The Keys to a Successful RTPI Deployment

Real Time Passenger Information (RTPI) is one of the keys to making public transport acceptable in the 21st Century. The uncertainty of waiting for a bus is known to be a contributing factor for passenger resistance to public transport.

Pioneering RTPI systems are now approaching the end of their serviceable life. Although some of these systems have been in operation for 10 or more years, they have struggled to meet passenger expectations. Even recent systems that use updated and supposedly improved technologies fail to meet the day-to day and month-to-month reliability needed to win passenger trust.

In addition, few if any systems have been deployed beyond a trial stage. In the UK no system can claim to provide reliable information to more than a small subset of riders. While these systems may seemingly perform to specification they almost universally fail to perform consistently.

Surveys have shown that passengers recognise the benefits of RTPI. However Councils will not achieve real cost-benefits until the information is trustworthy and readily available to the majority of passengers.

This paper provides an analysis of why RTPI systems don't succeed, discusses an RTPI system that has exceeded expectations, examines the basis for its success and the critical issues that must be addressed when establishing an RTPI system.

This paper contains the following sections:

I. Introduction

Real Time Passenger Information involves supplying passengers with reliable information about the bus they want to catch. The message that passengers expect is simple – 'my bus is 5 minutes away' - and must be dependable in order to earn their trust and confidence.

However the public is sceptical by nature and has a low opinion of public transport reliability. There is also no general understanding of the complexities involved in acquiring, producing and communicating real-time information. If this information is perceived as incorrect or inaccurate, that perception casts doubt on all subsequent information and further undermines the user's opinion of public transport.

Ideally, RTPI needs to be available to all passengers every time they board a bus. Therefore a fully deployed system should be measured by the percentage of passengers that have access to and use the available data.

So, an RTPI system should deliver reliable information about 'my' bus via a method that is accessible to 'me'. And 'me' stands for most of your passengers.

What is expected from an RTPI system?

It is important to understand what motivates each of the players in an RTPI system as well as their expectations. Broadly speaking there are three players - passengers, bus operators and political bodies.

What does a passenger want? Perceived reliability, choices and increased control. In return passengers will continue to use public transport and you may even attract some users away from other modes. A reliable system is better (or has to be better) than 95% of trips arriving within one to two minutes of schedule or the real-time information provided for that stop.

What does a bus operator want? Information that helps to increase the efficiency of their current fleet management system, and attracts sufficient passenger numbers to fill existing services. Their focus is to maximise profits the resources in-hand.

What does a political body want? To meet national performance objectives, increase rider ship and reduce traffic congestion. Other considerations include lifestyle improvement, and the reduction of land use and greenhouse gas emissions. These are only some of the significant potential benefits and savings for government if public transport patronage can be raised.

It is immediately obvious that the above objectives are not mutually inclusive. Bus operators are motivated by profits and the demands of shareholders. Political bodies are motivated to respond to their electorate as voters sit in traffic or spend increasing amounts of time travelling.

And while passengers get the benefits they are unwilling to pay for real-time information. They will also be highly critical if it's wrong. In fact if the system functions poorly, passengers will be prompted to move to alternative forms of transport faster than they do when real-time information isn't available.

A good RTPI system can be a mechanism for passenger growth, but without additional funding for more services any growth will be quickly negated as the buses become full. If rider ship growth is the main objective, then RTIP can be the catalyst for this. However, to leverage the benefits from such growth there has to be funding for more services. Bus operators cannot be expected to provide this funding as they typically seek a three-to-five year return on investment (ROI), and current bus industry ROI is more than five years.

In our view a successful RTIP system is about growing rider ship. Councils have to be prepared to provide all of the systems and services to achieve this as without proper funding any benefits cannot be fully realised. Even worse, players will opt-out rather than buy-in, which will almost guarantee failure of RTPI initiatives, and I believe that is presently the situation in the UK.

II. Why RTPI Systems Fail

There are lots of reasons why there are few, if any successful RTPI systems. The two main reasons are discussed below.

1. Commitment

The maxim 'garbage in equals garbage out' applies to any RTPI system. Fundamentally RTPI demands correct transit system data such as:

- route
- trip
- block
- timetable
- schedule
- vehicle specification

By necessity this data must also be supplemented by the accurate and timely assignment of the bus to the work.

If the above fundamentals cannot be reliably and consistently achieved then the outcome is typical of most RTPI systems deployed today. It is therefore imperative that all stakeholders commit to the RTPI system from the beginning, even in the initial planning phase. To assure the day-to-day success of the RTPI system, agreements also need to be put in place so that all parties continue to meet ongoing consigments. Before a system can go live to the public, the following areas need to be addressed and agreed upon:

- precise and timely route and timetable data including changes
- timely assignment of the bus to work
- service level agreements

Unless this support is in place, the accuracy of the entire system will be less than acceptable to the passenger and the credibility of the system is lost.

The Council or Passenger Transport Executive must also decide on a time scale and clearly define their desired long-term outcomes from the beginning. Most small or trial systems which have few signs and benefit a small number of passengers should be evaluated within a three to six months. After the trial is complete the Council needs to either switch the system off or expand it to a full system.

