EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

THEME [SST.2012.3.1-2.]

Collaborative project
Grant agreement no: 314262

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

DELIVERABLE: D2.3

DELIVERABLE TITLE: Lessons from descriptive case studies – recommendations for City-HUB model

DOCUMENT CONTROL SHEET

Project no.:	314262	**Acronym**	City-HUB
Project Title	City-Hub		
Work Package	2	**Title:**	Setting the scene
Deliverable no.:	2.3	**Title:**	Lessons from descriptive case studies – recommendations for City-HUB model
Version	**1**	**Revision**	1
Issue Date	28-June-2013		
Dissemination Level	PU		
Future references			
Author(s)	Petter Christiansen and Jardar Andersen (TOI)		
Co-author(s)	Sara Hernández, Floridea Di Ciommo, Andres Monzon, Nuria Sánchez, Tingting Su, Xavier Sanchez (UPM), Clare Harmer, Katie Millard, Markus Jones (TRL), Eftihia Nathanail, Giannis Adamos, Maria Tsami (CERTH), Juho Kostiainen, Tuuli Järvi, Armi Vilkman (VTT), Imre Keserű, Ádám Pusztai, Dr. Attila Vörös (KTI)		
Responsible Organisation	TOI		
WP Leader	Panteia BV		
Internal Reviewer(s)	UPM and VTT		
Project Officer	Natascia Lai		

City-HUB consortium	
UNIVERSIDAD POLITECNICA DE MADRID (UPM-TRANSyT)	Spain
KTI KOZLEKEDESTUDOMANYI INTEZET NONPROFIT KFT (KTI)	Hungary
TRANSPORTOKONOMISK INSTITUTT (TOI)	Norway
CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS (CERTH)	Greece
PANTEIA BV (NEA)	The Netherlands
TRL LIMITED (TRL)	United Kingdom
TEKNOLOGIAN TUTKIMUSKESKUS VTT (VTT)	Finland
INSTITUT FRANCAIS DES SCIENCES ET TECHNOLOGIES DES TRANSPORTS, DE L'AMENAGEMENT ET DES RESEAUX (IFSTTAR)	France
CENTRUM DOPRAVNIHO VYZKUMU v.v.i. (CDV)	Czech Republic

D2.3 Lessons from descriptive case studies – recommendations for City-HUB model

INDEX

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Description
CCTV	Closed-circuit television
D	Deliverable
TfL	Transport for London
WP	Work Package
UK	United Kingdom

ABSTRACT

Urban interchanges are subject to several analyses initiated by the European Commission due to the growing interest in the development of urban areas, the growing urbanisation trends, population characteristics as well as other socioeconomic targets; among others these could involve reducing car-dependencies, improving quality of life, improving transport system efficiency, developing better business models and other sustainability targets. The importance of well-designed interchanges in achieving these targets is obvious.

In the City-HUB project, a set of pilot case studies have been used to assess good and bad practice and improvement potential. The lessons learnt from these case studies will serve as input to the remaining work in the project. The aim of this document is to present the pilot case studies and describe the main good and bad practices that have been identified in these cases.

The selected pilot case studies are:

- Moncloa, Madrid (Spain)
- Ilford Railway Station, London (United Kingdom)
- Railway Station Thessaloniki (Greece)
- Kamppi, Helsinki (Finland)
- Köbánya-Kispest, Budapest (Hungary)

The discussion of good and bad practices has been organised by the topics *Management and Policy*, *Design and modal integration*, and *Accessibility.*

One key conclusion is that policy and organisation have a major influence on all aspects of interchanges successfulness. This includes finance, operation, maintenance, coordination, design and accessibility.

Several case studies reveal that integration with rail is more complex than integration between other means of public transport. This has at least two facets; first of all, railways are often managed at national level and have long traditions. In contrast, local buses, metro, and tram are often managed by the same local or regional entity. In several countries it appears to be a challenge to fully integrate rail services with bus, metro and tram, as it requires coordination and integration between different stakeholders, who may also have conflicting objectives.

The second particular aspect of interconnection between rail and other means of public transport is the possible difficulties of transferring an existing rail station into a multimodal interchange. Rail buildings are often old buildings, and these are not necessarily easily adapted to "access for all" standards and integration with other modes.

The pilot case studies feed into WP3, which will extract all the information about interchange design and integration of transport modes, while WP 4 will receive inputs for best management practices. The outcome from the pilot case studies will be a first input for defining the City-HUB model in WP 5.

1 Introduction

1.1 Background

Urban public transport represents an alternative to car transport and is as such an important element in the sustainable transport policies of urban policy makers. Interchanges in public transport systems should facilitate seamless travel, and are subject to several analyses initiated by the European Commission due to the growing interest in the development of urban areas, the growing urbanisation trends, population characteristics as well as other socioeconomic targets; among others these could involve reducing car-dependencies, improving quality of life (hence decreasing the noise and emission effects of traffic but also enhancing social inclusion), improving transport system efficiency, developing better business models and other sustainability targets. The importance of well-designed interchanges in achieving these targets is obvious.

City-HUB is a EC-funded project. which brings together leading experts of design and urban integration, transport operation and business, with local and regional authorities and end-users organizations, which represent the economic, demographic and territorial diversity of Europe.

The project aims at contributing to the design and operation of seamless, smart, clean and safe intermodal public transport systems, addressing, at the same time, how these interchanges should be designed in order to ensure that “vulnerable” target groups, i.e. the elderly, youth, physically and mentally handicapped people can adequately benefit from these interchanges. Within the project, an integrated business model will be developed and a comprehensive set of methodological guidelines will be proposed, addressing different aspects of an urban interchange and promoting public transport. The integrated model will be validated through a set of European case studies and the methodological guidelines will be fully exploited through a European transferability exercise and dissemination initiatives to target groups throughout Europe.

The document at hand presents five descriptive pilot case studies that have been used to assess good practice, obstacles and improvement potential from the daily operations in existing public transport interchanges. This task, which belongs to the second work package (WP) of the project validates previous findings from the work package. Later WP 3 will extract all the information about interchange design and integration of transport modes, while WP 4 will receive inputs for best management practices. The outcome from the pilot case studies will be a first input for defining the City-HUB model in WP 5.

The tasks of WP 2 and their milestones in the City HUB project are illustrated in Figure 1.

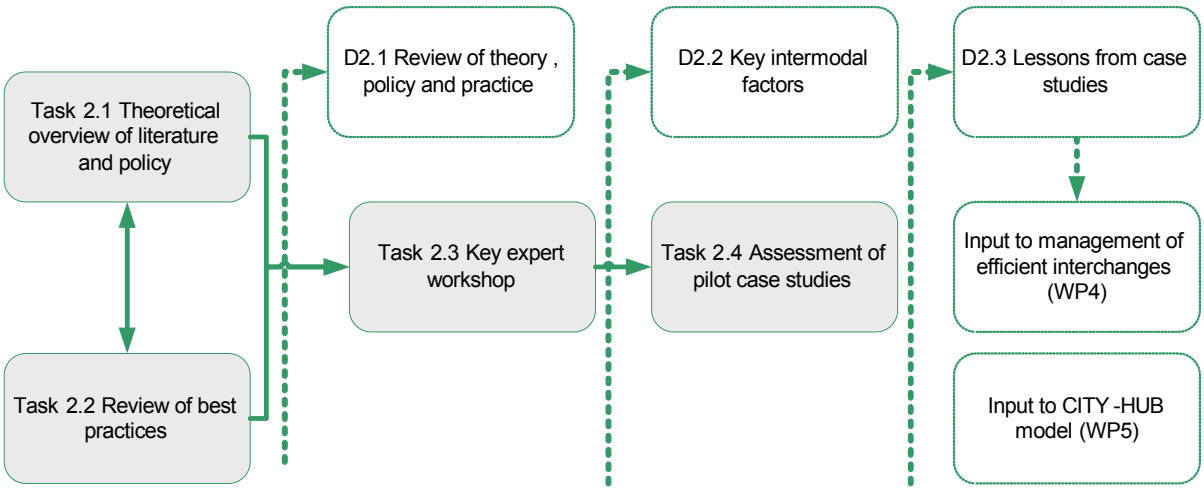


Figure 1: Workflow for WP 2

The aim of the first two tasks was to retrieve information from existing literature and case studies related to urban interchanges. The information collected constitute the basis for the WP 2 outputs and is documented in this deliverable (D2.3) (and the previously produced deliverables D2.1 and D2.2). In addition, key indicators have also been defined in an experts' workshop held in Budapest in March 2013, and reported in D2.2.

As part of task 2.4, a data collection template was generated and applied to five pilot European case studies. The information collected from the individual case studies has provided the main basis for this deliverable. The conclusions drawn from the case studies will serve as inputs into the analysis of the organisation of interchanges in terms of their operational functionality, and management (in WP 4) and so on, as well as to the City-HUB model which will be designed in WP 5.

The rest of this report is organised as follows: Chapter 2 presents the main aim of the work and the methodological approach, while Chapter 3 gives an overview of the five pilot cases that have been studied. Chapters 4 to 6 discuss good and bad practices that have been identified, while conclusions are given in Chapter 7. Complete case study reports are included as annexes.

1.2 Methodological approach for case studies

1.2.1 Aims and objectives

A set of 5 descriptive pilot case studies have been used to assess good practice, obstacles and improvement potential from the daily operations in existing public transport interchanges.
The selected pilot case studies are:

- Moncloa, Madrid (Spain)
- Ilford Railway Station, London (United Kingdom)
- Railway Station Thessaloniki (Greece)

- Kamppi, Helsinki (Finland)
- Köbánya-Kispest, Budapest (Hungary)

All of the interchanges play a key role in multimodal trips in their corresponding cities. They cover a wide spectrum in interchange types and geographical distribution. The output from this task is to provide recommendations for the development of the City-HUB model. Later WP 3 will extract all the information about interchange design and integration of transport modes, while WP 4 will receive inputs for best management practices. The outcome from the pilot case studies will be a first input for defining the City-HUB model in WP 5. WP 6 of the project will introduce another set of case studies that will be used for validation of the project developments and the City-HUB model.

1.2.2 Data collection

A case study can be defined as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2009). Gerring (2007) has a similar view. A case study is "*the intensive study of a single case where the purpose of that study is – at least in part – to shed light on a larger class of cases*" (Gerring 2007).

In other words, epistemologically, case studies (i) seek to develop logically consistent models, (ii) receive observable implications from the model, (iii) test implications against empirical observations and (iv) use the results to improve the model (George and Bennett 2004). The aim of case studies is partly, by in depth studies of a case, to make generalizations to a larger set of cases and develop hypotheses which can be tested empirically.

In order to provide recommendations it is necessary to emphasize the careful selection of cases (Lijphart 1971, Yin 2009). Our starting point has been to select cases that are comparable in specific elements, but which also secure diversity within various case studies (Ragin et al. 1996). Yin (2009) points out that substantial analytical benefit arise from using comparative studies and thus are more powerful, while Eckstein (1975) emphasises that selection of crucial case studies could provide for maximum analytical leverage. A least likely and most likely approach can thereby make it possible to find robust support for theories and hypotheses. A least likely approach selects cases which are at the limits of the theory's boundaries, while a most likely approach could provide good reasons for refusing a theory since it is selected from the heart of the defined theoretically scope. Such analysis is, however, difficult to create in an exact way.

Institutional approaches, on the other hand, set out to find variations between independent variables (Gerring 2007). A key point to examine is whether cases and variables can produce different outcomes. In such a perspective case studies revise and develop current theories (Bratberg 2011). By using a broad set of case studies we can provide an analytical scheme that combines elements of each approach. Causality is also an important potential in case studies, and especially connected to mechanisms and process (Gerring 2007).

By using case studies in the City-HUB project we can also identify other variables and topics which will be examined in other WPs. One advantage of employing case studies is that the method can handle large sets of complex relationships, which are context dependent (George and Bennett 2005) and explain intricate and stabile patterns which demands comprehensive, exact and systematic accounts. Moreover, case studies can be used in order to explain a

phenomenon and analyze the results in a larger context in which templates are used to compare the empirical results.

1.2.3 The template and reporting structure

To facilitate the task a reporting template was developed in order to provide a structured comparison of the five pilot case studies. The template was designed to be both strict, to ensure comparable answers across cases, but also flexible to ensure that additional topics, which were not mentioned in the template, could be included (if they were considered to be relevant).

The template was divided in numerous parts to be addressed to each of the interchange stakeholders. Those parts had several questions in common. The responsible case study partner needed to customize the questions to the specific stakeholders of its interchange and conduct an independent and critical analysis of why a practice is regarded as good or bad. The interviews were supplemented by gathering documents and reports concerning various issues relevant for interchanges.

Information on each case study, to complete the reporting template, was gathered using different approaches. For example, semi-structured interviews with relevant stakeholders, such as terminal owners, terminal operators (if different from owner), transport operators, service providers and decision-makers, and site visits/audits. Site visits/audits were used in order to calculate the transfer and waiting time between modes and to illustrate the good and bad practices.

The structure for the data collection is illustrated in Figure 2. The structure is defined into different levels. Management, at the top, is regarded as the superior level since it is directly linked to output when it comes to daily operations, but is also highly relevant for the design of the interchange and general accessibility for passengers. Policy, governance, organization and finance are interrelationships which foster or hinder the promotion of an efficient and attractive interchange. Management is also a topic which will be covered in depth in WP 4.

Interchange design, accessibility, and passenger services are all aspects which are vital for the quality of public transport and providing seamless door-to-door travel. Bearing this in mind, it is also necessary to note that no interchange is the same. Thus, it is not possible to give an optimal solution which is applicable for all interchanges. Embracing context, in terms of national, regional or local circumstances, location, finance and legislation, makes it obvious that a good solution in an interchange one place might be less relevant in one in another. This does not however mean that it is impossible to offer any recommendations, but rather it is necessary to acknowledge that are no one overall solution. Thus, the aim of this report is to illustrate that there might be several solutions for each case study and explaining why a practice is regarded as good or bad. At the end of the report, the various good and bad examples highlighted by the case studies will be linked to management, in order to explain the conditions which encourage or discourage “successful” interchanges.

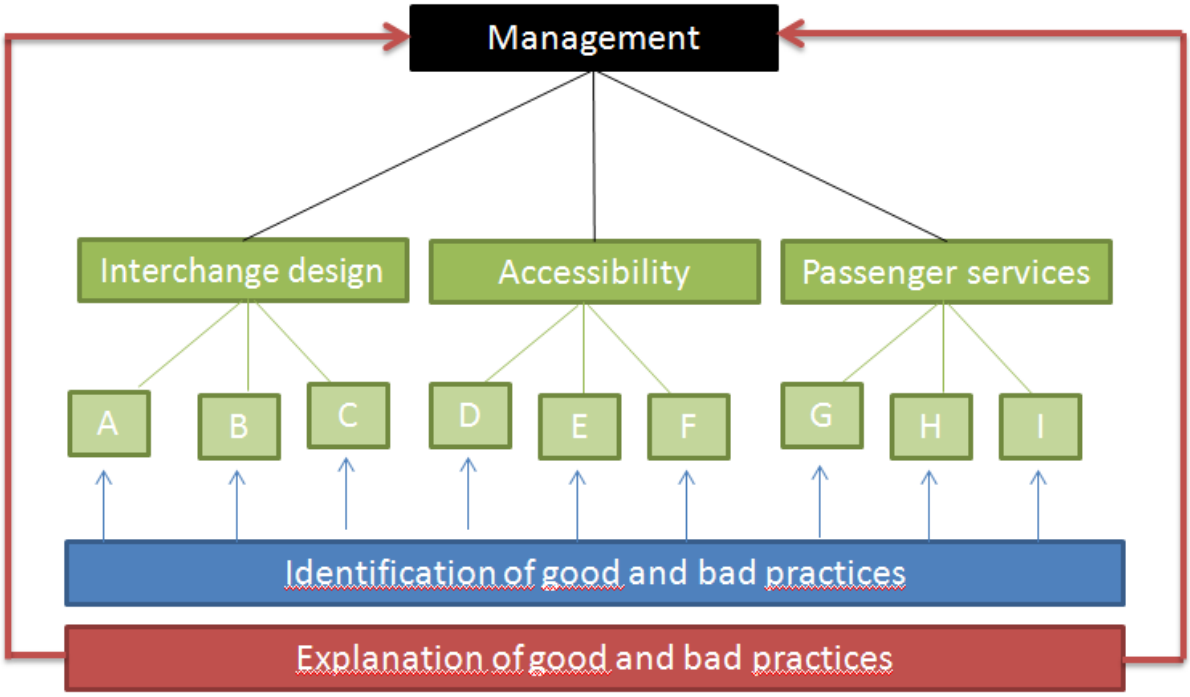


Figure 2: Structure for data collection

The presentation of good and bad practices in this report are organised in a similar way to that shown in Figure 2, although with some adaptations. For example, issues related to integration of transport modes and passenger services are integrated with design, while management and accessibility remain as indvidual categories.

Chapter 4 presents practices related to management, governance, policy and planning, which are interrelated. To a large degree these issues lay the groundwork for the design and performance of interchanges. Chapter 5 discusss good and bad practices related to design and integration of modes, while accessibility practices are dealt with in Chapter 6.

The good (G) and bad (B) practices are numbered consecutively.

2 Pilot cases

2.1 Moncloa, Madrid (Spain)

2.1.1 Role of interchange

The "Madrid Interchanges Plan" is the unification process between the exchange points of the interurban bus lines and the Circular Metro line. This plan consists in the adequate improvement of the already-existing transport interchange stations – Plaza Castilla, Moncloa, Avenida América and Principe Pío- and the construction of new interchange stations in Conde Casal, Chamartín and Plaza Elíptica in order to achieve a modal interchange network organized around Madrid´s entrances in relation to the highway and the interior circular Metro route.

Due to capacity problems resulting from the growth in demand within the A-6 motorway corridor, the expansion of the Moncloa transport interchange station was carried out to relocate the Metro line 3 station to the same level as the line 6 station so as to improve passenger transit and provide parking spaces for bus inspections, together with new installations and equipment.
This development was essential in order to carry out the expansion, or Arco (Arch) Module, of the station, as it freed up the required space that had previously been used for the Metro line 3 station and its garages.

Figure 3: Entrance to Moncloa station

2.1.2 Location

The Moncloa interchange is located at an entrance point to Madrid in an area with many historic monuments and connects directly to Metro line 6, the Circular line that travels around the centre of the city and links to all of the key points on the Metro network. The opening of this station has achieved excellent results in terms not only of increased demand, but also in reductions in surface-level bus journeys and improved journey times for both users and the transport companies.

The station's location in the city's centre, in a zone of intense traffic during rush hour and a monumental urban environment influenced both the construction, which was done with extreme caution to minimise potential impacts, and the design and location of the exterior elements.

Once the Arco module had been finished, all of the existing lines were transferred to the extension so that the redevelopment work in the Calle Princesa module could be carried out.
Regarding the effect on the environment, the external elements of the new Moncloa interchange station, such as the entrance buildings, emergency stairs, ventilation grilles, light wells, etc., were designed to taken into consideration the surrounding area of Moncloa and were, thus, made as discreet as possible, particularly in the areas closest to the important historic buildings (including the Arco de la Victoria, the District City Hall Building, the Air Force Ministry building). In addition, the external elements attempt to respect the green spaces in the area, such as the Oeste park and the Complutense University, without forgetting that in some areas it is appropriate to create a new and recognisable urban developments.

2.1.3 Brief history

The Moncloa transport interchange station was built in 1995. At the same time transport authorities expanded Metro line 6 to Moncloa, making it the busiest Metro station on the network, and opened the bus and high occupancy vehicle only lane on the A-6 motorway. Opening of the Bus-HOV (High Occupancy Vehicle) and the bus-only lane, resulted in a significant reduction in the total number of car journeys and a resulting increase in the demand for interurban bus journeys.
The evolutionary process of the Moncloa interchange station is summarized as follows:

- **1986-1993**: The first reforms were aimed at preparing the interchange station surface space.
- **1994-1997**: The second phase was the construction of the underground public bus station. These structures allowed the interchange station to grow beyond its surface space and improved the interchange with the Metro network by reducing transfer distances.
- **2001-2004**: The Madrid Regional Transport Board took the necessary steps to arrange a public tendering for the expansion of the existing Moncloa interchange. These changes were based on the characteristics of third-generation transport interchange stations through privately financed by the public franchise system, saving the Government the cost of the station´s refurbishing.
- **2004-2007**: The Madrid Transport Authority signed an agreement on April 7, 2004 with the Madrid City Council and the Regional Government Madrid to establish its commitment to arrange a public tendering of the refurbishing (expansion), operation and maintenance activities of the Moncloa interchange station.

The main characteristics of the expansion and reform of the Moncloa interchange were:

- Investment of 112.78 million euros
- Construction of 46,000 m2, separated into two floors
- Increase of the number of bus bays from 20 to 36 and regulation areas with completely underground entrances to the three islands from the bus lane in the A-6 motorway
- Physical separation of the air-conditioned pedestrian island from the buses
- Additional complementary services

2.1.4 Modes of transport

There are currently 56 interurban bus routes, with over 4,000 journeys per day, over 287,000 passengers per day, and 310 journeys per hour between 8:00h and 10:00h. The urban bus routes serve 125,000 passengers per day, with 4,141 bus journeys. The Metro had about 170,000 journeys per day in 2010. Currently, Moncloa is the Metro station with the highest daily demand.

The Moncloa interchange achieves excellent results in terms of increasing demand for public transport, reducing surface level bus journeys, and improving journey times for both users and the transport companies. Passengers do not have to travel to stations in the outskirts of the city to use interurban bus services, as the interchange is located in the centre of the city and connects directly to Metro line 3 and 6, which link to all of the key points on the Metro network.

The interchange, situated at the northern edge of Madrid, but in a built-up area, provides a gateway to the city for over 265,000 people per day. Bus services in the peak-hour are every 5 to 10 minutes, and access the underground bus station using an HOV lane. No private car parking is provided. Apart from the 56 interurban bus lines, there are 3 urban bus lines, 2 metro lines (line 3 and line 6) and 1 long distance bus line and a total of 12 operators in Moncloa interchange station (9 for interurban bus, 1 for urban bus, 1 for long distance bus and 1 for metro).

2.2 Ilford Railway Station, London (United Kingdom)

2.2.1 Role of interchange

Ilford railway station is situated on the Great Eastern Main line and has regular local train services (from Essex) to Liverpool Street station in central London. More than 10 bus stops are located within walking distance of the station, with the town being a hub of the London Buses network, providing buses to central London and various suburbs. The station is considered to be a major public transport interchange by Transport for London (TfL).

2.2.2 Location

Ilford is a large suburban town in the London Borough of Redbridge, East London. The town is a significant commercial and shopping district surrounded by extensive residential development. Redbridge is an outer London borough with a population of 278,970 (Census 2011[1]), having grown rapidly in the early 20th century as a residential area serving as a satellite to central London. Redbridge is the ninth most diverse borough in the country with approximately 55 per

[1] Key Figures for 2011 Census: Key Statistics, London Borough of Redbridge

cent of its population coming from a minority ethnic background[2]. In 2010, Redbridge was ranked 134th most deprived borough in the Country (out of 326). The Valentines area of the Borough – which contains Ilford Station and the main shopping areas, is in the highest 10% band of deprivation[3].

2.2.3 Brief history

The station opened in 1839, with the main entrance on Cranbrook Rook being extensively rebuilt during the 1980s (see photo below). The station also has a second (side) entrance on York Road which is open only during peak hours. The station has five platforms, two for trains into London (towards Liverpool Street) and two out of London (towards Shenfield).

Figure 4: Main Entrance on Cranbrook Road

The interchange is planned for re-development as part of the Crossrail project[4]. The existing station is to be re-configured to serve Crossrail trains from 2019. This will provide more than twice the current frequency of trains from Illford to central London and is expected to encourage significant increases in passenger numbers. The station improvements will provide a new ticket hall layout with greater gate line capacity, passenger lifts, longer platforms and a realigned station entrance and elevation to the street.

The town centre, in which the interchange is located, is dominated by a heavily trafficked gyratory road system (A118) around Chapel Road, Ilford Hill and Cranbrook Road; this connects

[2] http://www2.redbridge.gov.uk/cms/the_council/about_the_council/about_redbridge/2011_census/diversity.aspx

[3] Deprivation in Redbridge Report, 2010 http://www2.redbridge.gov.uk/cms/the_council/about_the_council/about_redbridge/research_and_statistics/deprivation_in_redbridge.aspx

[4] Crossrail is a railway, 118 km in length, currently under construction that will link Maidenhead and Heathrow Airport to the west of London with Shenfield and Abbey Wood to the east via Greater London with 42 km of new tunnels and new underground stations in central London.

to the nearby North Circular Road (A406) which provides a key orbital link around London. This one-way gyratory road system is a significant barrier to pedestrian movement due to the wide carriageway (of three lanes) with heavy traffic and several guardrails. However many of the retail outlets are located in more peaceful areas: along the High Road (which is partially pedestrianised), in the Exchange Shopping Mall and along Cranbrook Road.

2.2.4 Modes of transport

Ilford railway station is situated on the Great Eastern Main line and has regular local train services (from Essex) to Liverpool Street station in central London. The modes of transport available at the interchange are: main-line rail, bus, cycle (with cycle parking), pedestrian, private car with drop off, car parking and taxi. More than 10 bus stops are located within walking distance of the station, with the town being a hub of the London Buses network, providing buses to central London and various suburbs. The station is considered to be a major public transport interchange by Transport for London (TfL). The station is located within TfL Zone 4[5]. Most trains stopping at Ilford run between Shenfield and London Liverpool Street, with at least 6 trains per hour train in each direction. Train services are currently within the Greater Anglia rail franchise, operated by Abellio Greater Anglia Ltd.

Estimated station usage (rail only) shows passenger numbers of 6,721,486 in 2011/2012 (travelling from or to the station (entries & exits)) – an increase on the previous numbers of 6,286,174 in 2010/11 (figures derived from ticket sales data recorded in rail industry systems)[6]. An estimated 14,453 people interchanged at the station during the year (i.e. rail to rail). Most interchanges at Ilford will be local to local, with some being local to regional, for example for passengers who travel out to Southend.

2.3 Railway Station Thessaloniki (Greece)

2.3.1 Role of interchange

The New Railway Station is the central passenger railway station in Thessaloniki, which is the second biggest city in Greece and the capital of the periphery of Central Macedonia with a population of approximately 1000000 residents. The station is located in the suburban area of the city and the involved modes are commuter rail, interurban rail, local buses, suburban buses, interurban buses, taxis, bicycle ways, park and ride, kiss and ride, and metro (under construction).

The "under construction" metro station will play a catalytic role for the reconstruction of the terminal and the surroundings, including, indicatively, a new underground parking, new walking and cycling accesses, etc. The existing terminals in cooperation with the investments of the new metro station will enable the reconstruction of the existing infrastructure to a modernized integrated bus-railway-metro station.

[5] London Underground, Docklands Light Railway (DLR), London Overground and National Rail services in London are divided into zones. Most services operate in zones 1-6, with London Underground, London Overground and National Rail also operating in zones 7-9.

[6] Estimates of Station Usage 2011/12, Steer Davies Gleave for Office of Rail Regulation, 2013

2.3.2 Location

The station is situated very close to the central business district, allowing the movement of travellers all around the city. The station is also close to the port of Thessaloniki, enhancing the attractiveness of the interchange. Moreover there is a bus line connecting the railway station to the International Airport of Thessaloniki “Macedonia”, which actually connects the central bus station located in the West part of the city and the airport, located in the East part, passing from the railway station.

2.3.3 Brief history

The station, completed in 1961, replaced the old and much smaller passenger station which now accommodates the city’s cargo rail, and, although there have not been any changes since the 1960s’, the station remains the largest and busiest railway station built in Greece (http://el.wikipedia.org/).

The passenger station began its construction during the 1930s. The main concrete shell of the building was completed before the Second World War. In 1958, the project was finally completed and handed over to the public in 1961. Although some additions have been made the following years, such as the construction of a shopping centre and the installation of escalators for access to the platforms, the station has remained unchanged since the 1960s’ (http://el.wikipedia.org/).

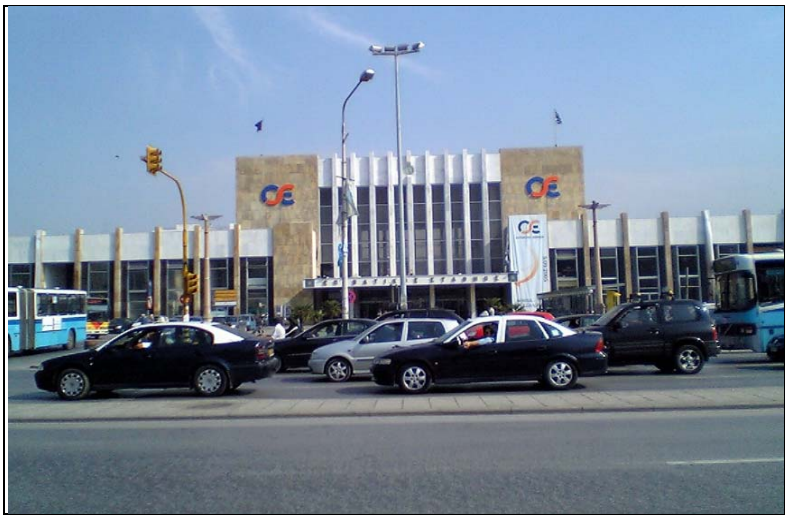


Figure 5: The New Railway of Thessaloniki

2.3.4 Modes of transport

The station is located in the suburban part of the city and the modes covered include commuter rail, interurban rail, local buses, suburban buses, interurban buses, taxis, bicycle ways, park and ride, kiss and ride, and metro (under construction). The currently "under construction" metro station will likely be a catalyst for the reconstruction of the terminal and its surroundings, including, potentially, new underground parking, new walking and cycling access, etc. The existing terminal building, in combination with the investment in the new metro station will enable the development of the existing infrastructure into a modern integrated bus-railway-metro station (Figures 6 and 7).

Apart from the provision of railway services, the station works as a terminal for the public bus services of the Thessaloniki Urban Transport Organisation (OASTH). The station is also directly connected to the interurban bus station, where there are routes to Athens and other Greek cities.

Focusing on buses, the average daily number of passengers travelling in the urban zone is approximately 137.971, while in the suburban zone it's approximately 22.630. In total 12 bus lines serve these travel needs. Regarding the railway, the average daily number of passengers arriving at/ or departing from the station is approximately 6.000. Of these 4500 use tickets issued by electronic systems, and 1.500 use paper tickets.

Figure 6: The under construction metro station

Figure 7: The Thessaloniki metro lines development plan (Source: http://www.ametro.gr/)

2.4 Kamppi, Helsinki (Finland)

2.4.1 Role of interchange

The case study involves the Kamppi terminal which is the terminal for local Western buses with ca 1000 buses a day, with a metro station underneath, and a separate terminal for long-distance buses in Helsinki. In addition, Kamppi terminal is a part of the city interchange area and has direct access to the Main Railway Station, the city hub for all local railway lines, trams, city buses and two smaller bus terminals, terminals for Northern and Eastern buses. The terminal is situated in the basement of the newest shopping centre in the inner city of Helsinki. Kamppi has been designed by a Finnish architect Juhani Paalasmaa and it was opened in 2005.

2.4.2 Location

The interchange itself is in a very central location in downtown Helsinki. The area of the interchange/shopping centre is approximately 4 hectares. In addition to the shopping centre there are also offices and flats in the same building complex. In the beginning of 2006, the population in Helsinki was 560 905 and 988 440 in the Helsinki metropolitan area. A total of 1.4 million people were living within a one hour driving distance from Kamppi. In addition, Helsinki has 9 million national and 2 million international tourists yearly[7].

Figure 8: Kamppi shopping centre with bus terminals and metro station underground

2.4.3 Brief history

The preliminary plans for the Kamppi terminal, located in downtown Helsinki, were completed in 1995, with the project plan being ready in 1997. The town planning process (including the appeal period) was from 1998–2001. The construction of the Kamppi interchange and shopping centre started in August 2002. The interchange started operation in June 2005 and the shopping centre was opened in March 2006. Work on the roads and outside areas were finalized in the summer of 2006.

Re-development since opening has included:

- Originally the terminal operated only as a final destination (or origin) for buses. Nowadays passage from the local terminal to the long-distance terminal is allowed

[7] *Source: Ministry of Transport and Communications Finland (16/2007). Impact assessment of Kamppi Travel Centre.*

without stopping. The purpose was to avoid congested traffic on the streets. This required changes to the operating plans (schedules) but no structural changes to the terminal.
- Slight changes have been made to the platform area to increase safety.
- Air filters have been added to the roof of the terminal area (which is an indoors space) to improve air quality. The terminal area is separated from the passengers' waiting area, but the exhaust gases were considered a health risk for the drivers.
- The road network outside the terminal has undergone major changes, affecting both in- and out-going transport.

In addition, night buses used to depart from the outside area while the terminal was closed, however in the summer of 2012 the departure of local night buses was moved into the terminal. This requires a limited access route to the waiting area, which is controlled by security guards.

2.4.4 Modes of transport

Modes of transport at the interchange include local, regional, national and international buses (to St. Petersburg, Russia), metro, tram, bicycle, car and taxi. The average number of visitors to Kamppi on working days is approximately 100 000, of which 84 000 use public transportation.
The total number of departing metro passengers from Kamppi in 2012 was 6 634 000. The average for all working days of the year was 21 700 (in 2011, the average was 21 600).
The average number of bus passengers departing on working days from the local (western) terminal in Kamppi was 19 360 in October 2012.

The central railway station is approximately 500 meters away from the Kamppi interchange. Located adjacent to the railway station there also bus stations for most of the Northern and Eastern local and regional buses.

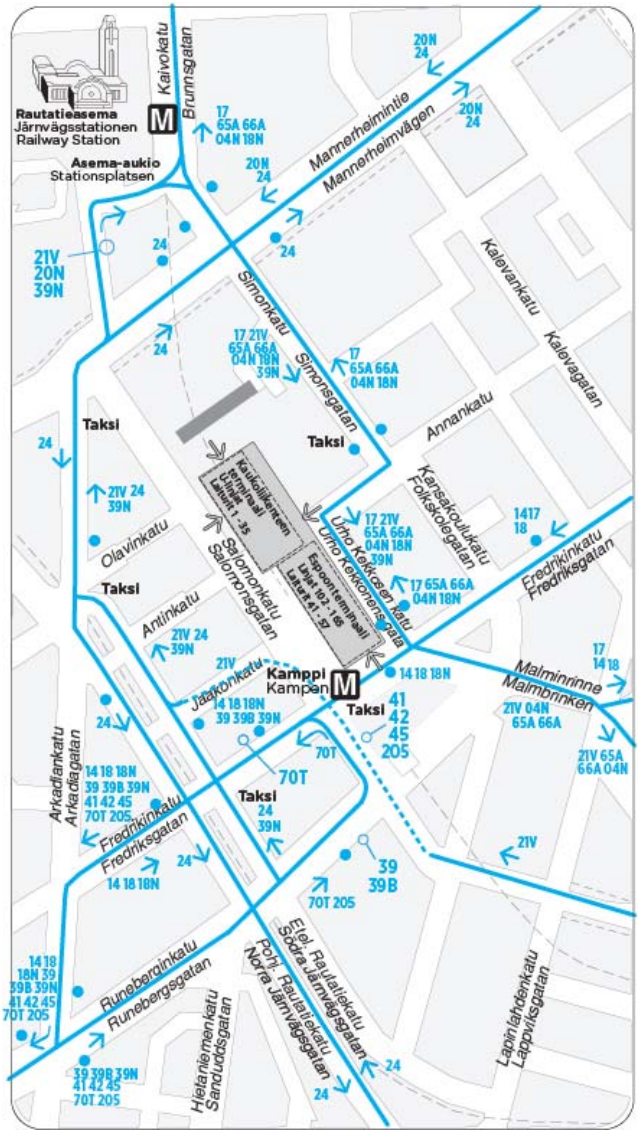


Figure 9: Kamppi interchange and bus lines near it ("Taksi" meaning taxi stands). (http://www.hsl.fi/)

2.5 Köbánya-Kispest (Hungary)

2.5.1 Role of interchange

Kőbánya-Kispest is the terminal of metro line M3, which is one of the backbones of public transport in Budapest connecting the northeast and southeast of the city via the city centre. Kőbánya-Kispest is also a major railway station, but most trains do not terminate there.

Local and regional bus connections are provided from anew bus terminal under the shopping mall, which has been constructed as part of a general refurbishment of the area. Although all types of connections are available, the interchange handles primarily local and suburban traffic.

2.5.2 Brief history

The interchange at Kőbánya-Kispest was created as part of the construction of the southern sector of Metro line M3, between 1978-1980. Thus, an interchange could be established between the metro and mainline railways (lines 100 and 142) at Kőbánya–Kispest which was until then a minor railway station. The interchange included a bus terminal for local and regional buses, as well as the airport bus. The connection between the railway station and the metro was facilitated through a new overpass. The parking lot was placed in the northwestern part of the complex, too far from the footbridge to the metro and the railway. Later, the opening of a new entrance solved this problem. At the time of its construction, the interchange was modern and architecturally valuable. The range of the facilities for passengers at the interchange, however, was poor, with only a few fast-food stalls and grocery stores. The level of the passenger services was also poor at the bus terminal.

Between 1989-1990 the communist system fell, giving rise to private enterprise. This was quite apparent in the retail sector, manifested by the appearance of a multitude of small outlets selling anything from newspapers to fast food. This had a huge impact on the overall picture of the interchange as well: with the new retail units usually being liquor shops or low level services. The appearance of new shops in the interchange caused another problem; that being the disappearance of natural light. Most of the transfer passageway between the modes was subdivided and occupied by small shops which covered up the windows on both sides. By 2000, passengers had to transfer through a dark, narrow, and unpleasant passageway. In the meantime, the condition of the once modern interchange had also deteriorated, noticeable by the poor state of the buildings and structures, see Figure 10.

Figure 10: Aerial view of the terminal before the refurbishment (source: http://www.globalplaza.hu/hir/oktober-14-en-nyit-a-koki-terminal)

During the second half of the 2000s, the local district council decided to refurbish the area around interchange. The plans included the refurbishment of the metro terminal, the bus terminal and the Park and Ride, and also a brand new shopping mall. The construction begun in 2008,

and three years later the new, modern intermodal centre was delivered. The cost of construction was approx. 40 billion HUF (approx. 130 million €). The reconstruction did not include the refurbishment of the railway station though, which was last rebuilt in 1980. Today, the intermodal complex provides the possibility for interchange between rail, metro, buses, bicycles and cars for approx. 80.000 passengers a day.

In 2011, the interchange was again renewed, with intermodality was strengthened, and its functions extended, with a wide range of shops and services. Pedestrian routes between the modes were extended by constructing a new footbridge, connecting the metro terminal, the bus terminal and the shopping mall. The existing footbridge was also refurbished. The bus terminal was relocated to be closer to the metro station. Pedestrian routes were simplified and all transfer facilities were covered. Significant improvements to accessibility were also made by providing new lifts and escalators, step-free access, and tactile surfaces. Passenger information was also renewed. The refurbishment of the railway station is being planned with new lifts, passenger information system and renewed escalators and platforms.

Figure 11: The terminal and shopping mall after the refurbishment in 2011

2.5.3 Location

The interchange divides two areas of the city that are very different in character. North of the railway tracks the area is a mixture of industrial sites, with a large number of abandoned factory buildingsl and a large, densely built high-rise housing estate (Újhegy) with prefabricated concrete buildings built in the 1970s (Fig. 6). South of the terminal, there is another large housing estate (Kispesti lakótelep) and detached houses (Fig. 7).

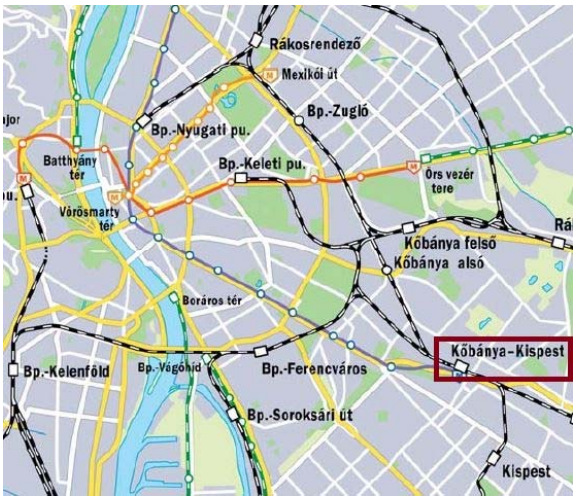


Figure 12: Location of Kőbánya-Kispest in Budapest (source: Vasúttal Budapest környékén, Magyar Közlekedési Klub, 2009)

2.5.4 Modes of transport

There are several possibilities for interchange between transport modes in the intermodal centre, including railway, metro, local and regional buses, as well as walking, cycling, and cars.

Kőbánya-Kispest is the terminal of metro line M3, which is one of the backbones of public transport in Budapest, connecting the northeast and southeast of the city via the city centre. It has a nominal capacity of 28,200 passengers/hour/direction and approx. 630,000 passengers a day. The highest frequency is every 2.5 minutes during peak hours.

Kőbánya-Kispest is a major railway station on railway lines No. 100 (Budapest – Cegléd – Szolnok – Debrecen – Záhony; suburban, regional, intercity and international services) and No. 142 (Budapest – Lajosmizse; suburban services only). Most trains do not terminate at Kőbánya-Kispest but in Budapest-Nyugati, a major railway station in the city centre.

Local bus connections are provided by BKV, the local transport provider in Budapest from the new bus terminal under the shopping mall. Three suburban lines to the eastern suburbs also terminate at the bus terminal operated by the regional operator Volánbusz. Terminal 2 of Liszt Ferenc International Airport is linked to the terminal by an express bus (200E) with 140 departures per day to the airport; the travel time is about 30 minutes.

Four parking lots are available: two park and ride facilities – one covered and one open air; a three-storey parking garage at the mall and an open-air parking lot at the local hardware store (OBI). There is no dedicated kiss ‘n’ ride zone. Bicycle parking is provided for cyclists.

Although all types of connections are available, the interchange handles primarily local and suburban traffic. There is no accurate information available about the number of passengers at the terminal, although it is estimated that about 80,000 people use it daily. The number of visitors to the shopping mall is about 40,000/day on weekdays and 30,000/day on weekends. There is no data available on the share of transfer between modes. It is estimated that at least 80% of all passengers using the terminal transfer between the metro and buses. Most train passengers transfer from the train to the metro.

3 Policy and management

Management involves the rights and responsibilities of actors involved at an interchange related to e.g. maintenance, finance and station operations. Management is directly linked to outputs when it comes to daily operations, but is also highly relevant for the design of interchange and its general accessibility for passengers. Policy, governance, organization and finance are interrelated and these foster or hinder the promotion of an efficient and attractive interchange.

Ubbels and Palmer (2013) retrieved information from existing literature related to urban interchanges. They identified the following success criteria for interchanges:

- Coordination of different modalities
- Establishment of rights and responsibilities of stakeholders and the facilitation of station maintenance and cleaning
- Management agreements when interchanges facilities are owned, managed or served by more than one organizations
- Monitoring of passenger needs
- Design of the interchange in order to minimize the potential for accidents, conflicts and collision
- Compliance of relevant safety and emergency standards
- Importance of multi-modal tickets and integrated ticketing system
- Generate revenues for renting space

3.1 Good practice examples

3.1.1 Policy and governance

G1. Interchange plan

Public administrations in Madrid have developed a *plan for transport interchanges* in order to promote functionality across modes and improve efficiency. Agreements have been made between the regional government, the city council and the Madrid transport authority, which have allowed for the development of interchanges for every access corridor to Madrid. Figure 13 illustrates the regional concept for public transport and interchanges within the region. Thus, the region achieves a modal interchange network organized around Madrid´s entrances in relation to the highway and the interior circular Metro route.

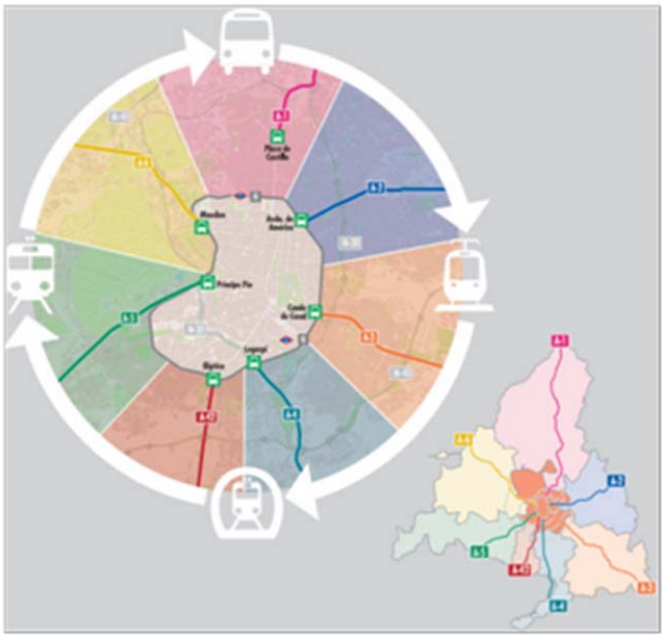


Figure 13: Interchange plan Madrid

These types of interchanges have the following characteristics:

- To be used as meeting points for the radial bus lines
- To reduce the times of trips and to improve the quality of the service
- To create nodes that simplify the conditions of transfer
- To reduce the costs of transport services allowing an increase in the journey frequencies

Why is it a good practice?
A comprehensive strategy analysing public transport, interchanges and land use in a wider context can be an important tool for improving the region's planning regarding land-use, accessibility for public transport and developing a well-functioning transport system. A strategy for land use and transport development may form a better basis for supporting increased use of public transport and better interaction between modes of transport. This is related to, for example, accessibility measures for public transport, but also related to the coordination between the transportation system and public transport in general.

G2. Special definition plan
The City Council in collaboration with Madrid Transport Authority developed the *Special definitions plan* for each of the interchanges. The objective of the Special Plan is to make the construction of the transport interchange station viable in land use terms, as an integral element in the public transport network within the municipal area of Madrid.

The Special Plan contains a justification of the solution proposed, based on the characteristics of the location in which the station will be built, and a transport and traffic study, which enables the definition of the scale of the infrastructure according to current statistical usage data and forecasts of future developments.

A second part of the Special Plan details the project's organisation and analyses the existing infrastructure, the repositioning of affected services, and the organisation and management of the work to be carried out.

Thirdly, it defines the Urban Planning Regulations, stating the specific conditions for the use of the various means of transport (limits to alignment, height, etc. for the structures above ground-level), the specific conditions for ventilation and climate control to ensure passengers' comfort and specific conditions for compatible tertiary use (commercial, offices, recreational and parking).

Once the Special Plans have received final approval, they become regulation and compliance with them mandatory for the development of the transport interchange stations and their permitted compatible uses.

A comparable measure is the guidance on transport interchanges which was developed by Transport for London. It aims at bringing stakeholders together, create a common purpose and ensure that interchanges are integrated into the urban environment.

Why is it a good practice?
Developing 'plans' for transport interchanges could be regarded as the next logical step in developing a strategy for interchanges. It might be particularly important to involve transport authorities in the planning process, to secure coordination and integration of public transport systems. It will be important to ensure that these plans clarify the organisation and management of the projects in order to reduce barriers connected to unclear and fragmented responsibilities.

Requirements and regulation connected to these issues ensure interchanges develop in a manner that is in accordance with "successful" interchanges. Finally, it is important that these plans are developed by the same organisations and authorities. Uniting and building up competence and experience is a prerequisite for developing attractive interchanges, establishing greater understanding of needs and challenges, as well as working with various stakeholders.

G3. User feedback
A User Perceived Quality and Satisfaction Survey was carried out prior to starting the construction of Moncloa station in Madrid. The purpose was to develop a quality assurance plan and set of actions for the interchange. Two topics were included in the user questionnaire: aspects which were regarded important at an interchange and their degree of satisfaction with services. An analysis of the results showed that security, functionality of services, information, and the stations general appearance were regarded as the most relevant aspects.

Why is it a good practice?
Ultimately, whether an interchange is regarded successful or not is to a large extent evaluated by its users' satisfaction with it. Gathering information about the user's perception of various elements can therefore be important means of ensuring that any re-developments satisfy their interests and needs. User surveys can thus highlight elements which haven't been taken adequately into account. Conducting several studies of various interchanges makes it possible to develop a better understanding of how various solutions are regarded. An indirect effect of undertaking these types of surveys might be better understanding and capacity building for those working within interchanges.

G4. "Public realm improvement scheme"

Transport for London has approved a £30 million fund to improve the public spaces around the future Crossrail stations, of which Ilford is one. Urban improvements will be taken forward by the relevant local authorities who will be able to bid to TfL for a share of the funding. Schemes are expected to include wider pavements, pedestrianised areas, traffic calming, improved transport interchanges, trees, seating areas and meeting places designed to integrate with local character.

Why is it a good practice?

Responsibilities for adjoining areas to an interchange are often different from the owner of the interchange. Interchange owners have little influence on needed improvements in areas connected to pavements, accessibility, traffic calming and surrounding areas. Financial contributions given to local authorities within which interchanges are located may provide incentives for making necessary upgrades.

G5. Integrated ticketing and information (professional procuring bodies)

An overarching regional transport authority responsible for all public transport in the region might facilitate the cooperation and integration of transport modes at an interchange. One challenge of this is that the various modes of transport may be in competition for the same passengers and thus have few incentives of coordinating schedules or promoting cooperation. A typical example is that of regional and local buses, trams and metro are under the responsibility of the regional authorities, while the train is owned or managed by national authorities. Therefore, there might be challenges related to promoting integrated ticketing and coordination of information between rail and other modes of public transport. Integration and cooperation can be facilitated by having an overarching regional transport authority. In Moncloa the concessionaire is responsible for collecting the fees that transport operators pay for using the station; those fees are settled in the concession contract and approved by the Madrid Public Transport Authority. In Ilford the bus services are regulated by Transport for London, which sets fares and specifies timetables, enabling them to be included in TfL's online journey planner and to be part of London's integrated public transport ticketing schemes, including the 'Oyster Card' smart-card. Oyster cards can also be used on the local rail services to and from Ilford as a result of negotiation between TfL and rail operators. Kamppi in Helsinki has a ticket system which integrate local and some regional public transport.

Why is it a good practice?

Integrated ticketing across modes is one of the most important aspects for promoting seamless journeys and increasing use of public transport. Integrated ticketing reduces uncertainties about fares, costs and time for passengers. For each of the pilot case studies public transport is organized in different ways, however the cases from Moncloa and Ilford illustrate that integrated ticketing and information is possible despite these different organizational structures.

G.6 Fare structure

In some countries fares typically vary between municipalities and regions. This might lead to a complicated fare structure where fares are set according to municipality borders and not set by more natural factors as for instance distance. In Helsinki, the fare policy will in a few years change and no longer follow the municipality borders.

Why is it a good practice?

People travelling across municipalities might have substantial more expensive fares compared to people within a municipality. A "border free" fare structure might lead to a less complicated

fare structure. It might also lead to fare structure which is fairer for travelers and ultimately it can stimulate to increased public transport.

3.1.2 Station operation, management and maintenance

G7. Concession contract

Moncloa organise station operation through a concession contract. The concession contract transfers responsibility for management and maintenance to the concessionaire consortium. The public transport authority is responsible for compliance with rules and obligations. This also involves responsibilities for commercial areas, which can be exploited by the concessionaire itself or contracted to a third party.

Why is it a good practice?

Perhaps the most important good practice to be highlighted is the need for establishing clear responsibilities and guaranteeing that standards for operation are maintained throughout the concessionaire period. Another example of good practice seen at Moncloa is that the interchange secures revenues from commercial areas and these are kept within the interchange organisation making it possible to finance future upgrades. Interchanges can therefore avoid challenges related to lack of coordinating cleaning, maintenance and financing of these services.

G8. Monitoring and feedback

Moncloa has developed an Integrated Management System, which reports the monitoring of indicators specified in a User Service Plan. The indicators reported relate to information, customer services, accessibility, and comfort (noise, air quality, lighting, cleanliness). Thessaloniki also monitors level of services provided to travellers and they have introduced punishments to services which fail to meet set standards.

Why is it a good practice?

Indicators are a tool that enables monitoring and feedback. Indicators can alert and reveal the key areas where policies and measures need to be put in place to make improvements. Such a system can also highlight status, performance, progress and efficiency. In wider context indicators can be an important tool for building capacity since they might foster understanding of what factors facilitate or hinder good practice in interchanges.

3.1.3 Safety and security

G9. Monitoring, warnings and presence of police/staff

Various measures can be introduced in and around interchanges to minimise risks and crime. Most of the pilot case study interchanges use CCTV to monitor their site. Ilford also uses numerous posters and signs, warning of various safety issues (see pictures below). Moncloa station is equipped with facilities for the police and the interchange staff includes a fireman. Thessaloniki also has presence of police and security personnel.

Why is it a good practice?

The above mentioned measures result in increased safety in cases of emergency, but also increasing traveller's experience of safety and minimising risks of threat and crime. A safe environment for travellers can promote increased use of interchanges.

Figure 14: Warnings at Ilford station

G10. Separating passengers from buses

Kamppi has established a system where the doors to the bus platforms only opens when the buses are about to depart. They also have monitors for drivers in order to provide good vision of activities behind the bus. A similar system is used in the Moncloa terminal as well.

Why is it a good practice?

The doors hinder passengers moving in traffic. Thus, the interchange has an effective measure which increases passenger safety. This can also help reducing pollution in the waiting area. Monitors provide bus drivers with vision in blind spots. This can prevent accidents caused by inattentive passengers or drivers.

3.1.4 Finance and revenue streams

G11. Private financing for infrastructure investments

In Köbánya-Kispest, a private investor was needed in order to finance the improvements to the interchange. A private investor was therefore found who wanted to locate a shopping mall in the interchange. The private investor covered the full cost of the refurbishment of the metro and bus terminals, connecting facilities and the surrounding road network, which amounted to about 10 per cent of the total cost of the complex including the shopping mall. In Moncloa, the concessionaire had to cover the construction cost, so the local authorities did not have to invest their own resources into improving the interchange.

Why is it a good practice?

Upgrades or re-developments of interchanges can be costly and those responsible for them might have challenges securing financing for necessary developments. In such cases the private sector can sometimes provide the additional investment which is needed to undertake projects. Interchanges can be attractive for private investors. For example, retailers can take advantage of the large number of travelers and consequently have an interest in locating in close proximity to an interchange. Offices might locate in close vicinity; in order to improve their accessibility and reduce the time spent commuting for employees and visitors. The same logic is valid for locating housing close to an interchange. All these factors can make it possible for interchanges to attract

additional finance and reduce the amount of public funding needed. In addition, private finance may facilitate upgrades to be undertaken in a shorter time frame.

G12. Cover construction costs by selling properties

The construction costs in Kamppi were covered by selling the properties for business (shopping centre, offices and housing).

Why is it a good practice?

Refurbishment or reconstruction of interchanges can be costly for (local) public authorities. Public transport investments have to compete with other objectives and it can be challenging to secure necessary financing. However, interchanges are often located in centre areas which might attract private investors. Central located interchanges can be attractive since the properties can be used for shopping centers, offices and housing. Public authorities can thus finance refurbishment or reconstruction by selling properties.

G13. Revenue generation through fees and commercial rent

The public transport operators using Moncloa have to pay fees for using the interchange[8]. Revenue is also generated from the commercial rents paid by business and rent gained from advertisements, vending machines, etc. These revenues account for about 20% of the total financing for the interchange.

Why is it a good practice?

The concessionaire at Moncloa has a responsibility for the whole interchange. Without this organization structure, the interchange itself would not receive the rents being generated. For example, at both Kamppi and Köbánya-Kispest although they have shopping malls located at or close to the interchange, these are not the responsibility of the interchange owner and as a result the interchange does not receive income from these services. Moncloa, on the other hand, secures income from the commercial rent which can then be used for management, and maintenance, etc.

3.2 Bad practice examples

3.2.1 Policy and governance

B1. Unclear division of responsibilities

The area in which the interchange operates can cause problems. For example, during daily operations or in the cases of maintenance or redevelopments there might be no clear problem owner, or where responsibilities are shared, undefined, unclear, or fragmented this can create barriers. In such situations professional stakeholders and actors focussing narrowly on their limited tasks can cause problems. One scenario is where different task “masters” disagree, with detrimental effects on the speed of implementation, and the chance of success (Friedman 2008). Some departmental divisions or stakeholder groups may have different priorities, and even conflicting interests which can lead to a lack of coordinated practice.

Why is it a bad practice?

Interchanges often involve various stakeholders who have responsibility for separate, distinct parts of an interchange. The interchange at Köbánya-Kispest underwent a major refurbishment

[8] However, operators can afford to pay these costs as a result of the improved travel time savings and the reduced levels of congestion

of the metro and bus terminals, the park and ride and a new shopping mall was added. However, the railway station was not upgraded at the same time due to the lack of funding and cooperation in planning during the initial stages of the project. This is because the responsibility for railway infrastructure, including platforms, falls under the Hungarian State Railways, whereas Budapest transport company and municipality of Budapest are responsible the rest of the interchange[9]. As a result there is a huge difference in quality between the railway station and the other terminals in the interchange. The division of responsibilities is also a challenge regarding daily operations, making it difficult for managers and operators to reach agreements and resolve disputes in a quick and efficient way.

B2. Lack of cooperation between stakeholders

When there are many stakeholders involved it is generally more difficult to co-ordinate processes. During the planning stage it is important that there is good cooperation between all of the stakeholders involved and that the cooperation is organised in a manner that promotes efficiency. One issue during the re-development at Köbánya-Kispest was related to difficulties coordinating the planning activities due to the lack of a main contact person at the key stakeholder. Reaching understanding between the stakeholders for managing and operating an interchange is also necessary, as complicated divisions of responsibilities are also challenging during operation, management and for maintenance at an interchange.

Why is it a bad practice?

Different decision making frameworks and a lack of cooperation can raise the levels of conflict level and reduce the possibility of implementation. Inter- and intra-organizational networks can build trust and mutual understanding between actors. It might be necessary to set mandatory requirements and provide guidelines to ensure systematic cooperation between the stakeholders.

