

Executive summary

Project description

The Auckland Integrated Fare System (AIFS) project forms part of an overall strategy to introduce comprehensive real time technology to Auckland public transport services.

AIFS is part of a larger coordinated package of public transport activities which seek to change the way Aucklanders travel, by providing a viable passenger transport alternative to private vehicle travel.

Auckland Transport see the introduction of the HOP¹ card as part of the AIFS as a transformational project with potential to change behaviour and increase public transport patronage significantly.

During the final period of HOP implementation, between 2012 and 2014, public transport patronage increased and the number of HOP cards and transactions increased and SuperGold and other concessions were incorporated. It is difficult however to separately identify the impact of the HOP card introduction from other concurrent initiatives and influences.

Although some investigation occurred from 2006 onwards, this review considers the main AIFS investment made over the period 2009–2014. This period saw considerable investment in public transport services including the deployment of real time information systems and organisational changes also occurred in the planning and delivery of public transport services.

The HOP card system allows fares pre-payment and requires users to tag-on and tag-off public transport. Faster loading times were intended to be achieved by removing on-vehicle cash transactions and the automation of ticket control.

It was the NZ Transport Agency's intention that AIFS would be National Integrated Ticketing Interoperability Standard (NITIS) compliant so as to provide a resource for the future roll-out of a national integrated fare system. This has not yet eventuated, but the functionality still exists to use AIFS to implement this.

Summary assessment of project outcomes

This review found the project achieved its primary objective, namely to introduce a smart card based integrated ticketing system for public transport in Auckland. The main project outcomes are summarised below and discussed in more detail in *Section 2: Project Benefits* of this report:

- Public transport patronage has increased and the HOP card introduction has almost certainly contributed positively to this trend, although the scale of this contribution is not known
- Bus travel times do not appear to have reduced because of automated ticket control although there may have been some reduction in travel time variability.
- It was not possible to verify the intended outcomes of the project due to a lack of suitable before and after data.

¹ A marketing term referring to the ability to "HOP on and HOP off" public transport.

Project cost and timeframe

The project was delivered at an implementation cost of \$99.2 million, 38% higher than the original estimate at the time of funding approval. This was due mainly to a widening of the project scope led by NZ Transport Agency to include NITIS compliant ticketing machines on buses. The AIFS project scope originally only included rail and ferry services.

Although investigations began in 2006, the main project was completed in a five-year period (2009–14), approximately 2 years later than originally planned. This was partly due to legal challenge by one of the ticketing suppliers, and the widening of the project scope to include buses.

Good practice identified

Good practice is summarised below and discussed in more detail in *Section 3: Good practice identified* of this report:

Good practice aspects identified include:

- Smart card (HOP) technology has been introduced reliably, on bus, rail and ferry services.
- An innovative and responsive culture has been developed through the management and organisation of HOP implementation.
- The effective use of data for planning, operational management and system improvement purposes.
- A strong focus on customer based market research and an evidence-based approach to planning, implementation and system development.

Lessons learned

Lessons with relevance for other future projects are summarised below and discussed in more detail in *Section 4: Lessons learned* of this report:

- The absence of before-data means there is no clear quantified demonstration of project performance.
- There is also an absence of supportive methodologies to monitor and evaluate the forecast project outcomes.

1. Project benefits

Expected benefits

Auckland Transport see the introduction of the HOP card as part of the AIFS as a transformational project with potential to change behaviour and to increase public transport patronage significantly.

The original economic evaluation² for the project funding application contained the following benefit forecasts:

- Public transport user benefits 32% (mainly time savings through reduced boarding/ ticket purchase time?)
- Non-user decongestion benefits 20% (transfer from car to bus and associated reductions in congestion)
- Operating cost savings 19% (more automation and economies of scale system benefits)
- Bus operating costs 9% (more efficient fleet utilisation)
- Capital cost savings 9% (compared with base case)
- Increased farebox revenue 7% (from new users and more frequent users)
- Reduced fraud 4% (automated detection of non-valid tickets)
- Information management efficiencies 1%

Accuracy of forecasts

Anything used in forecasting and evaluation should be capable of measurement and monitoring post evaluation, otherwise it is not possible to check project performance against the basis on which funding approval was awarded.

