

5 BUSINESS SYSTEMS

5.1 INTRODUCTION

A business system is essentially the back office operation that allows the efficient operation of the business. In this context we will be looking primarily at the running of congestion charging schemes however the principles are standard whatever business is being considered and whether it is private or public sector.

5.2 WHAT IS THE IMPORTANCE OF THE THEME

5.2.1 What is a business system?

Running a transport solution is no different to running any other type of business. Essentially we are dealing with customers, their records, some form of transaction, banking, web and telephone based interfaces, accounts, reconciliation and finally reporting on the performance of the business.

The way that these processes are glued together is effectively the business system and it would normally be expected that this would be fully automated with minimal manual intervention. The system would also be expected to provide all the necessary reporting information as well as providing a platform for dealing with customer care.

Attached to the core business system would be a number of other modules that would deal with the likes of web and phone interfaces, the front end technology such as automatic number plate reading cameras and tag readers, banking and merchant acquirer interfaces enforcement agencies and debt recovery.

5.2.2 How important is it to decision makers?

Decision makers need to be aware that the introduction of a new congestion charging or road pricing scheme is a very similar to the process of starting up a new business or company. The key is to look at the business model and to understand the key cost drivers and appreciation of the target customers.

Historically transport practitioners have tended to focus on front end applications when considering transport systems be it traffic signals, automatic number plate reading cameras, real time information systems and the like. Less attention has been paid to the back office applications which in the past have led to inefficiencies and interoperability problems. It has also often led to the development of bespoke software with the inherent problems associated with maintaining and upgrading the platforms and the loss of competition and cost efficiencies.

There is much to be learnt from best practice within private sector businesses. The supplier market is far bigger and more advanced and standard applications bring competitive advantages for the development and maintenance of business systems. By following this example significant benefits can be derived within transport applications and in particular for cities considering congestion charging schemes.

One of the barriers to implementing congestion charging is the cost of operation of such a system. If it is seen to be too expensive to operate there may be insufficient support to go through with the implementation. Similarly political decisions can be made without considering the impacts on the business and as a result it can have a detrimental effect on the efficiency of the operation.

System performance is also crucial to public acceptance and key stakeholders also need to be convinced that it will work flawlessly and there won't be any failures particularly in the early days of operation. This however needs to be balanced against the costs of providing high

service levels. One way of ensuring that cost and reliability are met is by using proven solutions widely used in the market place.

From a management perspective the key activity is the reporting on business performance. The most effective way to do this is to have a fully automated reporting process which presents key information to the managers to allow them to optimise the business offering. This does of course require all the business information to be available on a single platform.

The other key area is customer care and this is an area where poor performance can result in customer and stakeholder dissatisfaction and loss of confidence in the product. In order to deal with a customer complaint effectively it is necessary to be able to interrogate the business system to find the customer records from the beginning to the end of the process.

With the wealth of experience in running businesses world wide there are a number of standard enterprise solutions for transport applications which will require little in the way of customisation. The design does however need to be based around the business system in the first instance rather than the traditional way of looking at front end technology first. The client also needs to ensure that it has a sufficient expertise available when carrying out the procurement and implementation of the business system. The time, effort and cost of developing and introducing a system, particularly from scratch, should not be underestimated.

5.3 WHAT DO WE ALREADY KNOW ABOUT THE THEME

5.3.1 What does Business Systems cover?

The Business System is made up of a number of component parts. At the centre is the core application which essentially stores and processes all the information. Feeding into and out of this are all the ancillary systems needed to run the business. For a congestion charging scheme the technology for detecting and checking vehicles will be a key component. Whatever roadside technology is used is immaterial providing the required information can be passed to and from the central processing system. Other external systems will be very similar to other business requirements and will include banking, call centres, web interface and automated telephony, retails outlets, debt collection and the like. An example of the schematic used in the Development of the Edinburgh solution is shown below.

