



# Your career

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*Published April 2010*

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# Executive Summary

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The objectives of this Yorcard Research Final Report are to:

- Summarise the key findings of the research programme
- Outline and justify costs and benefits
- Make recommendations for future development
- Present the case for including Citizen Cards with Transport (or not)
- Review pilot objectives
- A summary of the key lessons learned from the pilot

The analysis and evaluation of the above objectives is based upon the data collected and subsequent analysis used to produce the results and findings reported in Phases 1-6 of this research programme.

The motivation behind the research package of the Yorcard project was to observe and monitor the different activities that took place during the pilot. With many different partners and stakeholders, the pilot was an extremely complex process, which the research was designed to complement and coincide with, whilst never interfering with the timelines stipulated by the pilot.

This report is designed to complement and be read alongside the Best Practice in Regional Integrated Smart Ticketing Report (RES912), which documents the Yorcard Ltd. view of best practice in the delivery of regional, smart, integrated ticketing and payment systems in the UK. That Report is based on the business case and business plan which has been presented to Yorkshire Forward, the Regional Development Agency, by South Yorkshire Passenger Transport Executive and Metro (West Yorkshire Passenger Transport Executive) to underpin Yorcard's request for regional funding for regional smart ticketing.

# Introduction

## 1.1 Background

Below<sup>1</sup> is the original background to the Yorcard project and gives an insight into the motivation behind the research carried out and detailed in this report:

The Yorcard Project aims to implement a smartcard ticketing system for public transport throughout West and South Yorkshire on bus, train and tram. The project would supply a fully managed 'back office' service that is expandable to other areas of the UK for transport (and other) needs and offers a platform to provide multi-application smartcards or Citizen Cards in the future.

The system is designed to fully meet the national ITSO specification meaning that all ITSO certified smartcards and equipment are interoperable. Once the scheme is fully rolled out, Yorcard will be the largest commercial public transport smartcard scheme in the UK that includes rail. The system is also designed to be compliant with the e-Government Interoperability Framework (e-GIF) for IT systems in local government.

South Yorkshire Passenger Transport Executive (SYPTe) and the West Yorkshire Passenger Transport Executive (Metro) received conditional major scheme funding from the Department for Transport (DfT) in April 2005 to conduct a bus pilot scheme in Sheffield and a rail pilot on the Sheffield to Doncaster route.

An EU procurement process was managed by SYPTe and a detailed evaluation of the bids received was undertaken by SYPTe, Metro and operator representatives. Three bidders were selected to submit best and final offers and in March 2006 a German supplier called Scheidt & Bachmann (S&B) was confirmed by the Yorcard Board as the preferred bidder.

The Yorcard partnership consists of the two PTEs, bus, tram and train operators in South and West Yorkshire and the funding bodies. All of these groups, and the Supplier, have representation on the Project Board which is chaired by SYPTe's Director General. Appropriate governance arrangements have been put in place for a project of this size and complexity.

The pilot scheme is planned to commence in the autumn of 2007 on three busy urban bus routes in Sheffield operated by First and Stagecoach and along the Doncaster to Sheffield rail corridor. It is planned to issue 30,000 Smartcards as part of the pilot scheme. Approximately 200 buses and 3 bus depots in Sheffield will be fully equipped and platform validators and ticket vending machines will be required for the rail stations.

The pilot provides the opportunity to examine the use of a number of new and innovative smartcard ticket types that are unavailable or difficult to provide as a paper based solution. The project will also focus on the delivery of a Stored Travel Rights (STR) product that acts as a form of travel token that can be capped, or an amount of usage triggers a reduction in subsequent fares.

The pilot establishes a number of additional retail channels, new to the Yorkshire area, including the Internet and auto-renew facilities. These services, being new, need to be understood in terms of user acceptance (breaking down the barriers to ticket purchase), sales volumes and business processes.

Both the usage of new ticket types and the new retail channels will need to be measured closely during the pilot. The use of auto-load and auto-renew ITSO product entities (IPEs) is the real innovation behind the efficient, cost effective use of the new retail channels since the Yorcard project is expected to be the first project to use these IPEs.

The objective behind the research package of the Yorcard pilot was to observe and monitor the activities described above. With many different partners and stakeholders, the pilot was an extremely complex process, which the research was designed to complement and coincide with, whilst never interfering with the timelines stipulated by the pilot.

This report is designed to complement and be read alongside the Final Report RES912 which documents the Yorcard Ltd. view of best practise in the delivery of regional, smart integrated ticketing and payment systems. Appendix 1 gives a brief outline of what was delivered and achieved by the operational pilot and documents the key delivery dates. The research element of the pilot has needed to be flexible to reflect the changes that occurred in the operational pilot. Change has been managed throughout with the agreement of stakeholders and the DfT. Although this may have been to the detriment of the research outcomes in some cases, it has, however, enabled a thorough and real evaluation of the pilot, resulting in many lessons learned and recommended best practise to share with public transport executives, operators and other stakeholders considering deploying smartcards in their region.

<sup>1</sup> SYPTe and WYPTE Response to DfT Invitation to Tender – Contract Number PPRO 4/12/36 : January 2007

# 1.2 Ways of working

The ways of working was one of the original documents, which stipulated, among other things, how each of the research team members would work together and the roles and responsibilities of Research Team members. It specified the following methodology for determining the ways of working:

- Definition of the structure for conducting the research workstream.
- Highlights the roles and responsibilities of Research Team members.
- States the project controls relative to the deliverables.
- Defines the process for scoping the research programme.
- Defines the process for report production.

An overview of the Research Team was communicated in the Research Project Initiation Document (PID). This team structure was amended to include the relationship of the prime supplier, who managed the contract between Yorcard and Newcastle University, as shown in the diagram below:

