“Emerging Trends in European Public Transport – Intermodalism: Facilitating Modal Transfers”

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Gothenburg and Jönköping, Sweden
Zurich, Lucerne and Zug, Switzerland
London, Birmingham and Hampshire County, Great Britain

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Introduction

This two week study mission involved visits and discussions with government officials and transportation providers in the following cities and countries: Gothenburg and Jönköping, Sweden; Zurich, Lucerne and Zug, Switzerland; London, Birmingham and Hampshire County, Great Britain. The purpose of this mission was to review emerging policy and technology initiatives designed to expand the use of public transport in these communities.

This paper explores the topic of modal integration or inter-modal connectivity. The ways in which the cities make their services easier to use will be examined relative to system infrastructure, information systems, timetables, schedules, ticketing and system maps. Since the policy environment in a particular region can impact the provision of public transport, the relationship between public policies and modal integration is also reviewed.

Background

Intermodal connectivity has been a subject of considerable interest within the transit community for many years. While improving inter-modal connectivity is a stated objective of every agency we visited, the overall policy and operational framework for achieving this objective varies widely from one location to the other. Some agencies manage their regional operations as entirely owned government enterprises with little outsourcing and no competition while others have introduced competitive bidding for routes. With the exception of London, Great Britain has entirely de-regulated the provision of public transport services.

In the end, the policy framework (deregulation vs. regulation, public service vs. private service) has some bearing on the success of intermodal connectivity, but it is not the sole determining factor. What is very clear from our mission is that the most successful communities at improving modal connections were those that take a holistic approach to traffic management as well as a reasoned and rational perspective on the different modes of transport.
Lessons Learned

Sweden

In 1988, the Swedish Government transferred responsibility for public transport to the regional governments. This act and subsequent legislation geared towards increasing competition for public transport services has led to fundamental changes throughout the country. Public organizations that previously maintained monopolies over service planning and delivery were mandated to publicly tender for routes and services. This has had a profound impact on intermodalism and led to innovative and unique approaches for managing regional public transport services.

The city of Gothenburg, Sweden is home to almost 500,000 inhabitants and is considered a crucible for practical public transit innovation and development in the areas of real-time information and traffic management systems over the last three decades. Designed in the 17th century by Dutch architects, Gothenburg is reminiscent of Amsterdam with its network of streets separated by canals. It has more green space (public parks) than any city in Sweden and its commitment to preserving its vitality and livability keeps it on the cutting edge of public transport innovation.

Gothenburg and the surrounding area is serviced by an extensive light rail (or tramway), bus, ferry, national rail and regional rail network. The organization responsible for planning and managing the region’s public transport assets is known as Västrafik. At the heart of the local transportation network is the light rail system. This consists of nine routes and more than 100 miles of dual track right-of-way. Together, the bus and LRV system provide more than 85 million trips per year with a fare recovery rate of 55 percent. In June, the city decided to purchase 40 new Sirio low floor light rail vehicles from AnsaldoBreda of Italy to augment their existing fleet of 205 LRVs and meet the needs of ongoing system expansion efforts.

Gothenburg has been on the forefront of public transport innovation for decades. In 1970, Gothenburg introduced a unique traffic restraint system that has helped maintain the number of cars entering the city at a constant level since that year. In 1980, the city initiated a signal prioritization program on shared bus/LRV corridors that dramatically improved commercial speeds for both modes.

An exceptional example of transport service integration can be found in the southern Gothenburg neighborhood of Frölunda Torg. Frölunda Torg is a place where people from all walks of life come together to shop, eat and make quick and easy connections to anywhere in the Greater Gothenburg area. The station is fully integrated into a major mall and shopping area. A total of thirteen bus lines converge into the light rail station every fifteen minutes so that quick and easy connections can be made from one route to another.

The “Star” system as it is called is not a completely novel concept (hub-and-spoke concepts are utilized in many cities), but it is applied at many terminus stations on the
outskirts of the city with a high rate of success. It is also a guiding principle at many commuter rail stations. As the excerpt from the system map below displays, the numbers of each feeder bus is noted at each LRV station.

Figure 1: Gothenburg’s system map is easy to read and highlights feeder bus service to the LRT system.

The Frölunda Torg station has an extensive park and ride lot as well as a substantial number of bike spaces to accommodate a healthy and active community. The station also serves as an end terminus for the city’s innovative FLEXLINE service. The FLEXLINE service is a highly successful minibus service for elderly and mobility challenged customers. It utilizes accessible minibuses and advanced Information and Communication Technology (ICT).

