



**Innovative design and operation of new or upgraded
efficient urban transport interchanges [Theme: SST.2012.3.1-2.]**

City-HUB Project



**City-HUB Fact Sheet N° 6:
Efficient and smart design**

Background and content

Throughout the last decades, social and economic opportunities have been revealed from mobility growth, causing significant increase of congestion in urban areas and environmental deterioration. Transport started to pose a threat for modern societies, while satisfying the demand for mobility is a key determinant factor for citizens' quality of life (Adamos et al., 2014).

Urban public transport can provide a feasible alternative to individual car transport; however, the availability of opportunities for direct journeys when using public transport is limited, while the majority of trips require interchange zones, thus areas which encompass one or more interchange facilities and public spaces used for access and/or transfer (Allen et al., 2014).

The scope of the 6th City-HUB Fact Sheet is to outline best practice guidelines for urban transport interchanges, covering governance, issues facing operators and managers, and users. An overview of the findings from a travellers' attitudinal survey, undertaken in five European case study interchanges, is also reported.

Lastly, key findings of the Transport Visioning Events "Good practices" and "Customer satisfaction priorities", which took place during the 2nd City-HUB Stakeholder Workshop in London 2014, are summarized.

Which issues should be considered when designing smart interchanges?

In order to identify those factors and elements required for the achievement of more efficient and smarter guidelines to design interchanges, an extended literature review was conducted and a number of practitioner interviews were taken from selected stakeholders of 15 organizations representing transport operators, local transport authorities and local business. The results showed that there are many issues that need to be considered when designing smart and efficient interchanges, among which the following (Allen et al., 2014):

- Connectivity between modes, including connections and efficiency, legibility, permeability, etc.;
- Information systems, addressing inclusive information, wayfinding, service information, etc.;
- Building elements, such as interchange spaces and stakeholder needs, building materials and finishes, comfort and attractiveness, etc.;
- Distribution of facilities and services, referring for example to capacity and passenger flows, safety and personal security;
- Space and legacy, including access to land, space and other legacy constraints, i.e. heritage;
- Energy efficient building design and operation, addressing assessment tools, guidance, etc.;
- Quantification of carbon emissions;
- Communication, i.e. between all stakeholders;
- Ownership and management structure; and
- Integrated planning.

Depending on several factors, i.e. size, location, passenger flows, modes in use and stakeholder priorities, the above issues may be considered at different levels of importance at different interchanges (Allen et al., 2014).

Guiding principles

The role of an interchange is to enable passengers to change from one route or mode to another, taking also into consideration that they may need to exit the system or wait for their connection. Although larger interchanges are being designed to offer a variety of commercial and retail opportunities to travellers, it is important to note that the core design of the interchange should be focused on transport transfers (Allen et al., 2014). City-HUB identified eight key guiding principles that can be applied to any interchange and set the basis for a useful checklist for those who plan, design or upgrade new or existing facilities (Table 1).

Table 1: Key guiding principles (Allen et al., 2014)