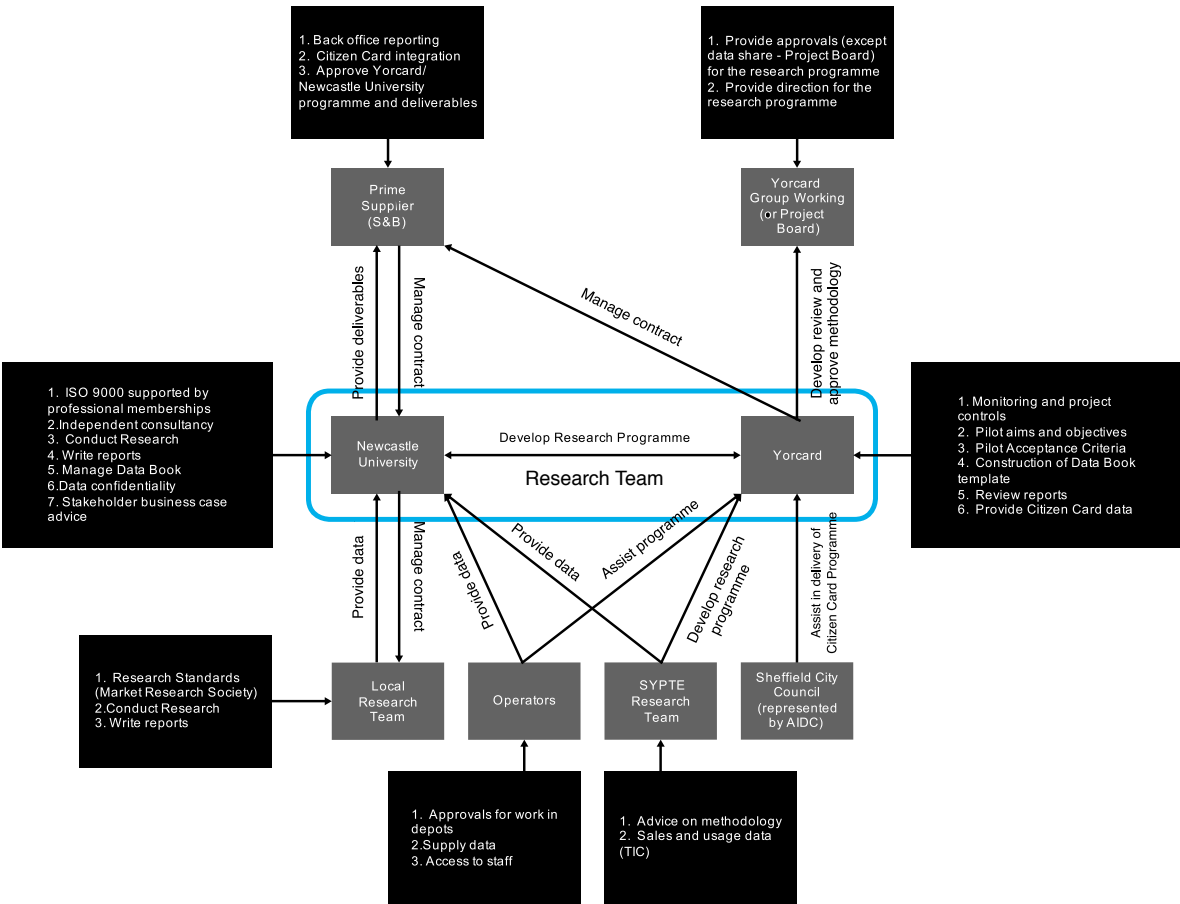


Figure 1. Research Team Overview

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The governance structure of the project played an important role in how the research was delivered. In particular, the circulation and use of data had to strictly comply with the Data Share Agreements contained in the Operator Participation Agreements. The requirements to maintain commercial confidentiality were also noted. All documentation was to be signed off by the Yorcard Working Group. Where any document related specifically to data, data access, data supply and its uses, then the Yorcard Board was responsible for approval of the document.

The Research Team was the responsibility of the Yorcard Programme Manager, who took direction from the Yorcard Project Board and provided leadership to the research programme. Members of the Yorcard Core Team supported the Programme Manager on a day-to-day basis and provided the nominated point of access.

A Research Team Leader representing the Pilot Project Team was appointed. The research, including data collection, reporting and use of pilot data, was managed by Newcastle University in accordance with all relevant Data Share Agreements and Confidentiality Agreements.

This research project was supported, where appropriate, by the business analysts and marketing teams at SYPTE to enable the information to be gathered in a timely manner. The experience and local knowledge of teams at SYPTE was a useful addition to the scoping exercises and organising data collection.

The Yorcard Working Group had the responsibility of approving all project documentation. For any work that involved data sharing (particular reference is made to the Data Book), the ultimate signatories to project documentation were the Yorcard Project Board. The following organisation representation was identified as being required for the operation of the Yorcard Working Group:

- Yorcard project representative and workstream leader
- FirstGroup
- Stagecoach
- MASS
- SYPTE
- Rail
- TravelMaster

For the purposes of developing and approving phase 6 documentation (Citizen Card Services), AIDC represented Sheffield City Council. The role of AIDC is specified in the phase 6 stage plan (reference YC-IGO-RES005).

The Rail representative attended Group meetings up to the end of 2008. (i.e to the end of the rail pilot.)



# Summary of Research Objectives

## 2.1. Yorcard and DfT

The following table was the initial research objectives stated in the original Tender document to the DfT:

Feature	Reference	Research Objective	Outcomes / Purpose
Technology and Standards	YC-RR-001	To capture the challenges and opportunities apparent in delivery of a fully compliant ITSO system.	The project should produce a lessons learned report.
Operations	YC-RR-002	To examine the impact of the system on bus boarding times.	Papers on bus boarding times prior to and after the introduction of the smartcard system to assess the impact to the consumer, the impact to the operators and the potential agglomeration benefits.
	YC-RR-003	To examine the systems performance of an ITSO smartcard ticketing solution including the multi modal interfaces.	Papers produced to assess normal bus, train and PTE operations and consider the impact of the introduction of the Yorcard smartcard system on operational performance with particular reference to any performance issues or opportunities that the system has manifested
Ticketing	YC-RR-004	To understand the value of new innovative ticketing products to the key stakeholders.	A paper documenting use of the ticketing products in the pilot and examining the real world application and impact of smartcard based ticketing compared to paper ticketing.
Consumers	YC-RR-005	To gauge the consumer reaction and appeal to the introduction of a multi modal transport smartcard.	Consumer research papers capturing the consumer reaction to smartcards and their perception of public transport when enhanced through the introduction of smartcards, extended services, account management and innovative ticketing.
Integration	YC-RR-006	To examine the practicalities, challenges and opportunities present in integrating the Yorcard transport service with a citizens card.	A paper documenting the design work and method of integration and its outcomes paying particular focus to any integration challenges and their resolution.
	YC-RR-007	To understand the value of using Citizen cards as an alternative to transport only smartcards.	A focus on the consumer reaction to a multi use smartcard proposition and assessing whether a greater application makes the card 'sticky' for the consumer.
Investment	YC-RR-008	To examine the business case for Yorcard to provide a basis for the preparation of robust business cases for other regional schemes.	A critical analysis paper of the Yorcard business case highlighting any recommendations to other regional schemes.
Expansion	YC-RR-009	To review the pilot solution and recommend any changes necessary to support the transition to main rollout of the Yorcard scheme.	Successful transition to main rollout will be supported through the lessons learned log, a design blueprint for the rollout service, a comprehensive project plan and budget.

Table 1. Initial research objectives

## 2.2. Pilot Acceptance Criteria

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This was subsequently translated into the following action plan for achieving the above objectives:

1. Provide a robust methodology for bus boarding time measurements that can be used and re-used
2. To provide a robust methodology to test user reactions and perceptions to current equipment that can be used and re-used for:
  - a. Bus Electronic Ticket Machine (ETM).
  - b. Travel Information Centre (TIC) issuance.  
to enable the development of a high quality, efficient delivery of the business processes
3. To provide a robust methodology to test public transport users and non-users reactions and perceptions to the current services, products and business processes provided, that can be used and re-used:
  - a. Bus
  - b. Rail
  - c. Retail
  - d. Customer Help
4. To provide detailed and accurate reports on each of the three items above for information to project stakeholders at stated intervals throughout the research project.
5. To provide all inclusive reports accounting for all the items noted above.
6. To provide detailed methodology based on those outlined in the tender submissions to the DfT.
7. To provide that each methodology can be re-used and measurements tracked and modelled throughout the life of the pilot.
8. To provide information regarding the use of multi-authority citizen card services.
9. To ensure that data and information collected is robust and accurate in order to be used to inform stakeholder business cases.

In all of the above cases, only data relevant to the Yorcard project was presented.

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The approach to the research was based on the Pilot Success Criteria. Every element of the research was identified and elaborated to assess whether they were tangible or intangible in nature, and how they lent themselves to being modelled, measured and analysed.

Each feature of the acceptance criteria was baselined prior to go-live (in Phase 1, for an explanation of the phases, see section 3) and then monitored through the execution of the pilot.

Methods included:

- Laboratory research
- Smartcard user surveys
- Field research
- Back office reporting
- Equipment user surveys
- Critical analysis

The mix of these methods also served to combat the complexity of the Yorcard scheme and ensure that each feature of the scheme was able to be assessed.

# Meeting Research Objectives

## 3.1 Meeting Research Objectives

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The following areas were defined and agreed by the research team and the Yorcard Working Group:

- Roles and Responsibilities
- Time Scales
- Communications
- Data Flows
- Approval of Scoping Work
- Report Production Process
- Work Package Overview

With respect to the latter bullet points, the following phases and deliverables were defined to enable the research objectives to be met:

Baselining Phase 1:

- Boarding Time Study Report
- Equipment User Survey Report
- Bus and Rail User Survey Report<sup>2</sup>
- Phase 1 Summary Report

Baselining Phase 2:

- Boarding Time Study Report
- Equipment User Survey Report
- Phase 2 Summary Report

Open System (Touch-on only (To)) Phase 3:

- Boarding Time Study Report
- Equipment User Survey Report<sup>3</sup>
- Bus and Rail User Survey Report
- Phase 3 Summary Report

Closed System (Touch-on, Touch-off (ToTo)) Phase 4:

- Boarding Time Study Report
- Equipment User Survey Report
- Bus and Rail User Survey Report
- Phase 4 Summary Report

Management information Phase 5:

- Periodic Network Data and Consolidated Information Reports including:
  - o Reimbursement and settlement evaluation
  - o Data Book production
  - o Impacts on bus fleet management

Citizen Card research Phase 6:

- Technological Trial Report
- User Survey Report<sup>4</sup>

End of Pilot Phase 7:

- Best Practice Final Report (including business case analysis and stakeholder consultation)

<sup>2</sup> Includes non-users.