Few verifiable forecasts were available for this review. Analysis in support of the original economic evaluation a range of assumptions were adopted, including that the change to 'integrated ticketing' would account for a 1% increase in patronage and that 'integrated fares' would lead to a further 1.5% increase in patronage. Bus running times were assumed to reduce by 3.5% and bus ticket fraud was assumed to reduce by 4%.

In July 2011, an attempt³ was made to define and quantify benefits but this was very general in nature and did not provide useable and verifiable data.

In May 2013, an update of project economics⁴ was undertaken, but this pre-dated the introduction of HOP cards on buses, appears to have concentrated on costs and does not seem to have examined AIFS benefits in any detail.

It would have been useful if measures for at least some benefit areas due to HOP card introduction had been identified, quantified, monitored and reported, for example in respect of:

- Time savings for bus users and service providers.
- Net operating cost savings.
- Increased patronage and revenue.

² A revised / updated evaluation in 2013 varied these proportions to some extent.

³ Benefits Realisation Report, Auckland Transport

⁴ AIFS, Update of Business Case, Stage 1 Report, MTC

- Reduced fraud.

Although the data now available from HOP and the real-time information system is of good quality there is no directly comparable 'before data' and no method has yet been developed to discern between HOP impacts and other impacts.

This being the case, it has not been proven that increases in patronage and revenues are attributable to the HOP card, or that bus travel times or fraud have reduced.

An integrated ticketing system may well now be regarded as a 'basic expectation' for public transport operation in a large modern city. It may also be the case that the absence of an integrated ticketing system would have a negative effect on public transport use. However, forecast benefits should still be identified, measured and reported. This requires better methodologies to be established for metrics to test and develop projects such as the AIFS.

Travel times

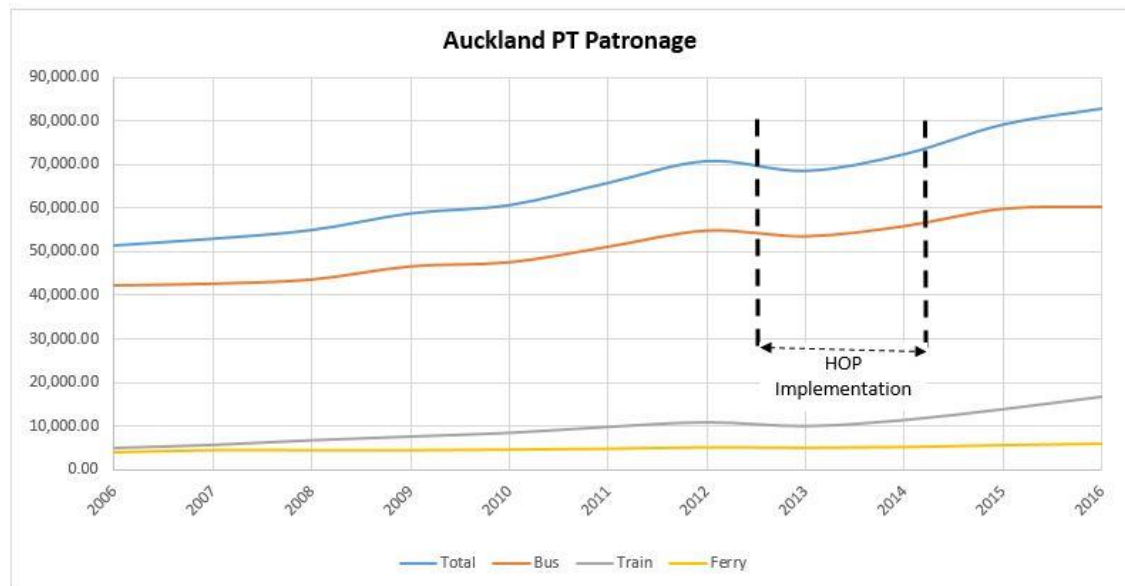
Intuitively it seems likely that boarding times per passenger have improved due to the move to off-bus ticketing. However, to some extent increased patronage could also affect boarding and de-boarding times. No data is available to quantify what the actual effect of HOP card introduction was on bus dwell times at stops and whether this translated into reductions in bus running times.