3.2.2 Station operations, management and maintenance

B3. Lack of integrated management

Köbánya-Kispest has a large number of stakeholders who are responsible for small parts of the interchange. For instance, R-CO Zrt. is the owner and developer of shopping mall and owner of a new pedestrian bridge to the metro station. Its subsidiary runs the daily operation and management of the shopping mall. The Budapest Transport Company (BKV) is the owner and operator of the metro terminal, the owner of the old pedestrian overpass to the rain and metro terminal and the operator of the bus terminal. The Municipality of Budapest owns all roads around the interchange, while the Centre for Budapest Transport (BKK) is the operator of ticket offices, the park and ride and the ticket vending machines. This illustrates the complexity issue when it comes to the number of stakeholders and the potential for lack of integrated management.

Why is it a bad practice?

Some of the challenges connected to management models might be the number of stakeholders involved in the process. There might be several stakeholders involved at an interchange, and the lack of a Coordination Plan can cause management problems. Transport operators, local/regional/national authorities and businesses are some of those organisations who might be directly involved. Each of these groups may have the power to delay processes and some may

[9] See annex for a further description of ownership structure at Köbánya-Kispest.

also have the organisational, financial, legal, or political power to veto a given measure or just ignore features which would improve services for travelers. Even where there is an overall agreement (or acceptance of the need) to implement or finance a measure, the number and variety of stakeholders, their individual perspectives and the interactions between them make for complex implementation processes (Pressman and Wildavsky 1973, Hill and Hupe 2002). Lack of clear management models might also foster conflicts and lack of coordination.

The good practices identified previously highlighted ways of securing a unified process connected to operation, management and maintenance. Complicated management structures with a fragmented organisation leads to variation in quality, connected to issues such as cleanliness, quality, and maintenance.

3.2.3 Finance and revenue streams

B4. Lack of adequate funding for maintenance

Interchanges need constant (funding for) maintenance. Without funding the interchange will deteriorate, resulting potentially in a poorer level of service and reduced attractiveness. Securing finance for such activities often depends on the stakeholders that own the interchange, and their financial situation. Therefore it is necessary to define a business plan for the interchange to assure its financial viability, independently of the shareholders. Locally or regionally public owned interchanges can face particular challenges needing to compete for funding, with other services. Köbánya-Kispest has problems due to neglected maintenance. The money squeeze can be a major challenge hindering the ability of the interchange to reach its objectives for being successful. State co-financing and getting the various stakeholders that benefit from the initiatives to also bear part of the costs can thus be necessary in order to stimulate municipalities to advance redevelopment schemes, and make the investments manageable.

Why is it a bad practice?

The lack of adequate funding for maintenance leads to deterioration of interchanges and might ultimately reduce the attractiveness for passengers of using the interchange. Studies of interchange users have concluded that general appearance is an important feature. In addition, lack of maintenance might lead to higher costs when upgrading, to catch up with previously neglected measures. This issue is also related to management models in place, for example interchanges which receive financial revenues through fares and renting of space have better potential for securing well maintained and high quality interchanges.

3.3 Main recommendations for policy and management

Table 1 summarizes the recommendations from the pilot case studies related to policy and management. Moncloa's recommendations have to a large extent already been explained in the main chapter text.

Table 1: Recommendations from the pilot case studies

Case study	Recommendation
Thessaloniki	Establishing of a regulatory framework dedicated to development and operation of multimodal interchanges
	Increase quality of service at the interchange
	Identification/establishment of a management structure, defining clear role and responsibilities amongst the stakeholders

	Medium to long term planning and development of interchanges through a master plan
	Better, more efficient connections between the terminals
	Increased sustainable design
	Promotion of commercial uses at the interchange
	Establishing green areas, footways, and cycling facilities
	Identification of capabilities and future needs in the interchange and prioritisation of investments and extensions
	Identification of financial resources
Köbánya-Kispest	Management roles need to be clarified early during the planning phase
	The number of stakeholders should be kept to a minimum. The responsibilities of the owner and operators should be set out during the design phase
	Uniform safety and security standards need to be guaranteed throughout the interchange irrespective of the stakeholder responsible
	Local/national zoning/building regulation should be adapted to the specificities of intermodal interchanges
	The financial and organisational arrangements for the maintenance and operation need to be planned early
	Planners and designers should prepare plans and designs that will accommodate any potential future changes
	Citizens should be involved in the planning of the interchange
	In case of Public-Private Partnerships, a strong representative from the public sector is needed to ensure that requirements are kept (private investors might try to keep the costs as low as possible)
	Static and real-time information systems need to be designed in parallel to the architectural design to create a uniform and integrated system
	Integrated management can improve cooperation between transport modes and create a uniform passenger experience
	Refurbishment of an interchange should cover all areas to avoid problems with barrier-free access and differences in the quality of the space
	Plans need to be made to utilise the old infrastructure
Ilford	There is a need to ensure that all access points feel safe and secure, at all times of the day
Moncloa	The organisation of traffic lights should be improved to provide better accessibility to the interchange
Kamppi	Establishing better practices for information distribution during alarms

The identified good and bad practices discussed above can have consequences on the various aspects which are important for a “successful” interchange. Table 2 is meant to illustrate this, where additional influences are illustrated with "X".. Interchange planning, special definition plan and concession contract are aspects which potentially can have major influence on the general quality of an interchange.

Table 2: Good and bad practices related to policy and management

Good practices	Policy and governance	Station operations, etc	Safety and security	Finance	Inter-change design	Facilities	Accessi-bility
G1. Interchange plan		X					X
G2. Special definition plan		X		X		X	
G3. User feedback							
G4. Public realm scheme						X	X
G5. Integrated ticketing and information							X
G6. Fare structure							X
G7. Concession contract			X	X	X	X	X
G8. Monitoring and feedback						X	
G9. Monitoring, warnings and presence of police/staff							
G10.Separating passengers from buses							
G11. Private financing for infrastructure investments					X	X	X
G12.Cover construction costs by selling properties					X		
G13. Revenue generation		X				X	

Bad practices	Policy and governance	Station operations, etc	Safety and security	Finance	Inter-change design	Facilities	Accessi-bility
B1. Unclear division of responsibilities		X	X	X	X	X	X
B2. Lack of cooperation between stakeholders		X	X	X	X	X	X
B3. Lack of integrated management			X	X	X	X	X
B4. Lack of funding for maintenance					X	X	

4 Interchange design and modal integration

4.1 Good practice examples

4.1.1 Travel time and space

G14. Distances

Distances between the various modes influence overall time spent on a journey. It should therefore be a goal of an interchange to have these distances as short as possible. Of course, however it is not only the distance which is of importance. The connectivity between modes is another feature which promotes multimodal trips. Also, for instance integrated ticketing and the capacity and location of ticket offices/machines influence the time spent moving between modes. This issue will be dealt with in another section of this report. In addition, WP 3 will also deal with traveler's satisfaction with distances.

Not all modes operate at all interchanges, therefore it is challenging to make comparisons between the pilot case studies. We have therefore selected various examples to highlight some of the most important transfers. The results show great variation between the interchanges. Bold numbers illustrate which interchange that has the shortest distance within a certain category.

In general there are, as one would expect, shorter distances between the same modes of transport (e.g. bus-bus, rail to rail). There is greater variation when it comes to distances between different modes of transport. Moncloa has in general quite short transfers (below 200 metres). Thus, all transfers could theoretically be done within 2 minutes. This might be linked to their careful planning strategy. During its re-development Köbánya-Kispest managed to relocate its terminals in order to create shorter transfer distances.

In general it is difficult to say what kind of distances are considered "unacceptable" since there are few studies which have focused on this issue. There is also a need to balance short distances and avoiding too little space for waiting areas. Either way distances are of great importance to passengers since each transfer might accumulate substantial time taken on a complete door to door journey.

Distances between modes at the five pilot case interchanges are summarised in Table 3.

Table 3: Distances between modes of transport. Meters

		Moncloa	**Köbánya-Kispest**	**Kamppi**	**Ilford**	**Thessaloniki**
		Min-Max	**Min-Max**	**Min-Max**	**Min-Max**	**Min-Max**
Access by walking	Metro-walking	**80-100**	250	300	- n/a	n/a
	Buses - walking	30-150	100-260	150	**40**	n/a
	Train – walking	n/a	120-270	n/a	**40**	n/a
Transfer public transport	Bus-metro	**90-170**	180	200	n/a	n/a
	Bus-bus	0-170	0-150	0-200	2-500	**18**
	Bus-train	n/a	220	n/a	**60-500**	220

G15. Coordination and waiting time

Coordination between the modes of transport is crucial for passengers. Public transport attractiveness is closely linked to the relative travel time compared to that of cars, making transfer time an important element of journeys. The responsibility for operating public transport might be divided across a number of actors, thereby making it more difficult to strive for better integration of routes.

The diagram below illustrates the desirable frequencies for public transport. Waiting time is calculated to be half of the interval between departures (Nielsen et al 2005). A key point to note is that short headways results in a significant reduction in waiting times. High frequencies also lead to a network effect in which travelers forget the timetable. Pre-planning becomes of greater importance if there is a long headway between modes of transport.

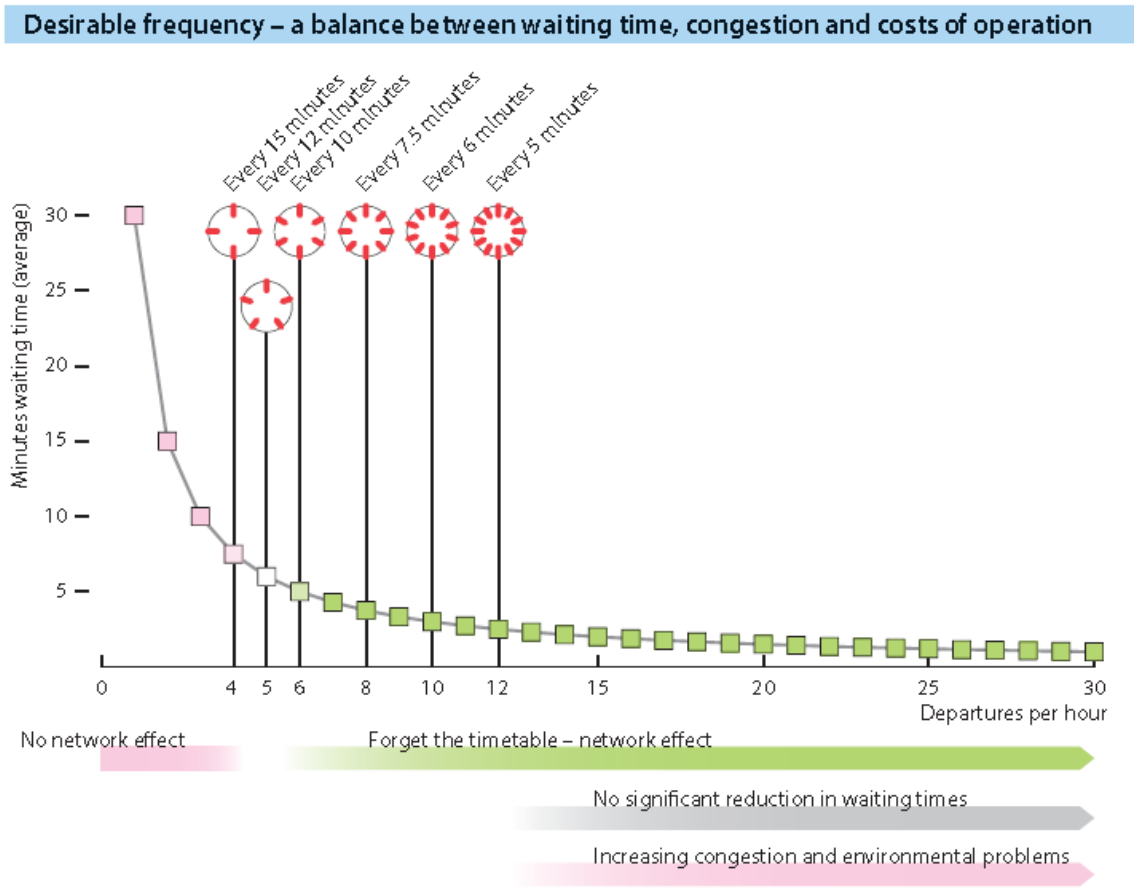


Figure 15: Desirable frequency (Nielsen et. al 2005)

It is somewhat difficult to estimate waiting times. There are a number of departures for the various modes and lines, which then often vary across the day. However, the table below attempts to illustrate the average waiting time across the modes for the five pilot case studies. Green colors means short waiting times which makes pre-planning less important. Yellow colors indicates waiting times which might have some network effect and red colors illustrate waiting times that requires pre-planning.

Kamppi for instance has at least five departures every hour making it easy to transfer. The same is true for transfers between metro-train and bus metro at Kőbánya-Kispest. The table also

shows that there is large potential for better coordination across modes. This is especially true in Thessaloniki, which seems to have few departures on public transport and little coordination across modes. This is likely to lead to an increased average waiting times, making public transport less attractive. However, Thessaloniki is making an effort to combine train and taxi as an integrated door-to-door movement. Such measures would to a large extent offset longer waiting times. Waiting times between modes of transport are summarised in Table 4.

Table 4: Waiting times between modes of transport

Kamppi

	Train	Metro	Tram	Bus
Train				
Metro			5	7
Tram		3	5	7
Bus		3	5	7

Moncloa

Time (minutes)	Metro		Interurban buses			Urban buses
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level
Waiting time	3.0	3.1	25.0	30.0	25.0	9.0

Thessaloniki

	Train	Metro	Tram	Bus
Train	37			15
Metro				
Tram				
Bus	21			16

Ilford

	Train	Metro	Tram	Bus
Train	10 or less			20 or less
Metro				
Tram				
Bus	20 or less			20 or less

Kőbánya-Kispest

	Train	Metro	Tram	Bus
Train		2		8
Metro	16			8
Tram				
Bus	16	2		

G16. Capacity, open space and logical passenger movement

Moncloa has over 260.000 travelers each day. However, despite this large number it is easy to move around and make connects as the interchange is never really overcrowded. This is of course related to its design. The interchange has four different levels without many physical

interruptions. A clear colour strategy, with consistent signage and symbols also contributes to logical passenger movements and enables people to easily orientate themselves.

Why is it a good practice?
Interchanges need to be designed so that they provide logical and easy passenger movement. Overcrowded areas and long queues for example to get through ticket barriers reduce traveler comfort and efficiency. A poor quality travel experience is one of the key reasons given for not choosing to travel by public transport.

4.1.2 Facilities, service and retail

G17. Shopping facilities at interchange
Kamppi interchange is in a very central location in downtown Helsinki. The area of the interchange/shopping centre is approximately 4 hectares. In addition to the shopping centre there are also offices and flats in the same building complex. A total of 170 businesses operate in the Kamppi shopping centre (May 2013). They have a wide selection of businesses, including 106 stores, 35 restaurants and cafés, and 29 services as beauty salons, gym, banks and laundry. Köbánya-Kispest also has a shopping mall right next to the interchange

Why is it a good practice?
Shopping facilities at the interchange provides travelers the opportunity to use their time more productively while waiting. This can be an important element in reducing the interchange penalty and might be particularly important for travelers which have rather long waiting times. However, it can also be important taken into account that passengers have to conduct several errands each day. Having services located at interchanges provides passengers the opportunity to shop necessary commodities during their regular travel and can thereby be an incentive for increased use of public transport.

G18. Clear strategy for retailer quality
In Moncloa, the concessionaire authorizes which services and activities are allowed to take place within the interchange. It is up to the concessionaire to set the standards for the services provided and thus they have control for deciding what kind of services are allowed (securing proper distribution of types of businesses) and the standards provided e.g. opening times, comfort, and distribution of merchandise.

The quality of services, and compliance with regulations, can be supervised and monitored by interchange employees. This could help to ensure high standards of retailer quality, as well as avoiding challenges connected to, for example, that facilities are not located in logical progression.

Why is it a good practice?
The image of an interchange is affected by the quality of service provided within it and also in the surrounding area. High standards connected to the design of the interchange and its facilities are likely to have a positive impact on traveler satisfaction and their value of time. It is particularly important to reduce the perceived time spent on a journey.

G19. Surveys for monitoring the level of service
In Helsinki they conduct regular common surveys concerning the level of service for the whole Regional and Local Public Transport. Some special studies have also been made about interchange safety and security issues.

Why is it a good practice?
Feedback from passengers and customers can be an important source of information in order to provide better services. Customers can have suggestions for improvements and state their satisfaction with various aspects at the interchange. Feedback from passengers and customers can also provide better capacity.

G20. Waiting rooms, protection against weather, WIFI access

At Moncloa, Helsinki and Köbánya-Kispest all transfers are completed inside the interchange building. Consequently they have protection from the weather, as well as having short distances to the various services provided.

Ilford is currently a rather old interchange, with its last redevelopment occurring in the 1980s. Old stations often struggle to be successful intermodal interchanges due to their outdated designs which don't necessarily sufficiently take into account the need for intermodal transfers or account for current passenger needs and expectations. Ilford does however have two passenger waiting rooms. The waiting rooms have lighting and heating, although their capacity might be insufficient at peak hours.

Moncloa and Kamppi are the only interchanges which offer free WIFI. At Kőbánya-Kispest it is only available at the shopping mall.

Why is it a good practice?
The value of time on journeys can often be improved by providing travelers with opportunity to use their time valuably, such as shopping or eating. It is also important to offer waiting rooms which give travelers protection against weather and noise. This is especially necessary during cold winter months. As a minimum there should be protection against snow and rain. Another important feature, which is becoming more important, is the provision of internet – through wifi. In recent years, there has been a rapid technological development which offers travelers new opportunities for browsing the internet, checking emails, etc. on laptops, tablets and mobile phones. Being able to work or read news these devices is a factor that could help to offset the advantage that might be seen of using a car.

4.1.3 Journey planning and real time information

Table 5 illustrates what kinds of services are offered at some of the interchanges for journey planning and passenger information. High levels of service in relation to this are considered essential elements for users of public transport. Recent technological developments have opened up a vast number of measures, which can help to improve traveler experience, such as mobile applications which provide real time public transport information. It is therefore not surprising that there is great variation in what kind of intelligent systems are currently being used.

Local and long-distance pre-trip planning is possible through both web and mobile applications. Moncloa currently has a system which recommends journeys according to the day of the week, starting time, location (street, stops, stations) and preferences about transport mode (for instance only metro or only bus). A similar system is also in place in London – which can be used for journeys to and from Ilford.

Table 5: Intelligent System or Service in use in the interchange area.

Kőbánya-Kispest	Kamppi	Ilford	Thessa-loniki	**Intelligent System or Service in the Interchange Area**
x	x	x	x	Journey planner for local public transport for pre-trip planning
x	x	x	□	Journey planner for long-distance public transport for pre-trip planning
□	x	x	□	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
□	x	x	x	Smart ticketing [speeds up transfer]
□(being installed)	x	x	□	Electric departure time displays based on *timetables* (for multiple stops)
□	x	x	x	Electric departure time displays based on *timetables* (at stops)
X (partly)	□	x	□	Electric departure time displays based on *real-time information* (for multiple stops, incl. fleet monitoring systems)
x	□	x	□	Electric departure time displays based on *real-time information* (at stops)
X (partly)	□	x	□	Departure times via audio calls
x	□	x	x	Real-time disturbance information provided via *displays*
X (partly)	□	x	x	Real-time disturbance information provided via *audio calls*
x	□	□	x	Multi-language information
□	x	□	□	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
□ (in the mall)	x	x	x	Information centre with personal service
□	□	□	□	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)
x	x	x	x	Guidance and warning surfaces for the visually impaired
□	□	□	□	Tactile maps of the interchange for the visually impaired
□	□	x	□	Information with hearing aids (e.g. “T-coil”)
□	□	□	□	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
□	□	□	□	Intelligent Indoor-Navigation System
x	□	x	□	Intelligent security systems (e.g. CCTV)
□	x	□	□	Areal or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.
□	x	□	□	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

G21. Tools for pre-trip planning

Local and long-distance pre-trip planning is possible through web and applications. Moncloa has currently a system which recommends journeys according to day of the week, starting time, location (street, stops, stations) and preferences about transport mode (for instance only metro or only bus). Transport for London also provides good online and multimodal journey planning system, which can be used for journeys to and from Ilford. The journey planner by the Helsinki Regional Transport Authority is very advanced and user-friendly (http://www.reittiopas.fi/en/). It provides multimodal guidance (including walking/biking), saving preferences (e.g. route with fastest or least transfers), picking locations from a map and so on. Perhaps most importantly, the service has free APIs (Application Programming Interfaces) for anyone to develop journey planner applications using the timetable (and real time) data for the public transportation and routes. For long-distance travels, there is a national journey planner available as well (www.matka.fi).

Why is it a good practice?

Prior planning is often crucial for users of public transport and a key factor used in promoting increased use of public transport. It is easier to plan and optimize intermodal trips if journey planners provide information about journeys across modes. Prior knowledge about journeys for all forms for modes can make passengers less stressed and make better use of their spare time (this links to the importance of the services provided within interchanges).

4.1.4 Fares and ticketing

G22. Electronic ticketing

Transport for London has a system an electronic ticketing system called the 'Oyster Card'; this is used for public transport in the Greater London area. It is valid on the metro, buses, trams, some boat services and most National Rail services within London fare zones. A standard Oyster card can hold single tickets, period tickets, and travel permits. Cards may be charged by recurring payment authority, online purchase, or at terminals within interchanges. Use is encouraged by offering cheaper fares, compared to cash.

In Madrid a new smart Public Transport Travel card was introduced in May 2012. It is based on RFID technology and offers numerous benefits compared to contact based tickets. Validation is carried out without direct contact to a reader and thus realizes cost-savings through reduced maintenance. Ticket validation is also much quicker than manual stamping and this reduces queuing and its valid for all public transport modes.

Why is it a good practice?

Electronic ticketing across modes is essential. Electronic ticketing makes it possible to have one ticket that can be used on various modes within a region. Electronic ticketing can thus reduce barriers connected to the problems of buying tickets, as well as saving time, for example when boarding public transport and as a result making public transport more attractive.

4.1.5 Safety and security

G23. Safe and secure design

It is necessary to carefully consider safety and security during the planning phase of interchange development/re-development and a wide range of tools are available for doing this. Studies which have a main focus on safety and security can ensure that safety and security are not neglected and highlights aspects which are problematic. For instance, analysing air-extraction

and ventilation provides information about smoke development in the case of fire. Simulation of passenger movement during evacuation procedures provides valuable information which helps designing a safe interchange. Keeping vehicles and passengers separate also helps to minimize the risk of accidents and collisions. The likelihood of design faults, like those seen in the Köbánya-Kispest case are minimized by employing such measures.

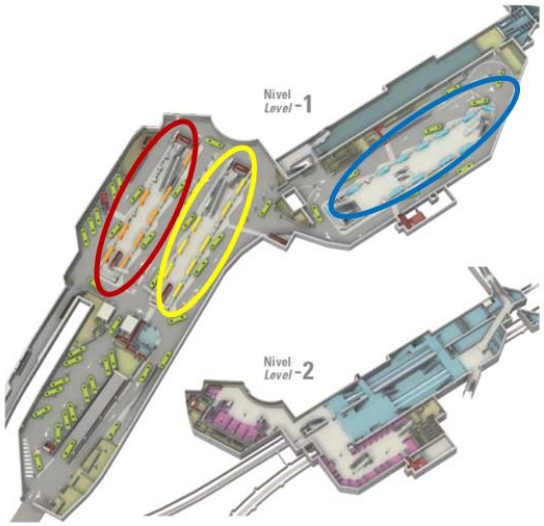


Figure 16: Design of bus platforms at Moncloa

Why is it a good practice?
Keeping flows of vehicles and passengers separate ensures that passengers are not present in areas which are used by buses. Avoiding parallel platforms with circulation lanes is one measure which might improve safety. Thus, the design reduces the risk for collisions and accidents between passengers and buses. Use of tools and simulations prior and during the design phase, can improve knowledge about the likely course of events in case of for example fire and passenger movement in terms of crisis.

4.1.6 Sustainable interchange design

G24. Air quality and energy efficiency

Kamppi use the exhaust air from the passenger areas to warm up the bus platform which does not have any heating system. Air filters have been added to the roof of the terminal area (which is an indoor space) to improve air quality. Kamppi also has doors to the bus platforms which only open while buses are departing. This can be both be a positive measure for security (avoiding passengers to move where buses traffic), but also energy efficient since it hinders unnecessary leakage of heat. Kamppi also has a system for monitoring the air quality and regulates the idling of buses.

Why is it a good practice?
Sustainable interchange design and energy efficiency are topics which receives increased attention by policy makers and authorities. It is not only relevant for environmental purposes, but can also have positive impact on both social and economic elements. It is therefore important that interchanges focus on such aspects. For instance is idling of buses a measure which can be rather easy to implement. Interchange staff can control or influence bus drivers to stop the engines. It is also possible to include idling in the tender for operating public transport.

G25. Hybrid or electric public transport

Interchanges themselves are not usually responsible for the public transport vehicles which use the site. Typically it is the transport operators which acquire new and less pollutant buses or trains in order to satisfy requirements or reduce emissions and/or save energy consumption.

As part of the Crossrail project – for which Ilford is a station - the UK are planning to use lighter trains and regenerative energy braking[10]. Introducing hybrid buses can be an important measure in mitigating local air pollution issues (NO_2 and PM_{10}). Transport for London is in the process of introducing about 1700 hybrid buses by 2016. It is expected to reduce emissions of local pollutants and carbon dioxide by at least 30 per cent. It cannot be certain however that hybrid buses will be used on the bus routes serving Ilford interchange. Both of these measures would also reduce total energy consumption.

Why is it a good practice?

Fewer pollutants would benefit travelers at interchanges, by reducing health risks and improving the quality of the environment. Interchanges can potentially attract a large amount of buses and the cumulative levels of pollution can be are harmful for travelers. Such issues are particularly important for people with health issues, such as asthma and other lung conditions. There is little doubt that public transport vehicles which emit less pollution would be beneficial for interchanges, even though there are few statistics available about air quality issues within or close to interchanges.

4.2 Bad practices examples

4.2.1 Travel time and space

B5. Barriers for accessibility

The case study from Ilford has identified five barriers at the interchange before passengers can access platforms from the main entrance:

- Gate lines could easily become overcrowded during the rush hour
- Conflicts between those queuing for tickets and those queuing at the barriers
- A fairly small area exists for the ticket office and ticket machines
- There is also a long distance from trains to some buses
- Narrow connections exist from trains to some buses

These issues with the gate lines and ticket office were identified in the urban realm study conducted as part of the planning for Crossrail and should be resolved once the interchange is re-developed as part of the Crossrail development.

Why is it a bad practice?

Enabling users to find their way in the shortest possible time period possible is of course important. Any barriers which increase travel time should be avoided. Establishing sufficient capacity for ticket offices or ticket machines are likely to be cheaper measures, compared to changes in design to the overall interchange. Barriers connected to validating or buying tickets could be reduced by having integrated and/or electronic ticketing. Travelers will have less need for buying tickets at interchanges and this could lead to less queues. Providing free WIFI can

[10] Regenerative Braking involves using motors in reverse as an electric brake and returning the energy to the electrical supply system and will be a design requirement on Crossrail rolling stock.

also facilitate fewer queues at ticket machines if it is possible to buy tickets online through e.g. mobile phones.

4.2.2 Facilities, service and retail

B6. Not an enjoyable place

Interchange popularity is influenced by its quality in terms of facilities and services. There are few retail opportunities within the Ilford train station. In addition, the quality of waiting rooms and toilet facilities is poor – something which will be improved when the station is re-developed as part of the Crossrail project. Köbánya-Kispest also face challenges connected to the quality of parts of the interchange. The rail station was not upgraded along with the rest of the terminal and has an interior design which is now outdated. Specific issues include lack of maintenance which has resulted in dead trees and graffiti on walkways (see photos below).

Figure 17: Lack of maintenance at Köbánya-Kispest

Why is it a bad practice?

Facilities at an interchange should be attractive, making the space an enjoyable place to be and reducing the interchange penalty. Value of time generally decreases when travelers are waiting in the interchange and only have low quality or few facilities. Section 5.1.2 illustrated that some travelers could expect to spend some time waiting. For such travelers it's important to provide enjoyable areas to relax or make better use of their time.

B7. Facilities not located in logical progression

There are conflicts of interest between the owner of the shopping mall and the passengers at Köbánya-Kispest. Naturally, the mall wants to locate services in such an order that passengers have to walk through as many shops as possible. Services at Köbánya-Kispest are consequently scattered around the mall. This is in contrast to passenger interests who want all important services located close to each other and in particular close to the main transfer route.

Why is it a bad practice?

Having facilities in a logical progression for users makes it easier for them to reach necessary destination points within a limited time period. Information, toilets, ticket machines and other retail or services should be located in sequence based on the traveller's needs. This will minimize distances and therefore walking time. Moncloa has a concessionaire agreement which might prevent such inappropriate development.

4.2.3 Journey planning and real time information

B8. Lack of integrated multimodal information

Operators at Köbánya-Kispest use different information systems and there is no coordination or integrated multimodal information. The electronic information systems are not connected since they use different types of equipment and displays. Thus, the transport operator's only give information about their own services. The shopping mall does not provide travel information, even though the shopping mall also serves as a waiting area for public transport users. The interchange also lacks an integrated information board which provides travelers with timetables, routes, fares or ticketing options.

Why is it a bad practice?

Information is a necessity for public transport users and an important strategy to consider when promoting increased use of an interchange. Lack of information increases barriers for interchange users. This is especially problematic for less frequent public transport users. Seamless intermodal journeys require integrated information across modes since it promotes both time and effort savings (Grotenhuis et al. 2007). Such practices are especially important if the interchange also lacks direct customer services, such as an information desk.

B9. No uniform signing

Köbánya-Kispest lacks uniform signing throughout the interchange. Figure 18 illustrates a situation where there are four different types of signing in the railway station. In addition, there is no uniform signing for bus stops.

Figure 18: Example lack of uniform signing

Why is it a bad practice?
Simple and clear signing within the interchange helps travelers transfer between modes. Confusing signing might lead to increased travel time and frustration. This might be especially important for foreign travelers, who in particular rely on signs for guiding them through an interchange.

B10. Location and capacity at ticket offices
Köbánya-Kispest has four ticket offices (one for rail, one for regional buses and two for local buses and metro). In addition there is a ticket vending machine, but it has been out of order for months. There are two main problems: (i) insufficient capacity at the most conveniently located ticket office for buses and metro and (ii) poor location of the ticket office for regional buses (it is too far from the bus terminal). This is in contrast to Moncloa station which has 25 ticket machines and sufficient capacity.

Why is it a bad practice?
An integrated ticketing system reduces the need for buying tickets each time travelers change mode of transport. Capacity and location of ticket offices becomes of greater importance without such a system. Short distances between modes can be offset by inefficient location and lack of capacity at ticket offices, which increases possibilities for missing transfers and in general leads to increased time spent on a journey. Location and capacity should therefore be a top priority in order to provide solutions which allow for seamless and efficient journeys.

4.2.4 Safety and security

B11. Unsafe design
There are a number of potential practices in interchanges which can reduce safety. We highlighted in the section on good practice that keeping flows of vehicles and passengers separate ensures that passengers are not present in areas which are used by buses. Avoiding parallel platforms with circulation lanes is also one measure which might improve safety. This is not the case in Köbánya-Kispest. There are several pedestrian crossings across roads used by buses. In addition there are series of columns along the stops at the interchange, which also act help to reduce safety.

Why is it a bad practice?
There are potentially several thousands of travelers crossing roads where buses are operating and not keeping the travelers separated increases risks of accidents and therefore injuries.

Figure 19: Example of design faults

B12. Secluded areas

Pedestrian studies carried out to inform the planned redevelopment of Ilford station identified aspects of the current layout which can make users of the interchange feel less secure in the hours of darkness, especially women and vulnerable people. In particular during the winter months when the York Road entrance is open (only during peak hours) this entrance may feel unsafe due to its location in a back street. The Crossrail redevelopment is expected to address this issue.

Why is it a bad practice?

All access points should feel safe and secure. Secluded areas might feel unsafe for users during hours of darkness. Female users regard walkways, secluded areas and tunnels as less secure than open areas. Such areas might lead to concerns about physical attacks, robbery or sexual assaults. Feeling insecure can lead to lower levels of comfort and make public transport less attractive, especially during hours of darkness.

4.3 Main recommendations for interchange design and modal integration

Table 6 shows the recommendations identified from the pilot case studies. It illustrates the importance of providing real time information, improving ticketing, and providing facilities which improve traveller's experience.

Table 6: Identified recommendations from the pilot case studies

Case study	Recommendation
Thessaloniki	Introduce real time information
	Reduce waiting time through e.g. providing ticketing machines
Ilford	Need for smart and integrated ticketing across modes
	Real time information for all modes should be provided at the interchange and online
	Web based journey planning should link all possible modes, including walking and cycling
	Good wayfinding should be provided to and from all interchange access points, not just from the entrance
	Passenger facilities, such as waiting rooms, toilets, ticket halls, should be maintained to a high standard
	High quality retail opportunities should be provided within the interchange building
Kamppi	Provide better capacity for ticket machines
Moncloa	Establishing a strategy for attracting businesses
Köbánya-Kispest	Improve capacity and location of ticket offices

Table 7 below illustrates the possible effects of good and bad practices discussed above. The 'X' shows what category is influenced by the good or bad practice. For instance, journey planning and real time information across modes is to a large extent dependent on policy and governance in the region, as well as how the interchange is organised. Such aspects are important since it has positive effects on accessibility.

Table 7: Good and bad practices related to interchange design and modal integration

Good practices	Policy and governance	Station operations, etc	Safety and security	Finance	Inter-change design	Facilities	Accessi-bility
G14. Distances							X
G15.Coordination and waiting time	X						X
G16. Capacity, passenger movement		X				X	X
G17. Shopping facilities at interchange				X			
G18. Clear strategy for retailer quality		X				X	X
G19. Surveys for monitoring customers satisfaction						X	X
G20. Waiting rooms, weather		X				X	X

Good practices	Policy and governance	Station operations, etc	Safety and security	Finance	Inter-change design	Facilities	Accessi-bility
protection, WIFI							
G21. Tools for pre-trip planning	X	X					X
G22. Electronic ticketing	X	X					X
G23. Safe and secure design							
G24. Air quality and energy efficiency	X						
G25. Hybrid or electric public transport	X						

Bad practices	Policy and governance	Station operations, etc	Safety and security	Finance	Inter-change design	Facilities	Accessi-bility
B5. Barriers for accessibility		X					X
B6. Not an enjoyable place						X	
B7. Facilities not located in logical progression		X				X	X
B8. Lack of integrated multimodal information	X	X					X
B9. No uniform signing	X	X					X
B10. Location and capacity at ticket offices		X					X
B11. Unsafe design							X
B12. Secluded areas						X	X

5 Accessibility

5.1 Good practices examples

5.1.1 Accessibility for walking and cycling

G26. Bike- and- ride

Köbánya-Kispest offers bike and ride facilities which are covered and also have signs along cycle paths. On weekdays the utilization is about 50 per cent. Ilford also has some cycling parking options within or close to the interchange. For instance, they have eight spaces for cycle parking which is under cover and monitored by CCTV.

Why is it a good practice?

A cycle journey starts and stops with parking. It is therefore of great importance to provide and then promote facilities for cycles. Lack of secure parking for bikes is often a barrier for promoting cycling. Establishing cycle paths that separate cycles and cars also promotes cycling and is an important supplementary strategy for intermodal journeys.

G27. Pedestrian Environment Review System

An analysis of the pedestrian environment surrounding the interchange, including assessing the level of comfort, has been undertaken in Ilford in preparation for the station re-development and urban realm improvements as part of the Crossrail development. It concluded that the immediate entrances to the station were comfortable, but other areas were rated "unacceptable" due to narrow footways and crossings and advertising signs and telephone boxes. Forecasts show that increased passenger flows expected as a result of the Crossrail development will result in lower levels of accessibility. Thus indicating improvements are needed which are being planned.

Why is it a good practice?

This is an example of the benefits of using formal pedestrian audit methods when planning a major redevelopment to identify and prioritise where improvements are needed. This will help to ensure that walking accessibility is improved once the station is re-developed. TfL has a toolkit of pedestrian assessment guidance, applied alongside its guidance on the design of transport interchanges[11].

G28. Multiple entrances

Moncloa has entrances on each side of the interchange. Before the renovation in 2008, the interchange area was considered dangerous due to high level of traffic. The renovation implemented measures which decreased traffic and made it safer for accessing by walking.

Why is it a good practice?

Safer and better access by walking is necessary to allow shorter distances, reduce travel time and increase safety.

G29. Cycle paths

Thessaloniki has built a bicycle path which cross the city center and terminates outside the interchange. This is also the case in Kamppi which has cycle paths to the interchange from all directions.

[11] TfL's 'Walking Toolkit' is available on its website at: www.tfl.gov.uk/businessandpartners/20953.aspx; Interchange Best Practice Guidelines are available at: www.tfl.gov.uk/microsites/interchange/default.aspx

Why is it a good practice?
Cycle paths are an important element for promoting increased use of soft modes. Such infrastructure offers travelers the opportunity to use soft modes to and from the interchange and it also promotes sustainability.

G30. Bicycle centre
A bicycle centre is located right next to the interchange in Kamppi. It provides rental bikes (during summer), maintenance and repairs as well as a bike park monitored by cameras.

Why is it a good practice?
Bicycle centre is a service which can foster increased use of cycles. Having such a service located next to the interchange gives travelers the opportunity to for instance repair cycles while travelling to or from work. A bike park with monitored cameras is also a measure which can increase safety at the interchange.

5.1.2 Accessibility for public transport

G31. Frequent public transport services
Kamppi, Moncloa, Ilford and Köbánya-Kispest have frequent public transport services. The frequencies at Köbánya-Kispest are for instance:

- Metro – more than 300 departures/day
- 15 local bus lines with more than 1000 departures/day
- 3 regional bus lines with more than 70 departures/day
- 2 railroad lines with almost 250 trains/day

Why is it a good practice?
High frequency on public transport is a necessity for promoting increased use of interchanges– meaning passengers can turn up and travel and not worry too much about missing a particular service.

G32. Dedicated tunnels for buses
The Moncloa interchange in Madrid has dedicated access tunnels for buses that ensure fast access to and from the interchange for those travelling by bus. This has increased the attractiveness of buses compared to cars, and it has also increased the interchange's ability to attract bus companies to the interchange. The Kamppi interchange in Helsinki also provides public transport lanes while access by car is limited.

Why is it a good practice?
Fast access for public transport to urban interchanges increases the joint level of service level of trips performed by the different modes.

G33. Combination of train and taxi ticket
Thessaloniki offers a service called TRAINOTAXI. This is a combination of train and taxi services making it possible to make transfers between taxi and train on the same ticket.

Why is it a good practice?
A combination of train and taxi ticket is an innovative service provided at the interchange. This enables travelers to reach their final destination in a comfortable and time efficient manner. Such

a services might be particular important for travelers with poor public transport services. A combination of taxi and train can increase the attractiveness and increase the use of public transport.

5.1.3 Access for all

G34. Access for all

Moncloa have implemented a range of measures in order to promote an interchange which is convenient, safe, rapid and free of obstacles. One especially important aspect is to integrate such aspects into the very beginning of the design process. Measures at Moncloa cover design, furniture, signs, evacuation, vertical movement between floors and special measures for the visually impaired.

A particular important measure is to reserve space for people with restricted mobility in emergency exits**.** Evacuation for people with reduced mobility is secured through evacuation ramps which have a maximum of 8% slope. The evacuation routes also have waiting and refuge areas for people with reduced mobility.

Toilet facilities are designed to be used by all users and the design takes into account needs for people with visual impairments. Regulations state that there should be established tactile routes which have different tiles and colours. This is similar to at Köbánya-Kispest, where signs and information are also made accessible for people with visual impairments. For example boarding buttons emit a low frequency sound which indicates that the bus is ready to load passengers.

Why is it a good practice?

Making transport systems accessible for all people is an important part of achieving an inclusive society. In many countries it is also a high political priority to design transport systems for all. An accessible transport system for all is important because it will benefit all user groups and contributing to equality for all. Some of the pilot case study interchanges showed obvious potential for improvement.

5.2 Bad practices examples

5.2.1 Accessibility for walking and cycling

B13. Insufficient cycling facilities

Cycle parking facilities on the platform at Ilford are seemingly covered by CCTV, but still may be unsecure (one passenger commented that they had recently had their bike stolen from this parking). It is also located on a mainly unused platform reducing the level of convenience. Moncloa has only space for only ten cycles and these are not protected from weather. In addition, there is only one cycle path to the interchange.

Why is it a bad practice?

Cycling is an environmental friendly mode of transport which has positive effects on health. Parking facilities for cycles can also be a fairly cheap measure to implement. Interchanges should therefore promote cycling and provide facilities that make it possible to park cycles.

5.2.2 Access for all

B14. Lack of access for all

Ilford currently has particular challenges for people with disabilities. Travelers need to walk down stairs in order to reach the platforms. There are lifts to the platforms, but these are all broken and cannot be fixed due to a lack of parts currently being available. New lifts will be included in the redevelopment. Köbánya-Kispest faces a slightly different challenge, with only partial barrier free access, since the railway station was not refurbished and therefore is not accessible by those with mobility issues. In addition, there are some missing lifts and escalators to a number of the bus platforms.

Figure 20: Examples of bad accessibility

Why is it a bad practice?

Making transport systems accessible for all people is an important part of achieving an inclusive society. In many countries it is also a high political priority to design transport systems for all. An accessible transport system for all is important because it will benefit all user groups and contributing to equality for all. Some of the pilot case study interchanges showed obvious potential for improvement.

5.3 Main recommendations for accessibility

The main recommendations related to accessibility are concerned with using available guidance and studies in order to promote better accessibility. This can be especially important in the design phase, but can also be used to analyse necessary improvements during operation. The main accessibility recommendations from the individual case studies are summarised in Table 8.

One key issue with regards accessibility is that the surrounding areas are not usually governed by the interchange. Therefore it is necessary to include all relevant stakeholders in the master planning process to ensure accessibility to the interchange itself, as well as access inside the interchange is high quality. Accessibility for cycling should also be secure, weather proof and located in sensible locations.

Table 8: Recommendations from the pilot case studies

Case study	Recommendation
Thessaloniki	Providence for people with reduced mobility
	Better connectivity
Ilford	Cycle parking should be secure, weather proof and located in sensible

Case study	Recommendation
	locations
	A Station Travel Plan could aid improvement of facilities and help minimize the impact of traffic on access roads
	Make use of guidance on transport interchanges that has been developed by Transport for London
	Undertake pedestrian and cycling studies. In addition make general improvements to the surrounding public realm
	Consider the surrounding area as part of a master planning process, including all relevant stakeholders
Moncloa	Provide better facilities for multi-language
	Improve facilities for visually impaired through for instance tactile maps
Kamppi	Provide audio services for visually impaired
Köbánya-Kispest	Establish barrier free access

Table 9 illustrates the possible effects of good and bad practices discussed above. The 'X' shows what category is influenced by the good or bad practice.

Table 9: Good and bad practices related to accessibility

Good practices	Policy and governance	Station operations, etc	Safety and security	Finance	Interchange design and modal integration	Facilities	Accessibility
G26. Bike and ride		X			X		
G27. Pedestrian Environment Review system		X					
G28. Multiple entrances		X					
G29. Cycle paths	X						
G30. Bicycle centre		X					
G31. Frequent public transport services	X						
G32.Dedicated tunnels for buses	X	X			X		
G33. Combination of train and taxi ticket	X						
G34. Access for all	X				X	X	

Bad practices	Policy and governance	Station operations, etc	Safety and security	Finance	Interchange design and modal integration	Facilities	Accessibility
B13. Insufficient cycling facilities		X			X		
B14. Lack of access for all	X	X			X		

6 Conclusions

Urban interchanges are currently the subject of several analyses initiated by the European Commission due to the growing interest in the development of urban areas, growing urbanisation trends, population characteristics as well as other socioeconomic targets; among others these could involve reducing car-dependencies, improving quality of life (hence decreasing the noise and emission effects of traffic but also enhancing social inclusion), improving transport system efficiency, developing better business models and other sustainability targets. The importance of well-designed interchanges in achieving these targets is obvious.

A set of pilot case studies have been used to assess good practices and improvement potential. The lessons learnt from these case studies will serve as input into the remaining work in the project.

The pilot case studies have highlighted great variation across the interchanges. However, it is necessary to point out that we have not been able to cover all of the possible good or bad practices at interchanges, as that would require a much larger set of cases. Some good or bad practices might therefore be missing since we are dependent on the practices present at the cases studied. However, we have highlighted some of the important aspects, which we believe are valuable to other interchanges.

6.1 Management and policy is crucial

One key conclusion is that policy and organisation have a major influence on all aspects of interchanges successfulness. This includes finance, operation, maintenance, coordination, design and accessibility.

Several practices from the Moncloa interchange in Madrid should be highlighted as particularly good. They have in many ways already implemented recommendations which were mentioned in the other case studies. It is therefore interesting to observe that Moncloa has considerable less bad practices and have to a large extent avoided practices which were present in some of the other case study interchanges. To some extent this validates the findings from the other case studies conclusions.

For instance, Moncloa has an **interchange plan** which is the unification process between the exchange points for bus and metro. They also have a **special definition plan**. Already in the planning stage they have put great care into considering the ownership, financing, standards and design. This has important consequences for explaining why Moncloa can be regarded as a successful interchange.

Table 10 illustrates the main findings related to which factors facilitate or hinder good practices. Aspects which facilitate good practices are to a large extent practices which can be linked to policy and organisation.

Table 10: Factors influencing good or bad practices

Aspects	Hindering	Identified effects	Facilitating
Policy	Public transport managed and operated by different organisations is a hindrance making good	Lack of coordination.	Switch of rail services to TfL place bus and rail service under control of a single organisation.

Aspects	Hindering	Identified effects	Facilitating
	links between rail and bus service.		
Policy	Planning process did not ensure sufficient information about investments.	Court cases.	Special definition plan.
Management and maintenance	No single organisation responsible for managing the interchange	Challenges for coordination of daily operation, maintenance and quality at interchange. Results in reduced services for travelers.	Practice from Moncloa - concessionaire responsible for interchanges. Dealt with in the planning stage.
Safety and security	Design hinders good practice. Poor maintenance.	Design faults and secluded areas. Results in reduced less secure and safe interchanges and less attractive interchange	- Concession companies are obligated to build facility according to standards presented in tender. - Special definition plan. - Analysis of passenger movement and smoke development.
Finance and revenue streams	Separate revenue streams for each mode and between the operator and infrastructure	Poor standard of facilities at the interchange and lack of maintenance. Increased travel time	- Multimodal ticketing. - Special definition plan making concessionaire receive revenues through services and fees.
Design	Lack of coordination between the stakeholders.	Design faults and poor standard.	- Concession companies are obligated to build facility according to standards presented in tender - Special definition plan
Accessibility	Poor planning and design. Poor maintenance.	Increased travel time. Poor access for those with mobility issues.	- HOV-lanes to interchange .(interchange plan can facilitate this) - Integrated and electronic ticketing. - Public realm improvement scheme. - Use of pedestrian environment review system

Figure 21 illustrates the interconnections from management and policy issues to design and modal integration as well as further impact on accessibility.

Figure 21: Main organisation of good and bad practices.

Figure 22 shows examples of interactions between management and policy, design and accessibility issues at Moncloa.

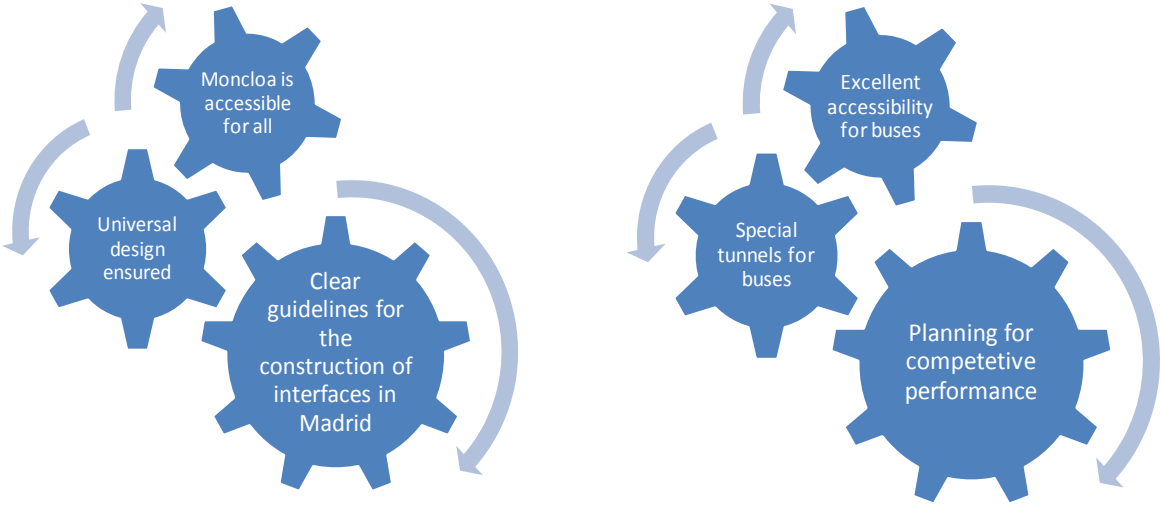


Figure 22: Interactions between management and policy, design and accessibility at Moncloa

6.2 Integration of rail and other modes

Several case studies reveal that integration with rail is more complex than integration between other means of public transport. This has at least two facets; first of all, railways are often managed at national level and have long traditions. In contrast, local buses, metro, and tram are often managed by the same local or regional entity. In several countries it appears to be a challenge to fully integrate rail services with bus, metro and tram, as it requires coordination and

integration between different stakeholders, who may also have conflicting objectives. Christiansen et al. (2012) pointed out that in some cases rail authorities do not want to collaborate too tightly with bus companies, as they consider buses as competitors, this is particularly the case for long distance buses. In Köbánya-Kispest the modernisation of the interchange did not include the rail station, which highlights the lack of integrated view. In Ilford there are also examples of a lack of integration of information between rail and buses at the station, while pre-trip journey planning and tickets are integrated. It is interesting to see, however, that following the re-development of the station and it becoming part of the Crossrail service, the rail services at Ilford will be managed by Transport for London, similar to the other public transport modes in London. In our view, this should facilitate better integration of modes.

The second particular aspect of interconnection between rail and other means of public transport is the possible difficulties of transferring an existing rail station into a multimodal interchange. Rail buildings are often old buildings, and these are not necessarily easily adapted to "access for all" standards and integration with other modes. Several challenges have been highlighted at Ilford and Köbánya-Kispest for example, although in the case of Ilford these challenges will be dealt with once the station is re-developed.

6.3 Final remarks

The identification and discussion of good and bad practices of urban interchanges in this report has focused on the importance of management and policy issues and design for the performance of urban interchanges. The next steps of the City-HUB project are to specifically explore the design of interchanges in WP 3 and consider integrated management in WP 4, before the main City-HUB model will be developed in Work Package 5. The final objective is to propose innovative instruments and define guidelines to improve urban interchanges. The good and bad practices identified in this report will serve as input to work packages 3, 4 and 5.

References

Bratberg, Ø. (2011) Multi-level politics and party change – a study of three British parties since devolution. PhD dissertation Department of Political Science University of Oslo.

Christiansen Petter, Bjørn Gjerde Johansen, Jardar Andersen and Olav Eidhammer (2012) Co-modality and interfaces between short and long-distance transport – Lessons learned from the CLOSER case studies

Eckstein, H. (1975). Case study and theory in political science. In Greenstein, F.I. and Polsby, N.W. (eds.) Handbook of Political Science, volume 7, Reading, Massachussetts: Addison-Wesley, pp. 79–137.

George, A. L. and Bennett, A. (2004). Case Studies and Theory Development in the Social Sciences, London: MIT Press

Gerring, J. (2007). Case Study Research. Principles and Practice, Cambridge: Cambridge University Press.

Grotenhuis, J.-W., Wiegmans, B.W. and Rietveld, P. (2007). The desired quality of integrated multimodal travel information in public transport: Customer needs for time and effort savings. Transport Policy, 14 27-38.

Hill, Michael and Peter Hupe (2002) Implementing Public Policy Sage Publications, London

Nielsen, Gustav (2005) Public transport – Planning the networks HiTrans Best practice guide

Lijphart, A. (1971) Comparative politics and the comparative method. The American Political Science Review 65, 3: 682–93.

Pressman, J-L and A. Wildavsky (1973) *Implementation* Berkely: University of California Press

Ubbels B., Palmer D., Laparidou K., Poppeliers R., Menist M., Jones M., Millard K., Harmer C. 2013. City-HUB project, Deliverable D2.1 Review of theory, policy and practice.

Yin, R.K. (2009). Case study research: design and methods. 4th ed. Applied social research methods series, vol 5. SAGE Publications

Annexes

Annex A: Template for pilot case studies
Annex B: Pilot case study report Moncloa
Annex C: Pilot case study report Ilford
Annex D: Pilot case study report Thessaloniki
Annex E: Pilot case study report Kamppi
Annex F: Pilot case study report Köbánya-Kispest

Annex A: Template for pilot case studies

Innovative design and operation of new or upgraded efficient urban transport interchanges

THEME [SST.2012.3.1-2.]

Collaborative project
Grant agreement no: 314262

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

WP2 – Task 2.4

Data collection template for pilot case studies

Contents

Introduction

The objective of the pilot case studies is to assess good practice, obstacles and improvement potential from daily operations in existing public transport interchanges. It is important that the partners take **pictures** of good and bad practices.

The output of the task will be recommendations for the development of the CITY-HUB model. WP-3 will extract all the information about interchange design and mode integration, while WP-4 will receive inputs for best management practices. The outcome from the pilot case studies will be a first input for defining the City-HUB model in WP-5.

To facilitate this work a case reporting template has been developed in order to facilitate a structured comparison of the five pilot cases. **This template is not a full questionnaire, but it is a collection of the topics that should be addressed for each case.** If a question is not at all relevant for your case, you can write so. Additional topics which are not mentioned in the template could also be included if they are relevant for the case study.

The template has to be divided in different parts to be addressed to each of the interchange stakeholders: terminal manager, operators, business located, etc. Those parts could have several questions in common. The responsible case study partner has to customize the questions to the specific stakeholders of its interchange. It is important to note that it is difficult to answer to some of the questions in an objective way. Therefore it is important that each case study partner conducts an independent and critical analysis of why a practice is regarded as good or bad. Pictures are also important to illustrate differences between interchanges.

Before launching the interviews campaign, some data about the interchange should be collected: location characteristics, modes, passenger demands, type of users (gender and age), area and type of building, etc.

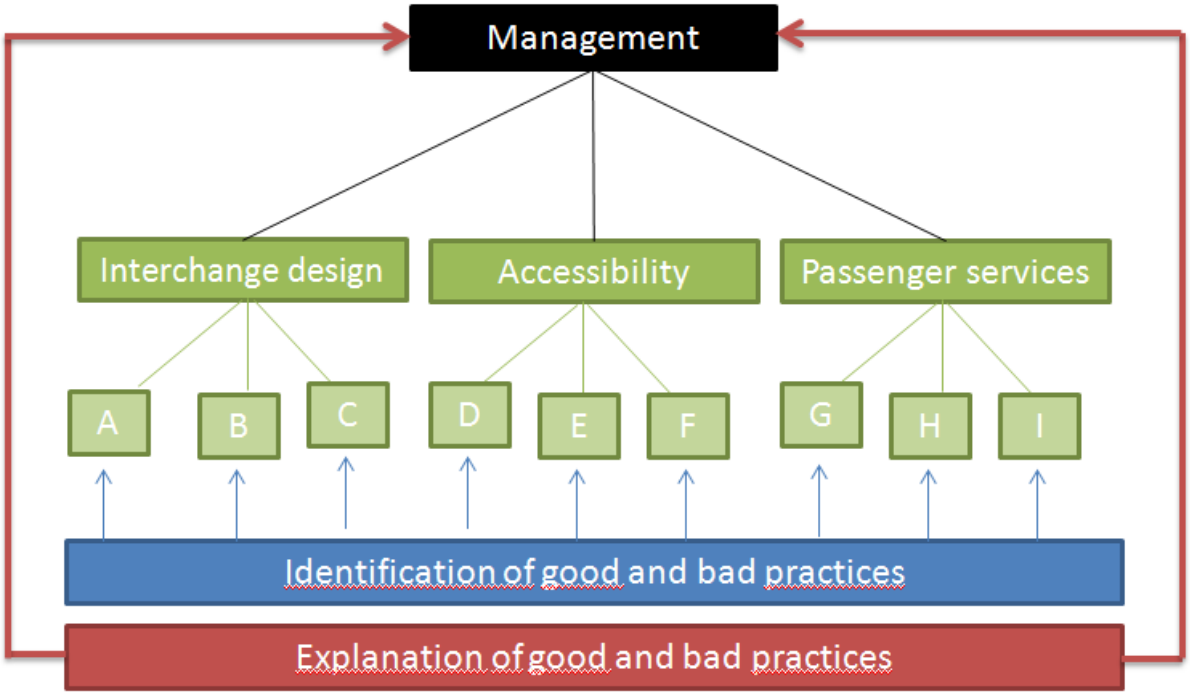
The responsibilities of the pilot case study partners are to:

- **Identify** the local **stakeholders** from which information must be collected
- **Customize** the **questions** to the specific stakeholders of its interchange.
- Make appointments and conduct **interviews**
- Analyse the information collected from the different sources and **fill the template** based on this information

The template also incorporated questions from the WP 3 questionnaire. These questions can be found in bold text and should also be addressed.

The final deadline for producing the pilot case reports is **May 31th**. It is important to start the preparations as soon as possible.

The case studies are organised according to the following figure:



1 Background

No two interchanges are the same; they vary in terms of history, modes and location. Therefore it is important to understand some of the specific characteristics of each pilot case study. Please start by providing a short introduction which includes

-A brief history of the interchange (include also whether the interchange is old or new, date of opening, circumstance of realisation)

- **Modes of transport at the interchange (please specify: walking, cycling (with cycle parking), cycle hire, motor cyclists (also scooters and mopeds), buses, long distance coaches, metro, light rail/ tram, heavy rail, private cars (with car parking), private cars (with drop off), taxis, other**)

- **Please describe the interchanges role/place in the overall transport network. For example, is the interchange for local, regional, national or international connections etc**

- **Please can you provide some information on current passenger numbers? Including the total passengers by mode, the percentage split by mode, the approximate share of transfers between modes and spatial scale (please see table below) and the distribution between men and women travellers**

- Approximate share of transfers between modes and spatial scales (see tables below)

- The background also needs to include a description of the location and the area surrounding the interchange. (Is the interchange also connected to other modes/public transport in proximity (ie not directly but close to))

- **When was the interchange opened in its current form? Have any (minor or major) re-developments taken place since the interchange first opened? If yes please state when and provide an explanation of the changes made** (increase of the city-hub itself, new organization between different modes, increase of the number of travelers, new path for travelers, etc.)

