Yorcard

Yorcard Research Folder - Phase 6

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This Folder is the sixth in a series of six folders and two reports funded by the Department of Transport, Technology and Standards Division that form the research outputs which complement the Yorcard Smart Ticketing Pilot. All folders in this series of six, comprise of a number of discrete and stand alone reports. Each report has been written so it can be read in isolation, giving the reader a detailed view of a specific subject matter or be read in conjunction with other reports in the same folder or other folders. Consequently there is a considerable amount of common information across reports, which the reader, if intending to read more than one report may wish to skip. There are four reports and one data book that make up this folder.

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

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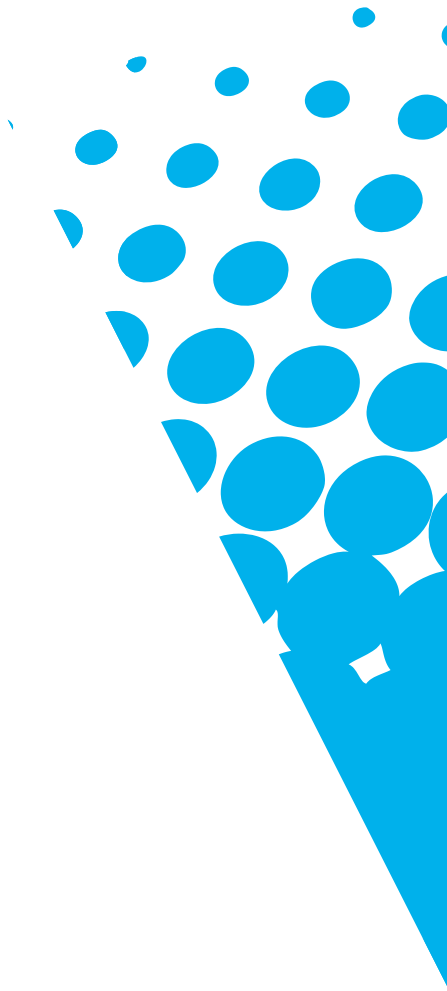

RES761 Phase 6: **Citizen Cards – Technological Trial**

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This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

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Glossary

AIDC - European Centre of Excellence for the Automatic Identification and Data Capture Technologies (AIDC): manages smartcard service for Sheffield City Council

Card Interface Device (CID) - In this document a device which can be fitted to bus, train or retail outlet to read smart public transport cards.

Citizen Card - Generic name given to smartcards that can be used in more than one environment. For example a public transport identity card and a library card.

Gemtag 501 - A device used by Sheffield City Council to read smartcards in local libraries.

GIS hand held reader - A device used by Sheffield City Council to read smartcards in a leisure environment

IPE - ITSO Product Entity. These are defined by ITSO and each IPE has its own set of unique characteristics. IPE 2 is a stored travel rights product, IPE 16 is a concessionary entitlement product and IPE 22 is an area based prepaid period type product

ITSO - A non-profit organisation that maintains the ITSO specification for Members and the Crown. Its role is the security of cards, products and transaction data between interoperable schemes. ITSO does not run schemes.

Mifare Classic 4K smartcard - Standard smartcard used by public transport schemes across the country. Phasing out of this card for new issues, started from 31 December 2008.

ms - Millisecond. One thousandth of a second.

PTE - Passenger Transport Executive. A public funded body responsible for the co-ordination of public transport in a metropolitan area of England. There are 6 PTE's in England.

Public Transport - In the context of this report smart enabled buses and trains in the Yorcard pilot.

Executive Summary

The Yorcard Project delivered a multi-modal, multi-operator public transport smartcard scheme trialled on certain buses in Sheffield and on the local train service between Sheffield and Doncaster and intermediate stations.

This report, examines under laboratory conditions, the affect of loading non-public transport applications along side public transport applications on one smartcard.

The key findings from the Phase 6 study are presented below :

- Mifare Classic 4k smartcards could be loaded with public transport and non-public transport applications on the same card.
- Cards with multi-applications could be read by using the appropriate hardware.
- The impact on the performance time of reading non transport applications in a non transport environment were nil or minimal in the test cases undertaken.
- There was a measurable time difference when reading the same applications using smart equipment used in the Yorcard pilot when reading transport applications. Time delays of up to 21% longer were recorded.

Introduction

1.1 Background

The Yorcard Project delivered a trial multi-modal, multi-operator public transport smartcard scheme in part of the South Yorkshire area from February 2008 to October 2009. The scheme offered certain commercial and concessionary ticket products in 'Smart' format and was built to the ITSO standard. Yorcard Limited procured all the hardware, software and services required to enable the successful implementation of a Pilot scheme. The Pilot was trialled on the services of three bus operators in Sheffield and on Doncaster to Sheffield rail services including intermediate stations. The Yorcard Pilot original target was to issue up to 30,000 smartcards for use on these services.

Sheffield City Council (SCC) is the primary local authority in whose area the Pilot is taking place, others being Rotherham and Doncaster through which the Pilot railway route passes. It currently provides a smartcard system for certain citizen services including library and leisure applications. There were approximately 175,000 e-voting smartcards in circulation within the local authority area, and now there are approximately 86,000 smartcards being used for library and leisure services. The SCC service is managed by the European Centre of Excellence for the Automatic Identification and Data Capture Technologies (AIDC)[1].

This Yorcard Phase 6 Technological Trial Report sets down the outputs forming part of a research contract between the South Yorkshire Passenger Transport Executive (SYPTE) and the Department for Transport (DfT), Transport Technology and Standards Division. An overview of the tender can also be found in the General Reference Document.

[1] AIDC is a public/private partnership supported by local and regional government and sponsored by Yorkshire Forward. Based in Halifax, West Yorkshire, it also operates a Smart Media Centre from the Sheffield office. More information can be found in the General Reference Document.

1.2 ITSO

During the scoping of this work, the ITSO board agreed to phase out the Mifare Classic platform for new issues from 31 December 2008, on which this trial is based. (All Mifare Classic media operating across the ITSO environment is to be supported until 31st December 2016.) This limits the results and evaluation but nevertheless provides valuable information regarding the technical issues that are likely to arise as a result of implementing a citizen card scheme. In addition, this trial will document the performance of citizen cards compared to a single function transport smartcard and a local authority smartcard.

1.3 Meeting DfT Objectives

The DfT have stipulated the following objectives as part of the tender:

a. All elements of the pilot scheme shall be fully compliant to the prevailing ITSO documentation.
b. Conduct a robust analysis of;
   1. Bus boarding times,
   2. Systems performance and
   3. Passenger reaction

   to address the concerns of all key stakeholders involved in the rollout of smartcard technologies within a deregulated transport industry. This should provide a comparison of existing performance measures prior to the introduction of smartcards to the pilot area.
c. The research shall assess the Customer Experience and the Operator and PTE expectations and provide recommendations for rollout. Included within this analysis shall be a study of the business case for deployment of similar regional schemes.
d. To understand the value of new innovative ticketing products to the key stakeholders
e. To understand the value of using Citizen cards as an alternative to transport only smartcards.
f. To ensure that all deliverables are clear, concise, accurate, thorough, of a high technical quality and well written.
g. The research shall complement the Yorcard pilot timetable.

This report must therefore evaluate how the relevant objectives will be met, particularly objective e, and objective b1 to assess the potential impact on bus boarding times.

1.4 Meeting Yorcard Objectives

It is also important to consider the objectives of Yorcard and its stakeholders. This report will consider how the most relevant objectives are likely to be influenced by Yorcard. Please refer to the General Reference Document for the full list:

- Reduce delays and improving reliability; and
- Inform business cases.

The information from this technological trial would help to address the question of ‘What are the technical implications to delivering a multi-authority, multi-application smartcard ?’ and understand if a transport scheme would drive the introduction of citizen cards or not.

Methodology

2.1 Introduction

This section provides details on the methodology used to undertake the tests for this trial. The basis of the trial was to use a Mifare Classic 4k smartcard encoded with the ITSO shell, one or more public transport products and one or two citizen applications. All smartcard encoding used the LASSeO specification for ITSO and local authority applications for the Mifare Classic 4k smartcard.

In the first instance, 70 smartcards were produced by Yorcard's card bureau to the above specification each with different configurations of transport products loaded onto them. The smartcards were passed on to European Centre of Excellence for the Automatic Identification and Data Capture Technologies (AIDC) where loading of the legacy library and leisure applications occurred.

The smartcards were tested in the AIDC laboratory before being tested at the Yorcard's suppliers test centre in Germany. In both cases, a control sample of existing smartcard configurations was maintained for comparison. These were cards without the LASSeo encoding and had no IPE 0. 5 control cards were created and tested by Scheidt & Bachmann (S&B) and 6 control cards by AIDC.

2.2 Pre-Test

A pre-test was conducted at the AIDC laboratory in February 2009. This test was necessary to ensure that the equipment and smartcards functioned before any full testing took place. This test would also serve to understand any variability in smartcard transactions using different readers and different smartcards loaded with different applications. This would therefore help to establish the number of smartcards and read cycles required for the citizen part of the trial.

The test proved that a sample of 8 smartcards were able to be read by three different devices. Transaction times were recorded using a 14ms clock, and transaction times showed little or no variability between devices or smartcards. However, the transaction time was dependent upon what SCC applications were resident on the smartcard. Each device would only read the application that it is programmed to (e.g. the GIS handheld would only read the leisure application).

The following fields (all common to each application) were read from the smartcard:

- Card number
- Date/time read
- First name
- Last name
- Address
- Postcode
- Date of birth
- Expiry
- Card type
- Read type

2.3 Sample size – Smartcards and Equipment Used

The total number of smartcards used in this trial was 81. This consisted of up to 70 LASSeO configured ITSO smartcards and 11 smartcards used as control. A table showing the transport products and applications loaded onto each smartcard is presented at appendix 1. As an overview, smartcards had a mix of a stored travel rights product, a concessionary entitlement product and an area based prepaid period type product plus a library and/or leisure application. The products chosen for transport are representative of the vast majority of all passenger journeys that may be used in a fully smart environment.

3 different devices were used in the trial:

- Gemtag 501 with desktop PC configured for use in a library environment
- GIS handheld reader configured for use in a leisure environment
- Scheidt and Bachmann Card Interface Device (CID) as used on the rail platform, at the TIC and on bus

Results and Analysis

3.1 Summary of Analysis

A summary of the results obtained for the three different devices are listed in Appendices 2 to 4.

3.1.1 Gemtag501 with desktop PC : Library Reader
60 cards were all successfully read. 3,716 out of the 3,730 non control card readings measured took 125 ms. This represents over 99.6 % of the total sample. 5 cards were up to 16 ms quicker and 9 cards up to 16ms slower. No time difference was recorded between the control cards and the vast majority of test cards.

A summary of the number of transaction times by card and products is at Appendix 2.

Cards were tested on three different Gemtag501 devices.

T-tests were carried out to examine the differences of the transaction times between the smartcards and the appropriate control cards. The tests aimed to examine the null hypotheses that the transaction time of each type of smartcard does not differ from that of the appropriate control card. The mean values of the transaction time of each type of smartcards are either 125ms or extremely close to 125ms, which is also the mean value of the transaction time of the control cards. Hence it suggests that the transaction time of each type of smartcards does not differ from that of the appropriate control card at a 5% level. (See Appendix 5 for p-values.)

From the tests undertaken and recorded it would appear that the different products loaded to the card had no impact on transaction times.

3.1.2 GIS Hand Held reader configured for Leisure environment
Control cards with no leisure entitlement on the card were read quicker than those with.

60 cards were successfully tested.

Those cards loaded with the library application in addition to transport applications took slightly longer to read. Of those, the majority 94.5%, took 196ms to be read. i.e 28ms greater than the time taken by cards without the library application or cards with both the library and leisure application. The remaining 5.5% observations were recorded to take 224ms or 56 ms greater than the time taken by cards with out the library application or cards with both library and leisure application.

All cards that had the leisure entitlement loaded (including control cards) took 168ms to be read. A summary of the number of transactions by card and product is in Appendix 3.

T-tests were carried out to examine the differences of the transaction times between smartcards and their appropriate control cards. (IPE 2 is a stored travel rights product, IPE 16 is a concessionary entitlement product and IPE 22 is an area based prepaid period type product.)

Card IPE 2, 16 Library
The test aimed to examine the null hypothesis that the transaction time of Card IPE 2, 16 Library does not differ from that of the appropriate control card. The statistical results indicate that the transaction time of Card IPE 2, 16 Library is significantly different from that of the appropriate control card at a 5% level (p=0.000)

Card IPE 2 Library
The test aimed to examine the null hypothesis that the transaction time of Card IPE 2 Library does not differ from that of the appropriate control card. The statistical results indicate that Card the transaction time of IPE 2 Library is significantly different from that of the appropriate control card at a 5% level (p=0.000).

Card IPE 2, 22 Library
The test aimed to examine the null hypothesis that the transaction time of Card IPE 2, 22 Library does not differ from that of the appropriate control card. The statistical results indicate that the transaction time of Card IPE 2, 22 Library is significantly different from that of the appropriate control card at a 5% level (p=0.000).

The transaction times of the other 6 types of smartcards, IPE 2, 16 Leisure, IPE 2 Leisure, IPE 2, 22 Leisure, IPE 2, 16 Library & Leisure, IPE 2 Library & Leisure and IPE 2, 22 Library & Leisure, are exactly the same, 168ms for all. Hence the examinations of the transaction time difference between each of the 6 types of smartcards and their appropriate control card were unnecessary.

