

THE ROLE OF MARKET REGULATION IN ENSURING AN INTEGRATED INTELLIGENT TRANSPORT SYSTEM

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SUMMARY

This paper looks at the question of the optimal regulatory system to control, plan, finance, integrate, maintain and ownership of Intelligent Transport Systems (ITS). In particular it looks at the proposed changes in the regulatory and institutional structures in Dublin. Where there are plans to change the current regulatory structure and introduce competition in to the bus market, and the establishment of a public transport regulator. The paper draws on data from a survey of European cities, concluding with recommendations for the provision of ITS in Dublin.

INTRODUCTION

Dublin is situated on the eastern side of the country and in 2002 had a population of 1.5million. The transport system in Dublin consists of an extensive bus network with eleven radial Quality Bus Corridors (QBC) (traffic lanes dedicated to public transport use), and heavy rail/metro line extending 45km from the north of the city to the south situated next to the coast, with stations in the city centre (1). In 2001 Dublin Bus operated 196.8 million journeys and Irish Rail operated via the Dublin Area Rapid Transit (DART) (heavy rail/Metro) 22 million journeys in Dublin (2).

In Ireland the majority of public transport is provided by the state owned company Córas Iompair Éireann (CIÉ) that is made up of three operational companies.

1. Dublin Bus: provides urban bus services in the Dublin Metropolitan area.
2. Irish Rail: provides inter-city and urban rail services, in Dublin with the DART (heavy rail/Metro service).
3. Irish Bus: provides commuter services, rural and inter-city bus services for the whole island.

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Currently the three operating companies report to the holding company CIE which in turn reports to the Department of Transport (DoT). As CIE is state owned, and the DoT is currently the regulator of the transport market, this could lead to a conflict of interests. From this need for the government to distance itself from any such conflict of interest the DoT is to re-establish itself as the policy maker as apposed to its present role as operator and regulator and policy maker. To this extent there have been moves to liberalise the public transport market and establish a Dublin Land Use and Transport Regulator (DTA). The proposed market type is that of a controlled competition. Competition would be for the market as opposed to within the market, with contracts awarded on a franchised basis. Under this new market structure the DoT aims to provide an efficient, integrated public transport system that enhances competitiveness, sustains economic progress and contributes to social cohesion (3). It was announced in 2002 that by 2004 25% of the bus market in Dublin would be opened up to competition and contracts awarded on a franchised basis. It is anticipated these franchises will be awarded to winning tenders that will have exclusive rights to operate services on a particular route or defined geographical area over a specific period of time (4).

The main responsibilities of the proposed DTA will be to: promote strategic planning for land use and transport; ensure that transport policy is implemented in a way that's consistent with the strategic planning framework; ensure co-ordinated implementation of transport investment; and the promotion of an integrated public transport network (5). It is planned that another of the DTA's main functions will be to regulate and monitor the market with regard to controlled competition contracts.

Under this proposed market structure it is not clear yet where the responsibility for ITS systems will lie. Given that the ITS in infrastructure Dublin is in its infancy, a planned approach needs to be in place in order to ensure efficient and effective integration of the transportation network.

This paper will examine best European practice in the area and suggest an optimal model that the new DTA could follow with regard to the planning, integration, financing and provision of an ITS infrastructure. This paper will examine the alternative models of ownership, planning and regulation available, drawing from the European experiences, and provide recommendations as to how the DTA should manage an integrated ITS infrastructure.

OBJECTIVE AND METHODOLOGY

The Irish Government is currently planning an unprecedented level of investment in public transport in the Dublin. The Dublin Transportation Office (DTO), which is independent of the DoT, and acts as transportation planner for the Dublin, produced the 'Platform for Change'. This is a land use and transportation plan for the period 2000 – 2016 in which plans to introduce a light rail system (€2,124m), metro/underground (€7,221m), DART/Suburban rail (€5,582) and bus improvements (€808)(6) are outlined. This extensive investment coupled with the plans to introduce a multi-operator market and the vision to have an integrated public transport system emphasise the importance of having an integrated ITS strategy.

