



Current and future use of geospatial information in the transport sector

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Scope

This paper considers the current and future use of geospatial information in the transport sector, and the main areas of application. It covers a broad range of transport activities, including the delivery of goods and services to homes and businesses, as well as public services such as street cleaning.

It looks at the factors influencing decisions made by organisations using transport, and possible reasons why they might increase their use of solutions which use geographic information. It also considers developments in geographic data that are relevant for the transport sector.

The paper takes in a number of closely related topics that have an impact on transport, including personal navigation devices, tracking, public transport and transport infrastructure planning.

Another growth area for geospatial information the wider transport world is the leisure sector, where cyclists, walkers and other enthusiasts are all potential users, and these are also considered.

Current position

Geospatial information is becoming ubiquitous throughout society. People may not know it under that name; they may think in terms of satnav, or real-time traffic information, or Google Earth satellite images on Web sites, or “how to find us” maps. But the fact is that all these developments are contributing to the increasingly strident clamour of voices telling us how location-based information is changing the world, and especially the way people move around in it.

It is tempting to imagine that all this is new to the transport world, but in fact it is already familiar territory here. Road transport has been using geospatial information to improve its efficiency for many years. Digital mapping, for instance, already plays an essential role in automated scheduling optimisation systems – familiar tools that are used widely throughout the world for planning the movements of vehicles and people. Mapping also lies behind strategic network modelling – deciding where to locate your depots, and which of them to use to serve specific customers.

What is happening now, though, is that more and more geospatial information is becoming available, and the revolution in mobile communications means it is available more quickly. Road and street mapping is becoming more detailed and accurate, and is being updated much more frequently than in the past. Real-time information is being made available about weather, traffic conditions and other

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factors that could influence transport movements. Massively detailed analysis of traffic volumes on specific roads at specific times has made it possible to predict future road conditions much more convincingly.

Whether by chance or through indirect cause and effect, the time is exactly right for the transport industry to make use of this enhanced information. Even disregarding the recent recession, fuel prices have been rising inexorably in the past few years, prompting a demand for more efficient transport. At the same time central governments and local authorities have been embracing policies such as congestion charging, from which freight vehicles are not necessarily exempt. That has driven a demand for more cost-effective transport planning.

And underlying all these developments has been the relentless shift towards “green” policies, which have put unprecedented pressure on transport operators not just to be efficient, but also to demonstrate that they are. Although the recession may have shifted the focus temporarily to more basic economic priorities, environmental awareness seems to have become too ingrained in the public consciousness to have drifted far off the social agenda.

This has affected not just freight transport operators (always a prime target in the public consciousness), but also private car users, who are demanding intelligent systems that optimise choices of vehicle and route, and also public transport operators, who are under equal pressure to reduce their carbon footprint.

In the business world, many of these pressures are being brought together as part of an emerging discipline known as corporate social responsibility, or CSR. This can cover anything from safeguarding the interests of mobile workers to respecting consumer protection laws and limiting the environmental impact of transport activities.

The world of geographic information is in a unique position to help address many of these issues, and this is likely to be the most evident opportunity and challenge for those in the market over the next five years. Whilst many of the building blocks for enhancing transport efficiency are already there, the task for people working with geospatial information will be to get them working effectively together.

Anticipated changes

1. Transport operators are likely to become more willing to share operational data in real time – and even use of vehicles themselves – in order to force down costs. Several such initiatives have been announced in recent years – and more can be expected to follow, particularly between leading organisations in FMCG, major retailers and their logistics services suppliers. Driving such initiatives will be the availability of more accurate scheduling and planning

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information, including details gathered by the use of transport telematics systems in near-real time about the location and load status of vehicles that might become free to collect loads.

2. Routing and scheduling optimisation systems, nearly all of which are reliant on digital mapping, will be introduced by increasing numbers of transport operators – not just on complex multi-drop operations, where the benefits of automated scheduling might seem obvious, but also on single-trip journeys, where optimisation systems can help to predict current journey times and plan for future staff and vehicle availability and suitability for individual tasks.

Such systems will make increasing use of real-world data on road types and historic, recent and predicted traffic patterns and volumes. Systems already on the market can schedule for different roads speeds on different segments of road or types of environment, different times of day and different days of the week, and this trend will gather momentum.

3. Incremental scheduling will become more common. This is the arrangement in which orders are allocated in advance to future delivery schedules, and loads are then reshuffled progressively as the delivery time approaches and new orders come in. This is a complex approach involving many variables, and will only be viable for users who can pool in-house and external data effectively, including the progress of the fleet of vehicles already out on the road.
4. Home shopping deliveries will continue to grow in volume terms, giving rise to an increasing demand for “day-definite” and time-definite deliveries. This will add fuel to the pressure for incremental scheduling, and will also require suppliers be able to ring-fence current stock to meet future orders, or amend production or buying schedules at very short notice in order to meet both current and predicted demand levels. The concept of the customer paying a different price dependent on the delivery service level is also increasingly apparent. Here, a wider time slot in which the delivery is guaranteed is presented as a “greener” as well a cheaper option which may suit the conscience and pocket of the cost-sensitive consumer and so creates more possible permutations for the vehicle scheduling process to take into account.
5. Real-time proof of delivery information, already gathered widely throughout the transport world, will become almost universal, requiring on-board or personal mobile computers to be carried by all drivers, with capacity to capture data, signatures and other information and