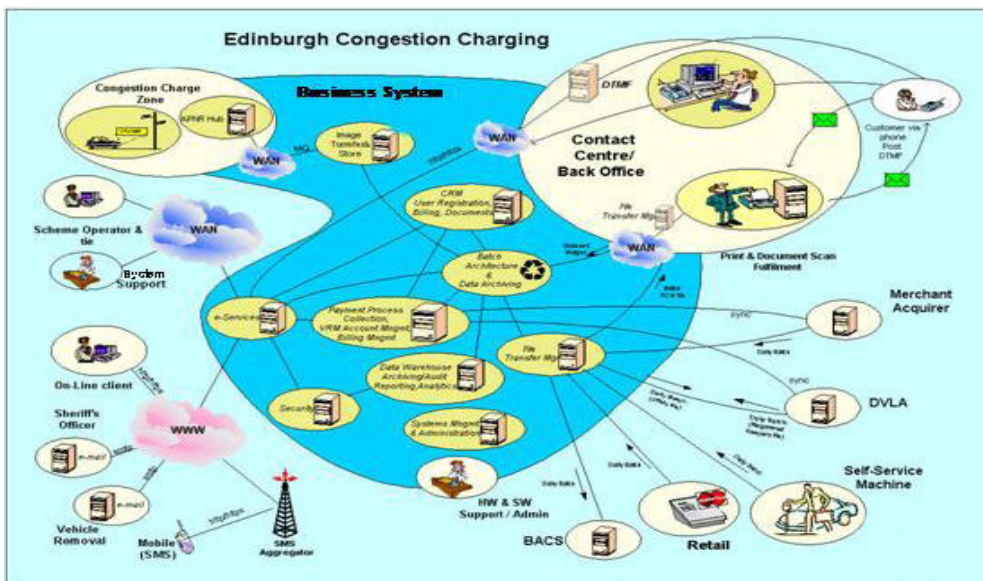


Figure 5-1: Business Model for Edinburgh Congestion Charging
Source: McCleod and Healey(2006)

5.3.2 What are the important requirements for a business system?

The diagram above gives a schematic view of the overall system but when considering the system design there are three distinct areas that should be considered. These are Financial Process Management, Operational Design and System Integration and each is described in more detail below.

Financial Process Management

The heart of any business system is the financial processes needed to cover the statutory obligations of the operation and have the ability to cover future financial processing, accounting, and reporting needs. For a public sector operation there is normally a requirement for complete financial transparency throughout these processes which should be fully auditable, and provide a suite of financial reporting capabilities for both Management and Statutory requirements.

The issue of potential fraud goes hand-in-hand with perceived trust from users and stakeholders alike. As such the system design, the technology middleware, and the back office finance processes and operation needed to be designed with this as a key requirement. The supporting technology should be demonstrably secure with full capability for future statutory and security requirements to be incorporated as they develop.

The best way to cover these requirements is to automate as much of the financial suite of processes as is practicable, and to sufficient levels of detail. Modern Enterprise solutions can provide full automated financial reconciliation down to individual transactions with full system audit capability. Such automation also reduces the possibility of fraud from within the operation.

The key element of such financial areas are:

- Accounts Payable. The ability to raise and authorise orders, and subsequently receive goods and services and authorise and settle payments for them, This can all be done through highly automated workflow constructs that can optimise operational structures and arrangements.
- Accounts Receivable. The ability to receive payments for goods and services, including refund capability.
- General Ledger. Consolidation of all financial transactions and movements that provides the basis for reporting and audit.

Consideration can also be given to optional functionality, namely;

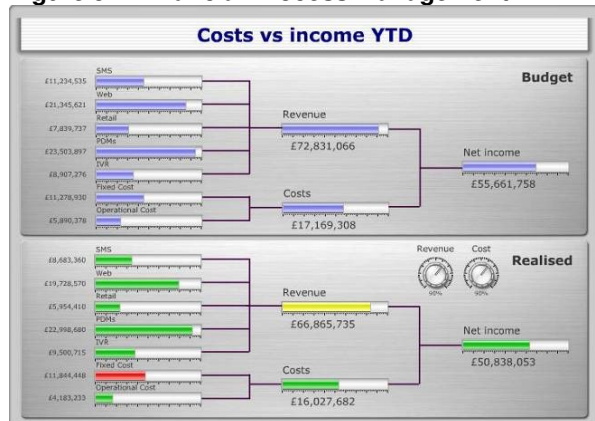
- Banking and treasury services providing liquidity for the operation
- Asset Management. Full accounting control over assets that should be controlled through this scheme (back office equipment, offices, POST equipment, etc), including full support for a range of depreciation models.
- Project Accounting. The ability to cover the accounting requirements for future projects that aim to build on and develop the scheme. Projects such as further deployment to cover other transport areas, marketing campaigns, and business efficiency projects can all be covered using this functionality

The financial construct, from its basis at the Chart of Accounts structure, will determine operational efficiency and the ability to report across and out with the organisation.

