Integrating technology into the transport business

Abstract

RTIG is the UK's community organization for technology in public transport. Its members include local authorities, PT operators, and the systems industry. In addition to subscription income it receives some grant funding from DfT for a rolling programme of research and coordination activities within the sector.

This paper summarises the current position of the marketplace, reflecting and building on the results from our latest annual Public Transport Technology Survey. Examples are given both of the problems, and of how they are being addressed in local projects around the UK.

The RTIG Survey 2011

RTIG conducted the UK's 2011 Public Transport Technology Survey with the aid of grant funding from the Department for Transport. The Survey report was published as RTIG-PR016-D001 in April 2012 and is publicly available.

The survey was based on information received from Local Authorities in response to a questionnaire issued during November 2011. Of a total of 136 issued, a total of 81 responses were returned, 55 of which were from local authorities with operational RTI systems.

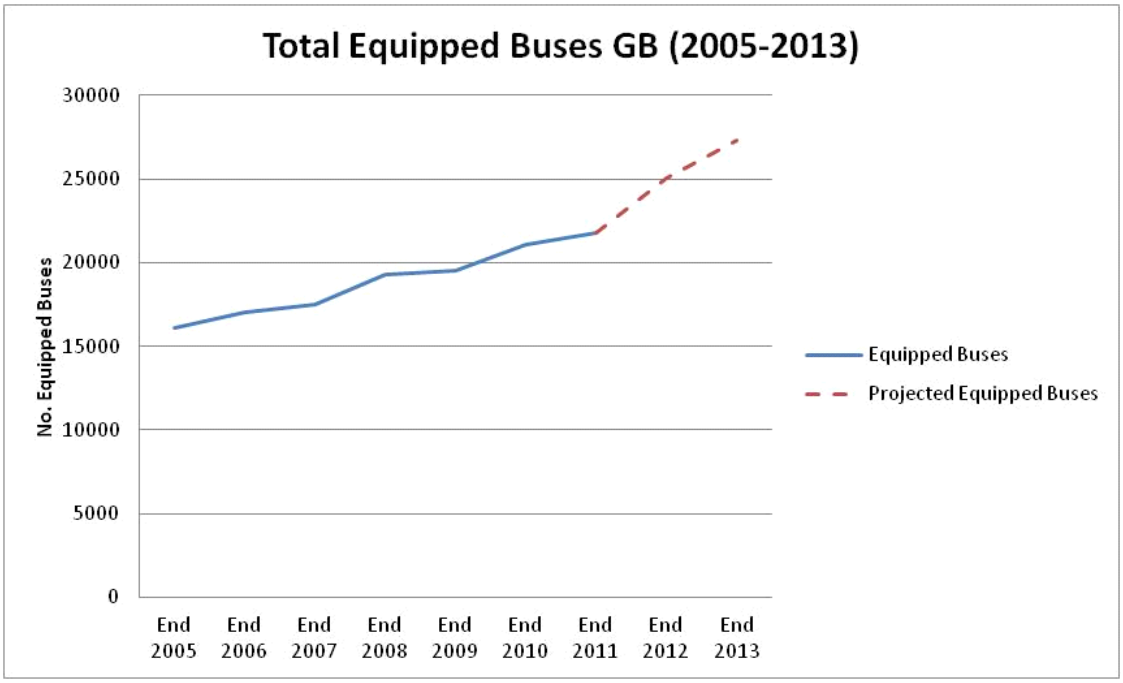
While headline numbers for equipped vehicles remain flat and expenditure is subdued relative to the first few years of the Survey, there are some dramatic changes in how systems are designed and configured, which look to change the national architecture substantially over the next couple of years.

The current UK position

The number of AVL-equipped buses has risen since 2002, and 2011 continues this rise with a modest increase of 704 equipped buses since 2010 to 22,118 or 50% of the total UK bus fleet. An estimated 3.4 Billion bus passenger journeys (65% of the UK total) occurred on equipped buses, largely unchanged from last year.