Approximate share of transfer between spatial scales. % of passengers. Spatial scales may be different for each interchange, please therefore outline the basis used for your categories e.g. local is up to 10 km, regional is up to 50 km, etc., or local covers all metro travel, regional covers travel on X bus route, national covers all X rail route.

From \ To	Local	Regional	National	International
Local				
Regional				
National				
International				

Local defined as:

Regional defined as:

National defined as:

International defined as:

Approximate share of transfer between modes on average weekdays. % of passengers. Buses should be separated between local, regional and interurban distances. Cycling and walking can be separated if there are available data. In addition there should be another table with approximate share of transfer between age and gender. This can be done in a separate table. If there are limited data please try to specify age[12] and gender in the sum category.

Modes From/to	Train	Metro	Tram	Bus: Local Regional Interurban	Car	Cycling and walking	Other (specify)	Sum
Train								
Metro								
Tram								
Bus: -Local - Regional - Interurban								

[12] Age can, if possible, be categorised in 17 years or less, 18-25, 26-40, 41-65 and 66 or more.

Car								
Cycling and walking								
Other (specify)					-			
Sum								

2 Management

WP 2.2 studied critical factors for the effective delivering of accessibility. This included funding streams, institutional arrangements and capacities, supporting legislation, policy guidance, key stakeholders, community structures and the role of champions. Moreover, WP4 will use the case studies to analyse the organization of interchanges in terms of their operational functionality, management, practicalities, services and efficiency at place. It will be important to detect innovative services as well as other special characteristics an interchange might have.

2.1 Policy and governance

	Questions and tasks
1	**Which organisation was responsible for the design of the multimodal interchange (including any enhancement)? (please specify all who are involved: central government or one of its agencies, regional government or one of its agencies, local authority, public transport authority, rail/metro/LRT operator, bus operator, private organisation, other. If other please provide details. Please describe who was responsible for design and any re-developments which have subsequently occurred**
2.	**Was the public consulted of the design of the interchange? If yes please describe the process applied to involve the public in the design process**
3.	**Which three key aspects were considered in the design of the multimodal interchange? 1. ……., 2. ……. 3. ……..**
4.	**What are the particular challenges that are commonly faced in the design of multimodal interchanges? Please provide details.**
5	Which organization was responsible for the planning of the multimodal interchange (including any enhancement)?
6.	What are the particular challenges that are commonly faced in the planning of multimodal interchanges?
7.	Did the planning processes ensure that transport hubs are close to, or co-located with, important origins and destinations, such as housing, office space and employment and retail opportunities?

8.	Please describe how public transport is organized in the region. A short description of the community or regional structure. Is there cross functions between local, regional and national level for decisions about the interchange? Is there a body (public or public-/ private) for the schedule regulation between all the transport modes at the interchange?
9.	Does the interchange have or use a station travel plan? If yes, please describe briefly the content.

2.2 Station operations, management and maintenance

	Questions and tasks
1.	**Which organization(s) is/are responsible for the management of the interchange (please specify all who are involved: central government or one of its agencies, regional government or one of its agencies, local authority, public transport authority, rail/metro/LRT operator, bus operator, private organisation, other. If other, please provide details.) Please describe the management structure.**
2.	**What is the ownership structure of the interchange? (Public, private, joint venture (Public-Private), other. If other, please provide details.**
3.	**Please describe the regulatory framework within which the interchange operates.**
4.	Please describe the key actors and secondary stakeholders; and the relationship between the transport and retail/commercial activities. Are there any models? In what ways do partners coordinate common responsibilities, activities, maintenance, etc?
5.	**Is the public involved in any on-going engagement with regards to the operation of the interchange?**
6.	**Is there co-operation between the different operators for ensuring connectivity between modes? For example, relating to timetabling, ticketing or information etc... If yes, please describe. If no, is there a reason why not?**
7.	**Can you describe any specific methods that were used or provide guidelines that aided the co-ordination between modes at the multimodal interchange?**
8.	**Are there any factors that could facilitate co-operation between modes?**
9.	What are the main issues for improving interoperability/ organisational coordination of modes? Related to for example lack of an integrated terminal management, high costs, long planning, design and financing of

	terminals, coordination of infrastructure management among involved stakeholders, congested or inadequate infrastructure, different regulatory structures for different modes
10.	(if several actors own or manage the interchange) Are there management agreements which specify cooperation procedures? How do they function and what key learning is suggested?
11.	Does the interchange use feedback from customers and passengers e.g. via surveys? (If yes, please note the frequency of data collection and who is responsible for their organisation/financing.)
12.	What are the main /most important factors that facilitate cooperation between modes??

2.3 Safety and security

	Questions and tasks
1.	Safety can be both the design of the interchange in order to minimise the potential for accidents, conflicts and collision, as well as compliance with safety standards. Are there any examples of good and bad practices connected to these issues? What has been done to enhance safety?
2.	Security encompasses for example minimisation of risks, crime prevention, monitoring and crowd management. Are there any examples of good and bad practices connected to these issues? This could also include cooperation and coordination with police.
3.	Is the interchange considered as safe for women and vulnerable people at all times of day? (This is of course difficult to measure. We suggest that interviews can shed light about whether they receive complaints from passengers about these issues.)

2.4 Finance and revenue streams (revenue generation)

	Questions and tasks
1	**Who bears the financial responsibility of the interchange (maintenance, investments, local charges)? Public, private, joint venture (public-private), other. If other, please provide details.**
2	If public – private partnerships. Please give a short description of the model
3.	**Is the interchange financially profitable? Yes, no? If possible, provide any (financial) reports that can be used to assess the economic performance of the interchange.**
4.	**Impact of capital costs on the interchange profitability.** **A) What has been the financing model to fund the development of the interchange?**

	B) What was the expected payback time of the investment? **C) Who are the main financiers?** **Is there a business model developed for the interchange? If yes, Please provide a copy (treated with confidentiality)** **If not, how are decisions on pricing level and services determined?** **If no business model exists, would the interchange benefit from having one? Yes, no**
5.	If possible, specify the income and costs as percentage/ ratio and give an indication about the importance of revenues from services, etc. For example how much are the subsidies, revenues from services located at the interchange income from operators arriving the interchange, etc
6.	How is the revenue used? This should also include how revenues are pooled and redistributed?
7.	Are there any incentives (rewards or punishments) in the management models? How do they function?
8.	Please describe the determination of costs (also including which actors who cover costs)

2.5 Good and bad practices

Relevant questions are:

- *Do you have any good practices which are particularly important regarding policy and governance, station operations, management and maintenance, safety and security and finance and revenue streams?*
- *Do you have any lessons learned connected to these issues?*
- Please mark with x which stakeholder perspective the good or bad practice applies for

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance					
Station operations					
Management and maintenance					
Safety and security					
Finance and revenue streams					

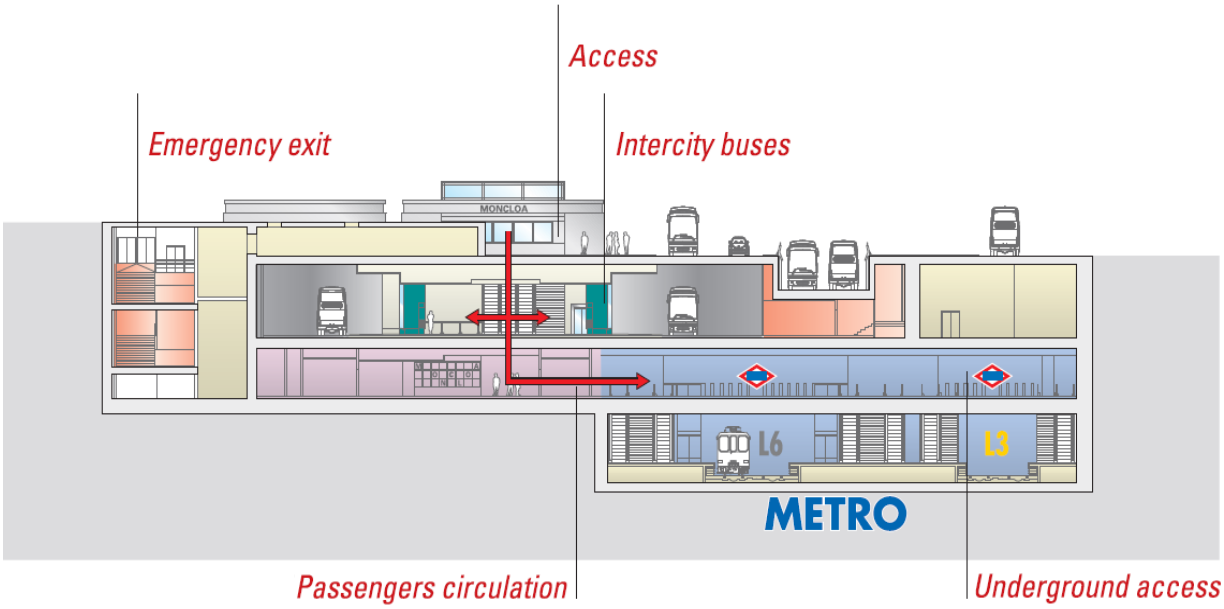
Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance					
Station operations					
Management and					

maintenance					
Safety and security					
Finance and revenue streams					

3 Interchange design

The case study should aim to provide an overview of the structure inside the interchange. The structure of the interchange can then be used to analyse aspects as travellers travel time, convenience, reliability, comfort and safety. The case studies therefore need to include map(s) with location of physical interconnections, location of shops, parking, entrances, etc. Distances and average travel time between various destination points are also needed. A map will be supplemented with a description of the structure. This section will provide an overview of the terminal which can be compared to the other terminals. The examples below are from Moncloa interchange in Madrid.


Access
Emergency exit
Intercity buses
MONCLOA
L6
L3
METRO
Passengers circulation
Underground access

3.1 Sustainable interchange design

	Questions and tasks
1	**Was energy efficiency considered in the interchange design? If yes, please explain how energy efficiency was ensured in the interchange design? (E.g. energy use of the terminal, accessibility by walking and biking including bicycle parking, etc)**
2.	**Was energy efficiency considered in the interchange operation? If yes, please explain how you follow the energy use and carbon footprint or CO_2-emissions of the interchange.**
3.	Please describe whether the interchange has an energy strategy to reduce its carbon footprint. A related subject can be whether the interchange management has undertaken any analysis of the energy efficiency and carbon footprint of the solutions (or general energy use from the interchange).
4.	What measures have been implemented to promote a sustainable interchange? Please provide examples (e.g. Use of natural light to reduce the need for artificial lighting, insulation, on-site sustainable energy, recyclable waste or (use of recyclable) materials, green areas
5.	Does the interchange analyse its impact on air quality? Is air pollution a problem for travellers at the interchange? Has the interchange implemented any measures to improve air quality (e.g. monitoring, ventilation systems, instructions to switch off engines while waiting)?
6.	Is it possible to estimate percentage of alternative energies used?

3.2 Travel time and space (We need this part ASAP for a better sample definition)

	Questions and tasks
1.	Average transfer and waiting time and distances between modes (for example transfer and waiting time and distance from bus to rail, average transfer time from car to public transport)

Waiting time

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train							
Metro							
Tram							
Bus							
Car							
Cycling							
Walking							

Transfer time

	Train	Metro	Tram	Bus	Car	Cycling	Walking

Train							
Metro							
Tram							
Bus							
Car							
Cycling							
Walking							

Distance

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train							
Metro							
Tram							
Bus							
Car							
Cycling							
Walking							

2. Location of ticket offices or machines. . Is there sufficient capacity? Are they well located?

3. Is their appropriate space, which is not overcrowded?

4. Are there direct uninterrupted and logical paths within the interchange (logical passenger movement)?

5. Do the facilities meet current and future passenger demands?

6. Is the interchange an enjoyable place? (For example does it include art or greenery))

7. Is their protection against weather and noise for travellers?

3.3 Facilities, service and retail

	Questions and tasks
1.	What kinds of retail are offered (shops, cafés)?
2.	Indicate the number of m^2 of commercial centers or retail commerce's inside and/or around the City-Hub. Please try to classify the shops into categories. For instance personal service (hairdresser, drycleaning), grocery, clothing, kiosk and eatiers. Please provide some information about average time for opening.
3.	Please describe the quality of the shops/restaurants? This is of course difficult to judge. One possibility is to map whether there are high street brands present. The main idea is to get some form of information about the interchange is primarily consisting of low, medium or high quality shops.
4.	Does the interchange have a policy for attracting services? Are there any joint promotions?
5.	What services are regarded as important to attract to the interchange?
6.	Please assess or describe the quality of customer service. Who is

	responsible for this and how is it paid for? Are there special services for impaired persons?
7.	Does the interchange offer passenger waiting rooms or only open concourse facilities? Is there sufficient capacity? Is there specific lounge for fidelity programs for travelers doing a lot of trips? Is toilet free or payed for? Prayer rooms? Opening hours for toilets and waiting rooms?
8.	Is there Wi-Fi access at the interchange? Is it free?

3.4 Impacts on local economy

	Questions and tasks
1.	**What has the employment impact of the interchange been?** **A) Direct employment effects (staff needed to operate and maintain the interchange)** **B) Indirect employment effects (supporting services created in the interchange)** **C) Impact on the surrounding areas (new services generated in the proximity of the interchange (estimate, if no data available)?**
2.	**If possible please provide an estimate of the typical cost of housing and retail units at interchange, and in close proximity to the interchange.**
3.	**Have there been any changes in the amount of new start-up businesses close to the interchange?** (The time frame is important. The interchanges vary in terms of location and history. The responsible case study partner should therefore themselves decide the time frame for evaluation of effects.) **Have there been any changes connected to housing in close vicinity to interchange?** **Has any new housing been developed in/or near to the interchange? If possible please provide the area (in m^2) and the type of housing.** **Please give an indication of the area (in m2) of commercial centres or retail in/or near to the interchange.** **Have any new offices been developed in/or near to the interchange? If possible please provide the area (in m^2) and the type of offices (e.g. headquarters, international or national offices).**

3.5 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the interchange has

solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? Please mark with x which stakeholder perspective the good or bad practice applies for.

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design					
Travel time and space					
Facilities, service and retail					
Impacts on local economy					
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design					
Travel time and space					
Facilities, service and retail					
Impacts on local economy					
Other issues					

4 Accessibility

Understanding accessibility to the interchange is a crucial first step in assessing the quality of the interchange. To attract passengers it is necessary that intermodal integrations support a safe and efficient transfer for all modes. For travellers it is attractive to have short distances between modes of transport and that transfers are possible where the public transport system can provide the best alternative to the end destination. The design of an optimal interchange depends on local framework and circumstances. Thus, the five case studies can identify and illustrate that there might be several possible good practices making it difficult to generalise. The case studies need to identify the different components required at an interchange and assess the accessibility for various modes. Below we specify questions which need to be addressed and what factors should be highlighted. Pictures of the various solutions are desirable in order to illustrate good and bad practices in the final report. The sub-chapters below illustrate how the reporting shall be structured.

4.1 Accessibility for walking and cycling

Provide a description of:

For walking:

	Questions and tasks
1	Please give a description of accessibility for walking to the interchange. This could include whether there are safe crossing, tunnels or bridges for better accessibility.

For cycling:

	Questions and tasks
1	Please provide a description of accessibility for cycling. This could include a description of cycle parking (what kinds, location to interchange, number, are they commonly used, secure, paid, weather proof?), does the interchange offer bike sharing facilities or cycle repair, and is it possible to carry cycle on train/carriage?
2	If possible give a an indications of the accessibility for cycling to interchange, cycle paths, etc

4.2 Accessibility for public transport

	Questions and tasks
1	Provide a description of whether there is efficient and unobstructed movement
2	Provide a description of the embarkation area - How close is the public transport to the main concourse - Is it all enclosed – protected from the weather or do people have to go outside - Does it have natural or artificial lighting (majority)
3	Public transport service to the interchange (e.g. number of departures, accessibility, how many lines in each mode does it connect, number of bus routes, number of metro lines, number of tramway lines included into the interchange)
4	**How many rail routes, bus routes, metro lines, and tramway lines use the interchange?**
5	**What are the average frequencies for public transport arriving and departing at the terminal?**
6	Is public transport generally on time or is there a problem with delays causing difficulties transferring between modes (punctuality)

4.1 Accessibility for car and taxi

	Questions and tasks
1	Car parking (park/kiss and ride), location to interchange, number, regulation, price, are they commonly used?
2	Is the parking an integral part of the interchange or under different

	management?
3	Provide a description of possibilities for taxi
4	If relevant, how is the accessibility for arriving with car to interchange
5	Does the interchange propose rent a car services or car sharing?

4.2 Access for all

	Questions and tasks
1	Provide a description of what measures have been undertaken in at the interchange to secure accessibility for travelers with reduced mobility. Are you working with associations for impaired people? What do they ask for specific arrangements? What are they?
2	Are there any obvious barriers for people with reduced mobility?
3	Is it possible to highlight any good or bad practices when it comes to accessibility for elderly, people with disabilities and people with buggies or luggage? (level access and possibilities for lifts/escalators). Interviews can shed light about whether they for instance receive complaints.

4.3 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the interchange has solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? Please mark with a x which stakeholder perspective the good or bad practice applies for.

Topic	**Good practices**	**Explanations**	**Relevant stakeholder/perspective**		
			Owner/operator	Government	User/traveller
Walking					
Cycling					
Public transport					
Car					
Taxi					
Access for all					
Other issues					

Topic	**Bad practices**	**Explanations**	**Relevant stakeholder/perspective**		
			Owner/operator	Government	User/traveller
Walking					
Cycling					
Public transport					
Car					
Taxi					
Access for all					

Other issues					

5 Passenger services

Information provision at interchanges is a vital aspect for all kinds of travelers. Interchanges need clear signs to enable easy transfer and movement. Good signage can thus provide for a faster transfer between modes and more efficient travel. Moreover, it is also of importance that the information is available and comprehendible for foreigner travelers and people with physical disadvantages.
In the last decade we have seen a rapid technological development in electronic ticketing (through mobile phones) and real time information. Some regions have developed advanced systems, while other have still some way to go before they can offer such services. It is therefore necessary to both highlight what kind of information is available and give explanations for good and bad practices.

5.1 Journey planning and real time information

Table 5 provides the main questions which need to be addressed.
Are you satisfied with the information and intelligent systems in the interchange? If not, how would you improve the quality, content or provided systems and services?

Please tick a) the ones currently in use and b) what you think would be essential to implement.

In use	Needed	Intelligent System or Service in the Interchange Area
☐	☐	Journey planner for local public transport for pre-trip planning
☐	☐	Journey planner for long-distance public transport for pre-trip planning
☐	☐	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
☐	☐	Smart ticketing [speeds up transfer]
☐	☐	Electric departure time displays based on *timetables* (for multiple stops)
☐	☐	Electric departure time displays based on *timetables* (at stops)
☐	☐	Electric departure time displays based on *real-time information* (for multiple stops, incl. fleet monitoring systems)
☐	☐	Electric departure time displays based on *real-time information* (at stops)
☐	☐	Departure times via audio calls
☐	☐	Real-time disturbance information provided via *displays*
☐	☐	Real-time disturbance information provided via *audio calls*
☐	☐	Multi-language information
☐	☐	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
☐	☐	Information centre with personal service
☐	☐	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)

In use	Needed	Intelligent System or Service in the Interchange Area
☐	☐	Guidance and warning surfaces for the visually impaired
☐	☐	Tactile maps of the interchange for the visually impaired
☐	☐	Information with hearing aids (e.g. "T-coil")
☐	☐	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
☐	☐	Intelligent Indoor-Navigation System
☐	☐	Intelligent security systems (e.g. CCTV)
☐	☐	Areal or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.
☐	☐	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

	Questions and tasks
1	Please provide a description of the information to passengers. (Information on concourse of all modes**,** real time or timetable only**,** public announcement, etc)
2	Please describe the dialogue between information systems between various operators. For travellers it's important that information is integrated on screens as well as mobile. Related aspects could be whether signing and information is coordinated and whether the information meets the needs of all passengers and all modes.
3	Has the interchange any strategy for securing that signing is balanced compared to service and advertisement?

5.2 Fares and ticketing

	Questions and tasks
1	Please describe the ticket purchasing systems and explain if public transport has integrated ticketing between modes? Are there separate tariffs for different modes?
2	Is electronic ticketing available?
3	If no, are there plans for allowing electronic ticketing?
4	What are the main barriers for integrated ticketing? (political, technical…)
5	Are there any factors specifically important for facilitating integrated ticketing?

5.3 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the

interchange has solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? Please mark with a x which stakeholder perspective the good or bad practice applies for.

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information					
Fares and ticketing					
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information					
Fares and ticketing					
Other issues					

6 Analysis of good and bad practices

This part should have some evaluation of the interchange which takes into consideration both good and bad practices. A critical approach is desirable. The template can hardly cover all aspects which might be relevant. This section could include aspects which is not covered or aspects which needs to be explained in more detail

The responsible case study partner needs to conduct an independent analysis of good and bad practices. The analysis can be supplemented which the questions below.

Why is this interchange considered successful? (Please tick all that apply.)

□ **Ownership/ management structure**

□ **Availability of interchange space**

□ **Quality of waiting areas**

□ **Range of retail establishments**

□ **Security and safety**

□ **Facilities for the mobility impaired**

□ **Quality of journey planning and real time information**

□ **Integrated ticketing arrangements**

□ **Transfer quality among modes**

□ **Other**

If other, please provide details.

Please explain in more detail why this interchange is considered successful?

Can you provide any other examples of successful multimodal interchanges?

□ **Yes**

□ **No**

If yes, please provide details of the location, a brief description (e.g. modes of transport available) and explain in what ways the interchange is successful; any specific factors, e.g. information systems, accessibility, energy efficient design/operation.

6.1 Good practices

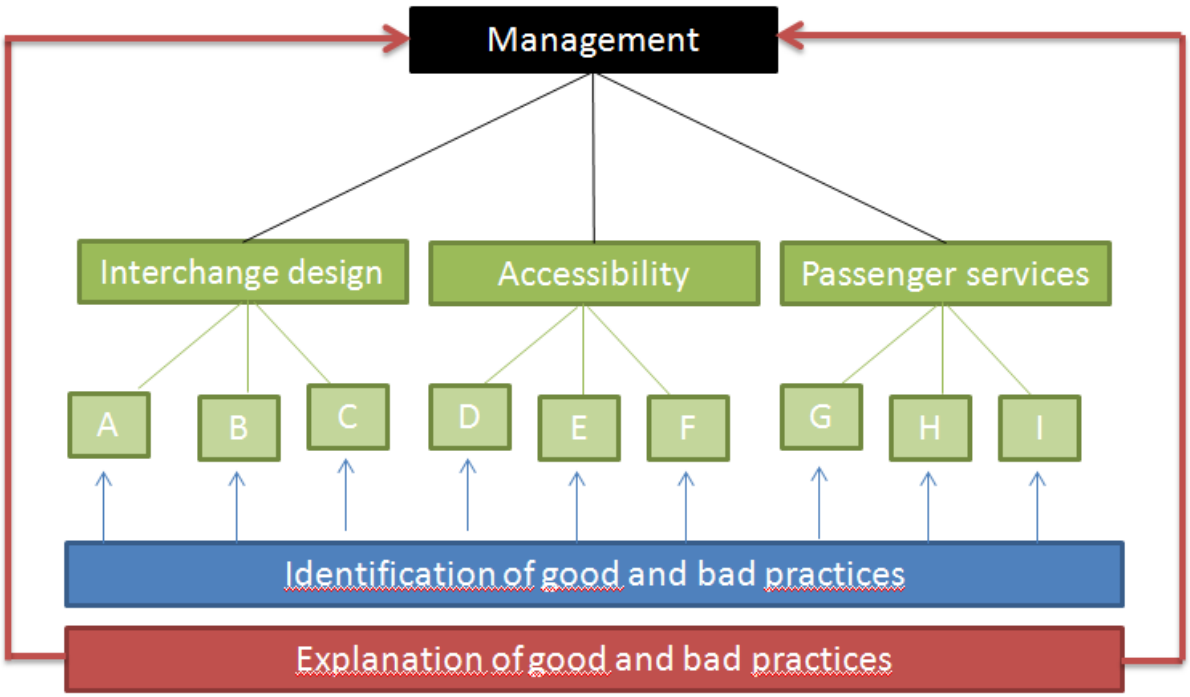
		Explanation – why is it a good practice?
Policy and governance	Practice 1	
	Practice 2	
	Practice 3	
Station operations	Practice 1	
	Practice 2	
	Practice 3	
Management and maintenance	Practice 1	
	Practice 2	
	Practice 3	
Safety and security	Practice 1	
	Practice 2	
	Practice 3	
Finance and revenue streams	Practice 1	
	Practice 2	
	Practice 3	
Interchange design	Practice 1	
	Practice 2	
	Practice 3	
Accessibility	Practice 1	
	Practice 2	
	Practice 3	
Passenger services	Practice 1	
	Practice 2	
	Practice 3	

6.2 Bad practices

		Explanation – why is it a bad practice?
Policy and governance	Practice 1	
	Practice 2	
	Practice 3	
Station operations	Practice 1	
	Practice 2	
	Practice 3	
Management and maintenance	Practice 1	
	Practice 2	
	Practice 3	
Safety and security	Practice 1	
	Practice 2	
	Practice 3	
Finance and revenue streams	Practice 1	
	Practice 2	
	Practice 3	
Interchange design	Practice 1	
	Practice 2	
	Practice 3	
Accessibility	Practice 1	
	Practice 2	
	Practice 3	
Passenger services	Practice 1	
	Practice 2	
	Practice 3	

6.3 Important factors facilitating or hindering good practice

The earlier parts of this template had particular emphasis on identifying good and bad practices and explain why it is a good or bad practice. Another part is to identify what factors can explain why an interchange has (not) managed to implement these practices. This is important for providing the first input to the City-HUB model.



Aspects	Factors facilitating or hindering good practice
Policy and governance	
Station operations	
Management and maintenance	
Safety and security	
Finance and revenue streams	
Interchange design	
Accessibility	
Passenger services	

6.4 Main recommendations

Annex B: Pilot case study report Moncloa

EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

City-HUB Project

WP2 – Task 2.4

Authors:
TRANSyT-UPM: Sara Hernández, Floridea Di Ciommo, Andres Monzon, Nuria Sánchez
With the collaboration of:
- Tingting Su, UPM research assistant, Xingua University, Beijing
- Xavier Sanchez, UPM research assistant, ENTPE Lyon

Data collection template for pilot case studies

Contents

1 Background

The Madrid city has maintained the same entryways despite its rapid expansion and urban transformation over the years, modifying only what was deemed necessary for the modernization of motorways and public transportation. In this respect, it is the concept of transportation that has seen the most radical change over the years. Today, transport interchange stations are a crucial part of the public transport system, which allows travellers to make a wide range of trips both comfortably and pleasantly. It is more and more evident that modal integration plays a fundamental role in the transport system´s success. Consequently, the old concept of railway and public bus stations is no longer valid.

The Moncloa transport interchange station was built in 1995 and has been an impressive success, not only in itself, but also because of several other measures which were taken at the same time, such as the arrival of Metro line 6, making Moncloa the busiest Metro station on the network, and the opening of the bus and high occupancy vehicle only lane for the A-6 motorway. This latter measure, the opening of the Bus-HOV (High Occupancy Vehicle) and the bus-only lane, resulted in a significant reduction in the total number of car journeys and a resulting increase in the demand for interurban bus journeys. In 1995, the Moncloa transport interchange station served 26 interurban bus routes, with over 1,603 journeys being made every day. There are currently 56 interurban bus routes, with over 4,000 journeys per day, over 287,000 passengers per day, and 310 journeys per hour between 8:00h and 10:00h. The urban bus routes serve 125,000 passengers per day, with 4,141 bus journeys. Demand for the Metro has likewise increased, from 44,076 journeys per day in 1995 to over 170,000 in 2010. Nowadays, Moncloa is the Metro station with the highest daily demand

The evolutionary process of the Moncloa interchange station is summarized as follow:

1986-1993: The first reforms aimed at preparing the interchange station´ surface space.

1994-1997: The second phase was the construction of the underground public bus station. These structures allowed to the Moncloa interchange station to grow beyond its surface space, improving the interchange with the Metro network by reducing transfer distances.

2001-2004: The Madrid Regional Transport Board took the necessary steps to arrange a public tendering for the Moncloa interchange, whose current station was to be expanded.

These changes were based on the characteristics of third-generation transport interchange stations through privately financed by the public franchise system, saving the Government the cost of the station´s refurbishing.

2004-2007: The Madrid Transport Authority signed an agreement April 7, 2004 with the Madrid City Council and the Regional Government Madrid to establish its commitment to arrange a public tendering of the refurbishing (expansion), operation and maintenance activities of the Moncloa interchange station.

Regarding the location of an interchange node it must strike a balance with the peripherally located stations, which are necessary due to the heavy congestion generated by large cities and central circulatory areas. This balance should also achieve improved travel dispersal. In the case of Madrid, the compromising solution for these two needs resulted in the construction of various peripheral interchange terminals, among them the Moncloa interchange. These terminals, which primarily offer interchanges with the interurban bus lines, are located in the vicinity of the city´s centre and are associated with the six main corridors that serve them.

At the same time, it is also crucial that the site of a transport interchange station is within an urban environment that is attractive to the traveller, allowing him more opportunities to perform life activities. Because of this fact, locations for interchange stations that offer access to the Metro and urban networks, and provide sufficient development space have been discarded due to their undesirable urban environments.

The Moncloa interchange is located at an entrance point to Madrid in an area with many historic monuments and connects directly to Metro line 6, the Circular line that travels around the centre

of the city and links to all of the key points on the Metro network. The opening of this station has achieved excellent results in terms not only of increased demand but also in reductions in surface-level bus journeys and improved journey times for both users and the transport companies.
Due to capacity problems resulting from the growth in demand within the A-6 motorway corridor, the expansion of the Moncloa transport interchange station was carried out to relocate the Metro line 3 station to the same level as the line 6 station so as to improve passenger transit and provide parking spaces for bus inspections, together with new installations and equipment.
This development was essential in order to carry out the expansion, or Arco (Arch) Module, of the station, as it freed up the required space that had previously been used for the Metro line 3 station and its garages.
The station's location in the city's centre, in a zone of intense traffic during rush hour and a monumental urban environment influenced both the construction, which was done with extreme caution to minimise potential impacts, and the design and location of the exterior elements.
The main characteristics of the expansion and reform of the Moncloa interchange were:

- Investment of 112.78 million euros
- Construction of 46,000 m^2, separated into two floors.
- Increase of the number of bus bays from 20 to 36 and regulation areas with completely underground entrances to the three islands from the bus lane in the A-6 motorway.
- Physical separation of the air-conditioned pedestrian island from the buses.
- Additional complementary services.

To carry out the planned work without interrupting the services provided by the transport interchange station, the expansion construction, or Arco Module, had to be carried out first, while the common electricity and climate-control services for the two modules, located in part of the Calle Princesa module, had to be prepared for going into operation.
Once the Arco module had been finished, all of the existing lines were transferred to the extension so that the redevelopment work in the Calle Princesa module could be carried out.
Regarding the effect on the environment, the external parts of the new Moncloa interchange station, such as the entrance buildings, emergency stairs, ventilation grilles, light wells, etc., were designed in consideration of the surrounding area of Moncloa and were, thus, made as discreet as possible, particularly in the areas closest to the important historic buildings (Arco de la Victoria, the District City Hall Building, the Air Force Ministry building). In addition, these elements attempt to respect the green spaces around the area, such as the Oeste park and the Complutense University, without forgetting that in some areas it is appropriate to create a new and recognisable urban element.
As mentioned above, Moncloa transport interchange station achieves excellent results in terms of increasing demand, reductions in surface level bus journeys, and improved journey times for both users and the transport companies. Passengers do not have to travel to stations in the outskirts of the city to use interurban bus services, as it is located in the centre of the city and connects directly to Metro line 3 and 6 which link to all of the key points on the Metro network.
Moncloa Interchange, situated at the northern edge of Madrid, but in a built-up area, provides a gateway to the city for over 265,000 people per day. Bus services in the peak-hour are every 5 to 10 minutes, and access the underground bus station using an HOV lane. . No private car parking is provided. There are 56 interurban bus lines, 3 urban bus lines, 2 metro lines (line 3 and line 6) and 1 long distance bus line and a total of 12 operators in Moncloa interchange station (9 for interurban bus, 1 for urban bus, 1 for long distance bus and 1 for metro).

Table 1: Passenger demand in the Moncloa interchange station. Madrid Transport Authority, 2011

Transport Mode	Demand (passenger/day)
Metro	109,321
Interurban bus	59,989
Urban bus	96,789
Long distance coach	169

There are 3 different islands with 39 bus bays, shopping and travel service areas, and 4 main accesses of C/Princesa, Paseo Moret and Moncloa Plaza District Board.

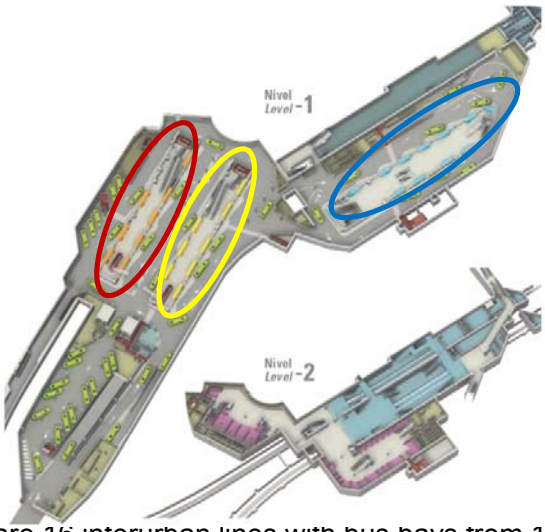


Figure 1: [illegible] ge station

In the island 1 (blue) there are 16 interurban lines with bus bays from 1to15.
In island 2 (yellow) there are 20 lines with bus bays 21 to 29.
In island 3 (red) there are 12 interurban lines and 3 urban lines with bus bays 30 to 39.
Moncloa transport interchange station has four levels:

- Level 0: Access at street level

- Level -1: The bus station

One special feature of the transport interchange station is the development of one single floor for buses below ground-level; this makes available large surfaces for ventilation and natural light, increasing the feeling of safety in the event of an evacuation.
The bus station is on level -1 of the Moncloa transport interchange station, beneath the Calle de Princesa and the pedestrian plaza.

- Level -2: The hall connecting bus station, Metro and shopping area

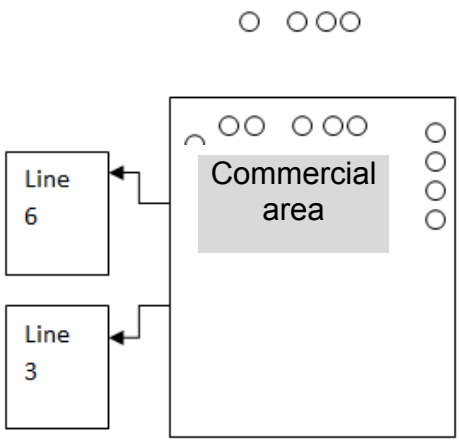
There are a total of three vertical connections with the entrance hall of level -2. The bays for alighting passengers are located at the head, where the exits to the surface are located along with the connection to the Metro station entrance hall.

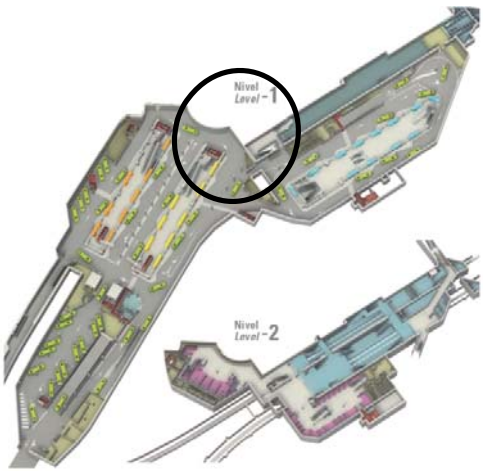
The bus bays are located close to the vertical communication units, and the stairs between level 0 and -1 and between -1 and -2 are displaced on their axes to shorten the distance that passengers have to travel.

- Level -3: The platforms for Metro line 3 and 6

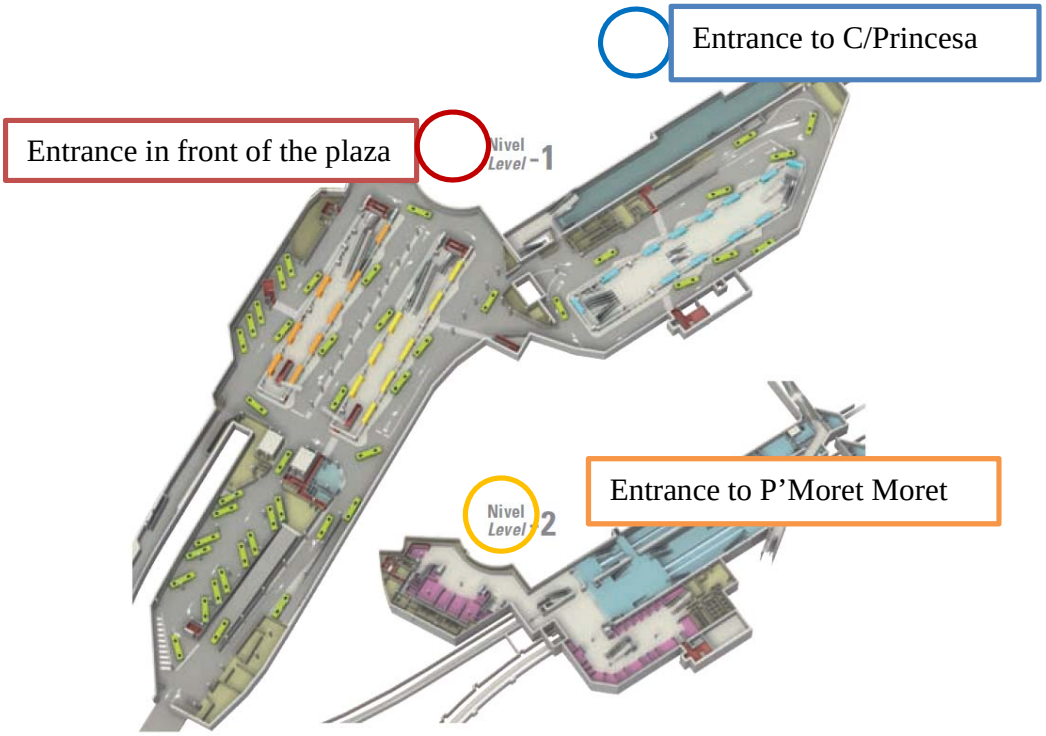
Moncloa transport interchange station is equipped with appropriate signs and screen displays, the routes to be followed through the station is immediate with different colours on the floors, walls and ceilings, making it easier to identify different areas.

There exist 10 shops and a relaxing room in the floor of -1 which is mainly for buses.
Outside the metro, floor -2, there is a zone of commercial. But there are little people walking into the shops between bus and metro except in the tobacconist where public transport tickets are sold as well.

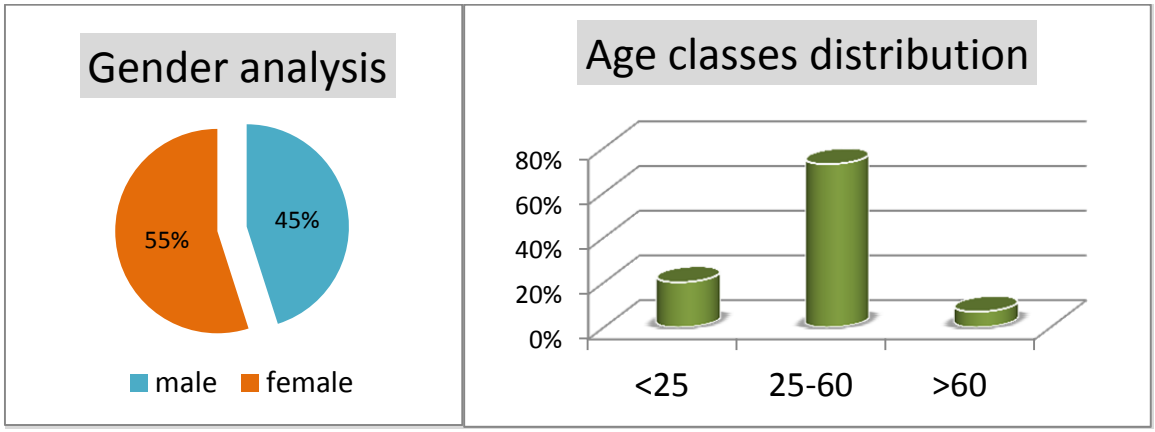




In order to characterize the population inside the Moncloa interchange station, a field data collection has been carried out during the first week of May. The data was collected from 7:30 in the morning till 21:00 in the evening every day. These data were classified in 5 different time intervals: morning peak as 7:30-9:30, late morning as 9:30-12:30, lunch time as 12:30-15:00, early evening as 16:00-19:00, and evening peak as 19:00-21:00.
It was followed a random procedure: taking notes of the 10 first people every 15 minutes in the entrance/exit of the main transport modes.



The main results are shown as follow:



During different time at different entrances there is no great difference in gender but there are some differences regarding the age distribution.
The number of young people (<25) in early morning is more than other times.
Young people usually choose the entrance to P' Moret (27%-30%) and the entrance to C/Princesa (21%-25%), rather than the entrance in front of the plaza (13%-16%). The average per cent is 20%. The possible reason is they prefer directly access to the metro while the entrance in front of the plaza is direct to bus bays.
The number of old people (>60) in the early morning (2%-5%) is less than other times (7%) while in the lunch time and early evening is higher.
The majority age group is the middle-age (25-60) during the whole day with an average percent of 73%.

2 Management

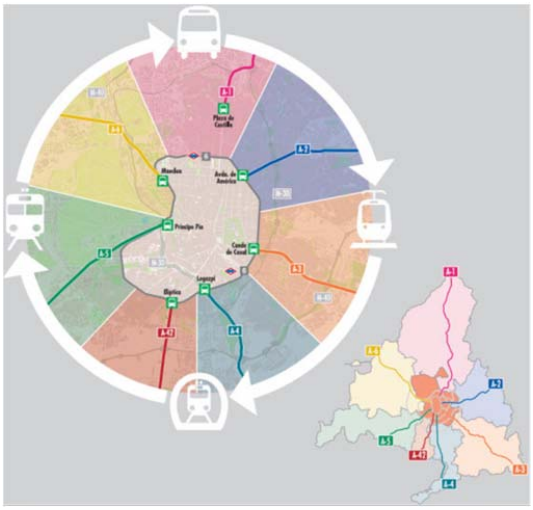
2.1 Policy and governance

The need to arrange the public transport mobility in the region and of promoting the functionality of every transport mode, improving the efficiency of the system led the development of a **Plan Transport Interchanges** in the city of Madrid.

There were several agreements signed between the different Public Administrations (the Madrid Regional Government, the Madrid City Council and Madrid Transport Authority) which have allowed building up a great interchange station for every access corridor to Madrid. These interchanges have the following functional characteristics:

- To use as point of confluence of radial buses lines that access to the city of Madrid and are distributed by the city across the Metro network and the urban buses network.
- To reduce the times of trip and to improve the quality of the service.
- To create nodes that simplify the conditions of transfer.
- To reduce the costs of exploitation of the transport services allowing to increase the journey frequencies.

Therefore, the **"Madrid Interchanges Plan"** is the unification process between the exchange points of the interurban bus lines and the Circular Metro line. This plan consists in the adequate improvement of the already-existing transport interchange stations – Plaza Castilla, Moncloa, Avenida América and Principe Pío- and the construction of new interchange stations in Conde Casal, Chamartín and Plaza Elíptica in order to achieve a modal interchange network organized around Madrid´s entrances in relation to the highway and the interior circular Metro route.



The Urban Engineering Department, part of the Sub-Directorate General for the General Plan for Urban Distribution, which is in turn part of the City Council Government for Urban Planning, Housing and Infrastructure, in collaboration with the Madrid Transport Authority, developed the "**Special Definition Plans**" for each of the stations in the Transport Interchange Station Plan. The objective of the Special Plan is to make the construction of the transport interchange station viable in land use terms as an integral element in the public transport network within the municipal area of Madrid.

The Special Plan contains a justification of the solution proposed, based on the characteristics of the location in which the station will be built, and a Transport and Traffic Study, which enables to

define the scale of the infrastructure according current statistical usage data and forecasts of future developments.
A second part of the report, which covered the scope and ambit of the Special Plan, details the project's organisation, analyses the existing infrastructure, the repositioning of affected services, and the organisation and management of the work to be carried out.
Thirdly, it defined the Urban Planning Regulations, stating the specific conditions for the use of the various means of transport (limits to alignment, height, etc. for the structures above ground-level), the specific conditions for ventilation and climate control to ensure passengers' comfort and specific conditions for compatible tertiary use (commercial, offices, recreational and parking).
Finally, it includes location, organisation and management plans from the 1997 General Plan, which had been adapted to the reality of the project and plans for the overall design of the transport interchange station (number of floors, elevation and sections).
Once the Special Plans have received final approval, they become regulation mandatory compliance for the development of the transport interchange stations and their permitted compatible uses.
In the last years the Madrid Regional Government, the Madrid City Council and Madrid Transport Authority have built up by the **Contract for Public Work Concession** (Title V of Legislative Royal Decree (RD.) 2/2000, of June 16, which establishes the Revised Text of the Law for Public Administration Contracts) five of these transport interchange stations, whose investment and operation were privately financed throughout the concession period. At the end of the concession term, all constructed infrastructures become part of the Madrid City Council. The expansion and reform of the Moncloa interchange in mid-2008 was carried out under this contract.
The Contract for public Work Concession is after the Special Definition Plan development.
Regarding regulation in quality matters, basically, the Quality aspect of the 2004-2007 Interchange Stations Plan had to be developed in an "ad-hoc" fashion, since apart from the PIRATE European project, no methodology or regulations had been drawn up to address this issue.
To put the quality plan into action, the following quality standards were used as reference:

1. On the international level: UNE-EN ISO 9001:2000, for quality management (Developing objectives) and UNE-EN ISO 14001:1996, for environmental management.
2. On the European level: UNE-EN 13816 for Public Passenger Transport.
3. On the state level: UNE 161001:2002 for Market Studies.

In compliance with existing regulations and prior to launching the various construction projects of each transport interchange station, an User Perceived Quality and Satisfaction survey was carried out with the intention of developing quality assurance plans and actions for the interchange stations.

The samples were designed to represent the reference population using the PAPI (Personal And Paper Interview) survey method on 500 people with a margin of error of ±4.38% over the total sample, a confidence interval of 95% and under the assumption of maximum imprecision.

The studies put two questions to users. One question dealt with the aspects that were very or quite important to them in a transport interchange station. The other question was concerning the users' degree of satisfaction with the service provided to date, before the interchange stations were put into service, that is, their perception of the services provided.

The overall analysis of the relative importance of aspects valued in the survey showed that the most relevant elements for transport interchange station users were particularly related to security, functionality of the facilities, information and the station's general appearance.

KEY FACTORS OF AN INTERCHANGE

The Madrid Transport Authority participated in the European PIRATE (Promoting Interchange Rationale, Accessibility and Transfer Efficiency) project, in which 13 transport interchange stations in eight countries were studied, and nearly 4,000 surveys were conducted with designers, operators, users and non-users. By the end of the project, a clear methodology was defined to evaluate the interchange stations (both the already-existing ones and those under construction), enabling their improvement. Through this study, the four most important elements of an interchange station were found to be:

- Information
- Security
- Transfers
- Management

MAIN ASPECTS IN THE DESIGN OF THE MULTIMODAL INTERCHANGE

The general characteristics that comprise the definition and the design of an interchange station are the following:

- Its ***location and integration within the public transport system,*** in relation to*:*

  - Its role within the public transport system and, especially, within the city´s mobility.
  - Adequate service fulfilment of users´ mobility needs in their travels to destination centres.

- The ***functional design of the physical elements that comprise the station,*** both for the public transport system and for travellers.
- The ***station´s integration into the urban environment***, contrasting the limited interchange environment with the vague space that constitutes the transport network, especially in reference to the urban bus stops that feed the transport interchange station.
- The ***systems directly related to the operation of the public transport system***, both those directed to the traveller (such as information, signs, ticket sales and validation, service coordination and waiting areas) and those required by the transport operators for their personnel, vehicles and transport service (suh as lockers, break rooms, vehicle repairs, communication systems, parcel service, etc.).
- The ***management and operation of the transport interchange***, such as the station´s director or coordinating-manager, security, illumination, cleanliness, toilets, left-luggage office, meeting points, telephones, commercial stores, leisure activities, general information about the city and the public transportation system, etc.

These aspects must be considered throughout the conception, planning, design and operation of a transport interchange station. Although some elements may experience a more advanced development than others and appear to be more important to the success of a station, all of the aforementioned aspects must be present in every one of the transport interchange station´s phases. Once in use, these factors will then achieve the purpose for which they were designed.
The implementation of a transport interchange station that is mainly fed by the interurban bus network as in the Moncloa interchange case should reduce users´ total travel time more so than if the interchange station didn´t exist.
The principle determining factor to be considered in the design of this type of station is the enormous surface area that is required to accommodate all of the public bus lines that should be servicing the interchange. The adopted design criteria should try to avoid or dissimulate the inconveniences that may be generated by the size of the transport interchange.
These criteria should respond to three types of needs: those of the transport interchange station, those of the users and those especially of the transportation modes servicing the station.

CRITERIA REGARDING INTERCHANGE NEEDS:

The fundamental design criteria that defines a transport interchange station is the reduction of interchange time between transportation modes, which is practically equivalent to the minimisation of the distance that users must travel during transfers. With this in mind, it is helpful to create solutions in which the necessary surface area can be divided into various levels with vertical communication centres that are positioned in central locations. The convenient location of these centres will make level-change quick, easy and safe.

At the same time, traffic flows must be organised to ensure against interferences. Similarly, the crossing of pedestrian circulation with that of transport vehicles must be avoided at all costs. For this reason, it is not advisable to position parallel platforms with circulation lanes, both in level-crossings situations (typical with buses), and in situations that obligate ascending and descending movements from a different level (typical in railway stations). With sufficient dimensions the most convenient arrangement is a central platform around which all public buses circulate in the same direction.

CRITERIA REGARDING USERS´ NEEDS:

From a user's point of view, the success of a transport interchange station is based on its perception as a singular space that clearly presents its functionality and possesses environmental characteristics that make users' time in the station pleasant.

In this sense, it is very important to have designs with light-filled spaces and visual connections that allow users to see everything in the interchange station. References, such as natural light, also help travellers become better oriented. From the moment a user enters the transport interchange station, he should know where he needs to go and sense the direction in which he should walk. Signs in the station should be comprehensive, homogenous and easy to read. These should not place too much trust in the user's sense of direction, but rather take on an informative role that confirms the user's intuition.

Environmental quality is achieved through proper ventilation (the extraction of contaminating gases should be positioned near the origin), and temperature and noise control (with equipped waiting areas). This is a fundamental aspect in underground transport interchange stations and a great determinant in their success – especially if the stations are intensely used by travellers and vehicles, alike –. It is helpful to separate the area for travellers from the public-bus operating area and, in extreme cases, regulate access to the interchange station for those buses that do not comply with the minimum contamination-level requirements.

These determining factors of environmental quality, which at first glance may appear to apply exclusively to public bus stations, they are increasingly used in underground rail stations, both for the Metro and above-ground railway networks. For this reason, it is essential that all interchange spaces and installations are equipped with adequate space to ensure proper environmental regulation.

The following complementary services illustrate the importance of adding value to the use of transport interchange stations: information, commercial area, toilets and a continually reinforced feeling of security.

CRITERIA REGARDING PUBLIC TRANSPORTATION NEEDS:

Transportation service providers should also be considered in the design of a successful transport interchange station. This entails finding ways to reduce the operational costs for the different modes of transportation that operate in the station.

Firstly, it is extremely important that the interchange station entrances are well-connected to their corresponding bus lines, and that travel times are reduced as much as possible with solutions from outside the transport interchange station.

Vehicle movements within the station's interior should be limited only to those that are necessary (logical circulatory sequence: entrance → descent → ascent → exit), avoiding heavy manoeuvres (saw-tooth bus bays are preferable to fish-bone bus bays) and movements of the

vehicles empty (including parking zones and the interchange station's surrounding area when equipped with public bus terminals).

2.2 Station operations, management and maintenance

The concession contract, including several private companies of bus and construction, states that the responsibility for management and maintenance of the interchange has to be transferred to the concessionaire consortium, while the Public transport authority is the responsible for guarantying the compliance of obligations and the respect of the concession rules.
Commercial areas can be exploited by the concessionaire itself or ceded by a second concessionaire contract to a third party.
The Integrated Management System is the platform on which the concessionaire will register the monitoring of the User Services Plan, whether through real-time monitoring or through the concessionaire entering the data or specific reports directly.

A list of the minimum indicators in the User Services Plan is given below, and this must be developed by the concessionaire in the General Operating and Maintenance Plan (PGEM), with the Implementation and Monitoring Plan being responsible for measurement and control:

- Information and Customer Service: achievement of timetables, quality, registers, processes and replies
- Operations of the information and customer service system. Availability
- Accessibility and internal mobility report

Comfort – including ambient noise, air quality, lighting and cleanliness. Every week, the concessionaire will issue a report to the Madrid Public Transport Authority on the comfort indicators, indicating and justifying any differences from the acceptable ranges for such values.

Concerning the coordination between transport operators, the Consortium is responsible for the ticket and fare integration for all public transport regional networks while the coordination of transport operations in Moncloa is set by the concession contract by a section about the operation of the interchange which establishes guidelines concerning transport activities. Any specific plan of coordination of frequencies between all transport modes is defined. The coordination of the transport operations seems to be enough.

2.3 Safety and security

Safety is one of the most important pillars of any transport infrastructure, particularly in transport interchanges stations which are used on a daily basis by hundreds of thousands of passengers. One of the important developments in the new Moncloa transport interchange station is the concept of the **bus bays**. This was a question of keeping the flows of vehicles and the flows of passengers separate. These bus bays have been grouped in "islands". As safety is a key issue, this design ensures that passengers do not cross or use the areas where the buses are maneuvering.

Moreover, transport interchange stations are unique buildings that are not explicitly covered by current **fire prevention** regulation. This aspect has been promoted from a design perspective so as to facilitate rapid evacuation and clearance of such buildings, along with the rapid removal of smoke caused by a fire in the building.
Highly specific tools have been used in areas where safety is concerned. The design and size of the air-extraction and ventilation facilities were facilitated by a specific study performed in collaboration with the Universidad Politécnica de Madrid on the behavior of smoke in a fire.
Another tool used to improve the passengers' safety was the simulation of evacuation procedures using a specialised program; this helped with the design, location and number of emergency exits from the transport interchange station, achieving building evacuation in less than six minutes in the case of maximum usage density at peak time.
Great care was also taken with the design of the **emergency exit stairways**. The objective was to make it easy for users to locate the emergency exits; this was achieved through the use of a distinctive colour, used only for this purpose, together with increased lighting in the evacuation areas. This enables users to find the emergency exits in the event of having to use them. They are in distinctive colours (reds) that stand out against the neutral colours (greys) of their surroundings. The emergency exits are also highlighted through the use of horizontal markings, similar to zebra stripes, which are illuminated throughout their length to the evacuation door.
Furthermore, at the level of interchange with the Metro, exclusive facilities have been provided for the **Police**, equipped with fixed work stations. This also results in greater safety for passengers and implies that the Emergencies Plan will have available trained personnel to help facilitate evacuation should this prove necessary. In addition, the staff of the traffic interchange station includes a **fireman**, who is responsible for fire safety and evacuation of the building.
The Safety section of the General Evacuation Plan has a description of the Monitoring Service and the procedures to be carried out in the event of an incident or emergency in a transport interchange station.
The resources required for emergency management are detailed in the Safety Plan, and consist of:

- The internal resources of the transport interchange (Manager, Head of Security, security guards, evacuation teams). These can be reinforced by personnel from the Maintenance and Cleaning Plan, as established in the Safety Plan.
- The external resources (local police, fire services, Samur health services, the General Department for mobility, etc.)

In accordance with the Safety Plan, control of the situation may be taken by an external Emergency Coordinator, who would coordinate all available resources, including the station´s own resources.

