Good Practice in Transport Interchanges

A range of case studies from across the Northwest Europe area examining public transport interchange design
Sustainable transport for North-West Europe’s periphery

Sintropher is a five-year €23m transnational cooperation project with the aim of enhancing local and regional transport provision to, from and within five peripheral regions in North-West Europe.

INTERREG IVB

INTERREG IVB North-West Europe is a financial instrument of the European Union’s Cohesion Policy. It funds projects which support transnational cooperation.
This report has been produced as a contribution to the work of the Sintropher project, but the views expressed in the report are those of the author. All photographs in this report are by the author, unless otherwise stated.

Acknowledgements

This report would not have been possible without the use of Transport for London’s *Interchange best practice guidelines: quick reference guide* (2009), and the advice and support of John McNulty and Emma Osborne of Transport for London is gratefully acknowledged. The work of ASGO in Ostend has also been influential in the preparation of the report, and the author is grateful to Karel Vanackere of ASGO for sharing his experience.
GOOD PRACTICE IN TRANSPORT INTERCHANGES
PROJECT REPORT

Table of contents

Table of contents ................................................................................................................................................. 1
List of figures .......................................................................................................................................................... 3
Introduction ........................................................................................................................................................... 5
Background .............................................................................................................................................................. 6
Organisational structure ........................................................................................................................................ 6
Interchanges as nodes for development ............................................................................................................. 8
Interchange design principles ............................................................................................................................. 9
Methodology ........................................................................................................................................................ 10
Rationale for selecting case studies ................................................................................................................... 11

Good practice in the design of small and medium-sized interchanges .............................................................. 13

Efficiency .............................................................................................................................................................. 13
Operations ............................................................................................................................................................ 13
Movement within the interchange facility ........................................................................................................ 15
Movement through the wider interchange zone ............................................................................................... 17
Sustainability ....................................................................................................................................................... 18

Usability ............................................................................................................................................................... 19
Accessibility ......................................................................................................................................................... 19
Safety and accident prevention .......................................................................................................................... 21
Personal security ................................................................................................................................................ 22
Protected environment ..................................................................................................................................... 23

Understanding ...................................................................................................................................................... 24
Legibility ............................................................................................................................................................... 24
Permeability ...................................................................................................................................................... 25
Wayfinding ......................................................................................................................................................... 27
Service information .......................................................................................................................................... 28
Quality ................................................................................................................................................................. 30

Lessons from larger interchanges ..................................................................................................................... 32

Efficiency .............................................................................................................................................................. 32
Operations ............................................................................................................................................................ 32
Movement within an interchange facility ........................................................................................................ 34
Movement through the wider interchange zone ............................................................................................... 36
Sustainability ....................................................................................................................................................... 39

Usability ............................................................................................................................................................... 40
Accessibility ......................................................................................................................................................... 40
Safety and accident prevention, personal security .......................................................................................... 41
List of figures

Figure 1: Decision spaces, movement spaces and opportunity spaces................................................................. 10
Figure 2: Leyenburg interchange ......................................................................................................................... 14
Figure 3: Tram and bus at Valenciennes .............................................................................................................. 14
Figure 4: Eschwege interchange (artists’ impression) .......................................................................................... 14
Figure 5: Eschwege interchange .......................................................................................................................... 14
Figure 6: Service information panel at Hessisch Lichtenau, with notice of temporary bus replacement service ...... 15
Figure 7: tram and bus services at Espace Villars .................................................................................................. 16
Figure 8: Manchester Shudehill Interchange ....................................................................................................... 16
Figure 9: Manchester Shudehill Interchange ....................................................................................................... 16
Figure 10: train and bus services at Zierenberg-Oberelsungen ............................................................................. 16
Figure 11: Valenciennes rail station forecourt and tram stop in background ....................................................... 17
Figure 12: Espace Villars: entrance to main street ............................................................................................... 17
Figure 13: Parking for cars and motorcycles at Bebra ......................................................................................... 17
Figure 14: Cycle store at Eschwege .................................................................................................................... 18
Figure 15: Accrington Eco-Station ..................................................................................................................... 18
Figure 16: Nelson Interchange ............................................................................................................................ 19
Figure 17: Sliding ramp for cases at Bebra .......................................................................................................... 20
Figure 18: Step-free crossing point at Leyenburg ............................................................................................... 20
Figure 19: ramped access to Manchester Metrolink tram platform .................................................................... 20
Figure 20: Dual-height platform at Laan van Noi ................................................................................................ 20
Figure 21: Platform arrangement at Voorburg t’ Loo ............................................................................................ 21
Figure 22: Platform arrangement at Forepark ..................................................................................................... 21
Figure 23: Pijnacker Centrum (the lift to the platform on this side of the station is to the right of the picture) ...... 21
Figure 24: Lift access at Nelson ........................................................................................................................ 21
Figure 25: Bus bay doors opening at Nelson ........................................................................................................ 22
Figure 26: A skateboarder on the Manchester Metrolink tram tracks ............................................................... 22
Figure 27: Lighting at Zierenberg-Oberelsungen ................................................................................................. 23
Figure 28: Protected environment at Nelson ....................................................................................................... 23
Figure 29: Protected environment at Eschwege ................................................................................................. 23
Figure 30: Protected environment at Zierenberg-Oberelsungen ........................................................................... 24
Figure 31: Legibility at Rotterdam Blaak ............................................................................................................ 24
Figure 32: Doncaster Bus Interchange ................................................................................................................ 25
Figure 33: Information and lighting pillars on the Valenciennes Tramway network ............................................ 25
Figure 34: Permeability at Nelson ....................................................................................................................... 26
Figure 35: Permeability of Eschwege interchange ............................................................................................. 26
Figure 36: Pijnacker Centrum (artists’ impression) ............................................................................................ 26
Figure 37: Landmark structure at Espace Villars ................................................................................................ 27
Figure 38: Information pillar at Eschwege .......................................................................................................... 27
Figure 39: Platform plan diagrams at Leyenburg ............................................................................................... 27
Figure 40: Service information on the Valenciennes Tramway ......................................................................... 28
Figure 41: Tram and bus information on the Valenciennes Tramway ................................................................. 29
Figure 42: Information pillar on the Valenciennes Tramway ............................................................................. 29
Figure 43: Information pillars in Kassel (left) and Eschwege (centre and right) .................................................... 29
Figure 44: Tram stop at Hessisch Lichtenau ....................................................................................................... 29
Figure 45: Real-time information at Zierenberg ................................................................................................. 29
Figure 46: Real-time information at Zierenberg-Oberelsungen ......................................................................... 30
Figure 47: Combined route map at Laan van NOI ............................................................................................. 30
Figure 48: Art by local schoolchildren in subway at Bebra station .................................................................... 31
Figure 49: Flowers by Friends of Nelson Station ............................................................................................... 31
Figure 50: Escalators at London King’s Cross St Pancras .................................................................................. 32
Figure 51: extra capacity exit at Amsterdam Bijlmer ArenA .............................................................................. 32

3
Figure 52: Deserted ticket counters at Manchester Victoria .......................................................... 33
Figure 53: Ticket hall at Ostend .................................................................................................... 33
Figure 54: Concourse at Liège-Guillemins .................................................................................... 33
Figure 55: Bridge above platforms at Liège-Guillemins ............................................................... 34
Figure 56: Temporary information sign at London King’s Cross St Pancras ................................. 34
Figure 57: single concourse at Ostend with platforms on the left .............................................. 35
Figure 58: single concourse at Kassel Wilhelmshöhe with platforms on the right ...................... 35
Figure 59: Kassel Hauptbahnhof .................................................................................................. 35
Figure 60: International passengers waiting to check in at Lille Europe ................................. 36
Figure 61: Access to platforms at Manchester Victoria is controlled by station staff checking tickets .......................................................... 36
Figure 62: bus station at Leiden, adjacent to train station ........................................................... 37
Figure 63: interchange zone at Rotterdam Blaak (NL) ............................................................... 37
Figure 64: interchange zone at Brussels West .............................................................................. 37
Figure 65: Ramps up from platform level at Kassel-Wilhelmshöhe provide access to front and rear entrances .......................................................... 38
Figure 66: Ferry services at rear entrance to Amsterdam Central .............................................. 38
Figure 67: solar panels in new design for Ostend ...................................................................... 39
Figure 68: Four-stream waste facility at Brussels Midi ............................................................... 39
Figure 69: Lifts at Leiden are an integral part of the concourse ................................................... 40
Figure 70: recent improvement to accessibility at Stratford ...................................................... 40
Figure 71: traffic-free space outside Sint-Niklaas station ............................................................ 41
Figure 72: Liège-Guillemins station: bus stops are across the open space ................................. 41
Figure 73: angled seating on platform at Sint-Niklaas ............................................................... 42
Figure 74: Protected environment at Kassel Wilhelmshöhe ......................................................... 42
Figure 75: Legibility at Kassel Hauptbahnhof ............................................................................. 43
Figure 76: View from concourse at Lille Europe ........................................................................ 43
Figure 77: Amsterdam Zuid connects two office parks ............................................................... 44
Figure 78: Access to fare-paid areas at Amsterdam Zuid ............................................................ 44
Figure 79: Side entrance at Kassel Wilhelmshöhe ....................................................................... 44
Figure 80: Street layout at Valenciennes ...................................................................................... 44
Figure 81: Wayfinding at Brussels West ....................................................................................... 45
Figure 82: Information pillars at Lille Europe .............................................................................. 45
Figure 83: The landmark of Amsterdam Bijlmer ArenA ............................................................... 45
Figure 84: Branding at rear entrance of Sint-Niklaas ................................................................. 46
Figure 85: Doncaster bus interchange online departure board .................................................. 46
Figure 86: online service timetable, NVV ................................................................................ 47
Figure 87: Online ticket information, Transville ....................................................................... 47
Figure 88: Interactive network map (RET) .................................................................................. 47
Figure 89: Real-time mapping of service disruptions (SNCB) ...................................................... 48
Figure 90: Interactive information about passenger facilities (Network Rail) ............................. 48
Figure 91: Sign to other modes at Brussels West ........................................................................ 48
Figure 92: bus bays at Nijmegen .................................................................................................. 48
Figure 93: bus bays at Sint-Niklaas ............................................................................................. 48
Figure 94: bus bays at Leiden ...................................................................................................... 49
Figure 95: Temporary information at Nijmegen ......................................................................... 49
Figure 96: Plan view of Manchester Piccadilly ........................................................................... 50
Figure 97: Plan view of Brussels Midi/Zuid ................................................................................ 50
Figure 98: Public space at Euralille ............................................................................................. 50
Figure 99: Sense of place at Amsterdam Bijlmer ArenA ............................................................. 51
Figure 100: Local street market at Rotterdam Blaak .................................................................. 51
GOOD PRACTICE IN TRANSPORT INTERCHANGES
PROJECT REPORT

Introduction

Sintropher\(^1\) is a transnational cooperation project bringing together five regions in North-West Europe. The project is due to last five years, with 14 partner agencies in five EU Member States. With a budget of €23m, it is part-financed by the EU INTERREG IVB programme, and involves a series of 36 feasibility evaluations, pilot investment and demonstration projects, as well as comparative analysis of EU best practice. The Lead Partner is University College London.

All our work is motivated by one overarching aim: to develop sustainable, cost-effective solutions to improve accessibility to, from and within peripheral regions in North-West Europe. As part of this, we have four specific objectives:

- Promote best possible cost-effective technology-based solutions
- Assess the appraisal procedure for regional tram systems and improve the business case
- Achieve high-quality, seamless interchange between regional tram systems and regional rail and air hubs
- Promote and market the benefits of regional tram-based systems to users and stakeholders

We have a particular focus on tram-train systems which allow local trams to run on to national rail tracks, as pioneered in Karlsruhe and developed in Kassel (Germany), as well as high-quality interchanges at key rail or air hubs.

In all, project partners from five demonstration regions in five EU Member States are working together: Valenciennes (France); the Fylde Coast (UK); West Flanders (Belgium); North Hesse (Germany); and Nijmegen-Kleve (The Netherlands). Participants include public transport operators, local authorities, regional management bodies and universities.

Each region will implement a programme of technical and economic feasibility evaluations for new systems, pilot investment projects, and demonstration projects. The programme will be complemented by a set of comparative analyses of EU best practice.