3.2 Summary of Results

3.1.3 Scheidt & Bachmann card Interface Device

Data from 64 cards tested was obtained and analysed. This included all the cards tested at AIDC plus a slightly greater range of cards with public transport applications. This was necessary to test what affect on transaction time the different public transport applications or combination of applications had. In the case of the tests undertaken by Scheidt & Bachmann all tests were undertaken with the measuring device in debug mode (a means of monitoring and capturing events) so that transactions times could be accurately measured and if necessary events analysed in detail.

It is estimated that in non debug mode (i.e normal operational use) transaction times would be made about 400-500 ms quicker.

A summary of the results obtained are in Appendix 4. Note as the timings for each observation gave a unique transaction time. Times have been summarised and rounded to nearest 100ms.

T-tests were carried out to examine the differences of the transaction times between smartcards and their appropriate control cards.

The test aimed to examine the null hypothesis that the transaction time of each of the cards in turn does not differ from that of the appropriate control card. The statistical results indicate that the transaction time of each of the test cards is significantly different from that of the appropriate control card at a 5% level (p=0.000). The transaction of the test card takes on average 163ms longer than that of the corresponding control card.

The results show that the addition of non-public transport applications to cards with public transport applications does have a measurable impact on the transaction time. For the sample cards produced the measured average transaction time was up to 21% longer than the fastest average time for the control smartcards with only public transport application(s).

The results obtained show that the addition of different products would have no operational impact in the library environment. The impact on the time to read a card in a leisure environment is minimal and it is unlikely that the user would be aware that in certain circumstances that the device took slightly longer.

The time taken to read products on a public transport device was far greater than the devices used in the Library or Leisure centres. This is attributable in part because the tests were undertaken in debug mode which added 400-500ms to each transaction Transactions times varied depending on the number and type of products on the card. With the average transaction time varying up to 21% longer than the fastest average transaction time for control cards with no non-public transport applications.

3.3 Sample Size

The card sample size and number of tests were sufficient to be confident that the results were robust. T –tests were undertaken as described above.

3.4 Citizen Transaction Times (Leisure and Library)

As described above, the addition of the library only application had an adverse affect on recorded timings when the hand held card reader(Leisure) was used. This could be up to one third longer in transaction time. This only occurred when there was no leisure application on the card.

This was attributed to the extended error handling times exhibited by firmware in the GIS reader, which was designed to read a leisure entitlement. The results in Appendix 3 demonstrate that the read-time is apparently reduced for the GIS reader where there is no Leisure entitlement on the card or an ITSO product. This does not however prove any causal relationship between the presence of the ITSO product and the extended read time.

The data provides strong evidence for the conclusion that the presence or absence of an ITSO product on the card has no effect on the GIS read time for the Leisure entitlement where this is actually present on the card. There are, however, differences in the reported read time for the GIS readers where the Leisure product is absent. This is however not a valid test for the purposes of this investigation, which is investigating the possible effect of ITSO on the read time for a Leisure entitlement which is present on the card.

These results provide strong evidence to support the view that the presence or absence of the ITSO shell and associated ITSO services has no observable affect on the recorded read time for the Leisure entitlement present on a card using the mobile GIS readers. In the case of the Gemtag501 (library) the time taken to read the card was the same. No differences were observed with different types or numbers of applications.

3.5 Public Transport Transaction Times

For public transport, the time taken for a card to be read is very important. Longer card reading times increase boarding times and have a measurable impact for not only the card holder but potentially for all those travelling on the same vehicle. The additional time taken by the inclusion of non-public transport products was measurable and in one instance recorded as 21% longer than the equivalent control card. Any additional boarding and alighting transaction times would have an adverse affect on the economic benefits of a public transport smartcard scheme and is unlikely to be acceptable to the provider or the customer who are seeking faster boarding times.

Review of Objectives

4.1 Reducing Delays and Improving Reliability

The data obtained from this laboratory test does show that in general terms the addition of a public transport and non-public transport product to the same smart card does have a measurable impact on transaction times. This would have an impact on boarding times and hence potentially reduce the attractiveness of smartcards.

4.2 Business Case

One of the key factors in any business case for smartcards is that they can reduce boarding times. Any increase in transaction times would lead to an increase in boarding times and hence reduce the business case for smartcards.

4.3 Analysing the Bus Boarding Time (DfT b.(1))

From the observations and recordings made the addition of non-public transport applications to a smartcard with public transport applications will increase the overall average transaction time. An increase of up to 21% in average transaction times compared to the time recorded for control cards was recorded.

Summary and Conclusions

The analysis carried out for this report has enabled the identification of the important calculations.

5.1 Citizen Card Transaction Times (Library and Leisure)

In practical terms no real impact would be observed by the customer.

5.2 Transport Transaction Times

Some measurable additional transaction time when public and non-public products are added to same card.

5.3 Key Findings

That further work would need to be undertaken if a Citizen card which covers both public transport and non-public transport applications is to be developed to ensure that bus boarding and alighting times are not compromised.

5.4 Lessons Learned

None from the point of view for delivering this piece of research.

5.5 Impact on Implementation

The results of this research work had no direct impact on the delivery of the operational pilot.

5.6 Limitations

A number of limitations were identified at the outset. The main limitations are:

- all tests were done under laboratory conditions and not in a live environment
- a relatively small representative number of smart public transport products were tested.
- Only Mifare Classic 4k cards were tested.

5.7 Objectives

The objectives have been met.

Advice for the Business Case

The proposed draft business case to be submitted to the DfT in early 2010 does not rule in or rule out a future Citizen card. Any move to a Citizen card would need to be mindful of the research results obtained in this study.

Recommendations

That the observations from this study are noted and feed into any future development of Citizen cards.

That the observations from this study are shared with other interested parties to help inform them of the possible impact on their operational efficiencies that a multi-application card might have on their scheme.

Appendix 1

Table of smartcard applications

Note: this matrix excludes smartcards used for control purposes as used in the environment at present. The ITSO reference (A, B and C) refers to the IPEs loaded into each smartcard where 2 is a stored travel rights product, 16 is a concessionary entitlement product and 22 is an area based prepaid period type product.

Card No	ITSO A	ITSO B	ITSO C	LA Library	LA Leisure	Not required for testing at AIDC
1	2	-	-	-	-	Not required
2	2	-	-	-	-	Not required
3	2	-	-	-	-	Not required
4	2	-	-	-	-	Not required
5	2	-	-	-	-	Not required
6	2	22	-	y	-	
7	2	22	-	y	-	
8	2	22	-	y	-	
9	2	22	-	y	-	
10	2	22	-	y	-	
11	2	-	-	y	-	
12	2	-	-	y	-	
13	2	-	-	y	-	
14	2	-	-	y	-	
15	2	-	-	y	-	
16	2	22	-	-	y	
17	2	22	-	-	y	
18	2	22	-	-	y	
19	2	22	-	-	y	
20	2	22	-	-	y	
21	2	-	-	-	y	
22	2	-	-	-	y	
23	2	-	-	-	y	
24	2	-	-	-	y	

Card No	ITSO A	ITSO B	ITSO C	LA Library	LA Leisure	Not required for testing at AIDC
25	2	-	-	-	y	
26	2	22	-	y	y	
27	2	22	-	y	y	
28	2	22	-	y	y	
29	2	22	-	y	y	
30	2	22	-	y	y	
31	2	-	-	y	y	
32	2	-	-	y	y	
33	2	-	-	y	y	
34	2	-	-	y	y	
35	2	-	-	y	y	
101	2	16	-	-	-	Not required
102	2	16	-	-	-	Not required
103	2	16	-	-	-	Not required
104	2	16	-	-	-	Not required
105	2	16	-	-	-	Not required
106	2	16	22	y	-	Not required
107	2	16	22	y	-	Not required
108	2	16	22	y	-	Not required
109	2	16	22	y	-	Not required
110	2	16	22	y	-	Not required
111	2	16	-	y	-	
112	2	16	-	y	-	
113	2	16	-	y	-	

Card No	ITSO A	ITSO B	ITSO C	LA Library	LA Leisure	Not required for testing at AIDC
114	2	16	-	y	-	
115	2	16	-	y	-	
116	2	16	22	-	y	Not required
117	2	16	22	-	y	Not required
118	2	16	22	-	y	Not required
119	2	16	22	-	y	Not required
120	2	16	22	-	y	Not required
121	2	16	-	-	y	
122	2	16	-	-	y	
123	2	16	-	-	y	
124	2	16	-	-	y	
125	2	16	-	-	y	
126	2	16	22	y	y	Not required
127	2	16	22	y	y	Not required
128	2	16	22	y	y	Not required
129	2	16	22	y	y	Not required
130	2	16	22	y	y	Not required
131	2	16	-	y	y	
132	2	16	-	y	y	
133	2	16	-	y	y	
134	2	16	-	y	y	
135	2	16	-	y	y	

Appendix 2

AIDC – Library Reader

Summary of Observations for Gemtag501 with desktop PC.
3 different model numbers used in a library environment.

The table below records the number of occasions a transaction time was observed for each of the specified amounts of time . All times in milliseconds (ms)

	ReadTime(ms)					
Products on Cards/Time to Read cards (ms)	**109ms**	**110ms**	**125ms**	**140ms**	**141ms**	**Total**
IPE 2, 22, Library			314			314
IPE 2, Library		1	307	1		309
IPE 2, 22, Leisure			314			314
IPE 2, Leisure	1		308			309
IPE 2, 22, Library & Leisure			312		1	313
IPE 2, Library & Leisure	1		306	1	1	309
IPE 2, 16 Library		1	619			620
IPE 2, 16, Leisure	1		620	1		622
IPE 2, 16 Library & leisure			616	1	3	620
Control Cards with Library and No ITSO shell			180			180
Control Cards with Leisure and No ITSO shell			180			180
Control Cards with Library and Leisure and No ITSO shell			180			180
Total	**3**	**2**	**4256**	**4**	**5**	**4270**

Note : Observations undertaken and recorded on 18 and 30 March 2009.

Appendix 3

AIDC – Leisure Reader

Summary of Observations for GIS handheld reader configured for use in a leisure environment.
3 different model numbers were used in the testing.

The table below records the number of occasions a transaction time was observed for each of the specified amounts of time . All times in milliseconds (ms)

	ReadTime(ms)					
Products on Cards/Time to Read cards (ms)	140ms	168ms	196ms	224ms	238ms	Total
IPE 2, 22, Library			270	15		285
IPE 2, Library	2		287	18	1	308
IPE 2, 22, Leisure		286				286
IPE 2, Leisure		308				308
IPE 2, 22, library & Leisure		286				286
IPE 2, Library & Leisure		308				308
IPE 2, 16 Library	1		563	32		596
IPE 2, 16, Leisure		596				596
IPE 2, 16 Library & leisure		597				597
Control Cards with library and No ITSO shell	180					180
Control Cards with Leisure and No ITSO shell		180				180
Control Cards with Library and Leisure and No ITSO shell		180				180
Total	**183**	**2741**	**1120**	**65**	**1**	**4110**

Note : Observations undertaken and recorded on 16 and 31st March 2009.

Appendix 4

S&B – Transport

Summary of Observations for S&B Card Interface Device as used on bus/rail and Retail outlet.

The table below depicts the number of occasions a card transaction time was recorded.

Products on Card	Transaction Time in 00's of ms rounded to nearest 100ms.												No. of Transactions	Average Transaction Time (ms)(See Note1)	Average Control Transaction Times (ms)	%increase in time taken when compared with an average Control transaction Time
	10	11	12	13	14	15	16	17	18	19	20	21				
IPE 2		79	19				1	1					100	1126	1033	9.0%
IPE 2, 22 Library			96	1				1	1	1			100	1236	1033	19.7%
IPE 2 Library			76			1	1	2					80	1186	1033	14.8%
IPE 2,22 Leisure	1		92	1	1	1	1			2	1		100	1244	1033	20.5%
IPE 2 Leisure			77			1		2					80	1181	1033	14.4%
IPE 2,22 Library, Leisure			93		1	1	2			1	2		100	1251	1033	21.1%
IPE 2, Library, Leisure	1	1	77		1		1						80	1173	1033	13.5%
IPE 2,16		98			1	1							100	1111	1033	7.6%
IPE 2,16,22 Library			95	1		2	1					1	100	1244	1059	17.5%
IPE 2, 16 Library			77	1		2							80	1184	1033	14.6%
IPE 2,16,22 Leisure			94	3		1					1	1	100	1247	1059	17.8%
IPE 2,16 Leisure			75	1	1	2	1						80	1192	1033	15.7%
IPE 2,16,22, library, Leisure			92	1	1		4	1			1		100	1255	1059	18.6%
IPE2,16 Library, Leisure			78			3							81	1186	1033	14.8%
Total Observation Count	**2**	**178**	**1041**	**9**	**6**	**15**	**12**	**7**	**1**	**4**	**5**	**2**	**1281**			

Note 1 : For the purposes of analysis, cards which had a transaction time of less 1,000 ms were not included as these could not be verified as being coded and measured correctly.
Note 2 : Fastest recorded average transaction. Observations undertaken in October 2009.

Appendix 5

P – Values

The summary of hypothesis tests with AIDC data for Gemtag501 with desktop PC

Type of Smartcards	IPE 2, 16 Library	IPE 2, Library	IPE 2, 22 Library	IPE 2, 16 Leisure	IPE 2 Leisure	IPE 2, 22 Leisure	IPE 2, 16 Library & leisure	IPE 2 Library & Leisure	IPE 2, 22 Library & Leisure
P-value	P=0.590	P=1.000	n/a	P=0.980	P=0.445	n/a	P=0.281	P=0.674	P=0.449

For the statistic tests that were undertaken, a p value was generated for each test. When $p<0.05$, the null hypothesis is rejected and it indicates that the result is statistically significant at the 5% level. When $p>0.05$, the null hypothesis is accepted and it indicates that the result is not statistically significant at the 5% level.