<sup>3</sup> This was not carried out in this phase as it was deemed unnecessary due to changes in the pilot timeline in Phase 2

<sup>4</sup> Additional tasks were added to this phase, as the scope was not fully addressed at the beginning of the project. See section 4.4 for more information.

The way in which all project documentation relates to the project deliverables and project controls is shown in the diagram below:

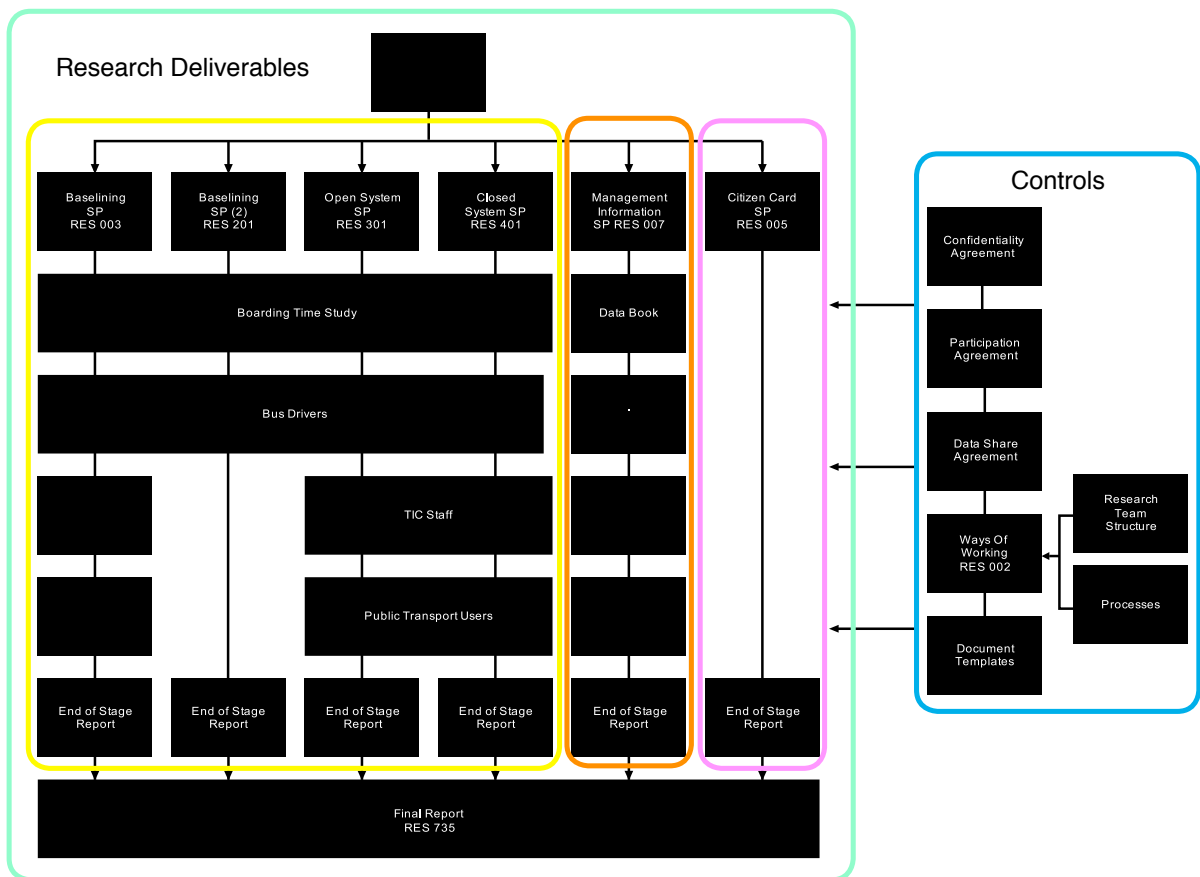


Figure 2. Research Deliverables

# Summary of Key Findings

## 4.1. Boarding Time Study

Within each of the study areas, the following sections summarise the key findings in relation to the relevant objectives (which for the convenience of the reader, we have reiterated in each section).

Boarding time studies took place in phases 1 – 4, and this section describes a summary of the findings. The objectives which were identified as relevant to this study in the initial stages of the research are as follows:

**Relevant DfT Objectives:**

- Analysing the bus boarding times.

**Relevant Yorcard Objectives:**

- Reducing the barriers to the use of public transport
- Reducing delays and improving reliability
- Informing the Business Case

**These have been realised through:**

- Measuring the payment collection process before and during the on/on and on/off trial;
- Monitoring ticket transaction time reductions throughout all the phases;
- Enabling the monitoring of journey time reductions throughout the phases by monitoring the changes in Dwell Time at bus stops; and
- Obtaining results that will feed into the business case.

Each of these objectives is addressed below in light of the boarding time research carried out between Phase 1 and 4:

**Analysing the Bus Boarding Time**

The studies carried and documented in the Boarding Time Study reports, have demonstrated an analysis of Bus Boarding Time. As the trial was envisaged to include the issuance of up to 30,000 smartcards in the Sheffield region, an off bus methodology was chosen to observe the various ticket types used, the number of transactions of each ticket type and the impact on at-stop dwell time. This mode of working had the advantage that there was no contact, either direct or indirect, between the surveyors and the boarding and alighting passengers. It also offered the opportunity to see transactions taking place between the driver and passenger, without other passengers obstructing views, which may have been the case for an on-board methodology.

Data was collected about Dwell Time and the components/variants, which have an impact upon Dwell Time. This included data about boarding passengers, such as, numbers, the time the first passenger steps on the bus to the last, and the ticket types used. As a result, it has been possible to estimate the additional time each boarding passenger adds to overall Dwell Time, accounting for different vehicle types and alighting passenger flows.

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With respect to smart-tickets versus standard tickets the regression analysis has shown that for cash-based transactions, Touch-on smartcard operations do appear to reduce the Dwell Time. For 'Adult Cash' tickets, this reduction in time for boarding is around 3 sec whilst for 'Child Cash' tickets, the reduction is around 1 second. For 'Flash Pass' tickets, the regression analysis indicates that smartcards increase the Dwell Time compared to standard ticketing. This could be due to the fact that standard flash passes need to be shown to the driver, whilst smart flash passes need to be touched on the scanner and then shown to the driver. The above conclusions were reached from the data obtained from the three boarding time phases undertaken when smart products were in operation, including phase four when ToTo was in operation.

#### **Reducing Barriers to the Use of Public Transport**

It was first highlighted in Phase 1 that there could be a number of ways that the new technology could have an impact upon the barriers to using public transport. Ideally, reducing the Dwell Time at bus stops would help to reduce these barriers, such as by reducing overall journey times or waiting times at bus stops which impacts both boarding passengers and those already on board. In terms of this study, it was important to analyse the current Bus Stop Dwell Time and its component times in order to monitor how smartcard ticketing could impact upon Bus Journey Times.

It has not been possible to detect an overall reduction in Dwell Time as a result of, for example, reduced boarding times, as there were not enough Yorcards in circulation. The study has shown that Dwell Time is the component of many different aspects, each of which can have a big impact upon the overall Dwell Time.