The FLEXLINE service was initiated on a trial basis in the Gothenburg neighborhood of Högsbo in March, 1996. The idea originated from the need to reduce costs for Special Transport Services for the elderly and mobility challenged which are provided via taxi service. It is a mix between fixed service line and demand responsive system. The service is fully flexible within established end-points. Rides are booked in advance through a computer that determines the best routes and approximate travel times. This service has proved to be highly successful and is preferred by 2 out of 3 eligible users in the service area over the taxi service.

The entire network of public transport in Gothenburg is controlled by a unique traffic management and information system which oversees the buses and LRVs. The brain of
the network is the KomFram traffic management system. Using screens and loudspeakers at bus and LRV stops, drivers and passengers are provided with up-to-date information on timetables, waiting times and any service disruptions. KomFram not only governs and prioritizes public transport systems, it also eases access for emergency vehicles.

Figure 2: Gothenburg’s KomFram traffic management system not only governs and prioritizes traffic management but also forms the basis for the system’s real-time information system which give customers control over their travel decisions.
In 1995, KomFram went on-line with its real-time information system allowing public transport customers to access actual arrival and departure times from all stops on the rail and bus network. An example of the real-time screen is found below:

![Real-time screen example](image)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Line</th>
<th>Direction</th>
<th>Next Departure In</th>
<th>Subsequent Departure In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tram</td>
<td>1</td>
<td>Frölunda</td>
<td>2 minutes</td>
<td>6 minutes</td>
</tr>
<tr>
<td>Bus</td>
<td>3</td>
<td>Marklandsgatan</td>
<td>1 minute</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Bus</td>
<td>58</td>
<td>Brottkärr</td>
<td>12 minutes</td>
<td>24 minutes</td>
</tr>
</tbody>
</table>

*Figure 3: Checking arrivals and departures for your stop is easy with the KomFram on-line features.*

Many new and intriguing developments in public transport real-time information systems have been tested and implemented based on research conducted by GOTIC, the Gothenburg Traffic Information Center. GOTIC is a “think-tank” where research and practical tests in the field of public transport information systems are carried out between university researchers, operating companies and private industry.

GOTIC has conducted real-time information trials on a wide range of issues and technologies, including the use of mobile phones as a source of traffic information, improving real-time information at major transfer points, and; on communicating information during network disturbances. The premise is that a well-informed customer who arrives on a bus looking to transfer to an LRV at a major transfer point has more control over his or her commute. The cooperation that exists within the framework of GOTIC between researchers, practitioners and private industry will ensure that Gothenburg stays on the cutting edge of public transport innovation and development for years to come.
Figures 4 & 5: In Gothenburg, transferring from buses or bikes to rail is easy.

The city of Jönköping, Sweden is located in the Southern part of Sweden on the picturesque shores of Lake Vättern. The region is home to more than 340,000 people. Similar to Gothenburg, the organization responsible for managing the public transport system in the region, Jönköpings Länstrafik AB, was mandated by federal law to contract out for bus services but still maintains strong contractual controls on route planning and service levels.

On June 10th, 1996, the city launched the “Comfort 1996” initiative which dramatically re-shaped the public transport system in the region. It involved the following:

- a modernized bus network based on two main routes (the City buses)
- new low floor articulated buses
- a real-time information system based on GPS technology that provides:
  - the exact position of all City buses
  - real time information to passengers at bus stops
  - signal prioritization at street crossings
- new "links" that shortened the distance between terminals
- new bus stops with modern equipment

The results have been impressive. Today, the farebox recovery ratio is 68% compared to 32% in 1986 and up 13% since 1996. Ridership has increased by 11% since 1996 where
it had been declining by a ...% on an annual basis prior to the launch of the program. In addition, market share for public transport has increased from 19% to 22%.

The “Comfort 1996” program as well as other features of the Jönköping network are particularly crucial in determining intermodal effectiveness. Express and regional buses feed the main rail terminal and there is coordinated scheduling for the first and last daily departures. The fare system is integrated within the county. Schedule adherence has greatly improved due to the implementation of the signal prioritization program or the “Green Wave” as it is known in Jönköping. This means that those passengers wanting to transfer to the national or regional rail system at the main station have more confidence that they will have adequate time to transfer. And, lastly, the architectural layout of the main railway station was designed to ensure close physical proximity between the bus berths and the rail platforms.