RES762 Phase 6: Consumer Survey

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This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

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Executive Summary

The Yorcard Project is intended to deliver a multi-modal, multi-operator public transport smartcard scheme which is being trialled on a certain corridor of buses in Sheffield and on the local train service between Sheffield, Doncaster and intermediate stations. Sheffield City Council also operate a smartcard scheme for access to libraries and leisure services, managed by the Centre for Automatic Identification and Data Capture (AIDC).

This report presents the findings from the Phase 6 Consumer Survey. The aim was to understand the consumer view of using existing Citizen Cards as an alternative to public transport, or library and leisure only smartcards, using technology and processes used in the Yorcard area as a set of case studies. Focus Groups were carried out in Sheffield and used to capture qualitative data and wider views from consumers and also to feed into a postal questionnaire. Apart from the 11-16 age group (3 questionnaires were returned), the sample size collected was in accordance with the methodology defined in YC-IGO-RES-005 (see tables 1 and 2). 1734 questionnaires were posted to Yorcard and SmartISheffield users, of which 781 were sent to Yorcard users. 254 questionnaires were returned which represents a 14.6 % response rate.

This report demonstrates that the methodology and the data collected meets the research objectives, as this Phase 6 study has enabled the identification of consumer opinions of a single card for multiple applications. The key finding from this Phase 6 study are presented below:

Focus Groups

- A discount scheme with similar benefits to a loyalty card was more encouraging to children and Slice/SmartISheffield card users than to senior/disabled concessionary users to use smartcards in the future.

- Opinions over an integrated Transport/Citizen smartcard were divided, respondents could see pros and cons:
  - Key advantage - one card for all services would be easier to manage
  - Key disadvantage - one card for all services would be more of an inconvenience if lost, albeit easier to replace.

- With respect to Touch-on, Touch-off (ToTo) on buses:
  - Children said there was no need for ToTo for their travel as they pay a flat fare;
  - Slice/SmartISheffield card[1] users (17-59) who had not experienced Public Transport smartcards were not generally convinced that having to Touch-off when alighting would be convenient. (Note: the Focus Group consisted of only 4 participants.)
  - Concessionary travellers did not see direct benefits for them, given their free travel, but many commented on indirect benefits for family members.

Response to the Postal Questionnaire

- The majority of participants were senior and/or disabled concessionary card holders and the main purposes of the journeys made were for shopping and leisure, rather than 'travelling to and from work'.
- The most frequently selected reasons for having a Public Transport (PT) smartcard are "I don't need to worry about what the fare is or have the right change', 'it is quicker to get on and off the bus' and 'I don't need to carry any money'. Although this was claimed mainly by concessionaires who are eligible for free bus travel, it indicates that public transport smartcards which allow credit to be stored in advance of travel can be attractive to a wide range of bus users.
- Single card solutions, covering multiple services was welcomed by participants, and cards combining both library and leisure services were used more often than those with only a single application, as reported by participants.
- Integrating PT, leisure and libraries to a single smartcard is generally welcomed.
- Using a multi-application card to pay bills, for small value goods and taxi fares is not popular, and the majority of them felt worried about losing the card.
- Views on a multi-application card are generally positive but with concerns about personal data and privacy.

Similar to the results from the focus groups, a discount scheme with similar benefits to a loyalty card was seen as the most appealing benefit of using the SmartISheffield card.

[1] Slice/Smart|Sheffield card is a discount card controlled by Sheffield City Council through the Smart|Sheffield Scheme.

Introduction

Introductory details including background, objectives and Pilot Acceptance Criteria for the Yorcard project can be found in the General Reference Document. As with the other Yorcard research reports, this report will address both the relevant Yorcard and DfT objectives in the conclusions section.

Methodology

The recommendation in the Phase 6 Stage Plan (reference YC-IGO-RES-005) was to use focus groups in the first instance to aid the design of a questionnaire and obtain qualitative data. The final questionnaire was conducted as a postal questionnaire in order to target existing Yorcard and Citizen card users within the immediate geographical area of the pilot services.

The questionnaire used was developed based upon the pilot acceptance criteria, highlighted in the methodology (reference YC-IGO-RES-005) and following the results from the focus groups.

Results from the Focus Groups

3.1 Introduction

Three focus groups were conducted, with the number of participants for each group in parentheses, as detailed below:

- Secondary School Children (11)
* Adult Slice/Smart card users, aged 17-59 (4)[2]
* Concessionary Travellers, aged 60 and over (17)

Candidates for the focus groups were canvassed at the same locations as in previous Phases, as well as by direct mail contact for Citizen Card holders. The groups were run at convenient times and locations within the geographical pilot area. There were a mix of male and females, and different social groups. An incentive of a £30 voucher was offered to all adult participants.

[2] The Adult focus group was intended to be carried out with both adult Yorcard users and Smart|Sheffield users. Due to the recruitment difficulty, there were only 4 participants in this group, all of whom were Slice card users and travelled by bus at various frequencies. Hence this group is referred as Adult Slice/Smart card users in this report.

Figures were provided by Yorcard including 873 aged 17-59 and 3641

3.2 Results

Generally, the focus groups were able to confirm that the questionnaire addressed the necessary points raised in the Pilot Acceptance Criteria and the methodology plan for this Phase. The focus groups also allowed for a greater understanding about peoples' views on PT smartcards, for example, how they learnt to use their smartcard and what they liked or disliked about the current systems. It also allowed for a more in-depth discussion about opinions of having a future integrated Transport/Citizen smartcard, namely the benefits and potential problems that may transpire from having one card for all services.

The results of the focus groups conclude that:

- Children have very positive views about smartcards:
- They found them easy to use, and learnt how to use them intuitively;
- The benefits they saw in having a smartcard include not having to carry cash, which made them feel more secure when travelling by bus, and also gave them a feeling of independence;
- The smartcards were considered to be more robust than paper-tickets, which was useful given the length of ticket validity.

- Children were, however, not as favourable about the card readers:
- Readers/scanners were unreliable and did not always work correctly;
- There was also some confusion as to why some buses did not have scanners, and how they were meant to use their smartcards on these services;

- When asked about an integrated Transport/Citizen Card, Children were generally in favour of the idea:
- No one in the focus group currently had a SmartISheffield card;
- Having one card for all services would make it easier to use, especially if it got lost or stopped working, as you would only have to replace one card;
- One card would also remove the confusion about which card was for which service and would take up less space in a wallet/purse;
- Desirable additional services on the card included an e-purse for items of low value, a loyalty scheme which could be used to accumulate points for leisure/entertainment, and a discount scheme for shops, restaurants or cinemas;

- Being able to use the card for proof of age was also seen as a potential benefit for older children as this would remove any conflict with drivers.

• Adult Slice/Smart users (17-59) had mixed feelings about smartcards:
- All participants found smartcards easy to use;
- All liked the discounts made available through the SmartISheffield scheme, but none had experienced the Yorcard scheme so could not comment;
- The main incentive for uptake of a PT smartcard had to be monetary incentives/discounts, as existing (operator-specific) day tickets were considered to be more appropriate for infrequent bus users;
- It was acknowledged that regular bus users would benefit from having stored credit on a card, to remove the need to always have change available. Whilst this would also benefit irregular travellers, it was stated that these users would be satisfied with purchasing a suitable day ticket when required;

• When asked about an integrated PT/Citizen Card, Adult Slice/Smart card users opinions were divided:
- One participant could see the benefits of having a single card for all services as it would make life a lot easier not having to manage so many cards;
- Other participants were against the idea, as if you had multiple cards and lost only one card you would only temporarily lose one service, and not all services on an integrated card;
- A multi-modal PT smartcard and an e-purse were additional services that would be considered useful;
- Again, financial incentives were considered key to encouraging uptake of an integrated scheme e.g. discounted entry to leisure facilities if you arrived by PT.

• Concessionary (60 and over) users were very positive about the smartcards:
- All participants learnt how to use their card intuitively and once the process was understood, all found smartcards ease to use;
- Most participants would, however, like a leaflet to be available to explain any future updates to the scheme, which is usually supplied by the PTE when changes to bus services occur;
- Those participants who had a SmartISheffield (Slice) card said the key benefit was having discounted leisure access across the city on one card;
- For Public Transport, all participants said that the ENCTS allowed them to remain independent, although some were unaware that the free travel extended to the whole of England;
- There was some confusion as to the extent of free/discounted rail travel available with their concessionary card;
• Concessionary users were not very happy with the readers and ticketing equipment:
- When scanning their cards, readers failed on a regular basis which did not instil confidence in the user that they had correctly used the system;
- Drivers were not very friendly when the readers failed or if card were used incorrectly;
- The practice of issuing a paper ticket for concessionary travel on some services but not others was also confusing, as participants were never certain if they needed a ticket for proof of travel/eligibility, especially if a ticket inspector boarded the bus;

• Regarding integrated PT/Citizen Cards, Concessionary opinions were divided:
- For some participants, the idea was very welcome as it would remove the need to find/remember individual cards for every service. This was especially true for those who had cognitive/memory impairments;
- Having a single help point for all services was also considered to be useful and more convenient;
- For other participants, the idea of having a single card was not a welcome one. Although the benefits were acknowledged, a single card would heighten their worries about losing it if it (a) had their personal details on it, and (b) was required for every service on it, as some services were deemed essential to their daily lives;
- It was agreed that having one card to lose would be easier to replace, as long as a replacement could be re-issued within a maximum of 24 hours.

- Frequency of use and willingness to pay were the key factors which would determine uptake of the scheme – it was questioned whether those who only paid for discounted use of leisure facilities on an infrequent basis would want to pay for an integrated card if they already received a free card for PT travel;
- Personal data security was the biggest disincentive to an integrated scheme – the notion of 'Big Brother' watching your every move was not welcomed.

• When asked about using Touch-on, Touch-off (ToTo) for Public Transport:
- Children said they paid a flat fare (40p) so there was no need for ToTo for their travel, but they could see how it might help other travellers;
- Adult Slice/Smart card users (17-59) (n.b. four participants) were not generally convinced by the idea, especially as having to Touch-off when alighting with heavy bags, buggies etc. would be inconvenient. The question was asked about what happens if you forget to Touch-off?
- Concessionary travellers did not see direct benefits for them, given their free travel, but many commented on indirect benefits for family members (e.g. grandchildren who were still eligible for child fares) or friends as it would remove the confusion over different fares for different journeys and operators.

• Overall, the discussions revealed that a discount or a scheme with similar benefits to a loyalty card were more encouraging to children and Slice/Smart card users than to senior/disabled concessionary users to use smartcards in the future.

• Opinions over an integrated PT/Citizen smartcard were divided, the key advantage being that one card for all services would be easier to manage, the key disadvantage being that one card for all services would be more of an inconvenience if lost, albeit easier to replace.

Results from the Postal Questionnaire

4.1 Introduction

The reporting of the results is presented in the following sections: Sample Profile; Use of Smartcard on Public Transport (bus); Use of Smartcard to Access Libraries and Leisure Services; and Use of Smartcard in the Future. The participants' age, gender, address and economic status are presented in the Sample Profile section. The participants' experience in using smartcards for bus travel, library and leisure services, their attitudes towards such experiences and their willingness to add more applications to their smartcards are reported in the following sections.

4.2 Sample Profile

150 questionnaires were posted to smartcard users aged 16 and under, 849 were posted to smartcard users aged between 17 and 59 and 735 were posted to those aged 60 and above. In total, 254 completed questionnaires were returned with 3 from those aged 16 and under, 83 from those aged 17-59 and 168 from those aged 60 and above, which gives a response rate of 14.6% (see Table 1 for details). However, 3 completed questionnaires from smartcard users aged 16 and under cannot represent the population and are excluded from the analysis.

Among the 251 participants, 47.4% were male and 52.6% female with 33.1% aged between 17 and 59 and 66.9% aged 60 and above (Table 2). Compared to the population of SmartISheffield users in Sheffield and Yorcard users in Sheffield, the sample contains more smartcard users aged between 17 and 59 but fewer smartcard users aged 60 and over.

Age	No. of questionnaires posted to SmartISheffield users	No. of questionnaires posted to Yorcard users	No. of questionnaires returned	Response rate
11-16	90	60	3	2.0%
17-59	550	299	83	9.8%
60 and over	313	422	168	22.9%
Total	953	781	254	14.6%

Table 1: Response rates

Age	The sample	Population of smartcard holders in Sheffield	
		SmartISheffield	Yorcard
17-59	33.1%	13.5%	19.3%
60 and over	66.9%	86.5%	80.7% (ENCTS)
Total	251	92,500	4514

Table 2: Percentage distribution of age groups.

4.3 Use of Smartcard for Bus Travel

In order to determine the diversity of the sample, the work status of each participant was also collected. Most of the participants were happy to provide this information. This sample is displayed in Table 3 which shows that more than half of the participants are retired. Given the fact that the majority of participants are aged 60 or older, this is not surprising.

Work Status	The sample
Employee in full time work (30+hours)	8.4%
Employee in part time work (<30hours)	9.5%
Self employed (full or part time)	5.2%
Unemployed and available for work	3.2%
Wholly retired from work	52.5%
In full time education at school, college or university	2.8%
Others (permanently sick or disabled, looking after the home or volunteer, etc.)	10.0%
Did not provide work status	8.4%
Total	**251**

114 participants have used a single application PT smartcard for bus travel. 15 (13.2%) were aged between 17 and 59, and 99 (86.8%) were aged 60 and above. There were 63 (55.3%) males and 51 (44.7%) females. Over half of them made 4 or more bus journeys per week (Figure 1).

Further examination reveals that the average number of bus journeys made by each participant in a week is 4.4. This is lower than the number of journeys made by Yorcard users in Phase 3 which was 5.7. The main purposes of the bus journeys reported by 88 participants were shopping and leisure, with only 4.5% being work-related (Figure 2).

