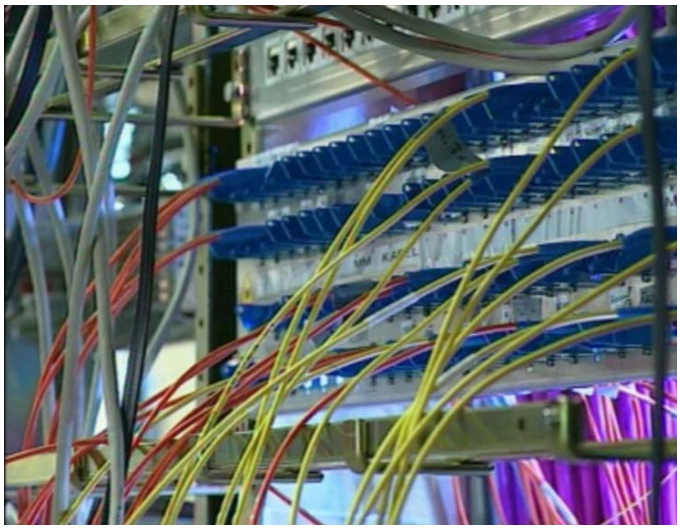
The wider range of data sources can be combined sensibly in a modern UTMC strategy manager to reliably operate the system automatically, reducing operator workload and resourcing requirements. This can benefit particularly in innovative solutions to traditional problems as well as providing better operation “out of hours” when no operator is available.

Publication of real time data is a powerful tool in encouraging modal shift and reducing congestion – however, quality is crucial to ensure the data being published is viewed by the end user as credible and reliable. Information displayed on variable message signs can significantly reduce congestion by directing drivers to car parks with spaces from the very outskirts of the city – rather than them driving past a car park with spaces only to have to return shortly afterwards.

Integration considerations

When implementing a new or updated UTMC central system it is very easy to simply define a requirement which integrates data from multiple systems. This in turn can very quickly lead to large amounts of data being collected and stored on a regular basis – in turn leading to questions around the costs associated with the storage and also the communications revenue to transmit and receive the data – especially if it is not actually being used! In addition to being wasteful in terms of resources and efficiency of the system overall it can lead to elements of the overall solution becoming discredited as poor initial data collection is never validated and corrected raising wider questions over data validity.

When integrating data for network management, the method and frequency of data collection must be considered – for effective incident detection, data must be available to the integrated management system in real or near real time to allow the early detection of any incident. This in turn places requirements on any communications network to ensure the timely delivery of data. If the integrated traffic management system is relying upon data delivery for automatic incident detection and control, then the risk of communications failure must be considered to ensure a suitable alternative response is available.



Data quality is also of crucial importance to systems integration – especially where automatic system operation is involved. Spurious or poor quality data acted upon by the traffic management system can very quickly lead to significant difficulties in network management – both operationally and politically. Therefore, before completing the final stage of systems integration and enabling any automatic modes of operation, the data sources must be rigorously checked for both reliability and quality, to ensure that spurious data does not cause an unwanted strategic response to be implemented and the corresponding difficulties this could cause. The data quality is equally as important where publication of data is being considered – whether via a variable message sign, broadcasters or the Internet.

Often data is available within other systems which do not directly support UTMC interfacing. The use of adapters is well proven to provide interfacing into the UTMC system but another option which should be reviewed is the use of any adapter tool to pre-process the data prior to integration. In this way, data quality and where appropriate consolidation, can be completed prior to integration thereby streamlining the system management process and removing any spurious data at source.