In recent years several new bus operators have entered the market in the Dublin. With the absence of a single framework to monitor these operators a lack of integration has already become apparent, as seen in

Figure 1. On this city centre street there are three stops provided by three different operators, these three services could be displayed on the single Real Time Passenger Information (RTPI) display. Under the proposed DTA, a coordinated RTPI/passenger information strategy would minimise such instances. Therefore minimising the cost, of duplicating information infrastructure. And reduce the cost to both the operator and the passenger.



Figure 1 Suffolk Street, Dublin 2, 26th May 2003

This paper examines European examples of best practice, and recommends a case that the DTA could follow. A survey (see Appendix A) was sent to European PTA's and where one was not established to the relevant authority. The survey concentrated upon the provision of RTPI and electronic ticketing systems, as these are the most relevant ITS applications to the Dublin situation. The indicators that have been used in the survey for successful deployment of ITS systems were lead-time and integration between modes and operators, as these would be the main success factors of an integrated public transport system.

CURRENT ITS SYSTEMS IN DUBLIN

At present there is no combined integration in the planning, operation, financing or provision of ITS projects in Dublin. Operators are providing/planning their own ITS projects but there is no cohesion or integration with in the system.

Currently RTPI is being provided and planned by two bus operators in Dublin, Aircoach (independent bus operator providing services from the city centre to the airport)

and Dublin Bus. Aircoach are planning to introduce RTPI via mobile telephones using General Packet Radio Service (GPRS) technology. This will be complemented by an on-board system that will display information in several languages on the proximity of the bus to Dublin Airport, the onboard system is already in operation and the mobile telephone service is in the planning stages. Dublin Bus introduced RTPI via Differential Global Positioning Systems (DGPS) in 2000 in three of its QBC's. Passenger Information Displays (PID) at 16 stops provides passengers with information with regard to route variant, and estimated time of arrival. The current Dublin Bus RTPI system in a pilot programme that is due to end in 2003, and decisions will then be made with regard to a citywide expansion of the system.

RTPI is also provided on the DART and is in the planning stages on the Luas (light rail due to open in 2004). The DART provides passengers with route variants and the estimated time of arrival. This information is gathered via contact with the track. Luas will also provide a similar system when it becomes operational.

Electronic ticketing is the second major ITS application that is operational in Dublin with major plans for its extension. For the past decade Dublin Bus has operated a Wayfarer magnetic strip ticket validation system on all of its fleet. This system is also provided on the DART service. And there is an integrated ticket, which allows access to both modes, however any integration only exists between the CIE operators.

The DoT in consultation with the DTO and CIE are also planning the introduction of a system of integrated ticketing. This will operate via a contact-less smart card system, which will allow entry and exit validation. This system of ticketing will be fully integrated between modes and operators with regard to both access and fares (7).

SURVEY RESULTS

The survey was sent to European PTA's or equivalent in order to ascertain the planning, financing, ownership, maintenance and integration of ITS applications. The 24 cities that responded are outlined in Table 5 in Appendix B.

One of the principal tasks of the survey was to ascertain the management of the planning, ownership, integration and maintenance of ITS systems in Europe. The survey was also used to look at the optimal model of city level integration of ITS systems, and factors such as lead-time, integration between modes and operators and the percentage of stops fitted with RTPI as measures the successful of implementation of ITS.

Lead-time

This section describes the amount of time from planning to implementation of the two forms of ITS applications that the survey examined.

Regulatory System	RTPI	Electronic Ticketing	No. of cities
State	4 years	4 years	1
State/Private Sector	1 year	2 years	2
PTA	2 years	2 years	14
Local Government	1 year	1 year	7

Table 1 Lead-time of ITS applications

Table 1 details the average lead-time from the cities to implement the ITS applications. In the results for the state and the state/private sector it should be noted that the number of responses to these was quite low. The results from the PTA's showed that on average RTPI projects were planned and completed within two years. The longest lead times RTPI was three years and 75 % of electronic ticketing systems were implemented within three years.