This report aims to contribute to the programme by reviewing current practice and sharing good practice in the design and operation of transport interchanges across partner regions.

The report is based on an evaluation of selected interchanges from the perspective of a visitor or occasional traveller, supplemented by discussions with representatives of partner regions. The evaluation draws upon Interchange Best Practice Guidelines, a framework developed in the UK by Transport for London (TfL, 2009) to advise its staff and partner organisations involved in interchange design and operation. The evaluation process was in turn used to assess the relevance of the Guidelines to smaller interchanges.

The report refers to ‘interchanges’ rather than ‘stations’ to emphasise that other public transport services play an important role as the rail network. The terminology adopted in the Guidelines is used where it is necessary or helpful to make a distinction between an interchange facility and an interchange zone:

- **Interchange facility** – a purpose-built facility where passengers can transfer from one mode of public transport to another, such as a railway station, bus station or bus/tram stop;
- **Interchange zone** – a wider area encompassing one or more interchange facilities creating a multi modal hub, linked by public spaces.

---

\(^1\) Sustainable Integrated Tram-based Transport Systems for Peripheral European Regions
Background

Organisational structure

SUMMARY: Rail infrastructure and rail services are usually provided by national organisations, some rail services by regional organisations. Infrastructure providers are often public or quasi-public bodies.

Other public transport infrastructure and services are usually the responsibility of regional or local organisations, often part of or linked to municipal authorities with wider functions.

Levels of co-operation between national, regional and local transport providers vary. Establishing co-operation in practice can be a difficult and complex process.

As a result of successive organisational reforms at European level beginning in 1991 with Directive 91/440, national rail services in Member States exhibit broadly similar institutional characteristics, with management (including maintenance, allocation and upgrading) of rail infrastructure in the hands of a national organisation (often state-owned and the successor to national rail service monopoly providers), and operation of rail services concentrated in a national organisation but increasingly open to a range of commercial operators (Holvad, 2009).

A variety of arrangements exist for the ownership and management of rail stations, generally involving one or a combination of the infrastructure management company and the rail service providers. In some cases, a separate or subsidiary body has been created to manage land and property assets associated with the network.

The provision of other modes of public transport typically involves journeys over shorter distances and is generally the responsibility of regional or local public bodies connected to regional or local municipal government authorities in some way (although the actual operation of services might be franchised or contracted out to a variety of private sector operators, the franchising authority generally retains some control over scheduling and provision of service information).

These bodies may have complementary responsibilities for maintenance and improvement of roads, pavements and public spaces, and for wider planning and regeneration functions. For example in The Netherlands, city-region authorities such as Stadsregio Arnhem Nijmegen have both transport and planning functions. In the UK, Transport for London is a public body under the authority of the Mayor of London alongside the regional planning authority. However, these arrangements are by no means universal and even vary within countries, with many existing on a voluntary basis.
Table 1 summarises the arrangements in the five countries visited

<table>
<thead>
<tr>
<th></th>
<th>Belgium</th>
<th>France</th>
<th>Germany</th>
<th>Netherlands</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rail infrastructure</strong></td>
<td><strong>provider</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrabel (part of SNCB/NMBS Group) (public limited company)</td>
<td>RFF³ (state-owned company)</td>
<td>Deutsche Bahn AG (state-owned company)</td>
<td>ProRail</td>
<td>Network Rail</td>
</tr>
<tr>
<td><strong>Rail service</strong></td>
<td><strong>provider(s)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNCB/NMBS</td>
<td>SNCF⁴ (state-owned company)</td>
<td>DB Netze Track (subsidiary of DB AG)/regional transport authorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rail station</strong></td>
<td><strong>ownership</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNCB/NMBS Holding (part of SNCB/NMBS Group)</td>
<td>SNCF</td>
<td>DB Netze Stations (subsidiary of DB AG)</td>
<td>ProRail/NS</td>
<td></td>
</tr>
<tr>
<td><strong>Public transport</strong></td>
<td><strong>authority</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STIB (Brussels) /TEC (Wallonia) /De Lijn (Flanders)</td>
<td>Various organisations at regional and sub-regional levels (eg SITURV)</td>
<td>Various organisations at regional and sub-regional levels (eg NVV)</td>
<td></td>
<td>Transport for London/Passenger Transport Executives in six metropolitan regions/County councils elsewhere</td>
</tr>
</tbody>
</table>

---

² Société Nationale des Chemins de fer Belges/Nationale Maatschappij der Belgische Spoorwegen
³ Réseau Ferré de France
⁴ Société Nationale des Chemins de fer français
⁵ NV Nederlandse Spoorwegen
Rail infrastructure management companies across Europe co-operate within the organisation RailNetEurope to, amongst other objectives, develop cross-border services. RailNetEurope produces guidance to companies on drafting the annual network statements that specify the terms of their agreements with rail service providers. For other public transport modes, networking and knowledge exchange occur at a more informal level (for example, the UK's Passenger Transport Executive Group recently commissioned a report on public transport tendering in the Netherlands (van de Velde et al, 2010)).

Despite the wide-ranging reforms to the institutional structure of European rail services, there is no explicit requirement on rail service bodies to co-operate with providers of other transport modes (and vice versa). Premius & Konings have argued that the poor competitive position of public transport is caused by inappropriate and fragmented provision “because the necessary logistic and entrepreneurial cooperation between the various providers of public transport has not been forthcoming” (2000, p236).

**Interchanges as nodes for development**

**SUMMARY:** Commercial and residential development around stations on the high speed rail network (and some large national rail stations) is common throughout Europe, and has attracted interest from academics and policy makers.

In principle, smaller stations could also become the focus for associated land uses, particularly community facilities. This could benefit both passengers and local communities.

The emergence of a European network of high speed rail services (in some cases with connections to airports, such as at Amsterdam Schiphol in the Netherlands) has helped to facilitate commercial and residential development in and around the stations on this network. In some cases, this has involved ambitious regeneration initiatives covering a wider area surrounding the station: London King’s Cross-St Pancras (UK) and Lille Europe (FR) are well-known case studies discussed by Bertolini (1996) and Newman & Thornley (1999); the relationship between high speed services to Amsterdam Zuid (NL) and office development in the area has been researched extensively (Bruinsma, 2009) and the new station on the high speed network at Liège-Guillemins (BE) is intended to project a “new cultural image” capable of attracting new residents and inward investment (Cassiers & LeClercq, 2009).

This process is to some extent being replicated at a smaller scale in and around other major national rail stations (such as Manchester Piccadilly (UK) and Leiden (NL)). In the UK, at least, planning policy strongly encourages higher density development around public transport nodes and accessibility to public transport is in turn a factor increasing land values in these areas. This issue is the focus of another strand of work within Sintropher, and will be the subject of a separate project report to be published in due course.

Although smaller nodes in more peripheral regions have not attracted the academic or commercial interest surrounding the high speed stations, the policy objective is essentially very similar. The potential for using small rural stations as hubs for essential community facilities such as post offices has been identified, in the UK context, by Green & Hall (2009). This strategy could benefit local communities by improving accessibility to essential facilities and could also enhance the experience of passengers using the interchange and provide a source of revenue which could be directed at further improving the provision of public transport services.
Interchange design principles

**SUMMARY:** Sintropher criteria for innovative interchange facilities: sustainability, integration and technical design.

Transport for London Guidelines: Efficiency, usability, understanding and quality are key principles. Design should be based on identifying and connecting “decision spaces” and “movement spaces”.

Sintropher has identified three criteria for evaluating new innovative interchange facilities:

- **Sustainability** (for example, using renewable energy to support information systems and innovative renewable features);
- **Integration**: for users and non-users, as nodes of mixed-use development;
- **Technical design**: providing universal access to all modes of transport, particularly for the most car-dependent passengers.

These criteria incorporate essential elements such as standard platform heights, ramps and effective connections from trams and trains to shops, services and homes.

**Transport for London**’s *Interchange best practice guidelines* (TfL, 2009) are based on four themes, each expanded into four criteria, giving a total of 16 criteria:

- **Efficiency** (interchanges encourage efficient movement of people and public transport services, and are simple to manage and maintain);
  - Operations;
  - Movement within the interchange facility;
  - Movement within the interchange zone;
  - Sustainability (Sintropher criterion: sustainability);

- **Usability** (interchanges are accessible, safe, secure and comfortable);
  - Accessibility (Sintropher criterion: technical design);
  - Safety and accident prevention;

- **Understanding** (interchanges are easy to use, require minimal signage and are well integrated with their surroundings);
  - Legibility;
  - Permeability;
  - Wayfinding;
  - Service information;

- **Quality** (the interchange is a destination in its own right, creating social, economic and environmental value and instilling a sense of civic pride in users);
  - Perception;
  - Built design;
  - Spaces (Sintropher criterion: integration);
  - Sense of place (Sintropher criterion: integration).

However, the underlying design concept is that of defining decision spaces (where passenger decisions take priority), movement spaces (connecting decision spaces) and opportunity spaces (the remaining areas that can be used for retail and other passenger facilities) (see Figure 1).
Methodology

**SUMMARY:** Combining Transport for London Guidelines with Sintropher criteria: sustainability; integration with mixed use development; and universal access.

Also considering cost-effectiveness and practical constraints of existing facilities.

Peer review evaluation of selected interchanges within Partner Regions.

The evaluation of selected interchanges summarised in this report is based on a combination of the criteria identified by Sintropher and those of Transport for London. Two additional criteria also have some relevance to the development of best practice:

- **Cost-effectiveness** (the cost of the development or improvement of the interchange is appropriate to the benefits it delivers). This criterion is influenced by station size and by longer-term strategic development plans for the area. In the UK, cost-benefit analysis is commonly used to decide whether a transport project should go ahead, although other partner regions might adopt different decision-making approaches.

- **Practicality** (where existing facilities present physical and technical constraints or problems, an effective solution to these is found). Improvement, extension or redevelopment of existing transport hubs and interchanges is more prevalent than the development of completely new ones, and so existing constraints will be influential in the design.

These 18 criteria were used to conduct a peer review evaluation of a selection of existing and proposed interchanges within the partner regions. Examples of good practice and issues for further consideration have been drawn from this evaluation for the report.
Rationale for selecting case studies

SUMMARY: Case studies from four categories: small interchanges between two modes in peripheral areas; medium-sized transport hubs with rail, bus and other services; large interchanges with national and regional rail services and urban transport network; major interchanges also offering international rail services.

Users include a mixture of local residents, inward commuters, tourists and occasional visitors, and business visitors. Larger interchanges generally have a more complex mixture of users.

Some medium-sized and large cases have separate interchange facilities within an interchange zone.

Categories reflect those of national rail infrastructure providers, but are not directly comparable.

Case study interchanges were selected to compare examples from Belgium, France, Germany, the Netherlands and the UK across four geographical categories. The number and type of examples varies between countries because the main objective was to review cases of inherent interest rather than to systematically compare the performance of different interchange providers. The categories are based on generic type and urban function, and are:

- **small interchanges** between (usually) only two modes in peripheral areas, catering primarily for local residents travelling into the nearest town or city, to work or to access education, community and leisure facilities;

- **medium-sized interchanges** acting as transport hubs in small towns or city suburbs, generally involving rail and bus services and often a third mode, catering for a mixture of local residents commuting to larger towns and city centres, inward commuters who work and/or access other facilities in the area, and (depending on the character of the area) some tourists and occasional visitors;

- **large interchanges** acting as the main transport hub in major cities, generally involving both national and regional rail services and an urban transport network, catering for all of the above groups but generally with a larger proportion of inward commuters, tourists and occasional visitors, together with some business visitors;

- **and the largest**, major interchanges offering international as well as national and regional rail services and an urban transport network, catering for all of these groups but generally with a larger proportion of tourists and business visitors.