For example, scheduling, deadtime, passengers boarding with heavy shopping, etc. Therefore, the positive impact of smartcards on reducing barriers to travel is more likely to be observed through the attitudinal surveys carried out and reported in the Consumer Survey reports. This can be seen in perceived reduced interaction time between the driver and passengers (a positive for both passengers and drivers), and ease of use of the technology. However, many of the opinions offered by drivers and passengers were based upon theory rather than direct experience.

#### **Reducing Delays and Improving Reliability**

This objective relates closely to the main DfT strategic objective to improve the punctuality and reliability of public transport. As with the previous objective, it has been difficult to prove that this pilot has had any impact upon both reducing delays and/or improving reliability as a result of the introduction of smartcard ticketing because of there is a large number of variables which make up Dwell time. However, the regression has shown that using a smartcard such as PAYGo or a smartcard with a period travel product does appear to be quicker than paying with cash.

#### **Business Case**

For this Boarding Time study, the regression offers strong evidence of an economic case for smartcards. It has shown that in some cases smart ticketing is quicker than paying cash. The study has not been able to demonstrate that Dwell Time has reduced over time through the phases, and this is due to a number of different reasons.

Firstly, Dwell Time is composite of many different factors, it can depend upon which stop is observed (for example, if the stop is extremely popular), the type of bus (for example, Double Decker buses have longer dwell times than Single Decker buses. This is likely to be due to a combination of more passengers and the fact that passengers must walk up/down stairs, requiring the driver to wait longer at stops), the weather, the time of day, etc. It can also be affected by the various ticket types. However, over a number of days, stops and buses the impact is diluted by all the other components.

Secondly, the limited number of cards in circulation made it difficult to observe smartcard usage at satisfactory levels. In hindsight, it would have been advantageous to carry out a laboratory test utilising a controlled data collection procedure, in order to control the other variables and to only observe the variation in the ticket types.

Thirdly, the technology was not always reliable on the buses, which had an impact upon the data collection by reducing the number of smartcard transactions observed during trials. Unreliable smart validators had the potential to increase the Dwell Time, as drivers may have had to explain that the technology was not working, also damaging the overall perception of smartcard technologies for both drivers and customers.

In terms of Touch-on Touch-off, this study has been inconclusive as there were only 151 Touch-off transactions on the routes selected for observation on the day the research focussed on alighting times in Phase 4. (During Phase 4 there were up to 1,200 Touch-off transactions per week for all pilot services.) However, the regression has shown that when only looking at these ToTo cases, there has been little measurable impact on the overall Dwell Time.

## 4.2. Consumer Study

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The consumer study took place in phases 1, 3 and 4, and this section describes the findings. The objectives which were identified as relevant to this study in the initial stages of the research are as follows:

### Relevant DfT Objectives:

- Analysing the passenger reaction
- An assessment of the Customer Experience

### Relevant Yorcard Objectives:

- Reducing the barriers to the use of public transport
- Enhancing the image of public transport
- Improving sales channels; and
- Informing the Business Case

### These have been realised through questionnaires and focus groups that look at:

- The perception of boarding and journey times
- Ease of product purchase
- Customer support
- Public Transport appeal; and

Each of these objectives will be addressed below in light of the consumer research carried out between Phase 1 and 4.

### Analysing the Passenger Reaction

The methodology employed for this aspect of the research has demonstrated that it has been possible to gain and analyse the passenger reaction to smartcards. The reactions observed throughout Phases 1, 3 and 4 have been varied, ranging from the positive 'idea of smartcards', with many people, particularly public transport users, tending to like the idea in principal, to the negative 'idea of smartcards', with people citing privacy issues such as 'Big Brother' as a major concern. The reaction in practise was more average as much of the questioning was on a practical level, the highlights from this questionnaire are discussed below in An Assessment of the Customer Experience.

The initial questioning did show that there was a need for 'something' as the bus users who took part in the focus group felt that current ticketing is complex with many different fares available, and some felt that ToTo could help if it were automatic and worked properly. However, many of the participants felt that Touch-on only operations were more appealing.

Reactions during questioning were more positive from children, for example, the main benefit of smartcards was cited as the ability to prove they were eligible for child fares. (Smartcards hold data on the card both in printed format and embedded electronically, to prove the holders entitlement to a concessionary fare or to travel to/from school for free.) In addition, the majority of non-Yorcard users aged 16 and under thought that 'if boarding the bus could be made quicker' Public Transport would appear to be more appealing to them, and just about half of non-Yorcard users aged 16 and under believed that Public Transport would be more appealing 'if the tickets were more secure'.

### An Assessment of the Customer Experience

As with the above, there has been a mixture of reactions, which inherently relate to the way in which people travel. The more positive reactions were from younger people (who like the 'techy' idea of smartcards) or those who travel on a regular basis, and see this as a more convenient type of ticketing. In terms of the actual experience of smartcards, there were issues with the on bus smart validators not working and some evidence that drivers were telling passengers that it was not working. Whether this was actually the case or the drivers did not want to use the technology, it can never be known.

Despite this, the research has found that over three quarters of the participants found the technology 'easy to use'. Of those who have used the telephone help service, the majority rated it as 'good' or 'very good', and for touch-off operations, the 'Smartcard Reader Well Placed' received an equal proportion of 'Strongly Agree' and 'Agree' responses. The surveys also showed that 5% (12 respondents of sample) of Yorcard users said they had increased the number of journeys as a result of having a smartcard. This equates to an extra 0.2 journeys per week per person surveyed. However, it should be noted that the absolute number of usable responses was low. It is suggested that any business case for the introduction of smartcards should not be based solely on this figure.

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The majority of users expressed a preference for Touch-on only (rather than Touch-on, Touch-off (ToTo)), when asked to select one method of operation from a limited list. However, this may be due to the fact that the ToTo trial was greatly reduced in duration and participants did not have time to become familiar with the full workings of the system. Despite any issues that may have been experienced as a result of the pilot and the limited number of Yorcard users, the majority of Yorcard users interviewed stated that they would recommend Yorcard to a friend or family. (It should be noted that a large proportion of these respondents were English National Concessionary Travel Scheme ENCTS users).

#### **Reducing the Barriers to the Use of Public Transport**

It was first highlighted in Phase 1 that there could be a number of ways that the new technology could have an impact upon reducing the barriers to using public transport. Ideally, improving the sales channels and making it easier to buy and use tickets would have a positive impact. In addition, increasing the security and versatility of ticketing could help to improve the appeal of using this ticket over another. Perceptions, rather than in practice experiences, particularly those analysed through the focus groups, have been collected through the series of reports, which has helped to understand whether smartcards would reduce the barriers to public transport.

In general, the perception of the benefits of smartcards does not seem to have a substantial impact on reducing barriers to public transport. For example, the majority of non-Yorcard users did not think that Public Transport would be more appealing to them 'if it was easier to pay for tickets'. In terms of security, the benefits that smartcards could offer seem to appeal to younger people.

For example, approximately half of non-Yorcard users aged 16 and under believed that Public Transport would be more appealing 'if the tickets were more secure' whilst the majority of those aged 17 and above did not think so. The idea of automatic fare calculation was not particularly appealing to those who had experience of Yorcard. The majority of Yorcard users said they agreed with the statement that 'If all the buses were equipped with a Touch-on Touch-off system which automatically calculates your fare' it would make Public Transport more appealing. In general, the younger the Yorcard users were, the more positive they are about the reductions smartcards could offer to the barriers to using public transport.

#### **Enhance the Image of Public Transport**

This objective is closely related to the objective above as it depends entirely upon user perceptions. As mentioned above, Children in particular have been observed to like the 'idea of smartcards' because they seem modern and you can, in theory, do lots of different things with them. There were other cases, however, where smartcards were very much seen as a negative. Many of these opinions were collected via the focus groups carried out throughout the research. For example, there appeared to be an inherent distrust in some user groups (particularly non-users) of smartcard ticketing, which could be related to either the 'Big Brother' or never wanting to use public transport.

Further research would need to be carried out to understand how public transport could be 'sold' to this group.