Integration

A key function of the ITS applications detailed in the paper is that they can be integrated between both mode and operator. Table 2 details the number of cities that have integration between mode and operator.

Number of cities with integrated ITS applications				
	Mode		Operator	
Integrated?	Yes	No	Yes	No
Regulatory System				
State	1			1
State/Private Sector		1		1
PTA	8	6	12	2
Local Government	2	5	3	4

Table 2 Integration between mode and operator

The results show PTA's to be quite successful in achieving integration. This could be credited to the fact that it provides an over arching infrastructure that the different bodies subscribe to which therefore enables it to successfully integrate the various operators and modes.

Planning

With regard to the planning of RTPI in twelve cities the PTA was responsible. And those cities, seven were integrated between mode and nine between operators. In the planning of electronic ticketing systems a PTA was responsible in eight cities. Of those nine cities five are integrated by mode and seven by operator.

Of the remaining RTPI systems either the operator or the operator/government body implemented nine of the systems of which three were integrated by mode and five by operator. A similar situation exists with electronic ticketing, with eleven systems being implemented, and three of these are integrated between mode and eight between operators.

Ownership

Table 3 details the ownership of ITS applications. Of the RTPI systems owned by the PTA four of the systems are integrated between mode and five by operator. The same situation exists for the integration of electronic ticketing applications.

Regulatory Regime	RTPI	Electronic Ticketing
PTA	9	7
Government Body	3	2
Operator	6	11
PTA/State	1	-
PTA/operator	4	-

Table 3 Ownership of ITS applications

Integration

From the results PTA's are generally responsible for the integration of ITS applications with RTPI and electronic ticketing coordinated by the PTA in thirteen and eleven cities respectively. In these cities they have been integrated between mode and operator in eight cities for both RTPI and electronic ticketing.

In the rest of the cases where a PTA does not preside over the integration of the systems eleven in the case of RTPI and thirteen for electronic ticketing, four of the RTPI systems are integrated and seven of the electronic ticketing systems.

The cities were also asked if the information they displayed was integrated on PID, only nine of the cities had integrated information displayed. Of these nine cities eight of them had a PTA to integrate their RTPI system. In the responsibility for fare allocation, nine cities indicated it was the PTA and seven the operator was responsible.

Financing

The survey results showed that the PTA made the initial investments in RTPI in fifteen cities. When it was a case that the lead-time to implementation was on average one year where as when it was the operator the lead-time was two years.

The results from the implementation of electronic ticketing showed that when the PTA was responsible it had an average lead-time of three years, and when the operator in controls it was four. The ongoing financing of the systems from the responding cities as displayed in Table 4.

Regulatory Regime	RTPI	Electronic Ticketing
PTA	12	10
Government Body	3	2
Operator	4	6
PTA/Government	3	-
PTA/operator	-	1

Table 4 Financing of ITS applications

Maintenance

With regard to the Maintenance of ITS applications the responsibility for their up keep from the results are evenly divided between the PTA's/local government and the operators. No pattern emerged between the different applications RTPI and electronic ticketing.

EMERGING BEST PRACTICE

Following the DoT policy (of introducing controlled competition in a multi-modal, multi-operator market) and the criteria established in the survey for the provision of ITS (low lead time, integrated source covering both modes and operators), Copenhagen would seem to provide one of the best European examples.

In Copenhagen, the Hovedstadens Udviklingsråd (HUR) is the PTA with responsibility for transportation and regional planning and the regulation of the public transport market. The HUR introduced controlled competition in 1990 and by 1995 45% of the bus market was franchised and the remaining 55% was completed by 2002(8). The HUR tenders franchises for bus services to the private sector, but these buses operate under the same livery, and the HUR provides a central source of passenger information. Under its role, the HUR provides RTPI to passengers on its bus routes that is integrated between operators and modes. This system took a year to plan and implement and the HUR is solely responsible for its planning, ownership, financing, integration and maintenance.