Journey frequency

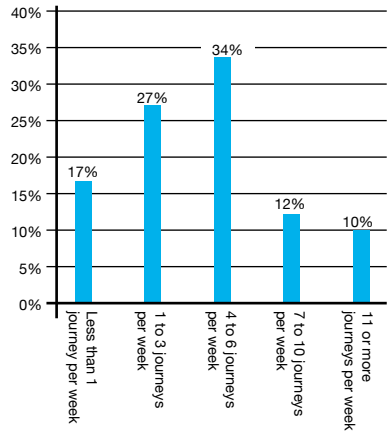

Figure 1: The number of bus journeys made by participants who used single application smartcard for bus travel (n = 114)

Journey purpose v journey frequency

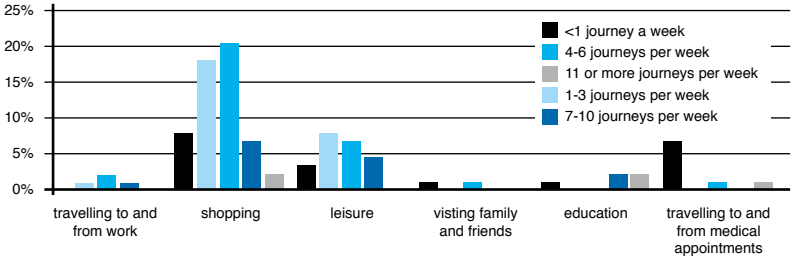

Figure 2: The purpose and frequency of journeys made by participants who have used a public transport smartcard for bus travel (n = 88)

Bus Pass/Product

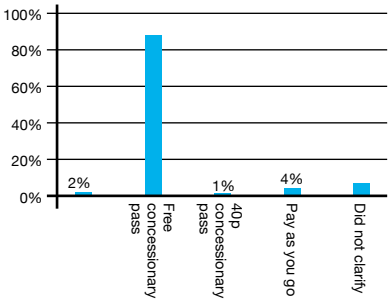

Figure 3. Types of bus pass/product used with a public transport smartcard (n = 106)

What do you like about using your public transport smartcard?

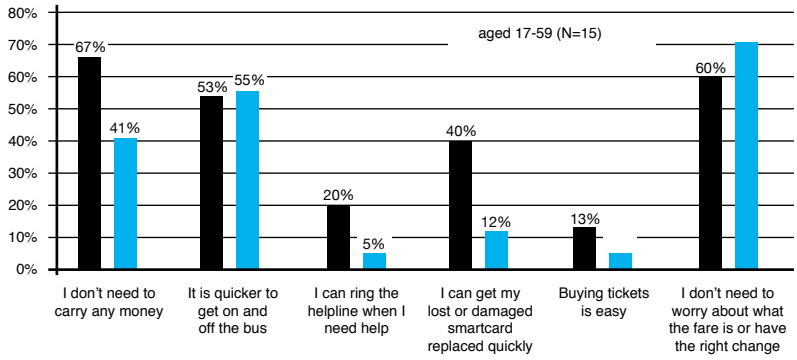

Figure 4. What do Public Transport smartcard users like about using the card

Although the findings are not in line with those from previous phases where 'travelling to and from work' was the main purpose of the journeys, it is likely to be representative of the sample population as about 87% of the participants who have used a public transport smartcard for bus travel are senior and disabled concessionary pass holders (see Figure 3). These people often travel for other purposes rather than working, and are therefore more likely to make fewer journeys than commuters.

The most frequently selected reasons by PT smartcard users about liking the card are 'I don't need to carry any money', 'I don't need to worry about what the fare is or have the right change', 'it is quicker to get on and off the bus' and (Figure 4). This finding delivers a clear message – cashless payments, speed of boarding and convenience are important to bus users. This indicates that PT smartcards which allow credit to be stored on the card in advance of travel , such as the PayGo card which was used by customers in Phase 4 of the pilot, should be welcomed.

About 5% of the participants stated that they found that the reader 'never works' or 'hardly ever works' and 16% suggest that it only works 'about half of the time' (Figure 5).

Reliability of smartcard readers on the bus

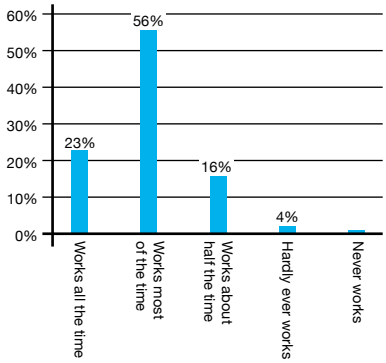

Figure 5. Participants' perceived reliability of the smartcard readers on the bus (n = 105)

A list of statements was used to obtain participants' views on their use of smartcards for bus travel (Table 4). The vast majority of them could use their smartcard on all the buses that they used and believed that the smartcard offers them a great deal of convenience.

Over half of them 'agreed' or 'strongly agreed' that they would get their lost or damaged card replaced quickly. Not many of them worried about losing or damaging the card, or agreed that they could see what tickets they had on the smartcard. About half of them would like to remain anonymous and unidentified individually, which is likely to be due to such things as the high profile of the ID card and the privacy ramifications.

List of statements		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
I can use my smartcard on all the buses that I use	17-59	36%	29%	0%	29%	7%	14
	60+	54%	32%	5%	7%	2%	92
I think that using my smartcard offers a great deal of convenience		56%	38%	3%	1%	2%	105
I am scared of losing or damaging my smartcard		3%	15%	42%	28%	11%	99
I can get my lost or damaged smartcard replaced quickly		13%	40%	44%	1%	2%	98
I can see what tickets I have on my smartcard		6%	15%	60%	9%	11%	82
I would like to remain anonymous and would not like my journeys identified to me as an individual		28%	23%	32%	11%	6%	94

Table 4. Participants' views on their experience whilst using public transport smartcards

4.4 Use of SmartISheffield card to access Libraries and Leisure Services

144 participants have used a SmartISheffield card to access libraries and leisure services. 55 (38.2%) were aged between 17 and 59, and 89 (61.8%) were aged 60 and above. 62 (43.1%) were male and 82 (56.9%) female. Figure 6 demonstrates that participants used their smartcard more often to access leisure service than to access libraries, and the frequency increased when the smartcard was used for both services.

Times of usage per week

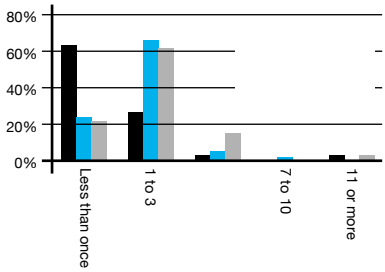

Figure 6. Frequency of using the Smart|Sheffield card to access libraries and leisure services (n = 144)

Similar to the results from the focus groups, 'the leisure discounts' was seen as the most appealing benefit of using the SmartISheffield card, followed by 'one card covering two services', and 'good value for money'. 'One point of call for queries' became the least appealing benefit. One participant suggested that the card had brought 'an excellent benefit for seniors' and another one reported that the card enabled him to receive some leisure services of which he had not been previously aware. Over 70% of those who used the single card for both services, suggested the key benefit was of 'one card covering two services'.

Benefits of using your SmartISheffield card

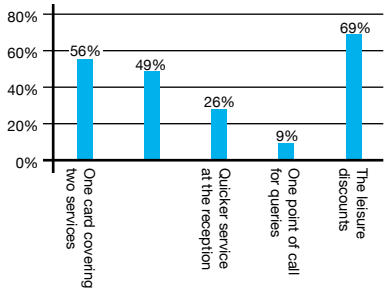

Figure 7. Participants' perceived benefits of using their Smart|Sheffield card (n = 144)

Although 85% of the SmartISheffield card users found the reader 'works all of the time' or 'works most of the time', 11% of them reported that the reader 'never works' or 'hardly ever works'. About 79% of the Public Transport smartcard users found the reader 'works all of the time' or 'works most of the time', only 5% of them reported that the reader 'never works' or 'hardly ever works' (Figure 8).

Reliability of the smartcard reader

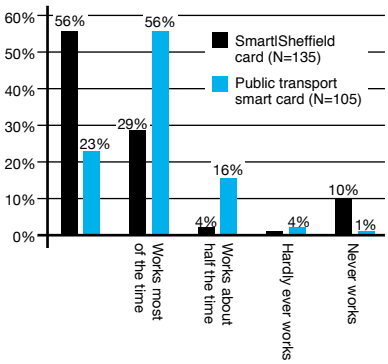

Figure 8. A comparison of the user perceived reliability of the smartcard readers

4.5 Use of Smartcards in the Future

'Public transport', 'leisure' and 'libraries' become the most appealing services whilst 'bill payment', 'small value goods' and 'pay taxi fares' are the least appealing services to use the same SmartISheffield card for (see Figure 9). This suggests that people could become cautious once the card had monetary value on it. The majority of participants stated that they would feel worried if they lost the SmartISheffield card with so many services on it, particularly those who stated that they want 'none of the above (services)' on their SmartISheffield cards (Figure 10). Encouragingly, over half of the participants are willing to use the card as an ID card to access other services. Also, among those who had not used their SmartISheffield card for the listed services, 76 wanted to use it for public transport, 54 for accessing libraries and 55 for leisure services.

To understand the public view on the potential benefits of having a multi-application smartcards, participants were invited to express their opinions on a list of statements shown in Figure 11. In general, participants were positive about the potential benefits of a multi-application smartcard scheme where almost 90% of them 'agreed' or 'strongly agreed' that 'using one smartcard is convenient'.

Desired services on one SmartISheffield card

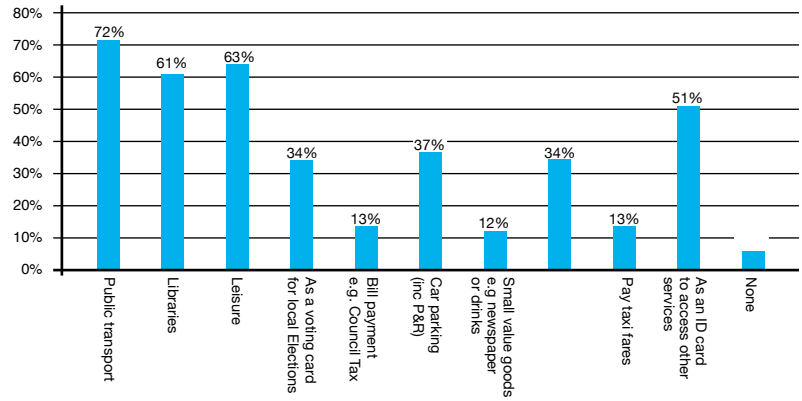

Figure 9. Participants' view on what services they would like to use the same Smart|Sheffield card for (n = 251)

Do you think that you would feel worried if you lost a SmartISheffield card with so many services on them?

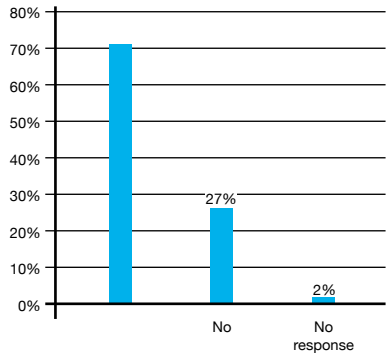

Figure 10. The participants' concern about a multi-application smartcard (n = 251)

How strongly would you agree or disagree with the following statements?

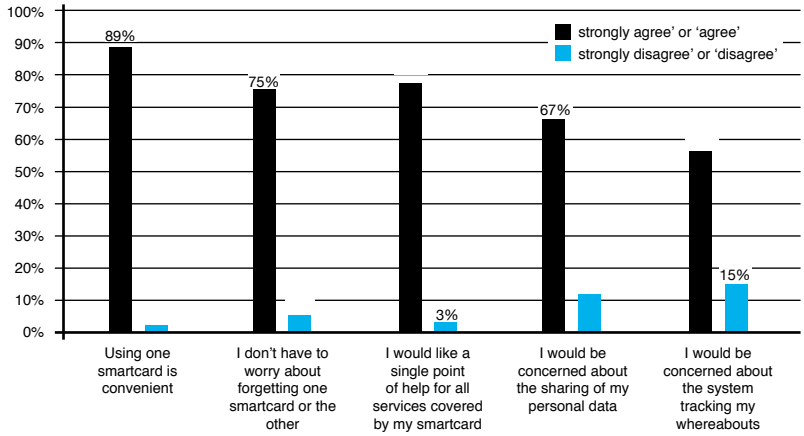

Figure 11. Participants' opinions on the statements (n = 251)

Which of the following incentives do you think would encourage you to use a single smartcard for all your public transport, library and leisure needs?

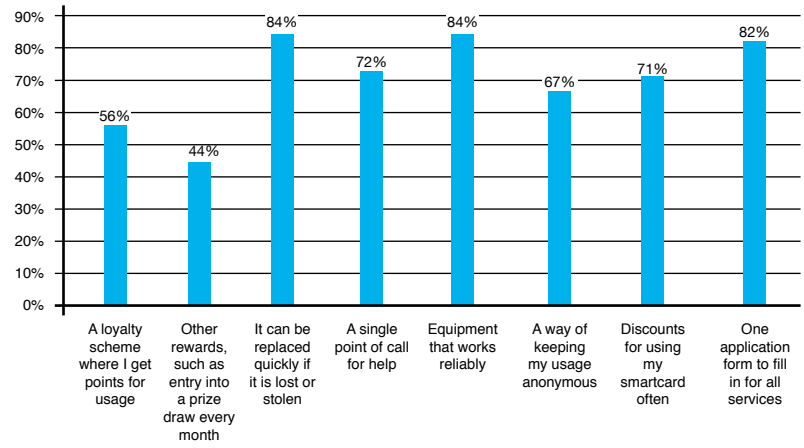

Figure 12. Participants' view on what incentives would encourage them to use a single smartcard for multiple applications (n = 251)

The most appealing incentives which would encourage the use of a single smartcard for PT, library and leisure services are 'it can be replaced quickly if it is lost or stolen', 'equipment that works reliably' and 'one application form to fill in for all services' (Figure 12). This suggests that the participants are well aware of the potential benefits of a single smartcard for multiple applications and expect a high level of performance from the system.