#### **Improving Sales Channels**

As with the equipment users research, there has been a positive trend in terms of the sales channels. Unfortunately, this has been due to the fact that many customers, particularly children, would prefer not to have to speak to the driver. It has also been seen that any help required during or after sales has resulted in a positive experience. Of those who have used the help service, the majority rated it as 'good' or 'very good' in Phase 4, which was more positive than in Phase 3.

#### **Business Case**

Traditionally the business case should be considered in terms of hard figures and statistics. However, with smartcards, a lot of the benefits are not as tangible and are difficult to quantify - these are referred to as 'soft benefits'. In terms of understanding the soft benefits to customers, as detailed above, this research demonstrates an insight into the perceptions of smartcards and what people think of them. However, as the trial is not to be rolled out across the Region (in its current form), it has been difficult to fully analyse the benefits for some aspects of the pilot. Some aspects of the pilot operations were said to be time consuming (for example, drivers learning the new ETM menu hierarchies), and concerns over issues such as forgetting to touch off when alighting, have impacted negatively on the results.



## 4.3. Equipment User Study

In terms of 'hard benefits' the research has shown that 5% (12 respondents to a questionnaire) of Yorcard users said they had increased the number of journeys as a result of having a smartcard. This equates to an extra 0.2 journeys per week per person surveyed, which is a figure consistent in both Phases 3 and 4. The main reason offered was 'it is really easy to use'. As the absolute number of usable responses was low, it is suggested that any business case for the introduction of smartcards should not be based solely on these figures.

The equipment user study took place in Phases 1, 2 and 4, and this section describes the findings from these studies. The objectives which were identified as relevant to this study in the initial stages of the research are as follows:

### **Relevant DfT Objectives:**

- Analysing the system performance
- An assessment of the Operator and PTE expectations

### **Relevant Yorcard Objectives:**

- Reducing the barriers to the use of public transport
- Reducing delays and improving reliability
- Reducing fraud
- Informing the business case

Each of the objectives will be looked at briefly below:

### **Reducing Barriers to the Use of Public Transport**

Phase 1 identified that the new technology could have an impact upon the barriers to using public transport particularly from the point of view of the sales channels. For example, drivers are often the customers' first point of contact, therefore if the equipment is easy to use then this is likely to have a positive impact upon how they deal with customers and potentially reduce perceived barriers to travel. The drivers view of the equipment has not been entirely positive, which is likely to have had an impact upon their behaviour whilst working during the trial. There were fairly low levels of Yorcard usage and generally drivers did not feel the equipment made their job easier. Reliability issues with the bus on-board smart validators, particularly through 2008, had an adverse affect on drivers and customers views.

However, when the technology and the potential benefits of smartcard were discussed during the Focus Group, such as reducing cash handling, more tickets bought off-bus, reducing the amount of interaction required between driver and customer, the reaction was much more positive. Certainly from the questionnaires and the Focus Groups conducted with the TIC staff, there could be many benefits, including improving customer service, which in turn would reduce the barriers to public transport, to encouraging more off-bus ticket sales. The results for this objective could also inform the DfT objective to improve accessibility of public transport.

### **Reducing Delays and Improving Reliability**

It was identified in Phase 1 that if the new technology is easier and quicker to operate, then this could have a positive impact upon the reduction in delays and improving the overall reliability. In this report and the Phase 4 Boarding Time Study, increased delays and boarding times have been observed and through both the qualitative and quantitative research, it has been observed that the drivers felt the new technology did not make their work easier as the ETMs were more difficult and time consuming to use (compared to the old ETMs). However, as mentioned above, when it was discussed in more detail, drivers could see the benefit in terms of boarding/journey time and ease of use, but only if all buses had the technology fitted (and the reliability was greatly improved) and the number of cards in circulation greatly increased.

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### **Reducing Fraud of all types**

Phase 4 has shown a slight decrease in the amount of smartcard fraud perceived by drivers. It is assumed that fraud may be harder with smartcards as they are more difficult to replicate or use in other fraudulent ways. The card communicates directly with the ETM and it is possible to 'hotlist' a card or product so that it can no longer be used. (However, in the pilot the functionality to 'hotlist' travel products was not provided.)

Compared to Phase 1, the number of drivers stating that they experienced fraudulent paper ticket use has increased. Drivers also reported that the fraudulent use of smartcards has decreased from Phase 2. The main instances of fraudulent use recorded by drivers was

- Smart validator records card as invalid
- Paper counterpart<sup>5</sup> does not match smartcard
- Smartcard passed back for other to use

The increase in the number of drivers stating that they have experienced more fraudulent behaviour may be because they are more aware of it. During the focus groups, some drivers stated that some drivers do not check for fraudulent tickets as they wish to avoid a confrontation with passengers. With more smartcards in operation, it will be harder to avoid this as the machine announces a ticket that is not valid. Therefore, while fraudulent use may reduce, it is also important to ensure the necessary support tools are in place for drivers to ensure they have the training and skills to interact with passengers in such circumstances.

The greatest risk to safety and security was thought to be carrying cash on the bus and the greatest impact to improve safety and security was thought to be less cash-handling. Reduced cash handling is certainly an area where drivers felt that smartcard technologies could benefit them.

### **Business Case**

As mentioned in the Consumer Study, the business case should be considered in terms of hard figures and statistics. However, with smartcards, a lot of the benefits are not as tangible and referred to as 'soft benefits'. In terms of understanding the soft benefits to drivers and TIC staff, this research can demonstrate insight into the perceptions of smartcards and what the equipment users think of them. However, as the trial was not publicised or rolled out in the manner originally intended, it has been difficult to fully analyse the benefits in practise, as the pilot has had some negative impact upon both the drivers and TIC staff. The technology has been shown to be a little cumbersome to use, and concerns over, for example, the reliability of the on bus smart validators have impacted negatively on the results.

### **Analysing the system performance**

When analysing the overall system performance from the driver and TIC point of view, the results cannot be shown to be that positive. The technology was hampered by reliability issues in the early stages and the staggering of the uptake to the technology meant that some drivers did not get the bed-in time recommended, and some only participated in certain phases for a much smaller period of time than originally planned.

This generally has meant that the system performance from the equipment user point of view is likely to be negatively influenced by the pilot itself. Despite this, 38% of drivers felt that the new ETM had made their job easier. Drivers did feel that the equipment was easy for customers to use, and that the equipment (ETM and validators) was well placed within the vehicle.

### **An assessment of the Operator and PTE expectations**

The opinions provided by drivers and TIC staff have been collected but this is more from the equipment user point of view rather than the operator or PTE perspective. These opinions can be seen much more clearly in the Citizen Card Study (Phase 6), where staff from the different operators and PTEs were interviewed.

<sup>5</sup> A paper counterpart was required for smart travel products which were valid on both smart and non-smart enabled services. Paper counterparts had to be shown to the driver when travelling on non-smart services.

## 4.4. Citizen Cards

This part of the research is categorised into 3 subgroups. These were Consumer Study, Practitioner Study and Technological Trial.

The objectives of this study overall were:

1. To evaluate the processes for multi-authority, multi-application smartcards to be re-issued and replaced:
  - a. Data transfer between organisations.
  - b. Costs of issuing individual smartcards.
2. To evaluate the practicalities of Local Authorities using applications outside the ITSO shell.
3. To evaluate the options for interchange between different Local Authority schemes, specifically inter - Local Authority service provision.
4. To evaluate the requirements of providing effective service to the customer:
  - a. Telephone helpdesk.
  - b. Gain information regarding customer perception.
  - c. Understand the balance between convenience and anonymity.
  - d. Understand the key features that customers would like on a Citizen Card.
5. To evaluate the usage of smartcard management systems:
  - a. Data sharing (where permitted).
  - b. Smartcard ID references.
  - c. Personal data.
  - d. Multiple systems with a single purpose.