Figures 6 & 7: The main rail station in Jönköping was designed to facilitate a quick transfer between the bus and rail systems. Bus passengers receive real-time information on bus arrivals via a GPS based monitoring system.

Cooperation between the local public transport authority and the city has been an important factor in the re-birth of public transport in Jönköping. Public officials
responsible for land-use planning, public transport and traffic operations work closely together and understand the significant inter-relationship between their organizations.
Switzerland

The country of Switzerland has one of the most well integrated public transport networks in the world. The frequency, ease of use and reliability of public transport in Switzerland is second to none. A disproportionate majority of Swiss residents live within a mile of local, regional or national rail transportation. For those that do not, they can take feeder bus service, ferries or other public means to connect to their final destination.

The cooperation that exists between the federal rail carrier, Swiss National Rail (SBB), local public transport agencies and organizations committed to improving mobility within the country is exceptional. The Swiss Pass and Swiss Flexi-Pass are successful examples of this cooperation and demonstrates the lengths that the Swiss go to ensure modal integration.

The Swiss Pass gives unlimited travel on the entire rail; bus and boat network of the Swiss National Travel System, including the trams and buses operated by urban transport systems in 36 cities and towns. It is valid for 4, 8, 15, or 21 days as well as for a period of 1 month. It also entitles holders to discounts on many scenic mountain railways. The Swiss Flexi-Pass allows a customer to freely travel on any of 3 to 9 days of his choice on the whole Swiss National Travel System network, enjoying the same facilities as found with the Swiss Pass. With either of these passes, one can arrive on a flight to Zurich, make a quick rail connection to the city center and connect to a light rail train or bus to your hotel. In the morning, you can travel on the Glacier Express to St. Moritz for lunch and tour the city by bus. All on one ticket! This type of flexibility and ease of use is what makes public transport on the Swiss National System so attractive.

The following section focuses on the cities of Zug, Lucerne and Zurich. For the cities of Zug and Lucerne, a brief overview is provided on two specific projects that are aimed at improving modal connectivity. For Zurich, a more comprehensive review of the complete multi-modal network is examined.

Most, if not all, of the downtown available space within the major cities like Zurich, Lucerne and Basel is already utilized. In recent years, this has led to substantial growth in smaller metropolitan areas. Due to its attractive tax policies, the city of Zug has become a haven for wealthy industrialists and multinational corporations looking for a home in Switzerland. One of the fastest growing cities in Switzerland, Zug and the surrounding area is home to more than 100,000 inhabitants. The population has more than doubled since 1960 and is expected to rise between 25% and 35% by the year 2020. To address growing traffic congestion, the Zug is developing a project called the “Stadtbahn Zug”.

The technology involved in this project is a cross between light rail and regional heavy rail technology that will travel along existing SBB right-of-way. A total of 10 new stations will be constructed that will augment the existing SBB stations which will also be utilized as station stops. The goal is to establish a more frequent regional rail service in the region which will reduce travel times compared to buses and automobiles by 50%.
Out of the 10 new stations, 4 will be fully integrated bus/rail facilities that will provide timed transfers and include extensive park & ride lots. A real-time information system will provide passengers with up-to-the-minute information on departures and connections. Although private operators will provide the feeder bus service, the fare system and schedules will be fully integrated. The system will be complete by 2004.

Figures 8 & 9: The rendering of “Stadtbahn Zug” station (above left) and an existing station on the SBB alignment (above right) demonstrates the close connection between feeder bus and rail services. Rendering and photo courtesy of the city of Zug.

The city of Lucerne is home to the headquarters of Mobility CarSharing Switzerland, the largest cooperative carsharing society in the world. This company offers an alternative to private car ownership with a market focus on short term rentals (less than two days). Mobility’s 45,000 members can book their vehicles on-line or via telephone and pick them up at over 850 locations, including 250 train station. From there, it’s a self-service operation. Cars are equipped with a chip card which allows members to swipe their Mobility membership cards over an electronic strip to open the doors and retrieve the keys that are always located on-board.

The notion of carsharing is not unique to Switzerland. In fact, many communities around the world have some type of carsharing program. What sets Mobility Carsharing Switzerland apart from others is its unique partnerships with public transport organizations throughout the country. The philosophical and practical foundations of
these partnerships are grounded in the belief that carsharing is a bridge to public transportation and in the principle of “Combined Mobility”. Combined Mobility is a belief that long distances should be covered by train or air and short distances by bus, LRV, bicycle and walking. Those journeys that cannot be met by the existing public transport network or efficiently within the existing public transport timetables are covered by Mobility Carsharing. How do these partnerships work from a practical standpoint?