The categories are intentionally loose: the latter three in particular could be more usefully understood as representing a spectrum of complexity and for this reason they are discussed together in the report. They can incorporate several separate interchange facilities, often a street-based open-air tram-bus interchange (or, increasingly popular in the UK, an interchange building solely for buses) attached to a rail station. These have also been considered as analogous to self-contained small interchanges, as they share many of the same design principles.
Each group of users is likely to have a specific set of needs, which might include:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Local residents</td>
<td>Service reliability, comfort, minimal waiting time</td>
</tr>
<tr>
<td>Inward commuters</td>
<td>Minimal transfer and waiting times, lack of obstruction, connectivity to surrounding area</td>
</tr>
<tr>
<td>Tourists and occasional visitors</td>
<td>Wayfinding, ticketing, route and service (including real-time) information in a selection of languages</td>
</tr>
<tr>
<td>Business visitors</td>
<td>Minimal transfer and waiting times, wayfinding, real-time information</td>
</tr>
</tbody>
</table>

This categorization recognizes that while different scales present unique challenges in interchange design and operation, useful lessons may be more widely applicable. It also views small interchanges as potential hubs of development that may attract new or expanded transport services in the future and would then face the challenges of medium-sized interchanges and so on.

Although rail stations are categorised according to size by national rail infrastructure providers, this report has not adopted their categorisation for three reasons. Firstly, the categories are not directly comparable: there are seven in the UK, six in Germany, five in the Netherlands and three in Belgium (with Brussels Midi in a category of its own). Secondly, the national rail bodies are generally not responsible for smaller street-based interchanges. Lastly, the categorisation process adopted here attempts to group examples by type and function rather than on more specific criteria such as passenger numbers, and does not necessarily reflect the categories assigned by national rail infrastructure providers. For example, Bebra (DE) is considered a small interchange here, reflecting the size and position of the town and the level of passenger interchange activity, although it is classified as a local transport node (category 3) by Deutsche Bahn AG, whilst Leyenburg (NL) is also considered a small interchange because, although it involves three modes in a city suburb, it is entirely street-based and so does not present the same issues as interchanges involving rail services.

Details of interchanges visited in the course of preparing this report are at Appendix I.
Good practice in the design of small and medium-sized interchanges

Efficiency

Operations

“How well are the different functions balanced and integrated?”: in small interchanges, the need for decision and movement spaces should be minimal. Real-time information and opportunity areas can help attract passengers.

“Does the interchange design offer sufficient capacity to meet demand?”: small interchanges with long platforms have the capacity to serve large numbers of passengers. Interchange design should allow for capacity to be increased in future if passenger numbers increase.

“Are public transport services and ticketing arrangements co-ordinated?”: this issue needs to be addressed at the network level and through agreements between service providers.

“Are fare paid areas clearly defined and do passengers know when they are moving from one operating environment to another?”: this issue is rarely problematic outside the UK and can be addressed through integrated ticketing systems.

“Where will temporary information be displayed?”: real-time information about changes or disruptions to services should have priority. Temporary information displays should be integrated into an overall service information strategy.

TfL (2009) describes the basic function of an interchange as facilitating transfer between services and modes, including private transport, by providing a balance of decision spaces, opportunity spaces and movement spaces. Service providers and the owners of the space also need to consider operational and maintenance issues, but these issues are considered to be outside the scope of this report.

For regular passengers using small interchanges with only two modes, transferring from the feeder mode to the principal mode during a journey to work involves no significant decision-making. Their overriding need is for real-time information about the service, particularly about delays or changes. On the return journey, the feeder mode has to be sufficiently attractive to discourage passengers from phoning family or friends to ask for a lift in the car instead, and in that sense the entire interchange zone could be viewed as a decision space. Real-time information is perhaps even more crucial at this stage, together with ‘opportunity areas’ (activities and facilities that can add value to passengers’ waiting time). If waiting is a pleasant and interesting experience, the interchange is more likely to attract passengers. Unfortunately, small interchanges are rarely perceived as having the potential to sustain commercial uses and the budget for passenger facilities might also be very limited.

Leyenburg (NL) provides an excellent example of a simply designed street-based interchange between bus, tram and light rail services in a suburban area of The Hague. A series of island platforms provide sheltered seating, waiting and information areas and offer the possibility of transferring between modes on a single platform. The platforms have the capacity to accommodate several long vehicles and large numbers of passengers. Although the interchange offers only
minimal facilities, this contributes to its overall efficiency and cost-effectiveness. Small interchanges may attract more passengers (and even more services) in the future. They should be designed with a view to increasing capacity if required, for example by lengthening platforms.

- **Example: Leyenburg**

  Figure 2: Leyenburg interchange

- **Example: Valenciennes Tramway**

  The Valenciennes Tramway (FR) also illustrates the benefits of running street-based tram services in parallel with bus services, enabling combined passenger facilities, service information and ticketing arrangements.

  Figure 3: Tram and bus at Valenciennes

In both examples, the need for decision and movement spaces is minimised by the layout.

- **Example: Eschwege**

  At Eschwege (DE), a more elaborate layout provides capacity for buses to turn and lay by, short- and long-term parking, cycle parking and an area of opportunity space. These facilities encircle the main area of interchange without creating any obstructions to it.

  Figure 4: Eschwege interchange (artists’ impression)

  Source: www.eschwege.de/default_neu.html

  Figure 5: Eschwege interchange

  Co-ordinating service frequencies and ticketing arrangements is a network-wide issue that needs to be addressed in the design of the system as a whole, rather than of a single interchange. Many regional and local transport authorities offer integrated tickets that can be used across all of the different modes they offer, and the Dutch *stripenkaart* provides integrated ticketing and fares across the entire country, but the interface with national rail services is often less smooth. One example of good practice on this issue is the ‘Plusbus’ scheme operated in the UK; passengers buying national rail tickets are offered the chance...
to buy an additional ticket valid on buses from their origin and destination stations.

Logistical difficulties are also involved in co-ordinating service frequencies in peripheral areas. Conversely, interchanges with a wide range of services offer so many potential combinations that service co-ordination becomes an impossible task. However, there may be merit in identifying and co-ordinating core commuter services across modes.

The need to define and control ‘fare paid’ areas appears to be specific to the UK; in the other countries participating in this study, the normal practice on most modes (other than some urban metro systems) is for passengers to self-validate their tickets via validating machines. This is also a network-wide issue, as an integrated ticketing system can eliminate the need for barriers between different operating environments (ie between services run by different operators). A lack of clarity on this issue can cause problems, however, and this point is discussed in later sections under ‘Service information’ and ‘Larger interchanges’.

Specific sites for displaying temporary information can and should be designed into an interchange facility, if possible as an integral part of a wider service information point or real-time information displays. Information about changes or delays to services should take priority.

- **Example: Hessisch Lichtenau**

This notice at Hessisch Lichtenau (DE) is integrated into the permanent service information panel but highlighted with the use of colour.

The display of temporary information is discussed further under ‘Larger interchanges’.

Figure 6: Service information panel at Hessisch Lichtenau, with notice of temporary bus replacement service

---

**Movement within the interchange facility**

**“Is movement between locations and services easy and accessible?”**: street-based interchanges between parallel services offer the best opportunity for accessible movement. They should be kept free from general traffic, with dedicated pedestrian crossing points.

**“Have passenger flow conflicts been minimised?”**: passenger flows should be separated if the interchange is operating at (or near) capacity. Signage can be used to define one-way routes, and placing of feeder modes can help to minimise conflicts.

Another obvious advantage of street-based interchanges is that movement between different services should be straightforward where these are running in parallel.

- **Example: Espace Villars**

Figure 7 illustrates a typical layout at Espace Villars (FR), a terminal on the Valenciennes Tramway.
Where street-based services are involved, the interchange needs to be kept free from general traffic, for operational efficiency and to allow passengers to move around safely and easily. In the UK, purpose built ‘interchanges’ for bus passengers are increasingly popular, offering a high-quality, clean and protected waiting environment connecting all available bus routes.

- **Example: Manchester Shudehill**

This example from Manchester Shudehill (UK) uses diagonals, wide spaces and clear sightlines to bus bays, to make movement flows as simple as possible (Figure 8). Tram services run in parallel at this point and a safe pedestrian route to the tram platform is provided across a dedicated crossing point from the interchange exit (Figure 9).

- **Example: Zierenberg-Oberelsungen**

Transfer between street-based services and single track rail services should also be straightforward, as at Zierenberg-Oberelsungen (DE). Access to ‘feeder modes’ can also be organised so that different groups of passengers are separated. Even in this smallest and most remote interchange, passenger flows have been planned so that the movements of cyclists, car drivers and passengers, and bus passengers are not in conflict.
Movement through the wider interchange zone

“Have routes to and from the surrounding area been optimised?” & “Is the interchange zone well connected with external facilities?”: street-based interchanges should be located at junctions in the surrounding road network, with dedicated pedestrian access to key locations.

“Are feeder mode facilities appropriate?”: access to public transport services by car, motorcycle and bicycle should be provided for. Terminals can also provide layby space for buses and trams.

• Example: Valenciennes Tramway

Street-based interchanges between bus and tram services are in some cases adjacent to rail stations providing heavy rail services, as in this example at Valenciennes (FR). The combination provides an ‘interchange zone’ within which movement spaces for transferring passengers needs to be prioritised over other functions. In this example, the most convenient solution for passengers would involve trams and buses stopping in front of the station, but this proved impossible due to statutory restrictions on the use of the adjoining space arising from the historic status of the station building. Siting the tram/bus stop in line with the buildings (in the background of Figure 11) is a good compromise which allows unobstructed movement between the modes but also makes other destinations within the town easily accessible for users of both.

Figure 11: Valenciennes rail station forecourt and tram stop in background

good pedestrian connections to the main shopping street, without disrupting local activities.

Figure 12: Espace Villars: entrance to main street

• Example: Bebra

Provision for private transport feeder modes (including cars, motorcycles and cycles) is especially important where local bus services have limited coverage, as in this example at Bebra (DE).

Figure 13: Parking for cars and motorcycles at Bebra

Eschwege (DE) also offers an excellent range of facilities for feeder modes: pedestrian crossings are well placed; cycle parking is nearest the road

• Example: Espace Villars

The interchange facility at Espace Villars provides
junction so that cyclists have the shortest trip into the facility; short-stay parking is accessed from the road junction and open-air; long-stay parking is to the rear and covered. A useful feature here is the inclusion of lockers within the cycle store.

Figure 14: Cycle store at Eschwege

**Sustainability**

**SUMMARY:** Open-air facilities and good design can minimise energy and resource consumption.

‘Future-proofing’ can involve providing scope to increase passenger capacity in the future.

Although the use of durable and sustainably sourced materials is an important means of minimising maintenance and lifecycle costs, this highly specialised aspect of interchange design is beyond the scope of this report. Most small interchanges considered in this report are open-air facilities or are lit mainly by natural light, and this suggests a design principle which will be considered further under ‘Larger interchanges’.

- **Example: Accrington**

At Accrington (UK), a new ‘Eco-Station’ building has been designed and built as part of the SusStations project funded by Interreg IVB, “using locally sourced ... [and] recycled materials ..., and materials that can also be recycled if the building is dismantled in the future ... solar panels and grey (rain) water harvesting for use in the public and staff toilets” (ELCRP, 2011). Although the station currently suffers from poor connections to bus services, links to pedestrian and cycle routes and to a new bus interchange are planned.

The proposed new interchange facility for bus and tram services to the train station at Koksijde (BE) has been designed for low energy consumption, although the use of large amounts of glass and the need to open doors frequently have made passive solar design impractical in this case.

Figure 15: Accrington Eco-Station

However, good visibility and easy access to and from the building are such essential features for a transport interchange facility that a trade-off between efficiency and energy consumption may be inevitable in interchange design. The Guidelines emphasise ‘future-proofing’ as an important element of sustainability, and in particular the need to cater for possible increases in passenger numbers if the area becomes the focus of increased development activity. The long platforms at Leyenburg (NL) (Figure 2) provide an
example of designing in the scope to increase passenger capacity as one way of ‘future-proofing’ a small interchange.

- **Example: Nelson**

The new interchange facility at Nelson (UK) has been designed with the aim of leaving sufficient unused space behind the building (on the right of Figure 16, with the train platform to the left) to accommodate the possible future expansion from one rail line to two.

Figure 16: Nelson Interchange

### Usability

### Accessibility

“Can all areas of the interchange zone be reached by avoiding steps?”: any means of improving access for passengers with mobility problems should be considered, even those not involving step-free access. Ramps can be integrated into the streetscape, and into platforms providing access to different modes.

