



*A study on European public transport centres in general
and Knutpunkten, Helsingborg in particular*

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Wayfinding - A study on European public transport centres in general
and Knutpunkten, Helsingborg in particular

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Abstract

Wayfinding is a big part of our daily lives, although we generally do not notice it until we get lost. Good wayfinding is particularly important in public transport centres where many users are unfamiliar with the setting, and many have reduced wayfinding capabilities due to stress or worry to miss a departure. Therefore, this study looks closer at the wayfinding processes and how wayfinding design can be implemented to improve intuitive navigation through public transport centres.

This master thesis is an investigative and descriptive study which aims at answering the following research question: Which are the main architectural and graphic factors important for intuitive and efficient wayfinding in complex building structures such as public transport centres?

A secondary aim is to raise the question of wayfinding within the discourse of architecture, and highlight the importance of considering wayfinding throughout the life span of a building.

The methods used in the study include a review of the theoretical framework as well as the development of

public transport centres, unstructured interviews to collect information and empirical observations which were conducted at four European public transport centres. To analyse the observed objects a walk-through evaluation was conducted at each setting. The findings are applied and tested on a case study, the public transport centre Knutpunkten in Helsingborg, and are formulated as general recommendations for improved wayfinding prior to its' upcoming reconstruction. The suggestions are illustrated verbally and in diagrams and photos.

The findings of this study indicate that the main architectural and graphic factors regarding wayfinding for first time visitors within public transport centres include, but are not limited to: identity, the building should be identifiable within the urban structure and the different functions should be identifiable within the building, clear and readable spatial organization, visual and audible access combined with physical access, consistent and reliable signage, and finally affordance based spaces and building elements which are perceived as logical and intuitive.

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Key words

Wayfinding, spatial perception, affordance, public transport centres, spatial planning.

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1

INTRODUCTION

1.1 Background

Wayfinding is a big part of our daily lives, though we might not always notice it. We have to find our way through the city, along streets and through buildings. The times that we are aware of using our wayfinding capacities are when navigating in an unfamiliar environment; we are there for the first time. People tend not to think about wayfinding until they get lost. In this thesis the focus will be precisely that; people finding their way in an unfamiliar building structure.

Imagine that you are in a hurry for a meeting or a departure, you are entering a large building for the first time; and you are completely lost. The frustration is rising as you struggle to find your way reading confusing signs and time keeps running...

Wouldn't it be wonderful then if the building itself could guide you in the right direction, without you even realising how it happened? Intuitive wayfinding - when it works you don't think about it, but when it doesn't, it really annoys you!

Research in wayfinding investigates the processes that take place when people orient themselves and navigate through space. How people find their way, what people need to find their way and how they communicate directions, as well as how people's verbal and visual abilities influence wayfinding, is explained in the theories (Raubal, 2008).

Wayfinding tasks can be categorised according to their functional goals: travel with the goal of reaching a familiar destination, exploratory travel with the goal of returning to a familiar point of origin, and travel with the goal of reaching a novel destination (Raubal, 2001). A task within the last category is most often performed through the use of symbolic information (Raubal, 2008).

When wayfinding has been considered during the planning of a building, the users will be able to appreciate the architecture, instead of trying to figure out how it works. The building will be navigated intuitively and afford the user to proceed in a certain direction. I find my beliefs formulated beautifully by Klasander in her PhD Suburban navigation:

"Design professionals must deal with aesthetics, but for those who want their designs to make an impression, it may be a useful reminder that use comes before form in people's memories" (Klasander, 2003 p 49).

A badly organized building on the other hand, makes the user get lost and feel frustrated. This in turn creates stress and aggression as well as being time consuming. The result is an inefficient building.

Wayfinding might be particularly important in public transport centres with a large variety of users and where many people are visiting the building for the first time. It is a challenge to provide good wayfinding conditions in public transport centres due to many factors such as their scale, complexity and disconnection with the surroundings. In addition, the users of public transport centres often have reduced wayfinding capabilities due to stress and worries to miss a departure.

Travel by public transport is increasing and public transport centres are developing, why it is interesting to look into this sector regarding wayfinding. There is an expected increase in numbers of passengers in the near future, and with this comes the need for redevelopment and streamlining of the public transport centres. Because of this there are a lot of expansions and renovations currently under planning and ongoing around Europe as well as in Sweden.

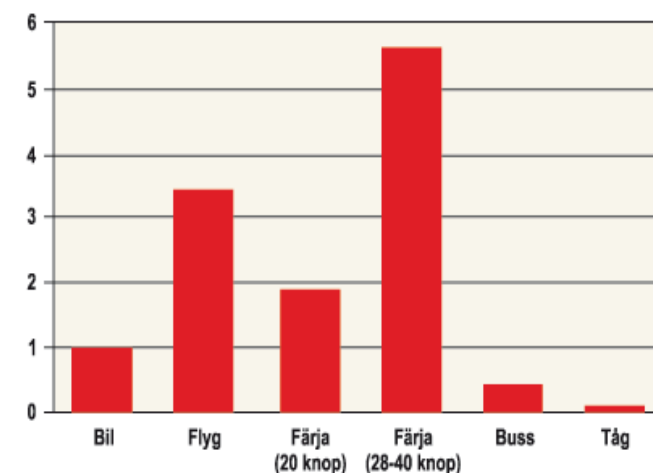


Figure 1
Climate impact per passenger kilometre compared to car travel, index 1
(Trafikverket, 2012)

The tendency to locate more functions not directly related to travelling, such as shops and workplaces, in the building, is also changing the role of the public transport centre in the city. It is developing into a meeting place, not just for travellers (Bakerson, 2009).

One of the reasons for the increasing travel by public transport is the sustainability issue. It is the environmentally friendly way to travel; locally, regionally and internationally. Trains are the second most sustainable means of transport, after bicycles (Kupé, 2013).

Figure 1 shows that the average plane releases 3,4 times more greenhouse emissions per passenger kilometre than the car, however trains don't release almost any emissions, provided that the production of the electricity doesn't create any. Trains and buses are the most environmentally friendly way of travelling counted per passenger kilometre (Trafikverket, 2012).

The project "Partnersamverkan för en fördubblad kollektivtrafik" was initiated in 2008 and the aim is to double the number of trips with public transport by 2020 (compared to 2006 figures). If public transport doubled its' market share, the carbon emissions from passenger traffic would decrease by 20%. The national trade organisations behind the project are: Svensk Kollektivtrafik, Svenska Bussbranschens Riksförbund, Svenska Taxiförbundet, Branschföreningen Tågoperatörerna, Sveriges Kommuner och Landsting and Trafikverket (Partnersamverkan för en fördubblad kollektivtrafik, 2013).

In Sweden the number of trips by public transport per person and year has increased from 130 in 2006 to 137 in 2011 as shown in figure 2, and the development in Skåne is following the same trend. Figure 3 shows that bus is the far most common means of public transport per passenger kilometre, while trams are the least

common. Stockholm is the region where the market share for public transport is the highest, while Västra Götaland, Skåne and Uppsala all share the second place (Svensk Kollektivtrafik, 2013).

The study begins with a summary of the theoretical background, containing spatial perception, affordance, wayfinding and the development of public transport centres. Then follows a description of the empirical observations conducted around Europe and the case study Knutpunkten in Helsingborg, on which the acquired knowledge is applied and tested as recommendations before an upcoming renovation. The suggestions are illustrated in text, diagrams and images. Finally there is a discussion where the results of the research are evaluated, reflected upon and concluded.

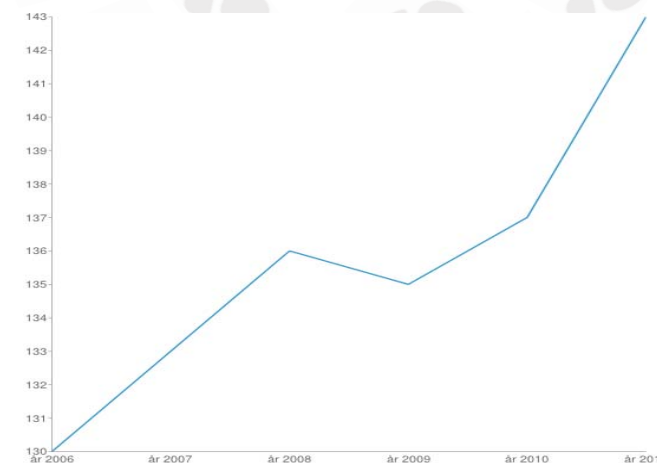


Figure 2
Number of trips by public transport in Sweden per person and year (Svensk Kollektivtrafik, 2013)

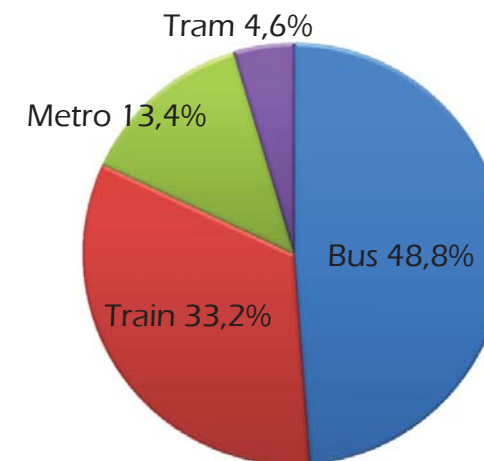


Figure 3
Distribution per means of public transport and passenger kilometre in 2011 (Svensk Kollektivtrafik, 2013)

1.2 Aim

The aim of this master thesis is to raise the question and highlight the importance of wayfinding within the discourse of architecture. It is a descriptive and investigative study which evaluates design advice given in literature as well as built examples according to wayfinding.

Research question

Which are the main architectural and graphic factors important for intuitive and efficient wayfinding in complex building structures such as public transport centres?

1.3 Limitations

The focus of this master thesis is on wayfinding in unfamiliar environments. Certain public transport centres in Europe are analyzed according to wayfinding and orientation. The study does not however include staff or office areas of the observed objects, only public areas of the stations are analyzed.

Further, the design and graphics of signs are not being studied in detail, however the location of signs are investigated. It is important to note that the suggestions for improved wayfinding in Knutpunkten are answers to specific problems, and not a general solution. The scope of this master thesis is also restricted due to a limit in time.

I am aware that there are many, sometimes conflicting, interests when planning and constructing such a complex structure as a public transport centre. If wayfinding for first time visitors was the only and main priority, there wouldn't be an issue in the first place. For example the convenience for commuters might be a conflicting interest to wayfinding for first time users.

1.4 Explanations

Affordance

according to J. Gibson in 1979: *"The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill"* (Heft, 1989)

Cognition

"the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses." (Oxford Dictionaries, 2013)

Cognitive map

"an overall mental image or representation of the spaces and the layout of a setting" (Arthur & Passini, 2002, p 23)

Decision plan

"the mental solution to a wayfinding problem as it is developed by the user" (Arthur & Passini, 2002, p 44)

Decision diagram

"a diagram established for design or research purposes, showing the desired way for users to solve wayfinding problems" (Arthur & Passini, 2002, p 44)

Imageability

"The ease with which the spatial layout of a setting is able to be understood and mapped" (Arthur & Passini, 2002, p 52)

Impaired

"Having a disability of a specified kind" (Oxford Dictionaries, 2013)

Legibility

"The ease with which information is able to be perceived" (Arthur & Passini, 2002, p 50)

Perception

generally *"the ability to see, hear, or become aware of something through the senses"* but it could also mean *"intuitive understanding and insight"* (Oxford Dictionaries, 2013)

Spatial cognition

"both the perceptual and conceptual processes involved in understanding the physical environment" (Raubal, 2001)

Spatial orientation

"The process of devising an adequate cognitive map of a setting along with the ability to situate oneself within that representation" (Arthur & Passini, 2002)

Terminus

Regarding Transport / Railways: *"either end of a railway, bus route, etc., or a station or town at such a point"* (The free dictionary, 2013)

In this thesis: end station.

Wayfinding behavior

"the purposeful, directed, and motivated movement from an origin to a specific distant destination that cannot be directly perceived by the traveler. It involves interaction between the wayfinder and the environment" (Raubal 2008)

Usability

"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11:1998)



2

METHODOLOGY

2.3 Empirical observations

In this study mixed methods were used (Bryman, 2008). A literature review was made and empirical observations at four public transport centres were conducted. The “walk-through evaluation” method, described below, was used to analyze the observed objects as well as the case study Knutpunkten.

2.1 Literature review

Previous research within the field was studied and summarised (fig 4). The areas looked into are spatial perception, wayfinding, affordance and public transport centres. The literature review was conducted prior to the study trip in order to use the theoretical information during the observations.

2.2 Interviews

On the 27th of February an interview with the planning architect at Helsingborgs Stadsdelsförvaltning, Carl Welin, and the project leader at Whilborgs Fastigheter AB, Lena Åberg, was conducted at Helsingborgs Stadsdelsförvaltning.

The interview with Ivar Krepp, who is the architect behind Knutpunkten, was held on the 29th of March, at Bastugatan in Stockholm.

Both interviews, which were conducted in order to collect information, were unstructured and took a bit over an hour each.

The empirical observations were conducted at four public transport centres in Europe: Helsinki Central Station, Prague Main Train Station, Berlin Hauptbahnhof and Copenhagen Central Station. The selection of study objects was made partly due to them being geographically reachable, as well as giving variation in size, age and typology. The evaluated travel centres are all central stations which are serviced by at least three different means of transport and are major interchange points. The times and days for the evaluations were also chosen due to the tight travel schedule.

The study objects were evaluated during a few hours each in February and March 2013. The evaluations were conducted by me and a travel partner. For the evaluation of Helsinki Central station, the travel partner was my mother who is a compliance officer with quite a lot of travel experience, but no education within architecture or urban planning. For the other three evaluations, my friend Maria, who is a nurse, was my travel partner. She is also a quite experienced traveller but hasn't got any deeper knowledge within architecture.

The general impressions of the observed stations are summarized as a text which both describes and analyses the studied objects.

In addition to the structured observations around Europe, indirect observations during my journeys in Sweden have contributed to the results of this thesis as well.

Walk-through evaluation

To analyse the wayfinding qualities and problems of the study objects, a modified version of the walk-through evaluation method was made at each site.

The method, also called “touring interview”, is used for Post Occupancy Evaluation, POE, in the U.S, U.K and New Zealand as a way to evaluate buildings both pre-planning and for improvement programs of existing settings. A walk-through evaluation is said to be a fast way to get an overview of the building, by walking through it, taking pictures and recording your experiences. A more detailed version of the analysis method, called “gåtur-metod”, including a discussion between users and planners has been successfully developed and used in Denmark by Ivor Ambrose (de Laval 1998).

Note that the person leading the walk-through is, more or less, affecting the result of the evaluation, mostly due to the choice of “stopping points” (de Laval 1998).



Figure 4
Some of the studied literature

To be able to compare the walk-through evaluations it is important to perform them in a prepared and careful manner, and try to conduct them as similar as possible, i.e. on the same day of the week and the same time of the day, use the same start and goal points of the routes etcetera.

A slightly modified version of the walk-through evaluation method was used during the observations together with my travel partner. Both of us were first time visitors of the stations, however I had studied them on paper in advance. At each study object we performed two different routes, simulating two regular routes by an average user.

One route simulated arrival by train, and therefore the starting point was at a platform (fig 5). From there we found our way first to a tourist information or map over the station and surroundings, and thereafter to connecting means of transport (bus or metro). The second route started outside the train station, simulating a situation where localizing the entrance is the first step, and thereafter purchasing a ticket, finding information about departures, and finally get to the right platform.

The difference between the walk-through evaluation method described above, and how I performed the analysis is that I set a certain starting and goal point of the route in advance, but not the exact route and every stopping point. Since the focus of my evaluation is wayfinding and orientation, setting a precise route beforehand would have decreased an important factor of the analysis.

The walk-through evaluation method used for this study is conducted as an indicative review of the Post Occupancy Evaluation investigation levels (Barlex, 2006).

Implementation: At each decision point we looked for

wayfinding cues, took pictures and recorded our impressions. We then proceeded in the direction given by the cues, and stopped at the next decision point. The procedure was repeated until the goal point was reached. After each route, we had a short conversation summarising our notes and discussed our general impression of the building.

I took precautions not to lead my partner, since I had previous knowledge from studying the floor plans of the buildings. I let my partner comment first, and occasionally asked additional questions.

The factors that were analysed at each decision point are:

-architectural wayfinding cues: shape, colour, patterns, light

-graphic wayfinding cues: signs, arrows, colour coding

-perceptual wayfinding cues: sounds, smells, other people, contrast, incline/decline

-problems: lack of wayfinding cues, contradictory cues

-wayfinding cues for impaired: visual or tactile guide paths, contrasts, location of elevators

2.4 Case study

The case study for my master thesis is Helsingborg Central station, Knutpunkten, which is currently undergoing planning for a major refurbishment. Both the current building as well as the proposed changes in the new detail plan have been assessed based on the

theoretical framework and the empirical observations. Finally, the acquired knowledge has been applied and tested as suggestions for improvements which would make Knutpunkten more intuitive according to wayfinding.

The reason why Knutpunkten was chosen as the case study for this master thesis is because it is a complex building with several functions and services. It is a central station and a major interchange point, and it is perceived by many to be a rather malfunctioning building which is not up to date with today's traffic flows.

The ongoing planning for quite extensive changes of Knutpunkten also provides a unique possibility for the result of this thesis to be implemented in reality within the near future.

A similar walk-through evaluation of Knutpunkten as of the previous study objects around Europe was performed, however without a travel partner.



Figure 5
Walk-through evaluation at Helsinki Central station



3

THEORETICAL FRAMEWORK

3.1 Spatial perception

Through our senses we receive information about the world around us, which we then use for example when making wayfinding decisions to navigate through the surroundings. The information is perceived through one or more of our perceptual systems.

The perceptual systems important for spatial perception are: the basic orientation system, the visual system, the auditory system, the haptic system and the olfactory system. We don't use one perceptual system at the time, but our experiences are often a conglomerate of several perceptions from the different systems. The perceptions from the different senses affect each other and they can both enhance and disrupt an impression.

To exemplify, a departure board tells you that your train departs from platform 3, and a loud speaker announcement reassures you that you have perceived the information correctly. In this case the two perceptions, visual and auditory, reinforce the impression and confirm each other. If two, or more, perceptions on the other hand contradict each other, the impression will be one of confusion (Ljunggren et al., 1997). As an example, the sign for a bakery points one way, but the smell of fresh bread reaches you from the opposite direction.

The reinforcements can be intentional or unintentional. An example of intentional reinforcement could be when a transport company confirms written information with oral messages, while the sound of a fire truck and the smell of smoke in an unintentional reinforcement (Ljunggren et al., 1997).

Noise is a word most of us associate with annoying sounds, but within psychology of perceptions, noise is any property of the environment which makes a perception unclear. Hence, it affects hearing as well

as vision, smell and orientation. A visual noise for example, could be when trying to spot someone in a crowd but not managing due to all the people moving in the room, and if we cannot distinguish the smell of something burning because of the strong scent of perfume, that is due to olfactory noise. Vibrations and extreme temperatures also count as noise because they reduce our attention span and capability to focus (Ljunggren et al., 1997).

I have chosen not to include the gustatory system (taste) in this study since it has little or no impact on wayfinding.

Basic orientation system

The basic orientation system receives stimuli through the vestibular mechanism in the inner ear among others. It informs us of our body's position in relation to gravity and acceleration, and tells us about the direction of these forces when we move. The vestibular mechanism is a lot older than, for example the visual system, and shouldn't be neglected. Some animals can to some extent move in complete darkness, and even blind people have something we usually call "sense of direction" (Gibson, 1969).

The simplest kind of orientation, direction up-down and towards the supporting surface, is the perception on which all other perceptions depend on. This is what sometimes is referred to as *spatial perception* i.e. a constant underlying awareness of what is permanent in the world. The basic orientation system offers a stable platform for the perceptual organs in the head and the eyes in particular (Gibson, 1969).

Visual perception

When asking people what function the vision has, they might answer "to read with" or "to recognize friends with", but few realize that the eyes are essential for the fundamental act of movement. The bishop and philosopher Berkley described the vision as a sense of space, and he viewed spatial vision as a foresight of what can happen when touching an object, before you touch it (Gibson, 1969).

Since our eyes are only able to focus on one point at the time, a scanning ability is required to examine the optical pattern. There has to be a selection of some things, and neglecting of others. This is what we call visual attention (Gibson, 1969).

When moving through a complex setting, the eye scans the visual field to identify objects or messages of interest. These objects are focused upon for only some tens of a second, and the obtained image is held in a short-term visual memory until it is translated into memory of longer duration. The short-term visual memory has a limited retention capacity, and if it is asked to absorb too much information an overload may occur. In particular graphic information has to be designed according to this scanning and glancing process, or people tend to ignore it (Arthur & Passini, 2002).

The scanning exploration enables a better general registration of the surrounding light, but only over time, since the simultaneous registration of the whole pattern partly has been sacrificed (Gibson, 1969). Despite this, visual scanning is fast, efficient and reliable for environmental perception compared to the other perceptual systems. Furthermore, the sight is also very versatile, it works both for distance and for close-up views (Arthur & Passini, 2002).

Depth is perceived either by registering the disparity between the perspectives projected in each eye, or by transferring the projection centre, thus moving our head in order to change the perspective (Gibson, 1969).

Both acuity and colour discrimination is reduced in darkness when the eyes adapt to night vision (Gibson, 1969).

The perception of colour is possible because surfaces and objects have different abilities to reflect and transmit different wavelengths from the incident light radiation. However, the relationship between this light radiation which reaches our eye, and the colour we actually see, is complex and ambiguous. Colour can appear as the colour of a surface, the colour of a volume, for example tinted glass or liquid, or the colour of a light source (Ljunggren et al., 1997).

The two basic functions for our colour vision is discrimination and characterization. With colour contrasts we can distinguish surfaces and objects from each other. The colour also informs us of the nature, quality and function of objects as well as associate to and arouse feelings (Ljunggren et al., 1997). Different cultures both transcribe different symbolic meanings to colour, but also perceive colours differently. Research shows that the language you speak affects how you see colour (Do you see what I see?, 2011).