Summary and Conclusions

5.1 Results

The data collection has been completed in line with the methodology and the main results for the focus groups and the postal questionnaire are summarised as follows:

Response from Focus Groups

- A discount scheme with similar benefits to a loyalty card was more encouraging to children and Slice/ Smart card users than to senior/ disabled concessionary users to use smartcards in the future. Opinions over an integrated PT/ Citizen smartcard were divided, respondents could see pros and cons:
  - Key advantage - one card for all services would be easier to manage
  - Key disadvantage - one card for all services would be more of an inconvenience if lost, albeit easier to replace.

- With respect to Touch-on, Touch-off (ToTo):
  - Children said there was no need for ToTo for their travel as they pay a flat fare;
  - Adult Slice/Smart card users (17-59) (four respondents) were not generally convinced as having to Touch-off when alighting would be inconvenient
  - Concessionary travellers did not see direct benefits for them, given their free travel, but many commented on indirect benefits for family members.

Response to Postal Questionnaire

- The majority of participants were senior and/or disabled concessionary pass holders and the main purposes of the journeys were shopping and leisure, rather than 'travelling to and from work'.
- The most frequently selected reasons for having a PT smartcard by both adults and concessionary users are ''I don't need to worry about what the fare is or have the right change', 'it is quicker to get on and off the bus' and 'I don't need to carry any money'. It indicates that public transport smartcards which allow credit to be stored in advance of travel can be attractive to a wide range of bus users.
- Single card solution covering multiple services was welcomed by participants and cards combining both library and leisure services were used more often than those with only a single application.
- Integrating PT, leisure and libraries to a single smartcard is welcomed.
- Using a multi-application card to pay bills, small value goods and taxi fares is not popular, and the majority of them felt worried about losing the card.
- Views on a multi-application smartcard are generally positive but with concerns about personal data and privacy.

5.2 Limitations

Limitations have been identified and should be taken into account when interpreting the data in this report. These are as follows:

- For the adult Focus Group there were only four Slice/Smart card users. Therefore it is unlikely that the responses offered a fair representation of adult opinions of a citizen card.
- The questionnaire was aimed at citizen card holders who are mainly concessionaires whilst the sample contains a higher percentage of responses from non-concessionaires and a lower percentage of responses from concessionary card holders. Again, this means that the responses are not representative of smartcard users in Sheffield.

5.3 Objectives

The main Yorcard objective which is relevant to this study of the Phase 6 citizen card research is “to evaluate the requirements of providing effective service to the customer”. 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 group and questionnaire responses suggest that generally the feeling towards a single multi-application card is positive, as it is seen as more convenient and efficient. There is certainly a level of apprehension towards a single card resulting from loss of one card, value on the card, and privacy and anonymity. Therefore, it suggests that a balance between privacy and the quality of services needs to be investigated and carefully assessed in advance of combining multiple 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.

Recommendations

- Some of the responses relating to privacy and anonymity were contradictory, for example, many participants stated that they want their card to be anonymous and then later said that if there was a way to keep data anonymous it would not encourage them to use a single card. This suggests that privacy and anonymity is a complex area of multi-application smart-media, which suggests that it is important to ensure that potential customers are well informed of what data they are agreeing will be used and by whom. It is also important to explain to potential customers why certain information is required.
- Future providers of a citizen card scheme need to give careful consideration to the best means of communicating with customers with a view to enabling the customer to satisfy themselves that all data will only be used to provide them with the services they require.

RES763 Phase 6: Organisational Views on Citizen Cards

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This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

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Executive Summary

The Yorcard Project is intended to deliver a multi-modal, multi-operator Public Transport smartcard scheme to be trialled on a certain corridor of buses in Sheffield and on the local train service between Sheffield, Doncaster and intermediate stations.

This report presents the findings from the Phase 6 Telephone Interviews. The aim of the interviews was to understand organisational opinions on the use of Public Transport smartcards for other Local Authority services and vice versa – an 'Integrated Citizen Card' scheme.

A series of telephone interviews were conducted with people representing a diverse range of potential stakeholders in an Integrated Citizen Card scheme in order to gain an in-depth understanding of multipurpose smartcards. It was also the intention to identify the key considerations and requirements to developing Citizen Card schemes from different perspectives (Local Authority, Public Transport Operator, and Equipment Suppliers).

The sample size collected was 13 interviewees and was in accordance with the methodology defined in the report 'Open System Phase – Consumer Survey Stage Plan' (YC-IGO-RES-305), which was to interview no more than 20 participants.

Although the majority of interviewees were from a managerial role, 2 participants were from other working levels (for a breakdown of this see Appendix 2). The key findings from this Phase 6 study are presented below:

Current Smartcard Services

- There are mixed opinions over the services currently provided
- Technological issues are the biggest problems for current service providers
- Multi-application smartcards have allowed new customers to be reached
- Public Transport has been modernised to meet customer expectations

Future Smartcard Services

- Sheffield City Council (SCC) are currently phasing out smartcard technology due to what they see is a lack of real benefits
- Public Transport smartcards are part of the PTE's short- and longer-term visions
- Technical barriers to delivering an integrated services smartcard were seen by the interviewees as:
  - Incorporating a range of existing and new technologies into a single scheme
  - Selecting a smartcard with sufficient memory for different applications, and acceptable security encryption for Public Transport
- Political barriers to delivering an integrated services smartcard include:
  - Each organisation wants their smartcard to be the platform from which other services are added.
  - Establishing which organisation is most trusted by others to be managing the overall scheme
  - Data access and usage issues
  - Corporate identity and branding when multiple organisations are involved
- Practical barriers to delivering an integrated services smartcard include:
  - Who is most suitable to be leading/ managing the overall service
  - 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?

Introduction

This report provides a detailed review and analysis of a series of telephone interviews conducted with representatives from a variety of potential stakeholders in an integrated services smartcard scheme. The methodology is outlined in the next section, followed by a discussion and analysis of the individual sections within the questionnaire used during the interviews.

Organisational opinions are important to identify any relevant issues prevalent within this particular workstream. Also of importance are the aims and objectives of each project that will help determine the similarities and differences in the long term aspirations. Gathering opinions from key members of staff of relevant organisations (Sheffield City Council and Yorcard participants) through structured interviews will assist in formulating these issues and risks.

Methodology

This section presents the outline methodology as recommended in the approved Phase 6 Citizen Card Research Plan (reference YC-IGO-RES-005).

Structured interviews formed the primary methodology for collecting organisational opinions and it was deemed necessary that members of staff at various working levels were interviewed from all sectors. Of primary importance to this study were the aims and objectives of each smartcard project which will help determine the similarities and differences in the long term aspirations of each project.

The following general questions have been derived to help understand, from an organisational viewpoint:

- Has the implementation of the smartcard scheme met with your expectations of what you expected to deliver?
- What do you feel are the costs and benefits of participating in a citizen card scheme?
- What combinations of services or applications do you feel should be delivered using a citizen card scheme?

The final questionnaire comprised three parts.

- Part I gathered information about the individual, their roles and responsibilities within their organisation and their experience with smartcards;
- Part II asked about current services provided using smartcard technology, but was not asked of the Public Transport operators due to commercial sensitivity reasons;
- Part III was designed to identify organisations' future plans for smartcards, their views on an Integrated Citizen Card scheme, issues/barriers to delivering such a scheme and if their organisation would support such a scheme in the future.

The final questionnaire can be found in full in Appendix 1 at the end of this report.

The interviews were conducted over the telephone with two interviewers from Newcastle University in order to allow detailed information to be recorded from each interview, which was then cross-checked post-interview for missing details and any errors or misunderstandings were rectified. Of the original list of 18 interviewees, 13 interviews were undertaken (a response rate of 72%), with each interview lasting between 10-30 minutes.

It should be noted that many of the interviewees were managers and decision makers, who may not have a technical background, and therefore may not have a complete nor in-depth understanding of the smartcard technologies available. A list of the interviewees' details can be found in Appendix 2 but for confidentiality reasons, their names cannot be shared.

The following sections detail the results and are split into the subsections of the interview questionnaire. It is important to note that the results and opinions presented throughout this document are purely those of the participants, and are not an interpretation made by the authors.

Results

The reporting of the results will be presented on a question-by-question basis for ease of reporting, combining various responses where necessary to avoid identification of individuals and for commercial confidentiality reasons. Responses from Part I (i.e. personal information about the individuals) will not be reported.

3.1 Current Services Provided Using Smartcards

The interviews were conducted with representatives from the Local Authorities, PTEs and Public Transport providers, so the current services provided were limited to the Citizen applications (Library and Concessionary Leisure membership) plus the Public Transport applications provided through ENCTS and the Yorcard project.

The Sheffield Citizen applications (Libraries and Leisure) were a spin-off from a previous e-voting scheme from 2003, the first of its kind in the World. From the existing stock of 200,000 smartcards used for e-voting, approximately 50,000 had been converted for use in Citizen applications. However, due to a number of reasons, the present stock of smartcards and associated services are being phased out and replaced with non-smart media.

3.2 Current Benefits of Existing Systems

From the Local Authority perspective, there have been mixed reactions to the smartcard systems in place. In terms of the benefits, it was noted that the multi-application element of the Citizen Card has increased Library membership figures. When applying for a Leisure Card, there was an option to also sign-up for Library membership in a single process. This allowed SCC to reach more potential users, including those who would not usually be associated with having a Library membership.

Data management and security were also highlighted as having been improved through the smartcard scheme. Photo IDs reduced fraudulent use and made it easier for staff to identify eligibility for concessionary entitlements. Having the date of expiry encrypted on the chip made it impossible to tamper with or alter, compared to the previous cards where the date was printed on the card face.

Bringing different services onto a single card was also mentioned, as this made it more convenient for the user to use and easier for the Local Authority to manage. The 'psychology' of possessing a smartcard made users more aware of the services available and they were more likely to maintain their personal record on the database. Having a correct address for every user is considered to be very important, especially for the Library services who must send reminders and collect fines.

From the PTE perspective, smartcard technology was seen to enhance the image of Public Transport, enabling it to meet increasing customer expectations. Smartcards provide a mechanism for a range of different ticketing options and could be used to add value for users in the future (such as cash incentives or non-Public Transport applications).

3.3 Current Challenges of Existing Systems

With respect to operations, data collated from smartcards allows for a greater understanding of travel patterns, identifying current gaps in the market and helping define the required adjustments or additions to existing service networks to meet actual travel demands. It has also allowed for the monitoring and management of concessionary travel and enabling bus operators to calculate claims for carrying PayGo customers.

As this particular section was not asked of the Public Transport operators (for pre-specified reasons pertaining to commercial confidentiality), it is not possible to directly report from their perspective. However it was indirectly noted that minimal benefits had been experienced so far, but the *potential* of the system could deliver benefits to the operators in the future once the existing technology had been proven and existing problems had been resolved.

From the Local Authority perspective, despite the benefits listed above, there have been a number of challenges with the technology used in the existing systems.

Linking multiple databases was highlighted as an area which has been a significant challenge, and operating two systems in parallel has been expensive, which is a particular issue for a free service (Libraries). There are inconsistencies between systems (e.g. 16-digit versus 9-digit card numbers) which have made it difficult to issue renewals. Training staff across 28 different sites across Sheffield to use different systems to do the same task was also viewed to be counter-intuitive. Overall, it is felt the systems have been running slowly and are not very reliable; hence why they are being phased out.

Technology was also stated to be the biggest challenge from the PTE perspective. However as stated, many of the interviewees are managers and decision makers, therefore, the nature of their responses may be due to a lack of understanding of the technology, which can be challenging. Although smartcard technology may appear quite simple from the customer-facing end of the system, trying to provide a single, seamless technological solution for ticketing in the diverse nature of deregulated Public Transport – multiple tickets across multiple operators across multiple modes – is a substantial challenge. Establishing and building the level of trust users have in the complete system was also seen as a challenge, given the range of different tickets already available – why would smartcards be different?

It was noted that one of the biggest technological hurdles was that too many established systems were already in operation, and trying to replace or retrofit each of these systems with new technology raised too many additional unforeseen problems. This has possibly tarnished the reputation of smartcards and a number of different responses highlighted that in the future, all individual systems have to be in place and working towards a common goal before integrated services are introduced, and it is important to get the basics right before moving on to providing more sophisticated services.

However, it was noted that there are organisations who are specialists in end-to-end smartcard systems. Part of their business is to provide expert advice and assistance but it was believed that unless organisations are looking at the wider picture and are willing to fully embrace smartcard technologies, it is difficult to provide such services in an effective manner. More guidance for authorities on what is required when developing a smartcard system is one solution, but the interviews have revealed that incorporating smartcards into a wider business case is a difficult task if the benefits cannot be fully quantified.

Marketing the smartcards in the most appropriate manner was also seen to be another challenge. More research is needed to understand exactly why people use smartcards, and what products they want on their smartcards.

3.4 Future Services using Smartcards

As mentioned, SCC are currently phasing out smartcards for Citizen Card applications as the general cost of operating the systems outweighed any tangible benefits, and so there are no immediate plans for smartcard services in the future. The key reasons for this shift in technology are that smartcards have not reached a critical mass for economic efficiency, and getting more than one service from different departments within SCC integrated onto a single card has been proven to be difficult.