Near real time reporting capabilities on financial metrics can form the basis of management reporting and allow the operation to be controlled and managed effectively.

The solution may also need to accept payments (and refunds) in other currencies. All of this should be possible through the solution.

Figure 5-2 Financial Process Management



Source: McCleod and Healey(2006)

Operational Design

The roadside infrastructure to support congestion charging has been evolving over the last few years and this is discussed elsewhere in this document. The key determining factors for successful delivery are strategic intent and organisational arrangements. Much attention is placed on the legislative requirements of a congestion charging scheme but equally important is the design of the Business System. This should start as early as possible and feed in to the overall development of the scheme.

The vast amount of information that will be generated by a congestion charging scheme needs to be analysed and exploited to allow the scheme to be effectively managed, provide stakeholders with valuable operational information, and possibly provide real added value to citizens and other organisations. Information Management is a key design principle in all business systems and the ability to consider the wider uses of the information available should be fully explored.

“Regardless of the state of your company and its immediate issues...you can only manage what you know. Moreover, you only know what the information tells you. Anything else is guessing.”

Jim Davidson, President, iWheels Logistics

Offering users multiple channels to pay, register query, complain, and eventually buy additional services will increase take-up of services and the user’s perception of the scheme. As such, design consideration of a wide range of channels for immediate and future use should offer such possibilities. eGovernment principles should be applied and the solution should be eBusiness ready.

By considering the operational model as a whole and developing a comprehensive approach to it, operational processes can be readily supported through the delivered solution which will enable the consolidated Information Management approach mentioned earlier. Some of the operational processes which should be integrated are;

- Registration processes
- New, Lost, Changes, Replacements, etc
- Handle queries, challenges, or complaints, including the full escalation process
- Channel management
- Customer Relationship Management
- Information Management

Delivering a full set of integrated tools to manage the entire spectrum of citizen interaction in an intelligent way (full case history, easy access account information, routing and learning

from enquiries and complaints, etc) will ensure that that a proactive approach is taken and that the operation dynamically learns from each interaction.

Information Management in the arena of channel management (future ability to access the system through various sources) is an essential requirement and should be built in to the solution from the start, even if it will not be fully utilised at first. By understanding citizens use behaviours, areas requiring attention can be identified and addressed.

The delivery business solutions that meet these needs in a world class operation would cover;

- The provision of timely, accurate, and intelligent information to support decision making (including web based portals, management dashboards, balanced scorecard reporting, etc)
- Workflow based processes with escalation capabilities
- Optimised for e-Business
- Easy addition of channels
- Full support for multiple currencies
- Intelligent Interactive Voice Recognition (IVR) solutions
- Predictive tools for determining trends, behaviours, etc
- A 'paperless office' design principle that could maximise document management techniques
- Statistical Process Control (SPC) techniques should be integrated into the solution to directly support continuous improvement
- Process exception control
- Dynamic performance reporting covering all areas of operation and system performance
- Customer service metrics
- Consistent data gathering and storage also provides a solid base for forecasting
- Reporting through SLAs, Key Performance Indicators (KPIs), etc
- Standardise the user experience

Such an approach, coupled with the possibilities afforded through System Integration open the potential to offer shared service arrangements for scheme development and service offerings to other authorities.