Mobility Carsharing has a unique relationship with the SBB and Daimler Chrysler which is known as RailLink. The idea behind RailLink is very simple: to provide SBB customers with direct and quick access to automobiles when they arrive for business or pleasure at a rail station. As part of this cooperation, Mobility provides central booking, vehicle maintenance, the on-board computer and process-know-how. SBB provides the central stations, their national sales and marketing network as well as parking facilities for the vehicles. Daimler Chrysler provides small vehicles and technology know-how. Enrolling in the program entitles customers to reduced rates for both the vehicles and trains.

Figure 10: A RailLink “Mini” waits for a SBB customer. Bridging the gap between public transport and private automobile use. Photo courtesy of Mobility Carsharing Switzerland.
Mobility even offers links to its partners such as SBB and local public transport providers on their internet site. These partnerships have proven to be mutually beneficial. From Mobility’s standpoint, its revenues have steadily increased in recent years. Prior to becoming Mobility members, individuals used public transport for 63% of their journeys compared to 75% after obtaining membership. This has led directly to an increase in passenger revenues for Mobility’s partners in public transport.

In terms of fare integration, time sequencing between service modes and physical integration at major transfer points, the public transport system of Zurich, Switzerland is first rate. Approximately 1 million people live in the Canton of Zurich, of which 500,000 live in Zurich proper. All public transport providers in the Canton of Zurich are linked together in the Zürcher Verkehrsverbund (ZVV). The underlying service delivery philosophy can be best described as “Networked Mobility”. The ZVV provides a dense route network of LRVs (trams), trolley buses, diesel buses, ferries and regional rail service.

When you arrive at Zurich International Airport, an underground railway station is located inside the airport for passengers traveling to the downtown area. It is very easy to reach and to find because of its convenient location in the central terminal and the
excellent signage. Travel time to downtown Zurich is only 10 minutes and with a service frequency of every 10 minutes, customers are guaranteed a short wait.

Upon arrival at the main railway station in Zurich, you have many options to get to your final destination. A majority of the 13 lines of the ZVV light rail system can be accessed from the main railway station without climbing up or down any steps. The light rail system is serviced by 334 LRVs and accounts for more than 60% of the overall system ridership. 234 buses of both the electric and diesel type service the extensive bus network. The total network has over 300 route miles and 657 stops which means that every citizen in Zurich lives within a quarter mile of a bus or rail station.

The ZVV offers a user-friendly and fully integrated fare structure system that ensures that its customers can ride all types of transport with just one ticket. For frequent commuters who travel during peak periods, there is the “Rainbow Card”. This is a season ticket which allows unlimited trips within established zones. An annual Rainbow Card gives the best discount as one pays the equivalent of 9 months but gets to travel for an entire year. The ZVV offers an array of fare instruments designed to meet the particular needs of just about everyone from tourist to frequent customer. These tickets can be purchased at over 2,000 easy-to-use ticket machines located at stations, Post Offices as well as SBB and regional rail stations throughout Zurich.

In its fare structure brochure, the ZVV provides its customers with clear directions on the ideal fare instrument as well as advice on making connections with the Swiss National System. The ZVV also provides its complete timetable as well as a helpful trip planner on its website.

What are the results of all of this? A jury at the “Expo 2000 Hannover” world fair acknowledged and honored ZVV’s “Modern Mobility Management” as a worldwide exemplary project. The typical ZVV customer takes 470 journeys per year on the public transport system. This is the highest average in Europe and compares favorably to the 150 to 200 journeys that are made by customers on systems in other similar sized systems. On average, each citizen of Zurich uses public transport twice a day. There is an extremely high consensus on public transport in Zurich as evidenced by the fact that not a single referendum on public transport has failed in the Canton since 1973.

These results are directly attributed to the system’s ease-of-use, reliability and overall modal integration. The ZVV even rents free bicycles, skate-boards and other zero emission mobility devices at chosen points throughout the city which brings an added dimension to the term “intermodalism”.