Nevertheless, there have been discussions between service providers, suppliers and SCC regarding future integration of Citizen and Transport services on smartcards, including an e-purse for small transactions. This is part of a wider digital authentication strategy within SCC, but it was reiterated that any future smartcard-based services should give serious consideration to what the customer wants, as opposed to just providing services which tie-in nicely with such Local Authority strategies.

Reference was made to the recent HM Government report 'Building a Society for All Ages'[1] which gives specific mention to integrated smartcards as a mechanism for the delivery of citizen services in the future:

'To help increase participation, we will work with local authorities to use smartcard technology to provide **all-in-one cards.** This will give access to a range of local activities…'

This is in line with the views of the PTE, as the short-term plan is to establish smartcards for Public Transport, with a longer-term vision to introduce non-transport services onto a Public Transport smartcard, including Citizen applications. It is acknowledged that this is not an easy process with many potential complications from an early stage. Starting off with one application and expanding to other sectors once the primary service is established may be the easiest route in practical terms, but has many political implications.

One key question was raised – 'Is a single, integrated card actually what the general public want?' There are strong opinions against national identity cards, so would people really be willing to have their personal details stored on a single card which could easily be misplaced or, even worse, lost completely? Instilling trust in the general population will take a long period of time, as smartcard products, such as the ENCTS, have to become recognised as a reliable product before mass uptake will occur.

[1] http://www.hmg.gov.uk/media/33830/fullreport.pdf, July 2009
[2] National Benefits Project: Sheffield Citizen Group Report. MRC McLean Hazel. (April 2004)

3.5 Future Strategies for Integrated Services on Smartcards

From this section onwards, Public Transport operators were asked all questions, and so their opinions can also be reported here along with responses from other participants.

When asked if their organisation would consider, or has considered, a strategy for an integrated Citizen/ Transport smartcard, the majority said this proposal has, or is, part of a business case. However, current views and opinions were divided as to how successful these strategies would be.

One key finding from the discussions is that every organisation involved in an integrated scheme wants their smartcard to be the platform from which other services are added. Research conducted for SCC[2] indicates that of all potential organisations participating in an integrated smartcard scheme, Local Authorities would be the body most trusted by the general public to store and maintain their personal data, given that they already do so for payment of taxes, rates and other civic purposes.

This is generally in-line with the opinions of the Public Transport operators as although integrated schemes are not at the top of their priority list, they would not be adverse to the idea of introducing a Public Transport product on top of a Citizen Card in the medium-to-long term on the proviso that the technology was established, appropriate management structures and legal issues (Intellectual Property Rights, restrictive covenants, data ownership and use) were fully agreed before any scheme commenced.

3.6 Views and Opinions on Integrated Services

The question of corporate identity and branding was also an issue with respect to an integrated card. Public Transport operators and PTEs would want to derive some corporate benefits from participating in an integrated scheme, but this would essentially require all smartcards to have multiple branding, carry the different services on them and still operate under the umbrella of a single scheme. It was also noted that additional schemes, such as ENCTS, would also require mandatory recognition and identification on relevant cards.

From a Local Authority perspective, current experience has shown a single system worked for Library applications (despite smartcards being withdrawn by SCC). Future strategies would be determined on a Council-wide basis and so the Libraries would have to remain in line with these.

Organisational views and opinions on integrated services were divided. The PTE views were generally positive, whilst the Local Authority and the Public Transport operators were more unconvinced about the scheme but could see potential in the future.

For the PTE, the positive features of an integrated scheme are that it would enable the key aim of 'making Public Transport better' to be delivered in a more efficient, manageable way, and the ability to add value through the provision of additional non-transport applications on a single card. Marketing of a single scheme would also be more cost-effective compared to multiple promotions for individual tickets and services.

From the Local Authority perspective, the benefits of a future integrated system would have to be clearly demonstrable so that the product could be marketed properly. This was borne out by the fact that between January 2007 and June 2008, of the 1,188 individuals who applied for a Slice (SmartISheffield) card and asked for Library applications to be added to their card, only 176 people (14.8%) had actually used both applications. For a service with limited budgets, an integrated service has to provide benefits from the time and money invested in the scheme. However, it was again reiterated that Local Authorities need to be looking at the wider benefits of smartcard technologies and be more proactive in defining their long term visions.

The key barriers for both the Local Authority and Public Transport operator are related to who will be leading/ managing the delivery of the services, the legal issues surrounding back office access and data usage, and, ultimately, who is going to fund the overall service. Clearly defined data sharing agreements, listing what organisation is permitted to see, could help alleviate this problem.

Within Local Authorities, it is felt that there will have to be better inter-departmental communications and joined-up thinking in order to deliver one coherent strategy, with common goals and objectives in addition to departmental-specific goals and objectives. This also applies to the different technology and databases within each department, and preliminary work to understand how individual systems can be combined should take place before any substantial customer-facing services are introduced. It is still not clear whether one department should take the lead within the Local Authority, or if there should be a smartcard panel made up of representatives from each department and led by the Chief Executive.

3.7 Key Benefits in Delivering Integrated Services on Smartcards

From a commercial perspective, it was stated that for the Public Transport operators it would be hard to convince those responsible for managing the financial side of the business to invest £X thousand in an integrated scheme, if £X thousand cannot be justified as a sustainable outgoing which would not be recouped through the additional benefits of participating in an integrated scheme. There is also the concern that without strong commercial agreements in place, there would be mechanisms for the Local Authority to influence fare structures.

Therefore, it is considered more productive and acceptable by the Public Transport operators if their time and resources are invested into developing an operator-specific smartcard upon which Citizen application providers can buy space. This is also viewed as a potential business model as it would allow users to specify what services they want on their integrated card, echoing the earlier views that any scheme must consider the needs of the user over the desires of a particular Local Authority strategy.

All agreed that one of the primary benefits for the user would be having all services on a single card, as this would (in theory) be easier to manage e.g. “having fewer cards in your wallet or purse”, which in turn would encourage greater usage of all services. The technology would also bring Citizen and Public Transport services into the 21st Century, meeting the growing expectation of users for e-services to deliver real solutions and bring them in-line with the type of services offered by other sectors (e.g. banking, shopping loyalty cards etc.)

It was highlighted that appropriate mechanisms should exist to minimise the impact of losing a single card with all services on it. The issue of card capacity was raised, as it would only be possible to include a finite number of services on a single chip - but how many applications do people actually want on a single card? It was suggested that it may be appropriate to classify applications into primary and secondary services, and allocate space on the card’s chip accordingly.

For customers on low incomes who are unable to obtain a passport or driving licence, and those without a permanent registered address, an integrated smartcard could provide a low-cost solution for issuing an alternative form of officially recognised proof of identity.

There is some disagreement as to whether there would be any real benefits from a service provider’s perspective. Integrated services should generate more accurate and richer data, allowing for providers to better monitor the usage of their services if databases are structured correctly. Having different services on one card would potentially allow for multi-service marketing, which could have commercial benefits through the generation of extra Public Transport journeys e.g. targeted marketing of Public Transport services to increase awareness about which services take people to their local library. This could also go some way to influencing modal shift, helping meet the PTE’s and operators’ aims and aspirations.

From an operational perspective, integrated smartcards would allow services to be streamlined, with fewer staff at the customer-facing end of the system. However this was countered by the fact that the cost of managing an integrated system may actually outweigh the benefits of staff savings. Encrypted data on the card’s chip could minimise fraudulent use (if equipment is working properly) which may also have cost savings through a reduction in lost revenue.

There is some doubt as to whether these theoretical benefits can be easily translated into real benefits, given the differing interests of each organisation. Overall, any benefit of an integrated services smartcard must be able to be incorporated into a wider, long-term strategy, and have tangible positive results to justify the time and resources invested.

3.8 Technical Issues to Delivering Integrated Services on Smartcards

The underlying technologies were highlighted as the biggest challenge to delivering the existing smartcard-based systems, and future providers should learn useful lessons based upon current experiences. Nevertheless, the technology does exist, there are numerous systems for potential buyers to choose from and sector-specific standards (e.g. ITSO for transport, LASSeO for citizen cards) in operation.

It appears that this range of choice of systems, combined with the lack of a national standard smartcard platform (such as different sector standards) has been identified as the biggest problem in this area. Improving the interoperability of different systems is viewed as the biggest technical issue that needs to be resolved if future integrated services are to be delivered successfully.

The selection of the type of smartcard to be used also has implications as to what services, or how many services, can be provided under a single scheme. The MiFare Classic 4k card is deemed to be sufficient for Library and Leisure services, but additional applications will require a card with more substantial capacity to be used. Recent reports[3] into the security levels of the MiFare system have led to concerns over the use of these cards for Public Transport applications.

Data management issues are also seen as problematic. Merging and maintaining information from different services, in a number of back offices (with the associated security implications) and from multiple databases with variable information quality and completeness is a complicated task. It has also been argued that Public Transport data and Local Authority data should be kept wholly separate from each other, as why do Local Authorities need to know or have access to Public Transport data, and vice versa? Existing methods of integrating and segmenting databases do exist, so establishing data sharing agreements and methodologies prior to launching an integrated scheme is crucial.

3.9 Practical Issues to Delivering Integrated Services on Smartcards

Managing multiple services and the interests of each organisation are the biggest practical issues. All organisations must have equal influence on how the scheme is delivered, and it is important to not bias a multiple-service card towards a particular sector or service, as this will generate the (false) impression that this is a card provided by X when it is actually for services provided X **and** Y **and** Z.

Standardisation of equipment is not only viewed as a technical issue. Not only would replacing any existing cards with a new, standard card have potential system compatibility implications, it is not clear who will fund the replacement cards, especially if this is an enforced change. It is recognised that the integrated system must have a common identity, as if users are faced with cards with different brandings, to be used with multiple readers, it is highly likely that the benefits and impression of a seamless, integrated system will be lost.

If data is to be combined from each service provider, getting clear commercial agreements about access to, and usage of, the various data streams will require 'hard' negotiations. Contingency plans and robust exit strategies also need to be agreed, in case one or more service providers withdraw from the scheme.

[3] http://www.cs.ru.nl/~flaviog/publications/Attack.MIFARE.pdf; http://www.smartcard.co.uk/mifare.html

3.10 Political Issues to Delivering Integrated Services on Smartcards

The provision of a helpline for all services provided under an integrated scheme is also seen as a difficult issue to resolve. Having a central point of contact would make it easy to replace a lost card and direct enquiries to, but would require helpline operators to have extensive knowledge of all the different transport and citizen services available. Suitable agreements and co-operation between the different service providers could minimise the time required to replace a card, if it was possible for helpline operators to reference all services on an individual's card by knowing their details (e.g. name, address and security password), then these services could then be directly loaded onto a new card.

The timescale for delivering an integrated service should be realistic from the outset and agreed by all parties. It is believed that too often these schemes are rushed through and the services delivered are of poor quality. This generates a bad reputation for all organisations involved, but is wholly unrepresentative of what the system could actually deliver if it was properly planned.

Different organisations have different targets, aims and aspirations. Indeed, individual departments within one organisation have different ideas and requirements. Getting all organisations to agree to work in partnership towards common goals will require a project manager with real foresight and understanding about what smartcard technologies can really offer.

Establishing trust amongst partners is also viewed by many as difficult to achieve. Previous Local Authorities' track records in delivering smartcard schemes does not instil much confidence from the Public Transport operators that the Local Authorities are the most suitable organisation to manage future integrated schemes.

Control of pricing structures is also an area of concern, as Public Transport operators do not want their participation in an integrated scheme to be seen as an indirect approach to giving Local Authorities control and regulation of fares and policies. If discounts are to be offered for Citizen services, would users then expect a similar discount to be offered for Public Transport services?

In the wider political arena, it is felt that delivering an integrated services smartcard which provides useful services that people actually want, using established technology that functions correctly at all times, will be a process which will inevitably take some time. This does not, however, fit in with existing political agendas and timeframes, so it is difficult to convince politicians and councillors to invest in something which is unlikely to happen during their term in office. Shifting mindsets to one of a future vision which will still benefit their current constituents is not easy nor is it politically viable.

Politicians are thought to see smartcards as 'exciting' and 'sexy', a technology which should be able to provide numerous services overnight. Given the existence of Transport Direct, ITSO, ENCTS and other national schemes (all of which have received substantial sums of money), they cannot comprehend why a national Citizen smartcard scheme is not happening at a faster pace. There needs to be a greater understanding in the political world as to why integrated Transport/Citizen smartcard schemes cannot be easily delivered in a short space of time.

3.11 Other Issues to Delivering Integrated Services on Smartcards

The Oyster system in London has skewed peoples' views about what smartcard technology can deliver; it is important to demonstrate why it is more difficult to deliver a similar scheme in an area such as Sheffield under the restrictions of a deregulated Public Transport environment with limited financial resources (compared to that available to London). Better information about how a scheme operates under the limitations of a deregulated environment may be one solution. Even so, it will be important to manage the media coverage of such a scheme, to ensure that the true message of the integrated smartcard is relayed to the public i.e. this is *not* a national identity card.

The issue of including smaller, independent operators in an integrated scheme was raised. If a future Public Transport-only smartcard is to be all inclusive, how would the smaller operators be included if they are unable to afford the financial outlay for the technology and the back office equipment, plus the technical support and maintenance? Allocation of funding and regional monies should be covered under new Bus Service Operators Grant rules which may provide a solution. However, if the scheme is expanded to include Citizen applications, would the extra requirements then make the costs of being included in the scheme even more prohibitive?

It is important to consider the limitations of available budgets for investing in integrated services when there are additional funding priorities for Local Authorities to consider.