The colour of an object affects how we perceive it. Light colours make objects seem larger, and this perception is accentuated if the light contrast between the object and the background is increased. The brightness and lightness of surfaces affect the experience of distance to it. Light and less bright surfaces is experienced as further away than dark and brightly coloured ones. The hue is another factor regarding perception of distances. Warm colours, such as yellow, orange and red, generally make a surface seem closer

to the observer than surfaces at the same distance with cold colours, such as blue and green (Ljunggren et al., 1997).

The experience of spatial qualities can also be modified through colour. A room with light limiting surfaces is perceived as larger and more open than one with dark surfaces. By making some surfaces of a room light, and others dark you can alter the perceived shape of the space. Colours are also said to be able to affect our physical experiences such as thermal comfort, pace of the time, and calmness versus activity (Ljunggren et al., 1997).

Auditory perception

Hearing is probably our second most used sense for wayfinding since it enables us to identify certain characteristics of the setting and to perceive distant cues (Arthur & Passini, 2002). The auditory system for perception includes not only the two ears, but the muscles which orient the ears towards the sound source as well. Hence, the function of the auditory system is not only to able hearing, but also to register the direction and nature of the sound in order to identify it (Gibson, 1969).

The type of stimuli perceived by the auditory system are vibrations in the air, i.e. sound waves. The so called wave front is specific for the direction of the source, while the wave length is specific for the type of source. If there are more than one sound source in the surrounding, the wave fronts will reach the ear at the same time. This implies that because the sound waves blend together, you would not be able to perceive or distinguish them. It is however possible, by so called selective listening (Gibson, 1969).

The value of a sound source for wayfinding is often reduced because of the unreliability of the source. For example, you can always see a tree from a given distance, but you can only hear it if the wind blows. Echo-location is more reliable in this sense, but it requires a relatively quiet environment and only works at small distances. Not only blind people are able to use sounds to identify objects. A study showed that blindfolded sighted people also were capable of identifying openings, barriers and overhangs through echo-location (Arthur & Passini, 2002).

The advantage of orientation by sound, compared to vision is that sounds travels around corners (Gibson, 1969). Sound are also excellent warning cues since they are perceived regardless of head position (Arthur & Passini, 2002).

Sound is measured in decibel, dB. The volume of a sound also gives information about the source. For example the increasing volume of an engine tells us that a vehicle is approaching (Ljunggren et al., 1997).

It is difficult to keep a conversation in a noisy environment, and the acoustics of a space influences at what distance it is even possible. Researchers claim that a space in which the reverberation is long, gives an even smaller possibility to perceive speech, than just the noise itself. Noisy environments and loud volumes are also associated with high blood pressure, aggression, lack of sleep and a decreased work performance among others (Ljunggren et al., 1997).

Haptic perception

The word haptic originates from the Greek word for “to touch”, haptikos. The haptic system is the mechanism through which you receive information about the surroundings as well as your own body. You perceive an object in relation to your body, and your body in relation to an object (Gibson, 1969).

In contrast to the other perceptual systems, stimuli to the haptic system is perceived with the whole body; the skin, the limbs, the muscles and the angle of the joints. Even the relation between different parts of our bodies give us important information about our body posture for example. Blind people are able to point in a specific direction, based on the information received from his or her own body in combination with the environment and gravity; horizontal, straight up, backwards etcetera (Gibson, 1969).

Perceiving with the haptic system is actually very often a form of indirect mechanic stimuli transmitted to the skin or limb through an appendage, such as hair or nails, and not via direct contact with the object. This works principally in the same way as when using extensions of our limbs, like a walking stick, to discover and examine the surroundings (Gibson, 1969).

Perception through the haptic system can be described as slower than, for example, visual perception. The area you can perceive by touching is restricted to the size of, for example your hands, while it is possible to perceive a whole landscape with your eyes (Ljunggren et al., 1997).

Though haptic perceptions are not as inferior to the optical as we might think. For example, the colour of an object cannot be distinguished with the haptic system but with the visual, however the relative temperature of that same object is impossible to perceive through vision (Gibson, 1969).

Olfactory perception

The word for the sense of smell originates from the Latin word *olfactus* (Ljunggren et al., 1997). The primary function of the olfactory system is to discover objects at a certain distance by its’ smell, or more precisely by its’ vapour, as well as to identify and evaluate the source of the smell. Secondary is orientation and controlling the behaviour, which includes movement in relation to the source of the smell; to follow a smell you maximize it, and to escape from it you do the exact opposite (Gibson, 1969).

Using a smell for orientation towards something other than the actual source, requires previous knowledge about the setting. If you know that the burger place is just left from the entrance, you can orient yourself in relation to the smell of it, but if you however are navigating through an unfamiliar environment, the smell can only direct you towards its’ source.

Our perception of odours is not fine enough to give us many directional cues though. Our sense of smell might have a limited capacity for place identification, but it tends to be very unreliable in our contemporary environment (Arthur & Passini, 2002).

People in general find it difficult to define a certain smell, and tend to describe them using metaphors instead. The experience of a smell is subjective. If we think that something smells good or bad depends, in many cases, on the situation and the person’s own preferences. What we can register however is people’s spontaneous reactions to a smell, which are relatively unanimous. For example do most of us wrinkle our nose when perceiving a “bad” smell (Ljunggren et al., 1997).

Smells also work as signs, it is something we give a meaning to. The smell of smoke for example, we interpret as something burning, i.e. we give the smell a meaning. Some functions define the facilities

they harbour. If you feel the smell of hair spray or coffee, you experience that as a sign of a hair salon or café nearby (Ljunggren et al., 1997).

3.2 Affordance

The concept of affordances comes from the ecological psychology based on the paradigm of direct perception; it is what an object, an assemblage of objects or an environment enables people to do (Raubal, 2001). The affordances of a given place in the environment establish for an individual what actions are possible there and what the consequences of those actions are (Heft, 1989). The term was originally introduced by James J. Gibson who investigated how people visually perceive their environment (Raubal, 2008).

Affordances have to be described relative to the person. For example, a chair's affordance "to sit" results from a bundle of attributes, such as "flat and hard surface" and "height", many of which are relative to the size of an individual. Hence, affordances can be considered as measurable aspects of the environment, but only to be measured in relation to the individual. It has been demonstrated that the "climbability" affordance of stairs is more effectively specified as a ratio of riser height to leg length. During experiments, subjects of different heights perceived stairs as climbable depending on their own leg length, as opposed to some objectively quantified value (Raubal, 2008).

The relative nature of affordances can be illustrated by the fact that a surface perceived as a seat by a young child may not be perceived as such by an adult. For example a bar stool might not be perceived as a seat by a child due to its height, and a cardboard box may not be perceived as a potential seat by an adult, however by a child, because of their differences in weight. Affordances then, have both objective and subjective qualities. They are objective in the sense that they are "facts of the environment", however what constitutes for example a seat, depends on the user. Affordances though, refer to much more than solely the dimensions of the body of the user. They are also related to

what an individual can do and what his potentialities for action are (Heft, 1989).

Buildings have many high-level affordances, including affording shelter from the exterior environment, affording comfort through climate control, affording storage of goods and affording aesthetics to occupants and passers-by. Looking at specific building elements, windows afford the transmission of light and possibly also the exchange of air, while floors afford support for walking and placing furniture (Maier & Fadel, 2009).

Many researchers have believed that Gibson's theory is insufficient to explain perception because it neglects processes of cognition. His account deals only with individual phenomena, but ignores categories of phenomena. Norman's investigations on the affordances of everyday things (POET), such as doors, telephones and radios, showed that the objects provide strong clues to their operation. In that sense, affordances are seen as the results from the mental interpretation of things, based on people's past knowledge and experiences, which are applied to the perception of these things. It has also been stated that a person's culture, social setting, experience and intentions determine her perception of affordances. Affordances, therefore, play a key role in an experiential view of space, because they offer a user centred perspective (Raubal, 2008).

The starting point for Norman's research was the observation that many people experience trouble with common everyday tasks such as opening a door or turning on a light, while at the same time proving capable of mastering complex technologies and challenges like computer programming. He argues that this is due to faulty design rather than the incapacity of the users, as much of our everyday knowledge resides in the world and not in our heads.



Figure 6
Push and pull doors at Helsinki Central station

The availability of knowledge in the world means that precision in behaviour is not obstructed by imprecision of knowledge in the head (Koutamanis, 2006).

When designers take advantage of affordances, the user knows what to do just by looking, and although complex situations may require supporting information, simple tasks should not or the design has failed. By applying affordances in the design of an object, the level of cognition and learning time required to use it, can be reduced. This should also be the case in architecture and buildings: most uses of the built environment should not require any additional information (Koutamanis, 2006).

Affordance theories suggest that human interaction with the built environment is largely conditioned by the affordances of building elements and spaces, which should allow for direct recognition of possibilities in any setting. Most users approach and manipulate buildings in a very intuitive and direct way. Buildings should not require extensive and detailed explanation of how they work, but be immediately evident on the basis of direct and meaningful relationships with the user's expectations (Koutamanis, 2006).

The cause behind most problems in the use of buildings is not cultural or individual differences, but rather design limitations such as the size or shape of a space, or incompatible use specification, for example large furniture in a small space. Affordances promise integration of different viewpoints, such as architects, engineers, clients and users, as well as continuity, namely compatible expressions of functionality and usability throughout the whole life span of a building (Koutamanis, 2006).

The door is a classic example for illustrating the affordances of a building element. The evaluation usually focuses on the door handle and the way the

user can open and close the door. A lever or knob invites the user to turn it and then pull or push, while a metal plate only affords pushing (fig 6). An appropriately shaped lever or a push and pull bar, which also releases the latch could be used for all types of doors, and is frequently encouraged in architecture (Koutamanis, 2006).

Possible uncertainty caused by misaffordances, such as designing both the fixed and opening parts of a glass facade in the same way which makes the user not know where to go, can be reduced by clearly indicating the approach to the door in the pavement. Other relevant visual cues of how to operate a door, involve the visibility of hinges and the position of the door in the wall (Koutamanis, 2006).

Architectural design generally involves a wider functional scope than the majority of objects discussed in affordance studies. Two levels of functional abstraction can be distinguished: the spatial level, where the door affords communication or separation between two spaces, and the interaction with the door itself in order to achieve the communication or separation. The spatial level is important for the formulation of use expectations, as well as for the recognition of visual clues concerning affordances. The design of a building should generate consistent affordances that improve functionality and usability. The spatial aspects should inform users in a direct manner about the intentions of the architect and the behaviour of the design (Koutamanis, 2006).

"The main advantage of affordances lies in the integration of information concerning functionality and usability into comprehensive structures which can be applied throughout the life cycle of the building" (Koutamanis, 2006, p 361).

3.3 Wayfinding

The forerunner of wayfinding, spatial orientation, appeared in neuropsychological literature over a century ago. Case studies of patients who were incapable of the most elementary understanding of where they were and how to reach given destinations due to brain lesions, were reported. These deficiencies were later identified as spatial agnosia and spatial amnesia (Arthur & Passini, 2002).

There are many definitions of spatial orientation, but they all refer in one way or the other to a person's ability to determine his or her location in a setting. From a cognitive perspective, spatial orientation is based on the ability to form a cognitive map. A cognitive map is the representation people have of their surrounding environment, which cannot be seen from one single point alone. It has to be composed from a series of individual perspectives. You are considered spatially oriented if you have an adequate cognitive map of the surrounding setting and are able to situate yourself within that representation (Arthur & Passini, 2002).

Researchers working in the field of cognitive mapping were confronted by major methodological and conceptual problems, concerning reliability, the term "map" and the notion of adequacy. Observations showed that people in many situations got around quite well and did not feel disoriented, even if they had a very primitive understanding of the setting. For example, even though complex underground public transport interchanges tend to be particularly difficult to map, people may not consider themselves disoriented as long as they know how to reach certain destinations (Arthur & Passini, 2002).

The term spatial orientation and the concept of cognitive mapping are perfectly suited to describe *the static relationship to space*, but cannot cover the

dynamic aspects of people's movement. A new concept which accounted for people's movement in space and their sense of being oriented, was needed (Arthur & Passini, 2002).

The term way-finding was first used by the American architect Kevin Lynch in his book *The image of the city* from 1960. His goal was to develop a method for the evaluation of city form based on the concept of imageability, and to offer principles for city design (Raubal, 2008). Maps, street numbers, route signs etcetera were described as way-finding devices. His work is however based on the concept of spatial orientation and the cognitive map. The best known part of his book is the analysis of the city and its' elements; paths, edges, landmarks, nodes and districts. Though Lynch's work had a major influence on research during the 60s, it had little influence on architecture (Arthur & Passini, 2002).

In the 1970s a conceptual shift occurred and the new notion, baptized wayfinding, incorporated all the perceptual, cognitive and decision-making processes necessary to find one's way. Wayfinding can be described as *the dynamic relationship to space* or spatial problem solving (Arthur & Passini, 2002), which is the interpretation of the concept used in this thesis.

Future wayfinding research will focus on differences between wayfinding in the real world compared to wayfinding in electronic and virtual spaces, to be able to design more user-friendly automated wayfinding systems, such as electronic navigation systems (Raubal, 2008).

According to Hirtle in his article *Wayfinding, landmarks* from 2008, important developments will probably occur in "*developing appropriate*

wayfinding theories for intermodal transportation, such as moving from bicycle to bus to subway and navigation through three-dimensional environments, such as subway stations". He also mentions spatial cognition and the use of landmarks in particular populations, such as elderly or impaired, as an area for active research (Hirtle, 2008).

The wayfinding process

"*Considering that every journey we ever make is based on wayfinding, the process works surprisingly well*" (Arthur & Passini, 2002, p 39).

The conditions for wayfinding can be described as normal, recreational or emergency. Normal way-finding conditions are those day-to-day conditions measured exclusively in terms of their efficiency and utility. By contrast, recreational wayfinding conditions call for the ability to explore and enjoy the setting. Emergency conditions, quite obviously, can and do happen at any time, anywhere (Arthur & Passini, 2002). In this thesis the focus will be on normal way-finding conditions.

There are four interactive resources on which people's spatial abilities mainly depend; perceptual capabilities, fundamental information-processing capabilities, previously acquired knowledge and motor capabilities. For people to find their way from an origin to a destination, these abilities are a necessary prerequisite (Raubal, 2001).

Wayfinding is problem solving, and making a journey and reaching a destination are wayfinding goals. Reaching these goals require action and behaviour. If a journey is taken for the first time and the

destination is unfamiliar, you are faced with a problem to which you must find a solution. The solution is a plan of action, answering the three major questions: where, how and when to go (Arthur & Passini, 2002).

Wayfinding comprises three specific but interrelated processes: *decision making* and the development of a plan of action, *decision execution* which transforms the plan into appropriate behaviour at the right place in space, and *information processing* understood in its generic sense as containing environmental perception and cognition (Arthur & Passini, 2002).

Decision making and execution

Decisions are related to each other, they are ordered. For example, to open a can of mushrooms you need to make some very specific decisions: get the can, get the can opener, apply the can opener, and activate the cutting device. Not only must you make these decision, you have to execute them in a certain order. As described by Arthur and Passini: “A *decision plan* (or *plan of action*) not only contains the relevant decisions but it reflects the logic that links the decisions to the problem. The same logic links wayfinding decisions” (Arthur & Passini, 2002, p 27).

Wayfinding is also continuous problem solving. Even with the best of intentions, the wayfinder cannot develop a detailed decision plan beforehand, simply because all the required information might not be available. Availability of information is crucial to wayfinding decision making. It is not uncommon that at a certain point along a route, no information or only contradictory information is available. In this situation the wayfinder has no other option than to resort to trial and error, making decisions based on chance or instinct. There is a however a slight difference in how people behave in wayfinding situations like this. Some will use only a minimum of information to make

the decision, “just enough to go ahead”, while others will do a more thorough search of available information before committing themselves. Taking a familiar route however, is nothing other than the execution of an already recorded decision plan (Arthur & Passini, 2002).

Looking at all the decisions included in a plan of action, figure 7, we can see that it is hierarchically structured with the most general decisions at the top (to the left in the diagram) and the decisions leading directly to spatial behaviour at the bottom (to the right in the diagram). By breaking down complex wayfinding problems into smaller problems, whose solutions do not exceed three to four decisions, they become more manageable. The structure also makes the decision plan a lot easier to remember. Notable is that a person giving directions, who relies on a structured plan of action, is able to describe a route including far more decisions than the inquiring person, who is receiving a string of decisions in an unstructured form, has the capacity to remember (Arthur & Passini, 2002).

A plan of action is a mental solution to a wayfinding problem, but to reach your destination your decisions must be executed, thus transformed into the right behaviour at the right place. When executing a decision, we match a mental image or idea with the environment, and if we find the corresponding intersection, stair or billboard, we execute the behavioural part of the decision. If we cannot find the corresponding part in the environment, we cannot execute the decision and instead we have to develop a plan to solve the problem. This is one way to define a *wayfinding problem*, which is a wayfinding decision which cannot be directly executed but requires further planning (Arthur & Passini, 2002).

While decision execution operates on an unconscious level, decision making generally requires attention.

Both decision making and decision executing require environmental information. One of the most important aspects of wayfinding design, is to provide this information at the appropriate place (Arthur & Passini, 2002).

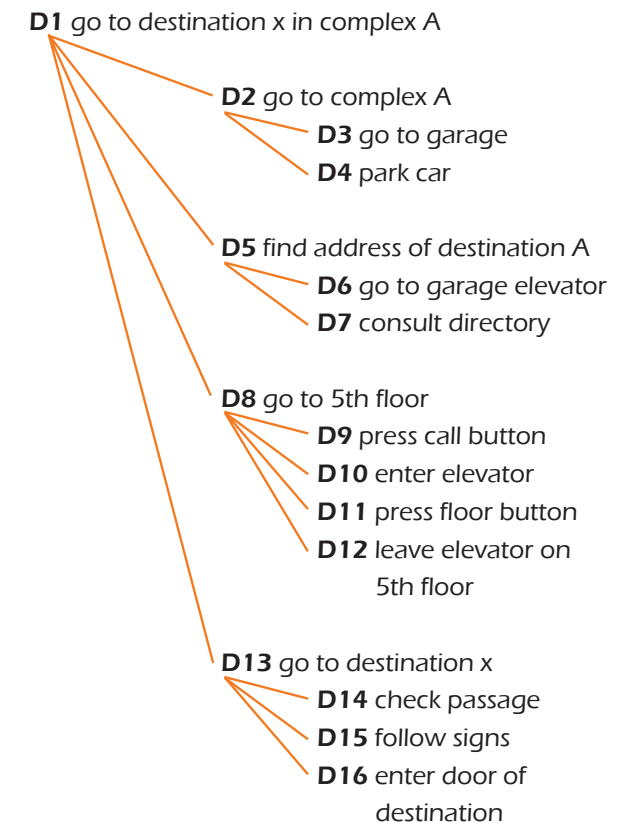


Figure 7
A hierarchically structured decision plan
(adapted from Arthur & Passini, 2002)

Information processing

Perception and cognition are the components of information processing. These two are interrelated and it is often difficult to distinguish one process from the other. Perception relates to the processes of obtaining information through the senses, while cognition relates to the understanding and manipulation of information (Arthur & Passini, 2002). Since environmental perception has been described in a previous chapter, this part will focus on environmental cognition.

Cognition means knowing and understanding. Arthur & Passini has distinguished two aspects of environmental cognition in their book *Wayfinding: People, signs and architecture*: The first one is “*The knowledge people have about the given components of a setting, such as the buildings they remember in a cityscape*”, and the second aspect is “*The understanding of the spatial characteristics of a setting, which has already been described as a cognitive map*” (Arthur & Passini, 2002, p 37).

Researchers who have studied which characteristics that make a building memorable, arrived at the following factors: the form of the building such as size, complexity of shape and uniqueness in architectural style, visibility and access, the use or function and finally symbolic significance. Some research has shown that people in the process of mapping a new environment tend to start by recording landmarks, and then used them as anchor-points to fill in the paths, while others assumed paths and districts to be the original structuring element. According to Arthur & Passini, the choice might depend on the features in the environment, as much as on personal preference (Arthur & Passini, 2002).

A distinction between two different types of cognitive maps can be made. The representation of a setting

based on personal exploration, tends to be more schematic and abstract, while learning a setting from a physical map tends to result in a more figural and Gestalt-like representation. The cognitive map learned from a physical map tends to be oriented, and one will “see” a map in the mind. The representation of a route learned exploring a setting is not oriented and therefore more flexible in use, however it may be less precise (Arthur & Passini, 2002).

To be able to use a representation of a setting to solve wayfinding problems, it needs to be manipulated. Arthur & Passini have identified some basic wayfinding problems and determined the corresponding spatio-cognitive manipulation for each of them, which are crucial for wayfinding. For example the wayfinding task of learning a new route requires recording a decision plan and/or developing a cognitive map, while returning to the point of origin requires inverting a decision plan or the mapped route. The spatio-cognitive operation which seems to be the most difficult one, is the mental rotation which is required when learning a route from a non-aligned display (Arthur & Passini, 2002).

Wayfinding design

“*Wayfinding requirements, whether they be at the regional, urban or architectural scale, are integral to the design process - from the most general, overall spatial organization of the setting to the articulation of the form-giving features, and right down to the individual architectural and graphic messages. Wayfinding requirements shape the setting, affect the choice of circulation system, and contribute to the design of the interior. This is particularly true in large building complexes*” (Arthur & Passini, 2002, p 42).

First time users have to reach a goal without the help of a previously acquired mental map, which means that they depend on external information, also called *knowledge in the world*. Such information resides in the environment and is communicated through signs, guidance systems and architectural cues. The deficiency of clues is the main reason for environments being too complex to facilitate wayfinding. When people are not provided with the adequate knowledge in the world, in many cases they find it difficult to perform wayfinding tasks in unfamiliar environments. These environments either lack sufficient wayfinding information or their architecture is badly designed and therefore not readable (Raubal, 2001). “*We all know the stressful and sinking feeling when one gets lost in an airport, a large office building, or on a university campus*” (Raubal, 2001, p 2).

Four classes of environmental variables that influence wayfinding performance in built environments have been identified: visual access, architectural differentiation, signs and room numbers to provide identification or directional information, and plan configuration. Studies have shown that the spatial structure of the physical environment has a strong influence on people’s wayfinding behaviour, and that people’s familiarity with the environment has a big impact on wayfinding performance (Raubal, 2001).