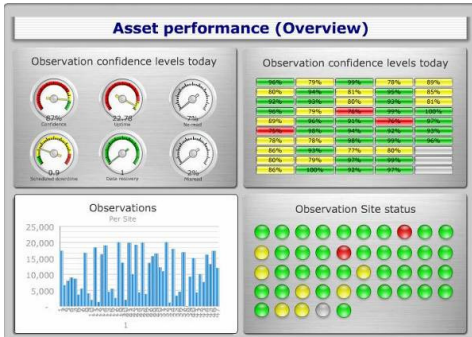


Figure 5-3 Monitoring Asset Performance
Source: McCleod and Healey(2006)

Figure 5-4 Call Centre Operations

Source: McCleod and Healey(2006)

System Integration

It is not uncommon on large scale projects for elements of system design and build to be provided by different suppliers. This presents technical challenges and requires the use of an experienced systems integrator to oversee the process. This can be carried out in house or be outsourced but the key is to ensure that the business system has scalability and flexibility built in as core design principles.

It is important to consider independence of hardware architecture so that front end technologies are independent of back office technologies and the technology base is independent of the subsequent operation. Modular design avoids big bang replacement and allows future technological advances to be incorporated with ease. Modules can be added on demand, new workflows and processes can be introduced without extensive redevelopment and open interfaces reduce dependency on single suppliers. Properly integrated, this approach results in highly flexible and scalable systems, which can rapidly be expanded to support future initiatives. Developing transaction level accounting systems with charging and disbursement, data warehouse and customer relationship management is all part of an integrated end-to-end solution.

5.3.3 How do you design and procure a business system?

Architecture is the most important factor in ensuring a quality integrated solution and ensuring that the solution meets the needs and requirements of the operation. The approach to integrated architecture development should be based upon best practice.

The first step in this approach is business process analysis where exhaustive scenarios are identified, prioritised and modelled. At this point the manner in which the integrated systems will support the business processes can be defined as can performance and capacity requirements.

The next step is to develop the architecture itself. The following design issues need to be considered:

- Identify each integration component
- Identify communications between components
- Identify user interaction with each component
- Propose a network topology and communications infrastructure
- Establish availability, fault tolerance, and load balancing requirements
- Incorporate security requirements
- Identify common services (e.g. process initialisation, audit, logging, error and exception handling etc.) so that these services can be consistent across the solution.
- Define operational monitoring and support
- Define test strategy and test cases to include volume and resilience testing

Selecting a highly reliable, flexible and scalable integration platform is key to achieving success. Effective integration requires the formulation of an integration strategy and the establishment of an organisational and technical infrastructure to support that strategy.

It is important that the skill sets for the managing the business system design is available in house before the procurement process is begun. There are a number of procurement routes that can be adopted ranging from a single turnkey contractor providing the design, integration, supply and operation of the system through to having separate commissions for each of the individual elements. Much will depend on the organisation of the body promoting the congestion charging scheme and timetable for implementation. It is recommended that a procurement strategy identifying the opportunities and risks associated with each route be developed early on in the process. This will allow the various routes to be evaluated and the best to be selected.

5.3.4 Deriving best value from a business system.

There are a number of key considerations when looking at delivering best value, outlined as follows;

- Develop an effective procurement strategy at the outset. The objective here is to ensure that competition is used to obtain the lowest whole life costing while providing the most robust and technically proven solution – this will almost certainly not be the cheapest solution on the table in terms of initial CAPEX investment. Experienced business system specialists should form the central role in the team. Key elements not to forget are;
 - Consider the complete scope of the operation, including financial management and reporting, HR, facilities, payment channels, partnerships, projects, etc
 - Adequately address the ongoing support and maintenance of the solution – this is linked with the next key consideration
 - Consider how the operation may develop, both core operations and future possibilities, and account for this in the specification. Flexibility and scalability considerations, both upward and downward should be undertaken.
 - Make sure the technology roadmap for the solution is understood and secure – this again is related to the next key consideration
- Specify industry standard (not just sector or function specific) packages rather than bespoke software solutions. This will provide benefit by ensuring that ongoing support and maintenance as well as future upgrades can be carried out at a competitive rate.
- Develop best practice business processes that address and streamline all operational scenarios. This should be complete before system architecture is defined and developed.
- Enshrine process automation in the solution to remove costly overheads. Such automation, coupled with statistical process control can remove the majority of manual intervention in the operation.
- Develop an optimised Operational Model. This needs to consider the most cost effective structures and governance models to run the business and the procurement implications for renewing operator, hosting, and support contracts.