2.4 Finance and revenue streams (revenue generation)

The city of Madrid has been a pioneer in the last few years in the adoption of measures intended to promote public transportation use. One of the most important measures has been the construction of Intermodal Exchange Stations (IESs) to facilitate the connection among public transport modes, particularly the linking of regional bus services to the subway system. The novelty of the management of the Madrid interchanges carried out by the Regional Government of Madrid consists of funding IESs by private capital through the concession approach, which has already a long tradition in Spain for funding highways.
The main characteristic of the Interchanges concession contracts is related to the the way that they were funded. The leverage of the concession companies is around 80% for all the cases. The interest rates of the loans requested were around 5%. However, most of the concessionaires decided to hedge by means of a swap to avoid taking the interest rate risk. The cost of this swap was around 1.35%. Assuming a beta (systematic risk of equity) equal to 0.6 it is

possible to estimate the cost of capital through the Capital Asset Pricing Model (CAPM) model and consequently to obtain the weighted average cost of capital (WACC) for each concession whose values are between 4.2% and 5.5%. The case of Moncloa shows a value of 4.2%. To calculate the WACC we have to take into account that the debt funding is free from income taxes, which in Spain are 30% of the profits annually obtained.
The CTRM considers that an IES concession is viable when the internal rate of return (IRR) of the equity cash flow is above 6%.
In the Madrid city, we distinguish two different groups of IESs in terms of their initial shareholders. The first group of IES originally had a large participation of private bus companies, mostly those companies that own the regional bus lines or interregional coach lines that arrive in the IES (Avenida de America, Plaza de Castilla and Principe Pío). The second group of IESs is characterized by a great participation of construction companies and a residual participation of bus companies (Moncloa and Plaza Eliptica). The reason for the low participation of bus companies in the latter group of IESs is perhaps that unlike the first group they were not designed to house interregional coaches that are the private companies contributing by private capital in a concession contract.
A concession contract has to deal basically with six types of risks: construction risk, expropriation, licence risks, operation risk, revenue risk and financial risk. The Spanish Concession Law establishes that the construction and operation risks have to be transferred to the concessionaire. Only in case when force major may be invoked does, the concessionaire has the right to have the economics of the contract rebalanced to take account of such a happening. The CRTM provides the bidders with a preliminary design of the IES, but each one of the bidders has to present its own definitive design in the tender. Once the concession has been awarded, the concessionaire has the obligation to build the facility according to the standards presented in the tender. This way, the concessionaire will not have any reason to later claim that an inadequate design of the facility has unfairly limited his future return.
The revenues generated by the IESs are of several types. The most important source of revenues comes from the fees that urban buses (EMT), interurban buses operated by private companies, and interregional coaches operated also by private companies have to pay to the concessionaire to use the IES. In the Moncloa Case study the major bus traffic is generated by inter-urban bus. The regional buses are obliged by the CRTM to use the IESs, but the interregional coaches are free to use the IES or not. However, the experience demonstrates that in the end, most of the interurban coaches decided to take advantage of the IESs. In general, the part of the fare that each bus operator pays for using the interchange is 0, 20 € for interurban and urban buses, while the long distance or interregional buses pays 18€ for each bus. The interchange of Moncloa hosts only one long distance line.
The operators can easily pay the cost of using the interchange using the travel time savings they realize thanks to the construction of the interchange and its adjacent tunnel. First, as the travel time becomes shorter, the number of buses and drivers necessary to keep the same bus frequency becomes lower. And second, as congestion is removed, the fuel consumption diminishes. Adopting a travel time cost of 48 €/hour for bus, we estimate savings for the companies in a range between 16,419 and 26,171€ per day for Moncloa. Moreover, comparing the operation cost savings of the bus companies during the concession period with the total infrastructure investment costs, we find that the operation cost savings are three times larger than the initial investment costs. That means that the bus companies can largely cover the additional fee to use the IESs without a surcharge added to the user tickets.
Although the fees paid by buses and coaches are the most important revenue sources for the concessionaire, there are other revenue sources that contribute to fund the IESs. The most important ones are the commercial rents paid by shops and cafeterias inside the IES and other revenues such as the rents obtained by advertising, vending machines and so on. All these revenues represent around 20% of the total for financing the Moncloa interchange.

The Interchange concession contracts are regulated by the Spanish Concession Law previously mentioned. However, the Law enables flexibility to each regional government to adapt the bidding terms to the specific characteristics of the infrastructure facility. The specific clauses of the interchange concession contracts can be summarized in the following three points:

- The funding of the construction, maintenance and operation of the Interchange will be only private. Neither the Regional Government of Madrid nor the CRTM will provide any subsidy or loan to fund the facility. However an additional contract is signed between the private consortium (concessionaire) and the public transport authority where the public authority guaranties 57, 5 millions of travellers per year. If the total annual amount is behind this, the concessionaire could be reimbursed. Until now the case seems not happened and in 2011 the amount of total travellers crossing the Moncloa interchanges was of 67 million.
- The duration of the concession contract is flexible within a range of five years (35 year in general), plus or minus, of the original duration stipulated in the contract, with actual duration depending on the real cash-flow level, as will be explained later on.
- Five years before the end of the concession contract, the Public Transport Authority will appoint a person who will be in charge of guaranteeing that the facility is handed over to the Public Transport Authority in a good condition.

2.5 Good and bad practices

GOOD PRACTICES

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Regional Government	User/traveller
Policy and governance		Reduction of contractual risks	x	x	
Station operations	Manager of the interchange	Regrouping different responsibilities	x	x	
Management and maintenance	Manager + definition of a Quality Assurance Plan along with surveys to users	Better coordination between operators and concessionaire	x	x	x
Safety and security	Interchange design and Safety & Security Plan	Reduction of risks	x	x	
Finance and revenue streams	Differing payments of initial investment by the concessionaire	The opportunity to realize the infrastructure now	x	x	x

BAD PRACTICES

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance					
Station operations	No coordination of frequencies		x	x	
Management and maintenance					
Safety and security	No good organization of traffic lights on ground level for accessing to the interchange		x	x	
Finance and revenue streams	Possibility to have a shadow subvention	Even if the financial risk is transferred to a concessionaire an additional contract is signed for guaranteeing the minimum passenger demand	x	x	

3 Interchange design

3.1 Sustainable interchange design

The construction of the Moncloa interchange and its adjacent tunnel and *Bus-VAO* brings important environmental benefits as well. First, the use of the bus in the corridor has increased, while the use of the private car has diminished. This has entailed a reduction of emissions and

congestion costs. The experience of the Madrid IESs has reported market bus share increases between 15% and 30% in the corridor in the two first years after the infrastructure was opened. Second, regardless of the modal market share, the reduction of congestion has prompted a reduction of emissions and energy consumption. And third, after the construction of the IES, the urban environment in the area where the buses used to stop in order to leave off the passengers has been substantially improved. Concerning the operation of the interchange, some measure is adopted for saving energy like the substitution of the old lights by led. People are already protected by the traffic pollution of the interurban bus by the screen enclosures. In this way the external negative effects on the health are reduced.

3.2 Travel time and space

The present section is crucial for defining the sample survey for each pilot case study. The previous analysis and the data collection of Moncloa interchange show that the interchange works at the two thirds of its maximal capacity (266,267 travelers per day, while the total capacity is estimated around 360,000 per day). Therefore, the interchange is not crowded even during the rush hour.

In order to improve the interchange in the future, we collected data concerning the transfer and waiting time and distance between modes. The transfer time is based on the observation of the pattern of a traveler regularly using Moncloa interchange. Actually, no many tourists carrying heavy baggage or irregular travelers use the Moncloa interchange because of the reduced number of the long distance buses. Therefore, the typical traveler using Moncloa knows where going.

Transfer time

Transfer Time (minutes)		Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
		line 3	line 6	Platf. 1	Platf. 2	Platf. 3	Ground level			Entrance 1	Entrance 2
Metro	line 3	0.0	1.2	2.0	1.5	2.0	2.7	3.6	2.1	2.1	1.7
	line 6	1.2	0.0	2.0	1.7	2.2	2.7	3.8	2.3	2.3	2.7
Interurban buses	Platform 1	2.0	2.0	0.0	2.2	2.7	0.7	1.9	2.8	2.8	0.9
	Platform 2	1.5	1.7	2.2	0.0	1.8	2.8	2.2	0.7	0.7	2.0
	Platform 3	2.0	2.2	2.7	1.8	0.0	3.3	2.2	0.7	0.7	2.5
Urban buses	Ground level	2.7	2.7	0.7	2.8	3.3	0.0	2.8	1.3	1.3	1.3
Car		3.6	3.8	1.9	2.2	2.2	2.8	0.0	1.7	1.7	2.5
Cycling		2.1	2.3	2.8	0.7	0.7	1.3	1.7	0.0	0.0	1.0
Walking	Entrance 1	2.1	2.3	2.8	0.7	0.7	1.3	1.7	0.0	0.0	1.0
	Entrance 2	1.7	2.7	0.9	2.0	2.5	1.3	2.5	1.0	1.0	0.0

Waiting time 7h-10h

Time (minutes)	Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level			Entrance 1	Entrance 2
Waiting time	3.0	3.1	25.0	30.0	25.0	9.0	0.0	0.0	0.0	0.0

Waiting time 14h 16h

Time (minutes)	Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level			Entrance 1	Entrance 2
Waiting time	4.5	2.5	30.0	30.0	27.0	9.3	0.0	0.0	0.0	0.0

Waiting time 18h 21h

Time (minutes)	Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level			Entrance 1	Entrance 2
Waiting time	4.5	2.7	24.0	30.0	27.0	9.3	0.0	0.0	0.0	0.0

Waiting time after 21h

Time (minutes)	Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level			Entrance 1	Entrance 2
Waiting time	12.5	14	27.5	45	30	12.5	0.0	0.0	0.0	0.0

Distance

Distance (metres)		Metro		Interurban buses			Urban buses	Car/taxi	Cycling	Walking	
		line 3	line 6	Platf. 1	Platf. 2	Platf. 3	Ground level			Entrance 1	Entrance 2
Metro	line 3	0	40	90	110	140	130	200	100	100	80
	line 6		0	90	110	140	130	200	100	100	80
Interurban Buses	Platform 1			0	138	170	30	230	130	130	50
	Platform 2				0	100	90	130	30	30	120
	Platform 3					0	90	130	30	30	150
Urban buses	Ground level						0	160	60	60	60
Car								0	100	110	120
Cycling									0	0	20
Walking	Entrance 1									0	20
	Entrance 2										0

There are 25 ticket machines in front of the subway access. The ticket machines seems never used at the same time, their number seems be enough. The distribution of some tickets machines in the bus platforms could be useful for inter-urban travelers. We expect the analysis of the travellers satisfaction questionnaire for better understanding the possible needs in this aspect.
It is easy to move inside of the interchange. Therefore, the connections parts are never really overcrowded. Even when, during the rush hour, the docks of subway could be crowded the

circulation inside the interchange has not in trouble. Nevertheless we observed long queue when people, wait for getting in the bus because of any assignment seat system exists: first comes, first gets the seat on the bus. We expect some additional elements from the analysis of travellers survey.
The interchange station is mainly constituted by 4 different levels characterized by open spaces without many physical interruptions between transport modes. The transport modes are indicated by a useful signaling system. However a criticism could be done in respect to the platforms. If two of them are really close, the third one is located at the other side of the interchange station. Even if there are screens which indicate the destinations of the bus of three different platforms, some passengers have difficulties knowing in which platform is located the bus they need. The information desk located at the center of the interchange station is very useful for that.
The place is comfortable with its shops, restaurants and free toilets. As the interchange works at the two thirds of its capacity, there is also an important margin for attracting new passengers. There is no greenery in the interchange in itself, but at outside of it there is a big and leasable park.
A wall inside of the interchange describes the evolution of the interchange and more generally of public transport in Madrid. In the commercial area there is a space dedicated to expositions. Lastly two expositions were about Le Cirque du Soleil and the promotion of the use of bicycle.
It is not really noisy, not crowded, the temperature pleasurable. Overall, the interchange is a quite comfortable place. The quality assurance plan fix the control value of noise, lights and internal temperature.
The interchange is mainly located at underground. Consequently its users are protected against bad weather conditions. The passengers waiting for the bus are separated from the bus bays by screen enclosures. They are in a waiting open space. It is a quiet space because of the separation from the noisy of bus traffic. Finally the opens spaces of the platforms are kept at a pleasurably temperature with a regularly refreshed air.

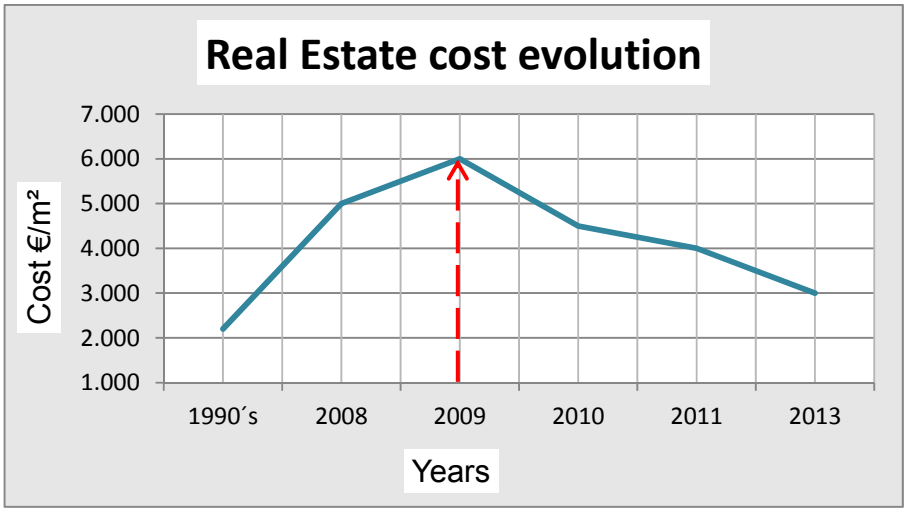
3.3 Facilities, service and retail

The quality of service of the commercial activities that take place in the transport interchange station (newspaper kiosks, cafes, shops, advertising, etc.) has a substantial effect on the image of the Madrid's Regional transport system.
In the event that the Madrid Transport Authority authorizes such activities to take place within the transport interchange station, the concessionaire should monitor the services to ensure the highest quality possible (opening times, distribution of merchandise, storage, comfort in the interior of kiosks, cafes and shops, etc., collection and processing of complaints and suggestions in relation to such activities, etc.).
Supervision of such commercial activities should be carried out continuously by all staff employed in the transport interchange station, particularly those who are normally present in such areas: Security staff who can ensure there are no issues relating to the activities being carried out during their normal rounds, and Maintenance, Repair and Cleaning staff, who can ensure that the premises on which such services are being provided are in suitable operating condition.
The interchange station of Moncloa includes various shops and other commercial services. Therefore there are some restaurants, cafés, snacks and candy shops, general stores, newspapers kiosks, book shops and a very used tobacco shop. Often the interchange is used like an advertising window for promoting new technological products (i.e. mobiles). Various vending machines including products like flowers or medicines could be founded in the interchange. There is some cash machine.
The commercial area inside of the interchange station is around 1500 m². For defining the survey and its Stated Preferences section, we regrouped shops and services basically in food

and not food shops and food and not food vending machines. In general, in the connecting between transport modes are located between 7 and 16 food shops or vending machines and between 8 and 17 no food shops and vending machines. The connection between metro lines is characterized by the absence of coffee points.
Any commercial mall is located inside or just outside of the interchange. However, a big commercial center, the Corte Ingles, is located at less than 1 km. The selected area of influence (300 m around) of the interchange station is highly commercial. Actually, it is possible to find there any kind of shops, restaurants, banks, real estate agency, and clothes shops.
The quality of shops, restaurant and services could vary a lot from the typical local restaurant to the fast food for young students. Actually a third of travellers using the Moncloa interchange are university students because of the nearness to one of the major Campus of Madrid, “Ciudad Universitaria”. In general, the interchange of Moncloa is part of a middle-upper class neighbors where the average income is around 3,000€ per month.
You can have a free WI – Fi access in the commercial areas and in each platform for buses.

3.4 Impacts on local economy

The interchange of Moncloa has generated 69 direct employments including staff for administrative officers, travellers’ information agents, maintenance of the infrastructure and safety and security agents.
A first exploratory qualitative survey, carried out by the UPM with 10 inhabitants and 10 shops holders located around the interchange, shows that the interchange station has not a noticeable impact in their activities. Anyway, the neighbours (inhabitants and commercial services workers are convinced that the interchange construction and its renewal reorganized the ground car traffic making more liveable the interchange area.
The interchange station was built in 1995. The equivalent price was 2,200€/m². In 2008 a considerable renovation of the interchange station changes the design of the interchange, gathering all dispersed interurban bus lines around the area inside of the interchange platforms.
According to the data collected by interviewing some local real estate agencies, the evolution of the cost of housing near the interchange shows that the price has tripled during the past 20 years, but that drastically it decreased during the last three years.
However, the evolution of the cost is not really linked with the presence or the renovation of the interchange station, but more with the housing bubble for its increasing period and with the economic crisis for its strong decrease.



The interchange area is integrated in a wider district named Moncloa-Aravaca, where the average cost of housing is higher (i.e. 3,500€/m²), while the average cost of all Madrid districts is 2,960€/m².
The estimation of the cost of retail seems to be more problematic because it depends on its the specific location (i.e. if it is a commercial or more a residential street. A micro-scale analysis should be engaged for better detecting the variability of the price. However, crossing cadastral data and real estate data set the resulting price is 5,000€/m².
Concerning the local economic evolution, the local shops, services and real estate workers seem to agree that the interchange didn't have a noticeable impact on increasing start-up business. Since 2008 and the last renovation of the interchange, there have been a lots of new services which have opened and lots which have as well closed. However, the amount of the closed shops is higher because of the economic crisis.
The interchange renovation is not at the origin of an urban gentrification process: people who live here have not really changed, like declared the local real estate agencies. Actually, no intensive housing programs were launched in the area. Only one or two new buildings were contracted. We have to remind that the interchange is located in an historical area where the construction of new building is difficult. Maybe a deeper data collection including the area of the municipalities of the region of Madrid (Majadahonda, Las Rozas etc.) that benefit of travel time saving could reveal some interesting change in this way.
There is no a commercial mall inside or just outside of the interchange. However the Corte Ingles – a big commercial center is located at less than 1 km. In any case, the interchange zone is one of the highest commercial zones of Madrid City with the commercial street linking Moncloa to the city center. Neither new offices have been developed in/or near the interchange. The last commercial novelty is a new Zara clothes shop over 5 floors and occupying 2000 m^2.

3.5 Good and bad practices

GOOD PRACTICES

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	Safety and security Integration of environmental criteria in the conception of the interchange	Exploitation of natural light when it is possible and the new led. The presence of screen enclosures	x	x	
Travel time and space	Efficient public transport operation	Very short transfer times between almost all transport modes	x	x	
Facilities, service and retail	Good services quality behind the quality assurance plan of the PTA	Varity of facilities and their good distribution inside of the interchange			
Impacts on local economy					
Other issues					

BAD PRACTICES

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller

Design	Long distance between Platform 1 respect to the others (Platform 2 and 3)	It is difficult to find the buses	x	x	x
Travel time and space					
Facilities, service and retail	No coffee shops in Metro transfer area		x	x	x
Impacts on local economy	No policy for attracting start up		x	x	
Other issues					

4 Accessibility

4.1 Accessibility for walking and cycling

ACCESSIBILITY FOR WALKING:

There are entrances in each sides of the interchange station which make it possible to enter it easily.
Before the renovation in 2008, the interchange area was considered dangerous because of the high level of traffic. After the renovation, the traffic decreased, and according to people working or living around the area which has become safer for walking and gets the interchange. However any pedestrian island on the street separating the two main entrances exists. Actually the street is wide; therefore, for crossing it the light time frame is too short especially for people with special needs (i.e. aged people, children, etc.).

ACCESSIBILITY FOR CYCLING:

There are around ten free bicycle racks in front of one of the main entrance of the Moncloa interchange station. It is the only one place where it is possible to park bicycles. They are located outside of the interchange without any bad weather protection. The interchange doesn't offer bike sharing facilities or cycle repair. Any measure is adopted for making safer the use of the bicycle in the interchange. It is quite difficult to use the bike for an intermodal trip: you can carry your bike if there is enough space in the public transport (i.e. metro trains, bus), not during peak hours and only if the bike can be packed up and the conductor is agree with that.
There is only one cycleway linking the interchange station to the university area (Ciudad Universitaria). Out of that, cyclists have to share the street with speedy cars traffic around the Moncloa station.

4.2 Accessibility for public transport

The urban bus shelters are located on the ground level outside of the interchange near the main entrances. Moreover, people that are waiting for the interurban buses and the subway are inside the interchange close to the main concourse.

The interchange station includes four levels mainly underground. Metro and interurban travelers are protected by the weather and benefited of artificial light, while people using the urban bus are not so protected by the weather, but they benefit of natural light.

The Moncloa interchange station basically includes four different transport modes: metro, urban bus, interurban buses and one long distance bus (see Section 1).
Public transport frequencies at different time frame of the day are:

Frequency 7h-10h

Transport mode	Metro		Interurban buses			Urban buses
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level
Frequency (number/hour)	20.0	19.4	2.4	2.0	2.4	6.7

Frequency 14h-16h

Transport mode	Metro		Interurban buses			Urban buses
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level
Frequency (number/hour)	13.3	24.0	2.0	2.0	2.2	6.5

Frequency 18h-21h

Transport mode	Metro		Interurban buses			Urban buses
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level
Frequency (number/hour)	13.3	22.2	2.5	2.0	2.2	6.5

Frequency after 21h

Transport mode	Metro		Interurban Buses			Urban buses
	line 3	line 6	Platform 1	Platform 2	Platform 3	Ground level
Frequency (number/hour)	4.8	4.2	2.2	1.3	2.0	4.8

The public transport is generally on time. Various screens inform the public on real time about the transport modes frequencies.

4.3 Accessibility for car and taxi

By difference from other interchanges of Madrid, Moncloa has not a parking or a Kiss&Ride infrastructure. This interchange was constructed for limiting the arrival of many cars from the northern municipalities of Madrid region. Actually, the objective of the Bus-VAO is to reduce the car use for getting Madrid City. A private parking is located near the station, but it is not integrated in the interchange infrastructure. An important taxi station is located at the entrances/exits of the interchange station. Any rent or car sharing company exists in the interchange station.

4.4 Access for all

The management of access to the transport interchange station and all transit movements within it is a key factor in the quality of service provided to passengers. Itineraries should be planned and managed accordingly in order to be convenient, safe, rapid, and free of obstacles.

Since the Community of Madrid's Law 8/93, of 22 June, on the Promotion of Accessibility and the Removal of Architectural Barriers (Official Gazette of the Community of Madrid 29/06/93) came into force, the concept of accessibility has evolved, changing from being considered a functional requirement that affects only those with disabilities of some kind and "special needs" groups, to being understood as a right of all citizens to enjoy an environment without any discriminatory barriers, including disabled people as just one part of this total, with the same "normal needs" as others.

The accessibility measures undertaken in the transport interchange stations cover a range of different aspects and their objective, as described in the regulations, is to integrate them from the very beginning of the design process to the screen enclosures.

Different types of actions can be identified:

- Those that involve safety and may be referred to as primary accessibility.
- For the visually impaired, this avoids risks.
- For the physically disabled, this enables safe and independent access.
- Those that facilitate usage and may be referred to as facilitating.
- For the visually impaired, these make possible use with equal conditions.
- For the physically disabled, these provide ease of access and use.

These actions cover a wide range of areas, including design, furniture and fittings, signs, evacuation, vertical communication between floors and special measures for the visually impaired. These actions focus on avoiding unnecessary risks, and improving conditions in the station and transit through it for the blind.

SCREEN ENCLOSURES

The physical barrier separating the area where the buses manoeuvre from the passenger areas make the transport interchange stations safer for passengers to pass through, as the only places where the two areas meet are the boarding and alighting doors, and these are designed to only let people pass under certain circumstances. This reduces the presence of people in the area of the buses to such a degree that they are no longer suitable for, or accessible to, passengers, and this minimises the interference of people with bus movements.

In order to facilitate the movements of people, the doors are equipped with equipment that automatically opens them, using a luminous button, in the case of the boarding door, and through a movement detector in the case of the double exit doors.

FURNISHINGS

The transport interchange stations include measures to make waiting more pleasant for passengers:

- Hip-level supports for seating.
- Benches for seating: these are equipped with armrests at the ends to make it easier for people with physical handicaps or limitations to sit down and stand up.
- Turnstiles: for connecting to the underground; these are normally 60cm-wide, but some are 80cm-wide to make it easier for people with physical handicaps or limitations to pass through.

SPACE RESERVED FOR PEOPLE WITH RESTRICTED MOBILITY IN EMERGENCY EXITS

In order to guarantee the evacuation of people with handicaps, evacuation ramps have been installed for emergency in use in places where this was possible. These ramps have a maximum slope of 8% and also serve for the evacuation of people on stretchers, if necessary, as they are over 3m in width.

The evacuation routes have waiting and refuge areas for people with reduced mobility, which are located in the halls immediately prior to the emergency stairs.

TOILETS FACILITIES: GENERAL USE

The accessible cubicles for the disabled have been designed, located and equipped to be used by all users, not just the disabled. Furthermore, they have been equipped with measures that facilitate their use, such as bars on the inside of the doors that make them easier to open and close, in addition to other accessories that make their autonomous use both safe and comfortable.

The internal layout of these cubicles makes it possible to approach the toilet from either side, and the sink can be adjusted both vertically and horizontally, with fittings that are easily accessible.

ESCALATORS: PLATFORMS

All the escalators meet the requirement that the first three steps form a platform, both when getting on and getting off the escalator. This makes the escalators safer to use, as there are a few tenths of a second at the time that the stairs come together or begin to separate at the end or start of their trajectory which give the senses time to acclimatise to having got onto or off a moving object and, secondly, give the user time to take hold of the handrail to help them to get on or off.

The escalators are capable of operating in both directions; as a result, in the event that one is not working, it is possible to reverse the other to make it easier to ascend.

ELEVATORS

The elevators have Braille on the control buttons, both inside the elevator, itself, and outside next to the elevator doors on each floor.

There are audio alerts indicating which floor the elevator has reached and the main use of the floor (exit, bus bays 01 to 10, Metro, complementary services for passengers, etc.) in addition to warning that the doors are about to open or close.

PEOPLE WITH VISUAL IMPAIRMENTS

The public areas of the transport interchange stations, the entrance halls, the passenger islands and the bus bays all have a range of features for people with visual impairments, which tends to suffer from problems in large open spaces in which reference points are lost in the magnitude of the space.

The regulations state that systems suitable for people with visual disabilities should be established to signal the main routes through the space. In order to achieve this, two types of floor tiles have been used: corrugated and domed, using two different colours. These types of tiles and the different colours are used to signal guidance, warning, lifts, stairways, steps, dangers and junctions of two paths.

SIGNS AND INFORMATION

The signs and information in the transport interchange stations give visual information, and the information is displayed in high relief and in Braille, which have specific functions, and are of a size that is intended to serve the largest possible number of passengers.

Moreover, the automation of the boarding door is made accessible for people with visual impairment as the boarding buttons emit a low frequency sound through a buzzer, located as close as possible to the button. The acoustic signal works in the same way and at the same time as the flashing luminous signal, which indicates that the bus in the bay is ready to accept passengers.

The information is displayed using a range of different types of signs, which are used throughout the station, from the exterior to the transport systems, and between the public spaces in the transport interchange station.

The signs have to perform several functions: giving directions, general information and specific information on the bus bays.

4.5 Good and bad practices

GOOD PRACTICES

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking	Good access to the interchange	Presence of different entrances	x	x	
Cycling					
Public transport	Urban bus stops near the entrances of the Interchange			x	
Car	Discouraging the use of Car from the nearest municipalities	The dedicated Bus line (*Bus VAO*)		x	x
Taxi					
Access for all	Architectural design		x	x	
Other issues					

BAD PRACTICES

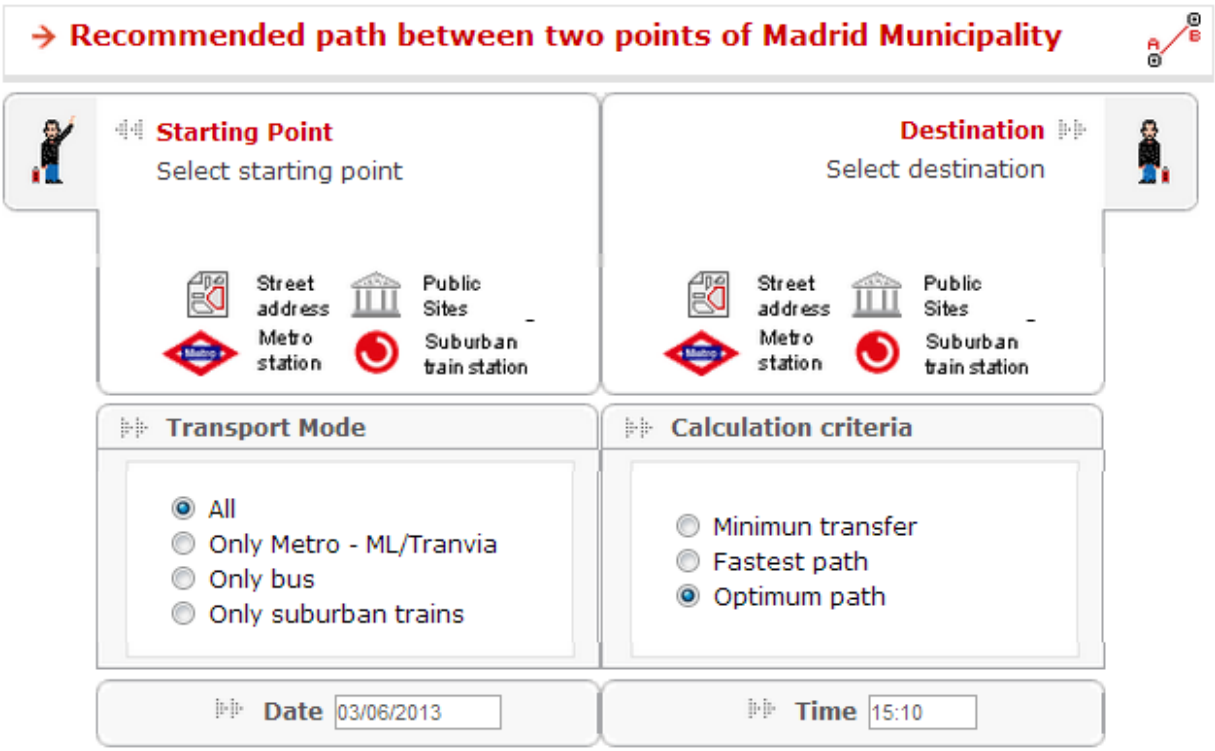
Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking	Difficult to cross the street for aged people and children	Time frame of traffic light too low		x	
Cycling	No oriented policies are carried out for promoting the bicycle use (no bike sharing, not extensive bike parking difficult to make an intermodal trip using the bike)	An incipient cyclist culture		x	x
Public transport					
Car	No space for kiss and ride		x	x	
Taxi					
Access for all					
Other issues					

5 Passenger services

5.1 Journey planning and real time information

JOURNEY PLANNERS FOR PRE-TRIP PLANNING

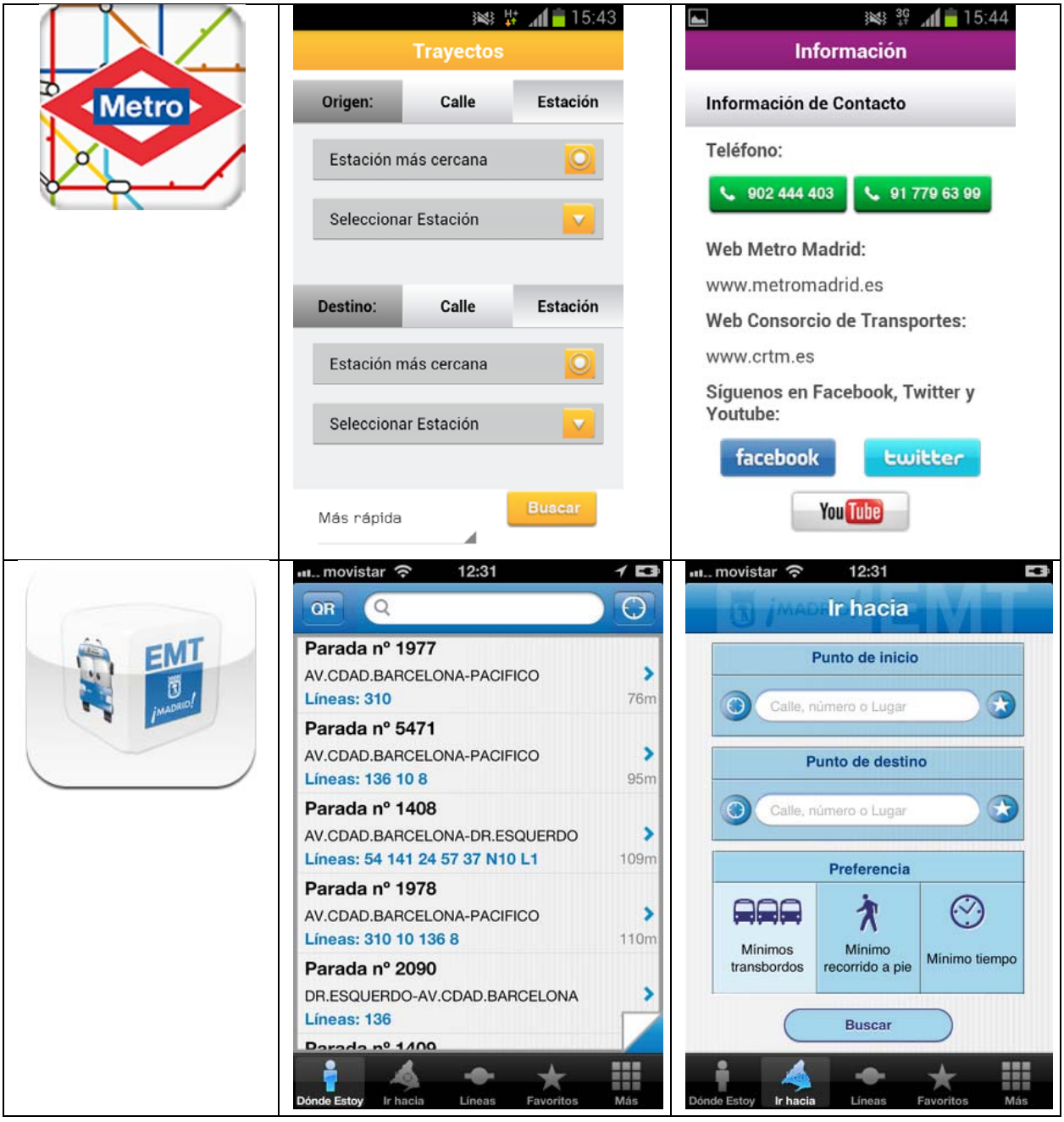
Current Transport Information System managed by the Madrid Public Transport Authority provides a number of Web-based applications for local and long-distance public transport pre-trip planning. A screenshot of one of the applications is shown below these lines:



The application recommends any user the path between:

- Two points of Madrid Municipality (see Figure above), according to the day of the week and the trip starting time. Starting/Ending points can be either a street of the city, a metro stop, a suburban train station or even a public site. The service allows the passengers to choose their preferences about the transport mode to be used (‘All’, ‘Only Metro - ML/Tram’, ‘Only bus’, ‘Only suburban trains’).
- Two municipalities in the region of Madrid, selecting starting and destination point by place name. Again, allowing the passengers to choose their preferences about the transport mode (‘All’, ‘Only bus’, ‘Only suburban trains’).
- Two suburban train stations, selecting the origin and destination stations from a list, and specifying date and time for trip departure.

Apart from this service, a number of different applications for smartphone are available in the Android Market and Apple Store for pre-trip planning. The official ones powered by Metro de Madrid S.A. and EMT provide the passenger with basic information services related to bus and metro respectively: map visualization, fares and route planning mainly. Real-time information about bus arrival time to a bus stop is also provided taking advantage of GPS-based onboard tracking systems.



INFORMATION ABOUT INTERCHANGE FACILITIES FOR PRE-TRIP PLANNING

Some information about Moncloa interchange facility is available on the Internet (e.g. interchange layout). In addition, a Call Centre for providing additional information is available on the 012. Thus, people, especially the disabled, can plan better their trips.

It is also importance to highlight the existence of a Traveller Information Centre, located in level -2 which opens from 7am to 9pm every day. Apart from face-to-face assistance, a public access information kiosk can be found inside.

Finally, special dedicated information areas provide audio services for visually impaired. By pushing a button, passengers get in contact with the station staff quickly.

ELECTRIC DEPARTURE TIME DISPLAYS

Once inside the transport interchange, several boards and electronic displays provide information about next departure times for both metro and buses independently, which are mainly based on timetables. In the event of disturbance, updated and real-time information is provided to the users of the facility through the same means.

The same display only provides information related to a particular mode of transport. Thus, electronic displays at the entrance of bus arrival/departure area only provide information about next bus departures and the corresponding bus dock. The same applies for next metro departures, ordered by line, direction and platform. However, no integrated information from different modes of transport can be found in the Moncloa Transport Interchange at the moment.

Finally, displays close to the bus stops from EMT outside the transport interchange, provide real-time audio visual information about next departure times.

5.2 Fares and ticketing

Different procedures can be followed for acquiring a valid ticket for travelling. There are ticket booths at the Metro network stations. Additionally, automatic ticket machines are distributed across the Moncloa transport interchange. In the last case, the user interface is adapted for the needs of visually impaired people.

SINGLE & 10-TRIP TICKETS

The transport interchange of Moncloa operates with Metro, EMT buses and urban and suburban buses as well.

For occasional use of either metro or EMT buses, both single tickets and 10-trip ticket are available for purchasing:

The fares for the integrated ticket for **Metro and EMT buses** from September 1st. of 2012 are as follows:

SINGLE TICKET		
EMT ticket	1.50€	
Metro ticket (Metro Zone A and ML1) (*)	1.50€	2.00€
MetroEste, MetroNorte and MetroSur ticket	1.50€	
TFM ticket	2.00€	
Combined Metro ticket (**)	3.00€	

10 TRIP TICKET		
Metro Zone A, EMT and ML1 ticket (Metrobús)	12.20€	
EMT 10 trips ticket with transfer (***)	18.30€	
MetroEste, MetroNorte and MetroSur ticket	11.20€	
TFM ticket	12.20€	
Combined Metro ticket (**)	18.30€	
TICKETS FROM/TO THE AIRPORT		
Single Ticket Metro+Extra charche (*)	4.50€	5.00€
Combined Metro Ticket+Extra charche	6.00€	
Airport Surcharge Ticket	3.00€	
Airport Express Bus Ticket	5.00€	

(*) Routes up to 5 stations or less: 1.50 €. Routes 6 to 9 stations: 0.10 € extra per station. Routes of 10 stations or more: 2.00 €. In the vending machines you pick a destination and it will automatically calculate the number of stations and the price for the shortest route among the possible.
(**) Valid for the Metro Network of Madrid Region, TFM and Light Rail.
(***) Valid for 10 journeys with a SINGLE transfer EMT + EMT in a maximum of 60 minutes starting from the first validation.

The **urban and suburban buses** fares from September 1st. 2012 are as follows:

Zone	A	A-B1	A-B2	A-B3	A-C1	A-C2	B1	B1-B2	B1-B3	B1-C1	B1-C2
Single ticket	1.50€	2.00€	2.60€	3.60€	4.20€	5.10€	1.30€	2.00€	2.60€	3.60€	4.20€
10 trip ticket	-	12.20€	16.10€	23.00€	29.70€	37.40€	8.50€	12.20€	16.10€	23.00€	29.70€

Zone	B2	B2-B3	B2-C1	B2-C2	B3	B3-C1	B3-C2	C1	C1-C2	C2
Single ticket	**1.30€**	**2.00€**	**2.60€**	**3.60€**	**1.30€**	**2.00€**	**2.60€**	**1.30€**	**2.00€**	**1.30€**
10 trip ticket	**8.50€**	**12.20€**	**16.10€**	**23.00€**	**8.50€**	**12.20€**	**16.10€**	**8.50€**	**12.20€**	**8.50€**

Single tickets can be purchased on the bus. They are valid for travel in the company concerned and the area of validity. 10 trip tickets are valid for travel any company mentioned in urban and interurban providing the service. These tickets are not valid on the services of EMT, or the company Prisei. They can be purchased at tobacconists in the relevant areas in the transport interchange and selected newsagents.

TRAVEL CARDS

Until May 2012, a Transport Season Ticket composed of a Card and a magnetic voucher was the only possibility for unlimited travel on public transport during a chosen period and zone. In order to travel, a monthly or annual voucher had to be purchased. Thus when travelling with METRO, EMT, TFM, METROSUR, METRONORTE, METROESTE, METRO LIGERO OESTE (Light Railway) or any company operating within the Community of Madrid using a magnetic cancelling system, the Voucher must be stamped both on entry and on exit, as appropriate.

Travel cards permits journey extensions within the Madrid Region. Existing zones from A to E2 can be visualized in the map below. If anyone want to make a journey exceeding the valid zone of the Pass, it is necessary to request the complementary ticket from the Inspector, before arriving at the limiting station of the pass, or to purchase it at the booking office before starting the journey.

The general fares from February 1st. of 2013 for most commonly demanded **Travel Cards** are as follows:

Travel Card/Zone	A	B1	B2	B3	C1	C2	B1-B2 B2-B3 B3-C1 C1-C2	E1	E2
Monthly travel card coupon	54.60€	63.70€	72.00€	82.00€	89.50€	99.30€	47.90€	110.60€	131.80€
Youth travel card coupon	35.00€	39.60€	45.00€	51.60€	56.20€	61.80€	30.30€	78.30€	97.40€
Monthly senior citizen travel card coupon	12.30€								
Annual travel card coupon	546.00€	637.00€	720.00€	820.00€	895.00€	993.00€	-	-	-
Annual senior citizen travel card coupon	123.00€								

The Standard Transport Season Ticket is for adults between the age of 23 and 64. The Young Person's Transport Season Ticket (Abono Joven) is for under 23s. The Senior Citizen's Season Ticket (Abono Tercera Edad) is for persons who are 65 and over.

This lead to the creation of other types of travel cards apart from the standard one: the **Blue Card**, directed to older people and people with disabilities who meet certain financial requirements at a price of 6.20 €; **Reductions for large families** are also applied.Finally, the **Tourist Travel Pass** fares from February 1st. 2013 are as follows:

Zones	1 day	2 day	3 day	5 day	7 day
A	8.40 €	14.20 €	18.40 €	26.80 €	35.40 €
T	17.00 €	28.40 €	35.40 €	50.80 €	70.80 €

For more information please visit the following link: http://www.ctm-madrid.es/red_transportes/tarifas/red_tarifas.jsp?CODPANTALLA=1&CODBOTON=203

SMART TICKETING

As of May 2012, the new **smart Public Transport Travel Card** begun to put in use. The implementation will be done progressively starting with the travel card in zone A.

Based on RFID technology, these contactless cards offer numerous benefits compared to conventional contact-based tickets. As the ticket validation is carried out without direct contact to a reader, public transportation organizations are able to realize cost-savings through reduced maintenance efforts for mechanically heavily stressed equipment in conventional, contact-based mass transportation systems.

Furthermore, the ticket validation process is much quicker than manual stamping thus reducing waiting queues and offering a convenient entry process for passengers. RFID-based public transportation applications help significantly increase efficiency with several millions of passengers per day that need to be equipped with reliable and convenient access solutions.

5.3 Good and bad practices

GOOD PRACTICES

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Existence of journey planners for public transport for pre-trip planning	Web-based applications and several Smartphone App are available on the Internet and through the Android Market/Apple Store for mobile use			x
	Information for interchange facilities	Layout available on the internet makes possible better pre-trip planning, especially for the disabled. Call Centre also available	x		x
	Electric departure time displays based on timetables	Displays installed close to the metro exit provide information to the travellers about next urban/suburban buses departures (bus number, direction, remaining time, platform). Information about next metro departures (per line and platform) is also	x		x

		provided at the entrance.			
	Real-time disturbance information	At the moment, only disturbance information is provided via displays			
	Public access information kiosk and Information centre with personal service	One kiosk and two people			
	Audio services for the visually impaired	Several points. Ticket machines also adapted for them			
Fares and ticketing	Smart ticketing	Being progressively introduced in Madrid. Speeds up transfer, reduces maintenance efforts	x		x
Other issues	Guidance and warning surfaces for the visually impaired				
	CCTV-based intelligent security systems	Currently under test			

BAD PRACTICES

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Electric departure time displays based on real-time	At the moment, only information from next EMT bus arrival is provided in real-time at bus stops located outside the transport interchange. No real-time information for multiple stops or even using different modes of transport is available at the moment.	x		x
	No departure times or real-time disturbance information is provided via audio calls at the moment		x		x
	Multi-language information	Most of information can be found in Spanish. Few information in English			
	Tactile maps of the interchange for the visually impaired	Not available			
	Information with hearing aids (e.g. “T-coil”)	Not available			

	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones	Departure times for a specific stop or platform not available through QR-codes, only information displayed on electronic boards and/or in paper			
	Intelligent Indoor-Navigation System	Not available			
Fares and ticketing					
Other issues	Advanced Intelligent security systems	More investment required			

6 Analysis of good and bad practices

Why is this interchange considered successful? (They are in blue colour.)
□ Ownership/ management structure
□ Availability of interchange space
□ Quality of waiting areas
□ Range of retail establishments
□ Security and safety
□ Facilities for the mobility impaired
□ Quality of journey planning and real time information
□ Integrated ticketing arrangements
□ Transfer quality among modes
□ Other
If other, please provide details.
Can you provide any other examples of successful multimodal interchanges?
□ Yes
□ No
If yes, please provide details of the location, a brief description (e.g. modes of transport available) and explain in what ways the interchange is successful; any specific factors, e.g. information systems, accessibility, energy efficient design/operation.
Every interchange stations which have been improved or that are of new construction. (To see Section 2.1)
The rest of the information required is regrouping from Section 1 to Section 5.

All information included in the current report was collected by using:
a) the following documents:

- *Plan Transport interchange of Madrid*
- *Di Ciommo, F., Vassalo, J. M., Oliver (2009). Private Funding of Intermodal Exchange Stations in Urban Areas. Case of Madrid, Transportation Research Board of the National Academies, No. 2115, Washington D.C., pp 20-26.*
- *Monzon, A., Alonso, A., Lopez-Lambas, M. 2013. Key Factors Affecting the Efficiency of Transport Interchanges. 13th WCTR, July 15-18, 2013 – Rio de Janeiro, Brazil.*

b) survey and interviews carried out by UPM team:

- *Interviews to operators, Public Transport Authority and concessionaire*
- *Qualitative survey to inhabitants, local real estate agencies and shops and services workers*
- *Data collection test and preliminary Travelers Survey results*

Annex C: Pilot case study report Ilford

EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

THEME [SST.2012.3.1-2.]

Collaborative project
Grant agreement no: 314262

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

WP2 – Task 2.4

Data collection template for pilot case studies

Contents

1 Background

Welcome to Ilford Sign at the interchange

Ilford is a large suburban town in the London Borough of Redbridge, East London. The town is a significant commercial and shopping district surrounded by extensive residential development. Redbridge is an outer London borough with a population of 278,970 (Census 2011[13]), having grown rapidly in the early 20th century as a residential area serving as a satellite to central London. Redbridge is the ninth most diverse borough in the country with approximately 55 per cent of its population coming from a minority ethnic background[14]. In 2010, Redbridge was ranked 134th most deprived borough in the Country (out of 326). The Valentines area of the Borough – which contains Ilford Station and the main shopping areas, is in the highest 10% band of deprivation[15].

Ilford railway station is situated on the Great Eastern Main line and has regular local train services (from Essex) to Liverpool Street station in central London. More than 10 bus stops are located within walking distance of the station, with the town being a hub of the London Buses network, providing buses to central London and various suburbs. The station is considered to be a major public transport interchange by Transport for London (TfL).

The station opened in 1839, with the main entrance on Cranbrook Rook being extensively rebuilt during the 1980s (see photo below). The station also has a second (side) entrance on York Road which is open only during peak hours. The station has five platforms, two for trains into London (towards Liverpool Street) and two out of London (towards Shenfield). The 5th platform is a bay platform that allows peak-period services into London to start at Ilford. Platforms 1 and 2 are rarely used, as they are on the 'fast' lines used by longer distance trains that mostly do not call

[13] Key Figures for 2011 Census: Key Statistics, London Borough of Redbridge

[14] http://www2.redbridge.gov.uk/cms/the_council/about_the_council/about_redbridge/2011_census/diversity.aspx

[15] Deprivation in Redbridge Report, 2010
http://www2.redbridge.gov.uk/cms/the_council/about_the_council/about_redbridge/research_and_statistics/deprivation_in_redbridge.aspx

at suburban stations. Platforms 1 and 2 are rarely used, as they are mainly reserved for the fast trains that do not call at suburban stations. The station is located within TfL Zone 4[16]. Most trains stopping at Ilford run between Shenfield and London Liverpool Street, with at least 6 trains per hour train in each direction. Train services are currently within the Greater Anglia rail franchise, operated by Abellio Greater Anglia Ltd.

Main Entrance on Cranbrook Road

The interchange is planned for re-development as part of the Crossrail project[17]. The existing station is to be re-configured to serve Crossrail trains from 2019. This will provide more than twice the current frequency of trains from Illford to central London and is expected to encourage significant increases in passenger numbers. The station improvements will provide a new ticket hall layout with greater gate line capacity, passenger lifts, longer platforms and a realigned station entrance and elevation to the street.

The town centre, in which the interchange is located, is dominated by a heavily trafficked gyratory road system (A118) around Chapel Road, Ilford Hill and Cranbrook Road; this connects to the nearby North Circular Road (A406) which provides a key orbital link around London. This one-way gyratory road system is a significant barrier to pedestrian movement due to the wide carriageway (of three lanes) with heavy traffic and several guardrails. However many of the retail outlets are located in more peaceful areas: along the High Road (which is partially pedestrianised), in the Exchange Shopping Mall and along Cranbrook Road.

[16] London Underground, Docklands Light Railway (DLR), London Overground and National Rail services in London are divided into zones. Most services operate in zones 1-6, with London Underground, London Overground and National Rail also operating in zones 7-9.

[17] Crossrail is a railway, 118 km in length, currently under construction that will link Maidenhead and Heathrow Airport to the west of London with Shenfield and Abbey Wood to the east via Greater London with 42 km of new tunnels and new underground stations in central London.

The modes of transport available at the interchange are: main-line rail, bus, cycle (with cycle parking), pedestrian, private car with drop off, car parking and taxi.
Estimated station usage (rail only) shows passenger numbers of 6,721,486 in 2011/2012 (travelling from or to the station (entries & exits)) – an increase on the previous numbers of 6,286,174 in 2010/11 (figures derived from ticket sales data recorded in rail industry systems)[18].
An estimated 14,453 people interchanged at the station during the year (i.e. rail to rail). Please note that we are not able to provide any further information related to passenger numbers, i.e. we are not able to split this by gender or age.
Most interchange at Ilford will be local to local, with some being local to regional, for example for passengers who travel out to Southend. No specific information was available on the approximate share of transfer between spatial scales.

Table 1: Transfer between spatial scales

From \ To	Local	Regional	National	International
Local	Most	Some	N/A	N/A
Regional	Some	Some	N/A	N/A
National	N/A	N/A	N/A	N/A
International	N/A	N/A	N/A	N/A

Key:

- Local defined as: All journeys within Greater London.
- Regional defined as: Rail journeys to/ from the East of England (Essex, Suffolk and Norfolk).
- National defined as: N/A at this interchange.
- International defined as: N/A at this interchange.

Partial information on transfer between modes is available based on data from a pedestrian flow analysis that was undertaken in 2010[19], as part of a study that also included an audit of pedestrian provision using the Pedestrian Environment Review System (PERS). The pedestrian flow data was captured on Tuesday 23rd March during the periods 7-10am, 12-2pm and 4-7pm. Interchange flows were calculated for:

- Bus to rail
- Bus to bus
- Rail to car pick up
- Rail to cycle

[18] Estimates of Station Usage 2011/12, Steer Davies Gleave for Office of Rail Regulation, 2013
[19] PERS and pedestrian flow assessment for Ilford Station pedestrian interchange. May 2010.

The information available is provided below[20].

Table 2: Transfer split between modes

	Train	Bus: Local only	Car: Pick up only	Cycling	Walking
Train	Not available	10.8%	0.4%	Very small	12.5%
Bus: Local only	7.5%	12%	Not available	Not available	5.4%
Car: Pick up only	0.2%	Not available	Not available	Not available	Not available
Cycling	Very small	Not available	Not available	Not available	Not available
Walking	12.7%	16.9%	Not available	Not available	Not available

2 Management

2.1 Policy and governance

The station was originally designed by the Eastern Counties Railway Company in the 19th century (private sector). Following nationalisation in 1948 British Rail (public sector) would have been responsible for the redesign that occurred in the 1980s. Given the timescale since this redesign it is not possible to provide information on the design and planning processes that were undertaken or the key aspects that were considered. The station is now owned by Network Rail, the UK national rail infrastructure operator which, and operated by the Greater Anglia train operating company.

As mentioned in the previous section, the station is now due to reconfigured as part of Crossrail. Crossrail is funded by the Department for Transport (DfT) and Transport for London (TfL the local government body responsible for most aspects of the transport system in Greater London), with private sector contributions from developers along the route. The scheme is being managed by Crossrail Ltd, initially set up as a joint venture between DfT and TfL, and now a wholly owned subsidiary of TfL Delivery of the upgrades required to the existing (surface) lines is being carried out by Network Rail.

The Crossrail Bill required to construct and operate the railway was introduced in Parliament in February 2005. The Bill contained a description of the works to be done and where they are to be carried out, and identified the land needed temporarily or permanently. The Bill was enacted on 22nd July 2008 when it completed all the Parliamentary stages and received Royal Assent to become The Crossrail Act (2008). Consultation exercises were carried out at key development stages of the Crossrail project and information made available through a range of communication media before and during the Parliamentary phase[21].

[20] Data was also provided on the flows between rail/bus and shopping destinations, but this has not been reported here.

[21] http://www.crossrail.co.uk/construction/public-consultation-during-construction

In partnership with Network Rail, the London Borough of Redbridge, Design for London and Transport for London, Crossrail are developing an overall design for the interchange zone around Ilford Station, known as the 'Ilford Station Masterplan'.

As part of the proposed redevelopment of the area Transport for London has approved a £30million contribution to Crossrail's "public realm scheme", which aims to improve public spaces as well as the stations themselves. Improvements are expected to include wider pavements, pedestrianised areas, traffic calming, improved transport interchanges, trees, seating areas and meeting places designed to integrate with local character[22]. These urban realm improvements for stations associated with Crossrail are to be taken forward by the relevant local authorities along the route, the London Borough of Redbridge in the case of Ilford. Local authorities will be able to bid to TfL for funding under the Crossrail public realm scheme. The Masterplan will be taken forward through the normal planning process, with public consultation expected in late 2013-14 when plans are sufficiently developed.

The interchange does not currently have a station travel plan.

Information on how public transport is organised in London is provided in the following section.

2.2 Station operations, management and maintenance

Railways in the UK are in the private sector[23], but they are subject to control by central government, and to economic and safety regulation by arms of government. The key players are:

- The Department for Transport (DfT) who sets the strategic direction for the UK rail network and works with various partners to deliver major projects. It is also responsible for specifying and letting contracts to Train Operating Companies (TOCs) to run franchised passenger services in England.
- TOCs are responsible for the day-to-day running of services, as well as managing most stations on their routes.
- Network Rail has responsibility for the management of the track and signal infrastructure, rail bridges, and for carrying out engineering work and setting speed restrictions. It also manages some larger stations.

Transport for London and six English Passenger Transport Executives also have a role in rail franchising and the long-term planning of the network in their regions. This includes a statutory right to be consulted on rail franchises in their area and a role in proposing amendments and enhancements to the franchise specification in their area. Other local authorities are not directly involved in franchising, but can comment on services in their areas during a consultation process when DfT develops the franchise specification, and can subsidise local services in their areas on top of those that would be provided under the rail operator's franchise commitments. They can

[22] Ilford Recorder, http://www.ilfordrecorder.co.uk/news/travel_2_3147/ilford_to_get_slice_of_30m_extra_funding_for_regeneration_around_crossrail_stations_1_1755522

[23] The railways were in the public sector between 1947 and 1994, until they were privatised in 1995.

also work with rail operators in other ways, for example on station improvements and in improving transport interchange facilities, for example as part of a Station Travel Plan[24].

The rail industry is regulated by the Office of Rail Regulation (ORR). The ORR is the independent economic and safety regulator which:

- Regulates Network Rail's stewardship of the national rail network;
- Licences operators of railway assets;
- Approves track, station, light maintenance depot access;
- Investigates potential breaches of the Compensation Act 1998 (alongside the Office of Fair Trading);
- Seeks to ensure the safe operation of the railway system; and
- Protects staff and the public from health and safety risks arising from the railways[25].

Passenger train services in the UK are largely provided through franchises let by the government for limited time periods. The Department for Transport is responsible for the design and procurement of new and replacement rail franchise services on the national rail network. A rail passenger franchise agreement is the legally binding contract between the Secretary of State for Transport, the franchisee (the owning group) and the franchise operator (the Train Operating Company) for the running of the UK's passenger train services. Abellio as franchisee is responsible for the operation and management of the Greater Anglia Area, and therefore the station and routes through Ilford, under a franchise that expires in 2016 – having been awarded the contract in November 2011.

Arrangements for services within London are different, with the London Underground directly managed by TfL, and additionally a number of surface routes within London, using Network Rail managed lines, are contracted directly by TfL rather than by DfT- these are the 'London Overground' routes.

Once Crossrail becomes operational (now expected in 2019) the Shenfield to London Liverpool Street services will be transferred from the Greater Anglia Area franchise to Crossrail[26], which is intended to be let as a concession by TfL, like London Overground. It is assumed that operation and management of the station will also be undertaken by the Crossrail concession. This may have some benefits for the interchange with the new concession being better linked into TfL.

All the station land and buildings are currently owned by Network Rail, a private company limited by guarantee[27].

Railways in the UK are regulated by numerous pieces of legislation. Some of the key ones of these are as follows:

[24] Further information on Station Travel Plans is available from the Association of Train Operating Companies at www.stationtraveplans.com

[25] The rail industry – an introduction. Passenger Transport Executive Group. 2011. Available at: http://www.pteg.net/NR/rdonlyres/45548B20-5D51-4FAD-B1D2-9ECE1AC35FE2/0/railguidefinalwebversion.pdf

[26] Ilford Recorder, http://www.ilfordrecorder.co.uk/news/travel_2_3147/ilford_to_get_slice_of_30m_extra_funding_for_regeneration_around_crossrail_stations_1_1755522

[27] Network Rail is a 'not for shareholder dividend' company and all profits are reinvested into improving the railways.

- The Railways Act 1993
- The Railways Act 2005
- The Railways and Other Guided Transport Systems (Safety) Regulations 2006
- The Railways (Interoperability) Regulation 2011
- The Health and Safety (Enforcing Authority for Railways and Other Guided Transport Systems) Regulations 2006.

Bus services in London are run by private operators via contracts similar to the railways. These contracts are let by London Buses, part of Transport for London, who regulates the service[28].

Transport for London (TfL) was created in 2000 as the integrated body responsible for London's transport system and is a functional body of the Greater London Authority. Its primary roles are to implement the Mayor of London's Transport Strategy and to manage transport services across the Capital. TfL is responsible for:

- London's buses, the Underground, the Docklands Light Railway (DLR), London Rail, Croydon Tramlink and London River Services;
- The Public Carriage Office, Victoria Coach Station and London's Transport Museum;
- The red route network, Congestion Charge, and London's 4,600 traffic lights; and
- Supporting a range of other ways of moving around the city, including cycling and walking.

London Buses manages bus services in London. It plans routes, specifies service levels and ensures service quality. It is also responsible for bus stations, bus stops and other support services. The bus services are operated by privately owned operating companies, which work under contract to London Buses. Bus services are let by individual routes, normally for periods of 5 years. Quality Incentive Contracts have been in place since 2001; these are based on gross cost contracts and also contain incentive provisions in the form of performance payment bonuses and deductions (linked to service reliability).