Wayfinding takes place in large-scale spaces which cannot be perceived from a single viewpoint, hence people have to navigate through these spaces to experience them (Raubal, 2008). An isovist space is the total area that can be viewed from one single point (Klarqvist, 1993). The concept of *isovists*, as shown in figure 8, is a way to define what is visually accessible from a specific point. Regarding wayfinding however, the interesting part is how the isovists are connected, and can be used to lead from one space to another by giving useful spatial information in any given space (Klasander, 2003).

Visual access alone though, is not useful for navigation to our destination, but needs to be accompanied by physical access. Examples can be taken from some housing estate suburbs, where the visual access might be unrestricted but the physical access is limited, often because of barriers created by the traffic separation system. You can see where you want to go, but not figure out how to get there (Klasander, 2003).

It is possible to give the impression of a smaller space in a large setting, such as hospitals or public transport centres, by limiting the necessary movements through the building, and provide good possibilities to survey the structure. Then the visitor doesn't have to conduct long, time consuming movements, and the feeling of smallness before the building is reduced (Bergström, 1996).

Architectural shapes affect people's movements in a way that is common for most people. The shapes can be attractive, repellent or leading in relation to the movements of the people. The movements are also affected by other people's positions and movements in the space. It is possible to use architectural elements to direct people's movements, and studies have shown that the design of the details is significant for that purpose (Bergström, 1996).

Spatial planning

"Spatial planning provides the context for wayfinding and sets the stage for the problem-solving performance" (Arthur & Passini, 2002, p 43). The organization and the nature of the circulation systems, i.e. the spatial characteristics of a site, affect the wayfinding difficulties that confronts the user. The location of entrances and exits, major destinations and therefore the nature of the circulation system, the organization of the spaces as well as the visual accessibility are determined by the spatial planning (Arthur & Passini, 2002).

Settings do not necessarily have to be simple for people to find their way. Spatially interesting, and even complex settings, can be wayfinding-efficient. The challenge is to design interesting settings that are safe, accessible and wayfinding-efficient despite the complexity they might have. Although the spatial layout emerges from a number of considerations such as the function and the servicing of the setting, the site and the neighbouring architecture, it is wayfinding and the circulation that are the main space-binding factors. In airports, public transport terminals, health care facilities and many other public settings which have to take large amounts of traffic, the spatial organization is the direct expression of circulation and wayfinding (Arthur & Passini, 2002).

There is a close relationship between spatial organization and decision plans, described previously. The starting point when planning a new setting should be making a decision diagram representing the desired way for users to solve wayfinding problems, and then develop an appropriate circulation system based on that. The relationship between simple decision diagrams and the accompanying circulation systems are shown in figures 9 and 10. The first example shows a spatial organization where the visitors are taken along a main passage from which they branch off to the different zones. In the second example the visitors initially go to a central information square and from there proceed to the desired zone. These two examples illustrate a linear organization in the first case and in the second a hierarchical organization (Arthur & Passini, 2002).

In existing buildings the spatial organization is already given, and therefore also the basic decision diagram. The planner should identify these diagrams to better understand the existing system and be able to propose design interventions such as articulating the system and making it perceptually accessible. The main design task in an existing setting is to develop

an appropriate information system (Arthur & Passini, 2002).

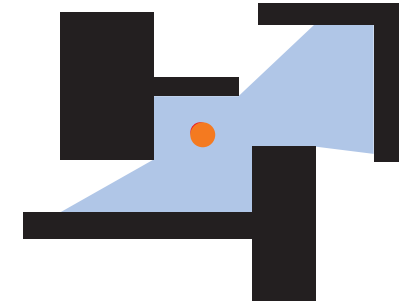


Figure 8
An isovist is the visually accessible area from a specific point (adapted from Klasander, 2003)

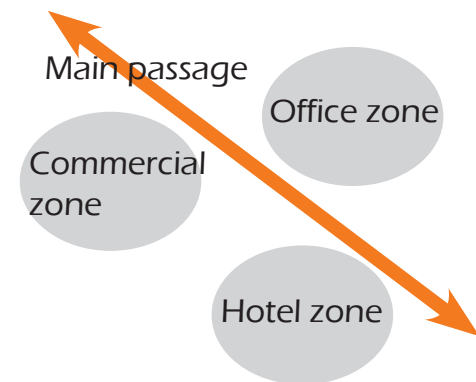


Figure 9
Spatial planning based on decision diagram
Linear organisation
(adapted from Arthur & Passini, 2002)

Environmental communication

If spatial planning is the stage for wayfinding, then environmental communication can be compared to the script. Many wayfinding difficulties are due to aspects of information processing, and providing the relevant wayfinding information is an issue both in architectural and graphic design. The design of an information system has to be based on people's wayfinding behaviour, contain all necessary information for them to make and execute decisions, and provide the information necessary for gaining a cognitive map of the setting (Arthur & Passini, 2002).

It is the decision plan that is the determining factor in designing an information system. If, for a given decision, we cannot assume that the users have the required information in the form of common knowledge, then the information has to be provided through architectural, graphic or other means. Wayfinding design should be concerned not only with individual decisions but with a series of them. The logic of the decision plan is what ties the individual decisions into a whole and must also be what ties the information units into the overall system (Arthur & Passini, 2002).

Since people when executing a decision plan only perceive information directly relevant to that plan, the information that is not directly applicable to the immediate plan, even if it would be relevant sometime later, tends not to be seen. The location of information is therefore a crucial issue (Arthur & Passini, 2002). Information at the wrong place is as good as no information at all.

The perception of distant cues is of special interest to wayfinding since it allows people to perceive and direct themselves towards a distant destination which otherwise would require intermediary points of reference. The perception of distant cues simplifies

many wayfinding tasks (Arthur & Passini, 2002).

An information unit has to be perceived at, or shortly before a decision point or the information tends not to be noticed. By transferring the decision of the diagram to the route, the planner can establish the location of the required information. To identify an acceptable area for placing information at a given decision point, the designer has to note the physical characteristics of a setting, such as light levels, density of people and heights of ceilings. By superimposing information areas from different routes, it is possible to identify the optimum location of information displays. The decision diagram thus, is the logic of combining content and location for the information system (Arthur & Passini, 2002).

For example, in a hierarchically organized multipurpose centre, the visitors will, after having entered the building, find themselves in a central square. Here they have to understand that this is a strategic place to figure out the organization of the setting. Architectural information can and should communicate the existence and location of the different zones, and graphics should confirm this information. Once the visitor has reached the desired zone, they enter a smaller information square. At this point the visitor needs to be able to determine how many complexes there are in this zone, where they are located and in which complex their particular destination is located. If the architectural expression is clear, a minimum of signs will be necessary. The information in this example is provided in sequence, and gets more and more detailed the further along the route you get. This is the optimum way to locate information. It always appears when the visitor needs it (Arthur & Passini, 2002).

In a large building there are almost an infinite number of different routes and destinations, however some routes are more representative of people's movement

in the setting, called primary routes, and others are of less importance, secondary and tertiary routes. The primary routes are generally quite limited in numbers. Three kinds can be identified: the main circulation between the entrances and exits and the major destination zones, the circulation from one major destination zone to another, and the circulation within a major destination zone. If the information system is clear and effective for the primary routes, it will set the wayfinding tone for the whole of the setting (Arthur & Passini, 2002).

The information a person seeks to solve a wayfinding problem is not solely determined by the environmental setting. It also depends on that person's preference for certain kind of information: linear and sequential or spatial and global. However most people use both in different situations. The kind of information preferred is linked to the typologies of cognitive maps described in a previous chapter. It is important that both spatial and linear information is provided to allow for both wayfinding styles (Arthur & Passini, 2002).

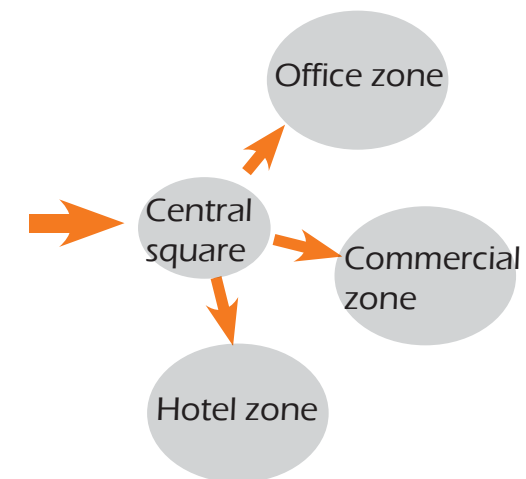


Figure 10
Spatial planning based on decision diagram
Hierarchical organisation
(adapted from Arthur & Passini, 2002)

The third major aspect of environmental communication, after content and location, is form. Two typical major flaws of information displays are: either the information is not *legible* because it is obstructed, badly placed, too small or blurred, or the information is not *readable*, i.e. it can be perceived but not understood (Arthur & Passini, 2002).

Studies have shown that on signs and maps only a small number of written items, generally three at most, can be read at a glance due to the scanning and glancing process. If more than three items are presented on a sign, they should be grouped into packages not exceeding that limit, in order for the message to be perceived in a few glances (Arthur & Passini, 2002).

To help the wayfinder's search by indicating what to look for, information displays should be consistent in their design and location. An information display should be able to be identified before it can actually be read. The form, the material and the graphics are all contributing elements, and people learn to recognise such displays after seeing them just once or twice (Arthur & Passini, 2002).

Colour can be used to facilitate the perception of circulation routes, for example by painting all vertical communication, such as stairs, escalators and elevators, in a bright colour. The result can be made even more effective by including the signage in the colour coding (Arthur & Passini, 2002).

Both spatial planning and environmental communication affects cognitive mapping in major ways. The clarity of the spatial organization and the architectural expression of the underlying principle, are probably the most important factors facilitating cognitive mapping by contributing to the imageability of the setting. The legibility of key architectural elements, such as entrances, circulation and major landmarks, is

a prerequisite to understanding the spatial organization (Arthur & Passini, 2002).

Components of wayfinding design

People finding their way in complex settings will try to understand what the setting contains and how it is organised. Two major aspects regarding the understanding of buildings can be mentioned: a spatial aspect that refers to the total dimensions of the building and a sequential aspect that considers a building in terms of its' destination routes. Destination routes should eventually lead to so called destination zones. These are groupings of similar destinations within buildings into clearly identifiable zones. In order to facilitate wayfinding to such destination zones the circulation system should be of a form people can easily understand (Raubal, 2001).

Circulation systems

Linking the spatial units of a setting can either start with a form and end up with the circulation system, or begin with the circulation system and end up with a form. Whichever way, form and circulation are closely related. The form of a building's volume provides the user with cues about the internal organisation and circulation system. Therefore it is known that underground settings are particularly difficult to map. If we understand the circulation system, we can also understand the spatial organisation of the setting and its architecture. The basic types of circulation systems may be categorised as: linear circulations, centralised circulations, composite circulations and circulation networks (Arthur & Passini, 2002).

The linear circulation systems can be described as single paths, cores and axes. The paths are either ordered (fig 11), where the geometrical form is



Figure 11
Single paths, ordered/Gestalt
(adapted from Arthur & Passini, 2002)

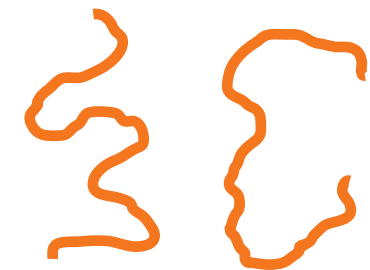


Figure 12
Single paths, random/shoestring
(adapted from Arthur & Passini, 2002)

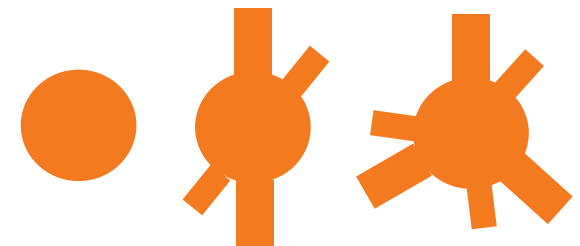


Figure 13
Focal circulation: square, central symmetry and rotation
(adapted from Arthur & Passini, 2002)

relatively simple, or random (fig 12) which resembles the form of a dropped shoestring. The core is also a single path, although it gives a certain importance to the setting and is not only circulation, but a place in itself. In an axial circulation system, the spatial elements are symmetrically reflected by a key axes (Arthur & Passini, 2002).

Within the centralised circulation systems group we find focal, concentric and spiral circulation. The focal system (fig 13) uses the square as the basic circulation space. The square can take many forms, but the characteristic is the centre around which space is organised. Related to the focal organisations are the concentric patterns. Concentric systems (fig 14) are characterised by circulation around a focal square which is perceptually accessible at least in parts. If the centre cannot be perceived, it is referred to as a loop. The spiral pattern (fig 15), a much less common spatial organisation, can be seen as a rotation with a regularly increasing radius (Arthur & Passini, 2002).

Complex settings are not usually based on a single path or focal square, but involve a combination of different circulation systems. These are called composite circulation systems and their main distinguishing features are the intersections, which create alternative possibilities of movement. Composite circulations can be based on paths only, squares only, or a combination of the two and they reflect either the random shoestring pattern or a more geometric form leading to a Gestalt pattern (Arthur & Passini, 2002).

Circulation networks are characterised by the application of a dominant, repetitive pattern over a large area. Three types of networks can be distinguished: scatter-point network, grid network and hierarchical network. In a scatter-point network (fig 16) all random points can be linked together by random lines or curvilinear connections, while the grid network (fig 17) usually is orthogonal or based on some other recurring

geometric form. The hierarchical network system (fig 18) assumes units of different values linked from a higher to a lower order. This system allows for a free arrangement of the spaces, the only prerequisite is a differentiation in the order of spaces and links (Arthur & Passini, 2002).

A layout based on a shoestring pattern must contain distinct features that can serve as cognitive anchor points, which are essential for the decision-making processes. In a network, anchor points should coincide with intersections. For layouts based on the Gestalt pattern to be perceived as a form, they have to be relatively simple, while layouts based on a geometric law are simple to map if the law is perceived and understood by the user. Symmetrical layouts also tend to be easily understood and mapped, however situating oneself in such a setting might be more difficult. Here unique landmarks can be introduced to allow users to distinguish one side from the other. Grid networks and especially orthogonal ones, are known to be easily perceived and understood, while in a hierarchical network, care has to be taken to communicate the underlying organisational principle (Arthur & Passini, 2002).

Architectural communication

The built environment provides the wayfinder with many and a variety of wayfinding cues, although people might not always be aware of it. The basic information about entrances, exits, location of paths and vertical accesses as well as the nature of the circulation system are all parts of architectural wayfinding communication (Arthur & Passini, 2002).

Paths are perceived by elements (fig 19), continuous or repetitive, on the ground, above, on the sides or a combination of these. A different floor material, articulation of the ceiling or elements next to the path can all be used to define it. The articulation of paths is



Figure 14
Concentric circulation
(adapted from Arthur & Passini, 2002)



Figure 15
Spiral circulation
(adapted from Arthur & Passini, 2002)

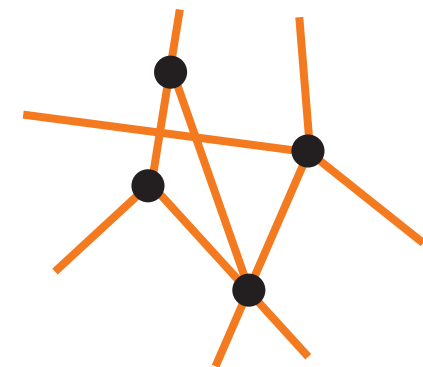


Figure 16
Scatter-point network
(adapted from Arthur & Passini, 2002)

a fundamental aspect of wayfinding, since it not only indicates the direction of movement and facilitates an understanding of the circulation system, but also suggests the importance of the destination. The design of a path can also tell the user whether the destination is private or public (Arthur & Passini, 2002).

The door might be the ultimate sign for an entrance, but it may not be visible from a distance and some entrances, such as gates, don't even have doors. The legibility of an entrance depends on the angle of approach. They can be approached in a frontal, oblique or indirect way (fig 20). One common way to heighten the legibility of an entrance from an oblique approach, is to project or recess it in relation to the facade (fig 21). Marquees, porticos and colonnades have a similar impact. If an entrance itself is not visually accessible, the landscaping and arrangements of paths has to provide strong cues. The form of the building volumes and facades may also indicate the location of the entrances (Arthur & Passini, 2002).

Although an exit is the same architectural element as an entrance, it is certainly not seen in the same way by the users. The perception of the exit is often limited to the actual doors, and most of the time they are seen at a very short range. In cases when the users are expected to enter and exit the setting at different points, such as shopping malls or public transport centres, the exits should be emphasised to be easily detectable. Exits are often limited by height and visual access, however distinctiveness is more important than size regarding legibility. The limitation in size can easily be compensated for by making use of the outside light as an exit cue (Arthur & Passini, 2002).

Stairs, escalators and elevators should be directly perceived upon entering a setting, since the vertical circulation is a must for changing levels. The vertical communication can be a strong architectural feature and there is no reason why it should be necessary

to install signs leading to them. In fact, the vertical circulation could be used both as a reference point and a landmark if its architecture is distinctive. Even small vertical accesses can be communicated efficiently though. While space may be limited, design is not (Arthur & Passini, 2002).

Communicating the circulation system is probably the most difficult aspect of architectural wayfinding design, but it is also the most useful. Both the form and the volume of a building can communicate the circulation system. Proper articulation of the circulation system combined with the expression of destination zones will create distinctiveness and thereby giving landmark quality to these architectural elements (Arthur & Passini, 2002).

Graphic information

"Fewer signs makes for better signage"
(Arthur & Passini, 2002, p 132).

Graphic information can reinforce and describe the circulation in more detail, but it can rarely effectively replace missing or misplaced architectural information. Graphic information can be classified as typographics, hand- computer- and photographs, pictographics and cartographics. Typographics are written messages, pictographics are symbols and cartographics are maps. Marks and lines on walls or ceiling, signal lights and colour coding are other means of providing visual information (Arthur & Passini, 2002).

Wayfinding signs have three functions: orientation signs providing information such as building directories and hours of service, directional signs with or without arrows, and identification signs in verbal or non-verbal form. The construction of signs can be categorised as self-supporting signs, wall mounted signs and suspended signs. In addition the signs may be single or double faced, internally or externally

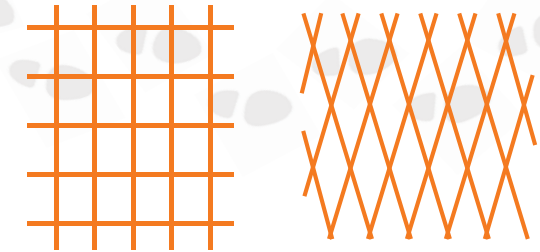


Figure 17

Grid networks

(adapted from Arthur & Passini, 2002)

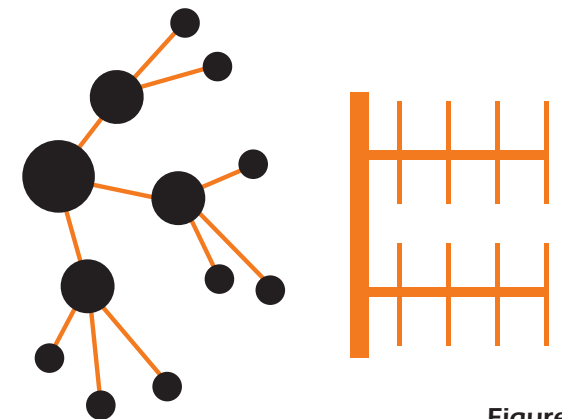


Figure 18

Hierarchical networks

(adapted from Arthur & Passini, 2002)

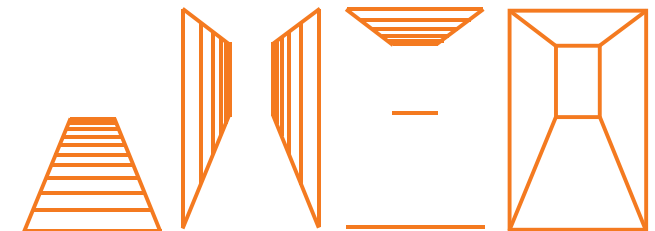


Figure 19

Elements of a path

(adapted from Arthur & Passini, 2002)

illuminated, static or dynamic (Arthur & Passini, 2002).

Signs are provided to aid wayfinding, however they are actually the cause of many problems which people encounter when navigating through an unfamiliar setting. The message might be ambiguous or communicate conflicting information. Another problem can be either too little or too much information, which both leads to confusion. The sign might not be perceived completely due to glare or obstructions, or the message might be illegible because the letters are too small. Inaccurate or unreliable information is also a cause of wayfinding problems (Arthur & Passini, 2002).

Impaired orientation capability

Many users have impairments in respect to perception, cognition and mobility which affect their wayfinding abilities. Some of these impairments are permanent and some are temporary.

Visual impairment

Visual impairment and blindness are the most obvious and most severe perceptual impairments affecting wayfinding. Blind travellers have to rely on auditory and tactile cues, and only in rare circumstances can they use olfactory or heat perception. The senses compensating for sight are generally less informative, less reliable and less efficient (Arthur & Passini, 2002).

People who cannot rely on sight have two ways of using hearing to perceive cues of the environment: perceiving an original sound source or perceiving sound produced by the person and reflected by objects, i.e. cane tapping. Being the prime mode of perception for the blind, auditory perception has to be optimised as much as possible, and background noise

has to be controlled. Blind people entering a transportation centre often find it difficult to extract any useful information due to the background noise that is so common in these places. Background noise as well as the strong air currents which are often encountered at entrances, have a generally disorienting effect to blind people, and make walking in a straight line even more difficult (Arthur & Passini, 2002).

Tactile maps have been shown useful to blind travellers, but just like reading braille, the reading of tactile maps has to be learned. Because buildings frequently have large open spaces, which may or may not be filled with potential hazards for the sightless, it is important to introduce trails or shorelines (fig 22) into the floor surfaces that will lead a blind person to the main destinations (Arthur & Passini, 2002). Tactile markings should also be used on for example platform edges and at the beginning of a stair. By giving the trails or markings a contrasting colour, they may be used not only by the blind but also by the visually impaired.

For people who are not blind but have impaired vision, such as low acuity, blurred vision, partial vision loss or night blindness, certain design criteria can facilitate the perception of relevant wayfinding information. Among the most important are: the use of strong colour and brightness contrasts in signage, the avoidance of contrasts as well as glare in the general level of illumination, visual and tactile definitions of main circulation routes and the pairing of visual with non-visual sensory information. These criteria will also benefit the population at large and the elderly in particular (Arthur & Passini, 2002).