5.4 CASE STUDIES.

The relevant case studies for business systems are London Stockholm and Edinburgh. Further information on the business systems developed in these cities can be found in Work Package 3; Learning from Case Studies.

As London was the first scheme in the UK, it was required to be fail safe and there was a time imperative in terms of establishing the system. A single turnkey contractor was employed to supply and operate the full system. It has received criticism for being too expensive however this is now being addressed as part of a re-tendering process.

Edinburgh was able to learn from London's experience and developed a lower cost solution to full prototype stage however this was never implemented due to the negative referendum result.

Stockholm introduced a trial scheme in the first instance and followed London's lead in using a turnkey contractor. Similar criticisms have been made on the cost of the scheme however now that it has been made permanent there is a recognition that costs have to be reduced. A complication in the Stockholm scheme is that the charge is classified as a Tax and therefore there is greater government involvement than there would be in a stand alone scheme.

5.5 WHAT ARE THE POLICY IMPLICATIONS AND IMPLICATIONS FOR OTHER THEMES

The implications for other themes are:

- **Objectives:** The design of the business system needs to be able to facilitate the scheme objectives.
- **Scheme Design:** Consideration needs to be given to providing the most cost effective solution. It is important that the scheme design works in parallel with the business system design to ensure that there are no conflicts. Some important areas that need to be considered are exemptions and management of fleet users.
- **Technology:** Provided the communication links are clearly defined the business system should be able to operate with any front end technology. What will be important however is to maximise the efficiency of the end to end process and being able to derive the lowest cost of operation.
- **Appraisal:** Provided the concept for a business system is developed early on in the process it will be a key tool for appraising the affordability and efficiency of different options. Going forward into operation it will provide the necessary information for evaluation and monitoring of the performance of the system allowing adjustments to be made to improve the efficiency of the scheme.
- **Economy:** The business system may be able to provide useful information in determining the wider economic impacts of the scheme. Moving forward into operation it should also be configured to provide the necessary reporting for monitoring and evaluation.
- **Equity:** The information collected by the business system can be used to inform policy makers on equity issues such as who are the winners and losers and where the benefits are being accrued.
- **Acceptability:** One of the barriers to implementing congestion charging systems is the cost of operation. In developing a sound business system it can be demonstrated what the whole life costings are likely to be. When the system becomes operational there will be an expectation for a high level of customer care and accuracy of the technical elements. These expectations need to be balanced against the cost of operation
- **Transferability:** The business system design concept can be transferred to other congestion charging schemes and to other transport applications. It will also be possible to provide some level of benchmarking between different operating systems. This will assist in the development of more efficient operations.

5.6 WHAT ARE THE RESEARCH GAPS

The development of business systems is fairly mature and is generally led by private sector operators. There does however require to be a dialogue established between the promoters of congestion charging schemes and system providers and suppliers both to understand what opportunities exist but more importantly to ensure that market competition is developed bringing with it cost efficiencies. Having established a business system this can easily be expanded to incorporate other transport solutions bringing additional cost efficiencies to the organisation. Typical applications could include parking, real time information systems, traffic control and public transport ticketing

As more schemes are being developed there may be a case for a standard business system solution which can be used off the shelf by the authority. The advantages are that it would reduce scheme development time, provide a robust and proven solution as well as providing cost certainty. The disadvantages are that there would be issues with ownership, upgrades and future proofing of the solution as well as concerns about ensuring competition in the market place.

One solution might be that larger cities or regional government invest in the fundamental platform to stimulate change making available a shared service to smaller authorities who could not afford such a comprehensive approach. Ownership and operation would be retained by the smaller authority but it would give them access to a higher quality service than they might be able to achieve on their own at lower cost and it would remove the technology risk for them going forward. It could also act as the stimulus that central government need for the adoption and progression of such schemes – not to mention realising efficiencies so cost can be driven out of associated activities in the transport management sphere. This political and administrative issue surrounding this type of shared solution is an area worthy of further investigation.