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**City-HUB, new perspectives of planning efficient and modern
intermodal terminals**

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1. Introduction

The use of an efficient and sustainable transport system has become lately a greater emphasis, due to the growth of mobility which conveyed serious problems regarding not only the congestions but also the environment. A possible solution could be the promotion of public transportation; it is efficient, and has great potential for the future. Although, one have to take into account its greatest drawback, which emerges a considerable barrier towards the travellers, namely the need of transfer between different transport modes. This is its Achilles' heel which has to be dealt with, and raises a great challenge for the experts in the sector.

A new approach has emerged, the intermodality, which concerns knowingly the joint of different transport means during the transportation chain. This notion has many aspects, and therefore has a great influence on the travel behaviours, mostly in terms of the ease of travelling, and travel time. The prior one concerns with walking distances, the quality of the waiting facility or the accessibility for certain groups of people, which is a matter of infrastructural development. The latter one mostly depends on soft measures, like contribution of different transport organizations for minimizing the transfer time by synchronizing their schedules, for example. The improvement of the quality of mobility is crucial, by supporting door-to-door travel; an interchange is nowadays more than a simple node in the network. Research literature showed that time savings, better use of waiting times, urban integration and improved operational business models could also be a beneficiary of the improvements of urban interchanges (Di Ciommo, 2002).

There were a plenty of former projects regarding the topic of intermodality (KITE, 2009, LINK 2010, HERMES, 2011, NODES, 2013) from a different perspective of an intermodal centre. The subject of this paper is the City-HUB project which takes place in the Seventh Framework Programme. It sets a goal for developing as a final outcome a useful and practical guidebook for the planners, stakeholders or decision makers in order to help creating successful interchanges. The paper aims to introduce this process, summarizes and tries to systematize the gathered knowledge in the form of a logical way, from the very beginning to the final handbook. Each main stage will be examined in order to get an insight how this intermodal guidebook should be developed. This process concerns not only the improvement of the quality of transport services, but tackles with other related issues such as management structures, technology, economic, land use or optimize waiting times by providing a vast range of services as well as social issues (*Fig. 1*).

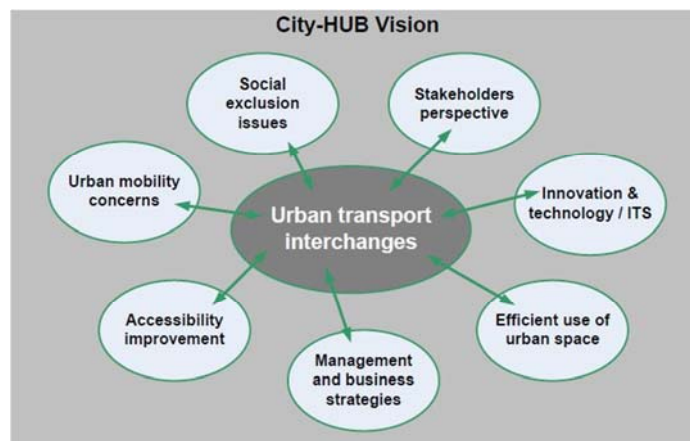


Fig. 1.: the City-HUB approach and different aspects (source: City-HUB D2.1 Review of Theory, Policy and Practice)

In order to obtain the answers for the above mentioned tasks, it should be cleared for whom we should improve the intermodality. Who are the stakeholders? What are their preferences? What do they lack the most? Which are the most important aspects? All of these questions are inevitably important for understanding an intermodal terminal, so these factors were investigated, contained by the next chapters.

To summarize the aim of the project with all of its outcomes is to provide a new approach for both the strategic and day to day planning, for the inclusivity of all kind of people, ensured by improved accessibility. In addition, it promotes the latest technology for a cleaner, smarter and safer interchange in order to grow the share of the public transportation from the modal split. The paper is based on the issued deliverables, which will be available on the website of the project (www.cityhub-project.eu) as a coproduction of nine European research institutes, from Hungary, the KTI Institute for Transport Sciences Ltd.