There is some indication that bus running times may not have reduced but that there may be reduced variance in bus running times. However, the information in support of this is not conclusive.

PT Patronage

The AIFS was developed against a background of increased patronage over the period covered by the project, as shown in Figure 1 below:

Figure 1: Patronage change (and HOP roll-out) by mode



The change in patronage over the period reviewed above has been substantial, prior to the AIFS implementation overall patronage grew by 5.5% p.a., during Implementation (July 2012 to March 2014) patronage grew by 1.1% p.a. and post implementation growth has been 7% p.a.

During HOP implementation, the number of SuperGold and other concessions were incorporated. It is difficult however to separately identify the impact of the HOP card

introduction from other concurrent initiatives, particularly in respect of, service improvements (for example, rail electrification) and changes in fare discounting policies (currently up to 33% less for HOP than comparable cash sales).

Management systems

The availability of the HOP card capability fulfilled several other functions, including the capability as a management tool, for reporting, operator analysis and reliability monitoring, as follows:

- Bus service revenue allocation (Public Transport Operating Model⁵, operator information, liaison and contract compliance).
- Operational responses (emergencies, incidents and events).
- Monitoring, analysis and studies.
- Reporting.

The AIFS investment has been a key component in the delivery of high quality data for a range of purposes.

2. Project implementation (scope, costs, and timeframe)

Project description

The Auckland Integrated Fare System (AIFS) project forms part of an overall strategy to introduce comprehensive real time technology to Auckland public transport services.

AIFS is part of a larger coordinated package of public transport activities which seek to change the way Aucklanders travel, by providing a viable passenger transport alternative to private vehicle travel.

The Auckland Integrated Fare System (AIFS) project created an Auckland region wide network of tagging equipment, ticket machines, retail agents, customer support centres and a centralised planning and operations unit.

HOP features include:

- Off-vehicle fare pre-travel purchase.
- Automated public transport loading (bus boarding and clearance times at terminals)
- Data reporting (for the management and operation of the system) from the “tag on tag off” approach which is recorded and combined with user details, known through card registration
- Discounted travel for card based travel and for linked trip legs.

⁵ This is a nationally required method for planning and contracting-out public transport services.

Figure 2: AIFS project components

Component	Bus	Rail	Ferry	General
Ticket Machines	9	65	-	-
Tag Points	3,000	146	40	-
Gated Entry/Exits	-	4	1	-
Ticket Offices	-	5	3	-
Stations/Terminals	-	41	18	-
Driver Consoles	1,300	-	-	-
Retail Agents	-	-	-	60
Customer Service Centres	-	-	-	10

The bus operation also consists of 9 Operators, 14 depots and 1250 buses.

The project was planned to make use of tried and tested technology rather than opting for more 'leading edge' technology.

As part of the NITIS programme of work led by the Transport Agency the Thales DESFire Card System was selected rather than the SNAPPER Java card system.

Around 11% of fares are paid by cash and there are a variety of bus service contract arrangements, including gross contract, net contract and private services, which adds to the complexity of the current system.

The AIFS was implemented as a distance based system but this has now been converted into a zone based system.

A further intention of the project was that AIFS would provide a resource base for the development and implementation of a co-ordinated national system. Throughout the development of AIFS it was envisaged by the Transport Agency that it would be National Integrated Ticketing Interoperability Standard (NITIS) compliant. It was envisaged that the national centre would be developed in Auckland and that eventually AIFS staff would move to this unit to service all integrated ticket systems nation-wide. Because of this, certain costs in the development of the Auckland system were funded at 100% Financial Assistance Rate. Although the national system has not yet eventuated, the functionality still exists to implement this.

