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Telematics – the road ahead

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Telematics has a fairly broad definition – "the use of IT and telecommunications in the provision or exchange of information". Such a definition covers a wide range of technologies e.g. pager, email, Internet, telephone, fax etc. and can apply to many diverse markets such as medicine, security, traffic and transport and even art. It would be impractical to deal with all technologies and markets within the confines of a single paper, therefore, I have selected several areas in which the market is developing rapidly and discussed these and the demands that they place on the map data provider wishing to supply the backbone needed to support these new applications. The specific areas to be dealt with in this paper are some of those requiring mapping as a core element of the service such as security (personal and vehicular), business efficiency and provision of pedestrian services.

The success or failure of all services, telematic or otherwise, will depend on factors outside of technical considerations. Far too often in technological markets companies release products and services in the market which fail because, although they are technically innovative, there is no real demand within their chosen sector. Fundamental questions need to be asked:

- Is there a genuine demand for these services? If not, can that demand be created and at what cost.

- Is the technology mature enough yet?

- What is the value to the provider?

- What is the value to the end-user?

- Will the customer pay for the service?

- How much will the customer pay and how? Subscription? Pay as you go?

- CAN THE PROVIDER MAKE MONEY OUT OF IT?

Bearing in mind the current conditions in the market-place and the track record of Internet companies like Amazon and Lastminute.com who have spent huge amounts of investors money building brands but still don't make any real profits after years of operating, it would not be surprising if anyone looking to invest in this potentially lucrative market is somewhat more sceptical than in the past. Although the consolidation of Telecos forced by poor investment decisions on licenses has created many opportunities for the survivors, investors will, I'm sure, wish to satisfy themselves that these issues have been fully considered before throwing their money into another bottomless pit.

Having said all this I'm sure that we stand on the cusp of some very exciting services being launched, which because of their dynamic and mobile nature have every chance of huge success in the future.

Security

Through GPS, or other means, location can be used in services providing additional security to both vehicles and people. Security tracking of vehicles with installed GPS receivers is nothing new, however, the cost of the hardware is continually reducing and car manufacturers are beginning to install these systems as standard in some cars. Just as importantly the growth and low costs of mobile telephony make it much more cost effective to provide the carrier needed to transfer the location data to the service provider or central base station. Many fleet tracking system suppliers have and are extending the range of services available to become a comprehensive fleet management tool. In terms of market requirements for these systems it is clear that if one stolen trailer can be retrieved in tact with a cargo worth 100's of 1000's of pounds (if not millions) any such installation would rapidly pay for itself, however, other fringe benefits could be reduced mileage and fuel costs and more efficient utilisation of the fleet.

The benefits are less obvious in the consumer end of the market. While nobody likes to have their car stolen, how many people will pay £100's to help retrieve it when they know that an insurance company will replace it. Unless the insurance industry is prepared to part fund such installations and services by offering insurance discounts to people subscribing to these services it is difficult to see it really taking off. Dare one mention the potential "white knight" of 3G networks? These could offer another possible route for mass uptake of these services by not only providing the hardware as part of your standard mobile phone but opening up the options for subscription and "pay as you use" services.

In the business-to-business sector there is an obvious opportunity to provide "panic button" services to vulnerable workers e.g. social workers through the use of telematics. By the simple pressing of a single button, assistance could be provided to the worker in a timely manner and straight to their location.

Bearing in mind the recent publicity surrounding a number of high profile cases of disappearing children, one variation of this "panic button" service might be a system, which can track the whereabouts of children. Such a service would certainly be highly popular with parents but perhaps less so with the children.

Similarly the roadside assistance providers in the UK could provide very high levels of customer service through implementation of this type of technology. Currently the most time consuming part of a call to these service providers is trying to locate the incident. GPS in the car or through a mobile device such as a GPRS or 3G phone would immediately pin-point the caller, improve response times and save money by reducing the time to take the call and searching time of the roadside engineer.

As a potential view of the future, I read with interest a report of a recent F1 Grand Prix. The continued monitoring of the performance of all aspects of these cars was nothing new to me but I did note that they also had the capability to remotely adjust certain parameters of the engines performance in attempt to correct a problem that was developing. Many innovations developed in this rarefied world do eventually find their way into our cars. Can we envisage a day when this sort of capability is available to us through AA/RAC or we get pulled to the side of the road to tell us that we need immediate adjustments to our engine management systems or we will soon breakdown? Fanciful! Maybe, maybe not.

Map data requirements for these types of service are generally already available and needs to be as up-to-date as possible, have reasonable positional accuracy ($\pm$ 5-10m) and be detailed enough for the given application. E.g. while location of a vehicle only really requires a road to exist on a map, a panic button service for a pedestrian may well require more detail such as building outlines and possibly even 3D information.

Business and Personal Efficiency

Whether it is to-and-from work each day or trying to get to your holiday destination, one of the most time-wasting pursuits of the human race is travelling (particularly in the car). How many of us poor London commuters spend 2-3 hours a day going no distance at all? While it is fairly clear that a reduction in the number of vehicles on the road is an ideal solution, public transport infrastructure is currently geared up to take the extra capacity required and anyway doesn't always present as a viable alternative because in most cities it is designed for radial commuting in and out of the centre rather than laterally through the outskirts. Every day as I sit **alone** in a traffic jam and look around me and see the majority of cars with a single driver I

think: we could solve the problem at a single stroke if everyone doubled up – any volunteers?, if only I could find a way around this next quarter mile I could save 20 minutes on my journey, perhaps I could have left earlier or later and do the journey quicker etc. – bang! I've hit the car in front as my mind ponders these matters and brought the whole of London to a standstill.