2. Methodological approach

2.1. Framework

The aim of this chapter is to present the methodology of each main stages of the creation of the handbook for the planning of an intermodal centre from the very beginning to the final experiences, based on the City-HUB project. As far as the prior literature is concerned, recent studies (MIMIC, 1999, GUIDE, 2000) have highlighted that an interchange is an unavoidable

feature of the public transport, and assessed recommendations and best practices regarding the functional specification and design. Also, these projects considered the barriers of intermodality from different perspectives. Later, a study (Towards Passenger Intermodality in the EU, 2004) aimed to outline the framework of an EU work plan towards the passenger intermodality. Other projects, like KITE (2009) introduced a framework for evaluating interchanges, with the focus mainly on the users' perspective.

In order to examine the question stated in the introduction as well as elaborate what are the important factors which should be improved to provide the desired guidebook, several different work stages should be conducted to obtain accurate data and to minimize the redundancies with the state-of-the-art knowledge.

To know where to start the examination, we need to indentify the corresponding questions, regarding what is to be considered as a high quality or good practice. To be familiar with the circumstances, a discussion was conducted with certain key experts in the form of an interview, complemented with the available literature. As a preliminary result, a set of key elements have been defined, which are crucial to provide seamless public transport. There are different topics which possibly cover the intermodality as a whole:

- **Process coordination and management:** operating an interchange might involve numerous stakeholders, with different interests who makes the process more complex, the operators' and passengers' should meet. That is why should be cleared the roles and responsibilities at the first stage, by elaborating a business plan for example.
- **Accessibility for all:** namely a very important aspect is the social inclusion, particularly the elders or physically disabled people or the juveniles.
- **Passenger services at interchanges:** the demand of different traveller types should be addressed, as it claims for an integrated approach, in order to achieve a high quality service. This includes the short transfer times, integrated ticketing, barrier free accessibility, reliable information provision or easy wayfinding.
- **Safety:** also includes security, which is a crucial issue regarding the judgement of this type of travelling.
- **Interchange design:** providing a welcoming environment makes people enjoying the place, brings added value to the neighbourhood, the perception of safety improves. In addition, a sustainable design helps keeping low the maintenance cost, so makes it more efficient in terms of the energy consumption, for example.

These topics are likely to have different levels of importance at different interchanges depending on various factors. In addition, a previous study (KITE, 2009) proves that it is hard to generalise the interchanges since there is a strong influence of the local circumstances and

behaviour. This means, we have to take into account the soft and hard elements of the interchange. **Soft** elements are considered as the travellers, the operators and owners and government. It is required to acknowledge the **travellers'**, or interchange users' needs, both the actual and possible potential passengers. Their attitude towards the travel is fairly sensitive regarding the costs, travel times, reliability, comfort, safety and security and accessibility. A difference should be considered among the possible passenger groups (gender, age, disability etc.). The management is being brought by the **operators and owners** of the interchange. Cooperation is vital among the stakeholders, the interest of each group (including the social groups) should be harmonized, not to mention the handling of the eventually occurred contradictions, they are responsible for the coordination of the services and facilities, maintenance, safety and security. The **government**, preferably the local municipalities, is in charge for establishing sustainable urban environment and transport. It has strong influence on the project; it can intervene on several points, so its attitude should be careful and responsible. The legal framework represented by the municipalities plays a serious role, which could speed up or hinder the project.

The **hard** elements are for example the size, location, design, typical passenger flows, and modes in use or stakeholder priorities. This enumeration can be completed with endless premises, and will be discussed later. The issues above, such as the key factors and different soft and hard perspectives have been kept in mind during the whole examination.

By getting acquainted, which should be the main premises which could characterize an interchange, the good and bad practices could be identified, and what kind of impact they have on different interchanges?

2.2. Pilot case studies

To identify them, the most accurate result could be provided with a carefully selected set of pilot case studies. The definition of the case study can be “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2009). The main premises should be their comparable attributes along with the diversity within various case studies. Our starting point has been to select cases that are comparable in specific elements, but which also secure diversity within various case studies (Ragin et al., 1996). To assess good practice, obstacles and improvement potential from the daily operation, five different intermodal interchanges has been selected as pilot case study. All of these interchanges play a key role in their own cities and cover a wide spectrum in interchange types and geographical distribution, explained below:

- **Moncloa, Madrid (Spain):** lies on the entrance of the city, realizes the access both to the highway system and the interior circular metro line. Is a part of the “Madrid Interchanges Plan”, which makes attempts towards the unification of exchange points between interurban buses and them metro system.
- **Iford Railway Station, London (United Kingdom):** this station is considered as a major public transport interchange, according to the Transport for London (TfL), by providing direct rail and bus connections to central London, and works as a hub by serving several suburbs.
- **Railway Station Thessaloniki (Greece):** located in the suburban area of the city, and serves approximately 1 million inhabitants. Includes both commuter and interurban trains, but local, suburban and interurban buses as well. The first metro line in Thessaloniki is under construction with connection to the station.
- **Kamppi, Helsinki (Finland):** this is a terminal for local buses serving the western part of the city, supplemented by a metro station and a separated long-distance bus terminal beneath. The terminal is a part of the city interchange area, providing access to the railway, trams and other city buses.
- **Kőbánya-Kispest, Budapest (Hungary):** this interchange lies at the southern terminus of the busiest metro line of Budapest. Also a major transit railway station is located in the terminal. Beneath the newly constructed shopping mall a bus terminal is being implemented, which serves both local and interurban buses.

2.3. Data gathering methods

By using these case studies, we have indentified the corresponding variables which have been examined in the further progress. The pilot case studies contained qualitative and quantitative methods as well, and a reporting structure was developed. Regarding the **qualitative methods**, the most questions on the template was common for every stakeholder, but some parts were customized for the specific stakeholder. The responsible partner conducted an unbiased and critical interview, regarding the good and bad practices, as well as gathered the relevant documents and reports. During the information gathering, different approaches were used, in terms of the most efficient result. For example, semi-structured interviews with stakeholders, such as terminal owners, transport operators, service providers, decision-makers. In addition, several site visits/audits were conducted, illustrating the good and bad practices and calculating the transfer and waiting times but also focused on the available facilities, services, retail as well as the accessibility, permeability, the general design and pedestrian routing. The structure of data collection can be seen in *Fig 2*.

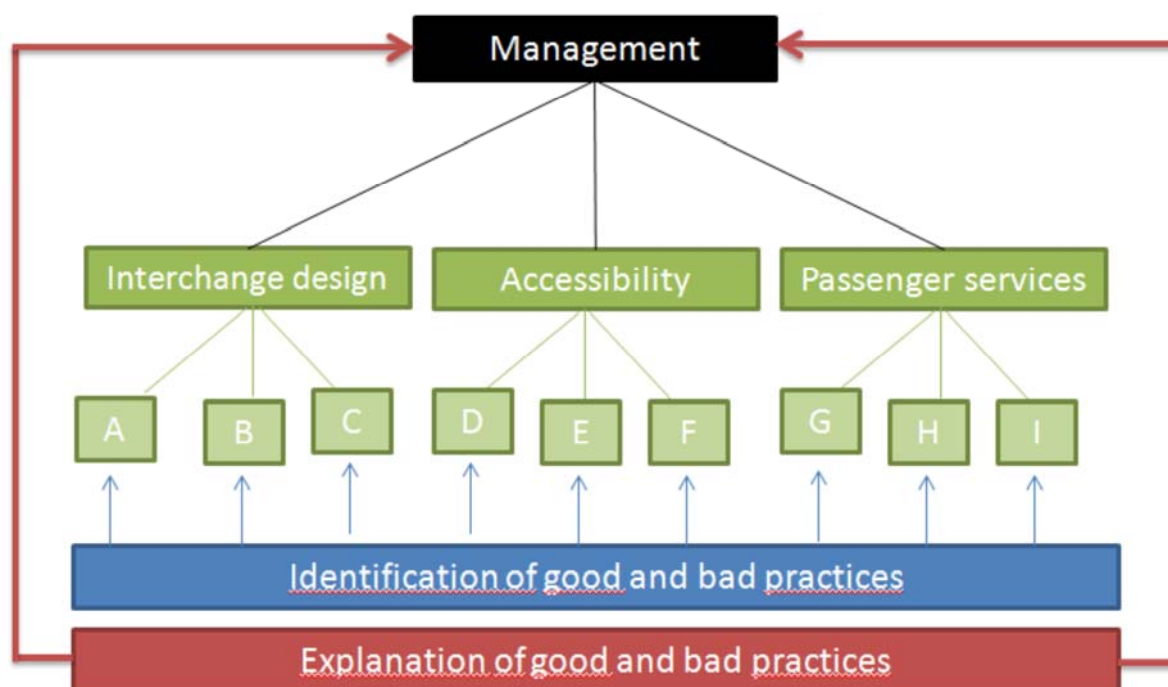


Fig 2: the used structure for information gathering (source: City-HUB D2.3 – Lessons from descriptive case studies)