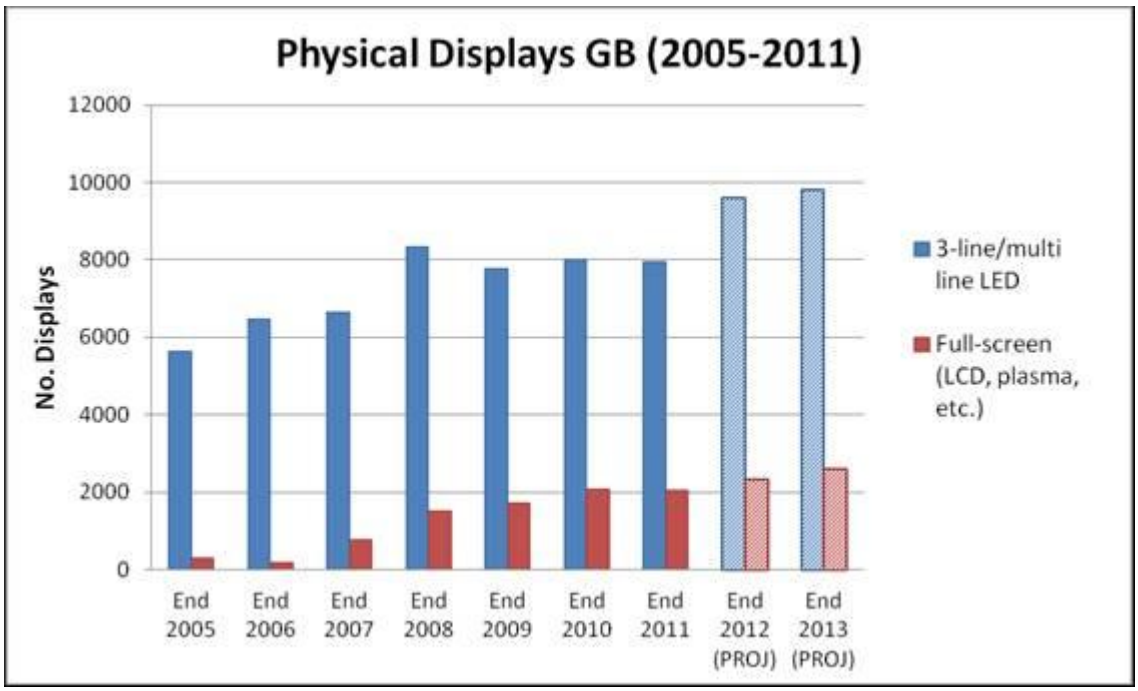
Growth this year and projections for the next two years are surprisingly bullish in the English metropolitan areas. From 3610 equipped vehicles in 2010, there are 5,006 this year, and this is projected to rise to well over 9,000 by 2013.

Also of note is the dramatic rise in the use of Electronic Ticket Machines (ETMs) as AVL equipment, from 3,382 this year to 10,289 by 2013. This is apparent across many authorities, both metropolitan and non-metropolitan.



Audio/visual equipment on buses continues to see a steady rise, but is still only provided by a few LAs: about 23 for on-bus visual displays and about 13 for audio equipment. Most of the buses equipped with audio/visual are in London – all 8,491 of London's buses are equipped.

Installation of physical displays in the UK continues the flat picture seen over last several years. In 2011, there were 10,176 stops fitted with RTI signs, a slight fall in reported numbers since last year. Although there was a prediction that there would be a shift towards full screen displays this year, that has failed to materialize.