The HUR also has the same responsibilities when it comes to electronic ticketing. At present it uses magnetic strip card validation. The HUR has out sourced the allocation of revenues to a private sector company; which provides an impartial allocation of the bus revenues. This system too is integrated between modes and operators. The main factors for choosing the HUR as the optimal model for the DTA to follow is due to the similarity of market structures, and the success the HUR experienced with regard to lead-time and integration of their ITS applications.

From the other cities examined The Hague and Manchester are also steering towards the model of central provision of information. The Hague like Dublin is in the process of introducing also introduce controlled competition (9). The PTA for The Hague, Personenvervoer N.V. (HTM) will be responsible for introducing this new market structure. Under its role as PTA it will be responsible for the introduction of controlled competition, it will also be responsible for the provision of ITS applications. Its RTPI system has been in place since 2002, and the HTM integrates this system by mode and operator.

In Manchester since the British government completely deregulated the bus market outside London, there are over 50 operators in Manchester, that can freely enter and exit the market, with the Greater Manchester Public Transport Executive (GMPTE) tendering contracts for the less profitable socially required routes. Within this deregulated market the GMPTE integrates RTPI and electronic ticketing and liaises with the different operators to ensure cohesion and integration of these services.

From the examples examined where there was a strong PTA at a city level as in Copenhagen, Barcelona, Geneva, Gothenburg, Hamburg, Helsinki, Prague, The Hague, Trondheim and Turin have all achieved integration of their ITS applications between mode and operator.

CONCLUSIONS

Dublin has experienced large lead times with regard to the implementation of ITS applications. Although there has been an electronic ticketing system using magnetic strip cards in place for over a decade it is only integrated between mode and not operator. The

current RTPI systems are not integrated between either mode or operator. In Dublin there are plans to introduce integrated ticketing via contact-less smart cards and to roll out RTPI. Integrated ticketing has been much talked about in Dublin with the first recommendations to introduce in the Dublin Transportation Initiative in 1995 (9). However, nothing has yet materialised, and introduction of this system is now expected in 2004 (10). This is a nine-year lead-time. Bus RTPI had a lower lead-time of a year, however three years later the system is still only at 16 stops and is still in the pilot stages of introduction (11).

With consideration of both the goals of public transport in the Dublin and the need to have a successfully integrated ITS infrastructure to facilitate its integration. This paper concludes with the following recommendations for the responsibility of ITS applications, in the Dublin.

- From the results when ITS applications are procured and managed from a central source such as a PTA they have a lower implementation time and increased integration between mode and operator.
- In order for the ITS infrastructure to be able to meet the needs of a multi-modal, multi-operator market place a coordinated approach needs to be in place, to avoid situation in Figure 1.
- From the survey responses ITS applications had the lowest lead-time and the most effective integration was where a PTA had responsibility.
- To this extent as seen above the lead times for the implementation of ITS projects in Dublin is much longer than the average (see Table 1) where a PTA was responsible. Therefore as seen in the survey results a single planning and implementation process needs to be in place.
- Due to the anticipated length of operational contracts (3-5 years) (2) there needs to be an approach independent of operator, due to the cost of ITS provision. The operator could then use these services with remuneration to the DTA stipulated in the operational contract.
- If the DTA should be given sole responsibility for sole information provided, it should be given the responsibility of the RTPI programme, enabling it to provide information to passengers irrespective of operator.
- As the DTA will regulate the market it should also be given the responsibility for the allocation of fares, from the smart card integrated ticketing project, as under this central provision model it will have responsibility for ITS provision.

ACKOWLEGMENT

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APPENDIX A

Intelligent Transport Systems (ITS) Survey

The Transport Study and Research Group (TSRG) Trinity College Dublin is completing the following survey, for a project focusing on the evaluation of Real Time Passenger Information (RTPI)/Automatic Vehicle Location (AVL) in Dublin. This research is being carried out with funding from the Irish Department of Transport.