When using colours, it should be kept in mind that 9% of males and 2% of females are colour blind, particularly with respect to red and green. Up to 50% of elderly people also have difficulties distinguishing various hues of dark or light colours (Arthur & Passini, 2002).

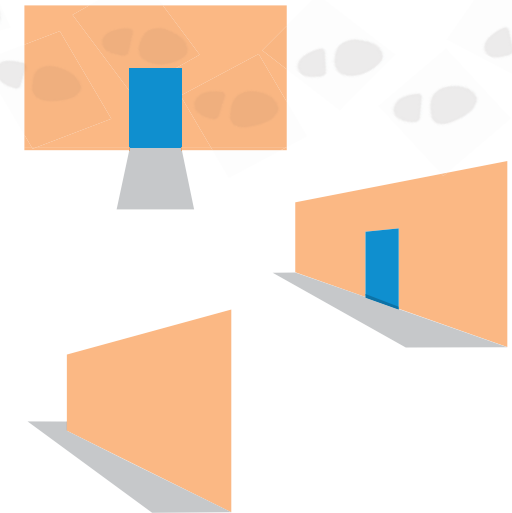


Figure 20
Frontal, oblique and indirect approaches to entrances
(adapted from Arthur & Passini, 2002)

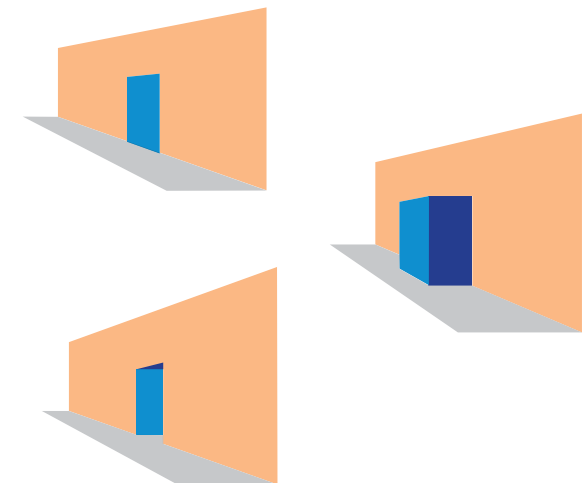


Figure 21
Flush, projected and recessed entrances
(adapted from Arthur & Passini, 2002)

The adequate light level for vision increase with age and reduced eyesight. Optometrists say that a 50-year-old need almost twice as much light to see clearly as does a 20-year-old. People who are 70 or older need four times as much light (Arthur & Passini, 2002).

Hearing impairment

A deaf person has to rely on written messages, sign language or lip-reading in order to communicate. When obtaining information from a non-deaf person, for example when asking for directions, lip reading would seem the most used. This can be made difficult by insufficient lighting in the setting. Some of the deaf have difficulties understanding abstractions and words describing concepts, both spoken and written. Their vocabulary tends to be more action oriented (Arthur & Passini, 2002), which should be taken into consideration when designing signage for public settings.

Screening, i.e. separating background noise from the desired message, when using a hearing aid is particularly troublesome, why we should be concerned about the soundscape of our built environment (Arthur & Passini, 2002). In regular conversations between unimpaired people, about a third of the information is communicated through the sight of the lip movements or general body language. Information given through loud speakers therefore require extra effort by the receiver, and the hearing impaired notice this most significantly (Ljunggren et al., 1997).

Deaf people who cannot rely on sound signals, tend to be excessively fearful of accidents, when for example crossing a busy road. To make things worse, almost all evacuation warning systems are based on sound signals. *“Safety is probably one of the major concerns of deaf and hearing-impaired people”* (Arthur & Passini, 2002, p 36).

Cognitive impairment

Cognitive impairments range from temporary confusion due to information overload or stress, to more or less severe incapacities due to disease, accidents, age or mental retardation. Cognitive impairment can affect linguistic abilities independently from spatial abilities (Arthur & Passini, 2002).

Persons who, by reason of their psychological state, may experience difficulties in processing environmental information and making appropriate wayfinding decisions besides those directly related to vision, hearing or literacy, are included in the category situational cognitive impairment. Everybody can be said to be situationally impaired at one time or another. Anger, confusion and fear all make us more likely to be distracted or distressed. The possible situational impairment as a result of stress is of particular importance, since it might be experienced when facing danger or having to evacuate a setting during an emergency (Arthur & Passini, 2002).

Another category is developmental cognitive impairment, where development refers to the whole life span. This impairment may affect the learning abilities of young children or result in the loss of cognitive abilities in elderly. Learning disabilities include conditions like dyslexia, dysgraphia and dementia caused by Alzheimer’s disease among others (Arthur & Passini, 2002).

Some brain lesions result in deficiencies leading to conditions of disorientation, which means the incapability of even the most elementary understanding of where you are or how to reach given destinations. These conditions are called spatial amnesia and spatial agnosia. The key manifestation of spatial agnosia is an inability to recognise spaces visited on previous occasions, while spatial amnesia leads to an inability to link spaces mentally into an overall representation.

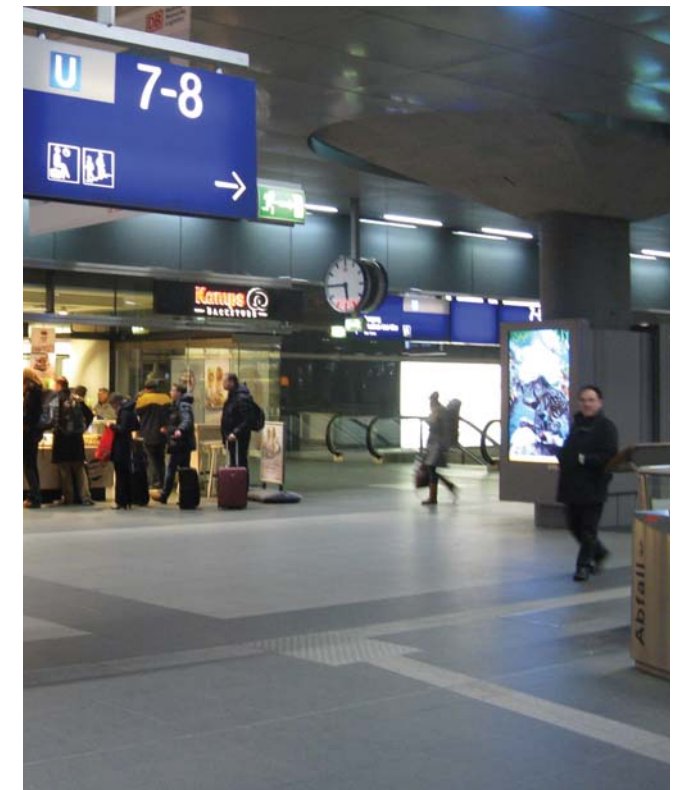


Figure 22
Tactile guide paths at Berlin Hauptbahnhof

The effect of spatial amnesia on people's ability to get around is dramatic. At the beginning, amnesic patients are totally incapacitated even if they find themselves in previously familiar environments, but after a certain adaptation period they learn to find their way by substituting verbal for the missing spatial information (Arthur & Passini, 2002).

Mobility impairment

For people in wheelchairs, wayfinding is made much more difficult if they are not able to use the main entrance. The detour requires far more wayfinding decisions, and each decision requires a mental effort and involves the risk of making a mistake. In addition, the wayfinding information required by wheelchair users are often missing. Accessing information from the height of a wheelchair is difficult, especially from horizontal displays or due to reflections and glare which are often accentuated from a wheelchair perspective. The major problem facing wheelchair users however, are physical architectural barriers such as stairs, steep ramps, and heavy doors (Arthur & Passini, 2002).

The largest number of mobility impaired people are those who can actually walk, however with difficulty. This group includes people on crutches or walkers, obese and elderly, as well as people carrying luggage or pushing trolleys (Hultgren, 2002). The common problem for the mobility impaired, which also applies to children, is that their cones of vision is restricted or lowered. This might be due to their eye level being lower or the need to look down instead of straight forward when for example using crutches. Signs that are located too high above the floor are generally difficult for the mobility impaired to perceive (Arthur & Passini, 2002).

Illiteracy

Illiteracy in the strict sense means the inability to read or write simple sentences in any language. Being functionally illiterate however, includes everyone who cannot read and write sufficiently well to fill a job application; many more than one would think. Expanding the meaning of functional illiteracy to include an inability to read a written message in any language, we are all illiterate when visiting a foreign country. In this sense children of preschool age are also considered illiterate (Arthur & Passini, 2002).

The obvious alternative to written messages are symbols and pictographs. They are particularly useful for international visitors in settings such as airports and public transport centres, provided their content is limited to very simple concepts such as toilets, tickets or baggage claims. Pictorial language has to be based on a set of recognised elements which implies a certain level of standardisation. They are also limited by what can be described or identified in a pictograph, and the number of different pictographs used in a sign (Arthur & Passini, 2002).

Architectural language becomes one of the major means of communication for the illiterate wayfinder. Anyone who has been in a foreign country that uses a different alphabet, was probably made painfully aware of what it means not being able to rely on written messages (Arthur & Passini, 2002).

3.4 Public transport centres

“Det kan ibland vara en svårtolkad och kaotisk arkitektur man möter på stationerna”
(Linde Bjur & Engström, 2010).

In order to better understand why public transport centres are organised as they are, a summary of their development up until now as well as some future tendencies are described below.

Short history

During the industrialism, trains quickly became a popular means of transport thanks to its' speed, availability and comfort. When the railroad became an important organic part of the city structure and transportation system, a new type of public building was born; the railway station. The earliest train stations were however not purpose-built. The first purpose stations, Manchester Liverpool Road and Liverpool Crown Street Station, opened in 1830 and both were two-storey classical-style town houses. Around the middle of the 1800s, the railroad companies started to invest in the station buildings and the construction took off. Gare Saint-Lazare in Paris was built in 1837 and London Bridge in 1838. In Sweden Gothenburg Central was built in 1858 and Stockholm Central opened in 1871 (Bakerson, 2009).

Most stations in Sweden built during the late 1800's and early 1900's were drawn by Folke Zettervall or Adolf Edelsvård and many of them are a-listed buildings today (Hultgren, 2002). For 40 years, starting in 1855, Adolf Edelsvård was the responsible architect for the state railways, and during this time over 5700 railway buildings were erected from Malmö in the South to Boden in the North (Linde Bjur & Engström, 2010).

The first railway stations in the larger cities were termini at the end of the railroad, since it became too expensive to enter the already developed city structure. Eventually the number of travellers started to increase, and to attract even more passengers, small stations were being constructed beside the existing tracks and with time the societies around these new stations grew and cities started to form. Behind the majority of the station projects were both an architect and an engineer, for example St Pancras which was drawn by the architect G. G. Scott in cooperation with the constructor William Barlow. The station building was architecture, while the station halls with their large spans were technology (Bakerson, 2009).

Railway stations have, since the advent of the railroad, had a representative role in the city. It has been the face of the city towards the visitors. This is probably one of the reasons why railroad companies and local authorities have invested in respectable and even grandiose station buildings. The development of engineering during the 1800s and new building materials like steel and reinforced concrete made it possible to increase the bearing lengths. Gigantic buildings of steel and glass were created, and the railway stations became symbols of modernity, such as Gare du Nord in Paris (Bakerson, 2009).

During the middle of the 1900s, when the car industry was flourishing, the construction of roads took off in most western European countries. People had become richer and getting a car had become easier. After the car came the plane, and flying became a quick, comfortable and popular way of travelling and a hard competitor to railway transportation. Large groups of people stopped travelling by train, and in just a couple of decades railway transportation lost its' importance as an efficient means of transportation. The result of the massive decline in passengers during the end of

the 60s and the beginning of the 70s, was reduced train traffic, closures or changes of function of station buildings and reduced investments. The maintenance works were drastically reduced and the quality of the service and the carriages deteriorated, and as a consequence the numbers of passengers decreased even more (Bakerson, 2009).

The railroad companies had to rethink and approach the problem from different angles, to try to attract passengers again. New service methods were developed and the travel standard improved. The most important motive for this intervention was probably the growing awareness of global warming and climate change. Environmental issues became more and more important, and all analyses and studies signalled the railroad as a future and sustainable means of transport. At the same time the consequences of the motor traffic was pointed out as one of the main sources of environmental pollution (Bakerson, 2009).



Figure 23
The bus terminal at Jönköping Central station

The first steps started by adapting the time table of the regional and long-distance trains to the schedule of the local public transport, which led to a series of reconstructions within the station area. Many stations were remodelled and some of them had fundamental reconstructions to adapt them for the modern times and the new trains. When the cooperation between trains and local transport was improved, many travellers returned and eventually in the 80s, people started to travel by train again. Within the station buildings and adjacent areas, the organisation of the movement patterns and connections between the terminal, platforms, restaurants, cafés and shops were improved. The majority of the stations in larger cities were turned into efficient communication nodes where trains, public transport, taxis and cars coexisted. The station areas became trade- and meeting places for residents and visitors (Bakerson, 2009).

In most European countries it has been possible since the mid 80's to purchase tickets outside of the station area, and in Sweden nowadays many travellers use e-tickets or mobile ticketing. The phenomena created a new category of passengers who could go straight to the platform without using the different functions in the station building. This possibility led to major changes of the structure, functions, and movement patterns of the station buildings. The new type of passenger required a time saving strategy; to reach the platform as fast as possible (Bakerson, 2009).

From the mid 80's, railway stations in large cities became available 24/7, which led to people visiting the station for other purposes than travelling. Over time the range of services increased, which in turn led to a growing number of visitors to the area. During the decades, railway stations have developed into commercial centres, at the same time as the station areas have become a work place for a large number of people (Bakerson, 2009).

Investment in a station building is an intricate question in many countries. There are often several different owners of the building, the tracks and the trains. This kind of situation complicates any alterations since all parties have to agree. Since 2001 the majority of the station buildings in Sweden are owned by Jernhusen AB (Bakerson, 2009). The tracks are run by Trafikverket and the trains by different private companies, such as SJ, Öresundstågen and Veolia.

Nowadays almost all new bus terminals being built are docking terminals, which increases the number of bus stops per area as well as shortens the walking distances for the passengers. A negative aspect with this type of terminal is that the buses are required to reverse out from the bus stop, which makes safety and visual access especially important. One of the first docking terminals in Sweden was Kampenhof in Uddevalla, completed in 1990 (Mynewsdesk, 2008). Some contemporary examples of docking terminals are the Nils Ericson terminal in Gothenburg and the bus terminal in Jönköping (fig 23).

As examples of modern public transport centres, the recently rebuilt Malmö Central Station and King's Cross Station in London can be mentioned. Before the renovation of the King's Cross Station, an urban movement study inspired by the Space Syntax Analysis was conducted to evaluate the existing structures (Space Syntax, 2013).

Tendencies

Changes and development in the society require alterations also of the travel centres. The number of functions within the stations are decreasing while the range of commercial services are increasing. This affects the characteristic structure of railway stations, and both the station areas and the station buildings are becoming larger and more extensive. The

traditional station buildings are gradually turning into public places contributing to the forming of commercial centres (Bakerson, 2009).

Waiting lounges, information desks, post office, luggage storage among other functions are decreasing both in numbers and size, and at the same time being combined with each other. These rationalisations are a consequence of the development within the service technology as well as changes in travel habits, travel needs and movement patterns (Bakerson, 2009).

Ticket counters are one of the basic functions in a travel centres which have changed radically. The endless rows of ticket counters are already gone, and often replaced by a general information and service office run by the train company. The significance of waiting lounges has altered during the last 20 years. They are often replaced by restaurant, cafés and other service spaces which can offer the travellers rest, food and recreation (Bakerson, 2009).



Figure 24
Illustration of Vienna Hauptbahnhof
(Wikimapia, 2011)

Hotel services are gradually increasing within the station areas, and usually hotels have been built in the vicinity of the station. This tendency is reinforced when all means of transport and service functions are gathered around the station. An increase in residents within and near the station area creates a growing need for group specific service within the area, such as the possibility to buy groceries. For people commuting to work via the station, this means an extra asset and a chance to save time (Bakerson, 2009).

The number of cars and parking spaces are decreasing around some communication nodes, due to more efficient public transport as well as traffic jams, increasing petrol prices, parking fees and congestion charges. There are however some travel centres contradicting this tendency, for example Malmö Central where large parking areas were created during the reconstruction (Bakerson, 2009).

Malmö Central and Citytunneln is also an example of the tendency to relocate tracks either below or above ground. The fast trains require flyover intersections, and Trafikverket has a vision to rebuild all intersections between railroads and public roads into flyovers (Bakerson, 2009).

Some examples of public transport centres currently in planning or ongoing construction are the Vienna Hauptbahnhof (fig 24), the new commuter train station at Odenplan in Stockholm, and the three new stations connected to Västlänken in Gothenburg (Trafikverket, 2013).

Typologies

The organisation of building volumes and functions is of significant importance for the design of the interior spaces and the control of flows of traffic within public transport centres. Four different organisation

typologies can be identified based on the relation between the station buildings and the tracks (fig 25). The different typologies affect not only the station buildings, but also the urban areas in which they are situated (Bakerson, 2009).

The first type of stations were the termini, or end stations, where the tracks end at the platforms in direct connection to the station building. Examples of this type of station are Helsinki Central station and Gothenburg Central station (Bakerson, 2009). The advantage of termini stations is that the platforms can be reached without having to use any vertical communication, which makes the accessibility at these stations easier to solve. Termini stations are also generally quite easy to understand and navigate through, due to the simple organisation and good visual access. On the down side is the fact that travellers are required to walk quite long distances, especially when interchanging from one platform to another.

Another type is the through station, or side station, where the station building is located besides the tracks, and the platforms are reached via tunnels or bridges (Bakerson, 2009). As examples of through stations Prague Main Train station and Lund Central station can be mentioned. This type of station is very common for small to medium sized stations in Sweden. On the pro side is the generally easy orientation at these stations, however the accessibility may be an issue due to the need for tunnels or bridges between the station and the platforms.

The third group includes the stations where the station buildings are located between, above or below the tracks (Bakerson, 2009). So called junction stations also belong to this typology. Berlin Hauptbahnhof is an example of a junction station where the building volumes are located both above and below the tracks. Another example is Copenhagen Central station where the station building is situated above the tracks. The

junction stations are often quite complex in their organisation and may be difficult to navigate through, while the stations where the building is located above or below the tracks, such as Copenhagen Central, often have a simple and direct organisation. Underground stations however, always require additional consideration regarding wayfinding.

The last typology is the group of stations which combine different types of organisations. Some tracks might be situated beside the station building while others end in front of it. An example of this type is Stockholm Central station, where some of the tracks pass the West side of the station building and some end on the North side of it (Bakerson, 2009).

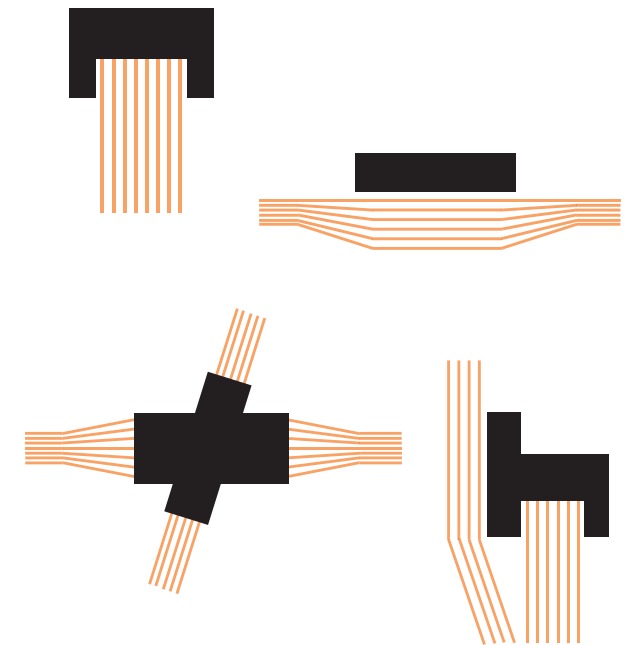


Figure 25

End station, through station, junction station and combined station (adapted from Bakerson, 2009)



4

EMPIRICAL OBSERVATIONS

4.1 Helsinki Central station

Short history

The central station in Helsinki is a famous landmark, not just because it is an important node in the transport system, but also because of its' design. The station building is the result of an architectural competition won by the, at that time recently graduated architect, Eliel Saarinen. The Helsinki Central Station was completed in 1919 and is a part of the, for the time so popular, architectural style Art Noveau (Irving, 2009).

An underground pedestrian tunnel located in front of the station, below Brunnsgatan, was completed in 1967. The tunnel called Asematunneli in Finnish and Stationstunneln in Swedish, connects the metro station Järnvägstorget, opened in 1982, with the central station. It also serves as a small shopping mall (Helsingfors Stad Stadsfullmäktige, 2012).

There are ongoing plans for a new underground railway around city centre, to relieve the congestion on the tracks at the central station during rush hour. The central station has about 200 000 passengers daily (Wikipedia, 2013).

Organisation

Helsinki Central Station is an end station, which means that there is no through traffic (fig 26). All trains have to turn around here. The original tracks are reached directly from the main station building and are flanked by the two wings of the station. Over the years more tracks have been added, both East and West of the original tracks. These tracks end where the wings of the station start. There is a tunnel under the tracks about mid-way, to facilitate movements between the added platforms 12-19 and 1-3.

There are two perpendicular main axial lines within the building; one from the main entrance, to and along the tracks, crossing the two main halls, and the other one between the two side entrances along the length of the second hall. The hall which you enter via the main entrance is flanked by additional halls on both sides.

The central station is connected with the metro station via the Asematunneli (fig 27). This underground shopping mall and metro station, located below Brunnsgatan just in front of the central Station, is reached via a staircase in the main hall of the central station, or separate entrances on Brunnsgatan.

One bus station is located West of the station building on Elielplatsen, and is an outdoor docking station, where the passengers board from a long narrow island in the middle. The island is covered by a roof. There is another bus station located East of the station building on Järnvägstorget. This bus station is a regular solution with parallel passenger islands.