Principle	Content
<i>Clarity of purpose and functions</i>	It is of high importance to have a clear layout for the interchange and its functions. This becomes more complex in the case that the interchange provides transfers between different modes and networks.
<i>Accessibility</i>	Physical accessibility, including step free and barrier free access to all, and a good location of the facility in its surroundings concerning infrastructure, lighting, legibility, etc. are two aspects of accessibility that need to be considered for interchanges.
<i>Legibility</i>	Legibility refers to uncomplicated design environments, which make navigation and movement easy and seamless, and consequently enables travellers' understanding, enjoyment and experience when using the interchange. Key elements to take into consideration in terms of legibility include layout, lighting, surfaces and materials, and finishes and furniture.
<i>Intermodality</i>	To some extent, all interchanges are considered as intermodal, since they require access by foot to and from the transport services. In the case of larger interchanges, passengers are able to shift between different transportation modes which may be rail or road based, surface or underground. However, different types of transport serving the interchange require different treatments, which may vary from servicing international and regional to local journeys.
<i>Management and ownership structures</i>	The more complex the interchange becomes, the greater the need is that the management and ownership structures are formalized. On-going engagement with customers throughout planning and operation of an interchange is an important guiding principle for successful interchange management.
<i>Financing and business models</i>	Function, size and context of the facility usually determine the choice of the business models to be adapted for interchanges. The majority of these models separate the capital cost from the operational costs and revenues; this is feasible when the interchange is planned, since initial capital investments comprise the largest proportion of the costs related to the life cycle of the interchange. However, when this is not possible, i.e. in the case of upgrading an existing facility, the financial cost of any debt associated with the capital investment of the facility should be separated from the operations, while the relevant operating costs should be clearly documented and reported along with revenues.
<i>Regulations and legal aspects</i>	National and local regulations influence some aspects of the design and development of an interchange, and determine which business models are applicable. In any case, basic levels of safety and security must be provided, as well as modal specific requirements, such as requirements for road or rail transport, overground and underground transport. Also, quality management standards addressing the environment (i.e. ISO 9001) or sustainable development guidelines can enable the guidance of operations of an interchange and ensure the satisfaction of its users.
<i>Dynamism and relevance</i>	An interchange should be seen as a dynamic actor in the urban transport network, providing highly dynamic quality environment for travel, while the management of this should not be neglected. In addition, even after the facility is built, it still needs to react and respond to a changing customer environment, taking into account the potential to cater for passenger growth.

Customers' perspectives and satisfaction priorities

The travellers' satisfaction survey took into consideration the overall satisfaction of users at the different case study locations, and also looked in more detail at which are the most important aspects for users (Allen et al., 2014):

- Information;
- Waiting areas;
- Safety and security;
- Services;
- Shops and cafes;
- Transfer communication; and
- Access.

Overall, the satisfaction levels were defined to be significantly influenced by both interchange characteristics and conditions and the individuals' characteristics and behaviour. Women were more satisfied than men, while younger people valued interchanges to be of higher quality. Although the interchanges have different features, the most important factors in all of them according to the users' requirements and preferences are: Information, safety and security, transfer communication and services (Allen et al., 2014).

In addition, the results showed that at the different types of interchanges, passengers have different requirements and concerns. In Moncloa and Kamppi, and in Ilford and Thessaloniki, small group of factors receive almost all the votes for importance factors from the users. On the contrary, in Köbánya-Kispest, almost all of the factors are considered of to be of some importance (Figure 1).