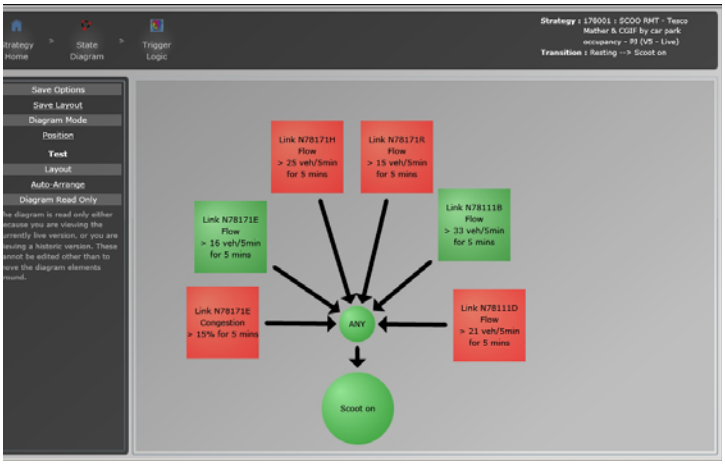
How can we get more from existing systems to maximise efficiency?

Traditionally traffic management systems centred on UTC/SCOOT – not least because in the past, computing hardware and software was expensive to acquire and maintain so increasing usage of the system provided greater return on investment. Today, similar functionality is more widely separated, often in different systems with the advent of powerful yet cheap computing power and the ease of software development for bespoke applications. This sometimes leads to innovative solutions to problems being overlooked as the answer may require a degree of integration using data which may exist but not necessarily be immediately obvious. Alternatively new and emerging technology can provide solutions which may previously have been impractical e.g. in detection and monitoring, but this still has to be integrated into the overall strategic management solution.

UTMC provides the glue to bring all of these elements together and allow easy analysis of disparate sources of data and processing in real time. The use of IP technology in communications has led to much richer sources of data being available for consideration, whether for processing at the instation or for live links to counting sites where in the past a visit was required to upload data.

Using this wide range of information stored in UTMC systems can dramatically reduce the requirement for operator intervention. In these financially challenging times, this can provide benefits for better management of the network when the control room is unmanned, or better automated operation during normal manning by freeing up operators to deal with unplanned incidents and occurrences.

Operating systems in an automated mode does however hold pitfalls for the unwary. Data quality and reliability becomes paramount to ensure consistent operation and acceptance by the ultimate network users – driver and pedestrians. If a data source is unreliable, or the proper analysis has not been done in configuration to ensure a unique combination of trigger conditions is chosen, the potential exists for chaos.



Imagine if you will a complex strategy of control, triggered for a football match at the local stadium which is incorrectly actioned automatically on the wrong day!

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Integrating new detection with SCOOT in Liverpool

In Liverpool, the development of a supermarket site led to a challenging SCOOT configuration with minimal link lengths from the detection to the stop line. Under certain conditions this leads to difficulty with much demand for green remaining undetected until just before the stop line, resulting in congestion which is not immediately recognised, and dealt with in a timely manner.

The solution for this required the use of both new detection methods (Traficon video detection) and careful automated management in the Comet UTMC system installed in Liverpool.