Scope changes

A substantial change in scope was approved in July 2013 to bring the supply of NITIS compliant bus ticketing equipment within the scope of the project and other changes to improve customer and business capabilities. The failure of one of the major bus operators to have a NITIS compliant ticketing system meant AT had to quickly include this in the project scope. This significantly increased project costs and delayed project delivery.

Costs

The project was delivered at a total implementation cost of \$99.2 million, 38% higher than the original estimate at the time of funding approval, as shown below:

Figure 3: Budgeted and actual cost comparison

Description of cost	Date	Project cost
Project cost estimate when funding approved	2008	\$71,809,209
Actual cost at project completion	2014	\$99,217,639
Variance (under/over budget)		+\$27,416,430 (+ 38.2 %)

The increase in costs was mainly due to the change in project scope to include the procurement and supply of NITIS compliant equipment by AT and the inclusion of the bus roll out.

The \$99.2m figure above is made up of \$65.77m construction, \$20.00m for the national system element and \$13.45m for operational implementation. Excluded are investigation and design costs (\$4.9m).

Operational costs were difficult to estimate for project funding application purposes because of individual operator systems and commercial sensitivity. The estimate of operational costs in October 2008 was \$5.6m p.a. The actual OPEX costs from 2012/13 onwards has been running at \$8m p.a. (on average) and are forecast continue at this level rate to 2020/21. Additional costs above the agreed \$8m p.a. OPEX level are funded through AT's PT Programme.

Some ongoing capital costs are also likely to occur as the AIFS is refined and developed in the future. For example, a budget of \$7.8m has been approved for the period 2014–17 for 'Integrated Fares' construction funding.

Timeframe

Although some investigation occurred from 2006 onwards, this review considers the main AIFS investment made over the period 2009–2014, a period coinciding with the deployment of the real-time information system (2007–13) and the formation of Auckland Transport (in 2010).

The project was originally planned for 2009–12 and was delivered approximately 2 years later than originally planned. This was partly due to:

- Delays for legal reasons (challenges by a bidder to the tender process)
- The need to widen the project scope to include the bus network
- Transition to new organisations/governance structures (especially the creation of AT)

A phased approach was used for the detailed implementation of the project:

- Phase 1: Central system – 2009–13

The roll-out of integrated HOP ticketing was as follows:

- Rail: July to November 2012
- Ferry: November to December 2012
- Bus: June 2013 to March 2014

AIFS is to some extent a continuous investment programme and further work on this, and operational, maintenance and support activity, is therefore ongoing.

3. Good practice identified

Good practice aspects were identified as follows:

- **Smart card (HOP) technology has been introduced reliably, on bus, rail and ferry services.** This coincided with a technological revolution in real time information (RTIS) and data processing, initially seen as highly unreliable but the HOP system investment has now bedded in and is now viewed as a positive facility (as demonstrated by customer satisfaction surveys)
- **An innovative and responsive culture has been developed through the management and organisation of HOP implementation.** The HOP system is a live process with a need for continuous review and improvement as user behaviour is monitored and evaluated. A responsive team culture is needed to manage this process and deliver high quality customer service.
- **The effective use of data for planning, operational management and system improvement purposes.** Data from HOP has been linked with real time information system to provide information benefits for operational management, analysis and planning purposes. For example, the identification of optimal fare zone boundaries for integrated fares policy development.
- **A strong focus on customer based market research and an evidence-based approach to planning, implementation and system development.** Customer surveys and targeted market research analysis is of high quality and contributes to a positive customer focussed strategy.

4. Lessons learned

Lessons with relevance for other future projects were as follows:

- **The absence of before-data means there is no quantified baseline to assess project performance against.** It has not been possible to verify some intended outcomes of the project, for example, with respect to improvements in bus loading times or reduced fare evasion because of HOP card introduction.
- **There is also an absence of supportive methodologies to monitor and evaluate the forecast project outcomes.** There is an absence of measurable performance indicators and this means it is not possible to HOP card introduction with actual outcomes. For example, has the HOP card resulted in the expected 1% uplift in patronage or lead to a reduction in bus operation costs?