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- pass it instantly back to base over wireless data networks. Increasingly this data will include precise geographic coordinates of each delivery point, automatically providing evidence of the fact that the driver was actually there, and for how long.
6. Transport planning software will increasingly be available over the internet on a hosted or “software as a service” basis, in which users will effectively “rent” access rather than buying on-site licences, as in the past. In such a scenario, the traditional software licence renewal cycle is replaced by an arrangement where the system can be updated centrally at any time, which will add to the demand for continually-updated mapping and related data.
 7. There will be ongoing price pressure on digital mapping, reflecting its increasing use in business software, along with a general public perception (albeit mistaken in many cases) that data should be freely available, no matter how much it costs to gather and keep up-to-date. New choices of digital mapping will become available for GIS applications in the transport sector, including data which is either newly created or newly made available, will continue to emerge to offer affordable, or even free alternatives to established sources and with less restrictive licensing. These new sources may stem from private sector commercial ventures such as UKMap from The GeoInformation Group, the European Union INSPIRE directive which will better facilitate public access to spatial information across Europe and the OpenStreetMap project which creates and provides free geographic data including street maps to anyone who wants them.
 8. Suppliers of map data may be able to counter price pressures to some extent by the amount of detail, guarantees of completeness and degree of accuracy with which their information is assembled, stored and kept up-to-date. Transport applications will require increasingly accurate and detailed information in order to handle the complex calculations needed to produce reliable routes and schedules that reflect the day-to-day reality of road conditions. Low-cost or free mapping may not meet the required quality standards for many transport, logistics and navigation GIS applications

Nevertheless, map developers need to be aware that data pricing could be more volatile in future than was the case in the past. This applies particularly to the leisure sector, where anyone from hikers to skiers will increasingly demand GPS and other related devices, but users are likely to expect data costs to be low. Although the potential market size is much greater in consumer than business circles, margins for the geospatial industry are therefore likely to be much tighter, and the rewards less predictable.

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9. As transport operators become aware of the opportunities presented by digital mapping and geographic information systems, more of them will use these resources to identify potential customers (the classic “spots on maps”) for use in both resource planning and marketing. Drivetime calculations and isochrone modelling, already used by savvy retailers, will become more commonplace in the transport world at large.

10. Road map data specific to commercial vehicles (height and weight limits, for instance) will gradually be used more extensively, both in the satnav systems for which they are being collected, and in scheduling and modelling software that uses the resultant data. Whilst truck-specific data is already available for some countries and on some routes, coverage is inconsistent, and this has limited the expected potential; but as gaps are filled, confidence in these systems will increase, and eventually it will be the norm for truck journeys to be planned on the basis of navigational data known to be suitable for them.

Impact of changes upon the geospatial industry and upon customers

Map data and software to process and interpret it will be increasingly embedded in transport and logistics systems of all kinds. Just as the consumer mainstream now takes mapping for granted, business users will increasingly do the same.

That is the good news for suppliers. It means demand from the transport sector is likely to remain strong, and will probably grow even further. What is less easy to predict is whether margins will stay at their present level, or dip as sales volumes increase.

Either way, users will also emerge as winners, since they will have access to increasingly sophisticated systems that exploit geospatial data to help them cope with tight margins, meet customer demands, fulfill compliance requirements and pursue market differentiation.

Among users, the biggest winners will be those transport operators who succeed in “joining the dots” in terms of way they deploy geographically-related systems throughout their business. They will be sharing such data across multiple functions including marketing, network management, scheduling optimisation, route planning, and proof of delivery management, customer services and compliance monitoring.

However, none of this is likely to amount to a revolution, but rather to a steady evolution in the way geospatial information pervades the transport world.

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Scenarios

Viewing the transport market at the closing stages of the decade, it is impossible not to see the economy as a defining factor in the deployment of geospatial data in transport. In practice, though, whether the economy revives and flourishes or languishes in its present state, geospatial information will continue to have an important role.

1 If the economy remains flat or even declines further

In this case geospatial information offers the opportunity for the transport world to reduce costs, while still respecting the unremitting drive for “greener” transport solutions. Spending restraints will eventually be relaxed, and the first place operators will look when making investment is at systems that can bring a quick and clear return on capital.

2. If the economy improves and the rates of growth and investment increase

In this case transport world will be in an even better position to take advantage of the advances that are being made in geospatial information.

In both scenarios, the transport world is likely to be drawn to classic applications such as network planning and scheduling optimisation. And as street-level mapping improves in detail, granularity and currency, there will be more opportunities to improve efficiency while at the same time enhancing customer service.

Summary of five key points

- Improvements in road network and related data will continue steadily, and will feed through into business applications, as well as enhancing the effectiveness of satellite navigation.
- The green agenda will continue to have an influence on the transport industry. Businesses will want to parade their credentials as part of their marketing message, and geospatial data will be a key element for them in achieving the necessary transparency and efficiency gains. However, cost saving will remain the biggest incentive to purchasing of technology, and this will wax and wane with the price of fuel, its availability and the extent to which taxation affects the market.
- Organisations will increasingly look to improve the information they have about vehicles on the move. Their interest will extend from vehicle tracking systems to real-time monitoring of arrival times and presenting of tracking information to customers.

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- Optimisation solutions will be adopted even more widely than at present in the private sector, and increasingly in the public sector too – introducing savings in activities such as waste collection and disposal.
- Geographic information will increasingly be integrated into the mainstream information technology systems of transport operators. Track and trace, visibility of the progress of an order, expected time of delivery, real-time proof of delivery, improved customer service: most of these things have already moved past the peak of the so-called Gartner Hype Cycle, and will steadily entrench themselves as “must-have” elements in the everyday transport mix.

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