Walk-through evaluation

The two routes of the walk-through evaluation were conducted on Friday the 22nd of February around mid day. The starting point for the first route was at the junction between Centralgatan and Brunnsgatan, approaching the station from South East, and the goal point for the first route was the platform from which the train to Åbo would depart. For the second route we started at the platform where the train from Riihimäki arrived, and the goal point was the metro station.

For the point by point evaluation see appendix.

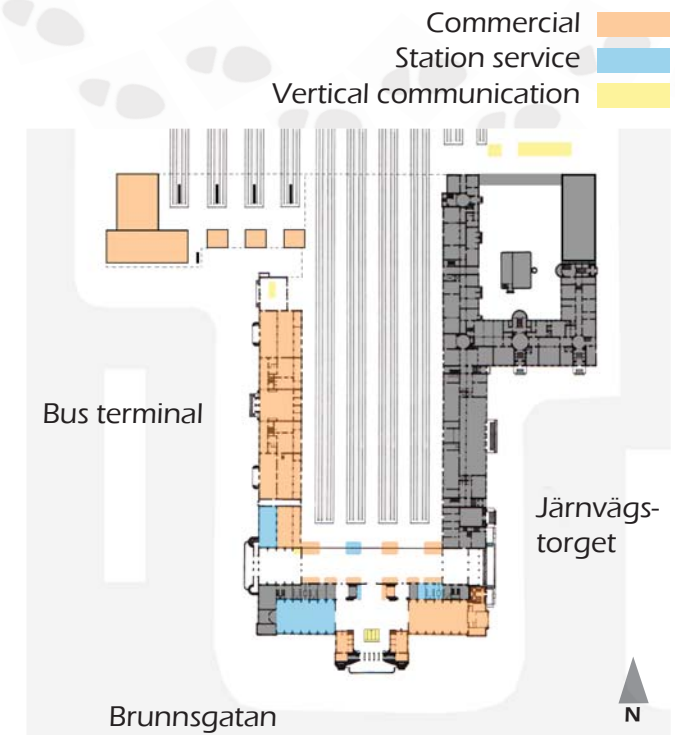


Figure 26
Helsinki Central station
(adapted from Hausen et al., 1990)

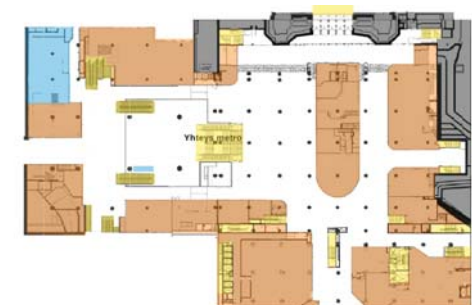


Figure 27
The Asematunnelin
(adapted from Otso Kivenäs, 2010)

The overall layout of the station is quite logical and clear. Since the Helsinki Central station is an end station, it is easy to reach all platforms from the main building, and there are no level differences. However this type of organisation also creates rather long distances to walk when changing between platforms, or to reach the last carriage of a train. The fact that they have added tracks with time, makes the layout less clear, since the newer tracks don't fit inside the two wings of the main building.

The railway square is situated East of the station building, and not directly in front of main entrance (fig 28) which is the usual location for an open space belonging to a landmark building. This might cause some confusion regarding main directions within the building. It might also explain why the majority of people moving through the station are using the two side entrances, instead of what was intended to be the main one. From the outside, the side entrances are almost as clearly articulated as the main one. Looking at the plan and the architectural space it is very clear what was intended to be the main entrance, however it is not the entrance most frequently used today.

At first it seems odd that the hall reached from the side entrances is the one containing most of the functions and information, and not the larger one reached from the main entrance. After a second thought it makes more sense, because today that is the most used space of the station. Many regular users don't even pass through the so called main hall, but go directly from the side entrance through the second hall to the platforms. If you as a tourist though enter through one of the side doors, it is very difficult to find your way to the service desks in the main hall.

The weak visual connection between the different parts of the station makes the spaces more difficult to understand. It would have been easier to read the space if there was just one large hall instead of many

separate ones.

In general I got the feeling that the regular users of Helsinki Central Station have some secret knowledge about how to get around the station in the easiest way, while as a first time visitor you have to rely solely on, sometimes misleading, signs. For example when the signs told us to exit the building and walk along the outside of the building to reach tracks 12-19, while everyone else seemed to take the more comfortable route on the inside instead.

There are also some obvious difficulties for people with impairments. The front doors are heavy and the air locks narrow. You also risk getting stuck in oncoming traffic of people half way through the air lock since the doors are not transparent enough. The East entrance towards the station square is reached by a stair and is therefore not adapted to people in wheelchairs.

No tactile or visual guide paths could be found in or around the station, except for the contrasting paint on the edge of the platforms. In addition the small departure and arrival boards are frequently placed too high, and are reflective which make them hard to read for elderly, people in wheelchairs or people with impaired vision. The elevators down to the Asema-tunneli and the metro are extremely difficult to find, and require long and unpleasant detours.

Generally it is important to be consistent in the use of signs and symbols. Using red signs for the metro all the way through the railway station and down to the Asema-tunneli (fig 29), and then suddenly using blue and pink ticket machines is very confusing. It would also make the signs easier to understand if the symbols were complemented with words.

The time aspect has definitely had an impact on way-finding within Helsinki Central station. Added tracks,

changing and moving functions, connection to the metro, changing surroundings, accessibility requirements etcetera have all influenced the original layout and intent of the architect. Because of this, as a first time visitor you are heavily dependent on signage.

An orientation map over the station, its' functions and close surroundings would have been very useful. It could for example have been placed next to the information board with the city map.



Figure 28
Helsinki Central station main entrance

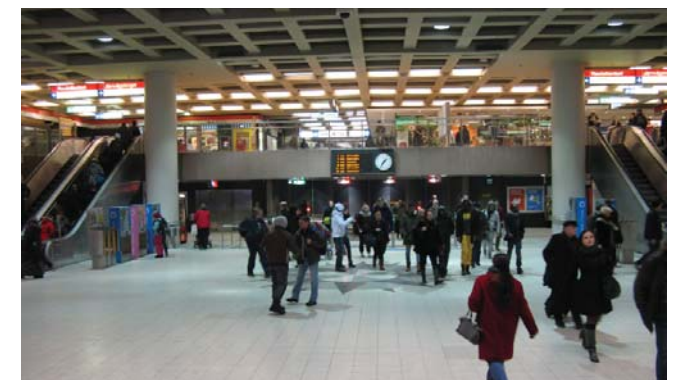


Figure 29
The metro station Järnvägsstorget

4.2 Prague Main Train station

Short history

The main train station in Prague, Hlavní Nádraží, was designed by the architect Josef Fanta and built between 1900 and 1909. The new station building replaced the previous station from 1870 by Antonín Barvičius. During the years between 1972 and 1977, the station went through a modernisation and a large hall linking the train station to the metro was constructed. The refurbishments and constructions did not however alter the older sections of the station, why it is now an officially listed historical monument (Theinhardt & Varejka, 1994).

The original station building is currently undergoing major refurbishments, and is closed during the process.

Organisation

Prague Main train station is a through station (fig 30). The original train station is very isolated from the city, by the railway on one side and a highway on the other. The newer terminal built as a souterrain in two levels, faces a park towards the city centre. From the park level you can reach the metro one level underground. Half a story up you reach the tunnels under the tracks which lead to the platforms. From the original train station you have to climb down the stairs to the tunnels and then up to the platforms.

Arriving to the station by car you reach the level of the original station and a large parking deck. From the parking you cannot reach the station on the same level due to the highway. You have to take a lift or stairs down to the park level and enter the newer terminal from there.

The bus stops are located along the Wilsonova road in front of the original station building.

The older station building by Fanta is referred to as the original station building in this thesis, and the extension from the 70's will be referred to as the modern terminal.

Walk-through evaluation

The walk-through evaluation of Prague Main Train station was conducted between 10am and noon on Friday the 8th of March. Route 1 started in the park in front of the station, went via the ticket office and ended at the platform for trains towards Berlin. The starting point for route 2 was the platform, via information and the goal point was the metro station.

For the point by point evaluation see appendix.

Due to the original station building being closed for restoration, that part could unfortunately not be evaluated. The impression perceived under these circumstances was that the newer entrance towards the park (fig 31) nowadays functions as the main entrance. This impression is reinforced by the quite heavy trafficked road running straight in front of the original station building and thus cutting it off from the city. The parking deck on the same level as the car road and the original station building, is visually but not physically accessible from the station side due to the lack of pedestrian crossings. To reach the station from the parking deck you have to take the elevator or stairs down to the park level and enter the station via that entrance. The current organisation works well for pedestrians approaching from the city, but not for visitors arriving by car or bus, and especially not for visitors with physical impairments.

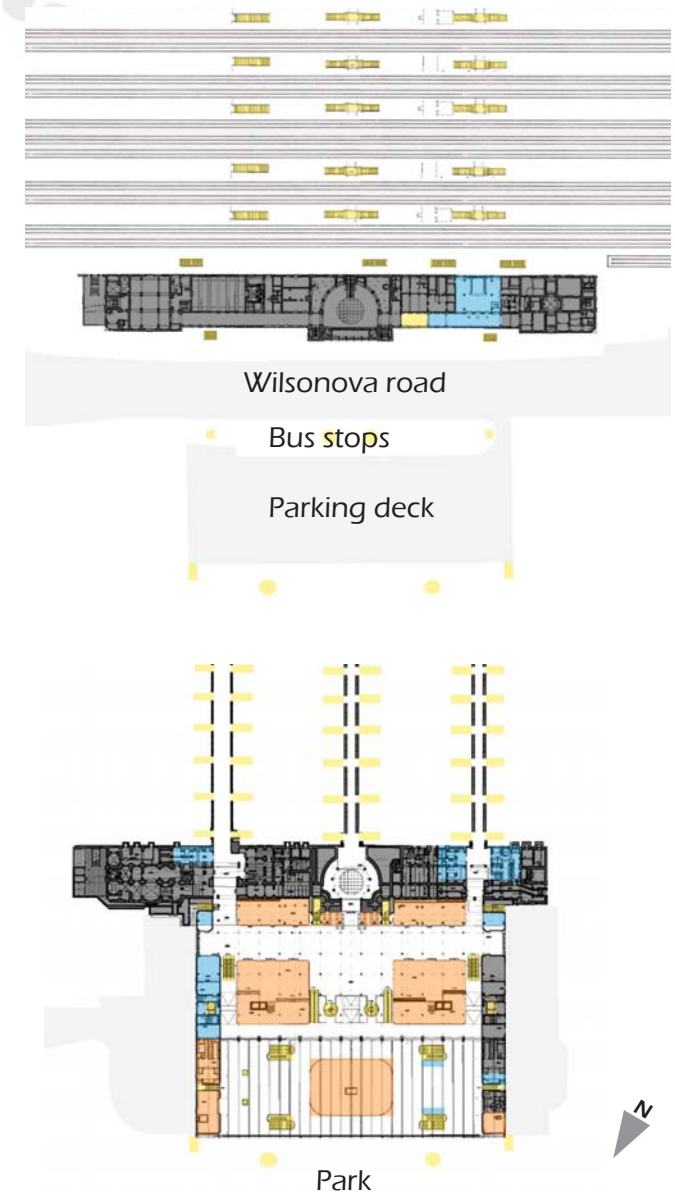


Figure 30
Prague Main Train station
(adapted from Casopis stavebnictví, 2007)

The original station building is easily recognised as a train station, however approaching from the city centre, you rarely get a view over that building. What greets you is the entrance to the modern terminal, which is clearly signed, but reminds you more of a metro than a train station. A first time visitor might hesitate whether the train station is reached via this entrance or not.

Being a side station, the organisation with the tracks, platforms and perpendicular tunnels underneath is quite logical. You enter the tunnel from the upper level of the modern terminal, and the platforms are numbered from 1 and forward as you proceed. Though the visual access between the modern terminal hall and the platforms is non-existent, and the passages are quite narrow and unclear. Clever floor markings however, make these narrow passages and stairs easier to locate. But there is no clear architectural direction towards the tracks and no contrast in light or other cues to locate the platforms.

The large open hall of the modern terminal (fig 32) towards the park is quite easy to navigate, however when proceeding further into the terminal, the many half storeys and escalators here and there make the space more complex. There are also quite many shops which make it harder to get an overview of the space. The terminal is rather noisy visually. The high temperature in the terminal hall also obstructs your perceptions to some extent.

The elevators from the modern terminal down to the metro are very clear and easy to find, unlike the elevators up to the train platforms which we did not manage to locate.

There are sufficient and clear loudspeaker announcements, and plenty of departure boards which are quite informative. An improvement would be to write the titles of the columns in English as well. Being Swedish

we are used to the departure times being stated to the left on the board, but here the times were stated on the right instead, which took some time to get used to.

Another difference from Sweden is that in Prague it was the platforms which were numbered, and not the tracks. So, for example platform 2 has two tracks and you don't know on which side your train will arrive until it is displayed on the digital sign on the platform. The movements of people were not a very useful cue here, since people were dispersing into all possible directions.

For a first time visitor, the many staffed counters are a great benefit since it in many cases is much easier to receive information orally than figuring it out from signs and maps. However the level of English with the staff varies from person to person. Most of the signs are supplemented with the English translation, but some of the symbols used are not understood intuitively, for example the symbol for the metro.

Some of the signs mounted on the wall of the stairs leading from the tunnel below the tracks up to the platforms, are hidden behind the low ceiling of the tunnel until you get quite close. This forces you to proceed forward without being able to confirm that you are moving in the right direction and increases the stress of the user.

The ticket office seemed to have a quite complex queuing system, with separated queues for different departures or types of trains and buses, and no queue number system. This system requires a lot of staff for very few customers. There are two information counters to the right in the ticket office, but these get lost in the visual noise from all the monitors and signs. The departure boards showed all means of transport on the same board which made them difficult to understand.



Figure 31
Prague Main Train station, new entrance



Figure 32
The modern terminal linking the trains and metro

4.3 Berlin Hauptbahnhof

Short history

The central station in Berlin is designed by the architecture office Gerkan, Marg und Partner and was completed in 2006. It is located on the site for the former commuter train station Lehrter Bahnhof and has more than 300 000 visitors daily. Due to the advanced construction and difficult ground conditions on the site, the construction cost turned out much higher than expected (Bakerson, 2009).

Organisation

Berlin Hauptbahnhof is a junction station with the station building above and below the tracks.

The station consists of three units, where two vertical, six stories high volumes are connected by the third volume (Bakerson, 2009). Between the two vertical volumes, which contain office space, are the public areas of the station. The vertical communications are all gathered in the central open space which is symmetrical in its layout. The main entrances are located on the middle floor, between the two vertical volumes, opposite each other.

On the bottom floor, which is two storeys below ground, run the regional and international trains. The three middle floors contain services and commercial space, and on the top floor run the tracks for the local trains, S-bahn, as well as some international night trains. The two railway lines intersect in this station. The regional and international tracks run underground in the North-south direction, while the S-bahn tracks run on a bridge in the East-west direction.

The bus stops are located along Invalidenstrasse just North of the station.

Walk-through evaluation

The overall organisation is very clear, with a central space containing the vertical communication, shops and services along the sides (fig 33) and good visual and audible access between the floors.

The symmetrical plan makes it difficult to know in which direction you're heading though, and from which direction you have arrived. Especially after moving up and down the escalators which force you to change direction several times. This also makes it difficult to point out your location on a map. I had to compare the plan with shops or other landmarks to figure out if we were facing North or South.

The low temperature during our evaluation affected our perceptions and wayfinding capabilities to a great extent, and I imagine that the station gets very warm in the summer time due to the extensive glass facades.

There are sufficient tactile guide paths for the visually impaired, and the elevators are easily located. There are also plenty of orientation maps over the station, as well as ticket and information offices with staffed counters on each floor. However the transparent railings do not provide enough contrast for the visually impaired and it might be perceived as frightening to approach the edge when not clearly seeing that there is a baluster.

On the departure displays on the platforms, the track number is written digitally which makes it easily confused with the departure time. The signs showing the name of the station though, are clear and backlit which make them very well legible.

It seems odd that the regional and international trains run from the bottom floor, while the metro and

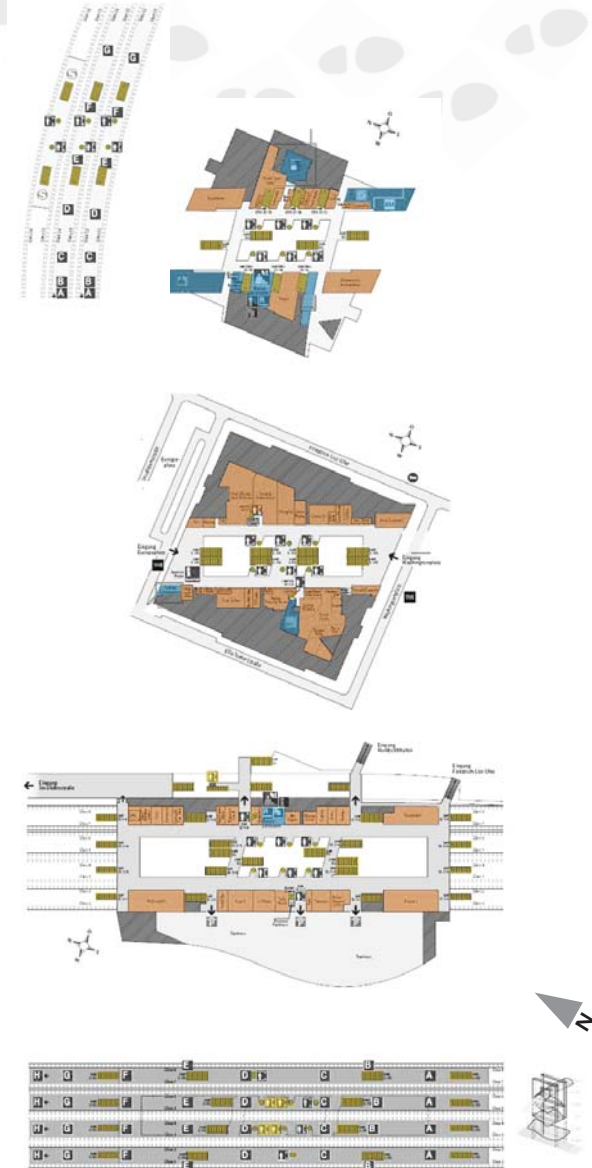


Figure 33
Berlin Hauptbahnhof
(adapted from Sadgoth.com, 2013)

commuter trains run from the top floor. Intuitively you assume that the local trains would depart from the lower level. There are also some inconsistencies to this system, since some international trains, for example the night train to Copenhagen, depart from the S-bahn platforms. Interchanging between the national trains and the S-bahn requires movement over quite a distance since there are three storeys of shops and services between the floors with trains.

The station is sufficiently signed, however for a first time visitor it is impossible to know what the symbols mean. There are signs for “U” and “S”, but no “M” or metro. Looking for the metro we guess that “U” means underground, but get unsure when that signs directs us out from the station building, towards a deserted bridge. Asking for help turns out to be difficult since the level of English of the people we stop is very low. Everyone get very confused when we ask for the metro. Eventually we find out that what is called metro here is actually a kind of tram, and the “U” is the underground, but the type of train we are looking for is actually the “S” which is a kind of commuter train functioning as the metro.

During our evaluation it was cloudy and dark outside so the lighting conditions were sufficient. However, on a sunny day, the strong light contrasts might make it very hard for elderly or people with visual impairments to navigate the building.

From the outside the building complex is identifiable as a public transport centre thanks to the visible and elevated tracks of the S-bahn, running through the building. The rest of the building looks more like a large office complex or shopping mall (fig 34), which in fact it also is. The tracks on the bottom level are situated underground and not visible from the surroundings, and it is a bit confusing that they run perpendicular to the S-bahn tracks. However, it is possible to discern the organisation from the shape of

the building volumes. In addition it is also somewhat confusing that the ground floor actually is the middle floor of the building. When entering, there are two levels below and two above you (fig 35).

The organisation and many levels of the building doesn't create a natural, central place for a larger departure board in connection with a waiting lounge. Instead there are many small departure boards located by the vertical communications.

Berlin Hauptbahnhof gives the impression of a shopping mall in connection to work places, which just happened to have a train service, and not at all the traditional atmosphere you expect at a central station.



Figure 34
Berlin Hauptbahnhof

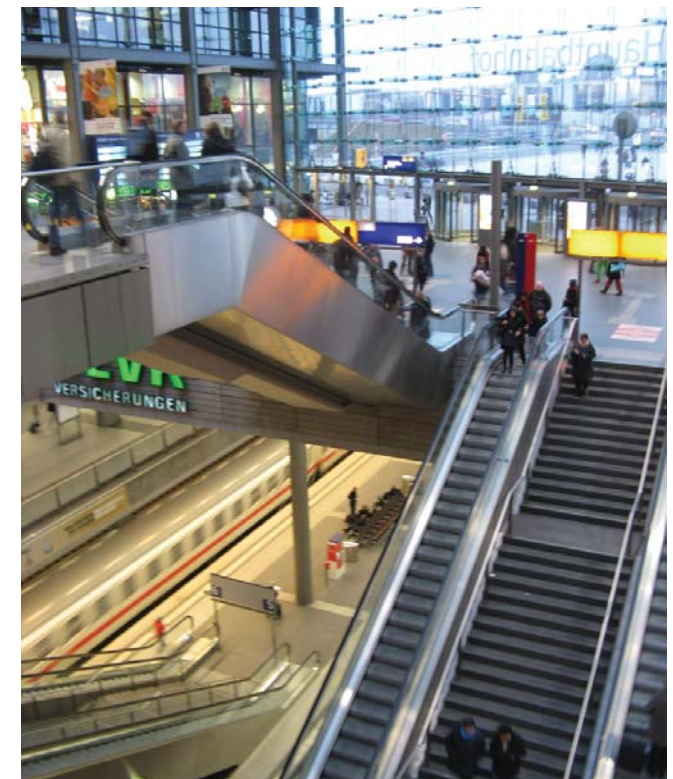


Figure 35
The interior

4.4 Copenhagen Central station

Short history

The architectural competition for a new central station in Copenhagen in 1900 was won by Heinrich Wenck. The construction of the railway station begun in 1906 and was completed in 1911 (Parissien, 1997). Like the town hall built just before, the new central station was an indication of Copenhagen's enormous growth at the end of the 19th century (Lind, O & Lund, A, 1996). Steven Parissien claims that the station building *"though relatively small for the principal railway terminus of a capital city"* (Parissien, 1997, p.115) is experienced as larger than it actually is due to the romantic, castle-like style.