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Figure 12: A Line #11 LRV makes the turn onto Bahnhofstrasse in front of the central railway station in downtown Zurich. The majority of light rail lines in Zurich feed directly to the main railway station enabling quick connections to the airport, intercity trains and regional trains. Photo courtesy of ZVV.
Great Britain

Public transport in Great Britain at the national, regional and local level faces many challenges. In July 1998, the government produced its White Paper for public transport. Along with mandating that all county governments produce a Local Transport Plan, it called for the creation of a Commission for Integrated Transport. Today, this consists of transport users, private sector individuals, local authorities and others who make recommendations for improving the interconnectivity of the public transport system in Great Britain. In a recent report, the Commission determined that nation is “lagging behind Europe in some aspects of integrated transport policy outcomes.”

Within London, the only remaining so-called regulated environment, the London Underground faces significant hurdles with its Public Private Partnership (PPP) which was developed to address deterioration in the facilities and system infrastructure brought on by many years of under-investment. Under the PPP program, three private consortiums would assume maintenance and modernization responsibility for the Underground’s decrepit facilities and infrastructure over a period of 30 years. It has become an enormous political football pitting determined political leaders and parties as well as public institutional bureaucracies against each other. The recently elected Mayor of London, responsible for the integrated Transport for London program, is vehemently opposed to the scheme and has filed injunctions against the London Underground to block the contract awards.

Outside of London, public transport is unregulated for all practical purposes. Local governments have awarded franchises for several public transport investment projects, but monopolies have been eliminated. Today, private operating companies provide public transport services. Consortiums awarded franchises for recently built LRT systems face direct competition along their routes from private bus operators. In simple terms, it is a free-for-all in some localities with private operators competing with each other on high ridership routes. This framework does not necessarily lend itself to effective or efficient modal integration. However, there are a number of positive developments to report and some cause for optimism in the future.

This section will focus on emerging trends in the city of Birmingham, Hampshire County and the capital city of London. The operations of the largest private carrier in Birmingham, Travel West Midland, will be reviewed with special attention given to the recently constructed METRO LRT system. This is followed by a review of the Hampshire County local integrated transit plan. Consideration is also given to the county’s leadership role in founding ROMANSE, an Intelligent Transport Systems model for public transport systems management.

This will be followed by an overview of recent developments in London, including the Mayor’s Transport Strategy as well as Transport for London’s Bus Priority Program. Finally, a brief review will be provided of the effort being made by the Association of

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Train Operating Companies (ATOC) to forge an integrated national rail network out of the 26 private rail carriers.

As indicated above, public transport in **Birmingham, England** is unregulated. One operator, Travel West Midlands (TWM), has emerged as the dominant service provider with an 83% market share. Travel West Midlands (formerly West Midlands PTE) was established as a company on October 26\textsuperscript{th}, 1986, following the 1986 Transport Act and deregulation of bus services. In December 1991, the company was sold to its employees in the form of a 100% Employee Share Ownership Plan (ESOP), the first of its kind in Great Britain. Today, employees hold the majority of shares and this gives the company a strong orientation towards customer service.

TWM carries more than 1 million passengers per day on its 1,800 buses over 450 bus routes. It has placed considerable emphasis on making the entire public transport network as integrated as possible in a challenging unregulated environment. They have done so by forging partnerships with the CENTRO, train operators and other local bus companies to provide integrated ticketing in the West Midlands. CENTRO is the corporate name of the West Midlands Passenger Transport Authority that is responsible for promoting and developing the public transport system. Under the fare scheme, bus drivers can issue bus, rail and tram tickets on-board to passengers.

A key reason for TWM’s dominant position in the Birmingham region is due to its family of Travelcards. In many respects, it was a pioneer in the use of Travelcards. These days, its multi-modal Centrocard and Busmaster are widely used. One can also purchase a Midland METRO Add-On Regional Travelcard which allows unlimited travel on TWM bus lines as well as the recently opened Midland METRO light rail system.

The Midland METRO LRT is a 13-mile system that runs along the former Great Western Railway route from Birmingham Center through West Bromwich ending at Wolverhampton. Opened in May, 1999, it operates 6 minute service during peak periods with a total fleet of 16 low floor LRVs. Travel West Midlands is responsible for operations and maintenance of the system and provides integrated feeder bus service at 9 out of the total of 23 stations. Each feeder bus is prefixed with the letter “M” for easy identification. There are a total of 4 park-and-ride lots and each station has a facility for bicycle storage to encourage car free journeys.
Although there are two extensions currently being planned for the Midland METRO system, there are significant challenges. Aside from the obvious challenges of financing and building a new LRT system, service integration for the next phases could be challenging since the existing franchisee is not certain to be the successful bidder on the extensions.

![Midland METRO LRT system](image)

**Figure 13:** Sixteen (16) Low Floor LRVs provide frequent and accessible service on the newly constructed Midland METRO LRT system.