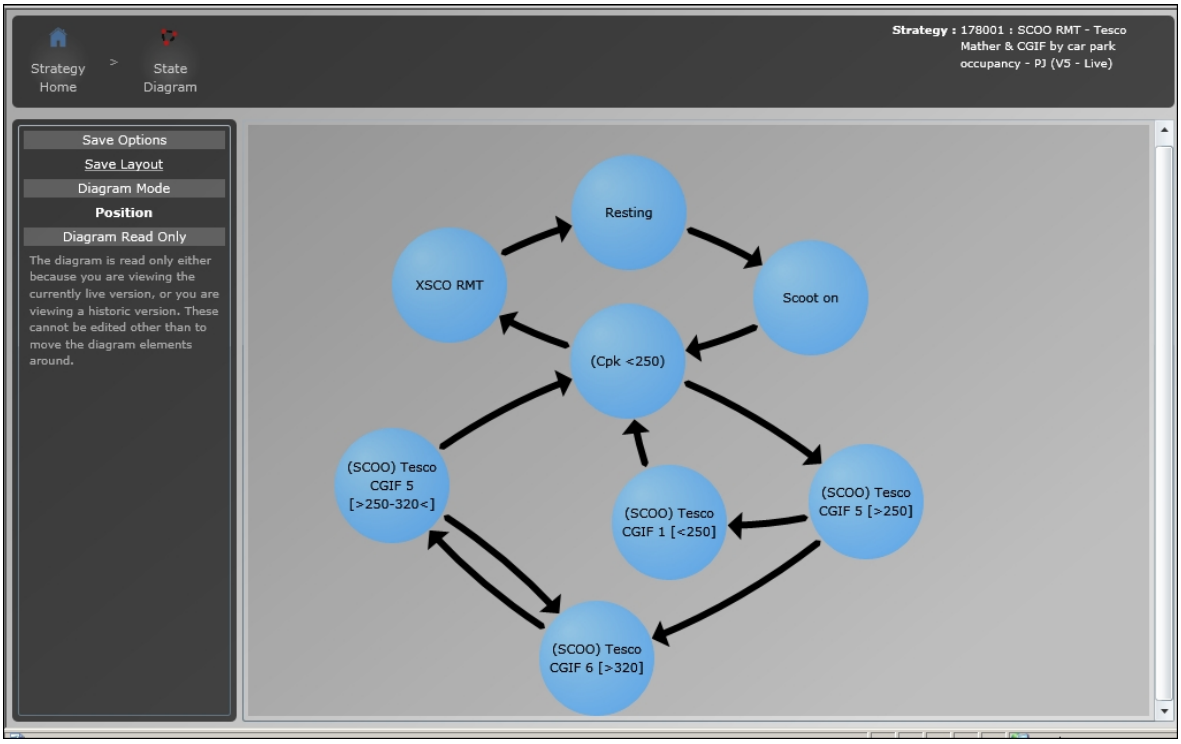
Firstly SCOOT operation is only enabled when sufficient demand exists to justify implementation of SCOOT – otherwise the intersections operate under local control to provide the most efficient mode of operation. SCOOT operation is automatically selected when demand over one or more links exceeds pre-defined thresholds for a specified period of time.

The configuration of SCOOT control is then monitored and automatically modified in conjunction with the occupancy of the car park at the supermarket site which is used as an indication of the level of business – and consequent traffic demands – from users of the supermarket.

The occupancy of the car park is then used as part of the trigger conditions within the UTMC strategy manager to drive different congestion configurations for the SCOOT node (Congestion Importance Factor). This method of control ensures that the short link lengths do not prevent SCOOT responding appropriately to potentially busy traffic conditions which are difficult to detect using traditional configurations.

Different car park occupancy values are used to determine different levels of usage for the supermarket car park and in turn configure varying CGIF values for the link.

This configuration ensures that when SCOOT detects congestion on the link it gives sufficient importance to the link in the split optimisation, bearing in mind the short link length and potential under normal circumstances to not operate as effectively.



This is all configured visually as a flow chart within the Comet UTMC system making what is a fairly complex series of trigger conditions and states, easy to assimilate during configuration and subsequent operation. In this way, effective control has been implemented at a site using non-traditional data, integrated through the UTMC traffic management system.

Conclusions

When systems are integrated to meet the requirements of a strategic network management plan, significant benefits can be achieved. The fusion of all available network data into a single, consolidated picture reduces the operator workload in simply determining whether the network is performing normally. Add to this the powerful data filtering and analysis tools in a UTMC common database such as Comet and for the first time the operators in the traffic control centre are able to concentrate on managing the network efficiently by realising new methods of control, increasing automation to support operations.

Many data sources already exist and new options are becoming available almost weekly to support UTMC solutions. The single reference source of information created by integrating systems allows easy configuration using open standards, and removes the need for bespoke interface development each time a new user is included. Data quality and reliability remains important for automated operation to ensure that systems operate effectively and reliability under all conditions.

Systems integration allows operators in today's traffic control centres to manage the road network using information from a variety of disparate sources to implement any strategic response. The continuing pressures on existing resources and budgets mean that greater user must be made of automation and information which is available within UTMC systems to reduce operator workload and provide the service which is expected by network users.