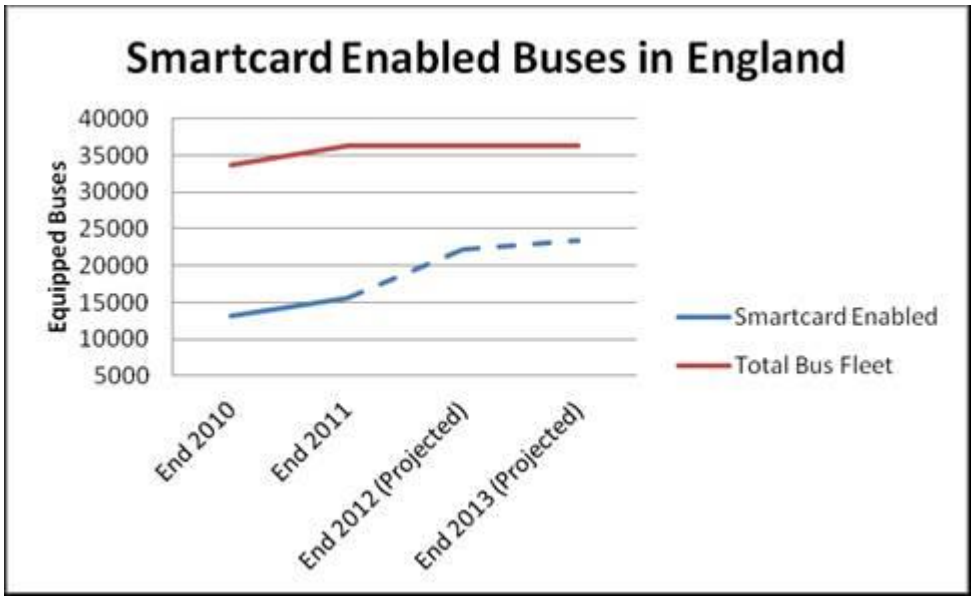
Stops covered by virtual dissemination far outnumber physical signs with SMS covering the largest number of stops at 108,221 and LA Websites covering 82,790 stops; mobile apps cover 63,459. The greatest growth over the next two years will be in mobile apps which are predicted to be offered at 103,482 stops by 2013. Respondents also indicated that mobile web (as distinct from apps) would be a significant player in future information provision.

Respondents were asked how they view the development and use of apps now and into the future. 44 out of 53 respondents felt that mobile apps were an important development in RTI distribution. Mobile apps were rated highly for reliability and accuracy.

System replacement is primarily the result of faulty equipment. Vandalism has been a particular problem for at-stop displays in previous years, but this has dropped this year to be comparable to end of life replacements. Discontinuation happened for various reasons including "cost of operation" and "failure to perform".

37 LAs indicated that they would be using the ITSO protocol for a Smart and Integrated Ticketing scheme. Three quarters of these are using only ITSO, while a quarter are using ITSO in combination with other protocols. However last year only 2 LAs reported using EMV, and that number has risen to 8 this year.

In England, 15,559 buses were smartcard enabled by the end of 2011 accounting for about 46% of the fleet. This is projected to rise to 23,465 by the end of 2013.



LAs are responding to the Government's Open Data agenda. 28 are providing real time data and 32 are providing schedule data, with 23 are providing both. Other information that is commonly provided is Stop Location and Routes provided by 24 LAs and disruption information provided by 12 LAs. Parking, Accessibility and CCTV all scored quite low with only 4-7 respondents providing these.

Data is most often provided as "raw" or "processed" (rather than "sorted" or "contextualized"), with similar numbers providing it in each way. Almost no LAs provide combined data for bus and rail services, largely because the LAs don't handle rail data. Interestingly open data does not tend to have any licensing restrictions, and where they do exist they are often not monitored.

During times of disruption, LAs either put a standard holding message on their on-street signs, or give out real time information about the disruption on their signs. Only a few – 8 out of 53 – actually turn their signs off.

Disruption information is provided through a number of channels and most LAs provide information through more than one. Most commonly it is given out through on street signs, and LA/3rd party websites. Mobile apps are not yet widely used, with information only provided through that channel by 7 LAs. Facebook is used by 8 and Twitter by 17 – including one which uses Twitter exclusively.

Total expenditure has continued to fall slightly this year, from £18.0M in 2010 to £17.3M in 2011. However, it looks as if the drop is levelling out and expenditure is predicted to rise in 2012.

The four issues which have the highest impact on LAs are similar to those in 2010: financial considerations, cost of maintenance, availability of power supply, coordination with suppliers. Coordination with Suppliers has displaced Bus Fleet Movement as the fourth concerning issue, jumping 5 places since last year.

"Financial considerations" has been a concern since 2004, and has now been the primary concern for three years. This is likely to be a reflection of the current economic climate at least in part. Similarly the cost of maintenance has ranked in the top 4 for the second year, but this may be a reflection of the age of some of the systems. The sudden movement of coordination with suppliers into the top four was more unexpected.