**Hampshire County, England** is located southeast of London and includes the cities of Winchester, Portsmouth and Southampton and is home to 1.6 million people. It’s proximity to London and Heathrow International Airport as well as its picturesque rolling countryside has made it one of the fastest growing regions in Great Britain. Traffic congestion in the county is growing at an alarming rate with no end in view.

To alleviate traffic congestion, accommodate economic growth and protect the rural quality of life in the county, the Hampshire County Council has developed a comprehensive Local Transport Plan (LTP) as mandated in the government’s White Paper. The LTP identifies public transport strategies covering all modes of transport, linking them together as part of a fully integrated plan. Several initiatives included in the plan are directed at improving the integration between buses, trains, ferries, cyclists, pedestrians and automobiles. These include: improvement to bus and rail interchange facilities to ease the transfer between modes; improvements for cycle and car parking at bus and rail stations; further investment in bus priority corridors; and finally, continued involvement and development in Intelligent Information Systems (ITS) programs.
The Hampshire County Council was a founding member of the ROMANSE Project. This project was launched to pilot Intelligent Transportation Systems (ITS) and to establish a model for transport management across Europe. ROMANSE can provide accurate, timely and accessible information to travelers before and during their journey. In this way, people can make informed choices about their route, time of journey and, most importantly, mode(s) of choice. The system also allows flexibility for people to change their route while travelling to avoid congestion, maximizing the efficiency of the travel network.
The ITS Traffic and Travel Information Center for Hampshire County is located in Winchester. The center is responsible for collecting, collating and disseminating information to local radio, information display units, TRIPlanners, variable message signs and electronic displays at bus stops. The ROMANSE TRIPlanner provides details about journeys by both public and private transport and enables the user to make informed decisions on how to travel. The TRIPlanner module consists of a computer and printer which is housed in a durable casting and installed at railway stations, shopping centers and libraries. Using simple touch screens, the user selects the location of the start of the trip and the final destination and the date. The optimum trip using one or a combination of modes is then calculated and printed, including a second and third choice option.

![TRIPlanner](image)

*Figure 16: TRIPlanners help commuters make informed decisions by providing the best routes and modes for their journeys.*

Improving public transport services by providing accurate and real time information is a key objective of ROMANSE. STOPWATCH is a real time information system that uses a network of electronic message signs to passengers at bus stops. Buses are equipped with AVL technology and in-bus computer units (IBCU). Bus location information is
sent to the ITS Traffic and Information Center which assesses the information vis-a-vis previous journey times and calculates the estimated arrival times of the bus for display at remaining stops.

Another important initiative is the South Hampshire Rapid Transit system which consists of a 10 mile LRT project that will link the towns and key public transport interchange points of Fareham, Gosport and Portsmouth in the southeastern part of the county. The first phase will consist of 16 stops and include a tunnel beneath the Portsmouth Harbor. It will also connect to the regional and national railway stations at Fareham, Portsmouth Harbour, Portsmouth and Southsea.

Integration is not easy to coordinate in an unregulated public transport environment where the competition between operators often works against the needs of the traveler for good connections and ultimately a seamless journey. The Hampshire County Council’s visionary investment decisions on Intelligent Transportation Systems (ITS), park-and-ride facilities, and interchange points is helping to make the best out of a challenging situation.

In contrast to the rest of Great Britain, public transport in London is regulated. Essentially, this means that, although private bus companies are responsible for service delivery within London, they do so under strict contractual controls with respect to performance and service levels. They are granted de facto monopolies for their contracted service which means that none of their competitors can operate along the same routes. London Buses is the organization responsible for setting standards, performance and service levels for contracted private bus operators.

British Rail is no longer a national monopoly. It is a national network but it is operated by 26 different companies with a common logo and, fortunately, offers fairly effective service integration. It is also regulated in a similar manner as London buses with no two competitors competing for the same fixed routes (this was thought to be unwise in a fixed route framework!).

The Association for Train Operating Companies (ATOC) has done an effective job of forging some semblance of integration out of the British Rail network by getting the different operating companies to understand the importance of this from a customer service standpoint. First and foremost, there is uniform marketing for rail service which includes the publication of schedules and maps as well as franchise agreements between the 26 carriers to carry and sell the others’ tickets. ATOC was also instrumental in establishing the National Rail Enquiry Service that assists rail customers with reservations, lost property, connecting services, and during service disruptions.
London Underground is still operated and maintained as a government agency, although changes loom for The Tube as well. In short, the public transport situation in London is a fluid hodgepodge of complicated arrangements that works fairly well but faces serious challenges. It will be the newly formed Transport for London (TfL) that will be responsible for making public transport work for the future of London.

