Image: Mikhail Dudarev / Shutterstock.com

Heading in the right direction

Transporting raw materials, finished goods and service call-out personnel has long been regarded as a fixed cost, with budgets rarely challenged. However, with increasing competition, tighter legislation, and a demand for same-day (if not same-hour) service, times are changing, as Faith Clark reports

Routing and scheduling are two common phrases often bandied about within the transport technology arena. The Vehicle Routing Problem (VRP) is described by Wikipedia as a combinatorial optimisation and integer programming problem that asks, 'What is the optimal set of routes for a fleet of vehicles to traverse in order to deliver to a given set of customers?' Vehicle Scheduling, also called 'blocking', is described as involving the assignment of vehicles to cover the trips associated with a given timetable.

In other words, when put together, routing and scheduling can be defined as where a vehicle needs to go, at what time, and in what order to meet a pre-defined set of criteria. Additional terminology is used in more specialist operations such as command and control for emergency services, taxi despatching systems, and service management systems for field maintenance

It is, however, the combination of the two technologies that provides a powerful solution for virtually every modern transport operation.

Pioneer

Paragon Software Systems from Dorking in Surrey was arguably the pioneer of routing and scheduling systems in the UK. Today, it is considered a market leader, supporting major retailers such as Sainsbury's, ASDA, Tesco and Harrods, as well as exporting solutions around the world with regional offices in the US and China. Routing and scheduling is at the core of the company's product offering, with solutions for single depots, multi depots and integrated fleets.

Running on the Windows platform, the Paragon suite of products holds details of customer addresses, delivery quantities, time windows, vehicle sizes, driver shift details and other transport parameters. The routing software then calculates the most effective delivery/collection sequence and calculates accurate journey times to produce or adhere to a schedule. The software can also allocate loads to appropriate vehicles to help maximise productivity. Paragon users can also amend routes or schedules in order to accommodate last minute changes, in house transport rules and local knowledge, for example.

Paragon customers have, over the years, enjoyed significant savings and efficiency gains, including a 142,245-gallon fuel saving by Sainsbury's across just four sites; a one million kilometre reduction in delivery miles by logistics company A F Blakemore & Son; a reduction of over 900,000 lbs of carbon dioxide emissions by distributor Martin Brower, and an £800,000 reduction in annual transport costs by

AAH - the largest pharmaceutical wholesaler in the UK. Global drinks logistics company Kuehne Nagel also achieved a 60 percent reduction in daily planning time.

Real-time working

For real time operations such as same day couriers, taxi companies and even patient transport services, a dynamic solution is required. Real-time routing considers not only the proximity or nearness of the resource but also its appropriateness for the job or service requirement, all in real-time. In some sectors, real-time operations are further complicated when the resource – driver or vehicle – is independent. 'Multi-agent' adaptive or real-time routing and scheduling provides a mechanism whereby decision making is distributed, rather than centralised, and the technology supports many decision making nodes.

It may easier to understand this technology in a real-world context. Magenta Technology, founded in 1999, developed a unique multi-agent dynamic scheduling system. Working with Addision Lee, London's largest private hire company that transports more than 10 million passengers each year in London alone, Magenta implemented a solution that schedules passenger orders as they are taken; reacts to each car's known position; takes into account both passenger and driver preferences, and can even accommodate real-world events, such as congestion. The first of its kind and the forerunner to Echo (Magenta's premium taxi despatch software), this solution helped Addison Lee achieve demonstrable bottom line improvements and gain substantial market advantage in a highly competitive market. Specifically, Addison Lee improved its fleet utilisation – with a reduction of 17.4 per cent in dead mileage and an increase of 1,000 jobs across the fleet in the first week. And with 97 per cent of jobs being allocated automatically, it also reduced the workload on controllers.

Magenta went on to develop Echo, a solution that now supports brands such as greentomatocars (the UK's first 'hybrid cars only' minicab service and London's second largest minicab company); eConnect cars (London's business class, chauffeur-driven car service using all-electric vehicles), and Q Despatch (a specialist private car hire operator, also based in the capital), to name just a few.

Smarter scheduling & routing

Introducing a new system can, as outlined above, achieve significant operational and financial gains as well as less tangible results such as improvements in customer care and reductions in environmental or social impact. However, in order to maintain market position and financial competitiveness, these benefits cannot be one-offs. Continuous improvement and review, not only of the operation itself, but also of the technology that supports decision-making and planning, is critical to continued success.

Smarter Mapping, newly launched by Paragon, is a suite of intelligent map layers with which transport planners can add greater precision to their output. Street-level mapping, including street denominations and turn restrictions, average road speed data and truck attribute data such as height, weight, width and length restrictions, can all help planners understand the road network in far greater detail and create feasible routes with more accurate timings.

Paragon has also applied its development team to incorporate

London's Congestion Charge and a threatened 'lorry ban' are upping the pressure on fleet operators to work smarter

Specialist private car hire operator Q Despatch uses Magenta's Echo despatch software to streamline its operation in the capital

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details of 'predicted' congestion caused by public events while still avoiding, for example, known restrictions. Route Control can take details of temporary road restrictions, one off sporting events, annual celebrations or even more regular congestion such as that caused by school drop-off and pick-up. Algorithms within the software calculate alternative routes and the results stored in a calendar for future use.

Magenta has used its experience in developing Echo for the private hire market to devise a real-time or dynamic routing and scheduling solution, Maxoptra. Aimed at users in the rapidly changing service and distribution sectors, Maxoptra is a web-based solution that offers smart scheduling, streamlines job despatch and service delivery, and reacts to real-world events in real-time. Maxoptra is already delivering benefits to organisations such as ServiceLine, Natures Menu and Flowervision.

Challenging times

Changes in legislation and the growing demand to reduce congestion on some of the busiest roads are leading to ever tighter controls on transport operations. Systems such as London's Congestion Charge Zone are already well established, but an expansion of the London Lorry Control Scheme with a threatened 'Lorry Ban' could have a dramatic impact on transport operations and require a considered response, not only from fleet operators but also from technology companies such as Paragon and Magenta.

Demand from consumers and customers is also increasing, with next day delivery no longer living up to expectations and same day – if not same hour – deliveries becoming more popular. The emergence of Uber – the request, ride and pay app – in the private hire sector may well give the service and distribution industries some indication of things to come!

1. Paragon Software Systems: www.paragonrouting.com
2. Magenta Technology: http://magenta-technology.com

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