6. To evaluate the requirements for inter-scheme hotlist management:
  - a. Understand the needs and expectations of integrating hotlists.
  - b. Develop recommendations for dealing with misuse.
7. To evaluate the requirements for common eligibility criteria:
  - a. Proof of eligibility once only.
  - b. Automatic loading of smartcard entitlements.
8. To determine the effect on smartcard performance using:
  - a. Bus and train equipment.
  - b. Local Authority point of service equipment.

The objectives above are designed to meet the following key questions as specified in the DfT tender:

- Do the citizens want a single smartcard for all applications?
- What are the practical issues to delivering a multi-authority, multi-application smartcard?
- What are the political issues to delivering a multi-authority, multi-application smartcard?
- What are the technical implications to delivering a multi-authority, multi-application smartcard?
- What are the accrued benefits to stakeholders of the multi-authority, multi-application smartcard?

Each section will demonstrate the key findings in relation to the objectives of each.

### Consumer Study

A questionnaire was sent to Yorcard and SmartSheffield users. The main Yorcard objective which is relevant to this study of the Phase 6 Citizen Card research, was to analyse customers' responses from a representative sample on the following issues:

- a. Provision of a Telephone helpdesk.
- b. Gain information regarding customer perception of a multi-application smartcard.
- c. Understand the balance between convenience and anonymity for the customer.
- d. Understand the key features that customers would like on a Citizen Card.

Ultimately, this is designed to follow the key question as specified in the DfT tender:

- Do the citizens want a single smartcard for all applications?

The results from the focus groups<sup>6</sup> and questionnaire responses suggest that generally the feeling towards a single multi-application card is positive, as it is seen as more convenient and easier to manage. It would also be appealing to a lot of people if there were some sort of incentive or money saving opportunities associated. There is certainly a level of apprehension towards having a single card, for example, losing the smartcard which has personal data and access to services on it, and also privacy and anonymity issues. Therefore, it is hard to categorically say at this point if customers really do want a single card for all applications, and consideration should be given to further research into the business case for combining applications onto one card. In this research, the most popular services to have on a single card were Transport, Leisure and Library services. The least popular services were bill payment, small value goods and paying taxi fares.

<sup>6</sup> Adult focus group consisted of 4 members aged between 17 and 59.

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### Practitioner Study

Telephone interviews were carried out with key stakeholders for citizen cards, such as operators, PTEs and a Local Council. The telephone interviews have gathered a wide range of views and opinions from the different organisations about existing smartcard services and the future of smartcard services. Given the different aims and objectives of each business, it is unsurprising that there have been some differences in opinions but it is encouraging to note that the majority can see the potential for integrated smartcards services in the future.

### Existing Smartcard Services

This section was designed to gather information about existing smartcard services, the benefits and the challenges of providing these services. There have been mixed reactions to the services provided, the main benefits are:

- Multi-application has allowed SCC to reach potential new users for Library services
- Data management and security have been improved
- Single card is more convenient for the user
- Public Transport is seen to be modernised to meet some customer expectations
- Data gathered had allowed analysis of travel patterns to take place

The main challenges to delivering existing smartcard services have been primarily technology-related:

- Linking multiple databases has proved difficult
- Operating two Library databases in parallel is expensive and unreliable
- There are inconsistencies between the old and new data structures which is confusing for both staff and customers
- Providing multiple tickets across multiple operators across multiple modes is a complex task
- Numerous services and systems already exist, retrofitting new technology creates new problems

### Future Integrated Services Smartcard - Strategies and Opinions

SCC are currently phasing out smartcard technology, but there are plans for future smartcard services to be included as part of a wider digital authentication strategy. Public Transport smartcards are part of the PTE's short-term vision with the addition of Citizen applications a longer-term aspiration.

It was highlighted that the potential benefits of an integrated services smartcard for the citizen are too significant to allow the idea to be left to stagnate. The technology already exists, so there needs to be a greater understanding and appreciation of what smartcard technology can do and how integrated services can be delivered in a realistic timeframe.

Many organisations now have a smartcard strategy in place. For the delivery of an integrated services smartcard, these strategies will need to be aligned. Current barriers offered by participants surveyed include the following:

- Each organisation wants their smartcard to be the platform from which other services are added.
- Establishing which organisation should be managing the overall scheme
- Corporate identity and branding when multiple organisations are involved

Organisational views and opinions on integrated services were divided. Overall, there is support for such a scheme but there are still a number of barriers to be overcome before an integrated scheme could be considered to be feasible. The benefits of an integrated scheme were seen as follows:

- One card for all services would be more manageable for users and providers
- It would have the potential to enable Public Transport services to be delivered in a more efficient, manageable way
- Could add value through the provision of additional non-transport applications
- Marketing of a single scheme could also be more cost-effective

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The key barriers offered by participants surveyed to a future integrated service smartcard, are as follows:

- Who is most suitable to be leading/ managing the overall service
- Data access and usage issues
- Incorporating a range of existing and new technologies into a single scheme
- Mitigating technological issues across numerous services
- Managing the risk of not deriving a commercial return on a substantial financial investment
- Delivering an integrated scheme over a timescale that is realistic yet politically acceptable
- Who is going to fund the overall service ?

#### **Delivering an Integrated Services Smartcard**

The majority of the organisations believe an integrated services smartcard could be delivered in the future, but the following issues need to be addressed:

- Smartcards for services within individual sectors have to be established before an integrated service is considered
- A strong business case for introducing an integrated scheme
- Agreement of all organisations involved concerning data access and usage, legal issues, commercial confidentiality etc.
- Recognition of the requirements of each organisation as well as the common goals of the overall scheme
- A clear strategy as to how the scheme would be managed and funded
- Realistic timescales for the implementation of the scheme
- Robust technology and support across the different sectors
- Flexible system which can incorporate new services with ease
- Establishing the trust of the customer

#### **Technological Trial**

This was successfully undertaken in partnership with Sheffield City Council's managed service provider Automatic Identification and Data Capture Technologies (AIDC). A variety of public transport and non public transport products were successfully loaded onto Mifare Classic 4K smartcards. These were then tested using a number of different devices to ensure the card could be read and the transaction time measured. All work was undertaken under laboratory conditions and all cards could be read.

There was no impact on the transaction times for card readers used in Sheffield libraries. There was a transaction delay of up to a third for card readers used in Sheffield leisure facilities. This delay was only recorded when the 'library only' function was loaded. No transaction delay was recorded when public transport products were loaded with leisure products. Given that these delays would be experienced in a relatively fixed environment they were not seen as a major cause for concern.

When the same mixture of products were loaded onto smartcards and the public transport applications were read using public transport card readers similar to that used in the pilot, transaction delays of up to 21% were recorded. The tests demonstrated that there was a measurable additional transaction time when non public transport products were added to smartcards with public transport products. The additional transaction times would have an adverse affect on boarding times.

# Data Sharing

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The data derived from each task enabled key variables to be tracked, monitored and reported upon throughout the life of the pilot. Data collection and analysis methods were therefore maintained where possible for consistency throughout the pilot.

Not all data was available to all parties and there was a data sharing agreement in place before the research commenced. The main reason for this was to protect the interests of operators because of the issues of industry competition.

To overcome these issues, two key factors were considered. The first relates to the procurement of an independent organisation to provide professional advice concerning execution of the research and control the quality of the pilot data. The second required commercially sensitive data, where available, to be published as an aggregate or an index in order to keep route specific data out of the hands of competitors. Newcastle University acted as the independent organisation for this project.