Transport for London (TfL) replaced London Transport as the single body responsible for transport in London in February 2001. It reports to the recently and first elected Mayor for London, Ken Livingstone. TfL faces a daunting and complicated challenge. London is one of the most severely congested cities in Europe. Public subsidies for privatized bus services, which fell in the years immediately proceeding tendering, have increased substantially in recent years. Furthermore, bus service quality and reliability have diminished recently. Presently TfL has responsibility for the following: London Buses; River Services; Croydon TramLink; Docklands Light Rail; Victoria Coach Station, and; the Public Carriage Office (Taxis).

TfL will also assume direct responsibility for the London Underground in 2002, the only part of the existing public transport system which it currently does not control. On October 23rd, 2001, when hundreds of thousands of commuters were stranded due to service delays and disruptions during the p.m. rush hour, the London Evening Standard called rail service: “the worst on record.” Regrettably, major service disruptions and overcrowding are a fact of life on the London Underground these days after years of financial neglect. The Mayor’s transportation staff and the London Underground do not
agree on how to cure what ails The Tube and have spent considerable time in court debating the Underground’s controversial Public Private Partnership program.

It would not be entirely fair to compare the public transport network of London to that of Zurich or Gothenburg. The London public transport network carries almost as many people on a daily basis as live in the entire countries of either Switzerland or Sweden. More than four million bus and three million Underground journeys are made on a daily basis in London. Nonetheless, most observers agree that the current state of public transport in London is considerable cause for concern and may threaten the economic viability of the city if aggressive action is not taken in short order. While London may fall short of being a well integrated public transport network, it has a foundation for this from an infrastructure standpoint and there is cause for optimism in the future.

At major transfer points and stations, it is easy to move between the different modes. Arriving at Waterloo Station on the Eurostar from Brussels, for example, one can make quick connections to national or regional rail service to anywhere in Great Britain or to the London Underground if London is your final destination. The signage is easy to follow and there are plenty of taxis. This is the case for most all major British Rail London terminals like Victoria, Euston, King’s Cross and Paddington Stations.

Figure 18: Major interchange facilities like Stratford station in East London offer quick and easy connections between bus, London Underground and British Rail services. Photo courtesy of Transport for London.
In recent years, express rail service has opened directly to both Heathrow and Gatwick International Airports and these have become attractive alternatives to taxis and private automobiles. The Heathrow and Gatwick Express services depart every fifteen minutes from Paddington Station and Victoria Station respectively.

Another area where London performs very well is with its use of the London TravelCard. This allows unlimited travel within specified zones on the bus and rail network throughout the capital. Whereas the fare structure of the London Underground is user friendly, the structure of bus fares outside of London is very complex. This adds significant dwell times at stops as fares are collected which means more congestion and longer trip times.

The vision for the future of London public transport is broadly outlined in *The Mayor’s Transport Strategy* which was published in July 2001. Improving the integration between the different modes of public transport is a key theme throughout this document. One scheme currently envisioned is known as Cross River Transit. This project will most likely involve light rail transit and will offer more direct connection from several of the major rail interchange terminals on the south side of the River Thames (Elephant & Castle and Waterloo) to those on the north of the river (Euston and King’s Cross).

Average traffic speeds in London are now 10 miles per hour throughout the working day and the average automobile driver spends more than 50 percent of his commute stuck in traffic. In order to alleviate some of the congestion and shift more people to public transportation, the Mayor is also proposing a congestion charging scheme. A final decision on this scheme has not been reached, but it would involve a standard charge of about $8.00 per vehicle per day within Central London. In simple terms, there is a recognition that a mode shift is in order between private automobiles and public transport. The public commentary period on the proposed congestion charging scheme concluded in September 2001 and it faces considerable public and political opposition.

Under the *Mayor’s Transport Strategy*, improving commercial speeds and journey times for London Buses is also a high priority. Since 1993, London has worked diligently on creating dedicated lanes and signal prioritization on heavily traveled bus routes. This has had a highly favorable impact on journey times and, while the number of bus journeys per year has decreased in other metropolitan areas of England since 1985, they have actually increased in London since this time.
The two photos below demonstrate the effectiveness of London’s priority bus corridors in practice. As traffic approaches in the photo on the left, a London bus appears in the background. Using the white maintenance van as a reference point in both photos, it is clear in the photo from the right that the bus has a clear lane and has actually moved swiftly past the congested area in less than one minute.