When the new metro lines Cityringen opens in 2018, Copenhagen Central station will be connected to the underground service by a new metro station on Stampesgade/Reventlowsgade, South west of the Central station. The new metro station is expected to serve around 41 000 passengers on a regular day (M, 2013).

Organisation

Tracks and platforms are situated below the main station building of Copenhagen Central (fig 37). According to Carroll Meeks, Copenhagen Central Station is one of the best organised stations of that period (Parissien, 1994). Originally there was a clear separation between arrival and departing traffic in the main hall. The separation was provided by a large service island in the centre, but was removed during the extensive renovation by architects Dissing + Wietling A/S which started in 1978. The original separation was in this process replaced by smaller service islands placed along the central axes of the hall (Lind, O & Lund, A, 1996).

From the South long wall of the main hall you reach all platforms via stairs and escalators down. The main entrance is located on the opposite wall towards North west, however the most frequently used entrance is the side entrance to the East.

The bus station is located on Bernstorffsgade north east of the central station. It is a regular island solution.

Walk-through evaluation

Copenhagen Central station was evaluated on Sunday the 10th of March, between 11am and noon. The platform was the starting point for route 1 and the bus stop was the goal. For the second route we started on Bernstorffsgade, via the entrance and ticket office and ended at the platform.

For the point by point evaluation see appendix.

Copenhagen Central station gives the impression of a "real" train station, which of course is a subjective perception. The large station hall even sounds like a proper train station with its' murmur of people and echoing loudspeaker announcements.

The station building is clearly identifiable as a public transport centre, with its' classical station architecture. The main entrance is clearly articulated (fig 38), however it is hidden behind the North eastern wing when approaching along Bernstorffsgade, and the side entrance is the one most used. Exiting or entering from Reventlowsgade on the West side though, you have to pass through a very narrow and anonymous opening and climb some stairs to reach the station hall. This entrance is as invisible from the outside as the inside of the building.

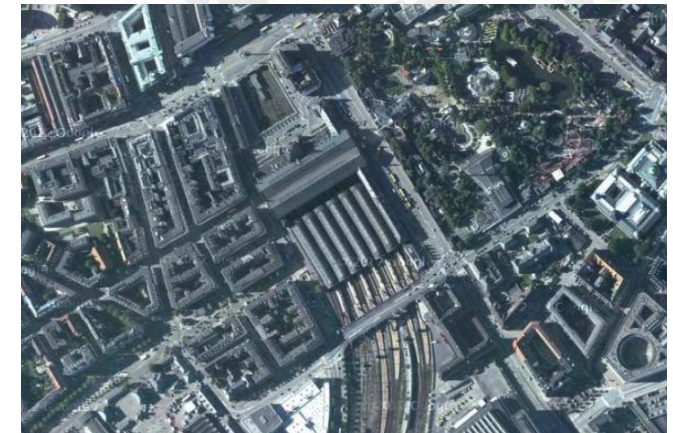


Figure 36
Satellite image of Central Copenhagen
(Google, 2013)

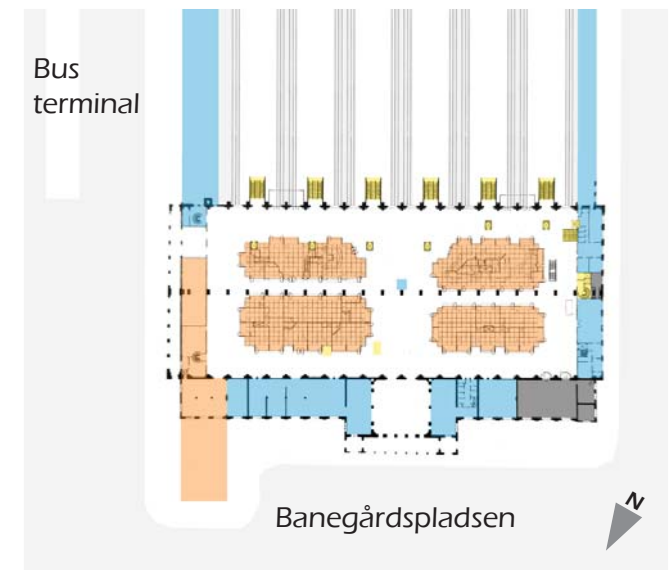


Figure 37
Copenhagen Central station
(adapted from Lind & Lund, 1996)

From the terminal hall there is very limited visual and audible connection to the platforms and tracks, due to the narrow and non-transparent tubes with stairs and escalators. It is understandable that these elements improve the sound climate in the main hall, however at the expense of wayfinding qualities. The secondary stairs down to the platforms are very dark and narrow and end up behind the primary stairs which is a very poorly lit area of the platforms.

The windows of the station building are beautiful, but the semi-opaque glass makes it impossible to use the surroundings as cues for orientation. In addition they create quite strong light contrasts which make some of the digital displays difficult to read.

The overall layout of the terminal is clear and legible, with all tracks reached along the same side of the hall, and the commercial functions are located in kiosks placed in the middle of the hall.

There are plenty of orientation maps over the station, however lacking a “you are here” dot, and no map over the city could be found.

There is good visual access between the platforms which help orientation, but very small signs for track numbers and the name of the station. The North ends of the platforms, below the station building, are very dark and unclear. Those parts are behind the primary stairs, very badly lit and the platform is very narrow on the sides of the stairs which you have to round to get up to the terminal. This is also where you end up when taking the elevator down from the terminal, which might make it tricky for example for wheelchair users to reach the South parts of the platforms.

The platforms are numbered from the left to the right, which seems logical, and the S-trains, a kind of commuter train, are clearly signed.

The graphic theme of the signage is discrete, but this also means that the signs disappear easier in the visual noise. There is also not enough light or colour contrast between the floor and walls, which make the space more difficult to perceive for visually impaired.

There are no distinct flows of people, many people enter through the east side entrance but then the flow is divided by the shops in the middle of the terminal. The long narrow space between the two rows of shop kiosks is not used by many, because of the pillars of the roof construction taking a lot of floor space, and the shops that are turning their backs towards this space.

The main directions in the space are the two parallel axial lines along each long side of the terminal hall (fig 39), and the perpendicular line across the hall, starting at the main entrance.

There is no large departure board, but several smaller ones. People still tend to gather in the middle of the terminal hall while waiting for their trains. In the middle of the hall there is also a staffed information counter, which is very useful.

The bus station is quite easy to locate just outside the side entrance. It would however be helpful to locate information about the bus lines somewhere within the station hall. As it is now you have to exit the station and look for information about bus lines and tickets, or ask in the ticket office which is located in the opposite direction.

It would be interesting to evaluate the station again once the new metro station has opened, to see how well incorporated it will be with the current infrastructure. Today, the overall impression is that the station is quite easy to navigate thanks to a simple and clear organisation.



Figure 38
Copenhagen Central station



Figure 39
The station hall

4.5 Indirect observations

In addition to the structured observations conducted during my study visits in Europe, indirect observations made during my everyday life, mainly when commuting by train between Gothenburg and Stockholm, have also contributed and inspired to the results of this thesis. Some of these observations are described below.

A bad example regarding wayfinding can be found at the recently renovated Stockholm Central station. The new escalators from the underground level up to the main station hall are located between the entrance and the exit of Konsum, figure 40. Visually the vertical communication appears to be situated in the middle of the supermarket, which is unexpected. This makes the escalators difficult to spot despite the transparent walls, especially when approaching from the metro station.

Another observation is the clever separation between the train station and Nils Ericsson bus terminal at Gothenburg Central station. The two zones are identifiable and discerned as separate functions by the interior gate, without reducing the visual access within the terminal. The gate, figure 41, communicates the beginning of a new function and yet keeps the visual connection between the two spaces.

I also noticed an example of how illustrations in combination with text can be a very efficient way to clarify the message of a sign. The signs at the entrances of Tingstadstunneln in Gothenburg, figure 42, are illustrated with waves and thus make you understand that this tunnel leads you under the river. Such illustrations are particularly important at underground settings where people are deprived of the normal cues from the surroundings.

An observation of what can go wrong regarding

signage was made in front of the entrance to the Central station in Borås. The two doors next to each other quite obviously lead to the same hall, however the signs above each door implies that one door leads to a café and the other to a waiting lounge, as shown in figure 43.



Figure 40
An escalator hidden in Konsum at Stockholm Central station



Figure 41
An interior gate to Nils Ericsson Terminalen



Figure 42
The entrance of Tingstadstunneln (Google, 2013)



Figure 43
Confusing signage at Borås Central station (Google, 2013)



5

CASE STUDY

5.1 The region and the city

My case study Knutpunkten, is located in central Helsingborg in the North western part of the region Skåne (fig 44). Helsingborg is one of the oldest cities within current Sweden. Archaeological observations indicate that there was habitation up on Landborgen as early as during the 11th century. Helsingborg is mentioned by Adam av Bremen already in the 1070's, however the beach town below Landborgen, which is the current city centre, started to develop at the earliest during the 1200's (Nationalencyklopedin, 2013).

Being situated at the most narrow part of Öresund, not far from Helsingör on the Danish side, Helsingborg is an important commercial, transport and industrial city. The harbour is one of the largest in Sweden, with a significant passenger and freight traffic. In addition, Helsingborg has got a large service sector with companies within the publishing and advertising industry among others (Nationalencyklopedin, 2013).

Helsingborg is the 9th largest municipality in Sweden with its' 132 011 inhabitants (by January 1st 2013). The area of Helsingborgs kommun is 346 square kilometres (Helsingborg, 2013). The population of Helsingborg is continuing to increase, however somewhat slower than before (Perspektiv Helsingborg, 2011).

Helsingborg is a part of Öresundsregionen, which is a cooperation between Sweden and Denmark, with a total of 3,7 million inhabitants (in 2010). Accessibility and openness are two words describing the continuously growing region. Decisions about Öresundsregionen are taken through a cooperation body called Öresundskommittén, which includes both regional and local politicians (Helsingborg, 2013). Ongoing dialogues regard for example preparing a fixed link between Helsingborg and Helsingör, and the development of Öresundsregionen as a model region for green transport (Öresundskommittén, 2013).

Public transport in Helsingborg

The first railroad to Helsingborg was constructed in 1865 as a side track of Södra Stambanan from Eslöv, and a station building drawn by Helgo Zettervall was erected on Trädgårdsgatan. In 1880 Helsingborg had railway connections in two directions; one towards Landskrona and Malmö and one towards Hässleholm and Södra Stambanan. When the railroad to Halmstad was opened in 1885, a new station building was erected close to Norra Hamnen. The first permanent ferry service between Helsingborg and Helsingör was opened in 1892 (Exhibition poster, 2013).

Since Helsingborg had two train stations at this time, the railway going through the city was blocking the way for the residents who wanted to reach the ferry service. The train was moving slowly through the city, and a railway official with a red flag was walking in front of the train and stopping all intersecting traffic (Exhibition poster, 2013).

Between 1902 and 1967 there was a tram network servicing the Helsingborg citizens with public transport. The first bus line in Helsingborg was opened in 1928, and after the second world war the bus network was extended significantly. This is one of the reasons behind the closure of the tram network. There are however ongoing discussions about re-introducing trams in Helsingborg (Wikipedia, 2013).

Knutpunkten was originally the name for the place where Trädgårdsgatan, Södergatan, Södra Storgatan and Bergaliden intersect. In that spot the tram lines branched out towards North, South and Stattena and in 1942 the tram company erected a "traffic kiosk" there, which is still around today (Exhibition poster, 2013).

Because the railroad running straight through the city centre was neither safe nor sustainable in the long term, the decision to construct a railroad tunnel below Helsingborg was taken. In 1987 the construction of the 1 600 meter long tunnel was initiated. The work was complicated and the tunnel runs directly underneath some of the city's beautiful buildings (Exhibition poster, 2013).

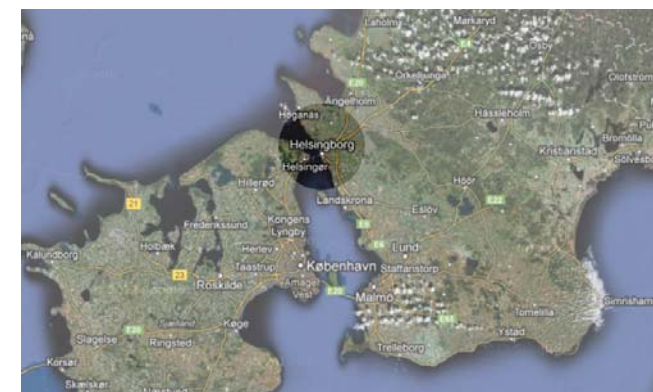


Figure 44
Öresundsregionen (Google, 2013)

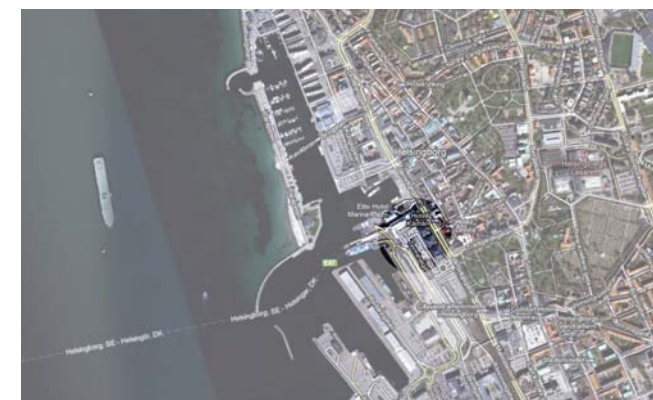


Figure 45
Central Helsingborg (Google, 2013)

In connection to the tunnel construction, the planning for a new public transport centre began. The new travel facility (fig 45) was going to be a joined terminal for trains, buses and ferries, with the railway running underground through the city (Samrådshandling, 2012).

When Helsingborg got connected to Väst kustbanan, the railway between Gothenburg and Copenhagen, around year 2000 the train travelling soared (Welin & Åberg, 2013).

Until year 2000 the ferries also took passenger trains to Helsingör, but nowadays the trains to Copenhagen run via Öresundsbron (Hultgren, 2002).

Today Öresundstågen services Helsingborg with trains to Gothenburg and Copenhagen, while Skånetrafiken runs the local and regional public transport. The ferries to Helsingör are operated by Scandlines and Sundsbussarna.

Development

Travelling by public transport in Skåne is increasing. In 1998 the number of trips by public transport was around 70 million, and in 2010 the number had increased to a bit over 137 million trips. This development would not have been possible without large investments for more and better public transportation. The construction of Öresundsbron was an important milestone, followed by the opening of Citytunneln in Malmö (Trafikförsörjningsprogram Skåne, 2012).

Several current tendencies in the society provide good conditions for a continuous increase in travelling by public transport. A changing labour market and a continuous integration within Skåne as well as between Skåne and neighbouring regions will create an increasing need to travel. Other tendencies which indicate a growing public transport sector are high

costs for driving cars, strong focus on sustainability in the society, and the congestion on the roads. The goal is to double the number of trips by public transport by 2020 (Trafikförsörjningsprogram Skåne, 2012).

There are several national and regional projects regarding public transport, and in particular the development of rail traffic. The expansion of Väst kustbanan to double tracks are expected to be finished in 2014 (Väst kustbanan, 2013), and there are also discussions regarding high speed trains between Oslo-Gothenburg-Copenhagen at a first stage, and Stockholm-Copenhagen at a later stage (The Scandinavian 8 million city, 2013). Both of these projects would provide very good national and international connections for Helsingborg, if realised.

The general plan (ÖP 2010) for Helsingborg from 2010, states that the areas within a radius of one kilometre around the three regional nodes Maria, Knutpunkten and Ramlösa, should be particularly considered for high level of exploitation for mixed developments. Furthermore it points out the importance of strengthening the regional transport nodes to make public transport more attractive (Begäran om planändring, 2011).

In direct connection to the existing urban structures, there are three large areas undergoing planning for extensive urban development. These areas, H+ (fig 46), Mariastaden and Östra Ramlösa, will provide a diversity of housing, and has potential for qualitative public transport. The vision is for Helsingborg to develop sustainably by densification (Begäran om planändring, 2011).

Knutpunkten is also included in the FÖP H+, which is an elaboration of the general plan for the H+ area. According to FÖP H+, the area around Knutpunkten is intended to become an extension of central Helsingborg and contribute to a mixed city with

offices, commercial premises and housing. The area is intended to be an important meeting place for people moving through the city. FÖP H+ further states that Knutpunkten should develop into both a functional interchange place and an attractive meeting place well integrated with the city. A future railway tunnel for passenger traffic between Helsingborg and Helsingör, as well as the possibility to expand Helsingborg C with additional platforms should be taken into account. The possibility to construct a bridge between Oceanpiren and Knutpunkten is also being studied (Samrådshandling, 2012).

In the long-term an over-decking of the railway tracks South of Knutpunkten, Södertunneln, has been proposed. This would remove the barrier between the city and the sea front and enable the development of housing areas on the piers. There are however some issues regarding dangerous freight, if locating residential buildings above the tunnel (Welin & Åberg, 2013).

Södertunneln is a part of the H+ project, which would give new possibilities for the south part of Knutpunkten, where new buildings and the public transport can develop around new entrances and stairs to the train platforms (Samrådshandling, 2012).



Figure 46

Illustration of Bredgatan for the H+ project
(Infrastrukturnyheter.se, 2010)

5.2 Knutpunkten

Short history

“Helsingborg blev en stor stad när Knutpunkten kom!” (Welin & Åberg, 2013).

The public transport centre Knutpunkten was designed through a competition won by the architect Ivar Krepp for VBB (current Sweco). At this time the ferry traffic was the dominating means of transport and Krepp's proposal was argued to have the best solution for handling passengers to and from the ferries by separating them on different floor levels. The train tunnel and platforms were excluded from the competition program and were actually already under construction at the time for the competition. The architectural work began in 1985 and the process continued during the majority of the construction, which started in 1988. For many years the construction site was the largest in Sweden (Krepp, 2013). Great efforts were made to get Knutpunkten finished in time, and the building was completed in 1991. The station opened on the 9th of June the same year (Exhibition poster, 2013).

Knutpunkten was built by a private construction company, and due to the many varying, both public and commercial functions, and the communication areas connecting them, the surfaces of the building itself became very large which in turn led to very high rents. The question was whether the purpose of the whole facility had been compromised (Hultgren, 2002).

Knutpunkten was SJ's first underground train station (Exhibition poster, 2013). It was in many ways a terminal ahead of its time, with through railway traffic at a central location and combining all means of transport (Welin & Åberg, 2013). At the time for the opening in 1991, the number of travellers using the

terminal was 18 million per year (Krepp, 2013).

The first years after the new ferry terminal was opened, many people found it difficult to find the right way to the ferries by car. For example, a Danish car drove from the parking deck, following the signs “Till färjorna”, in through the glass doors, passing restaurants and shops and didn't stop until the escalators made it impossible to go any further (Exhibition poster, 2013).

Several refurbishments have been made since the erection of Knutpunkten (Samrådshandling, 2012). In 2006 the bus terminal was modernised and rebuilt, mainly on the interior, to create a better environment for travellers. Knutpunkten had several issues from the beginning due to unforeseen circumstances such as the financial recession in the early 1990's as well as major changes in travel habits (Welin & Åberg, 2013).

The vision of the architect

On Friday the 29th of March an interview with the project architect, Ivar Krepp was conducted. Presented below is a summary of our conversation about Knutpunkten.

Ivar Krepp tells me that the client for the project was the municipality Helsingborgs stad, and the developer was a consortium consisting of JM, MPL, Riskbyggen and Peab. Ivar Krepp represented VBB who was responsible for the architectural drawings.

From the building program developed by Helsingborgs stad and also from the client, there was a request for open areas which should be easy to survey, in a light and airy environment. The references were closer to

the openness of an airport terminal. All to meet the future and create a good environment for the travellers.

VBB's proposal won the competition because it was the only proposal which managed to solve all the logistics in one central hall. The other competitors didn't manage to tie it all together. VBB's idea was that when entering the terminal you should not have to move through the building to orientate and navigate yourself. You should be able to see all directions from one single point after entering via the main entrance. You should see the escalators up towards the ferry terminal, the escalators down to the train platforms and the bus terminal straight ahead from the same view point in the central hall. That is where you make the decisions, therefore it is important.

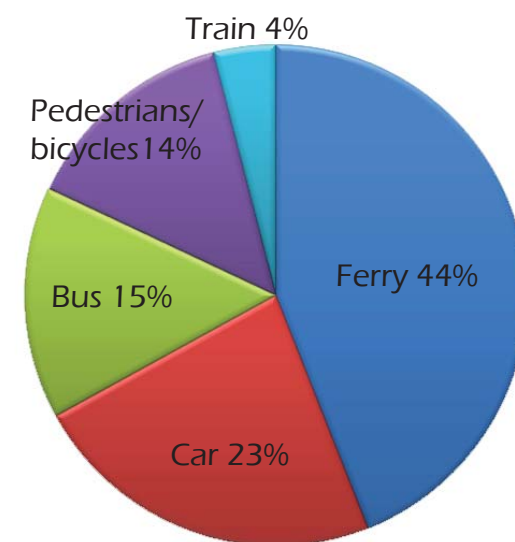


Figure 47
Distribution of traffic flows through Knutpunkten in 1991

At that time the flows generated by the different means of transport were very different from today. Öresundsbron did not yet exist, and the consumption pattern and coherent passenger flows were different. The proportions between the different transports were at the time for the project as following: ferry 44%, car 23%, bus 15%, pedestrians/bicycles 14% and train 4% (fig 47). Knutpunkten was dimensioned for the ferry traffic at that time, and that is why the spatial direction towards the ferry terminal is the strongest one.

But already during the planning and building process, the ferries serving Helsingborg-Helsingör were being replaced by new ones. The old ferries had taken around half an hour one way, while the new ones took only 20 minutes. This made the Helsingborg tradition to “tura”, which means taking the ferry back and forth while having just enough time to finish a dinner, fall flat. The new ferries didn’t leave enough time to complete a meal during the trip.