# Recommended Best Practice for Research

## 6.1. Planning

The impact of planning on the research carried out has been observed and lessons learned noted. These are set out in the table below:

Observation	Root Cause	Lesson
The impact of the pilot on research activities was underestimated/ unforeseen.	Holdups in the pilot, and changes in scope outside the research area, meant that data collection was staggered, delayed, and generally made resource management difficult to predict.	Leave more time to correct errors or do a full roll out and then analyse.
Overall structure of sub-contracting for research caused delays.	Research was subcontracted through the supplier making the supply chain longer and therefore agreeing contracts was more onerous and had to be repeated for each phase.	Do not sub-subcontract research. Agree contract at the beginning of the research to avoid incremental contracting which can cause holdups.
The original proposed methodology was based upon assumptions which were not true following a scope change to the pilot. This limited the quality of the methodology in places and the data collected and was a time-consuming error to correct.	Mis-communication and expectation management of data available. For example, ticket type information at the individual bus-stop level, which would enable the calculation of the average boarding time for passengers using a smartcard, was assumed to be available. Data was only available at the fare stage level, which proved difficult to clean, process, analyse and interpret with the degree of confidence required.	Establish exactly what data is available to reduce the number of assumptions being relied upon, agree it and design a methodology based upon this agreement.
Gaps in methodology due to misunderstanding of priorities between Yorcard Working Group and Newcastle University.	The study was started in a hurry to keep in line with the deadlines placed upon the research by the pilot phases. Its place in the supply chain made it difficult to interact effectively with customers for research outputs.	Ensure contracts are in place quickly (again avoiding 'middle-men contracting') and that deadlines are extended if the targets are unfeasible.
Overall the questionnaire was very long, which had a negative effect on the participants and therefore, the quality of the answers towards the end of the questionnaire could have been compromised.	The result of the number of stakeholders involved in research process, each with an individual agenda.	Establish the core essential answers needed, and focus on these. Manage stakeholder expectation.
A good cross-section of the population of Sheffield made up the on-street sample size	The locations for carrying out the questionnaires were well researched.	Thorough research of an area is required. Make use of local knowledge.
It was difficult to reach the required sample size for the postal questionnaire for the age group 17-59.	Some of the smartcards were anonymous and not registered by the user. Uptake was quite low.	Pitch for participants when they buy their card even if it is anonymous. Increase uptake and sales would also increase the overall numbers.
Difficulty in getting attendees for the Driver Focus Groups and driver buy-in .	Operators withdrew support until a new process was agreed to engage with drivers.	Need buy in from all stakeholders throughout the trial.
Low response rate to driver questionnaire before a £10 incentive was introduced	Many drivers did not appear interested in the trial.	Use monetary incentives.

Table 2. Planning Lessons Learned

## 6.2. Managing change

As with Planning, above, the lessons learned as a result of change during the pilot has been observed and noted in the table below:

Observation	Root Cause	Lesson
Data requested and received for some aspects of the research could not be used effectively.	Newcastle University were unable to guarantee that the level of the data provided could be used to assist with the process of predicting boarding and alighting times.	Need buy in from all stakeholders and a very good understanding of the data that can be made available.
Lack of Yorcards in circulation rendered significant parts of the research as less useful	Research, such as the boarding time study, required a lot of Yorcards to be in circulation as it was a field, rather than lab, test.	Either maximise circulation or use a different methodology, such as a laboratory test
Data collection in Phase 2 was compromised. Some buses were in Phase 2 while others were in Phase 1.	There was a staggered take up during the pilot due to changing scope after the methodology for research was designed and approved.	Design a scope that everyone agrees to prior to research methodology design
Amalgamation of Phase 2 and 3. Phase 3 boarding time study was used to rectify issues with the earlier methodology design due to changing scope and availability of data for ticket types.	Due to delays and staggering of uptake by operators and issues with technology, Phase 2 was essentially the same as early Phase 3.	The research was able to be flexible and utilise the time in other ways to enhance the research carried out.
The regression methodology was proven to identify time taken per customer and ticket type using information obtained from surveyors at bus stops taking detailed recordings.	The operator ticket type data was unavailable so an off-bus ticket observation methodology was tried and tested.	Ensure methodologies can be rigorously tested and proven for this and future research
Negative opinions of the smartcard equipment from customers.	A lot of these opinions were due to comments about the unreliability of the equipment	Make sure the equipment works to an appropriate level before marketing
Drivers from different operators were surveyed at different times and potentially at different times in their learning curves. Although it was attempted to avoid this, drivers may not have been under completely the same test conditions which may have affected the results.	Staggered operator entrance into Phase 2.	Need buy in from all stakeholders to avoid staggering.
At the time of Phase 2 and 3 surveys, the validators on the buses were running at about 70-80% reliability, which is likely to have a negative impact upon drivers' and customers' views.	Technical issues with ETMs..	Do not do surveys when technology is not working to acceptable standards

Table 3. Managing Change Lessons Learned



## 6.3. Lessons Learned from the Operational Pilot

In addition to a lessons learned log from the research work stream, a lesson learned log was maintained throughout the operational pilot by the Yorcard pilot team. In the summer of 2009 a series of individual lessons learned meetings were held between Yorcard staff, the prime supplier and each of the main stakeholders to draw out their views on the delivery of the pilot and the lessons that should be learned. The main lessons raised are set out below. They are ranked from the most often raised (top) to least often raised (bottom). This does not, however, mean they are in order of importance. The lessons learned were identified against different areas of the project delivery and the same lesson learned may have applied to more than one aspect of the project delivery.

- Ensure that Project Team has relevant skills, attributes and experience. It is the Programme Manager's job to identify and fix resource issues.
- Ensure that Programme Manager has relevant skills, attributes and experience.
- Ensure staff capturing business requirements have relevant experience, follow a common methodology and understand the required outputs.
- Choose a supplier who can demonstrate relevant expertise on the part of the people dealing with your project. Beware of "optimism bias".
- Ensure overall Project Governance is in place and is adequate and that an appropriate methodology is being followed; supervise the project properly.

- If a pilot is envisaged, carefully evaluate the costs and benefits: a pilot is not a substitute for proper design and procurement: a pilot should not be seen as stage one of a full roll-out.
- Audit the robustness of the plan, and make appropriate contingency arrangements. If sufficient funding is not forthcoming, then reduce the scope of the project. If this cannot be achieved then the project should not proceed.
- Greater sensitivity to supply chain issues should be shown.
- Ensure Quality Assurance; integrated testing suite and model installations are essential elements in the project management.
- Individual technical ability is important and will make a difference. Attempt to ensure a level of competence in staff by insisting on named individuals to support the project.
- Ensure that the technical solution and overall scope is deliverable.
- Operators are sovereign organisations with little motivation to co-operation with each other. Each has its own business processes and objectives, which are often in conflict. It is unlikely that one set of requirements will encompass the needs of all; therefore the lesson to learn is that a different way of delivering regional smart card schemes needs to be found. The route chosen for the pilot meant that it attempted to encompass too wide a diversity of view of what should be required
- A low-cost simple to use and maintain smart ticket machine and validator is required for small and medium size bus operators.

Due to the technical complexities associated with the scheme, the original scope was reduced, and the original timeframes were extended to deliver a solution which would be adequate to meet the minimum needs of the Yorcard Pilot Project. In particular, the Pilot changed from one which was focused on understanding acceptability of the system to the customers and the stakeholders, prior to full roll-out, to one which was concerned with proving the technical capabilities of ITSO and proving the viability of commercial ticketing. There was a mismatch between what was believed could be achieved and what was actually achievable.

Many of the lessons learned as the operational pilot evolved were implemented in later stages of the pilot. For example skill/experience gaps of existing staff were identified and appropriate new staff were recruited in the latter half of the pilot. They contributed directly to the overall success of the pilot

Following these changes the pilot became, at the time of operation, the most complete and successful ITSO scheme in the UK offering a diverse range of products, from single operator to multi-modal smart products

The lessons learned from the Yorcard pilot are at the heart of the new business case and plan for submission to the DfT and are included and documented in Yorcard's best practise document (RES912).

## 6.4. Arrangements for obtaining third party commercial data

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In this project, data sharing agreements were put in place prior to the commencement of the research. All parties signed this agreement, including the independent third party (Newcastle University). However, in practise, some elements of smart transaction data was unobtainable for commercial and in the view of bus operators, legal reasons. This had an impact upon the research and limited the outputs which could be published.