“Are lift and escalator locations and designs optimised?”: lifts and escalators should be in prominent and convenient locations.

Representatives of disabled passengers should be consulted during the design of an interchange and should be invited to help test services.

All European countries are in the process of introducing legislation to ensure that disabled people have equal access to public transport, and any new interchange facilities will need to be designed with this requirement in mind. Step-free access is a basic requirement for wheelchair-bound passengers and is helpful for any passengers with limited mobility.

The Valenciennes Tramway (FR) is an excellent example of good practice in this respect, as representative groups of disabled passengers were consulted in the design of the network and helped to test services before opening.

For existing interchanges, service providers will also need to make efforts to improve accessibility. The guidelines emphasise the importance of providing level boarding on all services and, although service provision is beyond the scope of this report, the use of ramps and variable platform heights can be relatively simple and inexpensive solutions for adapting existing interchanges.

- **Example: Bebra**

The cost of providing step free access at small older stations can be prohibitive but simple innovations such as this sliding ramp for cases at Bebra (DE) can help improve the journey for passengers with luggage.
• **Example: Leyenburg**

Small changes in pavement levels will often be sufficient to provide step-free access at street-based interchanges such as Leyenburg (NL), an approach which can also be used to cross rail tracks in some circumstances.

Figure 18: Step-free crossing point at Leyenburg

• **Example: Manchester Metrolink**

Even where street-based services use high platforms, ramps from street level can form an integral part of the streetscape design and a natural route to the platform, as in the Manchester Metrolink (UK) tram network.

Figure 19: ramped access to Manchester Metrolink tram platform

Source: www.railwaytechnology.com

• **Example: Laan van Noi**

Laan van Noi (NL) is one of five stations in The Hague at which the Randstadrail light rail service shares platforms with the Rotterdam Metro; level boarding is provided despite the different carriage heights of the two services, by using ramps to change the height of the platforms.

Figure 20: Dual-height platform at Laan van Noi

• **Example: Voorburg t’ Loo/Forepark**

This solution can be adapted for shorter platforms – such as at the next station, Voorburg t’ Loo (NL), where stairs at the platform edge are combined with a ramp, and for island platforms – such as at Forepark (NL), where stairs at the platform edge are combined with a central ramp and waiting areas (Figures 21 & 22).
Movement routes for less mobile passengers should not be segregated from the main route and, where lifts are necessary, they should be in prominent and convenient positions.

- **Example: Nelson**

  The train platform at Nelson (UK) is one level up from the interchange facility; the main route to the platform is by a ramp, but it can also be accessed by a lift. The lift is next to the ticket office at ground level, and at platform level leads to a pathway that reaches the platform at the same point as the ramp.

  ![Lift access at Nelson](image)

**Safety and accident prevention**

**SUMMARY:** Potential conflicts between vehicles and pedestrians should be minimised.

Specialist advice is needed to ensure interchange design meets safety and other regulatory standards. Standards can vary across modes, however, and need to be harmonised in the design of interchanges involving different modes.
This section of the guidelines emphasises the need for compliance with fire, safety and security regulations, and for an emergency management plan to be agreed between all stakeholders. These issues require specialist expertise and are therefore beyond the scope of this report.

For street-based interchanges, the most important safety issue is to minimise conflicts between vehicles, and between vehicles and pedestrians.

**Example: Nelson**

At Nelson, pedestrians have safe routes into the interchange building, where automatic doors are opened by the bus driver on arrival of the bus and warning barriers prevent passengers from accidentally walking into the path of vehicles.

![Figure 25: Bus bay doors opening at Nelson](image)

Safety standards can vary widely between different modes, however, and even where a protected environment is provided, passengers might choose to reject it.

**Example: Manchester Metrolink**

![Figure 26: A skateboarder on the Manchester Metrolink tram tracks](image)

**Personal security**

**SUMMARY:** Specialist advice can help minimise threats to personal security. Small interchanges can become isolated, but clear and simple layouts and good lighting can help encourage natural surveillance. Increasing levels and types of activity in the surrounding area can help minimise opportunities for crime.

Crime prevention requires specialist expertise and is therefore beyond the scope of this report. It is particularly important in small interchanges in rural or semi-rural locations, which can easily become deserted and isolated, although the cost of comprehensive security measures may be prohibitive. The principles of crime prevention through design emphasise the need to minimise opportunities for crime through features such as increasing levels and types of activity in public spaces (Carmona et al, 2003) and this provides a powerful argument for encouraging the role of small interchanges as nodes for mixed use development.
The smaller interchanges visited for this report all demonstrated clear and simple layouts that encourage natural surveillance.

- **Example: Zierenberg-Oberelsungen**

In isolated locations, good lighting can help to create a sense of personal security and safety, as at Zierenberg-Oberelsungen.

![Lighting at Zierenberg-Oberelsungen](image)

---

## Protected environment

**SUMMARY:** Enclosed spaces or platform canopies are essential for waiting passengers.

Small interchanges in particular need to provide a comfortable waiting environment to attract passengers away from cars.

- **Example: Nelson**

The enclosed space of Nelson Interchange (UK) provides a comfortable and secure waiting environment that bus passengers in the UK are rarely fortunate enough to encounter.

![Protected environment at Nelson](image)

- **Example: Eschwege**

However, well designed platform canopies, as at Eschwege (DE) can offer as comfortable an environment as entirely enclosed buildings.

![Protected environment at Eschwege](image)

- **Example: Zierenberg-Oberelsungen**

The smallest interchanges face the most difficulty in attracting passengers away from their cars, and
in these cases a weatherproof seating area becomes even more essential, as at Zierenberg-Oberelsungen.

Figure 30: Protected environment at Zierenberg-Oberelsungen

Understanding

Legibility

“Does the layout of the interchange zone make it easy for users to find their way around?”

Street-based interchanges should have simple layouts, clear sightlines between services, and a visual connection to the surrounding area.

Infrastructure and street furniture should be of a consistent design throughout the network.

- Example: Rotterdam Blaak

Small street-based interchanges with services running in parallel benefit from simple layouts and from a visual connection to the surrounding area. At Rotterdam Blaak (NL), the distinctive architecture of housing ahead and the rail station to the left help users make sense of the zone.

Figure 31: Legibility at Rotterdam Blaak
• **Example: Doncaster**

Clear sightlines, good lighting and a simple layout help users navigate Doncaster Bus Interchange (UK).

*Figure 32: Doncaster Bus Interchange*

If the design of infrastructure and street furniture is consistent throughout the network, passengers can easily recognise different stops on their journey.

• **Example: Valenciennes Tramway**

The Valenciennes Tramway (FR) and Nord Hesse RegioTram (DE) networks illustrate this principle.

*Figure 33: Information and lighting pillars on the Valenciennes Tramway network*

---

**Permeability**

“Does the interchange zone connect easily with internal and external destinations?”: safe pedestrian routes and clear sightlines should be provided to all parts of the surrounding area.

Rail tracks often create a barrier between two sides of an area. Interchange design can use differences in ground levels to reduce this barrier.

“Does the interchange facilitate movement through paid/controlled areas?”: self-validation of tickets reduces the need for ticket barriers and helps ease of movement.

• **Example: Nelson**

Nelson Interchange (UK) provides a good illustration of the design principle of permeability: pedestrian crossings provide safe walking routes from the Interchange entrance to the main shopping street but also to the residential side streets behind the rail line, while buses have a dedicated entrance and a drop off point for cars and taxis is provided to the side.
Pedestrian, cycle and road connections to the surrounding area are also well integrated at Eschwege (DE), where the interchange zone is at the edge of a roundabout connecting several main roads through the town. The street layout provides clear sightlines from the interchange zone into the town.

Street-based interchanges can be very effectively integrated into the surrounding street scene, and this attribute helps passengers move to and from the surrounding area. However, rail tracks can create a barrier between the two sides of the surrounding area and the design of rail stations can consolidate this, with a clear distinction between the imposing front entrance and poorer rear entrance. This challenge faces the old station of Bebra (DE) but also newer stations at Laan van Noi (NL), Lieden (NL) and Sint-Niklaas (BE), and any new interchanges involving (non-terminating) rail services, whatever their size.

**Example: Pijnacker Centrum**

Where ground levels differ markedly, good design can use this feature to reduce the separation effect of rail infrastructure, as at Pijnacker Centrum (NL) on the Randstadrail line, where the rail tracks are laid in a valley below ground level and the station is accessed via a lift, stairs and ramps.

As noted before, self-validation of tickets is widespread in all countries visited except the UK, with the exception of urban metro systems, which generally have automatic ticket barriers. This factor significantly increases permeability and ease of movement.
Wayfinding

“Does wayfinding design and signing facilitate intuitive movement?”: landmark structures and buildings can help visitors find their way around.

“Have signs … been installed to support passenger movement needs whilst minimising obstructions to flows?”: signs should be at decision points, combine all information about services and facilities at the interchange and routes to the surrounding area, and use graphic symbols and colour-coding.

This section is similar to ‘legibility’ in that it deals with how easily passengers find their way to, from and within the interchange. This should be a relatively simple issue for small interchanges. However, memorable structures or buildings can perform a useful landmark function for passengers unfamiliar with the area.

- **Example: Espace Villars**

  In this example, the canopy structure at Espace Villars (FR) provides a landmark, defining the boundary with the surrounding area and helping passengers find their way back to the interchange.

  ![Figure 37: Landmark structure at Espace Villars](image)

- **Example: Eschwege**

  Signs and information can help orientate passengers if located at the main decision points. This information pillar at Eschwege (DE) directs passengers entering and leaving the interchange zone and uses easily recognisable graphic symbols to provide information about facilities available.

  ![Figure 38: Information pillar at Eschwege](image)

- **Example: Leyenburg**

  Where several services are available, simple plan diagrams can help passengers locate the platform they need. These signs at Leyenburg (NL) are in prominent locations at the ends of each platform and use colour-coded labels to identify the stopping points for specific services across three modes.

  ![Figure 39: Platform plan diagrams at Leyenburg](image)
Service information

“Does information meet with the needs of all passengers?”: pre-journey information is mostly a network issue, although information at the interchange is reassuring for occasional travelers.

A consistent style and approach to information provision across the network helps passengers make sense of it easily. Different types of information should be grouped together in a central area.

Real-time information is particularly important in remote locations with low service frequencies.

Service providers rarely co-operate to provide integrated information at interchanges, although this could make inter-modal route planning far simpler.

This section emphasises the need for both pre-journey and in-journey information, including real-time information about service delays and changes. However, pre-journey information is primarily a network issue: many passengers will plan their journey before leaving home, with the internet (and, in some areas, text messaging) widely used as a source of pre-journey information and ticket purchase for all types of journeys across the five countries. Some examples of internet-based information systems are given under ‘Larger interchanges’. Rail and public transport operators also generally provide staffed information and ticketing centres within larger interchanges and some also have similar facilities in town centres (such as Kassel) or along routes (such as the Lijnwinkels of De Lijn).

Nevertheless, occasional travelers, tourists and visitors in particular need the reassurance of well-presented and easily interpreted service information at the interchange. As noted earlier in ‘Legibility’, a consistent style and approach at all destinations on a network will help passengers make sense of the information more easily.

• Example: Valenciennes Tramway

Route maps, timetables, ticket machines and real-time information displays could usefully be grouped together around a central seating area, as on the Valenciennes Tramway network (FR) (Figure 40). The panels in the sheltered seating areas provide integrated and consistent information about bus and tram services (Figure 41) and information pillars at the platform entrance summarise the routes available, provide a local area map and incorporate lighting (Figure 42).

Figure 40: Service information on the Valenciennes Tramway
Even where service information is at its most basic, as in this tram stop in Hessisch Lichtenau (DE), consistency of design is maintained.

**Example: Zierenberg**

Real-time service information is important to all passengers at all interchanges, but is particularly important in remote locations with low service frequency, such as Zierenberg and Zierenberg-Oberelsungen (DE), where information displays provide route numbers, destinations and expected arrival times, and are combined with a clock.

**Example: Kassel RegioTram network**

Consistent design of information pillars is also a feature of the Kassel RegioTram network (DE). The pillars at Eschwege (DE) give the location, mode sign and route numbers on one side and real-time information on the other; tactile and audio information is accessible through the yellow button.
Despite many examples of excellent service information within transport networks, service providers rarely co-operate to provide integrated information, particularly at the interface between national rail networks and metropolitan public transport services.