As a **quantitative method**, a traveller's attitudinal and stated preference survey was conducted in order to acknowledge the passengers' views and preferences on a definition of a smart interchange. In addition, it provides a better understanding of the emotional responses towards the 'perception of a secure environment', for example. The survey included three different parts; a travellers' satisfaction survey, a description of an actual trip, and a socio-economic information provision, to obtain their travel behaviours (including the user groups with special needs), the level of satisfaction. To elaborate the survey, a four-step model was built. Firstly, the population should be characterized, by its gender and age. As the second step, was to outline the process. The survey was conducted on the internet (SurveyMonkey), and leaflets, identified by a survey number were handed out at the previously determined points of the interchange, on two particular days, on Wednesday and Friday, since these days represent two different travelling patterns, the weekdays and the last day of the weekdays. To boost the reliability of responses, a prize draw was organized among the participants. All leaflets which were handed out, were recorded on a control sheet. The third step was the processing of the filled surveys. The database was homogenized, and processed by SPSS software. As step four, was to define the proper size of the sample by gender, to get a representative mass. As far as the population is concerned, a valid sample is required, so the minimum number of responses of each age cluster were identified. Moreover, a minimum of 10 disabled people's participation should appear among the responses.

2.4. The city-HUB model

To ensure a useful guidebook a model is required to carry out, in terms of addressing what are the considerable issues, what, when and how to implement to achieve a successful interchange. The model will represent the walk of life of the interchange, from planning to the everyday operation, including the monitoring and feedbacks. The approach of the model covers three main areas; each one is according to the target groups such as travellers, operators and governance:

- **transfer services and daily operation**, which covers the design and accessibility of interchanges, intermodal coordination, information and wayfinding, safety and security aspects and facilities and services.
- **Management and financing of the interchange**: including the ownership and management, the business models and stakeholder involvement.
- **Governance and city integration**: covering economic development effects, social and environmental impacts, coordination and land use and city integration.

According to the main areas presented earlier, a stepwise draft model has been developed. It has been revised and simplified by the project partners and stakeholders through interviews, surveys and workshops.

This model is being supplemented by a comprehensive checklist, which is useful for evaluation and a reminder which contains the aspect should be considered during the planning.

The final City-HUB model can be found in the Fig. 3. The first box represents the identification issues. At first, the interchange status must be assessed, practically, with a checklist, which highlights the areas of improvements, or at a new interchange, helps to achieve a successful centre by providing the main aspects. To identify the stakeholders and their interest it also belongs to this section, as well as to identify the policy goals, and define functions and logistics of the interchange. The previously mentioned management plan and the clear roles also take place in the beginning. And at least, the energy efficiency became more importance and recommended to concern with it at early stage. As it can be seen, every aspect reflects on the outline of the interchange booth the management and design.

The second box represents the viability check, which contains firstly the financial plan. It stands for an investment and maintenance plan including a revenue generation plan. Important to examine the opportunities with the private sector which concerns in the first row the commercial interest. In order to ensure growth in the transport investments and generate

economic development, the complementary policies and the development plan should be secured. This chapter proves the sustainability of the interchange both financially and ecologically.

The third part of the model concerns the implementation and operation. This means, a system should be established in order to monitor the performance and boost the effectiveness. A crucial part is the feedback from the travellers, which must be taken into account at the feedback and implement into the improvements. The previously described recommendations complemented by the model provide enough insight to develop the final outcome of the project.