Figures 19 & 20: Photos courtesy of Transport for London (TfL).
The London inner suburb of Croydon is home to one of the world’s newest light rail systems. The system was built utilizing a design, build, operate and maintain (D-BOM) performance specification that granted a 99-year concession to the successful bidder. The system was built for less than $550 million and opened in the spring of 2000 and carries more than 40,000 passengers per day along its 17.5 route miles which includes many interesting intermodal connections. Bus routes have been reconfigured to eliminate service redundancy and now feed directly into several stations along the LRT line. In addition, the system connects to the London Underground’s District Line as well as the Connex South Central and ThamesLink commuter services. In total, 9 out of the 38 station stops have connection with some other type of rail service.

Figure 21: The Croydon LRT system offers convenient connections to regional rail and bus service.

London benefited immensely from the economic prosperity of the 1990s. Unemployment dropped substantially in Great Britain and optimism returned as the economy diversified from heavy industry and coal to one based on service sectors. London’s rebirth as a major European capital has also placed a considerable burden on its public transport infrastructure. Traffic congestion on the road network and overcrowding as well as poor reliability on the London Underground threatens to choke off continued economic growth. Service quality and rising costs for the London bus system is also a major concern.

However, the problems are known and there is cause for optimism, particularly related to modal integration. Congestion charging and the Cross River Transit project are two
initiatives which may have a positive impact on the modal share for public transport. Major transfer points and stations offer a broad range of public transport options for riders. The Croydon TramLink and express rail service to London’s Heathrow and Gatwick International airports have drawn customers away from taxis and private automobiles. The Travelcard is an attractive form of integrated ticketing which offers customers unlimited travel on public transport within London. The Mayor has staked his political future on improving the public transportation system in London and government stakeholders do have the authority to regulate services. The key challenge will be whether a consensus can be achieved and maintained and this has proven very difficult up to now.
Concluding Observations

Seamless public transport can be best defined as: A user-friendly public transport system that gives well informed customers control over a multitude of safe, reliable and efficient public transportation options. Effective modal integration has some or all of the following characteristics:

- Integrated and Easy-to-Use Ticketing
- Highly Accessible Transfer Facilities (Intermodal Hubs; Physical Integration between Modes)
- Rationalization & Bus Feeder Systems (Timed Transfers)
- Private Vehicle Controls (Congestion Charging)
- Effective, Reliable and Frequent Service
- Prioritization Systems for Public Transport
- Designated Parking Areas for Automobiles and Bicycles at Terminals outside of the CBD
- Effective Passenger Information Systems (Real Time Information Systems)
- Easy-to-Use and Informative System Timetables and Maps

Effective modal integration has many benefits for transit operators and its customers. Zurich and Gothenburg are highly livable cities with tremendous business and social vitality in the downtown areas. Cafes and restaurants in the CBD are places to meet and gather and public transport is the way in which most people get there. In both cities, public transport has a very high share of the modal split and is favorably viewed by most citizens.

Cooperation between government agencies responsible for public transport, traffic, land-use planning and private sector stakeholders is a critical factor in determining the effectiveness of modal integration. This was evident in Jönköping where the city launched the highly successful “Comfort 96” program which has increased public transport patronage and revitalized the downtown area. Bus prioritization programs in London, Jönköping and Birmingham would not have been possible without the cooperation between public transport and city traffic officials. The relationship between the Swiss Federal Railways (SBB) and Mobility Carsharing has shown that partnerships designed to improve coordination between different modes can be mutually beneficial.

The city of Gothenburg and Hampshire County are on the cutting edge of information technology for public transport. The KomFram and ROMANSE systems are designed with the same objective in mind: to give customers control over their travel situation irrespective of mode! It should be noted that while these systems can be important ingredients of a well-integrated public transport system, they are not absolutely essential in determining modal connectivity. Zurich does not use real time information systems and is, nonetheless, an outstanding example of seamless public transport.

In the end, the most effectively integrated public transport systems are those that understand what customers want. Customers want consistency and predictability.
Customers will accept a multi-modal trip to work, social events or the airport provided that the service is highly reliable and the transfers are not overly complicated or time-consuming. To achieve this, public transport providers must have a clear vision, consensus and, finally, the will to make it work.