**Example: Laan van Noi**

This combined route map for the Randstadrail and Rotterdam Metro services at Laan van Noi (NL) station helps create the experience of a seamless interchange in which the opportunity to change modes does not make route planning unnecessarily complicated.

**Quality**

Perception, built design, urban realm and sense of place: factors affecting the experience of using an interchange (but less relevant to its basic functions).

New interchanges provide high quality facilities and high standards of design even in very remote locations.

Maintenance, repair and refurbishment of small ageing rail stations may be affected by cost constraints, but volunteers from the local community and art by local schoolchildren can help to improve their quality. Disused station buildings often have architectural merit and could play a useful role in the local community.

The four criteria addressed under the theme of ‘quality’ (perception, built design, urban realm and sense of place) are all very closely interrelated and so have been considered together in this report. Essentially they try to capture a variety of factors that may enhance or detract from the
experience of using an interchange, without necessarily being relevant to how well it performs its basic functions. Some, such as cleanliness and maintenance standards, are operational issues and not easily assessed through short visits. Others, such as the quality of architectural design, materials and finishes, and of the surrounding urban realm, are partly subjective, and affected by cost constraints in smaller interchanges.

On all these criteria, newly designed and built interchanges should benefit from the continuing development of design knowledge and expertise. The Valenciennes Tramway (FR) and Randstadrail/Rotterdam Metro (NL) demonstrate that high design standards can be maintained across a network of small interchanges. The Kassel RegioTram (DE) lines provide high quality basic passenger facilities (seating, shelter, automatic ticket machines, service information, real-time information, clocks) at very remote interchanges such as Zierenberg and Zierenberg-Oberelsungen. Eschwege (DE) provides an exemplary level of customer facilities for a small interchange, blending into an attractive public space.

However, the maintenance, repair and refurbishment of ageing (and perhaps partially redundant) rail stations are often more complex problems and very near the bottom of their owners’ priorities. Local communities may be a valuable source of help in enhancing quality in these situations.

• Example: Bebra

Figure 48: Art by local schoolchildren in subway at Bebra station

Art by local schoolchildren enlivens a dingy subway at Bebra.

• Example: Bebra

A local volunteer group helps to maintain Nelson station. 

Figure 49: Flowers by Friends of Nelson Station

The challenge of maintaining ageing stations emerges at every scale: with the growth of season ticket systems and online purchasing, and the reduced staffing needs of modern transport services, the station buildings of the 19th and early 20th centuries perhaps play a less vital role today. However, disused station buildings such as those at Zierenberg and Zierenberg-Oberelsungen often have a great deal of architectural merit and play an important role in creating a sense of place. Given their accessible locations, these buildings could be valuable as a base for local services or other activities for the benefit of the community, which in turn would generate more use of the interchange facility and would support some retail provision. It is unfortunate that the owners of stations currently have little incentive to encourage new uses which are not commercially profitable.
Lessons from larger interchanges

### Efficiency

#### Operations

**SUMMARY:** Decisions and movement patterns are more complex, with more potential for passenger flow conflicts.

Obstruction-free routes and adequate capacity are important for commuters, legibility and centralised information points for first-time visitors.

All facilities, information and retail areas should be integrated into the basic interchange design. If these functions are designed into the concourse area, there should be no need for a separate ticket hall.

Temporary information should be carefully controlled, and designed to attract passengers’ attention.

With a wider choice of services and modes, decisions become more complex in larger interchanges (particularly in the dense urban transport networks of larger cities, where several routes to the same destination might be available). Movement patterns are also more varied, and the combination of large numbers of daily commuters and first-time visitors can bring conflicts in passenger flows.

Regular commuters learn their route through the interchange and so have less need for legibility and wayfinding aids, but obstruction-free routes and adequate capacity become vitally important.

- **Example: King’s Cross St Pancras**

New escalators from metro platforms at London King’s Cross St Pancras (UK) have helped to resolve capacity constraints.

**Figure 50: Escalators at London King’s Cross St Pancras**

- **Example: Amsterdam Bijlmer ArenA**

A separate exit at Amsterdam Bijlmer ArenA (NL) can be brought into use when large numbers visit the adjoining stadium.

**Figure 51: extra capacity exit at Amsterdam Bijlmer ArenA**
Conversely, legibility is important for first-time visitors, who need to be able to make sense of an unfamiliar place and system. Larger interchanges often suffer from a surfeit of haphazardly placed information from different service operators. For the first-time visitor, every piece of information can create a decision space and too much information can lead to confusion and indecision; for the commuter who has learnt to ignore inessential information, the presence of visitors can become a major obstruction. This is a powerful argument for rationalising and concentrating information provision within central points.

Older interchanges often face problems as travel patterns and the surrounding urban fabric evolve and alter passenger flows, whilst the predominance of season tickets, online and automated ticketing make the ticket hall largely superfluous.

- **Example: Manchester Victoria**

In Manchester Victoria (UK) most passengers enter the, largely redundant, station building from the east or south east end and endure a long walk towards the train platforms at the other end.

- **Example: Ostend**

The marginalisation of the ticket hall is also evident at Ostend (BE), where passengers can transfer between train, tram and bus without needing to go near the station building. Options for the reuse of the building are now being considered, as part of the process of redesigning the interchange.

The design of Liège-Guillemins (BE) station is celebrated and justly so: retail areas, passenger facilities, lifts and service information are all integrated within the design of the concourse area running underneath the rail tracks, and a bridge above the tracks provides easy access to car parking. This design eliminates the need for a separate ticket hall area, prevents conflicts between passengers waiting for connecting trains and those arriving or leaving by car, ensures that retail units do not obstruct passenger flow or sightlines, and aids passengers’ understanding.
A potential problem arises when a single area acts as both concourse and ticket hall, however, and there is a need to keep opportunity areas and stationary functions such as buying tickets away from movement zones.

Although information needs differ, larger interchanges are also subject to the principle that each piece of information creates a potential decision space and therefore a potential obstruction to other passengers. Temporary information can create obstructions in larger interchanges if not carefully controlled. The main functions of temporary information should be to give warning of service changes or of localised hazards or route changes. If temporary information signs proliferate, one has to ask whether a basic flaw in the design of the interchange or a lack of control over station management is indicated.

Temporary information also needs to attract passengers’ attention above and beyond the other sources of information available at the interchange, in order to create or alter a decision space and to give passengers enough time to absorb the information and alter their plans.

- **Example: King’s Cross St Pancras**

Simple strategies such as large font sizes can help to create more convenient decision zones, particularly for short-sighted passengers, as in this example from London King’s Cross St Pancras (UK).

**Movement within an interchange facility**

**SUMMARY:** rail (and light rail) services should be connected by a single concourse, either at the end of terminating lines or as a bridge or subway linking through lines. Where only some lines terminate, they should also be accessed via the same bridge or subway.

If street-based services also run in parallel, this is an opportunity to incorporate them into a single concourse.

A concourse parallel to rail lines can be effective where passenger flows are high compared to the number of platforms.

Self-validating ticket systems and integrated ticketing should be normal practice. Separate departure areas should be provided for international passengers requiring passport control.

A consistent and simple layout, with level access and sufficient capacity for passenger numbers, seems to be the basic recipe allowing both commuters and visitors to move through the interchange easily. Essentially, this depends upon the basic design, which needs to concentrate
decision spaces, connect them with movement spaces and ensure opportunity spaces do not present an obstruction to movement.

Where rail services are provided, this suggests a single concourse, either at the end of terminating lines (as at Lille Flandres (FR) or Ostend (BE)) or as a bridge or subway linking through lines (as at Liège-Guillemins (BE), Kassel Wilhelmshöhe (DE) or Amsterdam Zuid (NL)).

The single concourse arrangement can also accommodate light rail tracks running in parallel, as at Kassel Hauptbahnhof (DE), Amsterdam Zuid (NL) and Amsterdam ArenA (NL). However, it rarely encompasses access to street-based services, perhaps because the railway track alignment and street layout have historically developed in isolation from one another, at a time when transfer between modes was not an important issue.

• Example: Ostend

A notable exception is Ostend (BE), where tram and bus routes run parallel to and alongside the rail tracks: the current re-design of the station takes advantage of this by incorporating them into a new single concourse area.

Figure 57: single concourse at Ostend with platforms on the left

• Example: Kassel Wilhelmshöhe

Figure 58: single concourse at Kassel Wilhelmshöhe with platforms on the right

• Example: Kassel Hauptbahnhof

Where both terminating and through lines are provided, a consistent bridge or subway arrangement is generally less circuitous and less confusing than using a mixture of different treatments. At Kassel Hauptbahnhof (DE), transfer between terminating regional rail services and the RegioTram through service is very straightforward by means of stairs and a lift up to the linking concourse.

Figure 59: Kassel Hauptbahnhof

• Example: Lille Europe

The alternative of a concourse parallel to the track is rarely seen, although Lille Europe (FR) provides an interesting example, with passenger facilities, access to platforms and exits all based around this single axis, and wayfinding information concentrated at the exit points. In this example,

---

6 Buses currently leave from the adjacent square, but this is a temporary arrangement.
the parallel concourse is effective because passenger flows are high relative to the number of platforms, expenditure on lifts and escalators is justified by the size and international role of the station, and changes in ground levels are used to separate pedestrian flows from road traffic.

Controlling access to fare paid areas is considered as an operational issue in the guidelines, and this becomes particularly important with international services involving passport control. These services can involve complex check-in procedures and providing a separate departure area for international passengers can prevent lengthy queues obstructing other passenger flows.

- **Example: Lille Europe**

Figure 60: International passengers waiting to check in at Lille Europe

However, as noted above, self-validating ticket systems are normal practice on most national and local networks: a rigid approach to control can easily obstruct passenger flow, as in this example from Manchester Victoria (UK).

- **Example: Manchester Victoria**

Figure 61: Access to platforms at Manchester Victoria is controlled by station staff checking tickets

Movement through the wider interchange zone

**SUMMARY:** bus and other street-based services should be provided in a single location immediately adjacent to the rail station and separate from general traffic.

Linking rail and metro services can be difficult if these are separately designed and not aligned.

Concourses should provide level access to the street where possible (whether above or below rail tracks). Designs should take advantage of variable ground levels to improve access and separate different types of traffic. Separate entrances can also be designed to reflect the functions of different areas of the city.

In the case of larger interchanges, movement through the wider interchange zone often involves transfer between rail services based in a station and urban public transport services. In larger cities this may involve combinations of underground metro, light rail, tram and bus
services. The aim should be to provide a single facility for buses immediately adjacent to the train station, so that passengers can change quickly and without having to cross any roads. If bus routes are also available from the rear of the station, information about where to catch specific routes should ideally be available within the train station to prevent passengers taking the wrong exit.

- **Example: Leiden**

At Leiden (NL) the purpose-built bus station is immediately adjacent to the train station. Similar examples are found in Nijmegen (NL), Doncaster (UK) and Sint-Niklaas (BE). Leiden and Sint-Niklaas also offer a limited number of bus services from the rear station exit.

![Figure 62: bus station at Leiden, adjacent to train station](image)

Interchanges involving tram and metro services as well as buses can be more complex.

- **Example: Rotterdam Blaak**

This example at Rotterdam Blaak (NL) is separated from general traffic and retains the open, permeable quality of smaller street-based interchanges, with the entrances to the train and metro stations clearly accessible on the left and right respectively.

![Figure 63: interchange zone at Rotterdam Blaak (NL)](image)

- **Example: Brussels West**

Similarly at Brussels West (BE), transfer between the bus/tram stops and the metro/train station is relatively straightforward.

![Figure 64: interchange zone at Brussels West](image)

Both, however, face the problem of linking separately designed rail and metro services, with transferring passengers having to go up to street level, through ticket barriers and back down again. For medium-sized stations, the cost of providing a more direct link may not be justified by the number of passengers transferring.