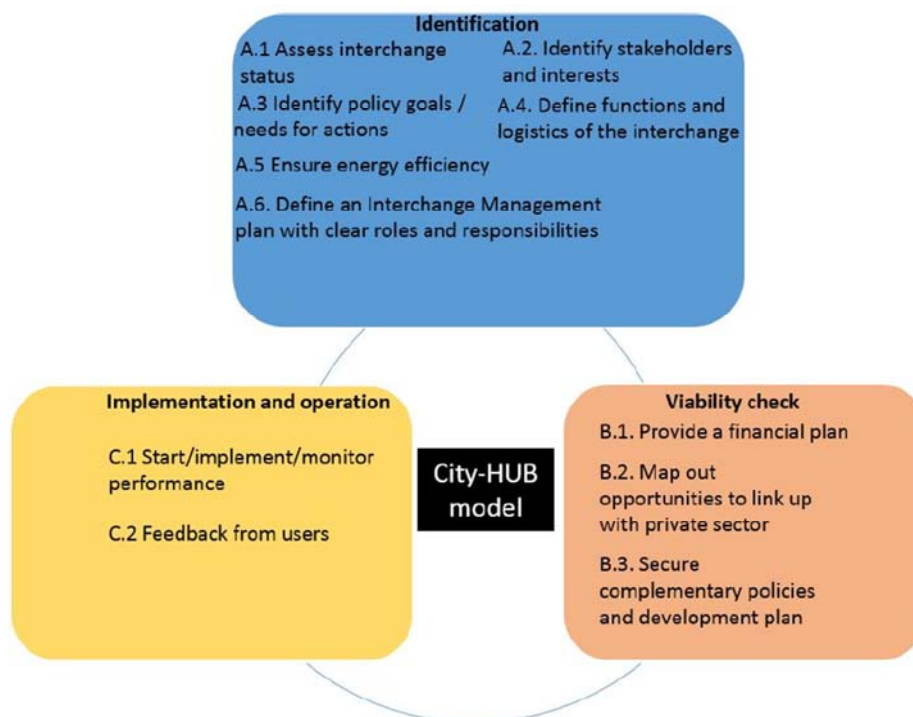


Fig. 3.: City-HUB model and key interchange properties (source: City-HUB project (2015) Deliverable 6.1)

In order to obtain a reliable model, in terms of the approach of intermodality, a validation process should be implemented, which helps to revise the above explained steps.

2.5. Validation process

The validation process is based on a standardized data collection from each validation case studies, which can be introduced as below. It aimed not only to validate the above described model, but the findings, which can be read in the chapter 3.

- **Gare Lille Flandres/Europe (France):** these two interchanges lie 500 meters from each other, in a particular railway station triangle, allowing the passengers to transfer from urban transport (metro, tramway, buses, bikes etc.) to the rail services. In addition, a huge shopping mall is located in between the two interchanges.
- **Utrecht Centraal (Netherlands):** this central transfer facility now operates beyond its capacity, so a refurbishment and extension is being planned in the future. A main railway station will be complemented with several urban transport means.
- **Oslo Bus Terminal Vaterland (Norway):** the station is the main hub for regional, national and international bus lines but the connection to other urban transportation lines, like local buses, tramways and subways is within reach. The bus station lies only 400 meters from the main railway station, but the central business and trade districts are also in the neighbourhood, which grows rapidly.
- **Paseo de Gracia, Barcelona (Spain):** a railway station with long history, located in the hearth of the city. It realizes connection towards three metro lines. Its location is ideal, the catchment area consist the zone of highest density of jobs and amenities.
- **Prague Terminal Dejvická (Czech Republic):** the terminal plays an important role in the city, as it located on one of the biggest square of Prague. The whole area was designed as a multipurpose district, which integrates administration, education, residential zones etc. Due to the congestion it was ought to refurbish the terminal, which opening is due in spring 2015.
- **Intermodal Terminal of Miskolc (Hungary):** this interchange is at the time of this article is being written, only a plan. The location is the busiest railway station of Miskolc, where other transport means terminates or passing by. The aim is to integrate all of these means in a complex intermodal centre which could deal both the commuters and the traffic of inhabitants.

As it can be seen, all of the interchange has different background and role in their city, which is a key point in terms of the validation process, since the models and findings could be tested in many different environment.

A template was developed in the same manner as it was introduced at the pilot case studies, and formed the basis of the interviews with the appropriate stakeholders, which were mostly transport or interchange operators or members of the local municipalities, since they are the

most capable in terms of the available information. The template concerned a vast aspect of an intermodal centre, such as identification (goals, stakeholders and stakes), assess interchange status (design, accessibility, coordination, services, safety, security, wayfinding etc.), validation and business model check (financial plan, policies, commercial interest etc.), concretization (management plan, energy efficiency) and at last, monitoring and evaluation (e.g. feedbacks). The answers given by the interviewee in every aspect could be planned/considered, not planned or currently not relevant.