Transport for London and London Bus Services Ltd (London Buses) are required to comply with a number of UK and European statutes and regulations. Some of the key obligations for the provision of bus services are detailed below:

- The Mayor and the Greater London Authority have a duty to develop and implement policies for the promotion and encouragement of safe, integrated, efficient and economic transport facilities to, from and within Greater London under Section 141 of the Greater London Authority Act 1999 (GLA Act).
- Transport for London has functions conferred or imposed on it by the GLA Act which facilitate the implementation of the duties imposed on the Mayor and Greater London Authority under Section 141 of the GLA Act.
- London Buses, as a subsidiary of TfL, has powers under Section 169(2) of the GLA Act to enter into transport subsidiary agreements with any person for the provision of any

[28] This is different to all other bus services in mainland UK, which are not regulated.

public transport services. Agreement to operate any bus routes within Greater London must be in accordance with Section 182 (1) of the GLA Act. London Buses; and

- TfL also have obligations under other more general Acts of Parliament, including the Transport Acts and the Disability Discrimination Act, and under European Union legislation.

In terms of the links between the interchange and the local retail and commercial activities, it is not clear whether there is any co-ordination that takes place. Given the disparate nature of the interchange and the quite separate nature of the modes and retail opportunities – such that they are not located in the same building. It is unlikely that any co-ordination takes place.

With regards to cooperation between modes, as the station is within the London area the buses are all under the control of TfL, enabling them to be included within TfL's integrated transport initiatives such as the TravelCard, the Oystercard smartcard, and TfL's online journey planner. Through negotiation with individual rail operators TfL has been able to get Oystercard rolled out onto local rail services in London that are outside of its direct control. When Crossrail services begin the rail routes serving Ilford will transfer to TfL from the current Greater Anglia rail franchise, further assisting integration. As described previously, a Masterplan for the Ilford station area, which includes transport access, is being developed jointly by Crossrail, TfL surface transport and the London Borough of Redbridge.
TfL has developed its own guidance on transport interchanges[29] which applies to schemes such as the Ilford redevelopment. Furthermore, as noted previously, as part of the process of producing the urban realm study for the station redevelopment, a pedestrian study was carried out using the Pedestrian Environment Review System (which TRL designed for TfL) and TfL's Pedestrian Comfort assessment guidance[30].
In terms of the main factors that facilitate cooperation between modes Ilford is within Greater London so has a far greater degree of integration of transport services than is the case for stations in other urban areas in the UK, where buses are deregulated and there is no overarching transport authority with equivalent powers to TfL. This means that when Crossrail services commence in 2018 that both bus and rail services will be under the control of TfL, and it will also be influenced by its initiatives on cycling and walking.

The public are involved in consultation with regard to the new development that will take place at the station as a result of Crossrail. Involvement will be both through Crossrail with regards to the developments on the line and at the station and the local authority as a result of the urban realm improvements. Rail passengers at Ilford are surveyed as part of the National Rail Passenger Survey, with surveys twice per year across the country. However, the number of passengers surveyed at an individual station can be quite small.

[29] See TfL's guidance on transport interchange: http://www.tfl.gov.uk/microsites/interchange/59.aspx
[30] See TfL's Walking Tools: http://www.tfl.gov.uk/businessandpartners/20953.aspx

2.3 Safety and security

Within the train station various safety measures have been put in place in order to minimize the potential for accidents. For example, posters and signs warning of various safety issues, markings on the platform to keep people away from the edge, public announcements warning when fast trains will be going through the station etc. (See photos below for examples of these). In addition, there are numerous 'Samaritans' poster throughout the station which offer support to those who might need it – in order to help reduce the potential for suicides. In terms of security the train station has CCTV, artificial lighting, and provides contact details for the British Transport Police on a passenger display board.

Examples of the various safety posters and signs within the interchange

Various CCTV notices within the interchange, along with a poster for the Samaritans and contact details for the British Transport Police.

The design of the station (see photos) suggests that users of the interchange may feel less safe in the hours of darkness, especially women and vulnerable people. In particular during the winter months when the York Road entrance is open (only during peak hours) this entrance may feel unsafe due to its location in a back street.

Directly outside of the train station there is a pedestrian crossing which provides access to the bus stops and shops on the other side of the road.

The York Road (peak hour) entrance to the station, which my feel unsafe for vulnerable users during the hours of darkness.

2.4 Finance and revenue streams (revenue generation)

The rail franchise bears financial responsibility for the station, being responsible for its maintenance and upkeep etc. As noted previously this is Abellio at present, but will change to be the Crossrail concession in 2019. The franchisee generates income through fares (60% of which are regulated by the government) and any retail opportunities in the interchange.

It is important to note that while national rail franchises give the operator fare income, and give them the risk arising from changes in demand, TfL's rail contracts (like its bus contracts) are management contracts only, in which the operator bids to provide services to the timetable and fares specified by TfL, with TfL retaining fares and associated risks.

London Buses is responsible for the bus stops that form part of the wider interchange. The operator generates income through a management contract to provide services and fares specified by TfL. As stated in the previous section, the bus contracts are performance based allowing for payment bonuses and deductions (linked to service reliability).

Cycling infrastructure on roads outside the station boundary is the responsibility of the local authority (the Borough of Redbridge), except on a network of core roads that are the responsibility of TfL. TfL is implementing a network of cycle routes across London, in partnership with London Boroughs, as well as other initiatives such as cycle parking improvements at key destinations and transport interchanges, and the London cycle hire scheme in central London [31].

Information on the profitability of the interchange is not available. However generally in England most rail franchises are not profitable which would suggest this is likely to be the case for Greater Anglia.

2.5 Good and bad practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Policy and governance	N/A	N/A			
Station operations	Information about trains times	RTI screens have been introduced to supplement printed timetables			X
Management and maintenance	N/A	N/A			
Safety and security	Several safety posters. Waiting rooms on two platforms.	Within the interchange there are various posters and other signs which highlight potential safety issues.			X
Finance and revenue streams	N/A	N/A			

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Policy and governance	N/A	N/A			
Station operations	N/A	N/A			
Management and maintenance	Due to its age the station is run-down. The atmosphere is therefore intimidating.	Maintenance is undertaken but due to the prospect of major renewal with the Crossrail project this may not be seen as a priority for the short term	X		
Safety and security	Secluded rear entrance.	The rear access may be perceived to be unsafe during winter months.	X		X
Finance and revenue streams	N/A	N/A			

[31] See The Mayor's Vision for Cycling http://www.tfl.gov.uk/roadusers/cycling/15459.aspx

3 Interchange design

The following diagram provides a map of the train station – the main element of the interchange at Ilford. The station has two entrances. The main entrance on Cranbrook Road and a second peak hour only entrance onto York Road (open from 06.00 – 10.00 and 16.00 – 20.00). At the main entrance there is a small ticket hall, with a gate through which passengers pass to access the five platforms. There is then a corridor, walkway and stairs onto the platforms. The majority of passenger facilities are found on platforms 2 and 3, including two indoor waiting areas, seating, a customer information office, a newsagent, vending machines, and toilets. An accessible toilet is located in the main corridor. Limited on-platform cycle parking is available on platform 1 but additional facilities that can be used by interchange users are available on surrounding roads.

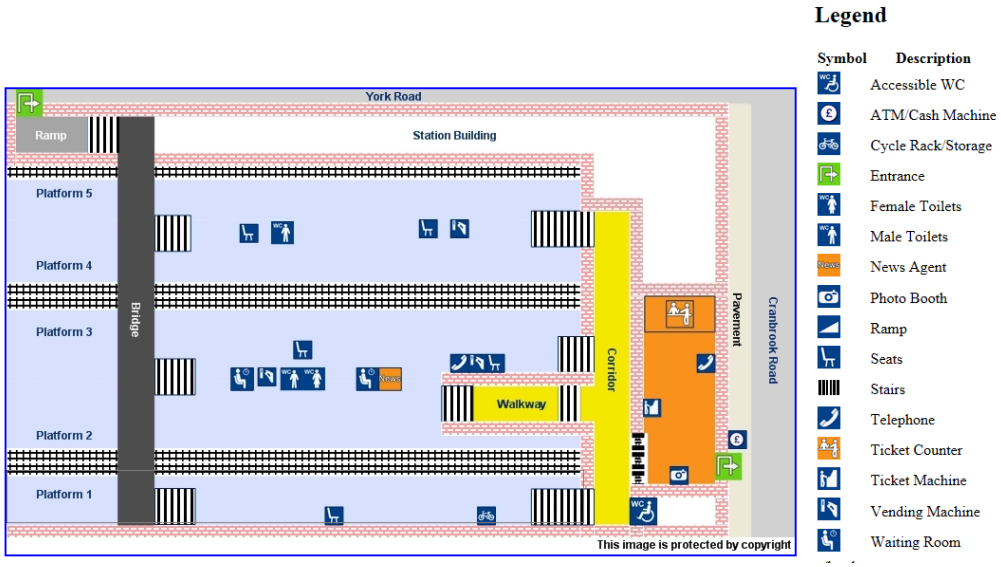


Figure 1: Ilford Station Plan

The following photos illustrate the design of the platforms, walkways, corridor and footbridge,

View of Platform1.


Views of the bridge connecting the platforms with the York Road Entrance.


Views of the walkway and stairs down to platform 2/3.


Views of platform 2/3.


Views of platform 4/5.


Views of walkway and stairs to platform 2/3. This design, allowing passengers to take two sets of stairs helps passenger flow during rush hour.

Outside of the station there are numerous bus stops which form part of the overall interchange facility, along with various car parks, a taxi rank and cycle parking. These are all described later in this document.

3.1 Sustainable interchange design

Energy efficiency would not have been considered when the station was originally constructed or indeed when it was last refurbished in the 1980s. At present there appears to be no measures taken to reduce energy use during operation or promote a sustainable interchange, with no alternative energy sources currently being used. Air quality would not be considered a particular issue within the train station (the trains in use are electric and not diesel).
The construction of Crossrail will provide an opportunity to address these issues. The aim is to deliver energy efficiency and low carbon transport[32]. Rail travel is generally considered to be a

[32] http://www.crossrail.co.uk/

sustainable form of travel, and Crossrail is planning to use light-weight trains and reduce station energy consumption. The range of energy efficient materials and systems to be introduced include energy efficient escalators and lifts, the use of daylight and natural ventilation, intelligent lighting control systems and lighter trains. Crossrail trains will use regenerative energy when braking[33]. Regenerative braking could save 20% of total energy consumption on Crossrail services.

In terms of the bus stops, which form the open-air part of the interchange, there could be an issue with air quality, depending on the type of buses used. The whole of the Borough of Redbridge has been declared as an Air Quality Management Area – as a result of the local levels of NO_2 (Nitrogen Dioxide) and PM_{10} (particulate matter less than 10 microns in diameter). TfL is in the process of introducing hybrid electric-diesel hybrid buses and will have more than 1,700 hybrid buses in the capital by 2016. Hybrid buses reduce emissions of local pollutants and carbon dioxide by at least 30 per cent compared to conventional diesel buses. It is also trialling zero emission electric technology for buses. It is anticipated that some will be used in the Ilford area.

3.2 Travel time and space

The average waiting times vary depending on the time of the day, with waiting times much reduced during peak hours (particularly in the morning). Generally waiting times are 10 minutes or less for trains and 20 minutes or less buses, although waiting times vary depending on the bus service being used. (More information on this is provided within the section which describes public transport accessibility.)

Table 3: Estimated Waiting time (in mins, various services see text on public transport accessibility for further explanation)

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	10 or less	N/A	N/A	20 or less	N/A	N/A	N/A
Metro	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tram	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bus	20 or less	N/A	N/A	20 or less	N/A	N/A	N/A
Car	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cycling	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Walking	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Transfer times vary depending on which modes are being transferred between and which services of those modes are being used. For example, transferring between trains when they go from the same or an adjoining platform will take a matter of minutes, while transferring between trains that require passengers to use stairs, walkways or a bridge will take about 5 mins. Similarly for buses the transfer time will vary, depending on the bus stop that is required. Stops H, K and G which are directly outside the main station entrance and have a shorter transfer time (of about 2 mins), compared to stops D, F, Y, C, P, L, M, B, R and Q which have transfer times of up to 10 mins. For details of the location of bus stops please see the section on public transport

[33] Regenerative Braking involves using motors in reverse as an electric brake and returning the energy to the electrical supply system and will be a design requirement on Crossrail rolling stock.

accessibility. The transfer time between trains and local cycle parking is approximately 2 minutes from the stands on platform 1, but longer for on-street cycle parking.

Table 4: Estimated Transfer time (in mins)

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	1-5	N/A	N/A	5-15	5-10	2	2
Metro	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tram	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bus	5-10	N/A	N/A	1-15	10	2	2
Car	5-10	N/A	N/A	5-10	N/A	10	10
Cycling	2	N/A	N/A	2	10	N/A	2
Walking	2	N/A	N/A	2	10	2	N/A

Distances between the various modes and their stops are commensurate with the transfer times given above. The maximum transfer distance between trains is approximately 40 metres, while the maximum transfer distance between local bus stops is approximately 500 metres. The transfer distance between trains and bus stops will between 60 and 500 metres, depending on the location of the bus stop. The transfer distance between trains and local cycle parking is approximately 40 metres (on platform 1).

Table 5: Estimated Distance (in metres)

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	40	N/A	N/A	60-500	60-400	40	40
Metro	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tram	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bus	60-500	N/A	N/A	2-500	400	40	40
Car	60-400	N/A	N/A	40-400	N/A	400	400
Cycling	40	N/A	N/A	40	400	N/A	40
Walking	40	N/A	N/A	40	400	40	N/A

The ticket office for the train station is located within the main entrance. There are four ticket office windows and three ticket machines. The space is fairly small and could easily become overcrowded during peak hours (especially in the morning) when people would be purchasing tickets.

Views of the ticket office

There are five barriers before passengers can access the platforms from the main entrance. These barriers are in use during peak hours only. The small gate line could easily become overcrowded during peak hours (both in the morning and evening). There could also be conflict between those queuing for tickets and those queuing at the barriers. The introduction of Oystercards[34] may have helped to ease these issues as fewer people will need to buy tickets on a daily basis and passengers travelling with an Oystercard can move through the barriers quicker than those people with paper tickets. As part of the proposed Crossrail development, the station entrance (and ticket hall) and gate line will be enlarged to help meet the needs of current and future passenger demand.

The gate line barriers, which are operational during peak hours

[34] The Oyster card is a form of electronic ticketing used on public transport based in Greater London. It is valid on the London Underground, buses, the Docklands Light Railway (DLR), London Overground, trams, some river boat services and most National Rail services within the London fare zones. A standard Oyster card is a blue credit-card-sized stored-value contactless smart card that can hold single tickets, period tickets and travel permits, which must be added to the card prior to travel. Passengers touch onto an electronic reader when entering and leaving the transport system in order to validate it or deduct funds. The cards may be "recharged" by recurring payment authority, by online purchase, at credit card terminals or by cash, the last two methods at stations or ticket offices. The card is designed to reduce the number of transactions at ticket offices and the number of paper tickets. Use is encouraged by offering substantially cheaper fares than with cash.

The interchange is not currently an enjoyable place to be. Although it is clean, it is run down and in need of modernization. There is no art or greenery.

There are facilities which provide travelers with protection from the weather – including a number of small waiting rooms and shelters along part of the platforms. There is no protection from the weather for passengers exiting using the pedestrian over-bridge and the York Road Entrance.

3.3 Facilities, service and retail

Within the train station itself there are very few retail opportunities due to the limited space. There is one small local quality newsagent between platforms 2 and 3, and a couple of vending machines, offering snack foods. There is also a photo booth within the ticket hall.

The newsagent and one of the vending machines found on the platforms.

Land uses surrounding the interchange is dominated by retail, concentrated along Cranbrook Road and High Road, with office and light industry sporadically located throughout the town centre (see Figure 2).

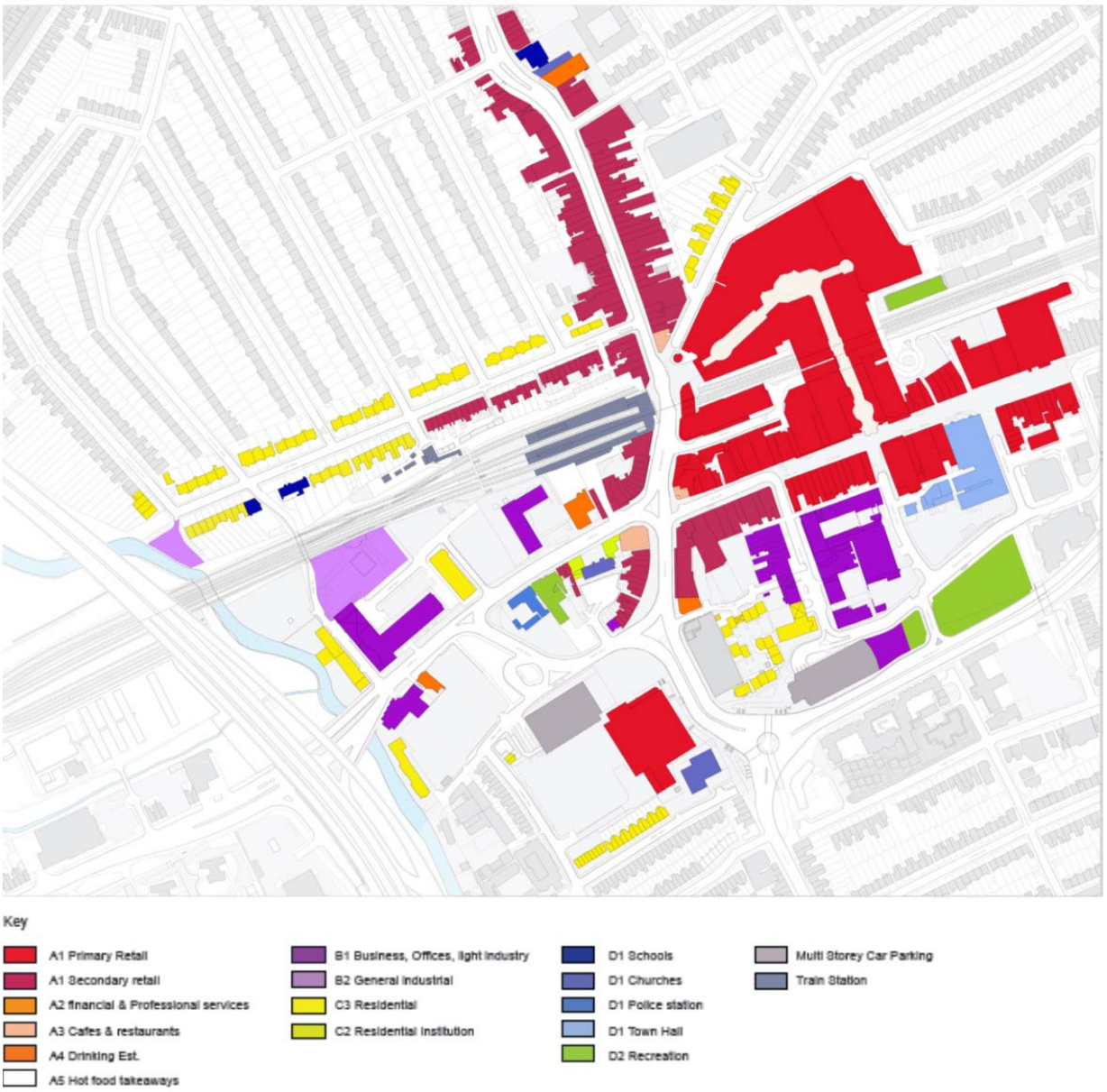


Figure 2: Land use surrounding the interchange (need to get permission to use)

Cranbrook Road, on which the interchange is located, contains secondary 'lower quality' retailing, including banks, charity shops, independent shops, takeaways and estate agents. Primary 'higher quality' retailing is focused on the High Road and in the Exchange Shopping Centre. However the Exchange Shopping Centre is close to the interchange – accessible within 2 minutes' walk from the main entrance. Most of the retail outlets are open from 8-9.00 until 17.00-18.00, although some open early such as the Tesco Metro and Costa Coffee.

Left. Entrance to the Exchange Shopping Centre on Cranbrook Road – opposite to the station.

Below. Low quality shopping along Cranbrook Road.

Crossrail development and the Ilford Town Centre Area Action Plan are likely to stimulate changes to land use surrounding the interchange, with significantly increased areas of retail and residential. The Ilford Area Action Plan (AAP), which was adopted in 2008, identified a range of sites to promote regeneration of the town centre. The aim was to deliver:

- More than 5,000 new homes (in the long term);
- Approximately 30,000m^2 of new and replacement High Street retail, restaurants, café, leisure and cultural uses;
- Approximately 20,000m^2 of other active ground floor uses (i.e. secondary retail, service/community uses, residential/office entrances;
- Approximately 45,000m^2 of new and replacement B1 office space;
- Approximately 8,000m^2 of new and replacement small scale commercial and employment uses; and
- A range of social, education, health and leisure facilities to serve the new and existing population.

It should be noted that since the AAP was adopted[35] some opportunity sites and aspirations have been overtaken by other events. In particular the Ilford Station redevelopment has been reduced in scope. This is discussed further below. Several of the opportunity sites[36] have been completed or are under construction, including the former Pioneer Market which is nearing completion, with ground and first floor retail provision with residential accommodation on the higher floors.

Left. View of Pionner Market high rise re-development from Cranbrook Road.

Above. Ground level of the Pioneer Market re-development.

Customer service within the interchange is provided within the main entrance and ticket hall – via the ticket office and gate line staff (during peak hours) – and at the customer information office on platforms 2 and 3. Help Points[37] are also located on platform 1, platform 2/3 and platform 4/5. Greater Anglia – the train operator – is responsible for customer service in the station. There are various services for those with impairments, including a height adjusted ticket counter, and an induction loop in the ticket hall. (Further details on access for those with mobility issues will be discussed later.)

[35] Local planning authorities must prepare a Local Plan which sets planning policies in a local authority area. These are very important when deciding planning applications. Independent planning inspectors must look at all local plan documents that local authorities in England prepare for an examination. The examination is the last stage of the process for producing a Local Plan. Once a Local Plan is adopted it sets the context for planning decisions.

[36] Opportunity Sites are London's major source of brownfield land with significant capacity for new housing, commercial and other development linked to existing or potential improvements to public transport accessibility.

[37] Help Points are free phone points providing a link to an office that is staffed 24 hours a day, seven days a week. Help Point operators are able to give train service updates, and to advise on train and station accessibility. When necessary, they can also arrange alternative transport.

Examples of customer service facilities in the interchange – including a help point and the customer information office.

The interchange has two passenger waiting rooms on platforms 2/3, with 12 seats in the first and 21 seats in the second. There are also a number of seats outside in a small waiting room adjacent to the ladies toilets (also on platform 2/4). The waiting rooms have lighting and heating and are open 4.30 to 19.00 daily. Both waiting rooms are wheelchair accessible. Capacity within the waiting rooms may be insufficient during morning peak hours, especially during winter months. Ample seating is also available on all of the platforms. Passenger toilets are available, which are open between 4.30 and 21.00 daily. These facilities are free of charge. There is no prayer room in the station. The quality of the waiting rooms and toilet facilities is fairly poor, with peeling paint etc.


One of the waiting rooms on platform 2/3 and seating on platform 4/5.

As with most of the station as a whole, the customer facilities are in need of modernisation and this is likely to happen as a result of the station redevelopment as a result of the Crossrail development.

There is no Wi-Fi access at the interchange (i.e. within the train station), although there is free Wi-Fi available at a coffee shop opposite the main entrance (Costa Coffee).

3.4 Impacts on local economy

In terms of direct employment the station employs about 15 to 20 full time staff. In terms of indirect employment, i.e. those who work in supporting services created in the interchange, this would only include those who work in the small newsagent. It is estimated that this outlet would employ about 3 to 5 staff. It is not possible to provide an estimate of the impact of the interchange itself on the surrounding local economy.

Currently there are no housing units within the interchange. Looking at the typical rental costs for small units within similar interchanges it could be estimated that rent by the newsagents is in the region of £5,000 to £10,000 per annum, subject to turnover. However given the high passenger numbers at Ilford, compared to others in the area, it might be higher – up to £30,000 (although this is considered unlikely).

It is difficult to provide an estimate of the typical cost of housing and retail units in close proximity to the interchange. However the table below provides details of a number of properties currently available to rent within ½ mile of the station which gives a broad indication of typical costs. As indicated the prices vary considerably.

Table 6: Rental cost (per annum) for commercial properties within ½ mile Ilford Station (May 2013)

Type of commercial property	Size	Cost
Garage	37 m^2	£25,000 pa
Office	105 m^2	£18,000 pa
Office	102 m^2	£16,500 pa
Leisure facility	1,672 m^2	£150,000 pa
Retail	743 m^2	£76,000 pa
Retail	177 m^2	£32,500 pa

Table 7: Rental cost (per calendar month) for residential properties within ½ mile Ilford Station (May 2013)

Type of residential property	Size	Cost
House	5 bedrooms	£2,400 pcm
House	4 bedrooms	£1,700 pcm
House	3 bedrooms	£1,450 pcm
House	2 bedrooms	£1,100 pcm
House	1 bedroom	£925 pcm
Flat	2 bedrooms	£1,350 pcm
Flat	2 bedrooms	£1,250 pcm
Maisonette	2 bedrooms	£870 pcm

Flat	2 bedrooms	£875 pcm
Flat	1 bedroom	£750 pcm
Flat	Studio	£500 pcm

In 2011, an Ilford Town Centre Health Check was published by the London Borough of Redbridge which provided data on shopping rents in the area. On average shopping rents were £1,575/m^2 per annum (in 2011, a decline on the £1,800/m^2 per annum in 2008)[38]. It seems from the report however that units closer to Cranbrook Road and the station warrant less rent – being more likely to be around £450/m^2.

At present there is no indication that there has been a change in the amount of new start-up businesses close to the interchange. This could change as a result of the Crossrail development once it is completed in 2019.

As mentioned in the previous section there has been some redevelopment in the area surrounding the interchange, as a result of the Town Centre AAP. Although it is not possible to be sure, it is likely that this redevelopment would have gone ahead even if changes had not been planned for the interchange – to help with town centre regeneration. Development to date as a result of the AAP has included:

- The former Pioneer Market Site at Winton Way (0.23 ha) involving ground and first floor retail, commercial and residential activities on the upper levels (159 flats) (nearing completion).
- The former Peachey House Office Building on Ilford Hill (0.59 ha) with much of the former office building being converted into an iconic residential building, with 135 flats (partially completed).

3.5 Good and bad practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Design	N/A	N/A			
Travel time and space	Frequent public transport services	During peak hours the train and bus services are frequent making waiting times short.	X		X
Facilities, service and retail	N/A	N/A			
Impacts on local economy	N/A	N/A			
Other issues	N/A	N/A			

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Design	N/A	N/A			
Travel time and space	N/A	N/A			

[38] "Shopping rents: pattern of movement in Zone A rents within primary shopping areas (i.e. the rental value for the first 6 metres depth of floorspace in retail units from the shop window)."

Facilities, service and retail	Rundown facilities within the station.	The station facilities are in need of improvement which means the interchange is currently not an enjoyable place to be. This should be rectified once the station is re-developed as part of the of Crossrail development.	X		X
Impacts on local economy	N/A	N/A			
Other issues	N/A	N/A			

4 Accessibility

4.1 Accessibility for walking and cycling

In terms of walking the station is fairly accessible. There are two entrances that can be used by pedestrians – the first on Cranbrook Road and the second on York Road (although this is only open at peak hours). The main entrance on Cranbrook Road is located on the main street which runs through Ilford. For those wanting to cross the road there are signal-controlled pedestrian crossings. There are some signs directing those on foot around the local area, although as recommended by the PERS[39] assessment undertaken in 2010, interchange would be improved by the provision of a high quality pedestrian wayfinding system – such as Legible London[40].

Example of a finger post for pedestrian wayfinding found close to the interchange.

The streets outside the station and along Chapel Road and Ilford Hill are a busy bus to bus and bus to station interchange. They are also heavily used by local shoppers and other visitors. An assessment of pedestrian comfort deemed the immediate entrance to the station as 'comfortable', along with long stretches from the top of Ilford Hill and Cranbrook Road from Station Road towards the High Road. However, the activity and quantity of people congregating around bus stops H and G (on Cranbrook Road), combined with a narrow footway, narrow crossings, advertising signs and telephone boxes contributes to this part of the road being rated as reaching 'unacceptable' levels of comfort. In addition another section of the footway along Cranbrook Road is rated as 'at risk'. Forecasts show that with the increased passenger flows expected as a result of Crossrail by 2026 larger sections of the footway would be downgraded in terms of the comfort, reducing accessibility for pedestrians and therefore indicating that improvements will be necessary.

The second pedestrian access point is onto York Road. This is a residential road that is fairly low trafficked. There are issues with this entrance as a result of personal security, due to the secluded nature of the entrance, and wayfinding. Pedestrians using this entrance/exit, will find it is poorly signed and wayfinding is difficult.

[39] Pedestrian Environment Review System
[40] Legible London is a pedestrian wayfinding system to help people walk around the capital.

Cranbrook Road, outside the station, is a busy pedestrian route. Pictured here during mid-morning.

In terms of cycling, there are a number of cycle parking options within or close to the station. Within the station itself there is cycle parking on platform 1 – with space for eight bikes. The parking is signed from the main station corridor, is under cover and is monitored by CCTV. In terms of security however it seems this may be an issue as a passenger informed the team that they had recently had a bike stolen from this cycle parking. The cycle parking may not be considered to be in the most appropriate location within the station as platform 1 is not used for trains stopping at this station. The interchange does not offer any bike sharing or cycle repair facilities. There appears to be some use of informal cycle parking, i.e. against railings, directly outside of the station entrance. As indicated by the photos below, the cycle parking does not appear to be well utilized.

Signage to and cycling parking within the station.

Outside of the station there are several other formal cycle parks, although none under cover or monitored directly by CCTV. The first is on Cranbrook Road directly across from the station entrance, with space for 12 bikes. This cycle park is outside of the entrance of the Exchange Shopping Centre and so may be used by shoppers. The second was noted on the corner of York Road and Cranbrook Road, again with space for 12 bikes.

Cycle parking facilities outside of the station. Left: on Cranbrook Road, outside of the Exchange Shopping Centre. Right: on the corner of York Road and Cranbrook Road.

There are very few cycle paths around the interchange, with just one short 'right turn' cycle lane noted allowing cyclists to turn right out of York Road onto Cranbrook Road (see photo). A couple of signs indicate that the London Cycle Network runs through the area however the very disjointed nature of these routes would appear to make wayfinding as a cyclist difficult.

Short right turn cycle lane and signage to the London Cycle Network.

Passengers are all allowed to carry cycles on trains – free of charge. However there are restrictions during peaks hours, with cycles not allowed on trains arriving into Stratford or London Liverpool Street between 07.45 and 9.45 or on any services booked to leave Stratford or London Liverpool Street between 16.30 and 18.30.

4.2 Accessibility for public transport

There are two rail routes through the station. The first is a local service that runs from Shenfield to London Liverpool Street; the second is a more regional service that runs from Southend Victoria to London Liverpool Street (see Figure 3).

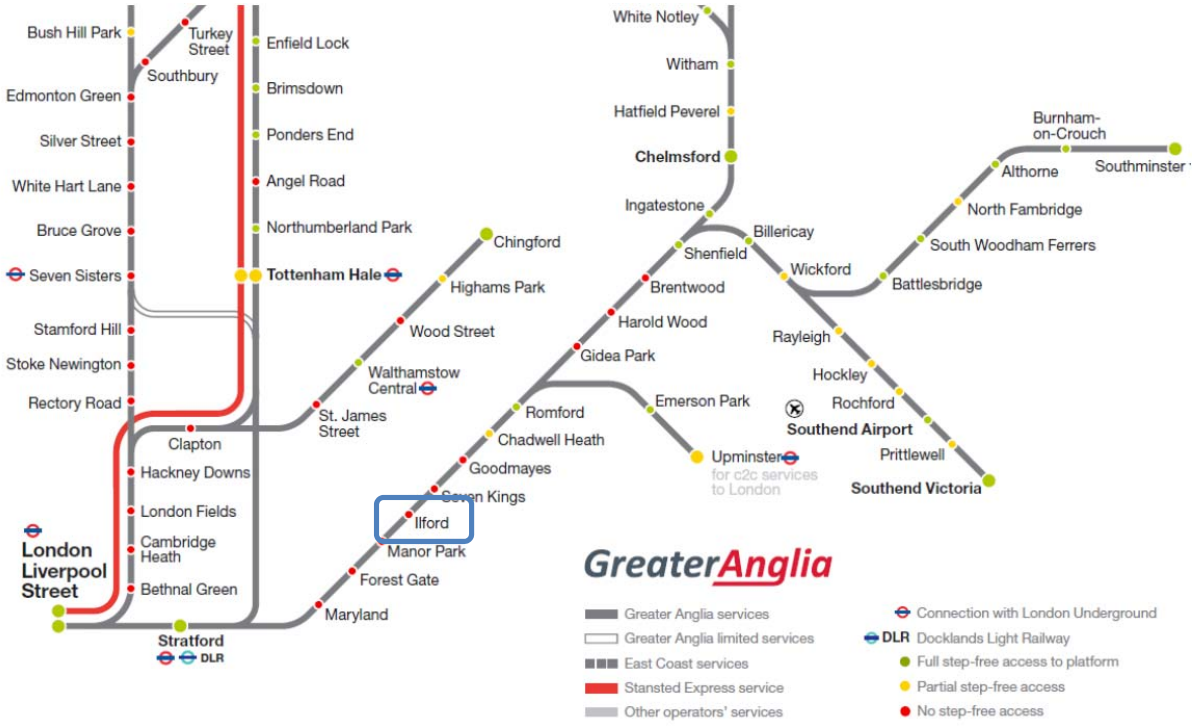


Figure 3. Excerpt of Greater Anglia Route Map (Source: Greater Anglia)

The average frequency of trains on a weekday from Ilford into London Liverpool Street is 6 per hour. During peak hours the number rises to 12 (between 7.00 and 8.00) and 16 (between 8.00 and 9.00). The average frequency of trains on a weekday from London Liverpool Street to Ilford is again 6 per hour. During peak hours the number rises to 13 (between 17.00 and 18.00) and 14 (between 18.00 and 19.00).

Only 2 trains a day run directly to Southend from Ilford – at 5.40 and 18.03. A similarly small number (of just 3) run directly to Ilford from Southend – arriving at 05.04, 05.34 and 08.22.

Ilford is served by a considerable number of bus routes, linking the surrounding area to that station via the Town Centre. Buses are accessed by leaving the station through the main entrance onto Cranbrook Road, with signs above the entrance directing passengers to the appropriate stops (see photo below). The walk between the station and bus stops is not enclosed and can be up to 500metres. Movement between the station and the bus stops is often obstructed due queues at the bus stops restricting the effective width of the footway, particularly along Cranbrook Road.

Signage to local bus stops at the exit of the station on Cranbrook Road.

There are 18 bus routes in total serving Ilford, plus one night route. Three of the 18 bus routes offer a 24 hour service. Buses connect Ilford to the West (West End, the City, Stratford, Walthamstow, Wood Green and Tottenham), to the North (Chingford, Grange Hill, and Barkingside), to the East (Harold Hill, Romford and Dagenham) and to the South (Thames New Estate and Barking) (Figure 4).

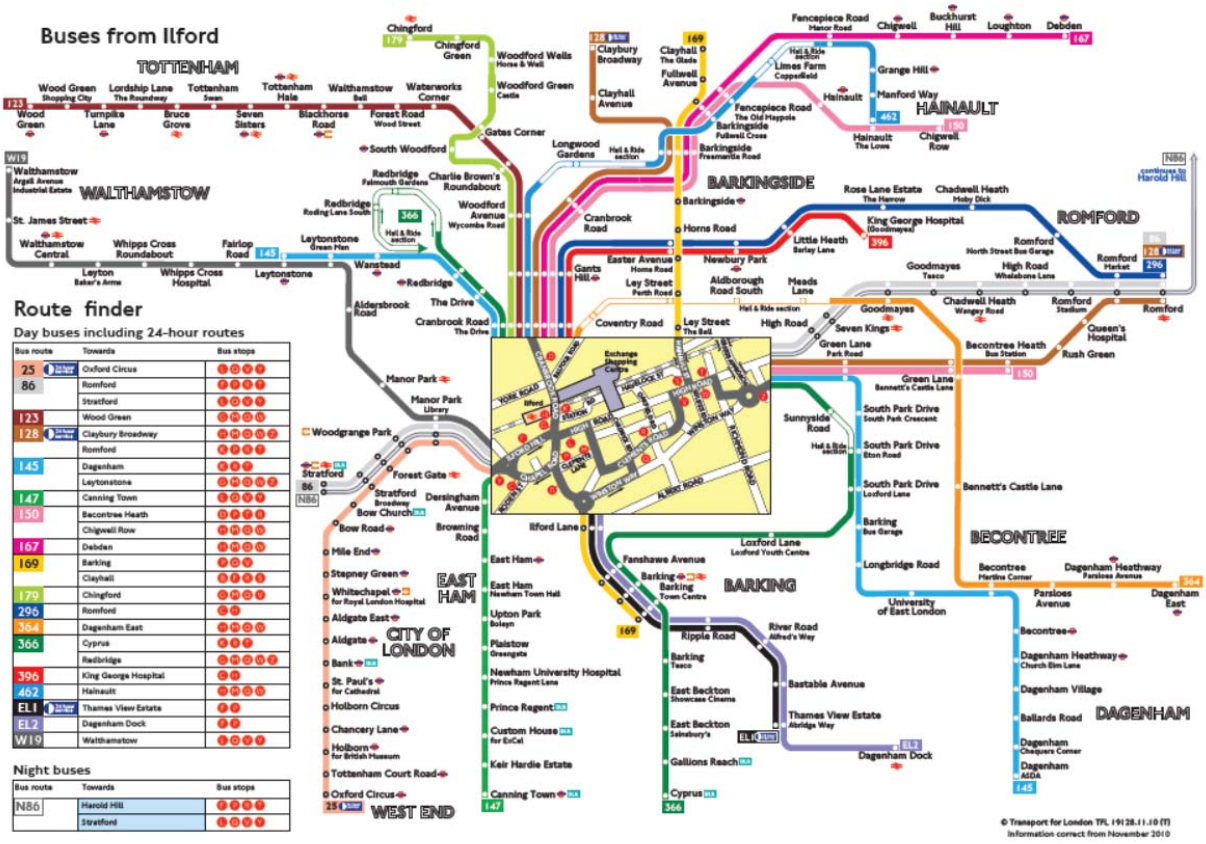


Figure 4: Buses from Ilford (Source: Transport for London)

There are 17 bus stops within Ilford, of which 12 are within 500 metres on the station and three (H, G and K: Ilford Station) are within very close proximity to the main station entrance on Cranbrook Road (Figure 5).

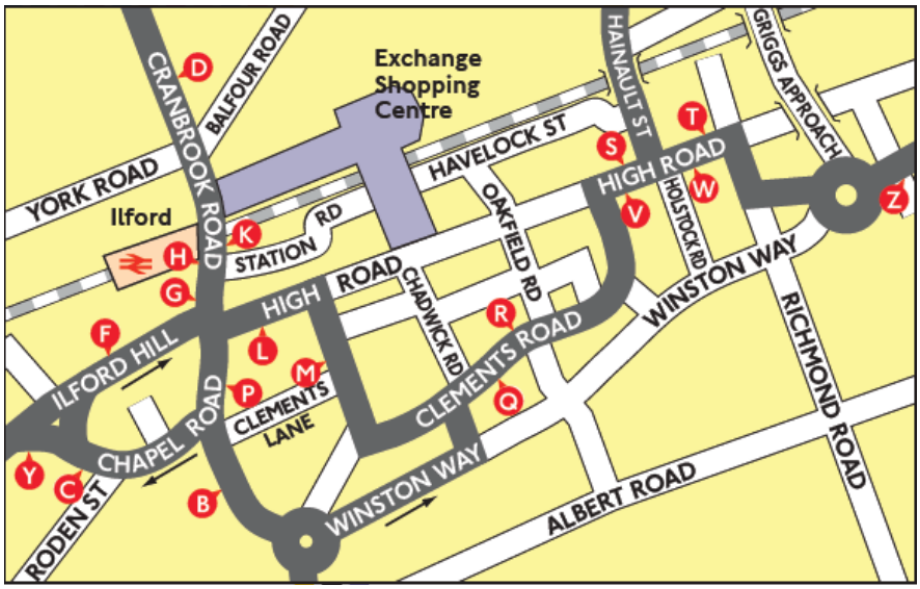


Figure 5: Bus stops in Ilford (Source: Transport for London)

Focusing on these three bus stops at the station, 11 routes serve these stops. The following table provides details of these routes along with the average frequencies of the services. As shown most routes offer 5 buses an hour.

Table 8: Ilford Station Bus Stops, Routes and Frequencies

Bus Stop	Route	Average weekday frequency (in minutes)
G	123 towards Wood Green	5 per hour
	145 towards Leystone	5 per hour
	179 towards Chingford	5 per hour
	366 towards Rebridge	5 per hour
H	128 towards Romford	5 per hour
	150 towards Chigwell Row	5 per hour
	167 towards Debden	3 per hour (6 during peak hours)
	296 towards Romford	3 per hour
	364 towards Dagenham East	6 per hour
	396 towards King George Hospital	3 per hour
	462 towards Hainault	4 per hour
K	128 towards Claybury Broadway	5 per hour
	145 towards Dagenham	5 per hour
	150 towards Beacon Tree Heath	5 per hour

	296 towards Roden Street	3 per hour
	366 towards Cyprus	5 per hour
	396 towards Roden Street	3 per hour

The embarkation area for these services is close to the station – with a transfer distance of about 60 metres from rail to bus. Each of these bus stops have a bus shelter providing waiting passengers with some protection from the weather and seating – although during peak hours the size of these would not be sufficient for all waiting passengers.

Shelters and seating provide some facilities for waiting passengers at bus stops

In terms of punctuality, although there is no specific data available for the trains arriving and leaving Ilford station, 94.88% of Greater Anglian trains within the metropolitan area arrived within 5 minutes of their scheduled time – within the four weeks to 30th March 2013[41]. This compares to 94.07% over the last 12 months. It is not possible to analyse the punctuality of buses from the stops at Ilford, however there are punctuality figures for routes within the Borough of Redbridge[42]. For high frequency services (i.e. those with 5 or more buses an hour) the average waiting time was 6.20 minutes, which was 0.85 minutes more than the scheduled waiting time. For lower frequency buses (timetabled routes) 85% were on time.

4.3 Accessibility for car and taxi

Accessibility to the station by car is limited. The station has a small dedicated car park (with 15 spaces, no disabled bays), plus there are various car parks in close proximity, including at the Exchange Shopping Centre (with 1,200 spaces) and four council car parks (totaling nearly 900 spaces). On York Road near the peak hour entrance there are several short term bays (2 hrs maximum stay) with parking meters.

There is no direct access from the Station Car Park into the station with passengers having to walk 400 metres along Cranbrook Road into the main station entrance. All of the various car

[41] http://www.greateranglia.co.uk/about-us/performance-figures
[42] London Buses Quality Service Indicators: Route Results for London Boroughs – Redbridge Fourth Quarter 2012-13 http://www.tfl.gov.uk/tfl/businessandpartners/buses/boroughreports/?borough=Redbridge&nameid=redbridge&boroughid=26

parks, including Station Car Park, are managed by companies other than that involved in the management of the interchange. Charges vary, up to about £10.00 per day. The daily rate in the Station Car Park is £5.00 or £4.00 if accessed after 9.30am. Monthly, quarterly and annual season tickets are available for this car park, which reduce the costs by as much as nearly £800 compared to paying on a daily basis.

There is a taxi rank close to the main station entrance. Passengers wishing to get a taxi must use the main entrance and then cross Cranbrook Road to Balfour Road. The taxi rank is not an integral part of the station and it is assumed that it is used also by shoppers, given its location at one of the entrances to the Exchange Shopping Centre. There is also a private taxi firm which can be found adjacent to the Station Car Park.

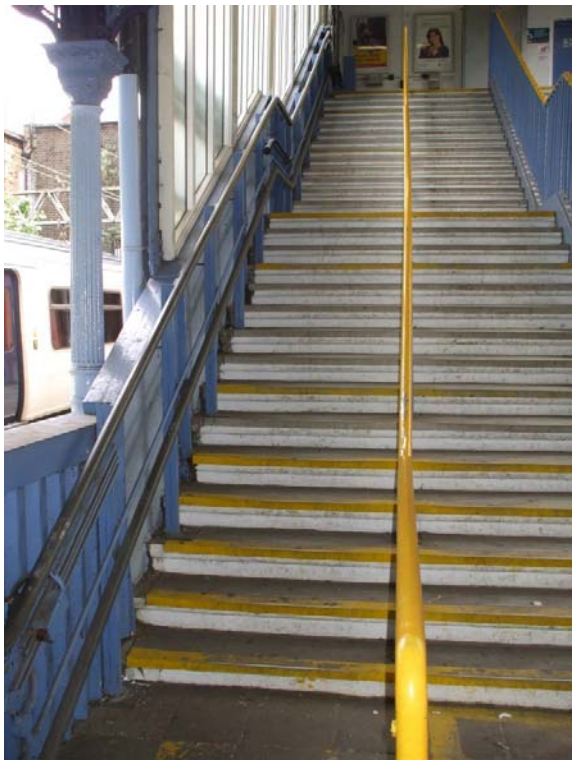
There are limited official opportunities for Kiss and Ride, with just one bay for two cars on Cranbroook Road – on the opposite side of the road to the station entrance (see photo). Informal kiss and ride is likely to be taking place instead at the bus stops, at the goods loading bay outside the station entrance, and when the pedestrian crossing lights turn red. Due to the quieter nature of York Road it is likely that Kiss and Ride opportunities near to the peak hour entrance are easier.

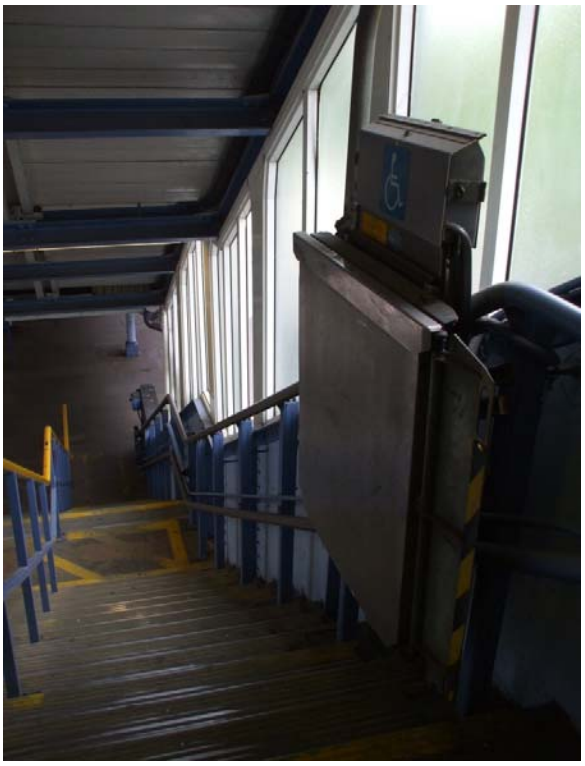
The interchange does not provide direct opportunities for car rental or car sharing. Several car rental firms however do work out of Ilford or are in the vicinity, including Sterling Car Rentals (on York Road about 300ms from the interchange and very close to the York Road Entrance), Sixt (about 1 mile from the interchange), and Budget (about 2 miles from the interchange). There is also a car club operating in Ilford, the nearest car club bay to the interchange is located on Mansfield Road about 150m from the interchange, very close to the York Road entrance.

4.4 Access for all

There are obvious barriers within the station for people with disabilities or indeed those with buggies or large items of luggage – these being the steps down to the platforms. Accessibility within the station is currently poor, as although stair lifts to the platforms had been fitted, these are all broken and cannot now be fixed as the parts are unavailable (see photos below). It is assumed that even when these were in working order only wheelchair users would have been able to access them – so access for those people with other mobility issues and with buggies/large baggage would always have been poor. The National Rail website does state that

the disabled stair lifts are out of order, although no solution is given. It is presumed that passengers would need to use an alternative station.





One of the sets of stairs faced by those with mobility issues and one of the out of order stair lifts

There are ramps provided for helping wheelchairs get onto the train and staff are available to assist when required. Although given the lack of lift, it is very unlikely that many people in wheelchairs are travelling through this station at the moment.

The station has a disabled toilet – located in the passenger corridor.

4.5 Good and bad practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Walking	N/A	N/A			
Cycling	N/A	N/A			
Public transport	Frequency of services	Rail and bus services from the interchanges are frequent – meaning passengers can turn up and travel and not worry too much about missing a particular service.	X		X
Car	N/A	N/A			
Taxi	N/A	N/A			
Access for all	N/A	N/A			

Other issues	N/A	N/A			

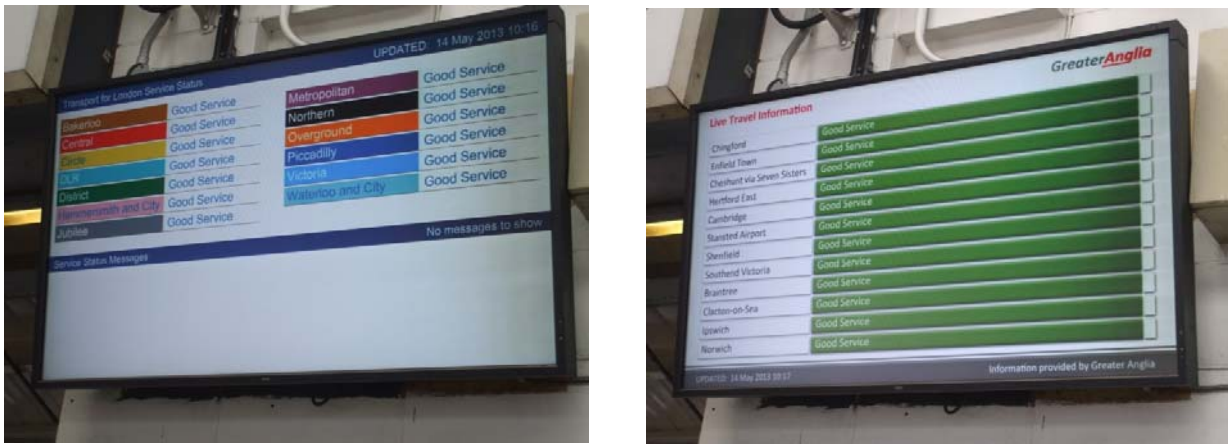
Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Walking	Unsafe entrance	The rear entrance appears unsafe.	X		X
Cycling	Unsecure and poorly located	Cycle parking although seemingly covered by CCTV may still be unsecure. Also it is located on a mainly unused platform reducing the level of convenience.	X		X
Public transport	N/A	N/A			
Car	No direct access.	The car park has no direct access to the station.	X		X
Taxi	Not directly outside station entrance.	The taxi rank is not directly outside the station entrance and requires passengers to cross a road to access it.	X		X
Access for all	Very poor access for those with mobility problems.	The stair lifts are broken meaning there is no access to the platforms for those in wheelchairs. There is also poor access for all those with mobility issues, including those with buggies and large items of luggage.	X		X
Other issues	N/A	N/A			

5 Passenger services

5.1 Journey planning and real time information

The level of information provision varies – between the different parts of the interchange. Within the train station the level of information is good, with both timetables and real time information and other passenger information being provided on the platform and within the front (main) entrance. Passengers are also able to get real time information online through the National Rail website or mobile phone app. Within the main entrance hall screens showed details for each of the platforms, with an additional screen showing various items of passenger information, including safety messages, information on the service status of the London Underground, information on the service status of Greater Anglia's services. No passenger information is provided at the York Road (peak hours) entrance. Public announcements are made on the platforms.

Left: Passenger information screens within the ticket hall (It is noted that the quality of this image is poor, appearing to show that full information is not provided. This is however an issue with the photograph and not the quality of information provided at the interchange). Right: Passenger information screen on platform 1.



Examples of the passenger information being provided on a rolling screen in the ticket hall.

Various websites, including that for National Rail and Greater Anglia, provide information that allows users to plan their rail journey. Transport for London's Journey Planner allows users to plan their journeys in advance – combing the various modes available in London and also those with mobility issues to select whether they need 'step free access' (see Figure 6).

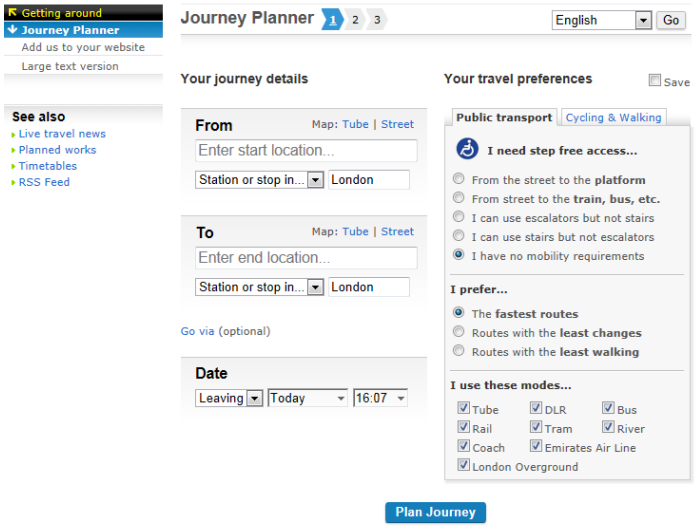
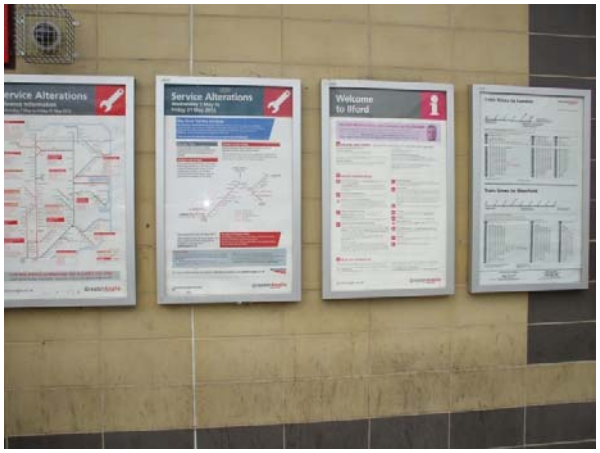


Figure 6: Excerpt from Transport for London's Journey Planner (Source: Transport for London)



At the bus stops the level of information is also good, with both timetables and real time information being provided, along with maps of local bus services. Passengers are also able to access real time information online through TfL's website.

Some information on rail services is also provided on the outside of the station building, as are a number of maps of the local area (see photo to the right).

Just as passengers exit the main train station, wayfinding is provided for those transferring to local buses, taxies or walking to various local facilities. At present however there is no link between the information systems provided for the rail and bus services. More passenger information could potentially be provided linking the modes. For example information on bus departures could be provided within the train station. However, it should be noted that the space within the interchange is limited at present and therefore providing this information could interfere with access and transfer times. It might be that this information will be provided when the train station entrance is improved as part of the Crossrail development.

Some information is provided for those travelling with disabilities, for example tactile pavements.

In use	Needed	Intelligent System or Service in the Interchange Area
✓	□	Journey planner for local public transport for pre-trip planning
✓	□	Journey planner for long-distance public transport for pre-trip planning
✓	□	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
✓	□	Smart ticketing [speeds up transfer]
✓	□	Electric departure time displays based on *timetables* (for multiple stops)
✓	□	Electric departure time displays based on *timetables* (at stops)
✓	□	Electric departure time displays based on *real-time information* (for multiple stops, incl. fleet monitoring systems)
✓	□	Electric departure time displays based on *real-time information* (at stops)
✓	□	Departure times via audio calls
✓	□	Real-time disturbance information provided via *displays*
✓	□	Real-time disturbance information provided via *audio calls*
□	□	Multi-language information
□	✓	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
✓	□	Information centre with personal service
□	✓	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)
✓	□	Guidance and warning surfaces for the visually impaired
□	✓	Tactile maps of the interchange for the visually impaired
✓	□	Information with hearing aids (e.g. "T-coil")
□	✓	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
□	□	Intelligent Indoor-Navigation System
✓	□	Intelligent security systems (e.g. CCTV)
□	□	Areal or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.
□	□	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

5.2 Fares and ticketing

Ticket purchasing for this interchange varies between the modes. Within the train station tickets can be purchased from the ticket counter and ticket machines within the main entrance hall. Opening hours for the ticket office are: Monday to Friday 06.10 to 20.00, Saturday and Sunday 06.10 to 20.00. Tickets are also available to buy online prior to travel – tickets can be collected from the ticket machines, delivered by post, or printed by the passenger. For rail journeys within London (and out as far as Shenfield) it is also possible for passengers to use an Oyster Card. For the bus, tickets can be purchased from local newsagents or on the bus. It is also possible for passengers to pay using an Oyster Card or using a contact less payment card.

5.3 Good and bad practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Journey planning and real time information	Good online journey planning	Transport for London provides a good online journey planning system – which is mutli-modal.			x
Fares and ticketing	Use of electronic ticketing across modes	Oystercards allow users to have one ticket that can be used on numerous modes across the whole of London. NB. It doesn't currently cover cycle hire or taxis.			x
Other issues	N/A	N/A			

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveler
Journey planning and real time information	Poor links between rail and bus passenger information – on site.	There is currently no information provided within the train station on the times of local buses. This information would be useful for users.			x
Fares and ticketing	N/A	N/A			
Other issues	N/A	N/A			

6 Analysis of good and bad practices

At present the interchange can only be considered successful in terms of its quality of journey planning and real time information and integrated ticketing arrangements. Journey planning is considered successful due to the ability of passengers to be able access real time information both at the interchange (i.e. on the platforms and at the bus stops) and online (via a computer or smart phone). This enables passengers to plan their journeys and keep up to date while they travel. The integrated ticketing is successful as passengers are able to use a smart ticket (the Oystercard) for both rail and bus journeys made from the interchange. This could nevertheless be further improved if passengers were also able to pay for car parking and taxis – the other modes currently available from this interchange.