The ‘bridge or subway’ debate alluded to above is perhaps best addressed by focusing on level access to the street or surrounding pedestrian area; the appropriate arrangement then depends on whether rail tracks are above or below ground level.
• **Example: Liège-Guillemins**

Variable ground levels in the surrounding area can be used to good effect to provide level access both above and below platforms, as at Liège-Guillemins (BE). This in turn provides an opportunity to separate car parking facilities from access for pedestrians and public transport users.

• **Example: Lille Europe**

Lille Europe (FR) also makes use of variable ground levels, with access to taxi services and the primary road network at the upper level, to the metro network at concourse level and to the Euralille development and Lille Flandres station at ground level. For the last two groups of passengers, however, the need to go up to concourse level and back down again must seem frustratingly circuitous.

• **Example: Kassel-Wilhelmshöhe**

Different types of traffic can also be separated without variable ground levels. At Kassel-Wilhelmshöhe (DE), ramps up from the platforms lead in two directions: to the front entrance and public transport, but also to the rear entrance and car parking facilities. This is a particularly convenient interchange as bus and tram services are concentrated immediately outside the front entrance to the station.

• **Example: Amsterdam Central**

Separation of traffic flows should also reflect the functions of different areas of the city: at Amsterdam Central (NL), the front entrance connects to public transport services through the city and tourist facilities, whilst the rear entrance connects to commuter bus services, ferries and cycle parking.

*Figure 65: Ramps up from platform level at Kassel-Wilhelmshöhe provide access to front and rear entrances*

*Figure 66: Ferry services at rear entrance to Amsterdam Central*
**Sustainability**

**SUMMARY:** Large interchange projects offer opportunities to demonstrate and improve sustainable design techniques such as use of renewable energy.

The functions and size of enclosed buildings need to be considered carefully. Natural lighting should be provided where possible.

Larger interchange projects often involve design teams with expertise in sustainable design techniques. These can potentially provide a pool of good practice that can be shared throughout other projects. Both new developments and restorations offer opportunities to demonstrate and improve sustainable design techniques.

- **Example: Ostend**

For example, the design for the new interchange at Ostend (BE) features solar panels in the roof to generate energy for use on-site.

*Figure 67: Solar panels in new design for Ostend*


At this point in the design of a new interchange it is worth considering what functions the facility is to fulfil; an enclosed building that is too large will consume more energy than necessary while one that is too small risks overcrowding and early demands for rebuilding. Covered spaces requiring high levels of artificial lighting will also consume more energy than spaces with natural lighting. Aiming to design protected and sheltered spaces rather than a traditional building might help to minimise resource use during construction and energy use during operation, as well as facilitating unobstructed passenger flows.

- **Example: Belgian waste facility**

Sustainability also needs to be considered from an operational perspective. For example, recycling facilities such as the four-stream system found throughout Belgian stations help to minimise landfilling of waste.

*Figure 68: Four-stream waste facility at Brussels Midi*
**Usability**

**Accessibility**

**SUMMARY:** interchange design should aim to make step-free access the normal route. Lifts and ramps should be in prominent positions, not segregated from the main route.

For older stations, improving accessibility should form part of a longer term plan for the station.

As mentioned above, interchanges involving through rail services generally involve a level change, either via bridge or subway. Providing step-free access throughout the interchange implies the provision of lifts and/or ramps. The key to accessibility is to ensure that these are in prominent positions and are ‘normalised’ rather than at the forgotten far end of platforms and segregated from other routes.

- **Example: Leiden**

For example, ramped access to platforms is part of the standard layout at Kassel Wilhelmshöhe and at Liège-Guillemins and Leiden, lifts are integrated into the central concourse area.

**Figure 69:** Lifts at Leiden are an integral part of the concourse

For older stations, improving accessibility can present enormous technical and financial challenges, but can sometimes be incorporated into longer term plans to increase capacity and introduce new services or facilities.

- **Example: Stratford**

In this example at London Stratford (UK), a circuitous and awkward transfer between rail and light rail services has recently been replaced as part of a wider programme of station improvements.

**Figure 70:** recent improvement to accessibility at Stratford
Safety and accident prevention, personal security

SUMMARY: As noted above, these are issues requiring specialist attention and so are essentially outside the scope of this report.

However, the general principle of separating fast road traffic from other passenger flows is useful at any scale.

- Example: Sint Niklaas

For example, at Sint-Niklaas (BE), the highway runs underneath the rail station and also links into car parking facilities, with the space around the station including a dedicated area for buses but otherwise almost traffic-free and providing a safe route for pedestrians and cyclists.

Figure 71: traffic-free space outside Sint-Niklaas station

Protected environment

SUMMARY: The comfortable protected environment of large rail station concourses rarely extends to other modes of transport within the same interchange zone, or to rail station platforms.

The best current examples offer a protected environment linking the rail station and other services. New interchange design should aim to offer a similar level of protection to all passengers.

A casual observer could hardly fail to notice that large rail stations offer passengers a high level of comfort and protection from the weather, but that this is not always extended to passengers accessing other modes of transport. Even at the efficient and well-appointed bus stations mentioned above, only minimal protection is offered.

This of course reflects the level of finance that large station projects are able to command, based on the commercial potential of large passenger numbers, against the relatively limited funding available to metropolitan transport providers. Institutional separation is often reflected in physical separation, with bus stops located on the other side of the attractive and well-designed public space outside the station.

Figure 72: Liège-Guillemins station: bus stops are across the open space

However, despite the grand concourses and shopping areas, the actual platform areas in rail stations are often as lacking in facilities and comfort as the waiting areas for the humbler modes on the street.
• **Example: Sint Niklaas**

More thought needs to be given to the comfort of passengers waiting on platforms: for example, angled seating at Sint-Niklaas (BE) helps to provide protection from the wind.

*Figure 73: angled seating on platform at Sint-Niklaas*

• **Example: Doncaster**

Doncaster (UK) is an interesting solution to this problem, with a covered shopping centre providing a weatherproof link between the enclosed bus interchange and the train station.

• **Example: Kassel-Wilhelmshöhe**

A simpler but no less effective solution can be found at Kassel Wilhelmshöhe (DE), where tram and bus services, taxi drop-off points and cycle parking are all situated under a canopy outside the station.

*Figure 74: Protected environment at Kassel Wilhelmshöhe*

---

**Understanding**

**Legibility**

**SUMMARY:** a single concourse is the most intuitive layout and helps visitors ‘read’ the station. Good visibility between the platforms and concourse and surrounding urban realm are also useful features.

The interface between rail and other services can be more difficult to understand where these are not clearly visible.

A good basic design and layout will generally help passengers find their way around the interchange intuitively. As mentioned above, a single concourse connecting different services offers the most intuitive layout.

• **Example: Kassel Hauptbahnhof**

In this example from Kassel Hauptbahnhof (DE), the consistent treatment of access to platforms and location of facilities, uninterrupted sightlines and use of natural light are all features helping visitors to ‘read’ the station.
• **Example: Lille Europe**

Lille Europe (FR) is designed to allow good visibility between platforms, the concourse area and the surrounding urban realm (although this is more the case for the Eurostar platforms than for platforms serving local trains). Visitors can easily understand the layout of the station and its connection to the surrounding area as soon as they arrive. More difficult to understand is the interface with metro and tram services, which are not clearly visible from the train station and are accessed via more circuitous routes.

**Permeability**

**SUMMARY:** a ground-level concourse can improve permeability by acting as a pedestrian link between two sides of the station.

Side entrances allow regular commuters to access the station from different parts of the surrounding area and to bypass crowded main entrances.

Older stations are often central landmarks located at significant nodes in the street pattern.

Rail infrastructure can create a barrier between two sides of the surrounding area and the station layout can exacerbate this, particularly where there is only one entrance. Conversely, the station concourse can improve permeability by acting as a ground level pedestrian link between the two sides.

• **Example: Amsterdam Zuid**

Leiden (NL) and Sint-Niklaas (BE) both provide such a link but perhaps the best example is Amsterdam Zuid (NL), where a major road runs alongside the rail and metro tracks: the ground level dips slightly in this area, allowing the station to provide a convenient pedestrian connection between the two office parks on either side. Ticket barriers are located at the foot of the escalators up to the platforms, providing access to fare-paid areas without interrupting pedestrian flow.
Another effective layout involves two side entrances to the station at either end of the concourse and a main entrance along the front. This works well for terminating services, as at Lille Flandres (FR), and through services, as at Kassel Wilhelsmhohe (DE), and a combination of both, as at Kassel Hauptbahnhof (DE).

Side entrances allow regular commuters to bypass the crowds of occasional visitors using the front entrance of busy stations (although they also create the potential for passenger flow conflicts).

- **Example: Kassel-Wilhelmshöhe**
The row of convenience shops at this side entrance to Kassel Wilhelmshöhe (DE) suggests it is widely used by local commuters.

- **Example: Valenciennes**
For example, Valenciennes (FR) station sits at the intersection of five streets, connecting to two major roads crossing the rail tracks.
Wayfinding

**SUMMARY:** signs and information also play a role in helping visitors find their way around.

Information about the station and surrounding area should be integrated in central decision spaces.

Landmark structures can help locate the interchange within the surrounding area.

Signs and information also play a vital role in helping visitors find their way around the interchange and the surrounding area.

- **Example: Brussels West**

In this concourse area at Brussels West (BE), a complete lack of clutter and simple, minimal signage reinforce the legibility created by good sightlines and use of natural light.  

*Figure 81: Wayfinding at Brussels West*

- **Example: Lille Europe**

At Lille Europe (FR), information pillars at each exit integrate direction signs and orientation maps for the station and surrounding area.

*Figure 82: Information pillars at Lille Europe*

Unique ‘landmark’ structures can help locate the interchange within the surrounding area.

- **Example: Amsterdam Bijlmer ArenA**

Amsterdam Bijlmer ArenA is an excellent example of a wayfinding device as it not only provides a recognisable landmark but also provides a pedestrian link between two areas.

*Figure 83: The landmark of Amsterdam Bijlmer ArenA*

Consistent branding can also help ensure stations are a prominent presence in the surrounding area.
• Example: Sint Niklaas

The rear entrance of Sint-Niklaas (BE), although very plain, is instantly recognisable as a Belgian train station from the four coloured pillars.

Figure 84: Branding at rear entrance of Sint-Niklaas

Service information

**SUMMARY:** pre-journey service information should be considered at the network level.

All service providers offer a good range of internet-based information, including: timetables, ticket information, tickets by text, interactive network maps, real-time mapping of service disruptions, information about passenger facilities, local and tourist information. All providers offer multi-modal journey planner tools, evidence of co-operation between providers.

Co-ordinated multi-modal service information is rarely provided at interchanges, although bus stations now often have high quality real-time departure screens.

Temporary information should be incorporated into real-time information displays.

As noted above, the internet is now the primary source of pre-journey service information and the provision of this information is generally an issue that service providers consider across the network as a whole rather than in relation to specific interchanges.

• Example: Doncaster

An interesting exception to this rule is the online departure board dedicated to Doncaster bus interchange (UK).

Figure 85: Doncaster bus interchange online departure board
Many examples of high quality online information can be found in the countries visited. Some particularly useful features are highlighted in the following examples, including timetables for specific services (NVV), simple ticket information (Transville), use of mobile phones to buy tickets by text (De Lijn and TEC), interactive network maps with the option to print route cards and timetables (RET), real-time mapping of service disruptions (SNCB), information about passenger facilities (Network Rail) and links to local and tourist information (GVB). Multi-modal journey planner tools incorporating real-time information are standard and are an encouraging sign of co-operation between operators in the interests of enhancing convenience for passengers (SNCB).
Figure 89: Real-time mapping of service disruptions (SNCB)

RK DISTURBANCE

Instructions of the Belgian authorities:
Forest Est [B] - Brussels-Midi [B]
from Verviers-Dottot [B]
to Brussels-Zuid [B]
21/01/2011 until 21/01/2011
Instructions of the Belgian authorities:
Brussels-Midi [B] only limited trams services are operating

Delays can be expected. A replacement bus service is replacing between Brussels-Midi [B] and Louvain [B].


Figure 90: Interactive information about passenger facilities (Network Rail)

Source:
http://www.nationalrail.co.uk/stations/sjp/PRE/plan.html?rt
nloc=PRE

• Example: Brussels West

Unfortunately, co-ordinated service information, including real-time information, at interchanges is relatively rare: this sign at the exit from Brussels West station at least gives route numbers for the bus and tram services available outside.