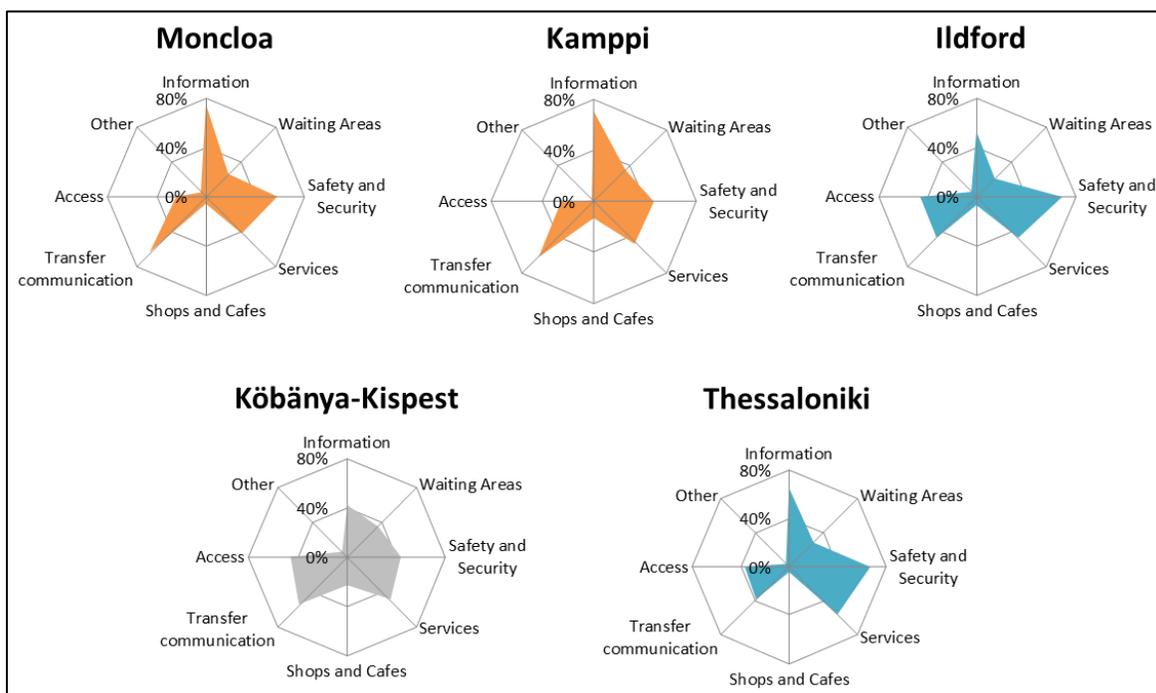


Figure 1: Factors of importance based on the % of sample selecting it as one of the three most important

Main conclusions of the Transport Visioning Events (TVEs)

Transport visioning event: Good practices

The 1st TVE focusing on the design of transport interchanges, aimed at identifying and defining good practices on topics such as the location of facilities and transport services, the operation and coordination of different modes, and ticketing. The key findings of this TVE can be summarized to the following (Keserú et al., 2013):

- Physical limitations should not be underestimated during the planning process. The availability of the site, including the type of land, the area and the shape, determine the design, while it may be difficult to fit all the desirable features into the available site.
- Improving facilities during the refurbishment of an interchange is a rather difficult process; the design and construction need to be reconciled, when the interchange has to remain operational. This results to potential compromises to be made on the design, in order to manage to finalize the refurbishment as soon as possible causing less disruption to users.
- A single template for an interchange does not exist, since there are different types of users with different needs. For this reason, there have to be design aspects for different groups.
- Guidance should be provided for different sizes and typologies of interchanges, since some factors depend on the size and revenue of an interchange. It is necessary that there is guidance for minimum service level addressing essential features and guidelines for the optimal service level involving desirable features.
- Interchanges should have the capacity to adapt to future changes; if their design is based on continuous innovation and resilience, this will enable them to cover increases in future demand.
- Although there is a high demand for seating places in waiting areas, still, interchanges typically do not have enough of them.
- Lastly, referring to transferability cultural aspects, ownership structures and economic environment were among the most important barriers indicated.

Transport visioning event: Customer satisfaction priorities

The 2nd TVE focused on customer satisfaction priorities, and issues such as information and transfer, safety and security, comfort and quality of services, were discussed. The key findings of this TVE are summarized to the following (Keserű et al., 2013):

- Customer surveys and passenger focus groups can be helpful in shedding light to the specific needs at the interchange, as they cannot be generalized amongst interchanges.
- The needs of customers are specific and their needs depend on the context of different interchanges; different types of travellers have different needs. For this reason, it is not possible to generalize the same needs for any interchange.
- Time was recognized as a key factor for almost all users. In this direction, services should be coordinated on the best way in order to minimize the time of transferring between different modes for most travellers. In addition, the reduction of the physical distance between different modes was also indicated as a crucial point to cope with certain constraints in existing interchanges.
- No matter the type of the terminal, the common topic which is desirable by all users is information provision.
- Other topics, related to time coordination amongst the modes of transport serviced at the terminal and other provision, such as internet connection etc., depend on the time duration of the anticipated time to be spent at the terminal.
- One very important issue that was pointed out, and received mutual acceptance by all participants, was that provision of what disabled customers require, assures comfort and service quality for all other customers, as well.

References

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