The position in Scotland

The position of Scotland differs from the overall UK position in a number of significant respects: in some areas, Scotland is distinctly in advance of the general UK position, while in others it is behind.

Some of these differences can be ascribed to large scale institutional anomalies, specifically that:

- London has a huge central operation and a coherent (almost entirely) metropolitan geography. Because of this its deployments may take longer but are more pervasive when they occur, and results which are either 0% or 100% are common. As London reflects a fifth of the UK's vehicles, and a third of its bus journeys, this has the effect of skewing the English numbers.

- Scotland has a generally more coherent approach to national and regional projects than England, where many local authorities are effectively left to get on with it. While this makes for a more flexible response, it makes coherent national policies much harder to deliver in systems terms.

For instance in Scotland, AVL-equipped buses number 1405 out of around 4300, a proportion of around 32%. This compares with a UK average figure of 50% – but quite similar to the figure for "England outside London".

Unsurprisingly, the deployment in Scotland is numerically greatest in the Central Belt, where most of the vehicles are. It is hard to peer too closely at local conditions, but it appears that it is still difficult to engineer a solution for infrequent rural services, where real time information may be of greatest social value to individual travelers – presumably because of the fixed costs of projects.

However there are some interesting regional variations within Scotland too. For example SEStran will see, over the next couple of years, a significant use of Electronic Ticket Machines (ETMs) as AVL equipment – no other Scottish region expects to take this approach. Conversely, the majority of SPT's vehicles already provide in-vehicle next stop displays, which is much rarer elsewhere.

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Similar differences appear at stops. In the SEStran are, primarily full-screen displays are used; in the SPT area, the older three-line LED displays dominate. More interestingly, the largest number stops for which "virtual stop" information is available (ie via SMS, web etc) is in the SWEStrans area, though both the Central Belt regions and NEStrans also make extensive use of this now and in the next two years.

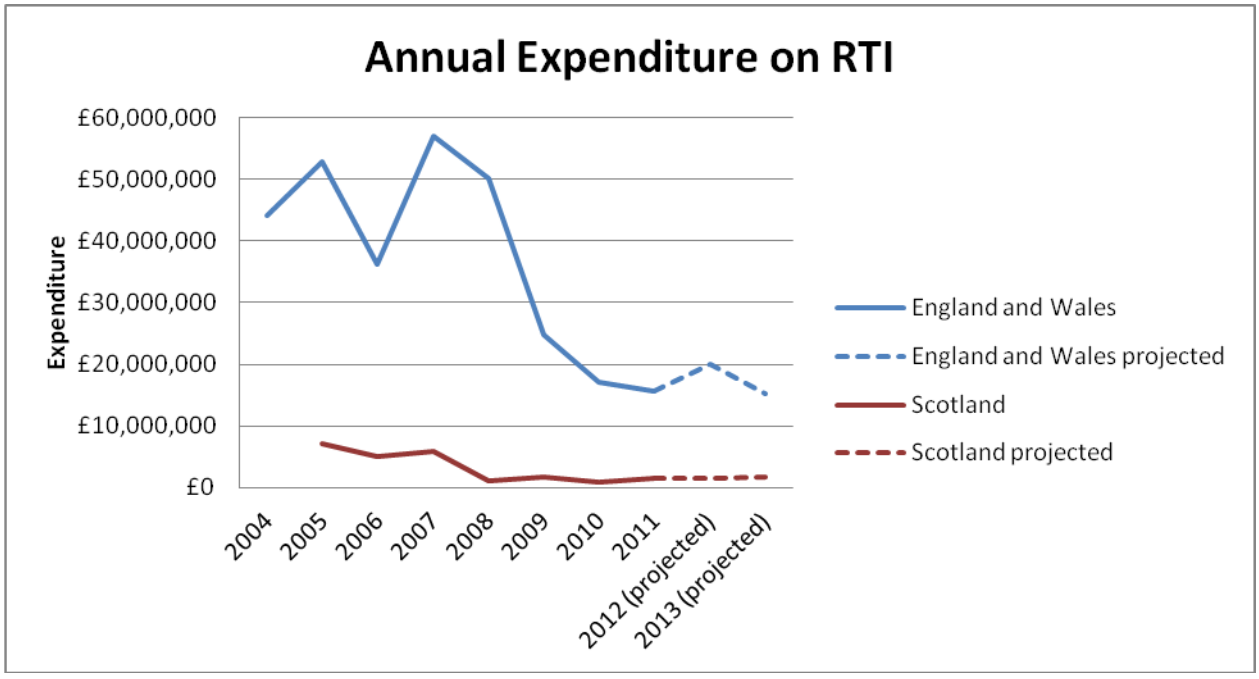
One area where Scotland gained an early lead was in smart ticketing, at least at the political level, for concessionary travellers. While England now has a substantial number of active ITSO schemes and more on the cards, Scotland has had a unified national project for a number of years.