Acknowledgment

We wish to thank Auckland Transport staff for their co-operation, assistance and prompt replies to information requests in connection with this review.

5. Auckland Transport response to findings

The response from Auckland Transport follows the report's structure

1.0 Project Benefits

Agreed the benefit measure in the EVA were very high level.

However, in terms of the meeting the customer expectations and needs the AIFS has met those.

The system has;

- 89% usage for public transport payment on any business day
- sold over a million cards since the 2012 introduction against the forecast of 350,000 forecast at the start of the project.
- The system was designed to handle 500,000 transactions per day the success of the system has seen the system regularly going over that figure by 70,000 to 90,000 transactions.

2.0 Project Implementation (scope, costs, and timeframe)

Project Description

There is the comment in this section about “tried and tested technology” this is about managing project risk and perhaps should be more prominent in the project assessment. While the AIFS project was progressing the NOVApay project was unfolding and the use of “tried and tested technology” was one of the reason the project was successful. Ticketing projects world wide a have a reputation for costing far more that they were budgeted for and taking far longer.

- Sydney had two attempts and was successful with the second using Cubic Systems and the Opal Card
- Netherland OC Chipkaart system large costs overrun €200M to €1.5B

Costs

The project under forecast the AIFS system operating costs as detailed, however AT HOP does benchmark themselves against Transport for London's Oyster card. The benchmark measure is ticket system operating costs divided by the total system turnover, TFL sits at 8.8% while sits around 9% which is good result given that AT HOP does not have the scale of London.

3.0 Good Practice Identified

Agreed

4.0 Lessons Learned (section headed by)

“The absence of before data.....”

While the absolute measures are not present some can be intuited e.g.

The Northern busway runs to two-minute interval timetable at peak times how would that be possible with a paper ticket system where each sale takes at least fifteen seconds and the bus loads both at the front and back of the bus.

“.... Absence of supportive methodologies....”

Agreed

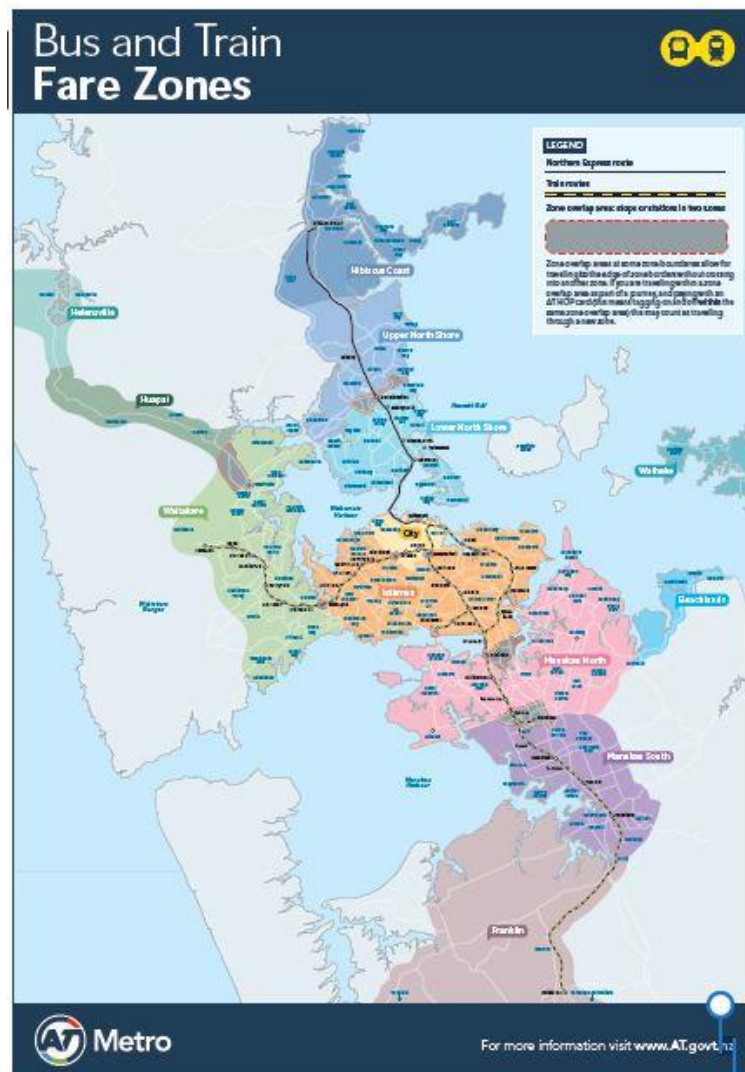
The AIFS project was a large IT driven project (\$99.2M), risk management should have been part of the project review given the recent instances of government funded project going over budget and time.