The municipality had pointed out that one of the development rights along Järnvägsgatan would be an appropriate place for the hotel which was a part of the competition program. The majority of the other proposals had done just that, and also located the terminal building as close as you were allowed to the quayside, about 12 meters. Ivar Krepp however considered it appropriate with a square in front of a public building of this size, and proposed pushing the terminal building backwards to create a plaza in front of it. This meant that there was not enough space along Järnvägsgatan for the hotel complex. He then proposed to locate the hotel next to the water between the square and the ferries, and thus breaking the rules of the competition program. The financial argument, a hotel with a sea view is worth quite a lot more money, was considered strong enough. Another argument for breaking the program was that the area of public space was kept in this proposal, just reorganized from a

long narrow quay, to a public square instead. Locating the hotel between the square and the ferries also shortened the mental distance from the city edge to the ferries, since it makes the city structure continue all the way down to the water instead of finishing on the other side of Järnvägsgatan.

Ivar Krepp tells me that at that time, you couldn’t even open a discussion about building upwards. A proposal with a 14 storey building would have been rejected straight away, because it wasn’t allowed to break the silhouette of the city from the sea or disturb the city profile. The height of the hotel building, six storeys, was motivated with the argument that a functioning hotel requires at least 200 rooms, as well as that the building volume would still follow the prevailing

height scale in the area, both the scale of the buildings as well as the ferries. However the new ferries are taller.

Another feature of the competition proposal which, I get the impression, that Ivar Krepp is quite proud of, is what he refers to as “lyktan”. It is the glass tower which distributes the flows of passengers to and from the different ferries. It was supposed to be open for everyone to come out there and have a view over the harbour, but soon the ferry company closed it off for non-passengers. On the top floor of “lyktan” there was conference and course premises for the companies renting work space in Knutpunkten. Today that space houses a clinic for plastic surgery.

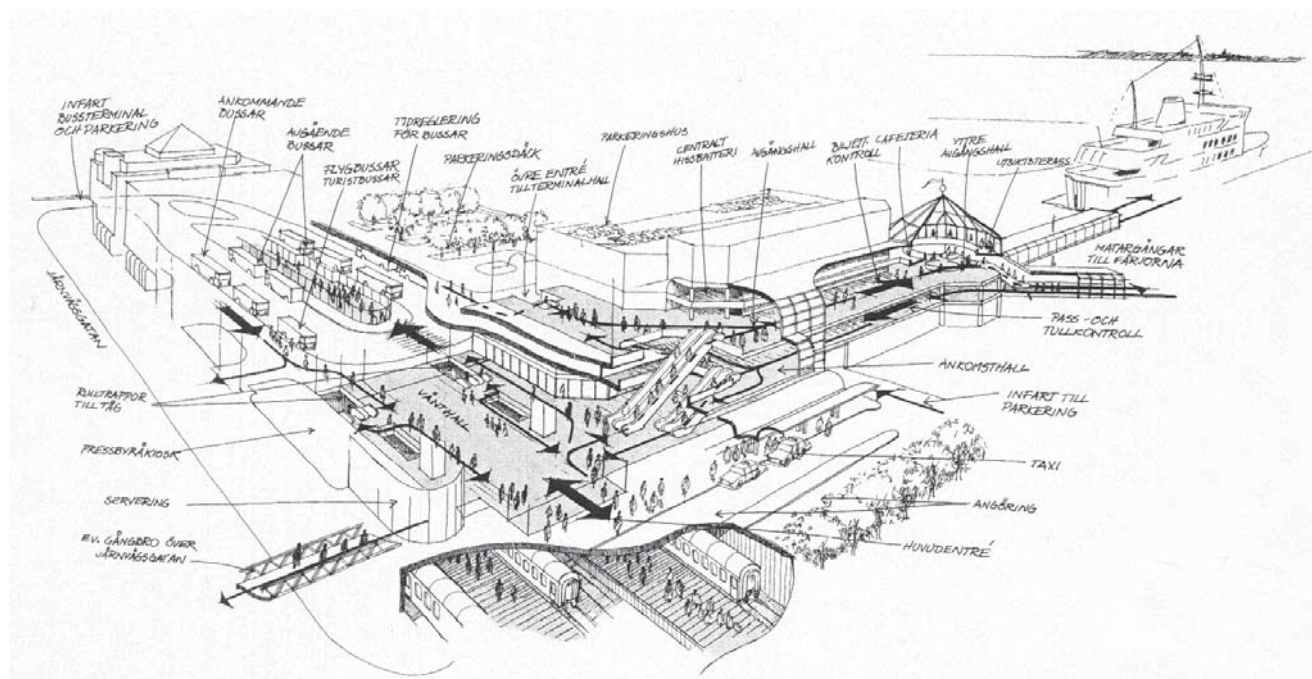


Figure 48
Perspective section of Knutpunkten from the competition
(Ivar Krepp, 2013)

The curved facade towards Kungstorget is breaking up the building height, displaying the communication route on the inside and is supposed to associate to the shipping industry. The new terminal was supposed to be a face towards the city. Since Knutpunkten was designed primarily as a ferry terminal, Ivar Krepp considered it appropriate to take inspiration from the nautical environment.

I ask Ivar Krepp about the long, curved roof above the main entrance, and he tells me that it was designed to protect passengers waiting with their luggage for tourist buses and other pick up services, and that the roof turned out so long was because of the length of the buses.

The reason behind the balcony along the inside of the facade towards Kungstorget, which is rarely used today, was the requirement from the municipality to include a pedestrian bridge over Järnvägsgatan into the proposal. Apparently some “trafiknisse” had come to the conclusion that there was too much traffic along Järnvägsgatan for pedestrians to wait at the crossing. So he thought that people would prefer to take a detour up on a bridge to cross from the terminal to the city side. With this pedestrian bridge in mind, VBB proposed a continuation of that bridge inside the terminal hall on the second floor, for arrivals from the ferry to be able to walk straight over to the city. When the bridge idea was scrapped later on, the interior bridge remained in the proposal. Ivar Krepp explained that they wanted to populate the space and imagined that the restaurants would place tables and maybe a buffet bar there.

During the planning process there were plenty of small restaurants willing to rent a commercial space in the food court on the second floor of Knutpunkten, but when the construction was finished, (in the middle of the recession) they had “disappeared”. Instead the tenant turned out to be McDonald’s which

expanded and expanded with time. So the original idea with many small restaurant failed even before starting. According to Ivar Krepp, it was the owner of Knutpunkten at that time, which only focused on short term financial profit, and set a rent which only large companies could afford to pay, which made the original concept fail.

On the original drawings the second floor around the food court was a lot more open, and the staff facilities were located on the third floor. The spiral staircase and odd escalator up to the food court, were created due to the request from the municipality to have separate communication for the visitors to the restaurants. Ivar Krepp agrees with me that the space behind the spiral stair became strange and underused. However, on my question about visual access down to the train platforms, he explains that it is difficult to achieve without letting the noise from the trains into the terminal hall.

The city structure and sizes of the blocks along the East side of Järnvägsgatan, was used to control the subdivisions of the development rights and building volumes of the office complexes of Knutpunkten. The decision to locate offices on the sea side as well was because they thought that the parking decks would look to ugly for people arriving from the sea side, and they wanted to cover it up with a building. It turned out to be a perfect location for the customs.

The idea with the bus terminal (fig 48) was that you were supposed to see the buses through the openings towards Järnvägsgatan, and for arrivals to quickly get out to the city. There was supposed to be an opening to the bus terminal between each office building, but today there are only two. The waiting lounge of the bus terminal was shrunk during the project, because they realised that there was no need for the large number of bus stops first drawn.

The competition program included a large number of parking spaces, but instead of drawing another parking house (than the one included in Terminalen 1) they decided to make a large open parking deck. The idea was to plant plenty of trees on the parking deck and create a nice environment for the office workers which entered from that side, and give the office buildings along Järnvägsgatan a view towards the sea. The premise next to the entrance to the terminal from the parking deck, was suppose to house a florist, and Ivar Krepp imagined that the greenery extending up through the full height space under the glass roof, would help to make the parking deck a greener and friendlier space.

Despite the obvious issues regarding changing flows of transport, Ivar Krepp believes that Knutpunkten has stood up to time quite well (fig 49).

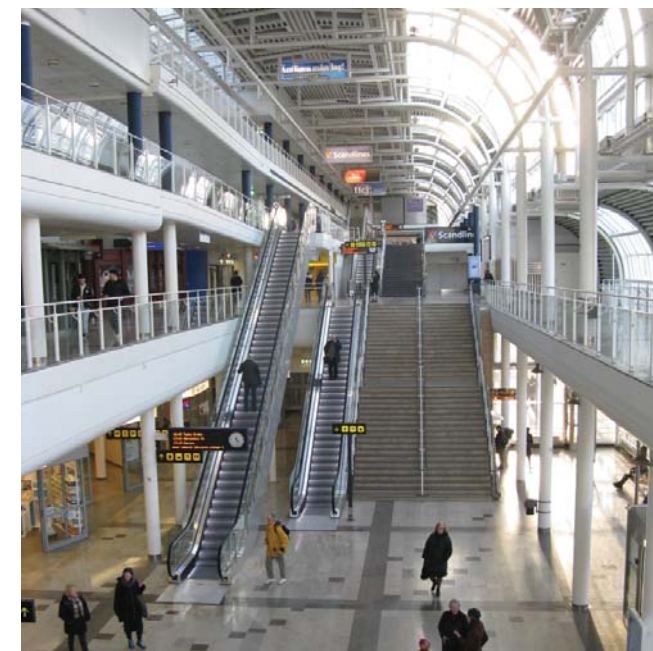


Figure 49

Interior view towards the ferry terminal

Current situation

Wihlborgs Fastigheter AB are the owners of Terminalen 1 since 2010. The previous owner was Nordic Land, a short term investment company. Trafikverket is responsible for the train platforms as well as the stairs, escalators and elevators down to the platforms. Helsingborgs Stad is the owner of the bus terminal (Welin & Åberg, 2013).

Originally there were three floors with shops and restaurants, but today the third floor only contains offices except for the departure hall for the ferries. Generally there is a lot of space in the terminal which is underused. Because the station is open 24/7 there are some issues regarding homeless people spending the night in the terminal, and there is a general feeling of insecurity at night time (Welin & Åberg, 2013). The only means of transport operating through the nights from Knutpunkten, are the Scandline ferries (Samrådshandling, 2012).

The building area of the terminal hall is 7500 square meters (Samrådshandling, 2012). The transport centre (fig 50) has around 45 000 visitors and travellers per day, which gives around 16,5 million per year. The train traffic is the largest means of transport and in 2011, 108 trains were trafficking Knutpunkten every day. The number of train passengers were 21 000 in 2011, but is expected to increase to 32 000 in year 2020 (Samrådshandling, 2012).

The second largest means of transport is the bus traffic. The bus terminal in Knutpunkten accommodates both national, regional and local bus traffic. Interchange between the local bus traffic and train traffic has the single largest exchange ratio within Knutpunkten. Travelling by local and regional bus traffic is expected to increase significantly within the close future (Samrådshandling, 2012).

The ferry traffic is the least used means of transport within Knutpunkten. The number of passengers

varies greatly over the year, but on a regular weekday there are around 5 500 travellers (Samrådshandling, 2012). The ferry traffic is of national interest, which means that certain flows of traffic have to be guaranteed. Today the majority of the ferry traffic consists of freight (Welin & Åberg, 2013).

These figures show that the ferry traffic has dropped from generating 44% of the passenger flows when Knutpunkten was built, to a meagre 12% today. The train traffic on the other hand has gone from the petty number of 4% in 1991, to generating astonishing 47% of today's traffic flows.

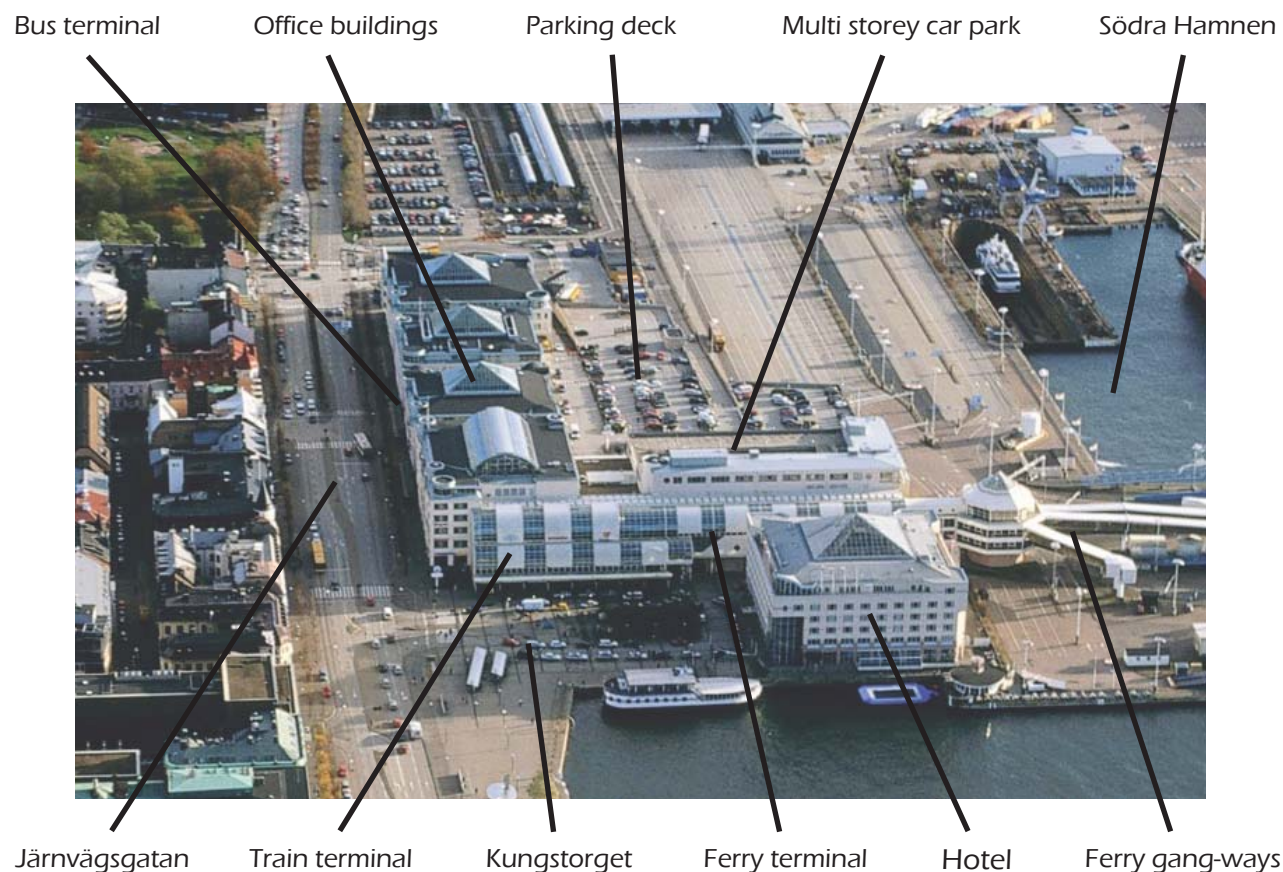


Figure 50
Aerial view looking South over Knutpunkten
(Infrastrukturnyheter.se, 2010)

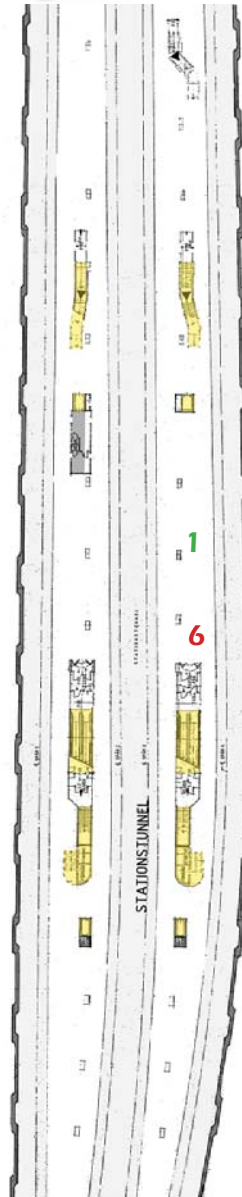


Figure 51
Underground train platforms
(Helsingborgs Stadsbyggnadsförvaltning, 2013)

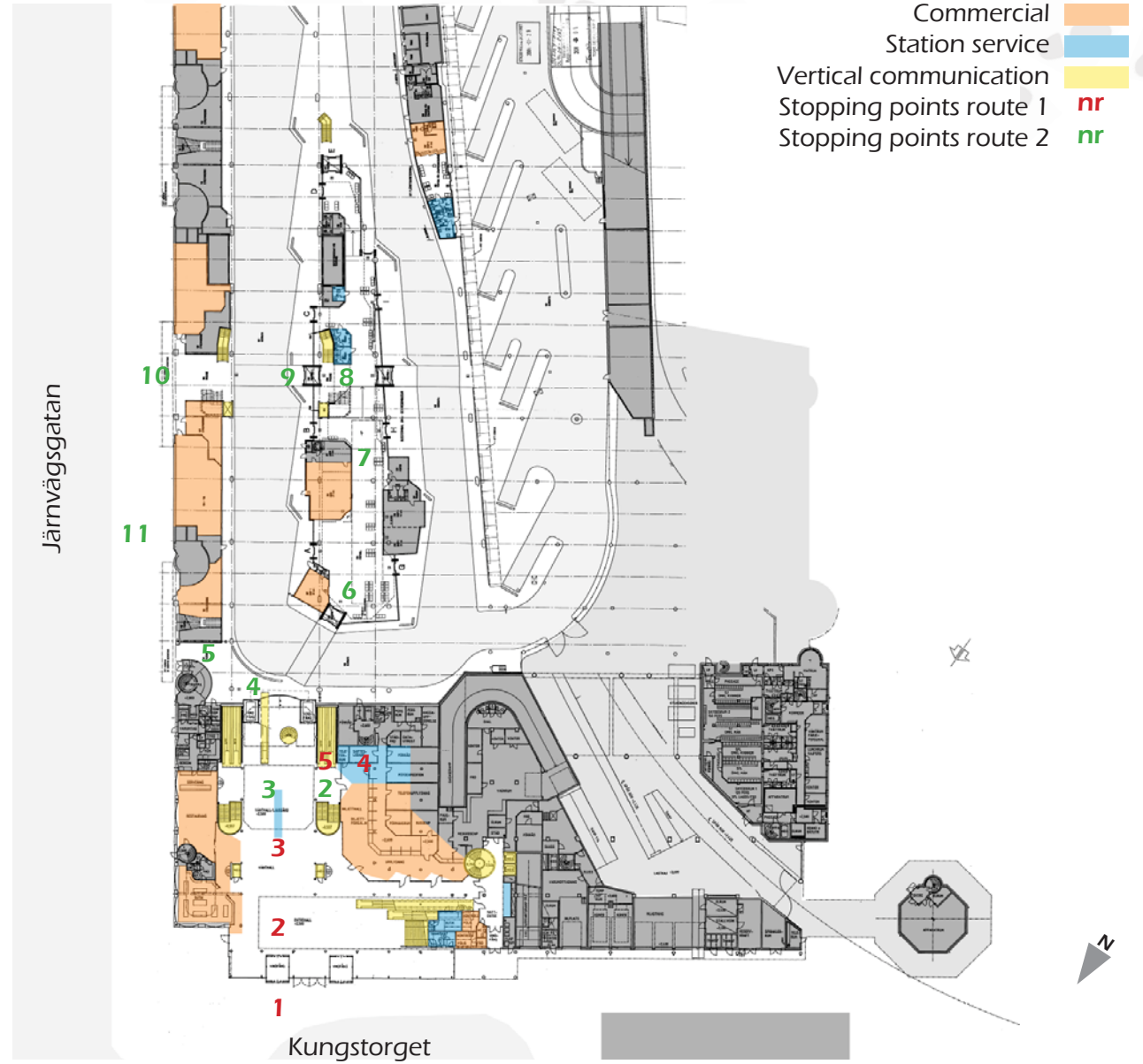


Figure 52
Ground floor
(Helsingborgs Stadsbyggnadsförvaltning, 2013)

Organisation

Knutpunkten is a public transport centre where the tracks run below the station building (fig 51).

The building complex of Knutpunkten consists of several different building volumes located along the South west side of Järnvägsgatan. Terminalen 1, which contains most of the station functions as well as some offices, is the five storey building facing Kungstorget to the North. This is also the location for the main entrance. South west of Kungstorget there is a hotel designed and built within the same project as Knutpunkten. The bus terminal is located on the ground floor (fig 52) below the office buildings, containing four storey office spaces, along Järnvägsgatan. There are two entrances to the bus terminal from Järnvägsgatan.

The train tunnel and platforms run parallel with Järnvägsgatan, below the bus terminal, and consists of four tracks and two platforms. The ferry terminal is located on the second and third floor in the West part of Terminalen 1 (fig 53 and 54). Arrivals on the second floor, and departures on the third floor. The taxi station and pick up/drop off space is located right in front of Terminalen 1 on Kungstorget.

The food court is located on the second floor in the East part of Terminalen 1.

South west of the building complex there is a large parking deck one level above ground, partly covering the bus terminal. There is also an entrance to the terminal from the parking deck. A multi-storey car park is integrated with the terminal building facing the parking deck to the South. The number of parking spaces within Knutpunkten is 936, and currently the availability of parking spaces are higher than the demand (Samrådshandling, 2012).