It is expected however that once the station is redeveloped at part of the Crossrail scheme and becomes part of the Crossrail franchise, which will be under the control of Transport for London, the interchange will be much more successful. For instance, the new ticket hall layout and greater gate line should improve the availability of interchange space, the provision of passenger lifts will improve facilities for the mobility impaired, and other general improvements to the station should led to improvements to waiting areas and improved safety and security. Proposed urban realm improvements associated with Crossrail would greatly improve the quality of the surrounding streets as well as the bus interchange areas. The change to the ownership and management structure may also help to improve transfer quality between the modes, as once both the bus and rail services are under the overall control of Transport for London there could be greater impetus and opportunity for joined up planning of services.

One suggested example of a good interchange is Stratford Station, which, like Ilford, is a future Crossrail station. Stratford is a large multi-level station which is currently served by Main Line Rail, London Overground, the Underground, the Docklands Light Railway, buses, taxies, and cycle parking. The station served as a major arrival point for the 2012 Olympic Games. The Station is also linked to Stratford International Station, via the Westfield Shopping Centre. Stratford is considered to be best practice due to it being modern, with a light and airy nature, good wayfinding to the different modes (for example the bus station can be seen from inside interchange building), and the availability of real time information. The station also has good access for those with mobility issues, with step free access and lifts to all platforms.
Tables 6.1 and 6.2 summarise the good and bad elements of Ilford interchange.

6.1 Good practices

		Explanation – why is it a good practice?
Policy and governance	Partnership between Crossrail, TfL and the London Borough in promoting urban realm improvements	It enables improvements within the station boundary to be planned alongside improvements to the surrounding streets that will affect the overall quality of the environment as well as improving access by bus, foot and bicycle.
	Practice 2	N/A
	Practice 3	N/A
Station operations	Provision of real time information	RTI screens have been introduced to supplement printed timetables on the station platforms and in the bus shelters.
	Practice 2	N/A
	Practice 3	N/A
Management and maintenance	Practice 1	N/A
	Practice 2	N/A
	Practice 3	N/A
Safety and security	Safety posters	Within the interchange there are numerous posters and other signs which highlight potential safety issues that are particularly relevant at this station. For example, reminding parents to strap their children into pushchairs – which will be essential for carrying them down onto the platforms.
	Waiting rooms on two platforms	Provides passengers with a feeling of security when waiting for trains. The waiting rooms have glass sides to allow for good visibility in and out.
	Practice 3	N/A
Finance and revenue streams	Practice 1	N/A
	Practice 2	N/A
	Practice 3	N/A
Interchange design	Frequent public transport services	During peak hours the train and bus services are frequent making waiting times short.

	Practice 2	N/A
	Practice 3	N/A
Accessibility	Frequency of services	Rail and bus services from the interchanges are frequent – meaning passengers can turn up and travel and not worry too much about missing a particular service.
	Use of PERS	Undertaking a pedestrian study using the Pedestrian Environment Review System should help to ensure improved waling accessibility once the station is developed.
	Practice 3	N/A
Passenger services	Good online journey planning	Transport for London provides a good online journey planning system – which is multi-modal.
	Use of electronic ticketing across modes	Oystercards allow users to have one ticket that can be used on numerous modes across the whole of London and out to Shenfield. NB. It doesn't currently cover cycle hire or taxis.
	Practice 3	N/A

6.2 Bad practices

		Explanation – why is it a bad practice?
Policy and governance	Practice 1	N/A
	Practice 2	N/A
	Practice 3	N/A
Station operations	Practice 1	N/A
	Practice 2	N/A
	Practice 3	N/A
Management and maintenance	The station itself and its facilities are run down	Due to its age the station is run-down. The atmosphere is therefore intimidating. Maintenance is undertaken but due to the prospect of major renewal with the Crossrail project this may not be seen as a priority for the short term.
	Practice 2	N/A
	Practice 3	N/A
Safety and security	Secluded rear entrance	The rear entrance may be perceived to be unsafe, particularly during winter months when it is open during hours of darkness.
	Practice 2	N/A
	Practice 3	N/A
Finance and revenue streams	Practice 1	N/A
	Practice 2	N/A
	Practice 3	N/A
Interchange design	Rundown facilities within the station	The station facilities are currently in need of improvement which means the interchange is currently not an enjoyable place to be. This should be rectified once the station is re-developed as part of the of Crossrail development.
	Limited retail within the	There are limited retail facilities within the interchange, which means waiting passengers have few opportunities for

	station	buying food and drinks or other goods within the building (although there are many facilities nearby).
	No wifi	There is no wifi access which means passengers cannot as easily add value to their time spent waiting in the interchange.
Accessibility	Unsafe entrance	The rear entrance appears unsafe due to its secluded nature and poor design. This is being reviewed in the urban realm improvement proposals, alongside other access issues.
	Unsecure and poorly located cycle parking	Cycle parking, although seemingly covered by CCTV, may still be unsecure. Also it is located on a mainly unused platform reducing the level of convenience.
	No direct access to car parking	There is no direct access from the station to its car park (which is small – 30 spaces only).
	Taxi rank not directly outside station entrance.	The taxi rank is not directly outside the station entrance and requires passengers to cross a road to access it.
	Very poor access for those with mobility problems	The stair lifts are broken meaning there is no access to the platforms for those in wheelchairs. There is also poor access for all those with mobility issues, including those with buggies and large items of luggage.
Passenger services	Poor links between rail and bus passenger information – on site	There is currently no information provided within the train station on the times of local buses. This information would be useful for users.
	Practice 2	N/A
	Practice 3	N/A

6.3 Important factors facilitating or hindering good practice

Aspects	Factors facilitating or hindering good practice
Policy and governance	The fact that the rail and bus services are currently regulated, managed and operated by different organisations is a hindrance to good practice in terms of making good links between the rail and bus services. However, the planned switch of rail services to TfL under Crossrail will place bus and rail services under control of a single organisation. On the other hand, as part of the process of planning for Crossrail there has been a high degree of partnership between different organisations in developing the urban realm improvements.
Station operations	None identified.
Management and maintenance	Currently the station is managed by Network Rail but has operators from Greater Anglia (rail) and TfL franchisees (bus). Bus stops are on the street, so come under the responsibility of TfL and the London Borough. There is therefore no single organisation responsible for managing interchange.
Safety and security	The current design of the station and its access points is hindering good practice. For example the location and design of the rear entrance onto York Mews is poor meaning this access point is unsecure.

Finance and revenue streams	The split between different operators for different modes, and between infrastructure and train operation, means that there are separate revenue streams for each mode. However, the widespread use of multi-modal ticketing such as the TravelCard and Oystercard, although requiring a complex system for distribution of revenues between operators, reduces the barrier as seen by the users.
Interchange design	In the short term the major hindrance stopping improvements to the station facilities, such as its waiting rooms, toilets etc is the stations future re-development plans. It is assumed that current TOC is not willing to make what would likely be costly improvements now as in the medium term the station re-development is likely to make the necessary changes.
Accessibility	In the short term the major hindrance stopping improvements to station access for those with mobility issues is the stations future re-development plans. It is assumed that current TOC is not willing to make what would likely be costly improvements now as in the medium term the station re-development will solve the problem.
Passenger services	The fact that there is a smartcard ticketing system in place across the whole of London helps to facilitate good practice in terms of ticketing and fares, with passengers able to pay for bus and rail services using one ticket.

6.4 Main recommendations

The main recommendations based on the findings from Ilford are as follows:

- The need for smart and integrated ticketing across the various modes.
- Real time information for all modes should be provided both at the interchange and online (for use on a computer or a smart phone).
- Web based journey planning should be possible linking all possible modes, including walking and cycling.
- Cycle parking should be secure, weather proof and located in sensible locations, i.e. close to the entrances or on platforms from which services depart.
- There is a need to ensure that all access points feel safe and secure, at all times of the day. An additional side entrance could be provided to the south of the station from Ilford Hill.
- Good wayfinding should be provided to and from all interchange access points, not just from the main entrance.
- Transfer distances should be minimised and good wayfinding provided between the modes.
- Passenger facilities, such as waiting rooms, toilets, ticket halls, should be maintained to a high standard (daily through cleaning, in the short term through maintenance and in the medium to long term by refurbishment planning.
- High quality retail opportunities should be provided within the building.
- A Station Travel Plan could aid the improvement of facilities and help to minimize the impact of traffic on the access roads.

- Make use of guidance on transport interchanges that has been developed by Transport for London.
- Undertaking pedestrian and cycling studies – using systems such as the Pedestrian Environment Review System (PERS) and Cycling Environment Review System (CERS) should help to accessibility to interchanges for walkers and cyclists. As well as making general improvements to the surrounding public realm.
- It is important when developing new interchanges to consider the surrounding area, not just the interchange itself. This could be undertaken as part of master planning process and would ideally involve all stakeholders involved in the design and planning of the interchange, those who will be involved in operating and managing the transport modes that will be involved, the local authority, local businesses, and the public.

Annex D: Pilot case study report Thessaloniki

EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

TASK: 2.4

TASK TITLE: Data collection template for pilot case studies

Authors: Eftihia Nathanail, Giannis Adamos & Maria Tsami

Institution: CERTH

Contents

LIST OF TABLES

LIST OF FIGURES

1 Background

The New Railway Station is the central passenger railway station in Thessaloniki, which is the second biggest city in Greece and the capital of the periphery of Central Macedonia with a population of approximately 1000000 residents. The city is a member of CIVITAS, CIVITAS CATALIST and Energy Cities, and, is also, studied in the ATTAC (Attractive Urban Public Transport for Accessible Cities) of the South East Europe – Transnational Cooperation Programme and the Urban Mobility Management System, a project funded by 50% by the countries of Iceland, Liechtenstein and Norway through the financial mechanism “European Economic Area” and by 50% from national funds.
The station, completed in 1961, replaced the old and much smaller passenger station which now accommodates the city’s cargo rail, and, although there have not been any changes since the 60s’, the station remains the largest and busiest railway station built in Greece (http://el.wikipedia.org/).
The passenger station began its construction during the 1930s after an international architectural design competition that was carried out that period, and the winner of the competition was the German architect Kleinschmidt. Although the architectural concept of Kleinschmidt formed the basis for what the station would look like, his complete designs were never realised, since they were later changed by other architects. The main concrete shell of the building was completed before the Second World War, however, there was a cessation in the construction when Greece entered the war. Despite the fact that the building was bombed throughout in the early 1940s, there were not any heavy damages. In 1958, the Greek architects Molfesi and Papagianni undertook the completion of the station based on the initial designs of Kleinschmidt, and the project was finally completed and handed over to the public in 1961. Although some additions have been made the following years, such as the construction of a shopping center and the installation of escalators for access to the platforms, the station has remained unchanged since the 60s’ (http://el.wikipedia.org/).

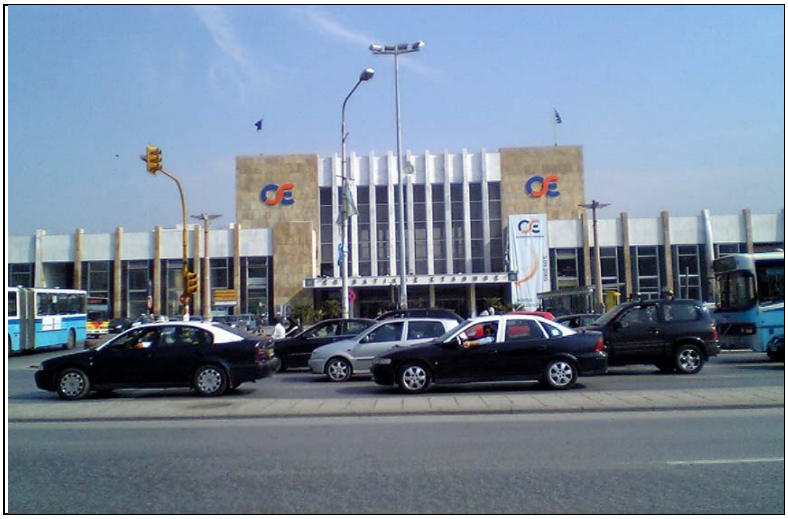


Figure 23: The New Railway of Thessaloniki

The station is located in the suburban area of the city and the involved modes are commuter rail, interurban rail, local buses, suburban buses, interurban buses, taxis, bicycle ways, park and ride, kiss and ride, and metro (under construction).

The "under construction" metro station will play a catalytic role for the reconstruction of the terminal and the surroundings, including, indicatively, a new underground parking, new walking and cycling accesses, etc. The existing terminals in cooperation with the investments of the new metro station will enable the reconstruction of the existing infrastructure to a modernized integrated bus-railway-metro station (Figures 2, 3).

Figure 24: The under construction metro station

Figure 25: The Thessaloniki metro lines development plan (Source: http://www.ametro.gr/)

Apart from the provision of railway services, the station works as a terminal of the public bus services of the Thessaloniki Urban Transport Organisation (OASTH), while the station is also directly connected to the interurban bus station, where scheduled destinations for Athens and other Greek cities are available.

The station is situated close to the city business distinct and very close to the central business distinct, allowing the movement of travellers all around the city. The station is also close to the port of Thessaloniki, enhancing the attractiveness of the interchange. Moreover there is a bus

line connecting the railway station to the International Airport of Thessaloniki “Macedonia”, which actually connects the central bus station located in the West part of the city and the airport, located in the East part, passing from the railway station.
Focusing on buses, the average daily number of passengers travelling in the urban zone is approximately 137971, and in the suburban zone approximately 22630. In total 12 bus lines serve these travel needs. Regarding the railway, the average daily number of passengers arriving at and departing from the station is approximately 6000, 4500 of which use tickets issued by electronic systems, and 1500 of which use paper tickets.

2 Management

2.1 Policy and governance

Initially the station was designed as a central railway interurban terminal for the city of Thessaloniki, interconnected with the city center with the bus by public transport and taxis. As the initial role was focused on rail transport, the station was designed by the Organisation of Hellenic Railways (OSE S.A.). Nowadays, the transformation of the station to multimodal interchange resulted from informal agreements between TRAINOSE S.A., which is the rail transport operator of OSE S.A. and local stakeholders, i.e. urban transport authorities, taxi associations, regional and municipal authorities towards the vision of sustainable mobility for Thessaloniki. TRAINOSE S.A. is the responsible organisation for the planning of the station.
A typical process of public consultation for the design of the station was not followed, however, the municipal and regional councils dealt with this issue.
Key aspects that were considered when designing the station include:

- The location of the interchange and the availability of open space.
- The connection with the city center and other transport nodes and/or transport generators/attractors, i.e. port, airport and the university.
- The potential of further expansion.
- The customer service quality.
- Lower prices in comparison to separate trips.
- Integrated management.

Challenges that are commonly faced in the design and planning of multimodal interchanges and may be also considered in the specific station include:

- Cooperation agreements (formal or informal) and deals among involved parties, transport authorities and local authorities.
- Activities and space allocation among stakeholders.
- Governance scheme and management – organisational structure.
- Design of the area where service should be offered.
- Tickets clearance.
- Any administrative issues.

Transport operators have the responsibility of the planning and scheduling of the public transport services. The bus transport scheduling follows in general the scheduling of rail transport.

2.2 Station operations, management and maintenance

The land and buildings of the station are owned by the public Organisation of Hellenic Railways (OSE S.A.), while the railway operations are performed by the public independent company TRAINOSE S.A., which is supervised by the Ministry of Development, Competitiveness, Infrastructure, Transport and Networks. Moreover, GAIAOSE S.A. (http://www.gaiaose.com), member of the OSE group of companies, has undertaken exclusively the administration, management and commercialization of real estate of OSE S.A. GAIAOSE S.A. owns three

subsidiary companies that deal with Solar Modules. Finally, the third member of OSE Group is ERGOSE S.A. (http://www.ergose.gr) which is responsible for the projects management of the train stations.
The bus operations are under the supervision of the Thessaloniki Urban Transport Organisation (OASTH), which is a legal non-profit entity organized under private law and serves as the public carrier in the province of Thessaloniki assisted with concession agreements that are signed between the Greek government and OASTH (www.oasth.gr). The overall passenger's movements are managed by the Thessaloniki Public Transport Authority (The.P.T.A), which is a decentralized public authority created in 2001 and is supervised by the Ministry of Development, Competitiveness, Infrastructure, Transport and Networks. The.P.T.A has the responsibility for decision making on matters relating to public passenger transport and the transport system in general at the geographical area of the regional unit of Thessaloniki (http://www.thita.gov.gr).
The station lacks of an integrated management structure, since each transport operator is responsible for the management of the space and the operations assigned to. Towards this direction, informal agreements for cooperation are made, and contracts for using the space are signed. TRAINOSE S.A. is responsible for the whole management through its Information Technology (IT) systems.

Regarding the regulatory framework within which the station operates, this is governed by the laws and regulations concerning the establishment and operation of the transport authorities that use the station.

For the coordination among the involved partners, the overall responsibility is under TRAINOSE S.A., which feeds other partners with the corresponding information, timetables, etc. Also, an effort is made for the combination of train and taxi within the framework of an integrated door-to-door movement with the same ticket.

Highlighting the main issues for improving interoperability and organisational coordination of modes, the following may be mentioned:

- Establishment of a regulatory framework dedicated to the development and operation of multimodal interchanges.
- Identification / establishment of management structure defining clear role and responsibilities among stakeholders.
- Medium to long term planning and development of interchange master plan.
- Identification of capabilities and future needs and prioritization of investments and extensions.
- Identification of financial resources.

Finally, the most important factors that facilitate cooperation among modes are the need for connecting the area of the interchange with the city center and other mode terminals, the provision of the needed services when and where the demand is high, and accuracy and reliability of the offered service.

2.3 Safety and security

The safety and security of the station is ensured, physically, by the presence of police officers and private security inside and outside the station. A central police department is also located outside the interchange. The private security company operates at the station in all posts, securing every spot of the area.
Moreover, a Closed-Circuit Television (CCTV) system is installed in the station inside and outside the central building. Fire protection systems are also placed in all parts of the station.

Due to the simple service that is offered at the station, there was no need for defining any specific safety standards. Focusing on the level or safety provided to women and vulnerable peopled, this can be considered as adequate, since such problems have not been reported till now.

2.4 Finance and revenue streams (revenue generation)

TRAINOSE S.A. bears the financial responsibility of the interchange, including, maintenance and investments. Assessing the economic performance of the station, although there is not a study to prove profitability of the interchange process, it can be assumed that the service does not provide losses to the rail company. On the other hand, the taxi company benefits from the participation.

The funding of the station was public through the Greek state. The transport operator – provider of each mode, under the relevant regulatory framework for the establishment and operation of these companies, determines the decisions on pricing level and services.

Lastly, there are punishments as a result of bad services. Punishments start from a short time duration exclusion from the service till the permanent exclusion.

2.5 Good and bad practices

Table 11: Management: Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance	Distinction between authorities responsible for land/network ownership and operations.	Avoidance of conflict of interests among the involved stakeholders, especially regarding ownership and operations.	x	x	
Station operations	Many bus lines originate at the station.	Provision of alternative bus routes' choices. Decrease of waiting time at the station. Decrease of the total travelling time.			x
Management and maintenance	Close monitoring for all problems regarding the offered services.	Decrease of the time needed for the confrontation of potential problems appearing at the interchange.	x		
Safety and security	Intense presence of police and private security company	Decrease of travellers' risk. Increase of the feeling of safety.	x		x
Finance and revenue streams	-				

Table 12: Management: Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance	Lack of a regulatory framework dedicated to the development and operation of multimodal interchanges.	Difficulties in the coordination among several operators.	x	x	
Station operations	Uncoordinated timetables between train and buses.	Increase of delays and waiting times. Inconvenience.	x		x
Management and maintenance	Lack of information when travelling from train to bus.	Inconvenience, especially for foreign travellers or travellers from other cities. Increase of delays.			x
Safety and security	Unprotected access at night	There are 3 main entrances to the facility which raises security concerns.			x
Finance and revenue streams	-				

3 Interchange design

3.1 Sustainable interchange design

Due to the fact that the station was designed decades ago, energy efficiency has not been considered in the initial design of the station. GAIAOSE S.A. follows an energy strategy for the reduction of carbon footprint and the utilization of the solar energy collected by the photovoltaic the company owns. The plan is within the next 5 years to launch trains that will be powered by electricity generated from the photovoltaic panels. Moreover the urban bus operator OASTH has already upgraded the bus fleet with greener vehicles. After the reformation of the central building, lighting and air-conditioning have been set to a level that reduces save unnecessary power consumption.

3.2 Travel time and space

In tables 3, 4 and 5 the average transfer and waiting time and distances among modes are presented. Only train, bus, car and walking are considered as effective modes, whereas the new metro line is under construction.

The following assumptions were made when calculating waiting time:

- Train to train: 37 minutes is the average train frequency of departure from the station.
- Bus to bus: 15 minutes is the average bus frequency of departure from the station.
- Train to train and bus to bus waiting time was calculated by considering the frequencies of all trains and buses departing from the station. The time spend for ticket purchasing at the station is not considered, as it differentiates a lot regarding travellers' habits and requires a survey to be estimated properly. For the same reason, the time spend in other

activities like shopping, eating etc. was not considered. These data could be addressed in the travellers' attitudinal survey.

- Walking and car cells were timed during a day at the station and the average values were estimated according to timed data and observations.
- In all transit operations, the night routes were also considered, although these routes are less frequent than those in the daytime.
- For the train and bus timetables and routes we considered only the ones of the weekdays, because weekend routes and timetables differentiate a lot.
- Train or bus to walking time refers to queuing time.
- Time when shifting within and between car and walk from one mode to other refers to the time needed for receiving information of buying a ticket.

The transfer time table was filled in considering the distance travelled in the station and the queuing to board or alight a vehicle. Also, the average walking distance calculated was 50 meters/minute.

Table 13: Waiting time

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	37 min			15min	2,5min		1,5min
Metro							
Tram							
Bus	21,04min			15,96min	1,5min		0,5min
Car	17min			1,5 min	3min		1,5min
Cycling							
Walking	1min			15min	1,5min		5-6min

Table 14: Transfer time

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	1,3min			1,4min	6,5min		0,5min
Metro							
Tram							
Bus	1,2min			1,16min	2,2min		0,3min
Car	6,5min			2,7min	0,1min		0,01min
Cycling							
Walking	0,5min			0,5min	0,02min		0min

Table 15: Distance

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train	15m			220m	300m		0m

Metro							
Tram							
Bus	220m			18m	110m		0m
Car	300m			110m	3m		0m
Cycling							
Walking	0m			0m	0m		0m

Ticket offices for trains are located in the central building of the interchange in the front entrance. There are 8 ticket offices for train tickets and relevant information, numbered from 1 to 8. Ticket office one serves exclusively people with reduced mobility and ticket office two exclusively trips outside the country. Offices 3-8 serve all other trips and travellers. The capacity is sufficient and the location is very good.

Regarding the ticket offices for buses, one can buy a bus ticket from a minimarket in the same price as from a ticket office of OASTH. In the station there is a minimarket inside the main building that sells bus tickets and 3 main ticket offices of the bus operator in the area surrounding the building and servicing travellers (one of these offices has a digital message sign informing foreign travellers that is a ticket buy spot). Three more minimarkets are outside the building offering the opportunity to buy a ticket from there. Bus ticket offices are very well located in the area (spatially), servicing all interchange users.

Assessing the available space in the station, it can be considered that the space is appropriate at the present, and although the station seems to be full in the peak hours, still, there is enough space to accommodate a large amount of travellers. The surrounding area of the central building is much extended, while there is a large waiting area in the main building which is rarely overcrowded.

On the other hand, the station lacks of direct uninterrupted and logical paths for passenger movements and of defined walking and cycling corridors. These deficiencies may be considered as significant disadvantages of the station.

Evaluating the protection of travelers against weather and noise, it can be mentioned that all railway platforms and bus stops are weather but not noise protected outside the central building (figures 4, 5).

Figure 26: Railway platforms

Figure 27: Bus stops

Concluding, the station seems quite enjoyable to travellers. There are two train wagons with historic interest decorating the main entrance of the building and the corridor to the train

platforms and a historic statue in the central building. Art is not spread in the area but there are many posters informing travellers for seasonally city events.

3.3 Facilities, service and retail

TRAINSPOT, covering about 1500 sqm area, is the central mall in the station with 16 shops aiming to cover station user's needs. There are also two automatic teller machines (ATM) located in the central building. Among the shops, there are coffee shops and restaurants, a rent-a-car company, a Citizen Service Center, drugstore, store for copies, bookstore, post office etc.

TRAINSTOP stores are open 24/7 to serve all time needs of station users.

3.4 Impacts on local economy

The overall impact of the station on direct and indirect employment effects, and on the surrounding areas may be considered as neutral. There have not been indicated significant changes in the amount of new start-up businesses close to the station, or in the housing in close vicinity to station, since services are offered exclusively from TRAINOSE S.A. facilities.

3.5 Good and bad practices

Table 16: Interchange design: Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	There is an underpass bypassing the station.	The underpass does not interrupt area connectivity.			x
Travel time and space	-				
Facilities, service and retail	TRAINSPOT, location of a mall inside the central building, with facilities and services that cover daily needs of the station users	Provision of variant services to travellers. Enhancement of creative time for travellers during their waiting time.			x
Impacts on local economy	Development of commercial businesses at the station.	Increase of productivity. Contribution to the limitation of unemployment.		x	
Other issues	-				

Table 17: Interchange design: Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	-				
Travel time and space	No information provided for combined modes.	Inconvenience. Increase of travelling delays.			x

Facilities, service and retail	Limited retail/services.	Limited service of travellers' commercial needs.			x
Impacts on local economy	-				
Other issues	-				

4 Accessibility

4.1 Accessibility for walking and cycling

Focusing on cycling, the city's bicycle path, crossing the city center, ends outside the interchange, offering the opportunity to travellers to transit to all available transport modes of the specific area. However, cycling is not allowed inside the interchange area and logical paths for cyclists are missing. The only way to access the station by bicycle is to store the bike somewhere outside the station, since there are not any bike lockers in close distance. Also, it has to be mentioned that transferring a bike in a bus is forbidden.
Regarding walking, the interchange is not attractive, as the surrounding area is usually overcrowded with traffic and the location is considered as deteriorated. Although the main central urban activities are very close and there are safe crossings, travellers rarely choose to walk from the interchange to the city center.

4.2 Accessibility for public transport

Accessibility for public transport may be considered as very good; the average distance of a bus stop from the main building of the interchange is approximately 100 meters. A large number of bus routes cross the interchange providing connections to the majority of the city districts.

In total, 29 buses cross the interchange, of which 5 serve the east-west suburbs of the city with approximately 22060 passengers daily, 7 the east suburbs with approximately 108521 passengers per day and 17 the west suburbs with approximately 30021 passengers at a daily basis.

4.3 Accessibility for car and taxi

Park and ride stands as an option in the surrounding area of the interchange, however, due to the metro construction works, the organized parking area is out of service this period. An organized waiting area for taxis is situated in the front of the central entrance of the main building of the interchange.
Considering car accessibility, someone has to cross the main road network of the city, in order to reach the station by car, and this causes travel delays and/or congestion problems.
Finally, rent-a-car services are available at the station.

4.4 Access for all

The level of accessibility for people with disabilities is good, since their movements are facilitated by ramps that are installed all over the interchange area and escalators that have been constructed in the train platform entrances. In addition, the will of the interchange personnel to assist their movements is intense.

4.5 Good and bad practices

Table 18: Accessibility: Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking	-				
Cycling	The main city bike path terminates across the street outside the interchange.	Promotion of the usage of soft modes. Promotion of sustainability.			x
Public transport	Connections to the majority of the urban districts.	Wide provision of travelling services and integration of efficient connections.			x
Car	-				
Taxi	Taxis are always available when it is needed	Increase of comfort. Increase of safety during the night.	x		
	Introduction of TRAINOTAXI, a combination of train and taxi service.	Integrated door-to-door movement with the same ticket	x	x	x
Access for all	Ramps everywhere.	Increase of comfort of people with disabilities.			x
Other issues	Increased mobility owing to various modes existing at the station.	Promotion of sustainability. Promotion of the usage of soft modes (cycling, walking). Promotion of combining various modes.	x		

Table 19: Accessibility: Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking	No defined walking corridors inside the interchange.	Increase of pedestrians' risks. Inconvenience.			x
Cycling	No cycling paths inside the interchange.	Increase of cyclists' risks.			x
	No cycle parking facilities.	Inconvenience. Increase of the possibility of stealing.			x
Public transport	-				
Car	-				
Taxi	-				
Access for all	No blind guides.	Inconvenience.			x
Other issues	-				

5 Passenger services

5.1 Journey planning and real time information

Regarding the public transport operator, the quality and content of journey planning and real time information are standing at a very satisfactory level.
However, among the significant barriers regarding journey planning and the provision of real time information is that there is no co-ordination dialogue among the information systems of various operators.

Focusing on signing, there is no strategy that could ensure that signing is balanced compared to service and advertisement.

Table 20: Journey planning and real time information indicators

In use	Needed	Intelligent System or Service in the Interchange Area
x	□	Journey planner for local public transport for pre-trip planning
□	x	Journey planner for long-distance public transport for pre-trip planning
□	x	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
x	□	Smart ticketing [speeds up transfer]
□	x	Electronic departure time displays based on *timetables* (for multiple stops)
x	□	Electronic departure time displays based on *timetables* (at stops)
□	x	Electronic departure time displays based on *real-time information* (for multiple stops, incl. fleet monitoring systems)
□	x	Electronic departure time displays based on *real-time information* (at stops)
□	x	Departure times via audio calls
x	□	Real-time disturbance information provided via *displays*
x	□	Real-time disturbance information provided via *audio calls*
x	□	Multi-language information
□	x	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
x	□	Information centre with personal service
□	x	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)
x	□	Guidance and warning surfaces for the visually impaired
□	x	Tactile maps of the interchange for the visually impaired
□	x	Information with hearing aids (e.g. “T-coil”)
□	x	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
□	x	Intelligent Indoor-Navigation System
□	x	Intelligent security systems (e.g. CCTV)
□	□	Areal or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.
□	□	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

5.2 Fares and ticketing

Electronic ticketing for the railway is available through the website of TRAINOSE S.A. offering smart deals and special prices for early bird ticket buying. Regarding bus ticketing, the potential of electronic buying is not available, however, all buses are equipped with ticket machines.

There is multi-zone ticketing for the national rail, and one zone for the buses. The rate for the bus tickets is standard; however an extra cost of 0.10 euro is required when someone buys the ticket from the in-vehicle machine.

An integrated ticketing policy is missing in the interchange, and the main barriers for this include political issues, meaning that a decision has to be made at a government level to force different operators to cooperate for integrated ticketing. In addition, the lack of central management system for the station burdens further this integration.

Better coordination for intermodal transport, improvements of the system, provision of high level services and the usage of public transportation means instead of private cars, may be defined as important factors for facilitating integrated ticketing.

5.3 Good and bad practices

Table 21: Passenger services: Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Web application for trip planning.	Time saving. Possibility of planning a trip in detail before its realization.			x
Fares and ticketing	Internet based application for train ticketing.	Possibility of buying online a ticket cheaper (instead of buying it at the interchange).			x
Other issues	-				

Table 22: Passenger services: Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Lack of co-ordination dialogue among information systems of various operators.	Unreliability, increase of delays, inconvenience.	x		
	Many links to various transportation operators.	Unreliability.	x		
Fares and ticketing	Lack of integrated ticketing for all modes.	Inconvenience, higher costs, unreliability.	x		
	Not a single point to issue tickets.	Inconvenience.	x		
Other issues	-				

6 Analysis of good and bad practices

The New Railway Station is the central passenger interchange terminal in Thessaloniki, situated close to the city business distinct, and very close to the central business distinct, allowing the movement of travellers all around the city. The station also works as a terminal of the public bus services of Thessaloniki, and it is directly connected to the interurban bus station, where scheduled destinations for Athens and other Greek cities are available. Moreover, the station is close to the port of Thessaloniki, while a bus line connects the station with the international airport of Thessaloniki "Macedonia". Taxis, bicycle ways, park and ride, kiss and ride, and metro (under construction) are modes also available at the station. Especially the construction of the metro station will reform both the terminal and the surrounding area, transforming the current terminal into a modern integrated bus-railway-metro station in the following years. Towards this direction, the New Railway Station may be considered as successful in terms of availability of the interchange space, since it meets the perspectives of its future development.
However, the station lacks of a cooperative management structure, since each of the involved transport operators is responsible for the management of the space and the operations assigned to. More specifically, the land and buildings of the station are owned by the public *Organisation of Hellenic Railways (OSE S.A.)*, the railway operations are performed by the public independent company *TRAINOSE S.A.*, supervised by the Ministry of Development, Competitiveness, Infrastructure, Transport and Networks, *GAIAOSE S.A.*, member of the OSE group of companies, undertakes the administration, management and commercialization of the real estate of OSE, *ERGOSE* S.A. is responsible for the projects' management of the train stations, and finally, the *Thessaloniki Urban Transport Organization* supervises the bus operations. There is not a business model for the coordination of all these partners; the overall responsibility is under the operator of the railway services TRAINOSE S.A. However, it has to be noted that integrated cooperation among the different operators is met in terms of timetables (scheduling). Also, at a pilot basis, an effort is made for the combination of train and taxi within the framework of an integrated door-to-door movement with the same ticket.
Assessing the level of safety and security provided to travellers, the intense presence of police officers and private security, inside and outside the station, creates a rather safe environment. A central police department is located next to the interchange, while the private security company operates at the station in all posts, securing every spot of the area. Focusing on technologies and protection systems, a Closet-Circuit Television system is installed inside the station, and fire protection measures have been considered all around the station.
Regarding the retail establishments in the interchange, the TRAINSPOT mall, located in the central building of the station, meets successfully the commercial needs of travellers, since a wide range of shops are available, including coffee shops, restaurants, a copy-store, a bookstore and a drugstore. Also, two automatic teller machines (ATM), a Citizen Service Center and a post office are at the disposal of travellers, who wish to process with other personal issues during their waiting time at the station.
Focusing on passengers' comfort, eight railway ticket offices are located in the central building of the interchange, one of which serves exclusively people with disabilities. Regarding bus tickets, one can get a ticket from a minimarket inside the main building of the station, as well as from three ticket offices of the bus operator in the area surrounding the building and from three more minimarkets located outside the building. Nevertheless, an integrated ticketing policy is missing.
Evaluating the available space in the station, it can be noted that the space is appropriate and enough to accommodate a large amount of travellers. The large waiting area in the main building is rarely overcrowded.
The lack of direct uninterrupted and logical paths for passenger movements, and the absence of defined walking and cycling corridors are among the main deficiencies that are indicated in the interchange and make it less attractive or safe.

Finally, the level of accessibility and especially focusing on people with disabilities may be considered as adequate, since ramps are installed all over the interchange area and there is personnel willing (but not assigned to) to assist their movement. The interchange lacks, though, of blind guides.
Summarizing, the interchange may be considered as successful in terms of:

- Availability of interchange space
- Security and safety
- Range of retail establishments
- Transfer quality among modes
- Quality of waiting areas

but not successful in terms of:

- Ownership/management structure
- Facilities for the mobility impaired
- Quality of journey planning and real time information
- Integrated ticketing arrangements

6.1 Good practices

		Explanation – why is it a good practice?
Policy and governance	Distinction between authorities responsible for land/network and operations.	This distinction between the owner of the interchange and the operators prevents any conflicts of interests among the involved stakeholders, ensures equal access to all interested bodies, promotes "health" competition and reinforces complementarity (Nathanail & Adamos, 2012).
Station operations	Many bus lines originate at the interchange.	The interchange is situated close to the city business distinct and very close to the central business distinct, working as the central passenger railway station and as one of main bus terminals. The potentiality of servicing passengers through a lot of bus lines that originate at the interchange enhances some of the main crucial characteristics of a transport interchange, thus attractiveness for public transport (less congestion, protection of environment, etc.) and covers one of the main parameters affecting passengers' modal choice, thus availability.
Management and maintenance	Close monitoring for all problems regarding the offered services.	As part of the overall evaluation of the effectiveness of the operation of an interchange, the (central) monitoring and solving of problems associated with the level of service provided to travellers stands as the key factor that makes the interchange successful in terms of enhancing its reliability and improving the offered services. The specific interchange for the better monitoring of the problems and the immediate response to their solving, has introduced the use of punishments as a result of bad services, which start form a short time duration exclusion from the service till the permanent exclusion.
Safety and security	Intense presence of police officers and private security	Safety is also one of the main parameters that affect travellers' modal choices. The intense presence of police officers and private security creates a rather safe environment for travellers, minimizing risks and increasing the sense of safety when transiting or waiting at the interchange. At the same time, the reliability of the interchange in terms of safety and security is achieved and its competiveness is increased.
Finance and revenue streams	-	-
Interchange design	There is an underpass bypassing the interchange.	With this construction intervention, the connectivity of the area is not interrupted, and the safe movement of people is ensured.
	Sufficient provision of variant services to travellers.	Due to free time restrictions that people have nowadays, in combination with the increased liabilities of their daily life (shopping, banking transactions, etc.), the potentiality of having some creative time during waiting time and processing with such issues of their daily routine, is of high importance, making at the same time the interchange more attractive.
	Development of commercial businesses at the interchange.	As part of the parallel services (apart from travelling) provided at the interchange, the forecast, when designing the main building of the rail station, to include facilities for the development of commercial businesses, was significant, since it enhanced the opportunities for local mainly actors to start up a new business in the area of the interchange.
Accessibility	Connections to the majority of urban districts.	The interchange provides connections to the majority of urban districts, enabling travellers to reach their destination efficiently (residence, airport, intercity bus terminal, port, etc.).
	The main city bike path terminates across the street outside the interchange.	The city's bicycle path, crossing the city center, terminates outside the interchange, offering the opportunity to travellers to transit to all available transport modes of the specific area, enhancing, at the same time, the use of soft modes and promoting sustainability.
	Adequate infrastructure for people with disabilities (i.e.	Taking into consideration that the most significant problems that people with disabilities face when travelling are related with physical problems, such as boarding, crowding, etc. (Ubbels et al., 2013), the provision of adequate infrastructure is very important for the comfort and safety of

	ramps)	this category of travellers.
	Taxis are always available when it is needed.	This availability at the interchange is widely appreciated by travellers, and especially those who travel late in the evening (increase of safety during the night) or seek for more comfort (the elderly, foreign travellers, etc.).
	Introduction of TRAINOTAXI, a combination of train and taxi service.	This combination of train and taxi within the framework of an integrated door-to-door movement with the same ticket is an innovative service provided at the interchange, enabling a lot of people to reach their final destination with safety and comfort, and in less time.
	Increased mobility owing to various modes existing at the interchange.	The existence of various modes at the interchange promotes sustainability, the usage of soft modes (cycling and walking) and enhances the combination of different modes.
Passenger services	Web application for trip planning.	This wed application enables travellers to plan their trip in detail before its realization.
	Internet based application for train ticketing.	Electronic ticketing for the railway is available through the website of TRAINOSE S.A. offering smart deals and special prices for early bird ticket buying. This availability enables money and time saving, both catalytic for the choices of travellers with public transport.

6.2 Bad practices

		Explanation – why is it a bad practice?
Policy and governance	Lack of a regulatory framework dedicated to the development and operation of multimodal interchanges.	The absence of a focused regulatory framework dedicated to the development and operation of multimodal interchanges causes significant problems, hampering the smooth coordination among various operators, the harmonization of the national legislation with the European regulations and the integration of common standards for the safety and security of travellers.
	Conflicts of political mainly interests of the involved stakeholders.	In the case of the New Railway of Thessaloniki, the lack of establishing an integrated ticketing policy is among the most important negative results of this situation.
Station operations	Lack of information kiosks.	Travellers, and especially visitors or people who are not familiar with the public transport system, seek for face-to-face provision of information, in order to feel more comfortable and be sure that they will choose the correct transport mode.
	Uncoordinated timetables between train and buses.	This situation increases delays and waiting times, and causes inconvenience to travellers affecting their modal choice.
Management and maintenance	Absence of a management structure for the definition of the role	When more than one entity is involved in the management and operation of an interchange, as in the case of the New Railway Station of Thessaloniki, usually, the responsibilities among the involved partners are not clearly defined. This situation, when a coherent management

	and responsibilities among stakeholders.	structure is missing, becomes more complex, and causes conflicts among the stakeholders and significant delays and complexities in the decision-making process.
	Absence of a long-term master plan for the development of the interchange	For the efficient and profitable integration of an interchange, a medium to long term planning and development master plan is needed, which has to include specific objectives and targets, define those parameters that affect the operation of the involved modes and set the strategic vision of the interchange. Without such a master plan, any future improvements of the interchange, such as potential extensions, cannot be launched.
	Lack of information when travelling from train to bus.	Travellers transiting from rail to bus do not receive any information in the interchange, for example, on which bus line to choose in order to reach their next destination. This situation causes inconvenience to travellers and especially those who are not familiar with the city's public transport system (e.g. foreign travellers or travellers from other cities).
Safety and security	Lack of emergency exits.	The absence of emergency exits increases significantly the risk of travellers, especially in rush hours, when crowding is intense.
	Unprotected access at night.	There are 3 main entrances to the specific facility that are unprotected at night, and this raises safety concerns at the interchange.
Finance and revenue streams	Lack of (national) funding for the development of the interchange.	This mainly happens because there is not a responsible authority for the identification of means and planning processes. As a result, interventions for the improvement of the interchange, its future development and maintenance become less feasible.
Interchange design	Absence of green areas or zones	The absence of green areas or zones causes discomfort to travellers and does not promote sustainability (lack of efforts for the environmental protection).
	No information provided for combined modes.	This situation causes inconvenience to travellers, increases travel times and affects the reliability of the interchange.
	Limited retail/services.	Limited service of travellers' commercial needs.
Accessibility	Lack of defined walking corridors inside the interchange.	This situation causes the increase of pedestrians'' risks and weakens the promotion of soft modes.
	Lack of cycling paths inside the interchange	This situation causes the increase of cyclists' risks and weakens the promotion of soft modes.
	Lack of blind guides	Difficulties in the movements of people with disabilities.
Passenger services	Lack of public consultation	The absence of travellers' satisfaction surveys means that any interventions in the interchange do not reflect users' needs and opinions.
	Lack of integrated ticketing policy	The absence of an integrated ticketing policy affects travellers' comfort, causes higher travel costs and unreliability, and makes difficult the entrances to each different mode.

6.3 Important factors facilitating or hindering good practice

Aspects	Factors facilitating or hindering good practice
Policy and governance	Regulation of appropriate structures. Legislative framework for the development of interchange stations. Standardization and certification of the interchange stations. Regulatory authority concerning the development and operation of such stations. Development of various management structures according to station operations, applicable at the national and regional levels.
Station operations	Coordinated scheduling. Existence of information kiosks. Assisting staff. Quality of services. Variety of services.

Management and maintenance	Inspection services. Adaptation of maintenance programs and schemes. Adequate resources for maintenance.
Safety and security	Lighting. Installation of CCTVs. Emergency exits. Fire alarms. Private security. Lockers.
Finance and revenue streams	Clear management structure. Existence of business plan. Identification of potential resources. Advertisement within the station area. Exploitation of other possibilities.
Interchange design	Variety of services (ATMs, etc.). Ergonomic design. Information and signing within the interchange area.
Accessibility	Urban public transport interconnections. Priority for high occupancy vehicles. Design for persons with disabilities. Better information services and signing.
Passenger services	Better coordination for intermodal transport. Improvements of the system and provision of high level services.

6.4 Main recommendations

Main recommendations for the reformation of the New Railway Station of Thessaloniki follow (Tsami et al., 2013a; Tsami et al., 2013b):

Aspects	Recommendations
Policy and governance	Establishment of a regulatory framework dedicated to the development and operation of multimodal interchanges.
Station operations	Increase of the quality of service aspects in the station, e.g. introduction of information kiosks and coordination of timetables between train and bus.
Management and maintenance	Identification / establishment of management structure defining clear role and responsibilities among stakeholders. Medium to long term planning and development of interchanges' master plan, including, e.g. the planning of further extensions of the interchange and the provision of information when travelling from train to bus.
Safety and security	Creation of user friendlier and safer environment (e.g. construction of emergency exits and forethought for people travelling late in the evening).
Finance and revenue schemes	Identification of capabilities and future needs and prioritization of investments and extensions. Identification of (national) financial resources.
Interchange design	Development of green zones/areas. Provision of real time information for combined modes. Promotion of the commercial use of the main station building (increase of retail services).

Accessibility	Creation of sidewalks and cycling facilities and infrastructure (e.g. bike parking area). Providence for people with reduced mobility skills (e.g. construction of blind guides).
Passenger services	Enhancement of public consultation (e.g. travellers' satisfaction surveys). Development of information systems (voice and visual) for the provision of real time information for departures, arrivals and delays. Introduction of integrated ticketing.

Acknowledgements

For the needs of this report, the data collection process, apart from web searching for historical and statistical information, also included the conduction of three interviews with stakeholders involved in the interchange. The authors would like to thank for their contribution Dr. Eleni Zacharaki, special advisor at the Ministry of Development, Competitiveness, Infrastructure, Transport and Networks, Dr. Athanasios Lois, IT Consultant at TRAINOSE S.A. and Dr. Georgios Spanos, Head of Planning and Scheduling Department at Urban Public Transport Organisation of Thessaloniki.

7 References

Nathanail, E. & Adamos, G., 2012. Policy Advisory Group recommendations. Deliverable D4.2. CLOSER – Connecting LOng and Short-distance networks for Efficient tRansport. CLOSER Project. Brussels, Belgium: CLOSER Consortium.

Tsami, M., Nathanail, E. & Adamos, G., 2013a. "Designing urban transport interchanges: The case of Thessaloniki railway station". International Conference on "Changing Cities": Spatial, morphological, formal & socio-economic dimensions. Skiathos Island, Greece, June 18-21, 2013.

Tsami, M., Adamos, G. & Nathanail, E., 2013b. "Moving towards the development of sustainable transportation hubs in Europe: Investigating the role of soft modes in Thessaloniki railway station reformation". 4th International Conference on Environmental Management, Engineering, Planning and Economics (CEMEPE 2013) & SECOTOX Conference, Mykonos Island, Greece, June 24-27, 2013.

Ubbels B.,Palmer D., Laparidou K.,Poppeliers R., Menist M., Jones M., Millard K., Harmer C. 2013. City-HUB project, Deliverable D2.1 Review of theory, policy and practice.

Annex E: Pilot case study report Kamppi

EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

THEME [SST.2012.3.1-2.]

Collaborative project
Grant agreement no: 314262

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

WP2 – Task 2.4

Data collection template for pilot case studies

Contents

1 Background

- A brief history of the interchange (include also whether the interchange is old or new, date of opening, circumstance of realisation)

The preliminary plans for the Kamppi terminal, located in downtown Helsinki, were done in 1995, and the project plan was ready in 1997. The town planning (including appeal period and process) was from 1998–2001. The construction of the Kamppi interchange and shopping centre started in August 2002. The **interchange started operation in June 2005** and the **shopping centre was opened in March 2006**. Work on the roads and outside areas were finalized in the summer of 2006.

In the beginning of 2006, the population in Helsinki was 560 905 and 988 440 in the Helsinki metropolitan area. A total of 1.4 million people were living within a one hour driving distance from Kamppi. Helsinki had 9 million national and 2 million international tourists yearly.

Source: Ministry of Transport and Communications Finland (16/2007). Impact assessment of Kamppi Travel Centre.

- **Modes of transport at the interchange (please specify: walking, cycling (with cycle parking), cycle hire, motor cyclists (also scooters and mopeds), buses, long distance coaches, metro, light rail/ tram, heavy rail, private cars (with car parking), private cars (with drop off), taxis, other**)

- Buses
  - Local (Western sector: Helsinki-Espoo)
  - Regional and national (Long-distance within Finland)
  - International (Helsinki – St. Petersburg, Russia)
- Metro
- Tram
  - One tram line has a stop right outside the interchange
  - More tram lines are accessible from less than 500 meters away from the interchange
- Walking
- Bicycle Center (outside the interchange)
  - Parking
  - Rental (from mid-May until mid-August)
  - Service (maintenance, repairs)
- Car
  - Parking Garages (250 + 500 places)
- Taxi stands (outside the interchange)

- **Please describe the interchanges role/place in the overall transport network. For example, is the interchange for local, regional, national or international connections etc**

Local, regional, national and international (bus to St. Petersburg, Russia).

- **Please can you provide some information on current passenger numbers? Including the total passengers by mode, the percentage split by mode, the approximate share of transfers between modes and spatial scale (please see table below) and the distribution between men and women travellers**

The average number of visitors in Kamppi on working days is approximately 100 000, of which 84 000 use public transportation.

The total number of departing metro passengers from Kamppi in 2012 was 6 634 000. The average for all working days of the year was 21 700 (in 2011, the average was 21 600).

The average number of bus passengers departing on working days from the local (western) terminal in Kamppi was 19 360 in October 2012.

- Approximate share of transfers between modes and spatial scales (see tables below)

- The background also needs to include a description of the location and the area surrounding the interchange. (Is the interchange also connected to other modes/public transport in proximity (ie not directly but close to))

The central railway station is approximately 500 meters away from the Kamppi interchange. Located adjacent to the railway station are also bus stations for most Northern and Eastern local and regional buses.

The interchange itself is in a very central location in downtown Helsinki. The area of the interchange/shopping centre is approximately 4 hectares. In addition to the shopping centre there are also offices and flats in the same building complex.

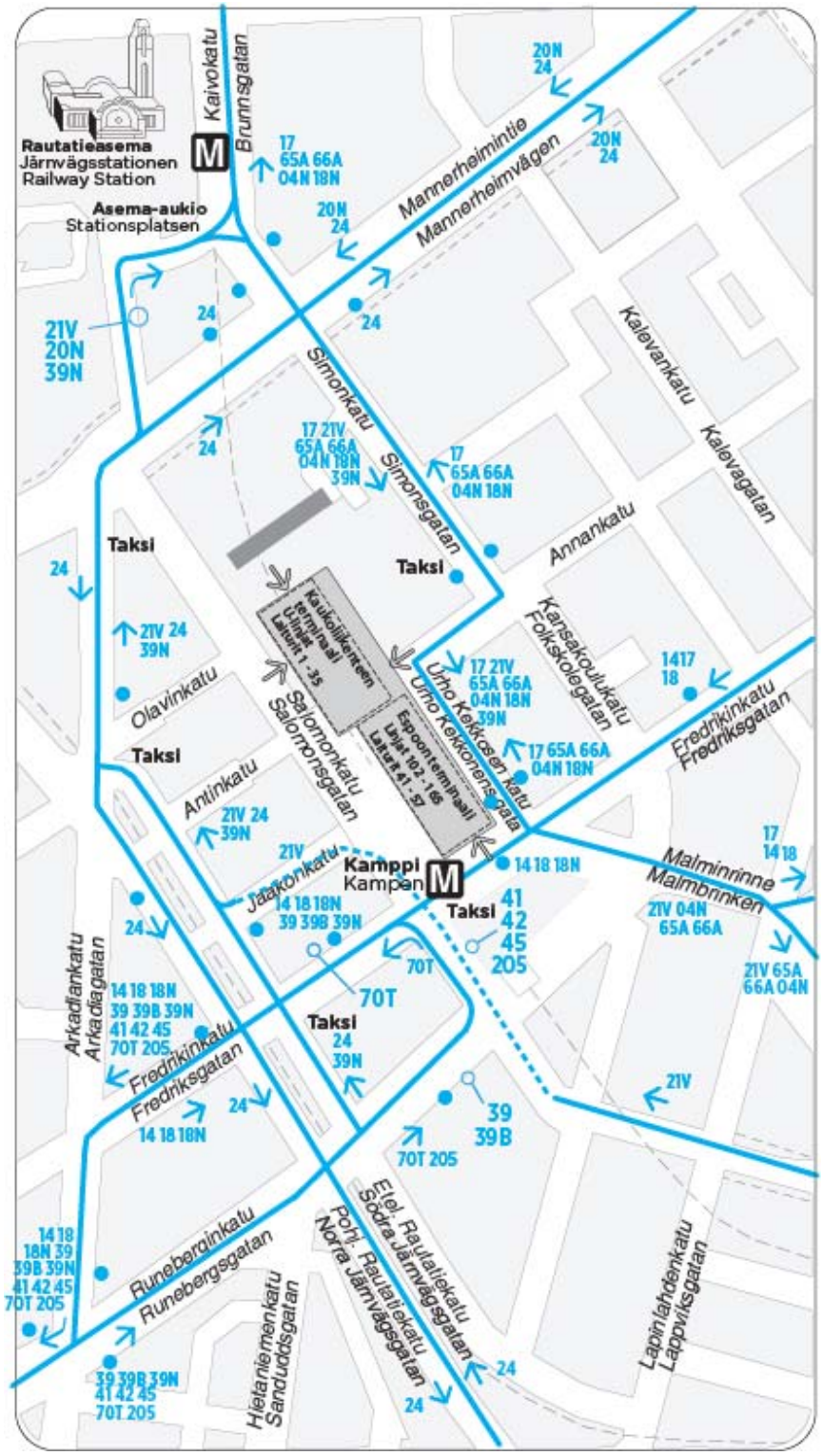


Figure 28. Kamppi interchange and bus lines near it ("Taksi" meaning taxi stands). (http://www.hsl.fi/)

- **When was the interchange opened in its current form? Have any (minor or major) re-developments taken place since the interchange first opened? If yes please state when and provide an explanation of the changes made** (increase of the city-hub itself, new organization between different modes, increase of the number of travelers, new path for travelers, etc.)

The **interchange started operation in June 2005** and the **shopping centre was opened in March 2006**.

Re-development since opening:

- Originally the terminal operated only as the final destination (or origin) for buses but these days passage from the local terminal to long-distance terminal is allowed without stopping. The purpose was to avoid congested traffic on the streets. This required changes to the operating plans (schedules) but no structural changes to the terminal.
- Slight changes have been done at the platform area to increase safety.
- Air filters have been added to the roof of the terminal area (which is an indoors space) to improve air quality. The terminal area is separated from the passengers' waiting area, but the exhaust gases were a health risk for the drivers.
- The road network outside the terminal has had major changes which affect in- and out-going transport.
- Night buses used to depart from the outside area while the terminal was closed. In the summer of 2012 the departure of local night buses was moved into the terminal, which requires a limited access route to the waiting area controlled by security guards.

Approximate share of transfer between spatial scales. % of passengers. Spatial scales may be different for each interchange, please therefore outline the basis used for your categories e.g. local is up to 10 km, regional is up to 50 km, etc., or local covers all metro travel, regional covers travel on X bus route, national covers all X rail route.

From \ To	Local	Regional	National	International
Local	75.10	*	12.9	*
Regional	*	*	*	*
National	7.4	*	4.9	*
International	*	*	*	*

*The proportion of international or regional passengers has not been distinguished from the number of long distance bus and long distance train passengers. The number is low, however. Number of buses from Kamppi to abroad is typically three per day (to St. Petersburg).

Table 23. Transfers at Kamppi interchange. (Ministry of Transport and Communications Finland (16/2007). Impact assessment of Kamppi Travel Centre)

	Walking	Local bus (within Helsinki)	Local bus	Metro	Tram	Local train	Taxi	Long distance train	Long distance bus
Walking	3,5	0,4	4,1	5,6	0,0	0,2	0,0	0,0	2,7
Local bus (within Helsinki)	0,4	0,4	2,7	3,5	0,2	0,4	0,0	0,0	1,2

Local bus	4,8	0,4	4,5	8,9	0,8	0,6	0,2	0,2	1,9
Metro	5,6	0,8	11,4	8,5	0,0	0,4	0,0	0,0	3,9
Tram	0,2	0,0	1,9	0,6	0,6	0,0	0,0	0,0	0,8
Local train	0,4	0,0	1,9	0,2	0,0	0,6	0,0	0,2	1,4
Taxi	0,0	0,0	0,0	0,2	0,0	0,0	0,2	0,0	0,6
Long distance train	0,0	0,0	0,2	0,2	0,0	0,0	0,0	0,0	0,4
Long distance bus	2,3	0,0	1,6	2,5	0,4	0,0	0,2	0,0	4,5

Local defined as: Helsinki metropolitan area (Cities of Helsinki, Espoo, Vantaa and Kauniainen, population of 1.0 million)

Regional defined as: Greater Helsinki region (total of 14 municipalities and a population of 1.3 million)

National defined as: Mainly long-distance, but including also commuters from outside the Greater Helsinki area.

International defined as: Abroad (in practice, only Helsinki – St. Petersburg bus).

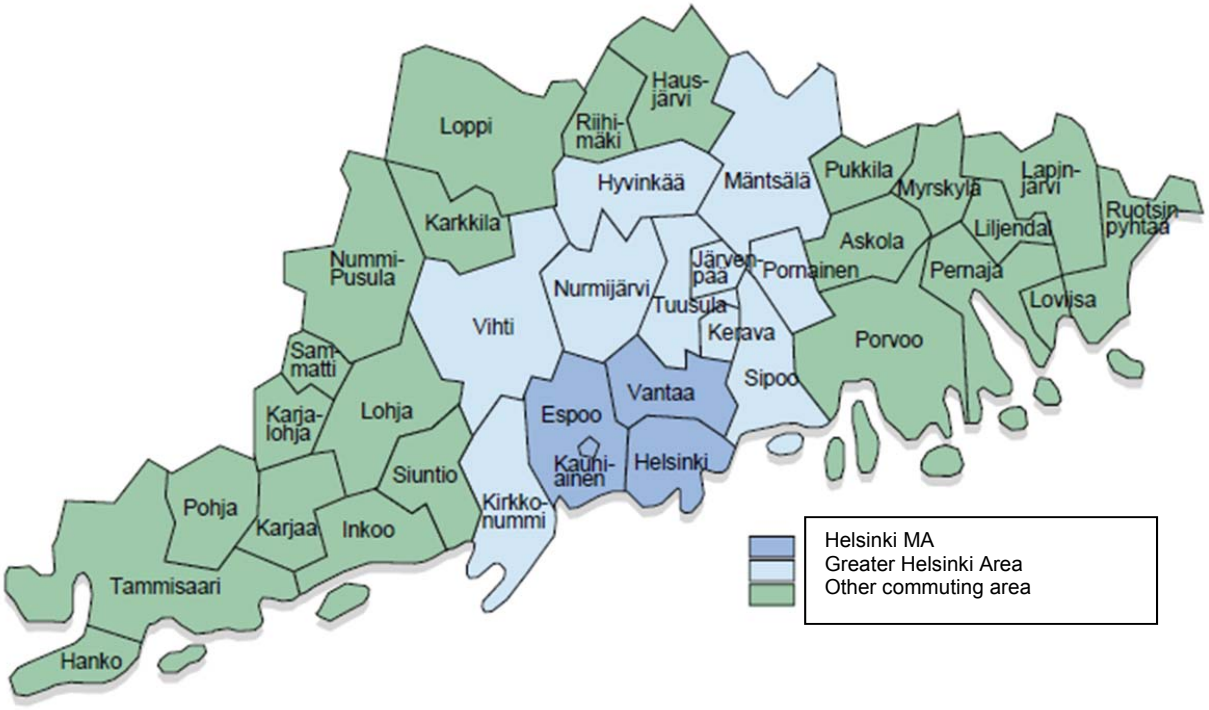


Figure 29. Helsinki commuting area. (Helsinki Regional Transport Authority 2010)

Approximate share of transfer between modes on average weekdays. % of passengers. Buses should be separated between local, regional and interurban distances. Cycling and walking can be separated if there are available data. In addition there should be another table with

approximate share of transfer between age and gender. This can be done in a separate table. If there are limited data please try to specify age[43] and gender in the sum category.