6. Post implementation illustrations

- – Britomart Customer Service Centre



- Auckland zone plan



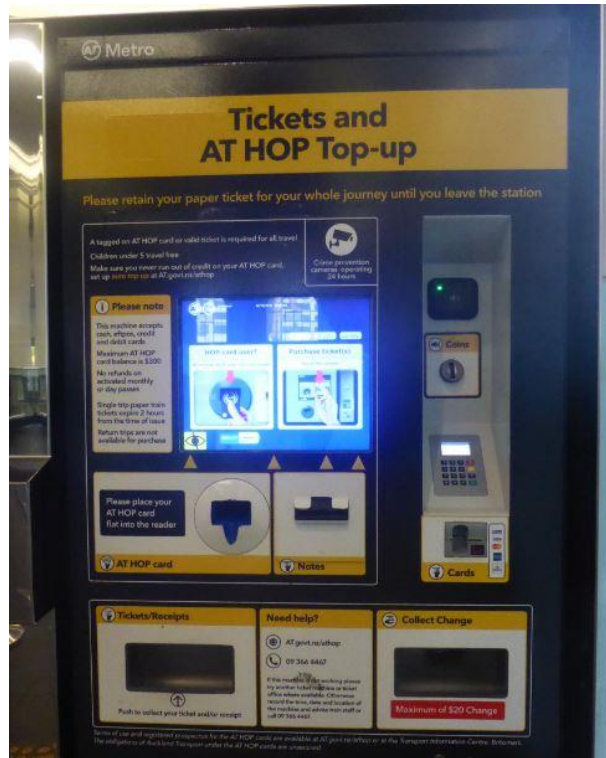
- Britomart barriers



- Ferry barriers



- Ticket Machine

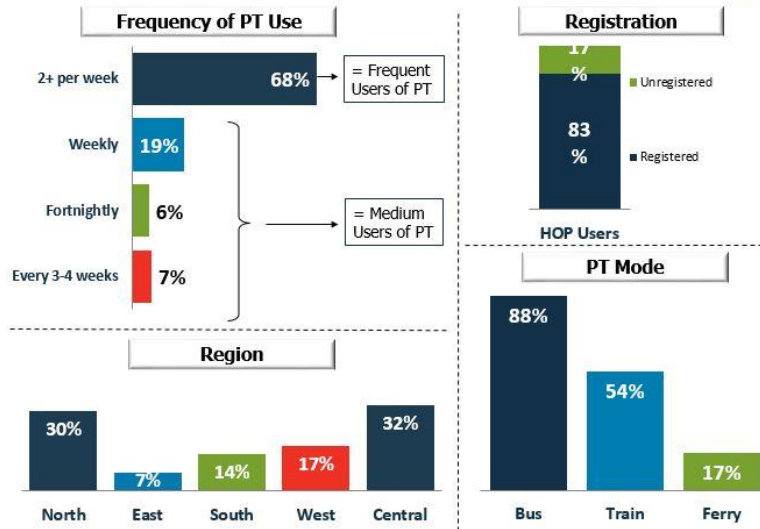


- Bus tag entry



- HOP market research

Profiling Our HOP Card Participants



- HOP satisfaction survey

AT HOP Attribute Scores - Cardholders