This initial interview allowed following the validation process, which could be used as a syllabus to elaborate every aspect should be relevant regarding the case study (Fig. 4.). At first, the main stakeholders provide a comprehensive summary of the interchange, including the connecting modes, facilities, history, legal framework, and environment, completed by a checklist on the basis of the findings regarding the integrated management and efficient and smart design. The second part is to summarize and standardize the experiences, in order to synchronize and uniform the different case studies. With the help of previous findings, the main reasons will be unearthed. Depending on the result of the checklist, a propose will be given considering its feasibilities. This means that there could be huge differences among the improvements (some are easier to implement than others etc.). It is recommended to rank them with a Likert-scale. The next step is the simulation of the effects. It considers which aspect will be affected, who will be the beneficiary. The key part of the validation comes after the simulation. The stakeholders of the interchange express his/her thoughts and opinion of the proposed improvements, its relevancy and usability. The submitted suggestions received from the stakeholders helps to shape and improve the content, which leads us to the final City-HUB model. Based on this iteration, the model has reached its final form (Fig. 3.).

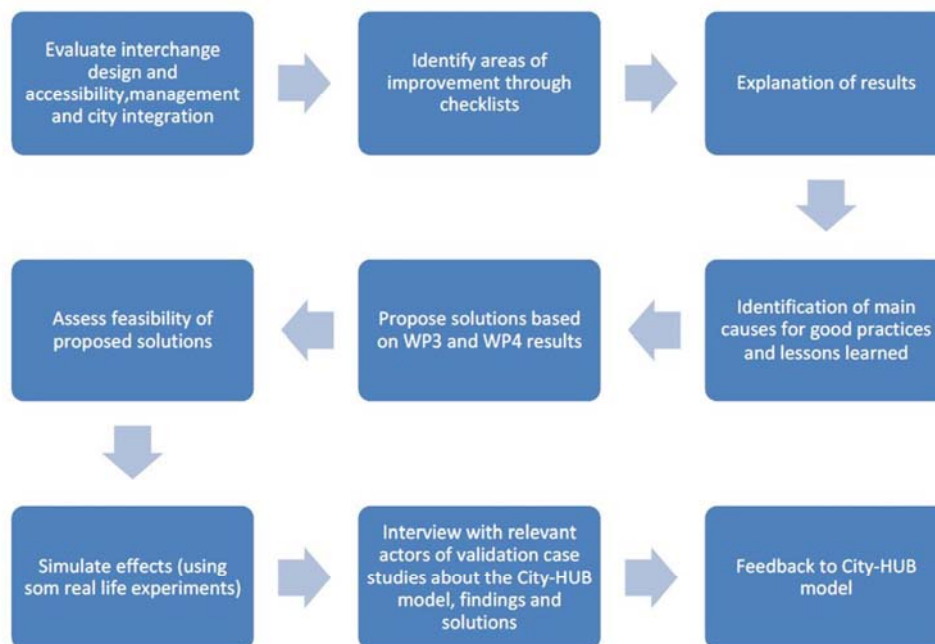


Fig. 4.: the schematic structure of the validation process (source: City-HUB project (2014) Deliverable 5.1)

3. Findings

3.1. Integrated management findings

Based on the conducted pilot case studies, many different ownership, management and operational structures are available across the selected interchanges. Regarding that, there is no best solution; however some are more optimal than others. In addition, as far as the design and construction are concerned, there are only a few examples of regulations or regulatory frameworks. Usually, an interchange facility is considered as a ‘grey area’ in transport planning; the roles and interest are dominated by the regulations of each mode.

This is why it is important to settle an **ownership and business model**, since an interchange would benefit from a close interaction between public and private sector. According to the case studies, an interchange managed by the private sector is economically viable, operations and management is based on commercially successful utilization. There are synergies between commercial operation and interchange management in terms of attracting the customers to utilize services which indicates the sponsoring of public transport by attracting

new customers. Moreover, additional services would reduce the need of use private car for shopping. Usually, these retail facilities are shifted out of central locations and pressurize the private car utilization, which could be radically reduced by the integrated services at interchanges.