Operators also perceived an issue with the PTE's. Operators did not want the PTE's to see their commercial data.. If this was an overall operational system and not a pilot, it would, therefore, have to ensure that data could only be seen by the owner (an ITSO principle) and it is likely that the data processing would be subcontracted to a third trusted party as an operational efficiency which also enhances the feeling of confidentiality.

The following observations were made, which may be the cause of the above.

In this pilot two of the three operators were large operators. The research element meant that all would be able to see the summary of data when published and, thus, by removing their own could identify their competitors' commercial data. There was therefore a reluctance by the operators to provide detailed smart transaction data information for commercial reasons. If a pilot were to be carried out again consideration should be given to engaging with more than 2 major operators, where this is possible, to allow for the publication of cumulative data whilst at the same time protecting commercially sensitive data at operator level. However, this could equally add to the time taken to reach any decisions.

This is an unusual circumstance because in a pilot the total results are open and available to anyone to read. If this were an operational scheme, operators could only see their own results.

# Appendix 1

## Appendix 1 : Brief Description of Operational Pilot Scheme

### Background

South Yorkshire Passenger Transport Executive (SYPT) and West Yorkshire Passenger Transport Executive (Metro) received conditional major scheme funding from the Department for Transport (DfT) in April 2005 to conduct a pilot smartcard ticketing system on bus in Sheffield and a rail pilot scheme on the Sheffield to Doncaster route. The project was to supply a fully managed back office service, meeting the ITSO specification and ensuring that smartcards were interoperable with other ITSO schemes elsewhere in the country.

Scheidt & Bachmann (S&B), a German company, were awarded the contract in March 2007.

The pilot was funded by the DfT, Objective 1 European Regional Development Fund, Northern Way Growth Fund and the two Yorkshire PTEs.

The project cost, as at December 2009 (subject to final amendment), is £9.08m.

### Scheme Description and Pilot Architecture

The Yorcard pilot was operated on three bus operators' services. First Bus, Stagecoach and MAS Special Engineering. Over 150 buses were fitted with on-bus smart validators.

The pilot was operated on prime commercial bus routes 40, 41, 42, 51, 52 and 120 which ran along some common corridors and all services passed through Sheffield City centre. All these services had a weekday day time frequency of 10 minutes or less. Tended school services served the main schools in the S10 postal district of Sheffield. The rail part of the pilot ran on the route between Doncaster and Sheffield, including intermediate stations. Smart validators and smart ticket vending machines were installed at the stations.

In total, three bus operators, 3 bus depots, 7 rail stations and a new retail network were used in the Yorcard pilot.

The Yorcard back office was planned to perform several functions which included:

- Error free and secure communication with the ticketing, platform and sales centre equipment;
- Ticket sales and usage data collection and processing;
- Security – including hot lists;
- Remote activation of products - action lists;
- Settlement of debt and credit between participants;
- Clearance & settlement of the amounts owing and due;
- Communications with other systems including banks, credit card organisations, Operators' corporate systems etc<sup>7</sup>; and
- Providing a Web-site for customer sales and account management<sup>7</sup>.

The scheme was planned to comprise a smartcard transport application, resident on a network of computers as shown in the diagram below:

<sup>7</sup> The scope of the project was changed to reflect what was achievable in this technical complex project in the timescales available and the ability of the supplier to deliver, without compromising the key deliverables. These items were not delivered during the pilot.

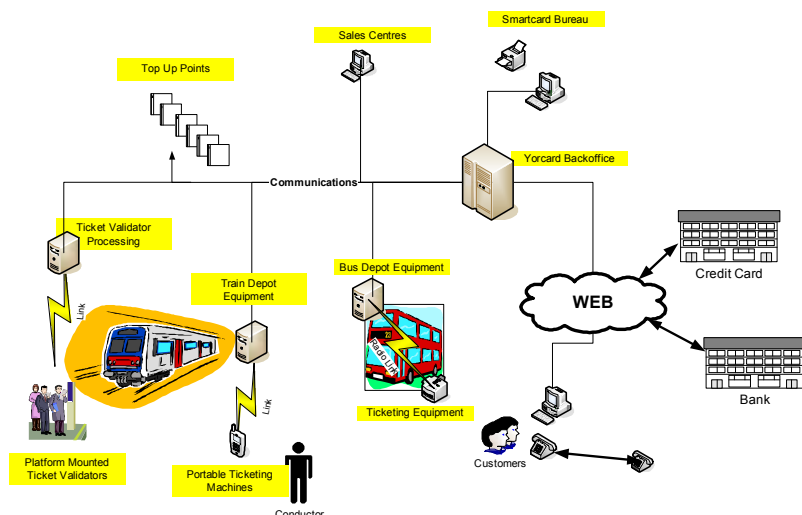


Figure 3. Proposed Yorcard Infrastructure

### Yorcard Pilot Implementation Dates

There were a number of contributing factors including technical challenges, supplier issues and project management, which led to the late start and delivery of this pilot. The headline deliverables as observed by the customer were as follows;

Year	Month	Deliverable
2007	March	Commencement of Scheme
2008	February	Mass Bus goes live with Touch-on
	February	Personalised smartcards issued to school children for remainder of academic year 2007/08
	1 April	English National Concessionary Travel Scheme (ENCTS) commences
	April	Stagecoach (Bus) goes live with Touch-on
	May	Issue TravelMasters (Multi-operator product) to SYPTe staff
	August	First Bus goes live with Touch-on
	August	Retail sales of smartcards established at SYPTe Travel Information Centres in Sheffield,
	August	Personalised smartcards issued to children and students for academic year 2008/09.
	September	Rail pilot goes live.
	December	Rail pilot finishes
2009	May	Introduction of single operator only commercial smart products
	July	Commence Touch-on, Touch-off trial and introduction of Pay as you Go card valid on some First Bus and Stagecoach services. This card offered adult single fares and/or a daily capped product.
	2 October	End of pilot operations
	31 October	Complete decommissioning of Yorcard pilot

Table 4. Key Dates

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### Smartcard and Transaction Statistics

For the duration of the project the following smartcards were issued to customers:

- 3,640 smartcards with the Yorcard shell to senior (60 years and older), living in the S10 postal area of Sheffield, as ENCTS smartcards;
- Over 3,500 smartcards to young persons as free home to school travel or MegaTravel /Student for the academic year 2008/09;
- Over 500 smartcards were issued to staff at SYPTE with the TravelMaster product
- 300 smart TravelMaster products to members of the general public
- Over 200 Pay as you Go cards were used to customers with STR loaded onto the cards.
- 3 different single operator only commercial products were available to the public
- Over 400 smartcards lost or stolen cards were replaced (Excludes ENCTS).

This resulted in the following number of Touch-on transactions that is representative of a typical week in the latter half of 2009.

- Up to 80,000 SYPTE issued ENCTS<sup>8</sup>;
- around 1,400 non-SYPTE issued ENCTS;
- 400 TravelMaster
- 500 young persons<sup>9</sup>, and .
- 400 Pay as you Go

In one month alone ENCTS cards from 143 different TCA's were recorded on one bus operator.

### Operational Pilot Summary

Yorcard delivered a fully working ITSO compliant multi-modal, multi-operator smartcard ticketing system in South Yorkshire. The core elements of bus, rail, back office (including the ITSO HOPS) and retail infrastructure were delivered in just two years from commencement of the project. The operational pilot started in February 2008 and concluding in October 2009

The Yorcard pilot was at the forefront of delivering an innovative public transport smartcard system, and provided the technology to enable a number of industry 'firsts', notably the first smartcard scheme to be able to accept all ENCTS smartcards with its bus equipment and the first use of RSP tickets on a smartcard platform. The first to successfully trial Touch-on Touch-off technology and offer a multi operator Pay as you Go product. It was, at the time of operation, the largest by transaction volumes and most diverse ITSO compliant scheme in England.

<sup>8</sup> this includes all ENCTS cards : i.e both cards with Yorcard and ISL shell.

<sup>9</sup> Data for the academic year 2008/09