The problem is even more serious for companies running fleets of delivery vehicles. Such problems, while being inconvenient and annoying for most of us, can be very costly in both money and customer satisfaction. Increasingly fleet managers are looking for ways to reduce cost by finding ways around traffic hold-ups and optimising the scheduling of vehicles. Services have been available for some time, which will provide information about traffic incidents but have left to individuals to decide what to do and how to work around the hold-up. A "solution" to this problem can be found already on continental Europe by use of in-vehicle satellite navigation systems, which make use of Traffic Message Channel (TMC) broadcasts over normal FM frequency radio channels. TMC broadcasts are used by the navigation system to determine whether or not the originally calculated route is still the shortest to reach the destination and, if not, re-route the driver via a quicker route. The broadcasts are related to a set of TMC codes – locations on the road network used to pinpoint sections of roads with traffic delays.

TMC services are free to air in Germany, Benelux, Austria and Switzerland. E.g In Germany TMC locations are defined by the government, messages generated by the police and broadcast free of charge on radio or at a cost via GSM (Tegaron). The UK is different.

The UK government has not been involved in discussions regarding the broadcast of TMC related data and therefore do not supply a standard set of codes for use in this environment. There are currently two suppliers of TMC codes: ITIS/AA (joined forces in June 2002) and TrafficMaster, however, currently ITIS are the only organisation with a licence to broadcast traffic data using TMC using Classic FM. Both organisations use different methods for producing traffic information: ITIS use "floating vehicle" data which involves monitoring the movement of large fleets of vehicle like National Express buses and Eddie Stobart trucks whereas TrafficMaster uses roadside traffic sensors to achieve the same result. There is a trial underway which will monitor the movement of mobile phones from one cell to another in order to assess road speeds. If successful, the increased number of monitors will improve the granularity of the traffic information. These services are being paid for by either uplift in the cost of an in-car navigation CD or subscription.

Currently only some Toyotas and BMW's are able to take advantage of TMC enabled navigation but it is expected that navigation systems will be able to do so in the next 2 years and that more off-board navigation systems offering additional services e.g. where is the nearest bank and is it open, will become available like those currently offered by Yeoman and TrafficMaster.

The real compelling systems of the future will, I'm sure, be those that can make effective use of the high functionality of in-car navigation systems, the crucial element of traffic flow data and the richness of off board information services. Such systems will sure be worth far more than the sum of the component parts.

For database companies, such as Tele Atlas, the non-standard nature of the UK market has already presented its own challenges. Apart from the collection and maintenance of some 10,000 – 15,000 codes the whole database model has had to be modified for the inclusion of multiple rather than a single set of TMC codes – a process now completed.

Pedestrian Services

With the advent of GPRS and 3G mobile phone networks and new generations of phone, which are able to locate the user accurately, we will start to see a whole range of services becoming available for delivery to a hand held device which we can take with us wherever we go. While there will no doubt be many services in the field of entertainment and general information, the most interesting prospect to a map data supplier is the potential of pedestrian or vehicle navigation through your PDA or phone.

It is unlikely that devices like these, which rely primarily on a GPS signal for location, will replace in-car navigation systems in the short term because of the potential loss of such signal is built-up areas. A brief loss of position could result in missing a turn and ending up taking a massive detour. Note: despite most

car manufacturers referring to in-car navigation systems as "satellite navigation systems", it is a bit of a misnomer. In-car systems primarily use data from gyroscopes, wheel sensors and speedometers to determine the speed and changes in direction of the vehicle and then match this information to the on-board map to determine position. The satellite is used mainly as a reality check once or twice a minute. Someone will have to market a low cost cradle for the phone or PDA, which can give the device access to this car data, before they become a real threat to the current navigation systems.

The great beauty of the mobile device is of course the ability to take it with you and use it while your walking the streets. The potential loss of GPS positioning is minimised by having more time to look for landmark instructions while walking. A typical instruction might be "turn right at the Red Lion pub on to Norfolk street" rather than the in-car systems "please turn next right" which crucially relies on knowing exactly where you are.

We can expect systems now not only to locate the nearest restaurant or a specific address but also to guide us to the door – early versions of such personal navigators such as those produced by Navman for the Compaq iPAQ, are already on the market.

The needs of a routing database for pedestrian navigation are clearly different in some aspects than for routing in cars, particularly if the requirement is for "safe routing". Although, if we exclude motorways and some A-roads, the road network is the same, pedestrians will not need one-way street or banned turn information. They will however need to know if a street has a pavement, whether or not it's lit and where the entrances to buildings may be. They will also require data sets that include footpaths, pedestrian bridges and lots of landmarks.

Issues for map supplier to Telematic Services

From the viewpoint of a map supplier like Tele Atlas, these exciting developments in the Telematic arena and many more that I haven't mentioned, present both a great opportunity and a dilemma. It is quite clear that additional road attribution, improved accuracy and more content rich maps are required but at the same time the investment required to collect and maintain a database will not support the concept of a proliferation of functionally specific data sets. Most digital maps are general-purpose maps, which can be used for telematics, routing and navigation, printing, general-purpose GIS work and many other things. As such the revenue streams from all these sources makes it economic to be in the business.

The development of these databases to cater for these additional markets will take both time and investment; will inevitably be the result a many compromises on the side of both map producer and service provider and may also involve the co-operation of many parties to achieve the desired infrastructure to make the emerging markets work.