It is unfair to expect bus operators to carry the additional work load of a partially deployed RTPI system without some compensation or the guarantee of deploying a full system (which increases revenue) after the trial. System vendors also need to recognise their risks and revenue potential. The advantage of short fixed-period trials is that they enable all stakeholders to make a proper assessment.

So a commitment to the RPTI system is vital, and should be contractual in order to prevent system degradation over time. The bus operator needs to commit to providing the following:

- accurate data
- assignment of buses
- ongoing and timely maintenance and support

Councils need to commit to:

- long term funding for system maintenance
- making the RTPI information available to passengers
- providing funding for new services as existing services become full

2. Tender Specifications

As already stated, there are few, if any, operational RTPI systems. How then can any public transport officer or consultant write a meaningful specification for a system that does not exist?

What we see are specifications that resemble a 'wish list', with no meaningful results to measure the success or failure of the final product. In some cases a 'cut and paste' copy of someone else's specification is provided to vendors. Our experience is that most Requests For Proposal are so specific that in reality the requirement is a custom or bespoke solution rather than a proven off-the-shelf product.

If you are seeking a bespoke solution then you can expect delivery delays and cost overruns. Complex IT projects have a history of going awry and the RTPI market is no exception. Furthermore, if your requirement is a modification of someone else's bespoke solution and it is not fully deployed elsewhere why expect it to work for your county, city or town?

One considerable benefit in buying an off-the-shelf product is that all technology risk is minimised. But when assessing a tender response many vendors focus on the bidding company's financial status, management and quality processes, rather than the products capabilities. Instead, the evaluation process should focus on existing customers and the products past performance within the specific market.

What really matters when writing tender specifications is clearly defined outcomes. Establishing the expected system results makes evaluation and acceptance simple to measure and should be a condition of the service contract.

Getting a system to work on the day of Site Acceptance Testing can be achieved by sheer vendor determination, with perhaps some 'smoke and mirrors' thrown in. However the true test of an RTPI system is that it works continuously every day, and, that it satisfies passenger expectations. A working system is as much about the design as it is about the support systems that keep it operating to a high standard.

For example, a system that does not have a responsive maintenance process in place will undermine passenger trust. If a bus with faulty equipment is allowed to operate, it will make upwards of 16 trips in a day and provide incorrect information to all of the passengers waiting at all of the stops that this bus passes. There has to be an agreement with the maintenance organisation and the bus operator regarding equipment repairs, in order to make the bus available. These agreements are as important as choosing a good RTPI system.

The tender document must set clear expectations of what is expected and the supplier must be held accountable for poor delivery and substandard performance. Inattention to this aspect will see a continuation of systems being deployed that have the potential to work but fail all the same.

III. A Successful RPTI System

The outcome of a successful RTPI system is increased rider ship and a decrease in motorcar reliance. But what does this mean to the players?

***For the passenger*:** The superior information improves the perception of public transport reliability and gives the passenger more choices and greater control. The end result is increased rider ship from existing passenger retention and migration from other modes of transport.

***For the regulator*:** Political objectives are met by increasing rider ship. This results in a requirement for more services and larger fleets as increased capacity goes hand in hand with patronage growth.

***For the bus operator*:** The initial effect is revenue growth, however the end result is the need to plan for further services. A good RTPI system provides several benefits for bus operators including a rapid increase in rider ship growth, and meaningful information that can be used for the day-to-day and long term management of the fleet.

IV. The Christchurch City RTPI System

In the late 1990's the Canterbury District Council and Christchurch City Council set a goal to double public transport rider ship by 2010. One of the components of their strategy was RTPI. The result so far is that rider ship has grown dramatically, and the aim to double patronage should be realised during 2007.

To achieve this, the councils initiated:

- **The wide distribution of RTPI;**

  Electronic signage is now at over 550 bus stops - approximately 27% of the 2,100 bus stops. This means 60% of passengers have RTPI signage at every bus stop they use and 90% of passengers have RTPI signage at a minimum of one of the stops they use. RTPI is generated for all 2,100 bus stops and is accessible via the Internet and WAP enabled cell phones.

- **Increased bus services;**

  The Council committed to funding service growth by increasing service frequencies and adding new routes. The bus fleet has grown from 190 buses in 2000 to approximately 280 in 2006. Daily trips have increased from around 2,000 in 2000 to more than 3,000 in 2006.

The additional 7.5 million public transport passenger trips has deferred spending on roads - an altogether positive outcome.

So what is it that sets the Christchurch system apart from other systems? The answer is complicated and in reality the contributing elements came together more by accident than design. Nevertheless, the outcomes enjoyed by Christchurch are repeatable given the right conditions and commitment.

The success of the Christchurch RTPI system was bought about the following:

- performance expectations
- system reliability
- commitment by all players
- commitment to a full system

Performance Expectations

The key impetus for the RTPI system in Christchurch was the proposed Bus Xchange. During the construction of the Xchange it became apparent that any incoming bus that had not been allocated to a platform would cause havoc, as neither the driver nor waiting passengers would be sure of which platform to go to. Therefore, the new Xchange would need to provide bus arrival information support dynamic stand allocation, and in order to support dynamic stand allocation.