However the move from concessionary to commercial services remains a challenging one, and the main focus of ITSO has been in two areas south of the border: rail franchises (beginning with South West Trains) and coexistence with Oyster in London. There is now a Ministerial target in England to get "most" journeys smartcard-enabled by 2014: it remains to be seen how the institutional mechanisms cope with this.

Scottish authorities are supporting the Open Data agenda, and indeed are more diligent than average on ensuring that data publication is restricted or licensed. Parking, Accessibility, Disruptions and CCTV are not mentioned but other, directly service-related, data are: stop locations and routes, and timetabled and real-time running.

For disruption information, most areas of the country provide information through websites and a number use existing at-stop signs. Penetration of new media channels is lower, and seems to be limited to the SEStran and HItrans areas – two very different geographical contexts.

Scotland projects that expenditure will rise from £1.05M in 2011 to £1.7M in 2012, a rise of 15%. However, expenditure will drop back to £1.6M in 2013 a fall of 5%. Almost all of the growth reported is taking place is SEStran. However, this is a very significant fall on investment a few years ago; more dramatic even than the substantial slowdown in England.



Trends

RTIG benefits from an unrivalled view across many public transport technology sectors. We can therefore add some qualitative commentary to the presentation of recorded facts provided above.

The changed fiscal environment has had a major impact not only on new projects, but also on the financial sustainability of existing public services. As the Survey shows, investment is sharply down, across the UK but in Scotland in particular.

Local authorities in particular find it challenging to translate policy goals into budgeted technology programmes, not least because of the continuing challenge of attracting and retaining suitably skilled staff. Attempts to develop public-private partnerships are now long-standing and widespread, but offer their own risks.

There is an increasing tendency for operators to take control of their systems, and to look for clear guidance on standards where information needs to be exchanged with others. The increasing use of ticket machines to provide source data for AVL is a major movement in this. In parallel, public authorities are having to learn to deal with negotiating conditions of use on data. There are some ominous signs that the Open Data agenda might be causing tensions in this.

Personal technologies (smartphones, tablets etc) are consolidating the increased expectation of passengers to have accurate transport information available "on tap". These systems, and the services they support (personalised apps, Twitter, etc), are beginning to have a substantial impact on projects – especially for disruption information. We are just at the start of this process, but the cost of at-stop installations makes this approach very attractive in current fiscal circumstances.

There is an increasingly confusing array of mutually incompatible technologies, notably in smart ticketing, which makes it difficult for project managers to plan robustly. Until recently ITSO would have been the only sensible choice for a widely-acceptable smart travel system, but we are now seeing a substantial upswing in interest in EMV in particular. Mobile ticketing is also being used, in both bus and rail worlds.

There remains a large gap between what is technically possible in principle, and what is deliverable in the real world – particularly in terms of achieving adequate system reliability. Even a "good" real time system will struggle to get journey matching much above 90%, which will still fail a passenger on one trip in ten. To resolve this will need a clear focus on engineering systems and procedures, "upstream"; this is a particular challenge for politicians, who tend to measure the "downstream" activity of displays and information feeds, regarding data quality as a given.

Conclusion

The world of transport information continues to present challenges and opportunities. Lack of human and cash resource is a more stringent constraint than it has been for some time. However, new technologies exist that can make things easier.

Nevertheless, the institutional understanding and coordination that is required to get smooth, effective projects in place remains daunting. This is something that we all need to work on together.