2 Management

2.1 Policy and governance

	Questions and tasks
1	**Which organisation was responsible for the design of the multimodal interchange (including any enhancement)? (please specify all who are involved: central government or one of its agencies, regional government or one of its agencies, local authority, public transport authority, rail/metro/LRT operator, bus operator, private organisation, other. If other please provide details. Please describe who was responsible for design and any re-developments which have subsequently occurred** The design was done by three architects. One architect was responsible for the design of the transport terminals, another architect was in charge of the commercial centre and apartment and office buildings, and a third architect designed the shopping centre and the public spaces outside. (http://www.srv.fi/)
2.	**Was the public consulted of the design of the interchange? If yes please describe the process applied to involve the public in the design process** No.
3.	**Which three key aspects were considered in the design of the multimodal interchange? 1. ....., 2. ..... 3. .....** **Land-use and city image:** 1. city image improvement 2. land-use efficiency 3. commercial services and competence creation for city-centre **Public transport issues:** 1 Improving the service level and image of public transportation 2 Improving transport connections and logistics 3 Improving accessibility and convenience of travel 4 keeping Public Transport Terminal in the centre 5 improving the competitiveness of PT
4.	**What are the particular challenges that are commonly faced in the design of multimodal interchanges? Please provide details.** Lack of space. The Kamppi interchange is in downtown Helsinki so the space is limited.
5	Which organization was responsible for the planning of the multimodal interchange (including any enhancement)? Professional construction consultant was responsible for the planning and

[43] Age can, if possible, be categorised in 17 years or less, 18-25, 26-40, 41-65 and 66 or more.

	construction as well as selling and renting the finished premises.
6.	What are the particular challenges that are commonly faced in the planning of multimodal interchanges? (See answer in 4.)
7.	Did the planning processes ensure that the transport hub is close to, or co-located with, important origins and destinations, such as housing, office space and employment and retail opportunities? The location of the Kamppi terminal is in downtown Helsinki and it is the same as that of the old Helsinki bus station (since 1935). Therefore, the location was obvious.
8.	Please describe how public transport is organized in the region. A short description of the community or regional structure. Is there cross functions between local, regional and national level for decisions about the interchange? Is there a body (public or public-/ private) for the schedule regulation between all the transport modes at the interchange? Helsinki Regional Transport Authority (HRT) operates beyond municipality borders and is responsible for organizing all local and some of the regional bus traffic. HRT plans the schedules and timetables and tenders out operation. Local rail traffic is organized by co-operation agreement with HRT and the national railway organization. Metro and tram are owned and operated by Helsinki City Transport.
9.	Does the interchange have or use a station travel plan? If yes, please describe briefly the content. The terminal is currently operating at nearly maximum capacity and additional traffic would be done from outside the terminal. However, a metro line extension is scheduled to be operational by the end of 2015 will bring significant changes to the bus lines that operate from the terminal.

2.2 Station operations, management and maintenance

	Questions and tasks
1.	**Which organization(s) is/are responsible for the management of the interchange (please specify all who are involved: central government or one of its agencies, regional government or one of its agencies, local authority, public transport authority, rail/metro/LRT operator, bus operator, private organisation, other. If other, please provide details.) Please describe the management structure.** Kiinteistö Oy Espoon terminaali (Real Estate Ltd. Espoo Terminal), owned by the cities of Espoo and Helsinki with an equal 50/50 share, is responsible for the management of the interchange.
2.	**What is the ownership structure of the interchange? (Public, private, joint venture**

(Public-Private), other. If other, please provide details.

Public-private partnership.

3. **Please describe the regulatory framework within which the interchange operates.**

The owners of the three terminals (western local bus, metro and long distance bus) are responsible for their own terminals.

4. Please describe the key actors and secondary stakeholders; and the relationship between the transport and retail/commercial activities. Are there any models? In what ways do partners coordinate common responsibilities, activities, maintenance, etc?

The transport terminals are operated separately from the commercial activities (the shopping centre).

5. **Is the public involved in any on-going engagement with regards to the operation of the interchange?**

No.

6. **Is there co-operation between the different operators for ensuring connectivity between modes? For example, relating to timetabling, ticketing or information etc... If yes, please describe. If no, is there a reason why not?**

The Espoo local bus terminal is operated by the Helsinki Regional Transport authority (HRT) that carefully plans the schedules for those bus lines to enable smooth traffic in and out of the terminal.

The cooperation between Regional operator (HRT) and long-distance operator (Matkahuolto) consists only common information displays.

The metro operates on a single line at frequent intervals and therefore does not require synchronization between other modes.

Tram lines operate outside the interchange and need not be scheduled specifically to fit the other modes at a single interchange.

7. **Can you describe any specific methods that were used or provide guidelines that aided the co-ordination between modes at the multimodal interchange?**

-

8. **Are there any factors that could facilitate co-operation between modes?**

-

9. What are the main issues for improving interoperability/ organisational coordination of modes? Related to for example lack of an integrated terminal management, high costs, long planning, design and financing of terminals, coordination of infrastructure management among involved stakeholders, congested or inadequate infrastructure, different regulatory structures for different modes

	-
10.	(if several actors own or manage the interchange) Are there management agreements which specify cooperation procedures? How do they function and what key learning is suggested? Responsibility and management are clearly distributed between the stakeholders.
11.	Does the interchange use feedback from customers and passengers e.g. via surveys? (If yes, please note the frequency of data collection and who is responsible for their organisation/financing.) Not interchange specific (except the one from year 2007). There are regular common surveys concerning the level of service for the whole Regional and Local Public Transport. Some special studies have been made about interchange safety and security issues. Organisation: HRT (regional operator)
12.	What are the main /most important factors that facilitate cooperation between modes?? Low number of stakeholders involved makes co-operation easy.

2.3 Safety and security

	Questions and tasks
1.	Safety can be both the design of the interchange in order to minimise the potential for accidents, conflicts and collision, as well as compliance with safety standards. Are there any examples of good and bad practices connected to these issues? What has been done to enhance safety? Doors to the bus platforms open only when the buses are about to depart. Therefore the bus terminals are very safe. At each gate in the platform, there is a monitor placed for the driver to have a good vision of activities behind the bus to improve safety.
2.	Security encompasses for example minimisation of risks, crime prevention, monitoring and crowd management. Are there any examples of good and bad practices connected to these issues? This could also include cooperation and coordination with police. The interchange itself is an indoors complex including a shopping centre. Therefore safety and security is handled very well, including video monitoring and security guards.
3.	Is the interchange considered as safe for women and vulnerable people at all times of day? (This is of course difficult to measure. We suggest that interviews can shed light about whether they receive complaints from passengers about these issues.)

Yes. Very safe.

2.4 Finance and revenue streams (revenue generation)

	Questions and tasks
1	**Who bears the financial responsibility of the interchange (maintenance, investments, local charges)? Public, private, joint venture (public-private), other. If other, please provide details.** Public Transport Terminals are the responsibility of transport operators. The commercial services are the responsibility of Kamppi business management. And the housing has their own financing and maintenance. The cities of Helsinki MA (Helsinki, Espoo, Vantaa and Kauniainen) subsidize public transport through Helsinki Regional Transport Authority by ca. 50%.
2	If public – private partnerships. Please give a short description of the model -
3.	**Is the interchange financially profitable? Yes, no? If possible, provide any (financial) reports that can be used to assess the economic performance of the interchange.** Public transport is approximately 50% subsidised in Helsinki Region. So also the interchanges are subsidised.
4.	**Impact of capital costs on the interchange profitability.** **A) What has been the financing model to fund the development of the interchange?** The construction costs were covered by selling the properties for business (shopping centre, offices and housing). **B) What was the expected payback time of the investment?** The investments were covered by the selling of the properties. **C) Who are the main financiers?** City of Helsinki was the main financier (who also sold the properties). **Is there a business model developed for the interchange? If yes, Please provide a copy (treated with confidentiality)** A company was started to manage the interchange property - Kiinteistö Oy Espoon Terminaali.

If not, how are decisions on pricing level and services determined?

-

If no business model exists, would the interchange benefit from having one? Yes, no

-

5. If possible, specify the income and costs as percentage/ ratio and give an indication about the importance of revenues from services, etc. For example how much are the subsidies, revenues from services located at the interchange income from operators arriving the interchange, etc

-

6. How is the revenue used? This should also include how revenues are pooled and redistributed?
Transport is completely separated from the shopping centre revenues. Transport operators use their revenues for their operations as they see fit.

7. Are there any incentives (rewards or punishments) in the management models? How do they function?

-

8. Please describe the determination of costs (also including which actors who cover costs)

-

2.5 Good and bad practices

Relevant questions are:

- *Do you have any good practices which are particularly important regarding policy and governance, station operations, management and maintenance, safety and security and finance and revenue streams?*
- *Do you have any lessons learned connected to these issues?*
- Please mark with x which stakeholder perspective the good or bad practice applies for

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance	cooperation in important common issues				
Station operations	common information systems				harmonized environment

Management and maintenance	Combining commercial functions with the interchange	All parties will have an interest in keeping the interchange safe, clean and pleasant for customers and travelers. (The same applies for safety and security.)	Transport operators, businesses		
Safety and security	security is very good	see above			
Finance and revenue streams	Separate financing and operating of main functions. But maintenance and security services are common.				

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance					
Station operations					
Management and maintenance	disturbance information is not comprehensive	No good practices for information distribution in ad-hoc alarms	HRT/Interchange security guard		
Safety and security					
Finance and revenue streams					

3 Interchange design

The case study should aim to provide an overview of the structure inside the interchange. The structure of the interchange can then be used to analyse aspects as travellers travel time, convenience, reliability, comfort and safety. The case studies therefore need to include map(s) with location of physical interconnections, location of shops, parking, entrances, etc. Distances and average travel time between various destination points are also needed. A map will be supplemented with a description of the structure. This section will provide an overview of the terminal which can be compared to the other terminals.

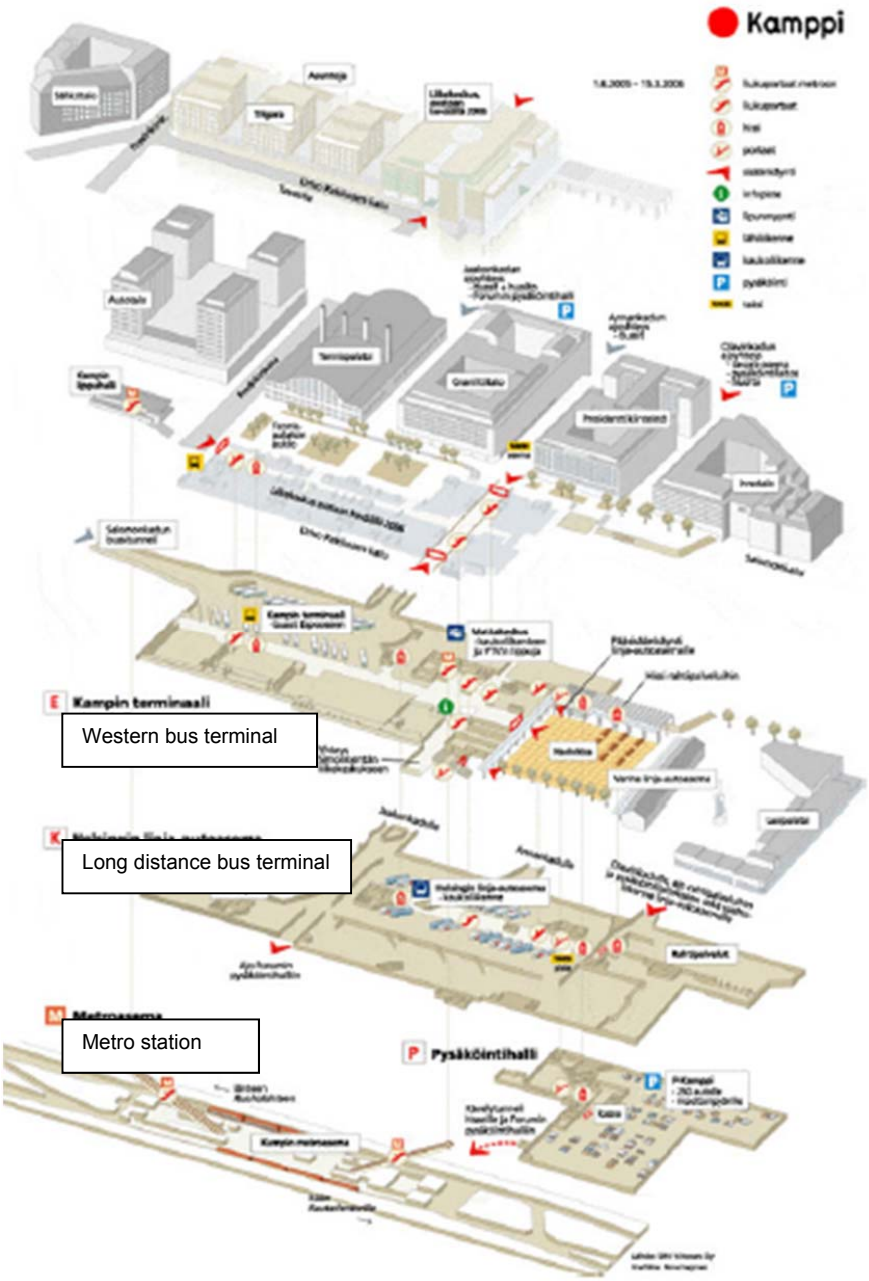


Figure 30. Kamppi terminals. (LVM 2007)

Figure 31. Kamppi, 1st floor of the shopping centre. (http://www.kamppi.fi/)

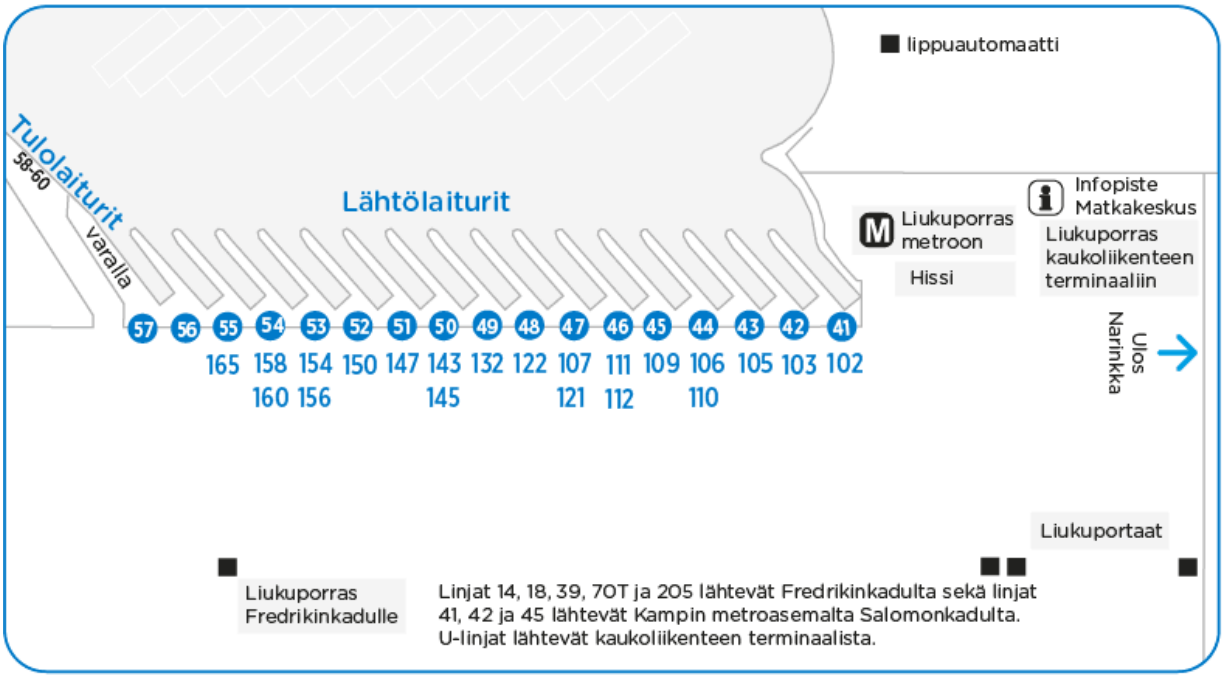


Figure 32. Espoo regional transport terminal in Kamppi. (http://www.hsl.fi/)

3.1 Sustainable interchange design

	Questions and tasks
1	**Was energy efficiency considered in the interchange design? If yes, please explain how energy efficiency was ensured in the interchange design? (E.g. energy use of the terminal, accessibility by walking and biking including bicycle parking, etc)** Having all three terminals in the same complex saves energy. The exhaust air of the warm passenger areas is used to warm up the bus platform, which does not have any heating system. This lower temperature is better for the buses than warm would be.
2.	**Was energy efficiency considered in the interchange operation? If yes, please explain how you follow the energy use and carbon footprint or CO_2-emissions of the interchange..** Cf. question 4.
3.	Please describe whether the interchange has an energy strategy to reduce its carbon footprint. A related subject can be whether the interchange management has undertaken any analysis of the energy efficiency and carbon footprint of the solutions (or general energy use from the interchange). -
4.	What measures have been implemented to promote a sustainable interchange? Please provide examples (e.g. Use of natural light to reduce the need for artificial lighting, insulation, on-site sustainable energy, recyclable waste or (use of recyclable) materials, green areas Artificial light is used and controlled to be energy efficient.
5.	Does the interchange analyse its impact on air quality? Is air pollution a problem for travellers at the interchange? Has the interchange implemented any measures to improve air quality (e.g. monitoring, ventilation systems, instructions to switch off engines while waiting)? The air quality is monitored and ventilation is controlled. The idling of buses is regulated.
6.	Is it possible to estimate percentage of alternative energies used? All energy comes from an energy company owned by the city of Helsinki (Helsingin Energia) that has a green strategy and uses alternative energies.

3.2 Travel time and space

	Questions and tasks

2. Average transfer and waiting time and distances between modes (for example transfer and waiting time and distance from bus to rail, average transfer time from car to public transport)

Waiting time

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train							
Metro			5	7			
Tram		3	5	7			
Bus		3	5	7			
Car		3	5	7			
Cycling		3	5	7			
Walking		3	5	7			

Transfer time

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train							
Metro			4	3	4	4	4
Tram		4	0	3	4	0	0
Bus		3	3	0-3	3	2	2
Car		4	4	3		4	4
Cycling		4	0	2	2		
Walking		4	0	2	4		

Distance (meters)

	Train	Metro	Tram	Bus	Car	Cycling	Walking
Train							
Metro			300	200	300	300	300
Tram		300	0	200	300	0	0
Bus		200	200	0-200	200	150	150
Car		300	300	200		300	300
Cycling		300	0	150	300		
Walking		300	0	150	300		

2. Location of ticket offices or machines. Is there sufficient capacity? Are they well located?

During day time the ticket machines are sufficient. Tickets can be bought or/and validated when entering a bus. In night time, however, the tickets must be validated when entering the interchange and the number of devices is not sufficient to avoid queues from forming.

3. Is there appropriate space, which is not overcrowded?

From the transport operator's point of view, the terminal is not too crowded even at rush hour. There is sufficient room in front of all the departure gates and the frequency of the buses keeps waiting times short.

4. Are there direct uninterrupted and logical paths within the interchange (logical passenger movement)?

Yes.

5.	Do the facilities meet current and future passenger demands? Yes.
6.	Is the interchange an enjoyable place? (For example does it include art or greenery)) The interchange has little art or greenery present but the overall environment is clean and safe. Outside the interchange some greenery can be found.
7.	Is their protection against weather and noise for travellers? Yes. Kamppi is an indoors interchange. The buses are separated from the waiting area by glass walls and doors that only open when the buses are about to depart.

3.3 Facilities, service and retail

	Questions and tasks
1.	What kinds of retail are offered (shops, cafés)? A total of 170 businesses operate in the Kamppi shopping centre (5/2013). - Stores: 106 - Restaurants and cafés: 35 - Services: 29 (e.g. beauty salons, gym, banks, laundry)
2.	Indicate the number of m^2 of commercial centers or retail commerce's inside and/or around the City-Hub. Please try to classify the shops into categories. For instance personal service (hairdresser, dry cleaning), grocery, clothing, kiosk and eatiers. Please provide some information about average time for opening. Gross lettable area in the Kamppi shopping centre is 43 000 m^2. (http://www.kamppi.fi)
3.	Please describe the quality of the shops/restaurants? This is of course difficult to judge. One possibility is to map whether there are high street brands present. The main idea is to get some form of information about the interchange is primarily consisting of low, medium or high quality shops. The quality of most of the shops and restaurants could be described as "regular" or "common". There are little to no luxury brands present.
4.	Does the interchange have a policy for attracting services? Are there any joint promotions? The interchange is situated in the ground floors of a shopping centre
5.	What services are regarded as important to attract to the interchange?

	-
6.	Please assess or describe the quality of customer service. Who is responsible for this and how is it paid for? Are there special services for impaired persons? Normal quality. No extra services for impaired persons (the whole terminal is accessible for mobility impaired).
7.	Does the interchange offer passenger waiting rooms or only open concourse facilities? Is there sufficient capacity? Is there specific lounge for fidelity programs for travelers doing a lot of trips? Is toilet free or payed for? Prayer rooms? Opening hours for toilets and waiting rooms? The interchange does not have waiting rooms. The departure frequencies are high enough so that a few benches in front of each gate are sufficient.
8.	Is there Wi-Fi access at the interchange? Is it free? Yes – free Wi-Fi is available.

3.4 Impacts on local economy

	Questions and tasks
1.	**What has the employment impact of the interchange been?** **A) Direct employment effects (staff needed to operate and maintain the interchange)** No changes compared to the old PT terminal **B) Indirect employment effects (supporting services created in the interchange)** - **C) Impact on the surrounding areas (new services generated in the proximity of the interchange (estimate, if no data available)?** Totally new commercial centre has of course created new employment.
2.	**If possible please provide an estimate of the typical cost of housing and retail units at interchange, and in close proximity to the interchange.** The Kamppi interchange/shopping centre has apartments in the top floors. The price of housing is likely to be higher than average in the same area (Figure 33) since the building is a new one (built in 2006).

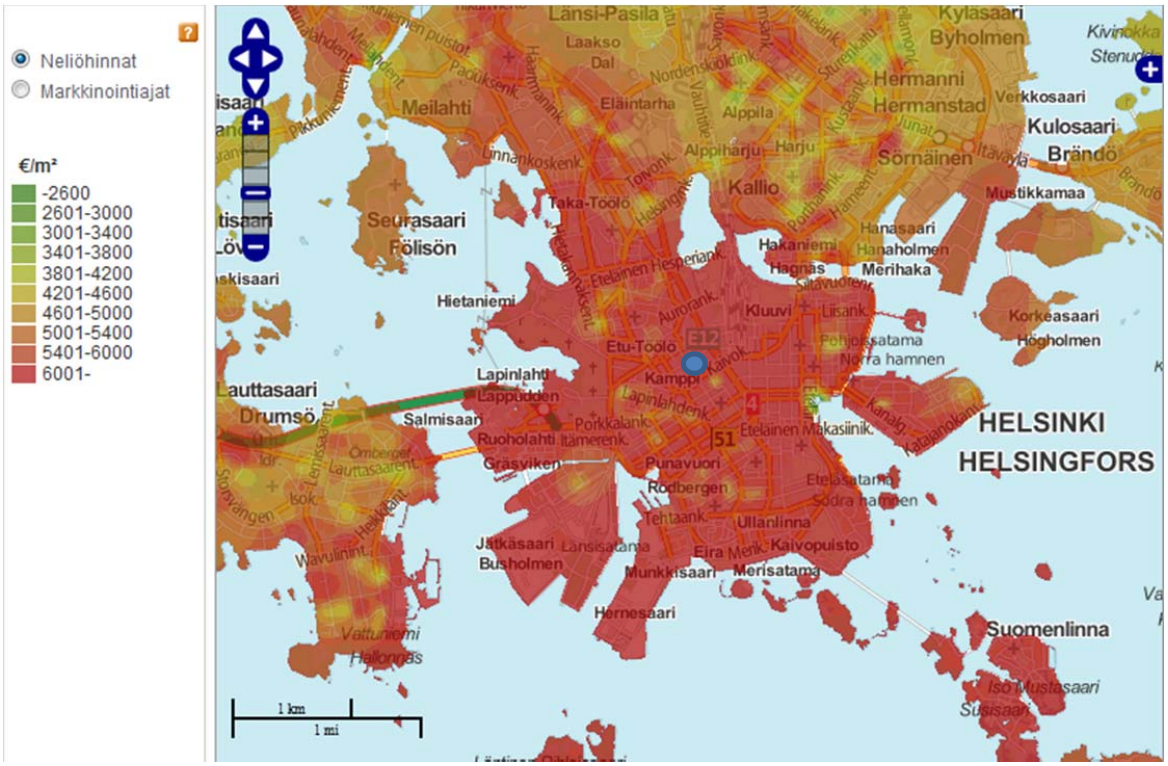


Figure 33. Apartment prices in downtown Helsinki 4/2013. (http://etuovi.com)

3. **Have there been any changes in the amount of new start-up businesses close to the interchange?** (The time frame is important. The interchanges vary in terms of location and history. The responsible case study partner should therefore themselves decide the time frame for evaluation of effects.)

Since the location is very central, the interchange has had little to do with the amount of start-up businesses nearby.

Have there been any changes connected to housing in close vicinity to interchange?

Since the location is very central, the interchange has had little to do with housing nearby (except for the addition of the new apartments in the top floors of the interchange).

Has any new housing been developed in/or near to the interchange? If possible please provide the area (in m²) and the type of housing.

The top floors of the interchange/shopping centre have 6 000 m² of private apartments.

Please give an indication of the area (in m2) of commercial centres or retail in/or near to the interchange.

Gross lettable area in the Kamppi shopping centre is 43 000 m².

Since it is located in downtown Helsinki, there are plenty of stores nearby.

Have any new offices been developed in/or near to the interchange? If possible please provide the area (in m²) and the type of offices (e.g. headquarters, international or national offices).

Since the location was very central beforehand, the interchange has had little to do with office locations except for the addition of those in the building.

3.5 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the interchange has solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? **Please mark with x which stakeholder perspective the good or bad practice applies for.**

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	high quality design	see motives in chapter 2 (question 3)			
Travel time and space					
Facilities, service and retail	good selection	commercial centre			
Impacts on local economy	good (but from commercial side, not in PT)	new commercial centre			
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	No alternative trafficking plans and information delivery	In case of incidents, the access for emergency vehicles should be guaranteed, organizing the transport nearby should be possible, and information about the incident should be provided quickly	x		
Travel time and space	Separate from railway station	The distance between the interchange and the railway station is 500 metres. Metro connection is available, however.	x		
Facilities, service and retail					
Impacts on					

local economy					
Other issues					

4 Accessibility

4.1 Accessibility for walking and cycling

Provide a description of:

For walking:

	Questions and tasks
1	Please give a description of accessibility for walking to the interchange. This could include whether there are safe crossing, tunnels or bridges for better accessibility. The accessibility is good. There is little traffic near the interchange. The buses using the interchange enter and exit through tunnels.

For cycling:

	Questions and tasks
1	Please provide a description of accessibility for cycling. This could include a description of cycle parking (what kinds, location to interchange, number, are they commonly used, secure, paid, weather proof?), does the interchange offer bike sharing facilities or cycle repair, and is it possible to carry cycle on train/carriage? A bicycle centre is located right next to the interchange. It provides rental bikes (during summer), maintenance and repairs as well as a bike park monitored by cameras.
2	If possible give a an indications of the accessibility for cycling to interchange, cycle paths, etc Bicycle paths lead to the interchange from all directions.

4.2 Accessibility for public transport

	Questions and tasks
1	Provide a description of whether there is efficient and unobstructed movement Public transport lanes provided. Access by car is limited in the nearby street network.
2	Provide a description of the embarkation area - How close is the public transport to the main concourse o Immediate proximity. - Is it all enclosed – protected from the weather or do people have to go outside o Yes – except for trams and taxies, which are located outside the interchange. - Does it have natural or artificial lighting (majority) o Artificial.

3	Public transport service to the interchange (e.g. number of departures, accessibility, how many lines in each mode does it connect, number of bus routes, number of metro lines, number of tramway lines included into the interchange) Metro lines: 1 (there are no more in Helsinki) Tram lines: 1 (right outside, 11 more lines are available a few hundred meters away) Bus lines: 21 local main lines, 24 regional lines, extra night traffic
4	**How many rail routes, bus routes, metro lines, and tramway lines use the interchange?** Cf. question 3.
5	**What are the average frequencies for public transport arriving and departing at the terminal?** In the local terminal, at rush hour, approximately 100 buses depart per hour. Daily amount is 1 000. The number of national and regional buses is lower. Metro frequency is 3-5 minutes during rush hour and 10 minutes other times.
6	Is public transport generally on time or is there a problem with delays causing difficulties transferring between modes (punctuality) The interchange is the first/last stop for buses. Therefore, departure times are very punctual.

4.3 Accessibility for car and taxi

	Questions and tasks
1	Car parking (park/kiss and ride), location to interchange, number, regulation, price, are they commonly used? There are 250+500 parking places available for cars. The parking garage exits are located in and near the interchange. The cost of parking is similar to elsewhere downtown Helsinki. For example, from Monday to Saturday between 8-18, the cost is 5.60 € an hour, evening 2 €, night time and Sundays 1 €.
2	Is the parking an integral part of the interchange or under different management? Under different management: EURO PARK
3	Provide a description of possibilities for taxi Taxi stands are located outside the interchange.

4	If relevant, how is the accessibility for arriving with car to interchange Easiest to park in to the parking hall (normal elevators). Kiss&Ride (dropping people to the interchange) is difficult, no special places for that.
5	Does the interchange propose rent a car services or car sharing? No.

4.4 Access for all

	Questions and tasks
1	Provide a description of what measures have been undertaken in at the interchange to secure accessibility for travelers with reduced mobility. Are you working with associations for impaired people? What do they ask for specific arrangements? What are they? The interchange has tactile features on the floors to guide visually impaired travellers to the gates. All the floors are accessible by elevators. In 2005, the Kamppi site received a "Well done diploma" for taking the safe and independent mobility of the visually impaired into consideration from the beginning of the planning. The diploma was given by the Helsinki and Uusimaa Association for Visually Impaired, which is the blind and partially sighted people's own organisation.
2	Are there any obvious barriers for people with reduced mobility? No.
3	Is it possible to highlight any good or bad practices when it comes to accessibility for elderly, people with disabilities and people with buggies or luggage? (level access and possibilities for lifts/escalators). Interviews can shed light about whether they for instance receive complaints.

4.5 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the interchange has solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? Please mark with a x which stakeholder perspective the good or bad practice applies for.

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller

Walking	easily accessed				
Cycling	easily accessed				
Public transport	easily accessed				
Car	to the car park				
Taxi	ok				
Access for all	yes				
Other issues					

Topic	**Bad practices**	**Explanations**	**Relevant stakeholder/perspective**		
			Owner/operator	Government	User/traveller
Walking					
Cycling					
Public transport					
Car					
Taxi					
Access for all					
Other issues					

5 Passenger services

5.1 Journey planning and real time information

Table 5 provides the main questions which need to be addressed.

Are you satisfied with the information and intelligent systems in the interchange? If not, how would you improve the quality, content or provided systems and services?

Please tick a) the ones currently in use and b) what you think would be essential to implement.

In use	Needed	Intelligent System or Service in the Interchange Area
■	□	Journey planner for local public transport for pre-trip planning
■	□	Journey planner for long-distance public transport for pre-trip planning
■	□	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
■	□	Smart ticketing [speeds up transfer]
■	□	Electric departure time displays based on *timetables* (for multiple stops)
■	□	Electric departure time displays based on *timetables* (at stops)
□	□	Electric departure time displays based on *real-time information* (for multiple stops, incl. fleet monitoring systems)
□	□	Electric departure time displays based on *real-time information* (at stops)
□	□	Departure times via audio calls
□	■	Real-time disturbance information provided via *displays*
□	■	Real-time disturbance information provided via *audio calls*
□	□	Multi-language information
■	□	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
■	□	Information centre with personal service
□	■	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)
■	□	Guidance and warning surfaces for the visually impaired
□	□	Tactile maps of the interchange for the visually impaired
□	□	Information with hearing aids (e.g. “T-coil”)
□	□	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
□	□	Intelligent Indoor-Navigation System
□	□	Intelligent security systems (e.g. CCTV)
■	□	Area or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.
■	□	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

	Questions and tasks

1	Please provide a description of the information to passengers. (Information on concourse of all modes, real time or timetable only, public announcement, etc) Timetable information is available on general displays as well as for individual displays for each gate.
2	Please describe the dialogue between information systems between various operators. For travellers it's important that information is integrated on screens as well as mobile. Related aspects could be whether signing and information is coordinated and whether the information meets the needs of all passengers and all modes. The different transport operators share the same information screens.
3	Has the interchange any strategy for securing that signing is balanced compared to service and advertisement? The transport signs and displays have a distinct visual design and they are separated from advertisements.

5.2 Fares and ticketing

	Questions and tasks
1	Please describe the ticket purchasing systems and explain if public transport has integrated ticketing between modes? Are there separate tariffs for different modes? The ticket system has been integrated for local and some regional transport in buses, trams, metro and trains. Long distance buses use different fares (unless used to travel only within the Helsinki metropolitan area). Currently the ticket prices vary when crossing municipality borders. The tickets are valid for 60 minutes (for one municipality) or 80 minutes (for more municipalities). In a few years the fare policy will change and no longer follow the municipality borders.
2	Is electronic ticketing available? Travel cards are used for Helsinki local transport. Paying for the trip with the travel card is cheaper than by using cash. Mobile tickets are available for metro and some bus lines connecting to the metro.
3	If no, are there plans for allowing electronic ticketing? -
4	What are the main barriers for integrated ticketing? (political, technical…) Main barriers for even wider integration than currently are agreements on financial distribution among municipalities.
5	Are there any factors specifically important for facilitating integrated ticketing?

-

5.3 Good and bad practices

We need a description and an evaluation of why the interchange has a solution which is or is not recommended. Moreover, it is of value if there are any planned strategies to improve facilities at the interchange. We also need a description and an evaluation of why the interchange has solutions which are or are not recommended. Can the current practices be linked to any factor hindering or facilitating good/bad practices from chapter 2? Please mark with a x which stakeholder perspective the good or bad practice applies for.

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Reliable and clear information	Easily accessible timetable and route information makes the use of public transport easier and more appealing. Therefore, it can affect the mode choice of people.	x	x	x
Fares and ticketing	Electronic ticketing	Easy payment/validation of trips saves time and effort (e.g. no need to carry change for the ticket).	x		x
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information					
Fares and ticketing					
Other issues					

6 Analysis of good and bad practices

This part should have some evaluation of the interchange which takes into consideration both good and bad practices. A critical approach is desirable. The template can hardly cover all aspects which might be relevant. This section could include aspects which is not covered or aspects which needs to be explained in more detail

The responsible case study partner needs to conduct an independent analysis of good and bad practices. The analysis can be supplemented which the questions below.

Why is this interchange considered successful? (Please tick all that apply.)

■ **Ownership/ management structure**
■ **Availability of interchange space**
■ **Quality of waiting areas**
■ **Range of retail establishments**
■ **Security and safety**
□ **Facilities for the mobility impaired**
■ **Quality of journey planning and real time information**
■ **Integrated ticketing arrangements**
■ **Transfer quality among modes**
□ **Other**

If other, please provide details.

Please explain in more detail why this interchange is considered successful?

Can you provide any other examples of successful multimodal interchanges?

□ **Yes**
■ **No**

If yes, please provide details of the location, a brief description (e.g. modes of transport available) and explain in what ways the interchange is successful; any specific factors, e.g. information systems, accessibility, energy efficient design/operation.

6.1 Good practices

		Explanation – why is it a good practice?
Topic	**Practice**	**Explanation**

Policy and governance	efficiency in landuse	everything carefully planned, no extra space
	central situation	public transport competitiveness and attraction better
	combination of PT interchange and commercial centre	many good impacts for both
Station operations	separate organisations but cooperation	separate organisations (for PT, for business area, for housing) but cooperation in many common functions: parking, cleaning, waste management, security etc.
Management and maintenance	common maintenance functions	cooperation in many common functions: parking, cleaning, waste management, security etc.
Safety and security	Transport terminals and commercial areas in one	Businesses have an interest in keeping the terminal area clean, safe and enjoyable.
Finance and revenue streams		
Interchange design	High quality as a goal	The Kamppi interchange was built with the idea that “it’s like being at an airport”, meaning that the effectiveness, safety and ability to utilize the waiting time were important aspects.
Accessibility		

Passenger services		

6.2 Bad practices

		Explanation – why is it a bad practice?
Topic	**Practice**	**Explanation**
Policy and governance		
Station operations		
Management and maintenance		
Safety and security		
Finance and revenue streams		
Interchange design		

Accessibility		
Passenger services		

6.3 Important factors facilitating or hindering good practice

The earlier parts of this template had particular emphasis on identifying good and bad practices and explain why it is a good or bad practice. Another part is to identify what factors can explain why an interchange has (not) managed to implement these practices. This is important for providing the first input to the City-HUB model.

Aspects	Factors facilitating or hindering good practice
Policy and governance	
Station operations	
Management and maintenance	
Safety and security	
Finance and revenue streams	
Interchange design	
Accessibility	
Passenger services	

6.4 Main recommendations

Annex F: Pilot case study report Kőbánya-Kispest

EUROPEAN COMMISSION
SEVENTH FRAMEWORK COOPERATION WORK PROGRAMME

Innovative design and operation of new or upgraded efficient urban transport interchanges

THEME [SST.2012.3.1-2.]

Collaborative project
Grant agreement no: 314262

Project full title: "**City-Hub**"
Project acronym: **City-HUB**

City-HUB Project

WP2 – Task 2.4

Data collection template for pilot case studies
Kőbánya-Kispest; Budapest; Hungary

Contents

1 Background

The interchange at Kőbánya-Kispest was created as part of the construction of the southern sector of Metro line M3, between 1978-1980 (Fig. 1). Originally, the metro terminal had been planned at Határ út (1 station west of Kőbánya-Kispest), but for the train yard the rails had to be extended anyway, so it was decided that the line would be extended to Kőbánya-Kispest. Thanks to this decision, an interchange could be established between the metro and mainline railways (lines 100 and 142) at Kőbánya–Kispest which was until then a minor railway station. The interchange included a bus terminal for local and regional buses as well as the airport bus. The connection between the railway station and the metro was facilitated through a new overpass. The parking lot was placed in the northwestern part of the complex, too far from the footbridge to the metro and the railway. Later, opening a new entrance solved this problem. At that time, the interchange was modern and architecturally valuable with its orange panels and octagonal windows. The range of the facilities for passengers, however, was poor at the interchange. There were only a few fast-food stalls and grocery stores. The level of the service was the same at the bus terminal.

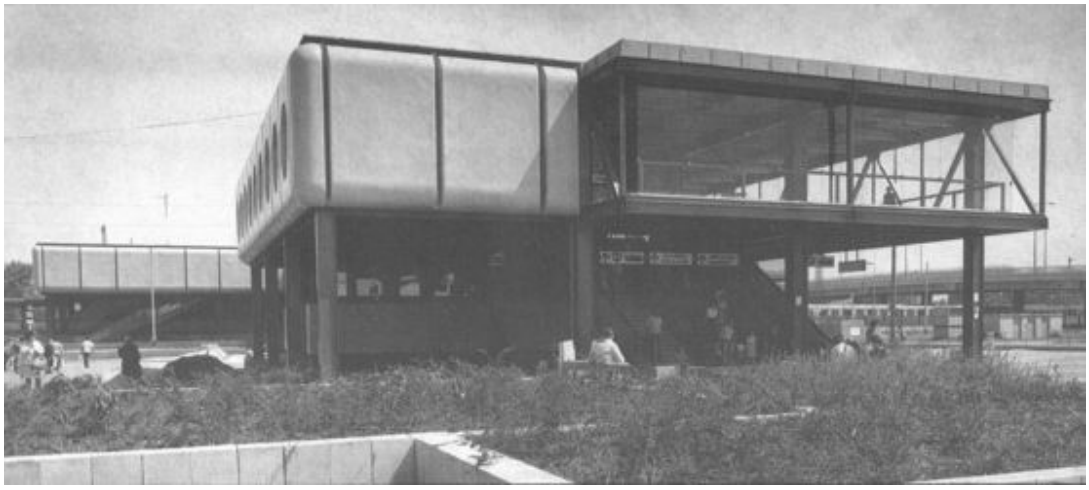


Fig. 1: The terminal at the opening, in 1980

In 1989-1990 came the fall of the communist system, which gave rise to private enterprise. It was quite apparent in the retail sector manifested by the appearance of multitude of small outlets selling anything from newspapers to fast food. This made a huge impact on the overall picture of the interchange as well: the new retail units were usually liquor shops or low level services. The appearance of new shops in the passageway caused another problem; the disappearance of the natural light as most of the passageway was subdivided and occupied by small shops covering up the window surfaces on the sides. By the millennium, passengers had to transfer through the dark, narrow and unpleasant passageways day by day. In the meantime, the condition of the once modern interchange deteriorated continuously which was also noticeable by the state of the buildings and structures (Fig. 2 and Fig. 3).

Fig. 2: Aerial view of the terminal before the refurbishment (source: http://www.globalplaza.hu/hir/oktober-14-en-nyit-a-koki-terminal)

Fig. 3: The condition of the terminal, before the refurbishment, in the 2000's

The next milestone was the second part of the 2000s, when the local district council decided to refurbish the area around intermodal centre. The plans contained the refurbishment of the metro terminal, the bus terminal and the Park and Ride and a brand new shopping mall. The construction begun in 2008, and three years later the new, modern intermodal centre was delivered. The cost of construction was approx. 40 million HUF (approx. 130 million €). The reconstruction did not include the refurbishment of the railway station though, which was last rebuilt in 1980. Today, the intermodal complex provides the possibility for interchange between rail, metro, buses, bicycles and cars for approx. 80.000 passengers a day (Fig. 4). The frefurbishment of the railway station is being planned with new lifts, passenger information system and renewed escalators and platforms.

Fig. 4: The terminal after the refurbishment in 2011

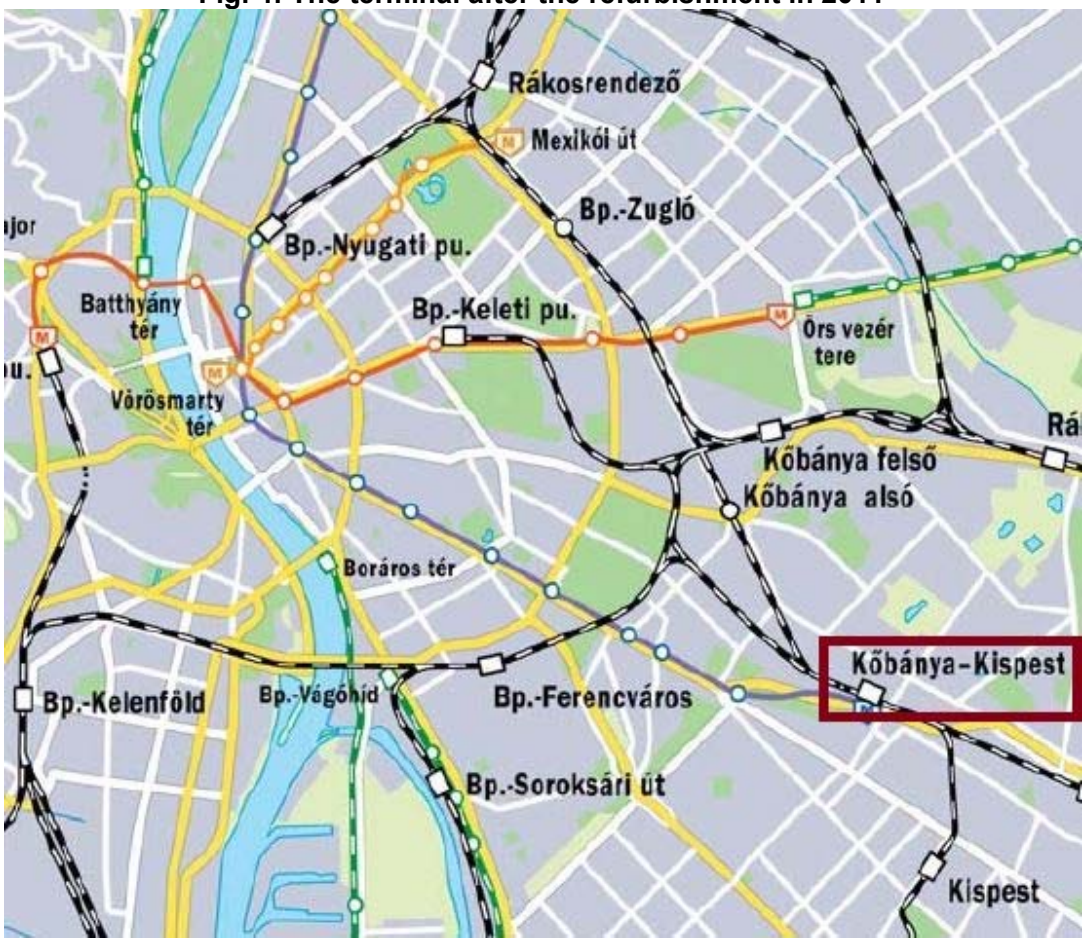


Fig. 5: Location of Kőbánya-Kispest in Budapest (source: Vasúttal Budapest környékén, Magyar Közlekedési Klub, 2009)

There are several possibilities for the interchange between the transport modes in the intermodal centre, such as railway, metro, local and regional buses, as well as walking, cycling and cars.

Kőbánya-Kispest is the terminal of metro line M3, which is one of the backbones of public transport in Budapest connecting the northeast and southeast of the city via the city centre. It has a nominal capacity of 28.200 passengers/hour/direction and approx. 630,000 passengers a day. The highest frequency is 2.5 minutes in peak hours.
Kőbánya-Kispest is a major railway station on railway lines No. 100 (Budapest – Cegléd – Szolnok – Debrecen – Záhony; suburban, regional, intercity and international services) and No. 142 (Budapest – Lajosmizse; suburban services only). Most trains do not terminate at Kőbánya-Kispest but in Budapest-Nyugati, a major railway station in the city centre.
Local bus connections are provided by BKV, the local transport provider in Budapest from the new bus terminal under the shopping mall. Three suburban lines to the eastern suburbs also terminate at the bus terminal operated by the regional operator Volánbusz. Terminal 2 of Liszt Ferenc International Airport is linked to the terminal by an express bus (200E) with 140 departures per day to the airport; the travel time is about 30 minutes.
Although all types of connections are available, the interchange handles primarily local and suburban traffic.
Four parking lots are available: two park and ride facilities – one covered and one open air –; a three-storey parking garage at the mall and an open-air parking lot at the local hardware store (OBI). A kiss 'n' ride zone is not dedicated. A B+R is implemented for cyclists.
The interchange divides two areas that are very different in character. North of the railway tracks the area is a mixture of industrial sites with a large number of abandoned factory buildings and a large, densely built high-rise housing estate (Újhegy) with prefabricated concrete buildings built in the 1970s (Fig. 6). South of the terminal, there is another large housing estate (Kispesti lakótelep) and detached houses (Fig. 7).

Fig. 6: Újhegy housing estate north of the intermodal terminal
(Source: http://ujhegyert.blog.hu/2010/08/08/egy_biztonsagosabb_ujhegyert**)**

Fig. 7: Detached houses in Kispest
(Source: Google Street View)

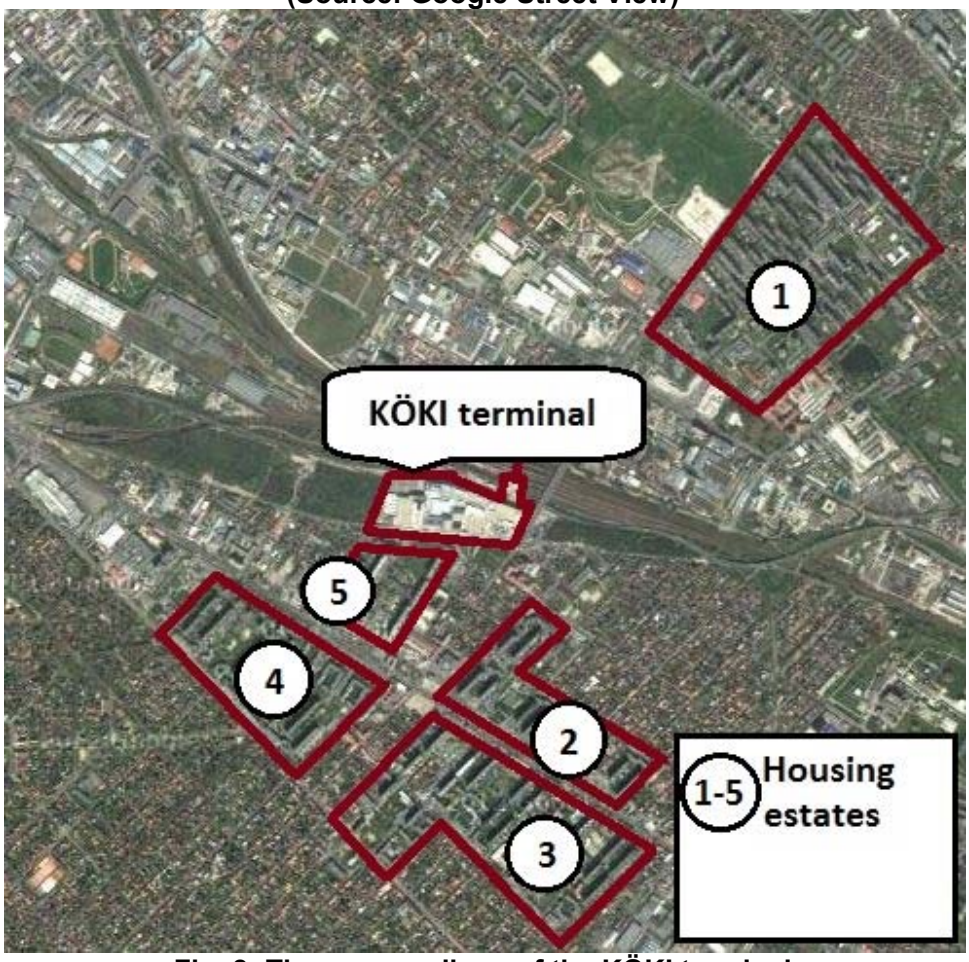


Fig. 8: The surroundings of the KÖKI terminal

In 2011, the terminal was fundamentally renewed, intermodality was strengthened, and its functions were extended with a wide range of shopping and services. Pedestrian routes between

modes were extended by building a new footbridge connecting the metro terminal, the bus terminal and the shopping mall. The existing footbridge was also refurbished. The bus terminal was relocated to be closer to the metro station. Pedestrian routes were simplified and all transfer facilities were covered. Significant improvements to accessibility were made by providing new lifts and escalators, step-free access and tactile surfaces. Passenger information was also renewed.
There is no accurate information available about the number of passengers at the terminal. The number of b

oardings for all transport modes is approx. 155,000. As most of the travellers are transfer passengers it is estimated that about 80,000 people use the terminal daily. The number of visitors to the shopping mall is about 40,000/day on weekdays and 30,000/day on weekends.

Mode	**Number of boarding and alighting passengers/day**	**Source of data**
Metro (BKV)	67,967	passenger count 2012
Trains (MÁV-Start)	9,866	passenger count, 2007
Buses (BKV)	74,650	passenger count 2012
Suburban buses (Volánbusz)	3,141	passenger count, 2007
P+R	400	Strategic plan for the development of the parking system in Budapest, 2008

There is no data available on the share of transfer between modes. It is estimated that at least 80% of all passengers using the terminal transfer between the metro and buses. Most train passengers transfer from the train to the metro. As the number of Park and Ride places is limited (206 at the moment, which will be expanded to 536 soon), transfers from car to metro/train are limited (approx. 200 passengers/day at the moment).
Transfers between the different spatial scales (in %; all values are estimated):

From \ To	Local	Regional	National	International
Local	88	7	3	0
Regional	7	0	0	0
National	3	0	0	0
International	0	0	0	0

Local defined as: Up to the boundary of the municipality of Budapest

Regional defined as: Up to approx 50 kms from Budapest

National defined as: More than 50 kms from Budapest

International defined as: Services to Romania

The age and gender distribution of transfer passengers cannot be determined due to lack of data.

2 Management

2.1 Policy and governance

1. In its original form, the municipality of Budapest and its transport company (BKV) was responsible for the design and construction of the intermodal terminal between 1978-1980. The design for the refurbishment was commissioned by R-CO Real Estate Development Ltd., the developer and made by MÜÉP, a private architectural firm.
2. The public was consulted during the development of the zoning plan as required by the laws. Several public hearings were organised as initially there was public opposition against the shopping mall based on fears of increasing traffic and noise and decreasing green areas.
3. 1.Short, clear and unobstructed pedestrian pathways. Originally, the bus terminal was perpendicular to the metro and railway tracks, which increased transfer distance and time. After the refurbishment the new bus terminal is parallel to the metro station and it is closer as well.
   2. Functional transformation of the urban realm from a pure transport interchange into an attractive urban area
   3. Creation of commercial areas large enough to make the whole investment profitable.
4. Public opposition due to fears of increased traffic and pollution.
5. Before the refurbishment a new zoning plan had to be prepared. It was a joint effort between the private developer (R-CO Real Estate Development Ltd.), the municipality of Budapest, the operator BKV and the municipality of District 19.
6.

- Finding the source of financing
- Coordination of planning and design
- Large number of stakeholders in the planning process
- Slow decision making (municipality, authorities)
- Opposition from the residents
- Unrealistic technical requirements

7. Yes. It is close to three large high-rise housing estates, and when it was built some large factories were also situated in the vicinity (most of them closed down after 1990).
8. BKK (Centre for Budapest Transport) acts as the contracting authority within the municipality of Budapest. It was founded in 2010. The organization is based on the Transport for London model. It is an intermediate body between the Municipality of Budapest and transport operators. BKK is responsible for strategy building, implementation, contracting of services, timetables as well as the sale of tickets and passes. Most local public transport services (buses, trams, metros, suburban railways [HÉV], trolleybuses, boats) within Budapest are operated by BKV Zrt. (Budapest Transport Company), which is also owned by the Municipality of Budapest. In recent years some smaller subcontractors for bus services have also been employed, initially by BKV Zrt. and today by BKK.
Public transport services outside of Budapest (including services originating from Budapest) are contracted by the Ministry of National Development. Railway services are provided by the state-owned MÁV-Start Zrt. (Railway Passenger Transport Company) on the network of MÁV Zrt. (Hungarian National Railways), which is the manager of the rail infrastructure including tracks and stations. Regional (including suburban) buses are operated by the state-owned Volánbusz Zrt.
The integration of the services has a relatively low level; however local passes are accepted on all services (railway and regional buses) within Budapest. The integration of fares and ticketing is in progress.

9. No

2.2 Station operations, management and maintenance

Organisation	Type	Task
R-CO Zrt.	Private	Owner and developer of shopping mall; Owner and operator of new pedestrian bridge to the metro station.
KÖKI TERMINAL CENTER MENEDZSMENT	Private	Daily operation and management of the shopping mall.
BKV Zrt. (Budapest Transport Company)	Public, owned by the municipality of Budapest	Operator of the metro and local buses; Owner of the pedestrian overpass to the train station and the metro terminal; Owner and operator of escalators to the platforms of the railway station. Owner and operator of the bus terminal based on an agreement with R-CO (use free of charge); Operator of the metro terminal. Owner of all buildings connected to the metro terminal and the railway station
Municipality of Budapest	Public	Owner of the metro station; Manager of roads around the metro terminal.
BKK (Centre for Budapest Transport)	Public, owned by the municipality of Budapest	Operator of the BKK ticket offices; Operator of the P+R (open and and covered); Operator of BKK ticket vending machines.
Volánbusz Zrt.	Public, owned by the State	Operator of regional bus services from two bus stops; bus stops are used based on an agreement with BKV; Operator of the Volánbusz ticket office rented from MÁV-Start Zrt.
MÁV Zrt. (Hungarian State Railways)	Public, owned by the State	Operator of railway infrastructure including

		platforms, but not the pedestrian overpass; Operator of the railway waiting room.
MÁV-Start Zrt. (Rail passenger transport company)	Public, owned by the State	Operator of the railway ticket office; Operator of trains.

There is no integrated management at the terminal which causes many problems. The responsibilities of maintenance and cleaning are different for the different parts of the interchange. The cleaning and maintenance of the bus terminal and the shopping mall are handled by different companies.

2. The ownership structure is mixed and complicated. The shopping mall and the new passenger bridge is owned by the developer (R-CO), while the one of the connecting passenger bridges and metro platform areas by BKV; the railway platforms by MÁV Zrt.

3. There is no specific regulatory framework concerning the operation of the interchange. As a transport hub all operations need to conform to the relevant regulations concerning railway traffic, metro traffic and road traffic (buses). The operation of the stations and stops of the transport operators is regulated individually by the respective transport operators in their internal regulations.

Transport operators are obliged to observe the specific points concerning the minimum requirements concerning stations/stops regulated in their public service contracts (e.g. provision of toilets, timetables, information etc.).

4. There is a lack of co-operation. Each owner/operator is responsible for the maintenance of its own territory only.

5. No.

6. The ticket office of Volánbusz is in the waiting room of MÁV, next to the railway ticket offices. As ticketing and fare system is not integrated, this does not help passengers much. There is no integration of timetables. The integration of information provision is basic: interchange possibilities across operators are indicated in the timetables and on vehicles. The reason for the low level of integration is the fragmentation of ownership and management between different operators.