Dynamic allocation facilitates the reuse of a single platform for multiple services, thereby greatly reducing total space requirements. Without an accurate, reliable and fully functioning RTPI system dynamic stand allocation is difficult to achieve. It was obvious that RTPI would make or break the operation of the Bus Xchange, especially if the Xchange was to reach its projected capacity.

A properly allocated bus takes less than two minutes to load and depart. An unallocated bus takes at least an additional three minutes to load and clear and the flow-on effect can cause major disruption, especially at peak traffic times. The Xchange was designed to handle up to 170 services per hour at peak and the arrival of one unallocated bus actually causes as much as five minutes of disruption. Any more than 12 unallocated buses in a single hour can stop the Xchange from functioning.

In addition, most buses arriving at the Xchange were less than five minutes into their trip. For waiting passengers to receive meaningful information, the RTPI system had to support trip linking and ensure arrival data was provided up to 30 minutes before a bus service arrived.

System Reliability

For the Bus Xchange to work, the RTPI system needed to be better than 98% reliable.

The base data had to be right. This was achieved by automating the link between schedule software and the real-time information software. The bus operator can now load timetables effectively and in real time. This means that timetable tweaks are loaded into the system as they are made and operators are encouraged to use the system as a normal part of their daily operations.

To achieve trip linking, the schedule and timetable data also had to be precise. Trip linking means that a bus only needed to be assigned once to a block of work, not to every trip - greatly reducing the number of entries into the system and minimising the potential for human error. To further reduce the point of entries and increase the operator involvement in the system, dispatch entry was chosen over driver entry.

With trip times of less than 40 minutes we determined that some buses would transit though the Xchange as many as 20 times per day. It would only take two or three faulty buses to upset the system (1.5% of the fleet) with unacceptable allocation failures and corresponding delays at the Bus Xchange.

Maintenance and speed-of-repair issues required an agreement with the operator to either swap a bus out, or to swap out the hardware design so buses could be quickly repaired during the lay over between trips.

A quality assurance system was instigated to prompt all five different operators using the Xchange to detect faulty buses as early as possible, and assign buses on time. To ensure total dependability this system needed to be enforced, and corresponding penalties were imposed for failing to comply with the requirements of the RTPI system.

The regulator also needed to adjust their legacy transit plans. In order for dynamic stand allocation to function properly, timetables had to be controlled so that a steady flow of buses arrived and departed the Xchange, rather than groups of buses all departing or arriving at the same time.

Also, other parts of the RTPI system needed to provide the same standard of reliability. Redundant systems were instigated so there is no single point of failure. A fully deployed system will throw the bus system into confusion if it not operational, and where passengers have grown to rely on the information, a broken computer server or radio network will affect all passengers.

Commitment by all players

In order to achieve its full potential, an RTPI system needs absolute dedication. The reliability expectations of the Christchurch Bus Xchange and its users demanded unconditional commitment from all players - drivers, dispatchers, regulators, planners and politicians, and especially the bus operators. The level of support shown by the operators in Christchurch has been fantastic.

However, getting all concerned parties to commit to an RTPI system requires focus. The Christchurch District and City Council's had a clearly defined goal – to double bus patronage – and were prepared to put in the effort needed to achieve that goal. As such, the Councils' developed a comprehensive project plan that outlined the steps needed to increase patronage, and the benefits it entailed. This enabled everyone to see the rewards for the effort involved, and made it easy for them to commit.

Commitment to a full system

An RTPI system creates a number of new day-to-day business problems for the bus operator and very few issues for the purchaser (the Council). It is the bus operator that bears the burden as they have to manage and maintain additional equipment on the bus and keep the static data up-to-date.

Partial or 'trial' systems complicate operator management and add stress to their operations, especially when the duration of the trial and how it will be evaluated is unknown. All of the responsibility falls on the operator and in return he gets signs at only a handful of bus stops. This is not enough to make a difference to passenger numbers and a lot of extra work for little if any financial gain.

But a fully functioning RTPI system allows the operator to take advantage of the detailed fleet management data. The high level of vehicle visibility bought about by the system also enables the operator to see schedule variations and off-route performance that can be immediately addressed.

V. Summary

The RTPI systems employed in the UK to this date have been unsuccessful. The reasons for this fall into two main categories: lack of commitment from one or more concerned parties, and unclear or imprecise tender specifications. Yet an RTPI system can provide important benefits to passengers, regulators and operators, if it is applied properly.

The catalysts for an effective RTPI system are:

- **Goal-directed reasons for employing an RTPI system;**
  It is vitally important to ascertain what the aim of employing an RTPI system is, as this creates the foundation for a results-driven commitment from all interested parties.

- **Functional specifications;**
  Tenders need to contain specific, objectively measurable goals that test the effectiveness of the system.

- **Contractual obligations;**
  All concerned parties must commit to following standards in order to sustain the long term success of the system. This includes bus maintenance, the punctual allocation of buses, and timely and accurate data.

If the above factors are met, then the RTPI system will succeed in elevating the perception of public transport, retaining current users and growing rider ship.