Figure 91: Sign to other modes at Brussels West

• Examples: Nijmegen, Sint Niklaas & Leiden

However, many bus stations now have good quality departure screens at bus bays, as in these examples from Nijmegen (NL), and Leiden (NL)

Figure 92: bus bays at Nijmegen

Figure 93: bus bays at Sint-Niklaas
As mentioned before, good practice would involve providing designated spaces for temporary information and incorporating it into real-time information displays.

**Quality**

**SUMMARY:** passengers at larger interchanges offer a captive market for retailers, and there is often a reciprocal relationship between station development and commercial office, retail and leisure development. These other uses can detract from the efficiency of the basic interchange functions.

Large interchanges also offer opportunities to provide landmarks, with iconic architecture and pedestrianised public space in city centres, and can encourage a concentration of commercial uses in the surrounding area.

Medium-sized interchanges can also be the focus of public space and other uses such as street markets.

This section of the Guidelines suggests that the interchange “may develop into a ‘destination’” in its own right. Larger interchanges generally offer more scope in this respect, as high numbers of passengers, often with long waiting times or in need of convenience shopping during a long journey home from work, provide a captive market for retailers. As Bertolini (1998) suggests, there is often a reciprocal relationship between the cost of rail station development and the amount and quality of retail space provided.

**Example: Manchester Piccadilly**

Manchester Piccadilly (UK) provides an interesting example of balancing these commercial spaces against passengers’ movement and information needs: the clear route from the main entrance to the main decision space is undercut somewhat by an inappropriately placed retail unit and by the lack of public transport connections at this entrance, whilst the balance between capacity for passengers transferring from public transport and for shopping facilities seems weighted too far in favour of the latter. As the plan view suggests, the amount of space provided for commercial retail units somewhat exceeds that provided for...
buying tickets, checking departure information and waiting.

Figure 96: Plan view of Manchester Piccadilly

Some large interchanges do not provide such a range of commercial office, retail and leisure facilities within the building, and it could be argued that these uses detract from the efficiency of the basic interchange functions. However, large interchanges often provide iconic ‘place-making’ architecture and opportunities for pedestrianised public space in the centres of big cities where these uses tend to be already concentrated.

• Example: Euralille

The Euralille development and surrounding public space connecting Lille Europe and Lille Flandres (FR) is a good example of this concentration of uses. Although the walk between the two stations is not the most efficient in terms of transfer time, the surrounding space offers passengers both retail and leisure facilities and the opportunity to simply spend time in the open air, without obstructing the main axis of movement.

Figure 98: Public space at Euralille

• Example: Amsterdam Bijlmer ArenA

Amsterdam Bijlmer ArenA (NL) sits in the middle of two large pedestrianised developments (an area of leisure facilities including a stadium and cinema) and a shopping and residential centre. With its size and striking design, the station provides a very effective focal point for both developments.

• Example: Brussels Midi/Zuid

At Brussels Midi/Zuid (BE), the plan view suggests an apparently logical layout which works well for passengers transferring from trains to the taxi ranks on Place Victor HortaPlein. However, transferring to the metro, tram or bus involves negotiating a way through the waiting passengers and casual shoppers milling around the retail arcade.

Figure 97: Plan view of Brussels Midi/Zuid

Source: www.networkrail.co.uk/aspx/921.aspx / author

Some large interchanges do not provide such a range of commercial office, retail and leisure facilities within the building, and it could be argued that these uses detract from the efficiency of the basic interchange functions. However, large interchanges often provide iconic ‘place-making’ architecture and opportunities for pedestrianised public space in the centres of big cities where these uses tend to be already concentrated.

• Example: Euralille

The Euralille development and surrounding public space connecting Lille Europe and Lille Flandres (FR) is a good example of this concentration of uses. Although the walk between the two stations is not the most efficient in terms of transfer time, the surrounding space offers passengers both retail and leisure facilities and the opportunity to simply spend time in the open air, without obstructing the main axis of movement.

Figure 98: Public space at Euralille

• Example: Amsterdam Bijlmer ArenA

Amsterdam Bijlmer ArenA (NL) sits in the middle of two large pedestrianised developments (an area of leisure facilities including a stadium and cinema) and a shopping and residential centre. With its size and striking design, the station provides a very effective focal point for both developments.

• Example: Brussels Midi/Zuid

At Brussels Midi/Zuid (BE), the plan view suggests an apparently logical layout which works well for passengers transferring from trains to the taxi ranks on Place Victor HortaPlein. However, transferring to the metro, tram or bus involves negotiating a way through the waiting passengers and casual shoppers milling around the retail arcade.

Figure 97: Plan view of Brussels Midi/Zuid

Source: www.networkrail.co.uk/aspx/921.aspx / author

Some large interchanges do not provide such a range of commercial office, retail and leisure facilities within the building, and it could be argued that these uses detract from the efficiency of the basic interchange functions. However, large interchanges often provide iconic ‘place-making’ architecture and opportunities for pedestrianised public space in the centres of big cities where these uses tend to be already concentrated.

• Example: Euralille

The Euralille development and surrounding public space connecting Lille Europe and Lille Flandres (FR) is a good example of this concentration of uses. Although the walk between the two stations is not the most efficient in terms of transfer time, the surrounding space offers passengers both retail and leisure facilities and the opportunity to simply spend time in the open air, without obstructing the main axis of movement.

Figure 98: Public space at Euralille

• Example: Amsterdam Bijlmer ArenA

Amsterdam Bijlmer ArenA (NL) sits in the middle of two large pedestrianised developments (an area of leisure facilities including a stadium and cinema) and a shopping and residential centre. With its size and striking design, the station provides a very effective focal point for both developments.

• Example: Brussels Midi/Zuid

At Brussels Midi/Zuid (BE), the plan view suggests an apparently logical layout which works well for passengers transferring from trains to the taxi ranks on Place Victor HortaPlein. However, transferring to the metro, tram or bus involves negotiating a way through the waiting passengers and casual shoppers milling around the retail arcade.

Figure 97: Plan view of Brussels Midi/Zuid

Source: www.networkrail.co.uk/aspx/921.aspx / author

Some large interchanges do not provide such a range of commercial office, retail and leisure facilities within the building, and it could be argued that these uses detract from the efficiency of the basic interchange functions. However, large interchanges often provide iconic ‘place-making’ architecture and opportunities for pedestrianised public space in the centres of big cities where these uses tend to be already concentrated.

• Example: Euralille

The Euralille development and surrounding public space connecting Lille Europe and Lille Flandres (FR) is a good example of this concentration of uses. Although the walk between the two stations is not the most efficient in terms of transfer time, the surrounding space offers passengers both retail and leisure facilities and the opportunity to simply spend time in the open air, without obstructing the main axis of movement.

Figure 98: Public space at Euralille

• Example: Amsterdam Bijlmer ArenA

Amsterdam Bijlmer ArenA (NL) sits in the middle of two large pedestrianised developments (an area of leisure facilities including a stadium and cinema) and a shopping and residential centre. With its size and striking design, the station provides a very effective focal point for both developments.
Medium-sized interchanges can also provide a focal point for an attractive public space, as at Kassel Hauptbahnhof (DE), or a range of uses and functions, such as this local Saturday street market at Rotterdam Blaak (NL).
Conclusions

Interchanges are gateways to wider national and international networks, and this report has considered a number of such examples within the North-West Europe area to serve as case studies. In this respect the TfL guidelines have proved to be a useful tool in thinking critically about the interchanges themselves, and thereby highlighting good and bad practice. However, it should be emphasised that they have not been used to assess the interchanges formally in any particular way. So the following points below summarise best practice as observed by the author, using the key headings of the TfL guidelines as a structure.

Evaluating the interchanges

Operations

• Emphasise the positive features of small interchanges – they usually require only minimal decision and movement spaces, particularly where services are street-based and run in parallel. These features help them operate very efficiently, even serving large numbers of passengers.

• Prioritise obstruction-free routes, adequate capacity, legibility and centralised information points in larger interchanges. These involve more complex decisions and movement patterns, and a greater variety of opportunity spaces, all features that introduce potential passenger flow conflicts and inefficiency.

Movement within an interchange facility

• Keep street-based interchanges between parallel services free from general traffic, with dedicated pedestrian crossing points, as such interchanges offer the best opportunity for accessible movement.

• Integrate single-track rail services into street-based interchanges where appropriate.

• Integrate facilities, information and retail areas into the basic design to avoid the need for a separate ticket hall.

• Integrate temporary information into an overall service information strategy. Prioritise real-time information about arrival times, changes and disruptions to services at interchanges of all sizes, and ensure it is designed to attract passengers’ attention.

• Minimise other types of temporary information, which can distract and obstruct passengers.

• Connect rail (and light rail) services by a single concourse, either at the end of terminating lines or as a bridge or subway linking through lines (or a combination of through lines and terminating lines).

• Incorporate street-based services into a single concourse if these also run in parallel.
Movement through the wider interchange zone

- Locate street-based interchanges at junctions in the surrounding road network, with dedicated pedestrian access to key locations.
- Where street-based services are combined with a rail station, keep them in one location immediately adjacent to the station and separated from general traffic.
- Ensure rail concourses provide level access to the street where possible, and take advantage of variable ground levels to improve access and separate different types of traffic.
- Facilitate easy movement through the zone by using Integrated ticketing systems and self-validation of tickets. This issue needs to be addressed at network level.

Sustainability

- Use the design of a new interchange as an opportunity to demonstrate and improve sustainable design techniques.
- Open-air facilities, good design and natural lighting are examples of features that can minimise resource and energy consumption.
- Consider the need for alterations to the design in future, to cater for new or expanded services and increased passenger capacity.

Accessibility

- Ensure the normal route through the interchange is step-free, with lifts and ramps in prominent positions.
- Integrate ramps into the streetscape, and into platforms providing interchange between different modes.
- At older rail stations consider any means of improving access for passengers with mobility problems – these do not necessarily have to involve step-free access. Consider improving accessibility as part of any longer-term plans for the station.
- Ensure rail and metro services are designed and aligned together to avoid difficulties with linking the two.
- Consult representatives of disabled passengers during interchange design and invite them to help test services.

Personal security

- Minimise opportunities for crime in situations where small interchanges can become isolated, by increasing levels and types of activity in the surrounding area.

Protected environment

- Provide a comfortable and protected waiting environment to attract passengers away from cars, although this does not necessarily mean an enclosed building. This applies in particular to small interchanges.
• Avoid the bad example often presented by large railway stations: the comfortable protected concourse environment rarely extending to other modes of transport or to station platforms.

Legibility

• Ensure continued ‘legibility’ in street-based interchanges by maintaining simple layouts, clear sightlines between services, and a visual connection to the surrounding area.

• For interchanges involving rail services, help visitors to ‘read’ the station by providing the most intuitive layout, a single concourse.

Permeability

• Provide safe pedestrian routes and clear sightlines to all parts of the surrounding area. Small interchanges are generally very effective in this respect.

• Be aware of the physical barrier that rail tracks can create. Design interchanges to reduce this barrier, using differences in ground levels to increase permeability and incorporating a ground-level concourse which can act as a pedestrian link between the two sides of the tracks.

• Increase permeability by building in side entrances, allowing regular commuters to access the station from different parts of the surrounding area and to bypass crowded main entrances.

Wayfinding

• Use landmark structures and buildings to help users locate the interchange within the surrounding area, and to help visitors find their way around the area.

• Use signs and information carefully as these also play a vital role. Integrate information about the interchange and the surrounding area and concentrate it within the main decision spaces.

Service information

• Reassure occasional travellers by providing comprehensive information at the interchange. Real-time information is particularly important in remote locations with low service frequencies.

• Ensure information provision is planned across the network as a whole.

• Maintain and extend the good range of internet-based information, including multi-modal journey planners, timetables, ticket information, tickets by text, interactive
network maps, real-time mapping of service disruptions, information about passenger facilities, local and tourist information.