Please fill in the following fields:

City _____ Organisation _____

1. How would you define the governing of Public Transport in your City?

State Run	☐	Local Government Level	☐
State / Private Run	☐	Private Sector Companies	☐
Public Transport Authority/Regulator		Other	_____

2. In your city which of the following bodies has responsibility for the following ITS systems:

	RTPI/AVL	Electronic Ticketing
Planning		
Public Transport Authority	☐	☐
Government Body	☐	☐
Public Transport Operator	☐	☐
Ownership		
Public Transport Authority	☐	☐
Government Body	☐	☐
Public Transport Operator	☐	☐
Integration		
Public Transport Authority	☐	☐
Government Body	☐	☐
Public Transport Operator	☐	☐
Financing		
Public Transport Authority	☐	☐
Government Body	☐	☐
Public Transport Operator	☐	☐
Maintenance		
Public Transport Authority	☐	☐
Government Body	☐	☐
Public Transport Operator	☐	☐

4. Are these ITS applications integrated between

Mode Yes ☐ No ☐
Operator Yes ☐ No ☐

5. How long has the implementation process taken for the following systems planning to implementation?

	Planning	Year Introduced
RTPI/AVL	_____	_____
Electronic Ticketing	_____	_____

8. Which modes does this RTPI system cover?

Bus ☐
Rail ☐
Bus/Rail ☐

9. What percentage of each mode stops is equipped with a RTPI passenger displays?

_____ Bus	_____ Light Rail
_____ Heavy Rail	_____ Metro

12. Is the information provided by the passenger information displays, integrated between modes?

Yes ☐ No ☐

13. If your system includes a Bus RTPI system does it have any of the following?

Automatic Passenger Counting ☐
Computer Aided Dispatch ☐
Bus Signal Priority ☐

14. In your organisations opinion who benefits he most from the provision of your RTPI/AVL system?

Passenger ☐
Public Transport Operator ☐
State/Public Transport Authority ☐

15. Does the public transport operator have to pay/lease for the use of the RTPI/AVL system

Yes ☐ No ☐

16. Who made the initial investment in the RTPI/AVL system?

Public Transport Authority/State ☐

Public Transport Operator ☐

Other please specify _____

19. Which of the following ticketing mediums does your system operate under?

Magnetic Strip Card ☐

Smart Card ☐

Paper ☐

20. If integration exists between modes and operator which following has responsibility for the distribution of revenues?

Public Transport Authority ☐

Government Body ☐

Public Transport Operator ☐

Thank you for taking the time to fill out our survey. All responses should be saved and sent to Brian Caulfield (TSRG).

APPENDIX B

City	Organisation	Regulatory System
Aberdeen (UK)	Aberdeen City Council	Local Government
Athens (EL)	Athens Urban Transport Organisation	State Run
Barcelona (E)	Transport Authority of Barcelona	PTA
Basle (CH)	BVB Basler Verkehrs-Betriebe	Local Government
Brighton (UK)	Brighton – Hove City Council	State/Local Government
Cardiff (UK)	Cardiff Bus	State/Local Government
Copenhagen (DK)	HUR – Hovedstadens Udviklingsråd	PTA
Edinburgh (UK)	Edinburgh City Council	Local Government
Freiburg (D)	Breisgau-S-Bahn	PTA
Geneva (CH)	Transports publics genevais (TPG)	PTA
Göteborg (S)	Göteborgs Stad Trafikkontoret	PTA
Groningen (NL)	RuG	State/Private Sector
Hamburg (D)	Hamburger Hochbahn AG	PTA
Helsinki (FIN)	Helsinki City Transport (HKL)	PTA
London (UK)	London Buses	PTA
Manchester (UK)	GMPTE	PTA
Prague (CZ)	Dopravni Podnik - DP Praha	PTA
Stockholm (S)	Swerco	Local Government
Swansea (UK)	Swansea City and County Council	State/Private sector
Tampere (FIN)	Tampereen kaupungin liikennelaitos	PTA
The Hague (NL)	HTM Personenvervoer N.V.	PTA
Trondheim (N)	SINTEF	PTA
Turin (I)	ATM Torino	PTA
Utrecht (NL)	Openbaar Vervoer Reisinformatie B.V.	State/Private sector

Table 5 Respondent Cities