In a similar vein, Public Transport operators want to ensure that any service they invest in will deliver financial results but that they are not under pressure to introduce smartcard tickets before the market conditions are suitable. There initially needs to be a societal shift towards a greater acceptance of smartmedia, as moving away from traditional paper tickets (which people can read, understand and therefore trust) to new smartcard technologies (which only machines can read, so there will be an element of uncertainty) will take time.

Smartcard systems can reduce fraudulent use and improve the safety and security for drivers, so there are potential commercial benefits, but it was felt these benefits were not currently at a proven level to justify such an investment. The benefits to the customer need to be demonstrable as well, as it was stated that trying to 'force' smart ticketing on customers before they are ready could potentially damage the overall impression of Public Transport. This supports the notion that an integrated scheme has to keep the benefits to the customer at the top of the priority list if it is to be deemed acceptable by the general public.

Consideration also has to be given to the geographic extent of an integrated scheme. If a PTE or Local Authority is involved, they only have a direct influence within their boundaries, but is this then limiting the potential of the scheme?

3.12 Support for Delivering Integrated Services on Smartcards

Two respondents said there were currently too many reservations and variables for them to fully commit to an integrated scheme. It was felt that 'getting the basics right' independently for Public Transport smartcards and for Citizen Cards was the most appropriate way forward, before integrated services should be considered as a viable service to provide to the public.

Overall, there is support for the delivery of an integrated services smartcard in the future but with a number of provisos.

The PTE are happy to be involved at any level with the provision of additional services on a Public Transport smartcard. Key questions that need to be answered are what outputs are required from the scheme? Who is best placed to facilitate and manage the overall scheme? What is required from each partner, financial input or technical input?

For the Public Transport operators, most would be happy to participate in future schemes after detailed discussions and scoping exercises with other partners to identify the benefits and risks involved for a commercial organisation. Any future plans should ideally fit in with existing card technologies and back office equipment to minimise the potential complications of introducing new services. If alterations to the existing technology were required and paid for by other sources, this would be acceptable as long as any disruptions to services were minimal. It is acknowledged that interoperability of different systems is a complex issue.

From the Local Authority perspective, the individual departments have to remain in-line with SCC's general corporate position and strategies, so this would dictate whether future schemes would be supported or not. Currently smartcards are being phased out as the benefits could not justify continuing with using multiple databases, so it is important that a robust business case is established which encompasses the views and needs of all partners involved, otherwise the problems faced by existing systems would be repeated again and again.

One of the key issues put forward on a number of occasions is not losing sight of the requirements and needs of the customer. It is believed that the potential benefits of an integrated services smartcard for the citizen are too significant to allow the idea to be left to stagnate as the technology exists now.

Key reasons as to why an integrated services smartcard is important include:

- Data management for services providers would (theoretically) be a lot easier, and could streamline services to increase efficiency and maximise investment;
- Card management for the customer would be simplified and more convenient – "limit the number of cards customers have to carry: one card in your wallet for everything, no need to worry about which card does what";
- Ability to market multiple services through an individual channel – "Accurate data stored in one place could allow us to better understand what services people are using and why… you could encourage use of all services through marketing one card";
- One card for all services may reduce barriers to services – e.g. "People don't understand how to use Public Transport and the different fare structures. One card would potentially allow them to just board any service and not worry about what the fare is going to be".

However, it was stated that all partners need to be more open-minded to the benefits of smartcard technology and have a long-term vision.

3.13 Key Elements Required for the Successful Delivery of an Integrated Scheme

All parties stated that there needs to be a strong business case and a clear strategy for how the scheme is going to be implemented, managed and funded from the very beginning. Before any integrated scheme is introduced, the basics have to be solved at an individual service level (Public Transport, Citizen Card etc.) It is vital that all partners involved recognise that delivering a complex scheme across different sectors will take time, and will need longer-term visions in order to make them successful.

Discussions and scoping exercises involving all partners before the scheme is launched would be recommended, but it was noted that any differences in opinions, requirements or willingness to co-operate may delay the start of the scheme until these have been contractually resolved. It was acknowledged that the current deregulated environment makes delivering integrated transport services difficult but it is possible, and integrated ticketing has been delivered but using paper-based ticketing. There are more technological barriers to overcome in delivering a smart-ticketing scheme and it was noted that all service providers need to be committed to the common goals of the scheme.

Combining existing technology and multiple systems has not been easy and adding more technology and more services into a scheme could introduce further complications. The scheme has to have robust technological solutions which work reliably and extensive technical support must be provided across all sectors, particularly if there is only one central customer service centre.

Systems need to be designed in such a way to allow new services to be added in the future whilst causing minimal disruption and problems to existing service providers. Secure data storage and management are very important, particularly if multiple back-offices are involved. Data access and confidentiality agreements and usage policies need to be defined from the start of the scheme and strictly adhered to.

Finally, establishing customers' trust that every service will work, the technology is reliable and there is a real need to have an integrated scheme is essential if there is to be the uptake to deliver the critical mass required to make the scheme economical.

All services within an integrated scheme need to be marketed proactively, highlighting the benefits of multiple services on a single smartcard, otherwise people will only continue to use the services which they already use. It is important to keep the customer happy and aware of the opportunities available to them so that they feel they are getting added value from having an integrated scheme and will not revert to individual cards for individual services.

Conclusions

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.

4.1 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 more potential users for Library services
- Data management and security have been improved
- A single card is more convenient for the user
- Public Transport would be modernised to meet customer expectations
- Data gathered on travel patterns had allowed for gaps in the networks to be identified

The main challenges to delivering existing smartcard services have been identified by the participants as 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, but has been achieved with paper ticketing
- Numerous services and systems already exist, retrofitting new technology creates new problems

4.2 Future Integrated Services Smartcard - Strategies and Opinions

SCC is 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. A number of participants stated that 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 interviewed now have a smartcard strategy in place. For the delivery of an integrated services smartcard, these strategies will need to be aligned. Current barriers discussed by participants 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 as highlighted by the participants 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 would also be more cost-effective

The key barriers to an integrated service smartcard identified by the participants are as follows:

- Who is most suitable to be leading/ managing the overall service
- Data access and usage issues, including recognition that some smartcards require the customer's photo for identification on smart and non-smart services (e.g. ENCTS cards.)
- Complexity of required legal and contractual agreements
- Incorporating a range of existing and new technologies into a single scheme
- Mitigating technological issues across numerous services
- Providing a detailed specification to enable a supplier to deliver the system
- Managing the risk of not deriving a commercial return on a substantial financial investment
- Delivering an integrating scheme over a timescale that is realistic yet politically acceptable
- Who is going to fund the overall service ?

4.3 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

4.4 Limitations to this Study

The following limitations have been identified:

- Many of the interviewees were managers and decision makers. Whilst representing the views of their organisations based upon their understanding of smartcards, the nature of their responses may be due to a lack of deeper understanding about the functions and potential of smartcard technologies.
- Due to commercial confidentiality reasons, Part II of the questionnaire was not asked of the Public Transport operators, therefore their opinions on current smartcard services were not recorded.
- Responses to email requests for interviews were not received from anyone representing the TOCs (Northern, TransPennine Express), so it was not possible to include the opinions of these organisations in this analysis. Efforts were made by both Newcastle University and Yorcard to engage with the TOCs on a number of occasions.

Appendix 1

Appendix 1 – Full Final Questionnaire

Part I: Information about you and your employment

This first section will ask you about you and your employment.

This section is not intended to be reported, but responses will be analysed by organisational groupings (e.g. bus operators or public sector) or by generic roles (e.g. operations/customer facing or IT based).

A summary of names and job titles will be presented as an acknowledgement list.

A	Name	
B	Title	
C	Organisation	
D	Role and responsibilities within the organisation	
E	Length of service in current role	
F	Have you held any posts in the past that were smartcard related? If so, please elaborate.	

Part II: The current services that your organisation provides using smartcards

The next section will ask you about the current services that your organisation provides using smartcards.		
1	What services does your organisation currently provide using smartcards?	
2	How long have this/these service(s) been operating for?	
3	What is the approximate smartcard volume?	
4	What are the current benefits to the delivery of the current system?	
5	What are the current challenges to the delivery of the existing system?	

Part III: Information about the future

The next section will ask you about the future – what the plans are for your organisation and what you feel are the pros and cons of implementing a smartcard system for citizen services and public transport ticketing.

6	What services are you planning to implement in the future using a smartcard as the platform for delivery?	
7	Would you, or have you consider(ed) a strategy to offer local public transport services using the same smartcards as other LA services using a 'Citizen Card'?	
8	What are your general views about providing such a service?	
9	What do you consider as being the key benefits of delivering a Citizen Card scheme including public transport?	
10	What do you see as the technical issues to delivery?	

Part III: Information about the future continued

11	What do you see as the practical issues to delivery?	
12	What do you see as the political issues to delivery?	
13	Do you see any other issues that do not necessarily fit into these categories?	
14	Do you think that your organisation would support the delivery of a full Citizen Card scheme?	
14a	If it would, why – if not, why not?	
15	What would be the important things that need to be in place to enable delivery of a Citizen Card scheme?	

Appendix 2

Appendix 2 - Participant Information

From SmartISheffield:

1. IT - Head of IS Service Management
2. IT - Corporate Programme Manager
3. Libraries - ICT Manager
4. Libraries - ICT Staff
5. Libraries - ICT Staff
6. AIDC – Smartmedia Business Co-ordinator

From Yorcard:

1. Yorcard Ltd - Project Director
2. PTEs - Project Sponsor
3. PTEs - Project Director
4. Bus Operators - Director Special Projects
5. Bus Operators - Commercial Director
6. Bus Operators - Projects Manager
7. Bus Operators – TravelMaster Chairman

RES764 Phase 6: Citizen Card – End of Phase Report

Contents

This report has been produced by Newcastle University for South Yorkshire Passenger Transport Executive under a contract with the Department for Transport. Any views expressed in this report are not necessarily those of the Department for Transport.

4.0 Limitations and Review of Objectives

5.0 Advice for the Business Case

6.0 Recommendations

7.0 Appendices

Executive Summary

The Yorcard Project delivered a multi-modal, multi-operator public transport smartcard scheme trialled on certain buses in Sheffield and on the local train service between Sheffield and Doncaster and intermediate stations.

This report presents:

- A summary of the deliverables forming the contract between DfT and SYPTE
- How each deliverable was completed, and how progress was made throughout Phase 6
- A review of DfT and Yorcard objectives and how objectives have been met
- A review of the methodologies used including the limitations, risks and issues that arose during the Phase 6 work
- The findings from Phase 6 that are common across different studies

Introduction

1.1 Background

This Yorcard Phase 6 End of Phase Report sets down the outputs forming part of a research contract between the South Yorkshire Passenger Transport Executive (SYPTE) and the Department for Transport (DfT), Transport Technology and Standards Division. An overview of the tender and a full description of the Yorcard pilot can be found in the General Reference Document.

The purpose of this report is therefore to provide an evaluation of the results from the Phase 6 reports. It is also has the purpose to review the delivery of the Phase and identify any lessons learned from a practical perspective regarding the management of the Phase and how this could be improved in the future.

Phase 6 is the final phase that makes up the research project. It is different from other phases. It does not include boarding time surveys. Phase 6 is concerned with combining 'Citizen Card' functions with smart public transport products onto a single multi-application card and understanding the associated issues.

1.2 Summary of Deliverables

The intention of Phase 6 was to help to meet the DfT objective

" To understand the value of using Citizen cards as an alternative to transport only smartcards."

The primary deliverables in Phase 6 were:

- A technological Trial
- A Citizen Card customer study
- An Organisational view on Citizen cards
- And this end of stage report

1.3 Review of Progress of Deliverables

One of the primary deliverables of Phase 6 was the technological trial. This involved working with Sheffield City Council's managed service provider the European Centre of Excellence for the Automatic Identification and Data Capture Technologies (AIDC). Smartcards were loaded with agreed products and these were tested to check that these products could function alongside each other on one card. The impact on transaction time was measured. This work was completed under laboratory conditions in Yorkshire and at Scheidt & Bachmann's offices in Germany. The summary results are reported later in this report.

The second stream of work was a consumer survey. This was undertaken in two parts. First, Focus Groups were carried out in Sheffield and used to capture qualitative data and wider views from consumers and also to feed into a postal questionnaire. Questionnaires were then sent to holders of public transport and/or non-public transport smartcards, resident in the Sheffield area. Consumer questionnaires have been returned and analysed. A summary of the findings is set out later in this report

Complementary to this work, a number of people representing a diverse range of potential stakeholders in an Integrated Citizen card scheme were approached in order to gain an in-depth understanding of multipurpose smartcards to organisations. The work also attempted to identify the key considerations and requirements to developing Citizen Card schemes from different organisational perspectives. This work was undertaken by structured telephone interviews. All interviews have been undertaken and again a summary of the findings are detailed later in this report.

1.4 Review Against Budget

The costs were within the agreed limits for the Phase.

1.5 Meeting DfT Objectives

The DfT have stipulated the following objectives as part of the tender specification:

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.
   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[1].

[1] This performance measurement is not included in the DfT tender and may be removed should time and cost resources be restrictive.

1.6 Meeting Yorcard Objectives

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?

Appendix 2 to this report identifies the work streams that form Phase 6 that have addressed the above objectives and the conclusions reached, if any.

The objectives of Phase 6 are primarily linked to the Yorcard objective:

- Inform Business cases.

The information obtained from all three research streams also contributes on some of the other nine objectives set for pilot and these are detailed in Appendix 1.

This report will look at how the information from Phase 6 has informed the draft Business case which it is proposed will be submitted to the DfT in early 2010.

Methodology and Planning Review

This section provides a review of the methodology used.

2.1 Review

The research work on Citizen card was quite different to phases 1 to 5 of the research. A new methodology for the technological trial was devised and agreed with AIDC. This was followed through-out.