To ensure an **integrated information system and ticketing**, cooperation among the stakeholders is inevitable. A clear information system is essential for an easy, efficient and stress-free user experience. As it was pointed out, the signalling and information provision should be provided in centralized and harmonized manner. Avoiding comparing different information sources, the spending of waiting time could be more efficient, by utilizing the spared time for reading e-mails, shopping etc., from which even the local retailers would make benefit. Integrated ticketing should be an issue worth to consider. One have to keep in mind that implementation of an integrated ticket system is usually independent from a particular interchange. However, in case of the circumstances are given, it would be a mistake to not exploit the opportunity. According to the case studies, it is rejoicing that there can be recognize the endeavour for an improved accessibility at every interchange. While the basics have been implemented, more detailed solutions, such as tactile map or voice guidance, are rarely available.

An interchange could have **impact on a local economy**, which could be positive or negative, largely depending on the success of the management. A positive effect is more likely to occur if there is an integrated development plan linking the transport function with the urban and economic function (Banister and Berchman, 2001). Some cases the revitalization of the neighbourhood is linked to the (re)development of the interchange, providing new homes and offices as well as cultural amenities.

The **energy efficiency** and the carbon footprint are common issues nowadays and deserve increased attention by policy makers and authorities, from several reasons. The obvious reason is the environmental purposes, but could affect the social and economic elements as well. For a traveller, the carbon footprint is not a main point but an environmentally healthy and a comfortable atmosphere is anticipated. However there are several tools to assess the energy efficiency, none of them is designed for transport buildings, but many tools can be applied on the interchanges in question.

And last but not least, how to engage the stakeholders to achieve an **integrated building and business plan**. Stakeholders' consultation is the integration of the opinions and concerns, helping to make the decision-making process more transparent, gather most of the inputs and support the decision. The benefits of the public participation are (Nokkala et al, 2013):

- improved quality of decision-making,
- minimising cost and delay,
- consensus building,
- increased ease of implementation,
- avoiding worse case confrontations,
- maintaining credibility and legitimacy,
- developing civil society.

A bad example for the lack of contribution is synthesized, namely the integration of rail, which is more complex to frame into the other transport modes. The problem stems from two different sources. First, the train is operated at national level, and as an organisation it is too cumbersome to implement in a dynamic environment. In addition, in many cases the train operator considers the interurban buses as a competent. The other reason is that the rail buildings are often outdated, old buildings and hard to implement it into the infrastructure seamlessly.

Three levels of **stakeholder involvement** can be identified: information provision, which aims to reach the widest possible target audience, included the hard-to-reach groups. Consultation is more targeted at particular groups, eg. travellers, operators etc., and involves a large number of people. A participatory technique generally prescribes a far fewer but more targeted groups of people with deeper participation. Since the possible tasks could be varied in a large scale, every described technique shall be utilized, providing that all of them satisfy the seven principles of good consultation practice, namely: integrity, visibility, accessibility, transparency, disclosure, fair interpretation and publication.

3.2. Efficient and smart design findings

There are many different aspects which might affect the interchange design, and the government along with the local operators/actors have influence on it. On the other hand, the users will perceive the provided environment, of which quality largely depends on the appropriate preparation and contribution of the stakeholders, as it have been highlighted earlier.

Nevertheless, the passengers' point of view should be taken seriously, since they are the most important stakeholders, and without them the interchange would be useless. Owing to the survey described in the chapter 2.3, we have obtained the people's intermodal travel behaviour, attitudes towards the services which can be utilized as a valuable output for further analysis.

These outputs are based on the users' requirements which have been outlined on the basis of the survey. The satisfaction level appears to be influenced by both the interchange

characteristics and conditions, and the individuals' characteristics and behaviour (Abreu e Silva et al., 2013). Assuming this, the preferences are the information provision, safety and security, transfer communication and the services. The passengers prefer firstly to reduce the time spent inside the interchange (adequate transfer connections), followed by receiving reliable information (high quality information) and finally, to improve the use of their waiting time inside the interchange (comfortable waiting areas and an increased numbers of shops and cafés).

Altogether eight different principles have been identified of a smart and efficient interchange, but only four concerns the design. The findings beneath could be a background of a checklist for the planning process.