Quality

- Consider maintenance issues when designing new interchanges, as perceptions of cleanliness affect passengers’ experience of the interchange.
- Aim for high quality facilities, high standards of design and a well designed urban realm, even in very remote locations, to create a ‘sense of place’ and encourage positive perceptions of the interchange.
- Consider alternative means such as contributions from local community volunteers and artists to help to improve the quality of small, ageing interchanges if maintenance, repair and refurbishment is compromised by cost constraints.
- Encourage service providers to extend this cooperation by providing integrated multi-modal information at interchanges, to make intermodal route planning as simple as possible.
- Consider the potential for disused station buildings to play a useful role in the local community.
- Use the design of larger interchanges in city centres to provide landmarks, with iconic architecture and pedestrianised public space, and encourage a concentration of commercial uses in the surrounding area.
- Avoid focusing too much on commercial office, retail and leisure development within the interchange, as these uses can detract from the efficiency of the basic interchange functions.
Concluding remarks

• good practice guidelines can be of relevance to different contexts but may need some adaptation

Although Transport for London’s Guidelines were used as the starting point for this report, they were designed for and are applicable to a specific geographical and operational context. Using the Guidelines to evaluate transport interchanges throughout Europe has highlighted aspects that might need to be adapted to other contexts. Operational and regulatory requirements are fundamental to interchange design but may differ widely between countries and even between areas within countries. The role of the interchange within the context of wider strategic priorities such as transport policy or the regeneration of the surrounding area will also vary.

• smaller interchanges offer fewer basic design challenges

Issues of movement within the interchange facility and wider zone, legibility and wayfinding are less challenging at smaller interchanges, which might involve simply transferring between two services on a single platform. Level access and permeability, although important aspects of design, also present less of a problem where interchanges are entirely street-based. Most of the interchanges visited perform these basic functions very well. However, the questions raised in the Guidelines should help ensure that the interchange makes a positive contribution to the surrounding streetscene, both in terms of its appearance and how it functions.

• smaller interchanges also have the potential to become a focal point for local community and commercial uses

Small interchanges are rarely seen as having the potential to sustain commercial uses or to influence development in the surrounding area.

The ability to generate income from commercial uses also affects the quality of materials and finishes, and the quality and range of passenger facilities provided, and funding for these aspects of quality is often more constrained at small interchanges. However, they provide an ideal location to focus other local community functions and, regardless of whether these functions generate commercial income, they should be a factor in planning and financing the development of small interchanges.

• overcoming technical barriers is one of the most complex aspects of interchange design and more detailed practical guidance on this would be useful

Basic design issues all become more important and more difficult to resolve when street-based services are combined with rail services, and it is at this level that the Guidelines could be most useful – currently technical matters are not explicitly addressed.

• Similarly, overcoming organisational barriers is equally complex; again more detailed practical guidance on this would be useful

The Guidelines do not unambiguously address the basic organisational barriers involved in integrating street-based and rail services, and there is a need for guidance of a more practical nature to help overcome this.

• facilities should be equally available to users of all modes of transport and co-operation between providers should be encouraged towards this end

Intermodal inequality is most pronounced at the largest interchanges, where rail stations can be architectural icons and tourist attractions in their own right, and designers of new buildings are under pressure to deliver ‘destinations’ in iconic settings. Investment is often focused on
passengers for high speed services, and commercial pressures might overshadow or undermine basic functionality for passengers, for example by allowing opportunity space to predominate.

Meanwhile, operators may see little incentive in co-operating with local and regional transport providers. Institutional separation, regulatory barriers, an imbalance of power, and the perception that different transport modes perform distinct functions for distinct groups of passengers, help to reinforce this view. However, the function of station buildings needs reassessing as online and automated ticket purchases make ticket halls increasingly superfluous. There are opportunities here to develop less complex but more inclusive interchange facilities catering equally for passengers on all transport modes. Co-operation between providers, essential to create this seamless interchange experience, needs encouraging.

- inter-agency co-ordination is a crucial issue at network level

Co-ordinated signage, service information and ticketing arrangements are less problematic where services are provided by a single operator (or even by different operators under franchises granted by a single authority). However, these are essentially strategic operational issues which need to be addressed at the level of the network rather than in the design of individual interchanges. Achieving this co-ordination across different service providers (and in particular, across the interface between rail and urban public transport services) seems far more difficult but is a crucial part of creating the seamless interchange. Online journey planners, combining information about services offered by various operators on various modes, are available throughout the five countries visited, and provide an exemplar for the provision of co-ordinated information at interchanges.

- the role of the interchange within the wider urban context should be considered as part of land use planning and other strategic planning processes

Strategic questions relating to the relationship between the interchange and the surrounding urban context are easily understood in the context of the largest rail stations, which are commonly seen as hubs of commercial business and retail development. However, small interchanges could play an equally important function as the focus for local community and commercial uses, reinforcing demand for transport services and generating funding to maintain and develop the interchange. To realise this potential, local and regional planning authorities and regeneration bodies must be involved in interchange design and development, perhaps through its integration within the statutory land use planning processes operating within the local area.
Next steps

This is a stage 1 report and the project is looking to develop the issues further by elaborating on the matters covered within this study. Notably, a special two-day workshop was organised on 27-28 September 2011 where the question of interchanges was examined in greater detail.
References


**Glossary**

**Decision space**: Areas where passenger decisions take priority (eg entrances, ticket offices or corridor junctions)

**Interchange**: the act of transferring between modes

**Interchange facility**: a purpose-built facility where interchange takes place (eg railway station, bus station or bus/tram stop)

**Interchange zone**: a wider area encompassing one or more interchange facilities creating a multi modal hub, and public spaces

**Legibility**: the extent to which visitors to an environment can ‘read’ it to find their way around within it

**Movement space**: areas connecting decision spaces (eg corridors and paths)

**Multi-modal (also inter-modal)**: involving two or more transport modes

**Opportunity space**: areas outside the core corridors of movement or decisions, which can accommodate cafés, retail entrances, retail display, seating or landscaping

**Permeability**: the extent to which an environment allows a choice of routes through and within it (visual permeability: the ability to see the routes through an environment; physical permeability: the ability to move through an environment)

**Private transport**: ways of accessing public transport services, including taxi, car, bicycle and walking.

**Real-time information**: information about current services (eg expected arrival times, delays and alterations to routes)

**Wayfinding**: improving the ease with which people can navigate themselves to, from and within an interchange facility or zone

---


Appendix 1 – map of stations visited

Belgium

Source: Google Maps/author

1 **Brussels Central**: Rail station for national and regional trains. Metro station a five minute walk away through a subway.

2 **Bruxelles Midi/Brussel Zuid**: Rail station served by international and national trains, with connections to buses, two tram lines and two metro lines.

3 **Brussels West**: Rail station for national and regional trains, four metro lines, connections to buses, and tram lines.

4 **Diksmuide**: Rail station served by one regional train line, with bus services available.

5 **Koksijde**: Rail station served by one regional train line, with bus services available; new interchanges and connection to coastal tram proposed.

6 **Liège-Guillemins**: Rail station for international and national trains, with bus services a short distance away. Opened in 2009.

7 **Ostend**: Rail station served by national and regional trains, with connection to tram and bus services; new interchange in development.

8 **Sint-Niklaas**: Rail station served by national and regional trains, with connection to bus services. Refurbished in 2004.

9 **Veurne**: Rail station served by one regional train line, with bus services available; new interchanges and connection to coastal tram proposed.
1 **Espace Villars**: Terminal for the Valenciennes Tramway and interchange with bus services.

2 **Lille Europe**: Rail station for international and national services, with connection to metro line. A tram station is adjacent but only accessible by crossing open space.

3 **Lille Flandres**: Rail terminal for regional services, with connection to metro line. Bus services are available on the adjoining streets.

4 **Valenciennes**: Rail station for regional services. Tram and bus interchange on the street a short distance away.
1 **Bebra**: Formerly major rail junction, now served by regional trains, with two bus routes available outside station.

2 **Eschwege**: New station, opened in 2009. Regional train service terminates here, interchange with bus routes.

3 **Hessisch Lichtenau**: RegioTram stop on street, bus route terminates around street corner.

4 **Kassel-Hauptbahnhof**: Rail station for regional trains and RegioTram lines, with bus routes a short distance away.

5 **Kassel-Wilhelmshöhe**: Rail station for national and regional trains, with interchange for tram and bus services outside.

6 **Zierenberg**: Train and RegioTram station, connecting with one bus route.

7 **Zierenberg-Oberelsungen**: RegioTram station, connecting with one bus route.
1 **Amsterdam Bijlmer ArenA**: train and metro station, with bus station adjacent

2 **Amsterdam Central**: national and international train services and local metro, tram and bus stops and ferry services outside station

3 **Amsterdam Schiphol**: train station as integral part of airport

4 **Amsterdam Zuid**: national and international train services and local metro, tram and bus stops 200m away

5 **Laan van Noi**: business district rail, light rail and metro interchange, with bus and tram services on street

6 **Leyenburg**: city suburb bus, tram and light rail interchange

7 **Leiden**: train station with bus station adjacent

8 **Nijmegen**: train station with adjacent bus station

9 **Pijnacker Centrum**: suburban light rail station

10 **Rotterdam Blaak**: city suburb train station, metro station and tram lines
1 **Doncaster**: Rail station served by national and regional trains, connected to bus interchange.

2 **London King’s Cross St Pancras**: Two adjacent rail terminals for national and regional trains (St Pancras is also a terminal for international high speed services), sharing a metro station with five lines. Bus services are available on surrounding streets but there is no dedicated bus station.

3 **London Stratford**: Rail station for national and regional trains, two metro lines (one terminating here) and a light rail line (also terminating here). Bus station outside. National high speed trains stop at Stratford International, currently linked to the main station by a shuttle bus, and international services are expected to stop from 2012.

4 **Manchester Piccadilly**: Rail station for national and regional trains. The terminal for the Metrolink tram service is accessed via a lift and escalator to the lower level, where bus services are available on surrounding streets. There is no dedicated bus station.

5 **Manchester Victoria**: Rail station served by regional trains and Metrolink tram service. Bus services are available on surrounding streets. **Shudehill Interchange** for buses is about 200m away and adjacent to another tram stop.

6 **Nelson**: Rail station served by one regional train line, connected to bus interchange.
**Preston**: Rail station served by national and regional trains. Bus services are available on surrounding streets, and a large bus station is located about 500m away.

**Key**
- Small interchanges
- Large interchanges
- Medium or large interchange zones including several facilities
- Medium-sized interchanges
- Major interchanges
What is Sintropher?

Sintropher is a transnational cooperation project bringing together five regions in North-West Europe.

The project is due to last five years, with 14 partner agencies in five EU Member States. With a budget of €23m, it is part-financed by the EU INTERREG IVB programme, and involves a series of 36 feasibility evaluations, pilot investment and demonstration projects, as well as comparative analysis of EU best practice. The Lead Partner is University College London.

All our work is motivated by one overarching aim: to develop sustainable, cost-effective solutions to improve accessibility to, from and within peripheral regions in North-West Europe. As part of this, we have four specific objectives:

- Promote best possible cost-effective technology-based solutions
- Assess the appraisal procedure for regional tram systems and improve the business case development process
- Achieve high-quality, seamless interchange between regional tram systems and regional rail and air hubs
- Promote and market the benefits of regional tram-based systems to users and stakeholders

We have a particular focus on tram-train systems which allow local trams to run on to national rail networks, pioneered in Karlsruhe and developed in Kassel (Germany), which allow urban tram systems to extend over national rail tracks to serve extensive city regions. Additionally, we are looking at high-quality interchanges at key rail or air hubs.

In all, project partners from five demonstration regions in five EU Member States are working together: Valenciennes (France); the Fylde Coast (UK); West Flanders (Belgium); North Hesse (Germany); and Nijmegen-Kleve (The Netherlands). Participants include public transport operators, local authorities, regional management bodies and universities.

Each region will implement a programme of technical and economic feasibility evaluations for new systems, pilot investment projects, and demonstration projects, of which the present findings report is one such document. This will be complemented by a set of comparative analyses of EU best practice.
Contact Details - Sintropher

Charles King
Sintropher Communications Manager
University College London

14 Upper Woburn Place
London WC1H 0NN
United Kingdom
+44 (0)20 3108 9538
charles.king@ucl.ac.uk

www.sintropher.eu
Partners

Sintropher is coordinated by

In partnership with

Co-funded by the INTERREG IVB programme for North-West Europe