7. No.

8. Integrated management would greatly improve co-operation between modes. This could provide a uniform passenger experience concerning information provision, cleanliness, security and safety. Problem solving and handling of emergencies would also be swifter by avoiding the current formal procedures of having to report problems officially from one company to the other (BKV →MÁV; BKV → R-CO).

9. Please see the information above regarding the lack of integrated management.

10. No information available at the moment.

11. No.

12. Same as question 8.

2.3 Safety and security

1. The bus terminal has several zebra crossings across the roads that are used by arriving and departing buses. The crossings are well signed, but they can also potentially pose a risk of accidents as opposed to a closed design (see Madrid Moncloa for example).

There is a series of columns holding the first floor of the shopping mall along the edge of the bus stops at the bus terminal. This is a design fault as there is a potential danger of a passenger getting stuck between the column and an approaching bus. Although there is warning signs ("Please do not stand in the marked are behind the column"). This is not an example of good design (Fig. 9).

Fig. 9: Columns along the bus stops at the bus terminal

At the railway station there are no fences along the railway tracks that could prevent passengers from crossing the rails.

2. The terminal has 24-hour CCTV surveillance (500 cameras) to prevent crime and enhance safety.

The most frequent crimes are vandalism (graffiti, vandalizing the lifts and the toilets), minor thefts from the toilets (toilet paper, taps). Illegal sale of goods and begging was a major problem in the old terminal. They have almost completely disappeared.

2.4 Finance and revenue streams (revenue generation)

1. Shopping mall: private
   Bus/metro terminal: public (municipality of Budapest)
   Railway station: public (state)

3. Data is confidential. According to recent news in the press, the developer R-CO has been facing financial difficulties due to low utilisation of the commercial space and falling rents at the shopping mall. It must be noted, though that the mall was only been opened 1.5 years ago.

4. A: Land next to the existing terminal was sold to private investors. In order to build a shopping mall the local zoning regulations had to be changed to allow greater site coverage as previously the area was covered by greenery, a sports field and an abandoned campsite for children. As part of the new zoning plan a list of investments of public interest was drawn up as a condition of the building permit for the shopping mall (e.g. refurbishment of the metro terminal, new bus terminal, construction of connecting roads, etc.). The investor spent about 3500 million HUF on public investments (approx. 10 % of the cost of the whole interchange including the shopping mall).

4. B: No information available.

4. C: The reconstruction was exclusively financed by the private developer partly from bank loans.

No business model exists for the mall.

Pricing level is decided by the demand for commercial space and negotiations with the potential renters.

A business model would not be very useful under the current fragmented management scheme.

Shops on the passenger overpass to the railway station and on the upper concourse of the metro station are owned and leased by BKV based on their own regulations for leasing property. When a vacancy is available it is advertised and the tenderer who offers the highest offer may sign a contract. There are special safety regulations concerning commercial establishments at metro stations.

5. No information available.

6. No common revenue due to the fragmented management. Each entity uses its own revenue.

7. No.

8. Each manager is responsible for the cost of maintenance and operation for its own territory.

2.5 Good and bad practices

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance	Link between planning and design	The designer of the interchange was part of the team that prepared the planning documents (zoning plan), which ensured continuity of the initial ideas.	X	X	
	Agreement on public investments in planning documents	All public investments required of the private investor were laid down in the local zoning plan approved by the municipality of Budapest	x	x	
Station operations	Security	The terminal has 24-hour CCTV coverage.	x	x	
Management and maintenance					
Finance and revenue streams	Private financing	In return for the possibility to build a shopping mall, the private investor was required to implement investments in the	x	x	

		public interest worth about 10 per cent of the total cost of the interchange. No public funding was needed for the refurbishment of the metro and the bus terminals and the surrounding road network.			

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Policy and governance	Excessive parking capacity	Building and planning regulations often require unnecessary parking capacity based on the useful commercial area of a building irrespective of the public transport connections. This results in overcapacity in parking and underused parking areas.	x	x	
	Lack of detailed complex planning	Initial plans frequently changed. initially there was not enough information about the extent of the necessary transport related investment (e.g. the refurbishment of the metro terminal).	x		
	No harmony between planning and design	The local zoning plan is not flexible enough. It restricts the architectural designer (e.g. road width).	x	x	
	Refurbishment limited to certain parts	The railway station was not part of the refurbishment.	x	x	x

	of the interchange	Therefore there is a huge difference between the quality of the space between at the railway station and the rest of the interchange.			
	Difficulties in dealing with stakeholders	During the planning phase there was not a single contact person at the main stakeholder (BKV), which made it difficult to coordinate planning activities.	x	x	
Station operations					
Management and maintenance	Lack of integrated management	Complicated management structure of the interchange with a multitude of stakeholders. The fragmented management structure leads to a strong variation of the quality of space within the interchange concerning cleanliness, quality of surfaces and level of maintenance.	x	x	x
	Complicated ownership structure	The complicated ownership structure makes it difficult to arrange the agreement between managers and operators and it can easily lead to disputes over maintenance issues.	x	x	
Safety and security	Road safety	Several pedestrian routes cross the roads at the bus terminal.	x		x
	Railway safety	Crossing the	x		x

		railway tracks is not prevented by a fence at the railway station.			
	Columns along the bus stops	Columns at the bus stops create a potential danger for passengers who might get stuck between the column and a vehicle.	x		x
Finance and revenue streams	Lack of adequate funding for the maintenance of the interchange	The parts of the interchange that are managed by public companies are neglected and not maintained properly due to lack of adequate funding and company culture. This may lead to a quick deterioration of the interchange.	x	x	x

3 Interchange design

Fig. 10: The general layout and new features of the intermodal centre

3.1 Sustainable interchange design

1. Yes. Heating is provided within the shopping mall only. The mall does not have its own heating generators/boilers, it uses "district heating" provided by Főtáv Zrt. (A company of the municipality of Budapest). Főtáv provides the shopping mall with hot water which is used for heating. The water is generated in a power plant that uses combined gas turbine technology to produce electricity and heat. The hot water reaches the mall through underground pipes.

The terminal can be accessed easily by walking and bicycle (please see the relevant section for details).

One of the most important commercial aspects considered during the planning phase was the large number of public transport passengers passing through the interchange. Car access was considered as less important.

The mall has an inner corridor that runs around the inner goods yard used for supplying goods to the shops. This also serves as insulation for the public areas and shops of the mall.

The glass roof used in other shopping malls was avoided in order to prevent overheating of the public areas and excessive cost of air-conditioning.

A roof garden also prevents the building from overheating.

2. No data is available about the CO_2 emission.

3. A compulsory energy certificate for the shopping mall has been prepared. It will be available in two weeks' time.

4. See point 1.

5. For the parking garages it is compulsory to report regularly the CO level to the environment authorities. There have been no problems so far.

There were complaints about air pollution at the bus terminal which is covered. There is no mechanical ventilation because the natural flow of air is supposed to ventilate the terminal through the open sides and entrances. Depending on weather conditions it may cause

complaints. In addition, a great proportion of the bus fleet of BKV consists of old buses with Euro 0 engines that produce unpleasant fumes locally at the bus stops. This problem should gradually be resolved by the use of new environmentally friendly buses.

As the shopping mall uses district heating it does not have its own heat enerators so it does not produce any local pollution (there are no chimneys).

6. No alternative energy is used.

3.2 Travel time and space

1. Average transfer/waiting times and distances

Waiting time (minutes)

	Train	Metro	Tram	Bus	Car	Cycling	Walking from north	Walking from south
Train		2		8	0	0	0	0
Metro	16			8	0	0	0	0
Tram								
Bus	16	2			0	0	0	0
Car	16	2		8		0	0	0
Cycling	16	2		8	0		0	0
Walking from north	16	2		8	0	0		0
Walking from south	16	2		8	0	0	0	

Transfer time (minutes)

	Train	Metro	Tram	Bus	Car	Cycling	Walking from north	Walking from south
Train		5		12	5	4	2	5
Metro	19			11	2	4	4	4
Tram								
Bus	20	5			4	2	4	2
Car	21	4		12		5	5	5
Cycling	20	6		10	5		6	1
Walking from north	18	6		12	5	6		6
Walking from south	21	6		10	5	1	6	

Distance (m)

	Train	Metro	Tram	Bus	Car	Cycling	Walking from north	Walking from south
Train		160		220	290	240	120	270
Metro	160			180	100	220	250	250

Tram								
Bus	220	180			240	90	260	100
Car	290	100		240		320	300	300
Cycling	240	220		90	320		330	20
Walking from north	120	250		260	300	330		350
Walking from south	270	250		100	300	20	350	

The method of cqlculqtion was the following: the transfer time consists of two different times, the walking time and the waiting time. The walking time comes from the walking distance, multiplied by the walking speed, which is 1 m/s. The sum of walking time and waiting time at each interchange possibilities gave the total transfer time.
There are three ticket offices (1 MÁV/Volánbusz and 2 BKK) and two ticket machines in the complex. One of the 2 BKK offices is at the bus terminal. It has 3 windows, but works at relatively low utilization. Opening hours are 6-20 on workdays, 8-16 on Saturday (closed on Sundays). There is also a ticket vending machine at the bus terminal, which has unfortunately been out of order for months, due to the lack of the maintenance. The other BKK ticket office is on the passenger bridge, which connects the railway station and the metro terminal. It has only a single window, but – unlike the other office – there are queues in front of it, regardless of time. The hours of operation are 5-22 every day. A mobile stall subcontracted by BKK (Fig. 11) tries to help ticket sale, but demand still exceeds capacity.

Fig. 11: The mobile stall opposite the ticket office

The difference in demand at the two locations is shown (Fig. 12). The MÁV/Volán ticket office is next to the BKK office on the overpass. It is less crowded. The interior design is outdated, since it was not refurbished during the renewal of the rest of the terminal. MÁV (trains) has 3, Volánbusz has two windows. Recognizing the demand for BKK tickets, the operators decided to sell BKK tickets at the MÁV ticket office as well, but it is not well communicated. The arrangement of the offices at the intermodal complex is not well considered. The Volánbusz ticket sale point is several minutes' walk from the bus terminal where Volánbusz services depart

from. At the same time, the ticket office at the bus terminal only sells BKK tickets with considerable free capacity.
For passengers it would be more convenient to move the Volánbusz office to the bus terminal and use one of the windows at the MÁV ticket office exclusively to sell BKK tickets.

Fig. 12: The utilization of the BKV ticket offices at 8 am

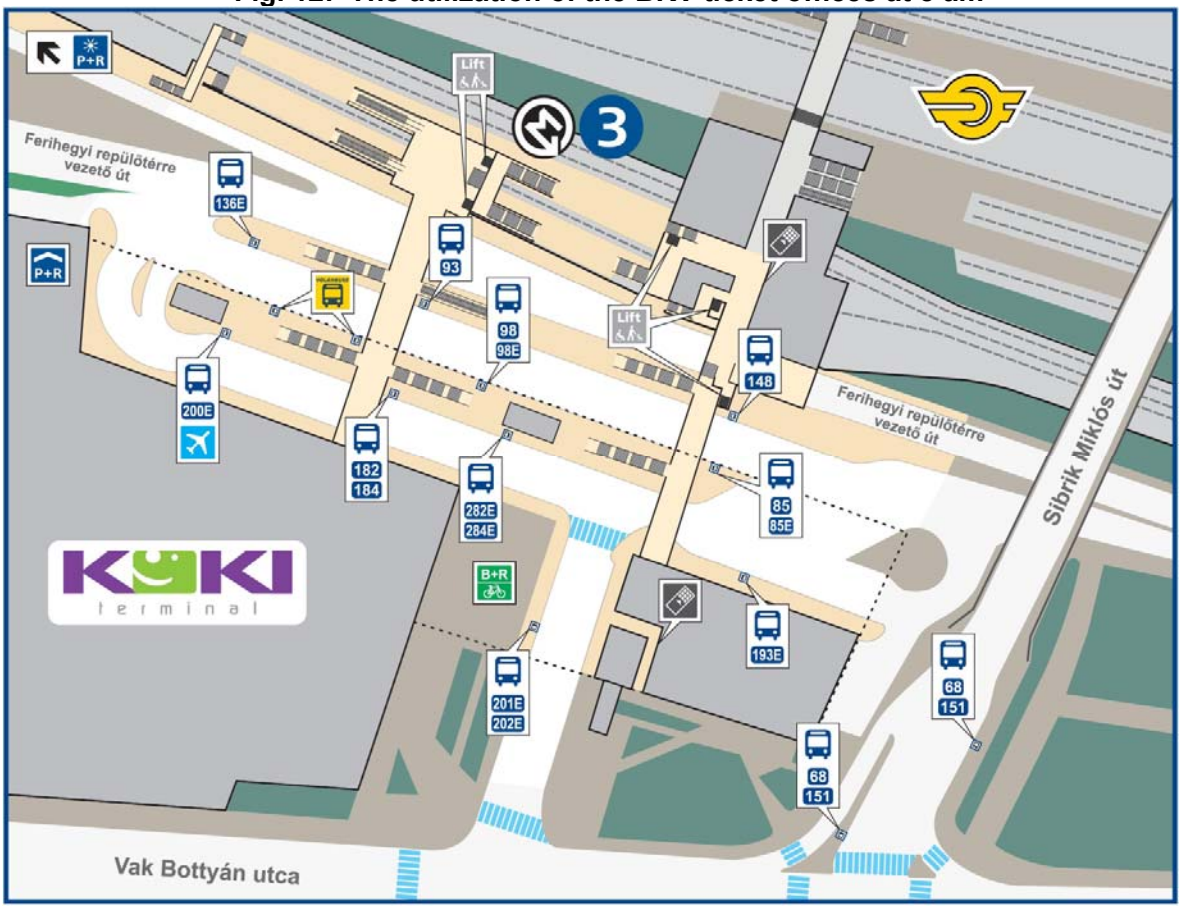


Fig. 13: The bus and the metro terminal (Source: BKK)

The MÁV ticket office functions as a waiting room as well. It is close to the platforms, covered, heated; there are seats and an electronic information board (departures, arrivals), beverage vending machines and it is open non-stop. A deficiency is that the locations of the ticket offices are not signed well from the P + R.

The passenger-overpasses are wide, glass-covered on both sides, so it is clear and bright. There are glass lids on the roof where it was not possible to use glass walls. The waiting areas at the bus terminal are wide as well. In the middle, there is a spacious waiting area, which does not feel crowded except when a crowded bus arrives.
The passenger overpass – as we mentioned – has not fully been refurbished, so you can see the difference on the (Fig. 14.).

Fig. 14: The new (left) and the old (right) part of the overpass

4. The interchange routes are logical.
5. Yes.
6. The transport interchange areas are functional. Greenery is confined to the southern entrance area of the shopping mall and the roof garden on the third floor of the mall building (Fig. 15).

Fig. 15: Greenery around the intermodal centre

These areas (especially the roof garden) are away from the main passenger flow. Some flowerbeds were created at the bus terminal, but they are not well designed as they lack natural light and rain. Due to the lack of maintenance the plants have died. Today, the dried plants have a negative impact on the place (Fig. 16).

Fig. 16: dried plants at the bus terminal (left) and the graffiti-covered overpass on the operation area of MÁV (right)

Art is limited at and around the terminal. A fountain is the main feature of the ground floor of the shopping mall (Fig. 17).

Fig. 17: The fountain at the shopping mall

In 2013 a statue was erected in the public park in front of the shopping mall commemorating the famous footballer Ferenc Puskás, who used to play at the district's football team (Fig. 18).

Fig. 18: The statue of Ferenc Puskás in front of the shopping mall (Photo: Harmadik at http://www.panoramio.com/photo/88095661)

Although smoking is not allowed at the terminal, many passengers smoke at the bus stops throw the cigarette stubs away. Sometimes the exhaust gases cannot escape, so the air is uncomfortable to breathe. It is dusty when the weather is windy. The old part of the overpass is covered by graffiti (Fig. 16).

All transfer routes are covered and protected from the weather. The stations and platforms are open air, but covered, so passengers are protected from the rain, but not from the cold. The overpass is noise protected; the section of the overpass above the railway station is used as a waiting area because it offers protection from the wind as opposed to the railway platforms and has an unobstructed view of the platforms to see approaching trains. The bus terminal is illuminated in the daytime, so there is enough light.

3.3 Facilities, service and retail

1. We have to distinguish between the shops and services located in the mall and in the interchange area; the contrast is remarkable. The shopping mall (called KÖKI Terminál) is a typical shopping centre offering a wide range of shops and services in the medium price range. The main categories available are personal services (bank, lottery, post office, pharmacy, mobile phone providers, currency exchange, hairdresser etc.), groceries (a large TESCO hypermarket, smaller delicacy shops), fashion (mostly international brands, mid-price level), pharmacy, restaurants and cafés. A large hardware and garden store (OBI) occupies the western section of the centre.

2. The net shopping area is 47.000 m^2, with about 200 retail outlets, but approximately 150 shops are occupied.

3. In general, the investor tried to adapt the variety of shops and services to the purchasing power of people living in the nearby districts (average and worse-than-average socio-economic status).The mall is open from 6 to 22.

The shops located at the bus terminal or on the passenger overpass have in general lower quality and price level. There are small grocery shops, fast food stalls, bakeries (which are very popular in the morning hours), tobacconists, flower shops and gift shops. Sadly, most of the shops sell alcohol, which has an impact on the security of the intermodal centre (Fig. 19).

Fig. 19: A typical shop in the mall (left, source: internet) and in the terminal (right)

The shops at the terminal are usually open from 4-5 in the morning till 22-23 in the night. The average walking time from the railway side passenger bridge to the different shops and services are as follows:

- bank: 2-4 minutes,
- post office: 3-4 minutes,
- change: 2-3 minutes,
- pharmacy: 3-4 minutes,
- mobile operators: 3-4 minutes,
- hairdresser: 2-3 minutes

Information about these services is not shown at the terminal, only the location of the bank and the post office, at the entrance of the mall. Without local knowledge, it is difficult to locate these facilities. Information about the location of shops is provided on information boards, signs, leaflets and in person at the customer service desk. (Fig. 20). Moreover, there are no toilets in the interchange areas, only in the mall. The toilets designed for handicapped persons are also in the mall, but some of them are out of order.

Fig. 20: Information board at KÖKI terminál

4. The shopping mall has a strategy to provide a wide variety of services that can serve passengers who interchange as well as people leaving in the nearby housing estates. Therefore several banks, a post office, currency exchange and the customer service of the gas company are available.
5. Post office, hairdresser, banks, customer services of utility companies, customer service of the local municipality, travel agency, currency exchange, mobile telephony providers, customer service for public transport (mobility centre).
6. There is no central customer service available for the interchange. The shopping mall has a customer service desk which provides information about the shopping mall and parking but not about public transport timetables and ticketing. The transport operators only have ticket offices that can also provide information but only through a window; there is no designated customer service office. BKK plans to create customer service offices at major transport interchanges, but at the moment no specific plans exist for Kőbánya-Kispest.
7. There is only one designated waiting room in the interchange. It belongs to MÁV and serves the railway station. It is in integrated with the ticket office for trains (MÁV-Start) and regional buses (VOLÁNBUSZ) (Fig. 21). It is not a very inviting place.

Fig. 21: The MÁV waiting room and ticket office, including a VOLÁNBUSZ ticket office

At the coach terminal there are only benches. The shopping mall is used by many passengers as a waiting area. It offers many benches, a free library, and a study area for children (Fig. 21).

Fig 22: Designated study area for children including a small library

8. Wireless internet is available in the mall; it is free and broadband, no registration needed. There are no praying rooms. Wi-fi is not available at the metro terminal and the train station.

3.4 Impacts on the local economy

1. A: Mall: Maintenance: 10 persons; cleaning: 20 persons; security: 30 persons (all subcontracted). Mall management: 8 persons.
B: Shops and services at the mall employ approximately 1000 persons.
C: Not relevant.
2. Office rent at the interchange (mall): 11-13Eur/month/sqm + 3,5Eur/month/management fee
The rental price for shops and services is not public. It is estimated at 20-40 EUR/sqm/month.
Cost of housing around the interchange: the cost/sqm for an average flat of 50-60 sqm was HUF 130,000-150,000 (450-520 EUR) in the first half of 2012. While prices for flats have not

increased since the opening of the new mall, it has been easier to sell them. Several advertisements state that they are "close to KÖKI TERMINÁL" as a selling point[44].
3. No statistics exist about new startup businesses. The number of businesses at the interchange increased considerably as the interchange was expanded with a new shopping mall. No increased business activities have been detected in the surrounding areas. Some businesses relocated from the neighbouring area to the new shopping mall (e.g. post office).
4. The proximity of the interchange has been a major selling point of properties even before the refurbishment. As only 1.5 years have passed since the refurbishment no conclusions can be drawn about its influence on the residential property market yet.
5. There have been no large scale residential development near the interchange.
7000 sqm of new office space has been created as part of the refurbishment of the interchange. Not all of the office space has been leased yet. The major clients are Hunguest Hotels Zrt. (hotel chain) (headquaters), Synergon Informatika Nyrt. (IT development) (headquarters). 13,000 sqm additional office space is planned but development has stalled sue to the economic crisis.

3.5 Good and bad practices

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	Passengers are protected from weather	All interchange routes are covered, passengers are protected from the weather.			x
	Large spaces within the terminal	The interchange is spacious and it does not get crowded.			x
	Complex development	The terminal includes retail, offices and public facilities (transport interchange)	x	x	
	Clear pedestrian routes	Pedestrian interchange routes are short and clear.			x
	Energy efficient design by using district heating	The terminal uses existing energy production sources through the district heating system therefore it does not locally produce heating-related CO^2	x		
	Additional green areas near the terminal	The investor was required to plant trees in front of the residential buildings opposite the shopping			x

[44] Source: http://ingatlanhirekma.blogspot.hu/2012/08/megvaltoztatta-e-lakasarakat-koki.html#.UacjGNgyTuQ

		mall for noise protection.			
	Easy-to-use parking system	The parking system is well designed with 5 entrances and 5 exits. The covered park and ride facility is situated close to the public transport stations/stops.			x
	Safe and efficient organization of road traffic	Bus, car and truck traffic is well separated. There is a goods yard in the middle of the building that handles all deliveries.			x
Travel time and space	High frequency of services	Metro and bus services run at a high frequency hence waiting time is low	x		x
	Short walking distances	The longest walking distance between two modes is 350m, approx. 6 minutesm while the average wlaking distance is 200 m or 3,5 minutes.			x
			x		x
			x		x
			x		x
Facilities, service and retail	There are a wide range of shops and services available at the shopping mall				x
Impacts on local economy					
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Design	Non-passenger friendly design elements	Although some design solutions do conform to current regulations, they are not passenger friendly (e.g. columns along the bus stops).			x
	Low quality	The intention of the			x

	of surfaces at the bus terminal	private investor to cut costs is reflected in the quality of the surfaces at the bus terminal (painted walls, bare ceiling).			
	Organisation of shop and services at the mall determined by commercial interest	The interests of the owner of the mall and passengers are conflicting in terms of the location of different services and shops at the mall. Services that are often used interchanging passengers are scattered around the mall so that they meet as man shop as possible on their way. Passengers (an transport operators) on the other hand want all important services close to each other and to the main interchange route to minimize walking time and distance.			x
	Location of lifts at the mall determined by commercial interests	The location of lifts inside the mall was also somewhat compromised in order to create larger shop windows. The lift doors are recessed behind the main corridor.			x
	Pedestrian routes in the mall determined by commercial interests	Some of the pedestrian routes inside the mall are not logical as they reflect the intention to guide customers to certain shops.			x
	Lack of greenery on ground level	The roof garden is somewhat isolated and cannot replace a real park on ground level.			x
	Location and capacity of ticket offices is not optimal	The capacity of the BKK ticket office on the passenger overpass is too small.	x		x

		The VOLÁNBUSZ ticket office is too far from the bus terminal.			
	Flowerbeds without plants	It is a design flaw to plan flower beds for the covered bus terminal where there is a lack of light and water. The flower beds are now used as rubbish bins by passengers.			x
	Main green area (roof garden) is too from from main passenger flows	The roof garden has only limited role in creating a pleasant atmosphere as it is on the third floor of the shopping mall.			x
Travel time and space					
Facilities, service and retail	Public toilets only at the shopping mall	There are no public toilets at the metro and railway stations. They are only provided at the shopping mall.			x
	There is no customer service available to serve passengers	Only the shopping mall provides a customer service but it has no information about transport timetables.	x		x
	The only available waiting room is not inviting	The waiting room is not well lit, furniture is outdated and the entrance area is dirty.			x
	Free public services provided at the shopping mall	A free library, a study corner for children and free Wi-Fi is provided at the shopping mall. Unleased shops are used for events and exhibitions.			x
Impacts on local economy					
Other issues					

4 Accessibility

4.1 Accessibility for walking and cycling

The centre is approachable on foot from two directions, from north and from south. The north side entrance from the railway is neglected. There is only a stairway, without any passenger-information or escalators/lifts. On the southern side, the surroundings of the entrance are renewed and landscaped. The roads beside of the intermodal complex have safe passenger crossings including pedestrian traffic lights, tactile surfaces and lowered kerbs (fig. 8).

Fig. 23: The difference between the north side (left) and the south side (right) entrance.

A B+R facility is located on the west side of the complex, next to the coach terminal. The surrounding roads are suitable for bikers, because of the cycle tracks, which has a separate lane. It is positive that the B+R is not only covered, but it is indicated with signs along the cycle path in different places (Fig. 24). The B+R is free of charge, provides protection from weather, but not guarded. There is no bikesharing or cycle repair facilities provided. Another cycle parking facility is available at the northern entrance, but it is not covered.

The utilization of the B+R in the terminal is fairly good; it is above 50 percent on weekdays. The transfer time between the bicycle and other transport modes:

- buses (local or regional): 1 minutes,
- metro: 3 minutes,
- Railway: 5 minutes.

A bicycle lane runs only on the southern side of the mall, in Vak Bottyán Street. The lane is only 750 m long, and has only one connection to the rest of the cycle path network at Katica Street, which has a separated cycle path. There is also a cycle path leading to the northern entrance of the terminal (B+R) but there is no cycling route connecting the southern and northern sides of the terminal on the flyover across the railway tracks.

Fig. 24: The B+R sign (left) and the B+R itself (right)

4.2 Accessibility for public transport

Public transport has the following characteristics at the intermodal terminal;

- 1 metro line (M3), more than 300 departures/day,
- 15 local bus lines, with more than 1000 departures/day altogether (9 of them are express lines)
- 3 regional bus lines, with more than 70 departures/day altogether,
- 2 railroad lines (100, 142), with almost 250 trains/day altogether.

The frequency differs by time of day and transport mode. The average frequency of the metro at peak hours is 2-3 minutes, and at other times 4-6 minutes, except early in the morning or late night (10 minutes).The variation in frequency of buses is significant between lines (2 to 60 minutes). Some bus lines operate only in peak hours. The regional buses (VOLÁNBUSZ) run every 15-30 minutes in the peak hours; and hourly during other periods. Commuter trains, depends on the direction, run one to three times trains per hour. Long distance InterCity trains twice every hour with alternate directions to Debrecen and Szeged. Fast trains depart every two hours towards Szolnok-Debrecen. Trains are frequently delayed but it does not cause considerable problems for transfers as the connecting metro and bus lines run frequently.
The metro provides a direct connection to the city centre (Deák tér interchange to M1 & M2) (10 stops; 16 minutes) and the north of Budapest (Újpest-Központ; 31 minutes). Local buses mostly play a feeder/distributor role for the metro and connect to the surrounding housing estates south and nort of the terminal. Most passengers transfer from the metro to the buses at Kőbánya-Kispest. A direct connection is available to the airport by bus line 200E. The regional lines of VOLÁNBUSZ provide a connection to Üllő, Monor, Maglód and Vecsés in the eastern agglomeration of Budapest.

Fig. 25: Transport connections from Kőbánya-Kispest

The walking time between the transport modes is short, maximum 5 minutes. It is 2-3 minutes between the railway and the metro (depending the arrival platform, and walking speed), it is 2-3 minutes between the metro and local/regional buses and it is 5 minutes between the railway and buses.

4.3 Accessibility for car and taxi

There are several parking possibilities around the intermodal terminal. On the one hand, a P+R parking lot is available next to the metro terminal. The capacity is 206 cars, and the site is guarded. The facility is open 24 hours. A daily ticket costs as much as a single ticket for public transport (currently 350 HUF - about 1,2€). The daily ticket is valid between 6-22. Outside these ours (e.g. overnight parking) the hourly rate is 210 HUF. There are passes for different periods (weekly, monthly, 6-monthly) offering further discounts. Next to the P+R parking, 19-20 cars park illegally (Fig. 26).

Fig. 26: Illegal parking lot next to the P+R

There is also a P+R facility within the shopping mall. These parking places are in the property of the mall, but will be managed and used free of charge by BKK. The facility will be opened soon. It will provide 330 parking places with the same conditions as the open-air P+R. Although the P+R was completed as part of the shopping mall, difficulties in finding the public operator prevented the facility from opening. Recently, an agreement has been signed with BKK about the operation of the P+R.
The mall also has its own parking system, which offers parking in the three storey parking garage for 1800 cars and an open air car park in front of the OBI hardware store. The first hour is free of charge and every additional hour is charged at 50 HUF (about 20 Eurocents). Carsharing, car rental or car repair facilities are not available. Taxi ranks are located on the west side of the mall.
An unofficial P+R was formed at the northern entrance of the complex; it is demanded to create a P+R parking lot at the Vaspálya utca.
Dedicated kiss and ride areas are not available; however some points are unofficially used for it, at the P+R parking lot. Taxi ranks are located at the west side of the mall, suitable for 8-10 taxi cabs (Fig. 27). The taxi ranks are not integrated into the terminal; they are practically in the street opposite the shopping mall.

Fig. 27: Taxi ranks near the mall (source: Google Street View)

By car, the complex is approachable from 3 directions. The above-mentioned Vak Bottyán Street is located on the west side of the mall; it has 2x2 lanes. The parking garage is reachable from this direction. Ferihegyi repülőtérre vezető Street is parallel to the Vak Bottyán Street, it has 2x1 lanes, and this is a transit road to the airport. It has connection to the P+R (northbound) and to the parking lot of the OBI hardware store (southbound). Vaspálya Street is on the other side of the complex; this is a residential road, with 2x1 lanes. As we mentioned above, it is usually used as an unofficial P+R. The connection between the two sides is realized by the Sibrik Miklós Street, which is a bridge over the railroad.

4.4 Access for all

One of the most important achievements of the refurbished interchange is the provision of accessible facilities.

Accessibility planning was complex and systematic with attention to people with wheelchairs, the blind and people with hearing impairments as well. There are tactile surfaces everywhere, including the metro terminal, bus terminal and the shopping mall. At the shopping mall, a tactile line leads to the information desk while at the bus terminal tactile lines lead blind passengers to the front door of buses (although sometimes bus drivers ignore the correct positioning of the bus (Fig. 28)). Pedestrian routes are step-free, thanks to the elevators, and escalators. The employers are well trained and helpful. Signs show the routes to the elevators.

Fig. 28: Tactile line to the front doors

However, the accessibility of the complex suffers from several mistakes. One of the main issues is that not the whole complex was refurbished in 2011; therefore the railway station does not provide accessible platforms. A legacy of the past is the difference in levels of the shopping mall the connecting passenger bridge and the old railway station (Fig. 29). A lift is only provided on the southern side of the corridor close to the entrance of the shopping mall. The tactile surface also ends at the border of the old and new parts of the interchange.

Fig. 29: End of the refurbished part of the terminal with non-accessible stairs

Another problem is related to the definition of the area for refurbishment. The planning (and investment) area followed the roads around the interchange. This resulted in phenomena like it

is demonstrated in Fig. 30. One side of the pedestrian crossing has tactile surface but the other one does not.

Fig. 30: half-accessible crosswalk at the border of the planning area

The third problem is related to maintenance. While several entities are responsible for the different areas of the interchange, the responsibilities are not clear. Consequently, it has proved to be impossible to maintain the initial state after refurbishment. This is demonstrated by escalators and lifts that are out of order for prolonged periods making it difficult for people with disabilities to move around.

Another issue is the accessibility of the connecting network and vehicles. While the new metro terminal is fully accessible, none of the other stations of metro line M3 provide accessible facilities. The majority of trains of MÁV-Start are also not accessible. Some of buses are step-free, it is signed at the time table, with the underlined arrival time. Volánbusz lines are partially served by low floor buses.

The locations of the elevators/escalators are not optimal. A bad example is the interchange from the metro to the bus line 200E, which terminates at the airport. The middle platform of the bus terminal is only accessible on stairs. Disabled persons or passengers with luggage have to follow an illogical route including a level crossing of the road of the bus station and a door that needs to be pushed hard to open (Fig 31.).

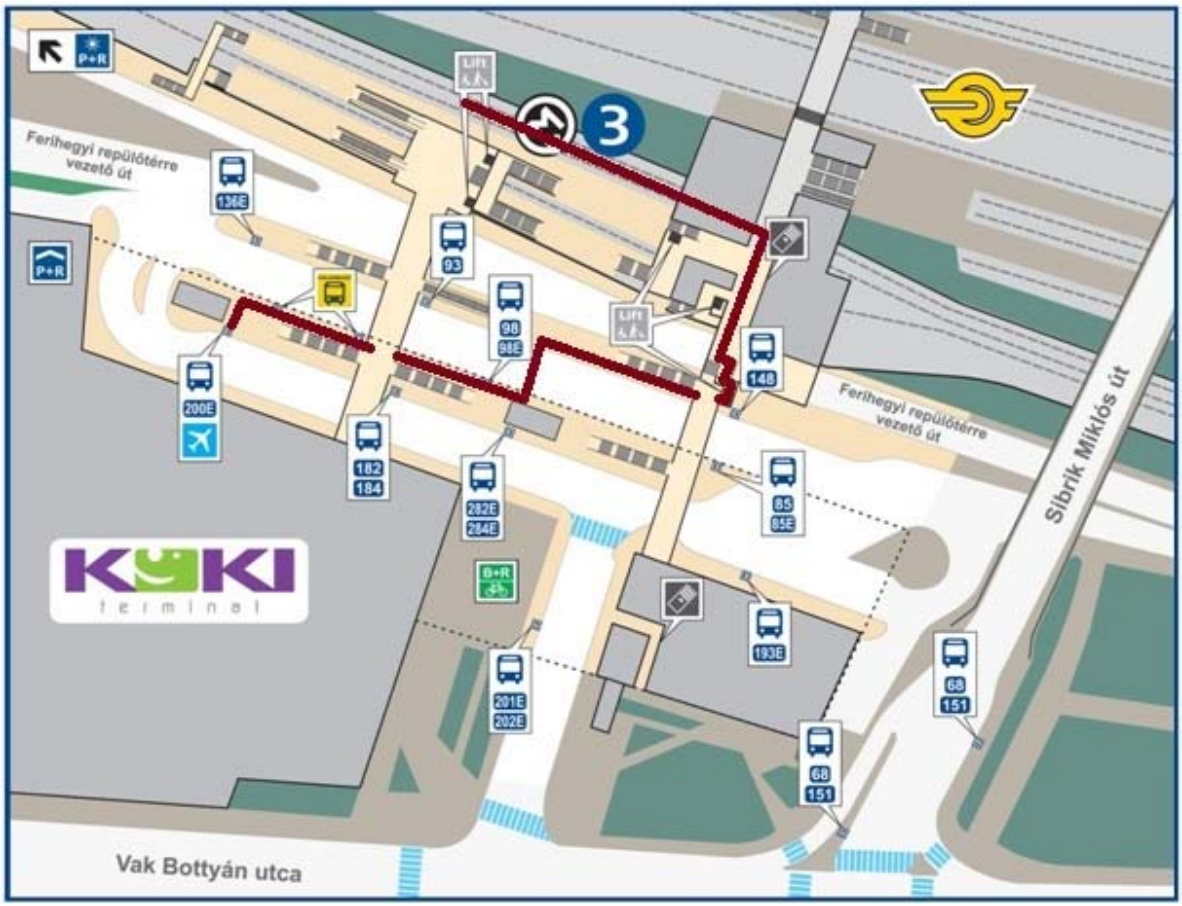


Fig. 31: Step-free interchange between the metro M3 and the airport shuttle 200E

4.5 Good and bad practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking					
Cycling	Good access by bicycle	Two B+R facilities are provided with connections to cycle paths			x
Public transport	Frequent public transport services	Metros and buses run very frequently which minimizes waiting time.			x
Car	Cheap P+R facilities are available with good access to transport stops	An open-air and a covered P+R facility are available for the price of a public transport ticket.			x
Taxi					
Access for all					
Other					

issues					

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Walking	Access from the northern side of the terminal across the railways is neglected and has no lifts	Access from the north has not been refurbished	x		
Cycling					
Public transport					
Car	No P+R is available on the northern side of the terminal across the railway tracks	There are many cars parked at the northern entrance of the terminal partly on-street and partly on the grass as there is a lack of designated P+R parking	x	x	x
	No kiss and ride area	An area is missing for those who want to stop to pick up or drop off someone at the terminal. Stopping is forbidden on the main highway that runs across the terminal.	x		x
Taxi	Taxi stands are not integrated into the terminal	Taxi stands are in the street opposite the shopping mall, too far from the bus and metro terminals.			x
Access for all	Partial barrier-free access	Barrier free access is partial as the railway station has not been refurbished. There is no barrier free access to the terminal from the northern side of the railway. Some lifts and escalators are missing from the bus terminal as well.			x
	Missing lifts and escalators	Lifts and escalators are missing at some of the bus platforms. The middle platform (airport bus) for example cannot be			x

		reached directly by lift/escalator.			
	The majority of the vehicles are not barrier free (low-floor)	While most of the terminal is barrier free, the vehicles that serve it are not. This is the only barrier free station on metro line M3.			x
Other issues					

5 Passenger services

5.1 Journey planning and real time information

In use	Needed	Intelligent System or Service in the Interchange Area
x	□	Journey planner for local public transport for pre-trip planning
x	□	Journey planner for long-distance public transport for pre-trip planning
□	x	Information for interchange facilities and layout available on the internet (or via call centre) for pre-trip planning (important especially for the disabled)
□	x	Smart ticketing [speeds up transfer]
□	□	Electric departure time displays based on timetables (for multiple stops)
□	□	Electric departure time displays based on timetables (at stops)
□	x	Electric departure time displays based on real-time information (for multiple stops, incl. fleet monitoring systems)
X[45]	□	Electric departure time displays based on real-time information (at stops)
X[46]	□	Departure times via audio calls
X[47]	□	Real-time disturbance information provided via displays
X[48]	□	Real-time disturbance information provided via audio calls
X[49]	□	Multi-language information
□	x	Public access information kiosk / internet kiosk restricted for Public Transport information (not for open internet surfing)
□	x	Information centre with personal service
□	x	Audio services for the visually impaired (e.g. a special dedicated information area with a push button)
x[50]	□	Guidance and warning surfaces for the visually impaired
□	x	Tactile maps of the interchange for the visually impaired
□	x	Information with hearing aids (e.g. “T-coil”)
□	x	Matrix bar codes (e.g. QR-codes) for additional information with mobile phones (e.g. for departure times for a specific stop or platform)
□	x	Intelligent Indoor-Navigation System
x	□	Intelligent security systems (e.g. CCTV)
□	□	Areal or terminal fleet management with the aid of cameras, in-vehicle systems, Variable Message Signs etc. for guiding buses, taxis, park&ride etc.

[45] Available for trains and metro, in progress for buses
[46] Available only at the train station
[47] Available only at the train station
[48] Available only at the train station
[49] Partly on timetables and audio announcements for InterCity trains
[50] Partly, not at the railway station

In use	Needed	Intelligent System or Service in the Interchange Area
□	□	Intelligent automated passenger or people counting (infrared, video, thermal etc.)

4.6 Journey planning and real time information

1. Both static and dynamic information is provided to passengers. Static information includes the location of bus stops, metro, train station, P+R and lifts on signs as well as timetable information for the individual bus lines at the stops, timetable of trains at the waiting room or the rail station, timetable of the metro at the metro station. Dynamic information is provided at the railway station on a large departures board, with the actual state of the arriving/departing trains (delays). This information is replicated on smaller electronic displays on the passenger bridge that leads to the platforms and at the platforms (Fig. 32). The arrival and departure of trains and any information about disturbances is provided by speakers as well. Real time train information is not available outside of the railway station. Timetable and real-time information is also provided on the website of MÁV-Start.

Fig. 32: Departure indicators at the train station

On the departure platform of the metro there is a counter, which indicates the time left until the departure of the next metro. As all metros have the same destination routing information is provided on static signs.

Fig. 33: Real time information at the metro terminal (time until next departure in minutes)

Currently, no real-time information is available for bus arrivals and departures. A new, dynamic passenger information system is under implementation, however. The real-time information displays are being installed at the time of writing (Fig. 34). The new system will provide system-wide real-time departure information on displays at stops, on BKK's website and on mobile devices.

Fig. 34: Real-time information display to be installed at Kőbánya-Kispest as well (Source: BKK)

2. Unfortunately, the different operators use different information systems and there is hardly any coordination. For the static system there is no uniform signing throughout the terminal. An example of it is the indication of the railway station. At the mall, the railway is indicated with the logo of the railway company, at the metro and bus terminal it is shown with a locomotive (Fig. 35), while at the railway station the railway company uses its own logo. Signs indicating the locations of bus stops are not uniform either. Although the bus terminal has several approaches from the shopping mall, no information is provided about the location of the stops of different bus routes within the mall.

The electronic information systems are not connected in any way and they use different types of equipment and displays. No electronic/real time information is provided about departures inside the mall although it is used by passengers as a waiting area. No one-stop-shop information is available about the intermodal terminal at the terminal or online. The transport operators only provide information about their own services (maps, timetables) on their websites and at their stops. There is no integrated information board

at the terminal which would guide passengers to the right stop/station indicating routes and timetables, fare and ticketing options. This is especially a problem for the airport bus that carries a large number of foreigners who transfer to the metro on their way to/from the city centre.

Electronic journey planning is available separately for the services of MÁV-Start, BKV and VOLÁNBUSZ. An integrated national system is being developed. This will enable route planning across modes. Google Transit is available for BKV services online and on mobile devices.

The website of the shopping mall only gives information about the numbers of the bus/metro routes that can be used to access the facility. There is no map available online or at the terminal that would cover the whole terminal.

Parking information is also fragmented. The shopping mall only informs about the paid parking operated by the mall. Information about the P+R is only available on the website of its operator, BKK.

There is no information displayed anywhere about the location of the taxi rank.

3. No.

Fig. 35: Four different types of signing of the railway station at the intermodal complex

5.2 Fares and ticketing

1. There is no integrated ticketing. Separate tickets have to be bought for the services of each transport operator according to the following table:

Company	Mode	Type of ticketing	Ticket purchase possibilities
BKV	metro, local bus	paper tickets and passes; electronic ticketing under development to be introduced in 2014	2 BKK ticket offices, vending machines (basic tickets only) newsagents, post office, MÁV-Start ticket office; from the driver on some bus services (e.g. 200E airport bus)
MÁV-Start	trains	paper; print-at-home (internet ticketing)	ticket office, online (print-at-home or print-at-the-station by entering a code received at purchase on the internet)
Volánbusz	regional buses	paper	ticket office

There is limited integration of fares within the municipality of Budapest. Monthly passes, day-, three-day and weekly tickets for Budapest can be used for the services of BKV, Volánbusz and MÁV-Start within the boundaries of the municipality of Budapest. For pass holders for local transport in Budapest discounted tickets are available for suburban services. They only pay the fare from the city boundary to the destination outside Budapest.
Credit cards are accepted at all ticket offices at the terminal.
2. Print-at-home tickets based on online booking on the train services of MÁV-Start.
3. Electronic ticketing is under development for local transport in Budapest to be introduced in 2014.
4. The main barriers are organisational and political. As there are three transport operators in the region (BKV, Volánbusz, MÁV-Start) they need to be incentivised to allow cross-operator ticketing. This requires a political decision as all operators are publicly owned. Another issue to be tackled is the integration of fares as currently BKV applies a journey-based fare system (you need a new ticket for each leg of your journey), while Volánbusz and MÁV-Start fares are based on the distance travelled.
The new electronic ticketing system to be introduced by BKK in 2014 will make it possible for additional companies to join the system. It will be based on cards with NFC chips. A time-based fare will be introduced for journeys in Budapest.
5. The principles of a new integrated ticketing system are as follows[51]:

- simple-to-use system
- integrated fares for all transport modes within the city
- interchange should not be 'punished' by higher fares
- fares should incentivise regular use of public transport
- interoperability of ticketing and fare systems in the region of Budapest and across transport operators
- the system should provide data on travel habits of users.

[51] Feasibility study of the electronic ticketing system. BKK, Budapest, 2011.

4.7 Good and bad practices

Good practices

Topic	Good practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information					
Fares and ticketing	Good location of ticket offices	Ticket offices and ticket machines are close to the main flow of passengers			x
Other issues					

Bad practices

Topic	Bad practices	Explanations	Relevant stakeholder/perspective		
			Owner/operator	Government	User/traveller
Journey planning and real time information	Lack of coordination between the information systems of different operators	The static and dynamic information systems are not coordinated between operators and modes. Signing is not uniform throughout the interchange. There is no connection between the real-time information systems of different operators. There is no real-time transport information provided within the shopping mall.	x		x
	No one-shop-stop information is available about the interchange	There is not a single website and information centre where all information about the interchange can be obtained at one place.	x		x
Fares and ticketing	No one-shop-stop information is available about the interchange	There is not a single website and information centre where all information about the interchange can be obtained at one place.	x	x	x
Other issues					

5 Analysis of good and bad practices

Why is this interchange considered successful? (Please tick all that apply.)

□ Ownership/ management structure

X Availability of interchange space

□ Quality of waiting areas

X Range of retail establishments

□ Security and safety

□ Facilities for the mobility impaired

□ Quality of journey planning and real time information

□ Integrated ticketing arrangements

□ Transfer quality among modes

X Other : the method of financing the investment (private funding)

Can you provide any other examples of successful multimodal interchanges?

□ Yes

X No

If yes, please provide details of the location, a brief description (e.g. modes of transport available) and explain in what ways the interchange is successful; any specific factors, e.g. information systems, accessibility, energy efficient design/operation.

5.1 Good practices

		Explanation – why is it a good practice?
Policy and governance	Link between planning and design	Continuity of planning and initial objectives was ensured throughout the planning and design phases resulting in a uniform design.
	Agreement on public investments in planning documents	All public investments required from the private investor were laid down in a public document (local zoning plan) publicly consulted and approved by the municipality of Budapest. This ensured transparency and representation of the interests of the public.
Safety and security	The terminal has 24-hour CCTV coverage and security personnel.	Security and safety has been ensured and improved considerably through the new security system.
Finance and revenue streams	Cost efficient financing model	In return for the possibility to build a shopping mall, the private investor was required to implement investments in the public interest worth about 10 per cent of the total cost of the interchange. No public funding was needed for the refurbishment of the metro and the bus terminals and the surrounding road network. This could be a win-win situation especially if public funds are limited for infrastructure development.

Interchange design	Passengers are protected from weather	The user experience has been improved.
	Large spaces within the terminal	Well-lit and spacious areas make the terminal more attractive for passengers.
	Clear pedestrian routes	Interchange time has been minimised.
	Energy efficient design by using district heating	The CO^2 emission and energy consumption of the terminal has been kept low.
	Complex urban development	The terminal includes retail, services and offices and it is close to large, densely built housing areas contributing to integrated urban development by concentrating different types of activities.
	Easy-to-use parking system	Interchange between cars and public transport has been made attractive.
	Safe and efficient organization of road traffic	There are no traffic problems (congestion) around the terminal and no complaints have been received from residents living nearby about increased noise and pollution.
	Short walking distances	Interchange time has been minimised.
	Wide range of services and shop available	They have made the interchange more attractive for passengers as waiting time can be spent usefully.
Accessibility	Good location of the interchange	Good pedestrian and public transport connections to the interchange make access easy and have promised a lucrative business for the private investor.
	Low-cost P+R at the terminal	Combined car – public transport journeys have been made attractive.

5.2 Bad practices

		Explanation – why is it a bad practice?
Policy and governance	Excessive parking capacity	Building and planning regulations require unnecessary parking capacity based on the useful commercial area of a building irrespective of the public transport connections. This results in overcapacity in parking and underused parking areas.
	Refurbishment limited to certain parts of the interchange	The terminal does not provide a uniformly high quality user experience.
	Stakeholders are represented by several persons	If there is not a single point of contact in the planning and operational phase negotiations and handling of problems becomes difficult.
	Excessive parking capacity	Building and planning regulations require unnecessary parking capacity based on the useful commercial area of a building irrespective of the public transport connections. This results in overcapacity in parking and underused parking areas.

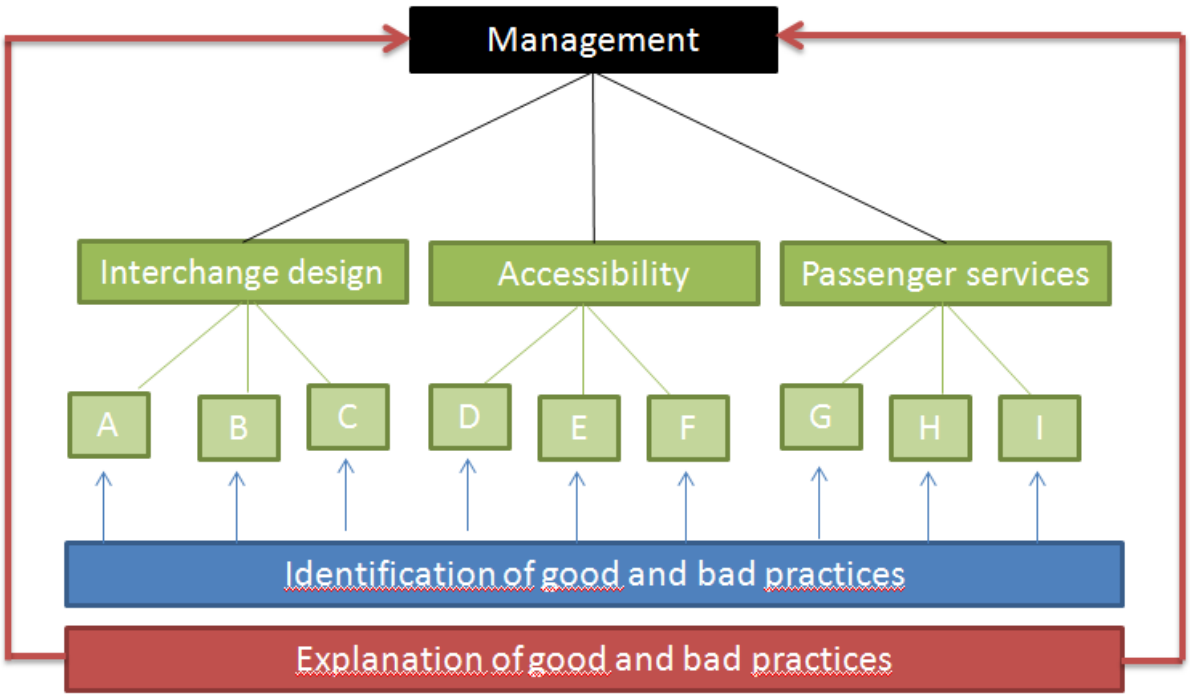
Management and maintenance	Lack of integrated management	The fragmented management structure leads to a strong variation of the quality of space within the interchange concerning cleanliness, quality of surfaces and level of maintenance.
	Complicated ownership structure	The complicated ownership structure makes it difficult to arrange the agreement between managers and operators and can easily lead to disputes over maintenance issues. Part of the bus terminal is owned by the shopping mall while the rest is public and owned by the municipality.
	Lack of detailed complex planning	Lack of detail of information about costs in the initial planning phase resulted in additional costs later during the implementation phase. There are still debates about who should bear these extra costs and several court cases are running.
Safety and security	Road safety	Due to design issues and the intention to keep costs low, the bus station has a layout that is not entirely safe for pedestrians.
	Railway safety	Crossing the railway tracks is not prevented by a fence at the railway station.
Finance and revenue streams	Lack of adequate funding for the maintenance of the interchange	Some parts of the interchange have already deteriorated.
Interchange design	Some design elements are not passenger friendly	Conformation to current regulations does not necessarily mean that the solutions are comfortable and attractive to passengers.
	Low quality of surfaces at the bus terminal	The public interest was not represented properly when it was decided what level of quality of the bus terminal the private investor has to ensure. The investor was inclined to save costs, which resulted in some low-quality surfaces and public areas.
	Refurbishment limited to certain parts of the interchange	The terminal does not provide a uniformly high quality user experience.
	Organisation of shop and services at the mall determined by commercial interest	The interests of the owner of the mall and passengers are conflicting in terms of the location of different services and shops at the mall. Services that are often used interchanging passengers are scattered around the mall so that they meet as man shop as possible on their way. Passengers (and transport operators) on the other hand want all important services close to each other and to the main interchange route to minimize walking time and distance.
	Lack of greenery on ground level	The required area of greenery was fixed in the local zoning plan. The investor was allowed to fulfil some of the requirements by creating a roof garden. A roof garden, however, does not have the same value as a par on the ground floor, and public access is limited by the opening hours and its distance from the main flow of passengers. Although current regulations allow for roof gardens, more green areas should be created on ground level, along the main passenger routes.
	Location and capacity of ticket	There was no careful planning of the capacities and the locations of ticket offices hence some of them are underutilised while

	offices is not optimal	others are crowded which may lead to passing complaints and increased transfer time.
	Design flaw concerning the flowerbeds at the bus terminal	Greenery was not designed for the appropriate place in order to conform to building regulations (minimum green area to be created).
	Toilet facilities are distributed unevenly at the terminal (only available at the mall)	The public managers/operators of the terminal want to avoid the cost and hassle of maintaining toilets. For user it is an inconvenience because the toilets at the mall are far from the main pedestrian routes.
	There is no customer service available to serve passengers	Passengers with little or no local knowledge are not supplied with sufficient information concerning the terminal (transport information).
	Free public services provided at the shopping mall	The free services are attractive to passengers who use the shopping mall as a "waiting room".
Accessibility	Access from the northern side of the terminal across the railways is neglected and has no lifts	As the refurbishment was not extended to the railway station and the northern access, this entrance is not attractive to passengers.
	No P+R is available on the northern side of the terminal across the railway tracks	P+R is not attractive for car drivers living north of the terminal as they have to make a detour to use the official P+R facility.
	No kiss and ride area	The obvious need for a drop-off/pick-up area was left out of the plans, therefore kiss and ride is inconvenient.
	Taxi stands are not integrated into the terminal	Taxi is not integrated as one of the transport modes at the terminal which makes transfer to taxies unattractive.
	Partial barrier-free access	The terminal is not completely barrier free which makes it difficult for disabled persons to use it.
	The majority of the vehicles are not barrier free (low-floor)	Barrier free access is also affected by the lack of barrier free vehicles.
	Access from the northern side of the terminal across the railways is neglected and has no lifts	As the refurbishment was not extended to the railway station and the northern access, this entrance is not attractive to passengers.
Passenger services	Lack of coordination between the information	Way finding and access to information is not easy which impacts on the passenger experience.

	systems of different operators	
	No one-shop-stop information is available about the interchange	It impacts on the passenger experience.
	Lack of integrated ticketing	It impacts on the passenger experience.

5.3 Important factors facilitating or hindering good practice

The earlier parts of this template had particular emphasis on identifying good and bad practices and explain why it is a good or bad practice. Another part is to identify what factors can explain why an interchange has (not) managed to implement these practices. This is important for providing the first input to the City-HUB model.



Aspects	Factors facilitating or hindering good practice
Policy and governance	**Planning regulations** should endorse early designation of planning and design elements.
Station operations	Seamless interchange between modes can only be facilitated through better and closer **cooperation of the different transport operators and infrastructure owners**.
Management and maintenance	**Integrated management has not been endorsed** during the planning phase. Now it is very difficult to deal with conflicting interests of the operators and the private developer.
Safety and security	Safety and security are under the **responsibility of several stakeholders,** which can make cooperation difficult.
Finance and	The maintenance and daily operation of different parts of the interchange

revenue streams	are under different financing regimes. Public areas have been deteriorating due to the **lack of public funding** provided by the municipality/state.
Interchange design	The **coordination of the interests** of the different public and private stakeholders was not efficient enough. Public interest was not represented uniformly and strongly enough as at that time there was not a single body which was responsible for public transport development in Budapest.
Accessibility	The partial refurbishment of the terminal and the resulting "half-hearted" improvement of barrier-free accessibility was a result of **mistakes made in the early planning phase** when the refurbishment of the railway station was not included as a requirement towards the developer in the local zoning plan.
Passenger services	The low level of integration of ticketing and fares is the result of the **lack of political will**. For the past 20 years there has been plans to integrate public transport services in the urban region of Budapest, but the necessary political support has not yet been given.

5.4 Main recommendations

- The management structure needs to be clarified early during the planning phase to avoid later problems and conflicts.
- The structure and the number of stakeholders (owners and managers) have to be kept as low as possible. The responsibilities of owners and operators have to be laid down early already during the design phase.
- Uniform safety and security standards need to be guaranteed throughout the interchange irrespective of the number of owners/managers.
- Local/national zoning/building regulations should be adapted to the specificities of intermodal terminals (e.g. no need for large capacity parking if good public transport connections are available).
- The financial and organisational arrangements for the maintenance and operation need to be planned early as negotiations and contractual arrangements between different operators and managers take a long time.
- To reduce costs planning and design takes the current needs of transport operators into account (passenger demand, configuration of bus stops). If the demand and/or requirements of the operators changes during the operation of the interchange these can often hardly be accommodated due to design constraints (e.g. lack of lifts to certain platforms that were originally meant for low frequency services). Therefore planners and designers should prepare plans and designs that can accommodate future changes.
- It is important to inform the residents of the neighbouring areas about the plans for the interchange in order to avoid strong opposition.
- If the interchange is financed by a private investor or PPP a strong representative of the public sector (municipality) is needed to push through all requirements of the public as the private investor is interested to keep the cost of any public investment as low as possible.
- The static and real-time information system needs to be designed parallel to the architectural design of the buildings in order to create a uniform and integrated system.
- Integrated management can greatly improve cooperation between modes and contribute to the creation of a uniform passenger experience concerning information provision, cleanliness, security, safety and emergency response.
- Refurbishment of a terminal should cover all areas to avoid problems with barrier-free access and large differences in the quality of space.

- Plans have to be made for the utilisation of the old infrastructure (in case of replacement or refurbishment).