- **Clarity of purpose and functions:** important to be unequivocal for every passenger, this is a general principle. The more complex the interchange the more attention should be spent on this feature. Moreover, it is important to emphasize that there are three different qualities for the spaces: decision (entrances, ticket offices, corridor junctions, where people usual stop and make decisions), movement (corridors and paths to/from/between transport modes, where the path should be unobstructed by furniture, advertising etc.) and opportunity (cafés, retail, seating etc) (London's Interchange Best Practice Guidelines 2009). Each ones should be respected and ensure that neither of them would interfere with another.
- **Accessibility:** this should be considered in two different meaning. The first is to make the whole interchange barrier-free for the disabled people. This stands not only for the physical design (step-free, tactile surfaces etc.) but the provision of audiovisual services. The other part of accessibility is largely depending on the setting of the interchange, since this concerns the connectivity of its surrounding, in terms of the type of the infrastructure, design, local lightning and the treatment of the public space, including the legibility.
- **Legibility:** two important aspects should be taken into account regarding the legibility, the wayfinding and permeability. This principle could improve the passengers' ability to navigate to and inside the interchange. The improved wayfinding largely boosts the permeability, since the less to concern with to find the right way (and spend more time with that) the more people could go through the interchange, especially in case of spasmodic passenger streams. The design and placement of the signage plays a central role.

- **intermodality:** the connection of each modes should play a key role. It has to be kept in mind that not only public transportation means should be connected but private modes such as cars or bicycle are needed to be linked to the public solutions. Nevertheless, the connection of local/regional/national/international transport layers should be taken into account. To fulfil this requirement, a careful integration is desired among the stakeholders.

Considering these principles, the findings can be organized into five categories which describe the accessibility and multi-functionality of the interchange (Table 1).

Table 1.: key variables, which has been developed based on the pilot case studies (source: P. Christiansen, J. Andersen, 2014)

Interchange design and accessibility	Coordination of intermodal transport	Information and wayfinding	Facilities and services	Safety, security and environment
Pedestrian flow	Smart and integrated ticketing	Harmonized information	Physical limitations	Minimize conflicts
Cycling and walking accessibility	Regulation	Wayfinding plan	Meeting place	Separate flows
Step-free access	Inter-modes distances	Legibility	Decision, movement	CCTV, human interaction
Tactile surfaces	Technology	Permeability	Opportunity space	Emergency management
Air quality, noise, temperature			Telephone and Wi-Fi signals	Energy efficiency

4. Conclusion

As it was described in the introduction, the main goal was to provide a coherent and insightful guidebook for the planners and decision-makers, in order to create successful interchanges. This final outcome will be published presumably in June 2015. Since the guidebook will be publicly available once it has been released at the website of the project (www.cityhub-project.eu), the aim of this chapter is solely to summarize the methodology and the findings which form the basis of the final guidebook available for everyone.

The paper divided into two main parts; the methodology and the findings. There was a great emphasis on the methodology in this paper, since one of the main objectives was to introduce how this evaluation process should be like. The methodological steps followed a clear logical path. Firstly, a decision had to be made on the definition of the main premises, which will be the backbones of the measures. Once these key topics were outlined, namely the process coordination and management, accessibility for all, passenger services at interchanges, safety

and interchange design the pilot case studies were able to elaborate, by qualitative and quantitative techniques. Owing to these case studies, their good and bad practices were synthesized providing the recommendations and findings, which will be summarized later. Based on these findings, a model was developed, which is being called City-HUB model, referring to its main purpose, to make an efficient hub in the cities. It covers three different topics, like transfer services and daily operation, management and financing of the interchange, governance and city integration. The model consists of three parts, introductory issues, the viability check and implementation and operation, which could be identified as a walk-of-life circle of an interchange. The validation process was to examine whether both the findings and the developed model is viable, through a different set of case studies, workshops etc.

The main findings were from the topic of integrated management and efficient design. As it can be seen, both issues belong to one of the three main focus groups: the first one is concerned with the operators/owners, the second one to the passengers. And of course, there is a strong connection between them. From the side of owners, operators, or even the local government, the ownership and business model, integrated information system and ticketing, impact on a local economy, energy efficiency, integrated building and business plan and last but not least the stakeholder involvement are those topics which should be improved following the instructions of the guidebook. For the passengers, Clarity of purpose and functions, accessibility, legibility and intermodality are the key issues. All in all, these above mentioned aspects are those topics where the guidebook – through the developed model – offers solution towards an environmentally and financially sustainable interchange.

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