In the case of the telephone surveys of potential stakeholders of an Integrated Citizen Card scheme and consumer surveys (focus groups and questionnaires), these were conducted in accordance with the agreed methodologies.

2.2 Risks and Issues

The following risks were identified as being relevant to Phase 6:

- That the technological trial would not give consistent results to allow for any conclusions to be reached.

Consistent results were obtained - CLOSED

- The number of respondents to the questionnaire would be insufficient in number to allow for meaningful analysis

A sufficient number of responses were received to the questionnaire - CLOSED

- That an insufficient number of customers would attend the focus groups to allow for meaningful data to be obtained.

2.3 Lessons Learned

A sufficient number of customers did attend the focus groups - CLOSED

- That the stakeholders would not be willing to divulge their views on smartcard schemes

Stakeholders, with the exception of Train Operating Companies, did divulge their views on smartcard schemes.

The following Issues were identified as being relevant to Phase 6:

- None were identified.

Project based lessons learned relating to the delivery of the Yorcard project in general will be presented in the Best Practice Final Report. Lessons learned from the pilot will be summarised in the Final Evaluation Report to be submitted to the DfT.

One of the lessons learned from Phase 6 was that if Yorcard wanted to have a clearer understanding of consumers' concerns about multi-application smartcards and associated data issues, then more detailed work than was planned, would need to be undertaken.

Analysis of Phase 6 Data

3.1 Summary of Analysis

The results presented in this section relate to the findings in the three Phase 6 reports. The research undertaken in Phase 6 is separate to the work of the other Phases and compliments the work of the Pilot. In particular it seeks to understand how smartcard technology can be developed and seen as a gateway to public transport and other public services. A summary table of the key findings relative to the Yorcard and DfT objectives is shown at appendix 1 and 2.

Technological Trial

This was successfully undertaken in partnership with AIDC. A variety of public transport and non-public transport products were successfully loaded onto 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.

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 recorded when the 'library' function was loaded and no other functions were 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 believed to be a major cause for concern.

When the same mixture of products were loaded onto smartcards and the public transport applications were read by public transport card readers, 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 and read with validators similar to that used during the operational pilot. The additional transaction times recorded would have an adverse affect on boarding times. Data obtained from boarding time surveys has demonstrated that it takes marginally longer for English National Concessionary Scheme (ENCTS) customers to use their cards on smart buses where they are required to present their card to the validator and show their card with photo to driver than on non smart equipped buses where they only have to show their card to the driver. The addition of a further time delay, as recorded in the technological trial, would be deemed unacceptable.

Consumer Survey

The views of consumers were sought on Citizen Cards which had public transport and non-public transport applications. In addition, their views on Touch On and Touch Off (ToTo) operations on public transport were also sought.

The majority of consumers could not see the advantage for them of Touch on/ Touch Off (ToTo) systems deployed in the latter half of the pilot. This is probably because most of the respondents pay a flat fare (children) or no fare (ENCTS). The four adults (17-59 years of age) who participated in the focus group also expressed reservations about Touching off when alighting. However, it is understood that none of the adults in the focus group had used a Yorcard in practise and these interviews were undertaken before the introduction of the Pay as you Go card.

When asked about their views on smartcards, consumers said that smartcards were easy to use. Consumers perceived that smartcards resulted in quicker boarding and alighting times. The other main reason offered for liking smartcards was people did not need to carry money and did not have to know the fare or have correct change.

The results from the focus groups and questionnaire responses suggest that generally the feeling towards a single multi-application card is positive, as it is seen as more convenient. It would also be appealing to a lot of people if there were some sort of incentive or money saving opportunities associated. However the use of a single card to additionally allow the user to pay bills or pay for small value goods and taxi fares did not attract a great deal of interest. Consumers also expressed concerns about personal data being held on a multi-application card. In particular concern was expressed about losing such a card.

Further investigation could be undertaken to understand in more detail customers concerns about the data held on a card, how the data is managed and who has access to it. Alternatively, any new scheme could address these concerns by a combination of clear communications and publicity with its customers.

Organisation Survey

Telephone interviews were carried out with key stakeholders for citizen cards, such as operators, PTEs and a Local Council. The telephone interviews 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 The majority of organisations contacted, believed that an integrated services smartcard could be delivered in the future which could have realisable benefits to both the customer and participating organisations.

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 is 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

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 integrating 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

Limitations and Review of Objectives

4.1 Limitations

Data collected and analysed for this report has allowed for a number of important pieces of information to be obtained in support of the Yorcard pilot. There were however, some limitations identified whilst gathering and collating data and these should be understood.

The limitations are as follows:

- The technological survey was limited to three different public transport and two non-public transport products. All combinations of these were volume tested. However, they were only tested under laboratory conditions. All tests were undertaken on the Mifare Classic 4K smartcard which the ITSO board decided to phase out for new issues.
- Only four adults (17-59) attended the focus group and hence the opinions expressed about Citizen Cards from this group may not be representative. The response to the questionnaire from children was also very poor. (3). The majority of respondents were from holders of ENCTS cards who were the predominant holders of smartcards in Sheffield.
- None of the Train Operating Companies responded to the repeated request for an interview.
- Public Transport Operators were not asked questions on their current smartcard services as these were seen as commercially sensitive.

4.2 Objectives

This study has set out to meet the objectives of the stakeholders involved in the Yorcard project. A full assessment of the impact on project objectives is shown at appendices 1 & 2.

Advice for the Business Case

A draft business case for a Yorkshire wide smart ticketing scheme is currently in production with a view to be submitted to the DfT in early 2010. The lessons learned and information obtained from this phase and all the other phases has been fed into the draft Business case for the DfT consideration.

The draft business case and plan concentrates on the delivery of a public transport smart ticketing scheme at its core. A sound business case will be put forward which does not require any income streams or shared costs with non-public transport functions. The draft business case and plan does not recommend or reject the idea of a Citizen card. The draft business case and plan will allow for the addition of non-public transport applications to be added at any convenient or appropriate point to reflect the ambitions of stakeholders.

Recommendations

The supporting research demonstrated that there is a demand for a Citizen card from the customer. Most customers appeared to be quite conservative in their demands and ambitions. Stakeholders and organisations of current schemes recognise that whilst there are benefits to be obtained from Citizen cards there are also considerable practical and technical obstacles to delivering schemes that meet both the demands of the public and the participating organisations. There needs to be a greater understanding and appreciation of what smartcard technology can actually do and how integrated services can be delivered in a realistic timeframe. This report has identified the key issues that need to be understood.

To allay customers concerns about personal data, future providers of a citizen card scheme need to give careful consideration to the best means of communicating with customers with a view to enabling the customer to satisfy themselves that all data will only be used to provide them with the services they require. It is important to ensure that potential customers are well informed of what data they are agreeing will be used and by whom. It is also important to explain to potential customers why certain information is required.

Technically the supporting research demonstrated that Citizen cards can be delivered. However, it was demonstrated that if Mifare classic 4k cards were used as Citizen cards these would be measurably slower when used with the infrastructure used on the Yorcard pilot. The addition of a time delay as measured in the technological trial would be considered unacceptable. This suggests that before any future scheme adopts a Citizen card, a full scale laboratory test should be undertaken at an early stage to measure and quantify the transaction times to understand any impact on operational times such a card may have.

Appendix 1

Appendix 1: Summary of the analysis of Yorcard Objectives

	Study Deliverable			
	Objective	**Technological**	**Consumer**	**Organisational**
1	Reduce barriers to the use of public transport	The laboratory technological tests proved that multi-application cards do work.	Consumers said they generally welcomed multi-application smartcards	Multi-application smartcards for library and leisure services allowed new potential customers to be reached. Multi-application cards have the potential to reach wider and new audiences.
2	Reduce delays and improving reliability	This test proved that multi-application functions on a single smartcards increased transaction times with the pilot equipment used on smart enabled transport and hence have an adverse affect on boarding times.	51% of consumers stated that smartcards resulted in quicker boarding and alighting.	N/a
3	Reduce in fraud of all types	N/a	Some consumers expressed concern about what would happen if a multi-application card was lost and the sharing of personal data with multi agencies.	Some non-transport organisations reported improved security as a result of using a smartcard system.
4	Enhance the image of public transport	N/a	Consumers generally had positive views about smartcards	A Multi-application card was perceived to present a positive image to the potential list of services offered to the public.
5	Reduce administrative costs	N/a	N/a	Potential financial benefits of multi-application cards could be envisaged by some respondents. Marketing of a single scheme could also be more cost effective.

	Study Deliverable			
	Objective	**Technological**	**Consumer**	**Organisational**
6	Improve sales channels	N/a	N/a	N/a
7	Improve MTC revenue distribution by providing more accurate information on journey lengths to meet legal obligations.	N/a	N/a	N/a
8	Prove ITSO compliant equipment and operational protocols in a major scheme	Proved that ITSO compliant products could be loaded onto a smartcard with other non transport applications and that these products could be read.	N/a	N/a
9	Integrate with Real Time Information	N/a	N/a	N/a
10	Inform Business Cases	Tests proved that current technology could be used to offer a multi-application smartcard. However, for the cards and equipment tested, this resulted in increased transaction times which would adversely affect any business case.	Whilst consumers were positive about multi-application cards they do have some reservations about sharing personal data and losing such cards.	The majority of organisations across the range of those interviewed, believe that multi-application cards could be delivered in the future. There are a number of significant barriers to achieving this.

Appendix 2

Appendix 2: Summary of the analysis of DfT Objectives

	Study Deliverable			
	Objective	**Technological**	**Consumer**	**Organisational**
1	To evaluate the processes for multi-authority, multi-application smartcards to be re-issued and replaced:			
	a.) Data transfer between organisations	N/a	Consumers expressed some reservations about personal data being on multi-application cards.	Organisations recognised that these were not easy deliverables and could be time consuming and complex. Data sharing agreements would involve hard negotiations.
	b.)Costs of issuing individual smartcards.	N/a	N/a	It was recognised by local authority organisations that efficiency savings could be made by combining smartcard schemes.
2	To evaluate the practicalities of Local Authorities using applications outside the ITSO shell.	Tested and proved that this could be achieved However it did have an adverse affect on transaction times for public transport.	N/a	N/a
3	To evaluate the options for interchange between different Local Authority schemes, specifically inter - Local Authority service provision.	Tested and proved that this could be achieved for single Authority cards for non-public transport applications without a significant adverse affect on transaction times.	Consumers were supportive of the idea of multi-application cards. However, they did have some concern about losing such cards especially if they held personal data.	Local Authorities are familiar with the potential benefits of multi-application cards particularly for the customer. They are also aware that there are significant barriers to address.

	Study Deliverable			
	Objective	Technological	Consumer	Organisational
4	To evaluate the requirements of providing effective service to the customer:			
	a.)Telephone helpdesk	N/a	6% of respondents who said they liked smartcard and cited being able to call a helpdesk as a reason for liking smartcards. 9% of respondents cited having one point of call as a benefit for the Sheffield card	To provide a single point of contact was seen as quite a difficult issue to resolve in a multi-application field. There would be benefits of centralising the point for lost and replacement cards. Other specific queries would require helpline operators to have an extensive knowledge covering all services or to pass on more difficult enquiries.
	b.)Gain information regarding customer perception	N/a	See responses above and below on customer expectations and concerns.	N/a
	c.)Understand the balance between convenience and anonymity.	N/a	Convenience and ease of use were put forward by many customers in support of smartcards. 51% of consumers however, wanted their journeys to remain anonymous. Whilst consumers could see the benefit of multi-application cards they did express concerns about losing them particularly when more applications were added.	Organisations are mindful of the consumer's demands and concerns.
	d.)Understand the key features that customers would like on a Citizen Card.	N/a	The top three applications requested were; 1.Public transport 2.Leisure facilities 3.Library Bill payment, taxi fare payment and paying for small goods were low on list of priorities.	Organisations understand that customers like the idea of combining multi-applications onto a single card.

	Study Deliverable			
	Objective	**Technological**	**Consumer**	**Organisational**
5	To evaluate the usage of smartcard management systems			
	Data sharing		Over 60% of consumers expressed a concern about sharing personal data.	Organisations recognise that this is a major issue in any multi-application smartcard system. Both for personal and commercial data.
	Smartcard ID references	N/a	N/a	Organisations recognise that this is an issue in any multi-application smartcard system
	Personal data	N/a	See above comments about data sharing and wishing to remain anonymous.	Organisations recognise that this is a major issue in any multi-application smartcard system
	Multiple systems with a single purpose.	N/a	N/a	Integrated services should generate more accurate and richer data, allowing for providers to better monitor the usage of their services if databases are structured correctly.

	Study Deliverable			
	Objective	**Technological**	**Consumer**	**Organisational**
6	To evaluate the requirements for inter-scheme hotlist management:			
	a. Understand the needs and expectations of integrating hotlists.	N/a	N/a	Organisations recognise that this is an issue in any multi-application smartcard system.
	b. Develop recommendations for dealing with misuse	N/a	N/a	Organisations recognise that this is one of the many areas where a business process and a technical solution would need to be agreed.
7	To evaluate the requirements for common eligibility criteria:			
	Proof of eligibility once only	N/a	Less than 10% of customers said that this would make multi-application cards more attractive.	This could be a benefit to organisations but only if business processes and formal data sharing agreement were established.
	Automatic loading of smartcard entitlements	N/a	N/a	This could be a benefit to organisations but only if business processes and data sharing agreement were established.
8	To determine the effect on smartcard performance using:			
	Bus and train equipment	There was an adverse affect on public transport readers transaction time when non-public transport applications were loaded onto smartcards.	N/a	N/a
	Local Authority point of service equipment	In general the performance of equipment was NOT affected by the addition of multiple applications	N/a	N/a