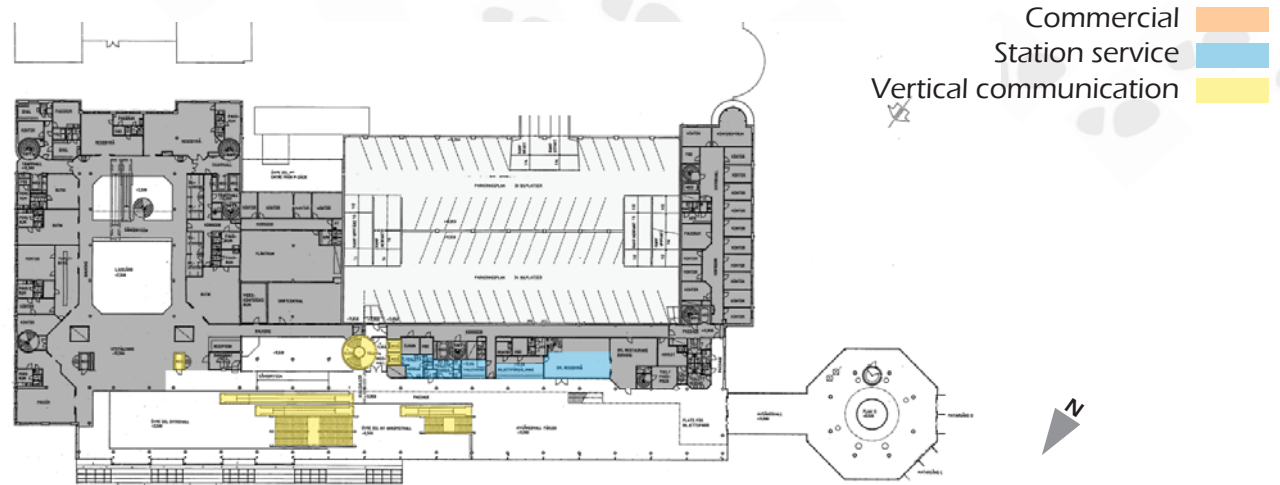


Figure 53

Third floor

(Helsingborgs Stadsbyggnadsförvaltning, 2013)

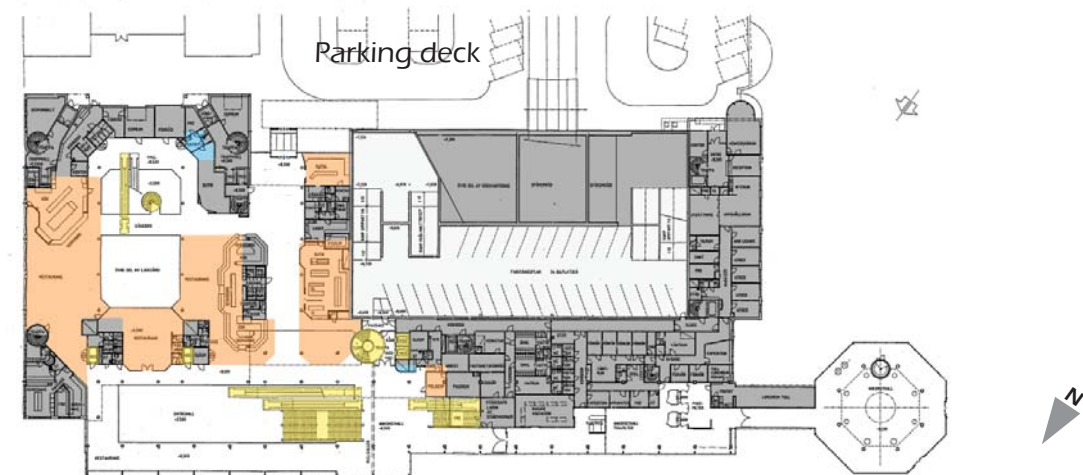


Figure 54

Second floor

(Helsingborgs Stadsbyggnadsförvaltning, 2013)

Walk-through evaluation

The walk-through evaluation of Knutpunkten was conducted on the 27th of February roughly between 3 and 5 pm. The starting point for route 1 was on Kungstorget, and the goal point the platform for trains to Gothenburg. For route 2 the starting point was the platform of trains arriving from Malmö, and the goal was the bus towards the hospital.

Route 1

Starting point

Approaching from the square North of Knutpunkten (fig 55), the building is not really identifiable as a public transport centre. It could also be a shopping mall or an office building. There is a clock on a glazed arch at the top of the building, but it is almost invisible. If the clock were more visible it would guide you towards the entrance of the terminal, which is now very unclear. The curved roof along the facade indicates that you can enter anywhere along the length of the square, when there is actually just two air-locks to enter through. The entrances are blocked by the taxi's and cars parked in front of it.

Stopping point 1

The entrance is hidden behind mailboxes and pillars of the external roof. There are quite a lot of reflections in the windows and doors of the air-lock which make the facade seem less transparent than it is.

Stopping point 2

The entrance leads to a large terminal hall, which is quite noisy visually. To the left there is a large departure board above Pressbyrån. The main direction seems to be up to the right where large stairs and escalators lead up to the second and third floor (fig 56). There are however not many people moving in that direction. The hall straight forward is quite cramped (fig 57), both with people and advertising booths. No ticket sign is visible from this point, neither the stairs

leading towards the trains. I move straight forward since the majority of people seem to do the same. I also spot a very small sign for info further ahead.

Stopping point 3

Once I have reached the signs with information and ticket machines for Skånetrafiken, I spot a Skånetrafiken shop to the right. I am not sure if I can get Öresundståg tickets there, but make a try. A lot of people are moving up and down the escalators just outside the service shop, which makes the flows of people crash a bit.

Stopping point 4

In the Skånetrafiken shop there is a clear queue number system and counters. There are also departure boards in here, which is helpful. The train to Gothenburg departs from platform 4a.



Figure 55
Starting point of the first route



Figure 56
Stopping point 2 of the first route



Figure 57
Stopping point 2 of the first route

Stopping point 5

Once outside the Skånetrafiken shop I find myself stopping and looking for signs in between the escalator and stairs going down, and in the middle of the flows of people. It is not a good place to stand since I interrupt other passengers. Just above me in the ceiling there is a sign for platform 3 and 4, pointing down the stairs. The sign is located very high and might be difficult to spot for people for example in a wheelchair. No sign for elevator is visible from here. I decide to follow the people down the escalators. The tracks and platforms are not visible until you are all the way down the escalator. The visual connection between the floors is limited.

Stopping point 6 - goal

The signs for departures and platforms are not visible until you have passed the glass doors. There is a small sign straight in front with platform numbers and tactile guide paths leading to that sign which is located hand high and provides information in braille. The platform is quite narrow, especially next to the stairs and elevators.

Route 2

Starting point

The second route starts at platform 4 where the train from Malmö has arrived (fig 58). I am looking to take a bus to the hospital. When departing the train it is a bit difficult to understand in which direction the exit for the main terminal is. The signs are a bit contradictory, pointing towards exit and stairs both ways. I follow the stream of people

Stopping point 1

I find departure boards for the buses on the platform, which is good. There is also a map over the bus terminal, however no map over the city or bus lines. So I need to find that info to know which bus to take.

There is a stair where signs are pointing for “Utgång Campus” and the symbols of a bus and an airplane. I get unsure, and decide to follow the people up the escalator instead.

Stopping point 2

Once at the top of the escalator I find myself facing the stairs leading back down, and stop to look for signs, which means I am blocking the people behind me in the escalator. To the left there is the Skånetrafiken shop and an Espresso house. To the right I see ticket machines for Skånetrafiken and a sign for information (fig 59). I go there to look for info about the bus lines.

Stopping point 3

On the other side of the ticket machines there are information posters. There are departure boards, information about tickets and a regional map over Skåne, but no city map with the bus lines. I spot a directional sign with a bus, plane and toilet symbol which says Campus and points to the right. Does that mean that buses to Campus run from there? Or all buses? At this point I imagine I would have got into the Skånetrafiken shop and bought a ticket. Then I follow the signs back towards the buses (fig 60). There are a lot of people moving in both directions through the air locks, which are hiding a bit behind an escalator and spiral stair up to the second floor. The air locks are narrow and not very transparent. They remind me of the security gates at an airport.

Stopping point 4

Once I have exited the air locks I find myself in a cold and dark semi outdoor space (fig 61). Right in front of me is a concrete balustrade stopping pedestrians from entering the bus street. To the left I spot some information signs, despite the contrasting light from the street outside, with what seems to be time tables.



Figure 58
Starting point of the second route



Figure 59
Stopping point 2 of the second route

Stopping point 5

On the information posters I read that bus number 9 should take me to Lasarettet, and it should depart from gate N. There is still no map over the city or bus lines though, so I have no idea in what direction or at what distance the hospital is located. If I didn't know Swedish I would not understand that Lasarettet means Hospital. The entrance for the bus terminal is quite clear, but the atmosphere is not very friendly and makes me want to hurry to get out of there.

Stopping point 6

Inside the bus terminal I sense a clear direction forward in the space. There are tactile guide paths, but the visual contrast between the floor and walls is not optimal. I spot a large sign for gates A and G, and I assume that the other gates are further ahead.

Stopping point 7

I am looking for gate N, but first I want to confirm the time of departure of bus 9. The digital displays feel more trustable than the printed time tables, since that info might not be up to date. I find a departure board on the wall to the left, but first I don't see my bus. Eventually it pops up, but I still don't find gate N. The gate numbering is very illogical and not in alphabetical order. The terminal hall is getting more and more narrow and I realise I won't find gate N further ahead (fig 62).

Stopping point 8

Next to the exit towards Järnvägsgränd I find a map over the terminal, and after some confusion, I realise that gate N is not a gate but a normal bus stop out on the street. I follow the sign towards Järnvägsgränd.

Stopping point 9

There are very strong contrasts in light towards the exit from the bus street (fig 63). The signs above the exit are not visible in the contrasting light, however I follow the day light to get out on the street.

Stopping point 10

Out on the pavement I don't see any further directional signs, but after looking around I see a bus stop to the left. I go there in the hope of finding bus stop N, or at least a map.

Stopping point 11 - goal

It is bus stop N! I made it, but it was not easy to find!

**Figure 60**

Stopping point 3 of the second route

**Figure 62**

Stopping point 7 of the second route

**Figure 61**

Stopping point 4 of the second route

**Figure 63**

Stopping point 9 of the second route

The new detail plan

“Knutpunkten (...) behöver tydligare och effektivare interna kommunikationsvägar”
(Helsingborgs Dagblad, 2012).

A new detail plan for the property Terminalen 1 (fig 64), which includes the terminal building of Knutpunkten, is currently in process (Dnr 47/2011). The proposal has been developed in co-operation between the city planning office of Helsingborgs stad and Wihlborgs Fastigheter AB which are the owners.

The background for trying a new detail plan for Knutpunkten is the change in travel habits as well as the rather large underused areas of the terminal. Knutpunkten was designed for a different time. The planned renewal of Knutpunkten is also a part of the larger project to densify and develop the area South of Knutpunkten as well as the piers in the harbour. The distinct direction of the building, turning its back towards the parking deck, is another issue which will become even more evident when developing the piers of Södra Hamnen (Welin & Åberg, 2013).

The new detail plan for Terminalen 1 means a redistribution of the building volumes, and allowing different parts of the plan area to be of varying building heights and number of storeys. The plan also intends to clarify the functions of the terminal building and the connection to the surrounding urban space, as well as enable the construction of another 10 000 square meters of office space at a central location (Samrådshandling, 2012).

The proposed plan also tries the possibility to develop the station parts of Knutpunkten to streamline the different functions and clarify the central station's location in the city. The proposal has been designed to make the station easier to find. The terminal building should be welcoming and safe, and face all directions in the city. In addition, the number of passengers and traffic movements are increasing and the station

should be adapted to these flows (Exhibition poster, 2013).

The terminal building is intended to be rebuilt, both on the exterior and interior. The North eastern part of the building will receive a new volume and facade as well as undergo an internal restructuring. The functions will mainly remain as they are. The adjacent part of the building will also receive a new facade, as well as be rebuilt to be exclusively an office entrance on the ground floor leading to a staircase servicing the offices on the remaining floors. The North western part of the building might be rebuilt to accommodate office space as well (Samrådshandling, 2012).

The building will be designed as three separate parts, which will get specific expressions but still interact (fig 65). The three parts will be the transport terminal in the East, a lower middle part containing communication areas, and an office part in the West. The existing buildings along Järnvägsgatan will be preserved (Samrådshandling, 2012).

The detail plan is proposed to regulate the facades towards Kungstorget (fig 66), to guarantee that these are designed to create a good visual connection between the square and the terminal hall, as well as exposing the function of the terminal (Samrådshandling, 2012).

Some criticism regarding the planned reconstruction of Knutpunkten (fig 67 and 68) have been voiced in the local newspapers. Chister Bodén, a local architect who was sceptic already in 1991 when the current Knutpunkten was proposed, calls the new proposal an “almost disaster” and “bombastic trend architecture”. He would like the design of such a central building in Helsingborg, decided through a competition (Helsingborgs Dagblad, 2012).

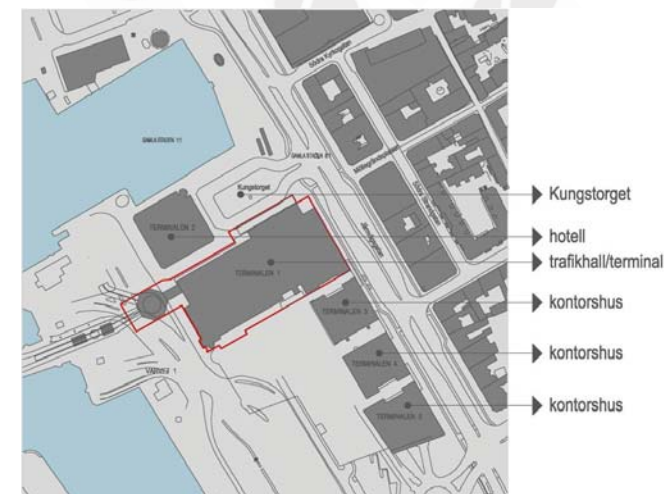


Figure 64
Situation plan with Terminalen 1 circled in red
(Bensdorp-Redestam, 2012)



Figure 65
Illustration of aerial view from the new detail plan
(Bensdorp-Redestam, 2012)

Analysis of Knutpunkten

The following chapter contains a summary of the impressions received during the walk-through evaluation of Knutpunkten as well as reflections based on the interviews and theoretical studies of Knutpunkten and Helsingborg.

General impression

Knutpunkten gives the impression of a shopping mall or large office complex rather than a public transport centre. There is a lot of visual noise in the main terminal, and the space is not uniform in shape. The most distinct direction is the one towards the ferries. From the main entrance it is difficult to see the stairs leading down to the train platforms. They are hidden behind signs, poles and elevators. Neither the Skånetrafiken shop is visible from the main entrance.

There is no map over the whole terminal, only one of the bus terminal, which however is “up-side down” with the entrance at the top and lacks a “you are here”-dot. In addition the gate numbering of the bus terminal is illogical.

Hultgren writes that maps should be provided in order for passengers to find their way to the next means of transport, which often is the local traffic. Arrivals should be able to see how to proceed by bus, tram or on foot on a city map (Hultgren, 2002). I did find a map over Helsingborg in Knutpunkten, however it was very difficult to locate. I didn't see it until I was about to leave again. Furthermore, the city map does not display the bus lines, which would have been very useful.

I didn't see any ticket machines in the bus terminal, which means that having forgotten to buy a ticket earlier, one would have to re-enter the main terminal to purchase a ticket. The semi outdoor space between the main terminal and the bus terminal is cold and dark, and the visual connection with the main terminal

is limited.

The food court on the second floor is hidden around a secondary atrium, which you don't see until you move further into the terminal. The vertical communication to get there is odd and badly located as well.

The office parts of Terminalen 1 are very unclear. How do you find the office entrance? Do you have to walk through the terminal to reach it? There are plenty of staircases and elevators, but in no apparent hierarchical order. Which communication leads where?

The escalators toward the ferry terminal lead to separate floors. If you want to reach the second floor you either have to take the escalator to the third floor and then another one down again, or climb the stairs. This is due to the ferry departure hall being located on the third floor, while arrivals enter the second floor. Nowadays when the ferry passengers are fewer, it seems illogical to keep the escalators in this way.

The elevators are placed a bit here and there. They are quite visible on the ground floor, but pops up in strange and hidden places on the second and third floor.

Since the terminal is subdivided into so many different parts and levels, it is perceived as a restless space. It is difficult to get an overview of it. There is no central space where it would seem logical to place a departure board and waiting area. There are however many corners and semi enclosed spaces which not many people use and are perceived as unsafe at night time.

The visual connection is quite good between the ground floor and the second and third floors, but the physical access doesn't always follow the visual access.

It is difficult to orientate yourself when arriving by train, since you cannot use the surroundings to get a

sense of direction. The signs on the platforms are a bit contradictory, pointing towards Exit in one way and Exit Campus in the other. There are also stairs and elevators leading directly to the bus terminal from the platforms, but it is not very clear due to the confusing signage. Where do you end up if you chose the exit not pointing towards Campus?

A comparison to information given at each metro station in Stockholm can be made. It provides a certain security knowing that you will always find the same information at each station: a map over the neighbourhood around that metro station displaying the bus lines and a map over the metro lines. The different exits are also equipped with directional signs towards streets or important landmarks. Both on the platforms so you can choose the right exit, as well as in the “terminal” which you see before you exit the station. This kind of signage is especially important at underground stations where it is generally difficult to orientate oneself.

In some places there are strong contrasts in light, which make it difficult for the visually impaired



Figure 66

Illustration of interior view from the new detail plan (Bensdorp-Redestam, 2012)

to perceive information. There contrast in colour between the floor and walls is not sufficient, which makes it more difficult to understand the space, and there are no tactile guide paths in the main terminal.

The two air locks of the main entrance are unexpected under the long external roof. The roof doesn't communicate the same information as the air locks. Apparently there's a plastic surgery clinic on the top floor of "lyktan", which for obvious reasons people have a hard time finding. It is a very unusual location for a clinic.

The entrance to the terminal from the parking deck is much clearer than the main entrance. The entrances for the office buildings however are not visible. Especially the elevators from the parking deck down to the terminal and up to the office buildings are hidden very well.

Once through the entrance from the parking deck, you find yourself in a long deserted corridor. It feels like a backside, and it takes a while before you reach the main space of the terminal. In addition, the view straight ahead which could have shown the harbour and Kungstorget is blocked.

The luggage storage is tucked away behind the escalators for the ferry terminal. They are located in the entrance staircase for the offices in the building, which is not very practical. There are also public toilets in the basement, which are reached from this staircase. This make the staircase seem ambiguous. Is it public or private?

Reflections

Knutpunkten is a building which was before its' time when planned and built, but quickly became outdated,

mainly due to the rapid changes in travel habits. It is interesting that Knutpunkten was dimensioned for 18 million people per year, and you expect that number to have increased until today, when actually the current number of visitors and travellers have decreased somewhat. However the type of traveller and the means of transport has changed drastically, which have resulted in the large underused areas.

One can wonder why the commercial concept in Knutpunkten did not work, since the trend for public transport centres is heading in that direction. Knutpunkten was "before its' time" combining terminals and commercial functions, but why didn't it work in reality? Was it due to the spatial organisation? Or perhaps the recession at the time for establishment? It cannot possibly depend on the location in the city, since Knutpunkten is located as central as could be. It was a good decision to locate the terminal further South than the competition program suggested, in order to create a public square in front of the main entrance. This makes the building more identifiable as a building of importance for the public.

The spatial organisation of Knutpunkten is hierarchical. From the main entrance your reach a central space, and from there you chose which destination zone to go to. Once arrived at the destination zone you chose your specific destination. I believe that this type of organisation works better than a linear organisation at public transport centres, since the visitor can reach their destination faster and don't have to proceed along a linear route. However for this type of organisation to work, all zones have to be identifiable from that initial point, which is not the case in Knutpunkten.

The docking terminal was not invented when Knutpunkten was being planned (Ivar Krepp, 2013), however why the bus terminal was not developed into a docking system during the renovations in 2006, is beyond me.

Hultgren states that pictograms in signage should be followed by verbal information in the local language on a white background (Hultgren, 2002). The understanding of the signs in Knutpunkten would indeed be improved if complemented by verbal information, however using white background for the signage would not work in this case due to the light interior of Knutpunkten.



Figure 67

Illustration of the parking deck entrance
(Bensdorp-Redestam, 2012)



Figure 68

Illustration of street view from the new detail plan
(Bensdorp-Redestam, 2012)

5.3 Identified problems and suggested solutions

In this chapter Knutpunkten is analysed and some recommendations prior to the upcoming reconstruction are suggested based on the theoretical framework and empirical observations of this study.

The following suggestions are solely an answer to a specific situation, one way to solve it, and not a universal solution. The suggestions for improved intuitive wayfinding in Knutpunkten have been divided into two categories. The solutions in the first category, extensive changes, would require more considerable reconstructions and a larger investment, while the suggestions in the other category, moderate changes, are more feasible and short-term solutions.

Facades

Identified problem: Knutpunkten is quite anonymous today. The building does not display its' identity as a terminal very well, and doesn't stand out enough for being a public building. The building is especially difficult to identify from the South and from Järnvägsgatan. The current facades do not express the different functions of the building, but imply that the dominant means of transport is the ferry traffic.

Extensive changes: Make the station identifiable as a public transport centre from all directions by replacing the facades. Create a balanced transparency in the facade which allows visual connection but avoids disturbing light contrasts. Open up the facade towards South east to better display the bus terminal.

The facades of the proposed detail plan work rather well in making the different building volumes and functions distinguishable, however they don't

necessarily make the building come across as a public transport centre. The identity of the building is still rather weak in the proposal, and it could be confused for an office or commercial centre (fig 69).

Moderate changes: By placing a clearly visible clock, the transport companies' logos and the local name of the station on the facade towards Kungstorget, the building would express its' function as a terminal better (fig 70). The current clock is not contrasting enough with the background and is located too high to be visible. Increase the visual access between Järnvägsgatan and the bus terminal and create more passageways. Change the facade expression of the office buildings along Järnvägsgatan to distinguish them from the terminal functions.

Spatial organisation

Identified problem: The building is not dimensioned for today's flows of traffic and people. There are large underused areas which make the terminal feel unsafe at certain times. The vertical communication is not as direct as it could be, and solely the organisation of the ferry terminal is expressed in the building volume. The terminal is directed towards Kungstorget but turns its' back to the South (fig 71).

Extensive changes: The Södertunneln project suggests new stairs down to the train platforms from Stadsparken, which I believe would be a good idea. The idea would be improved further however, if the new entrance would lead to the bus terminal as well (fig 72), and not just to the train platforms. This would also make Helsingborg Central easier to locate and identify for people approaching from South.



Figure 69
Illustration of view from Kungstorget
(Helsingborgs Dagblad, 2012)



Figure 70
Suggested change of view from Kungstorget
(adapted from Helsingborgs Dagblad, 2012)

The strong visual direction towards the ferry terminal externally could be reduced by altering the building volumes. The building volumes proposed in the new detail plan work rather well to divide Terminalen 1 into a terminal volume, a middle communication volume and finally an office volume.

To reduce the strong visual direction towards the ferries in the interior, as well as to adapt the number of square meters to current passenger flows, the ferry terminal could combine arrivals and departures on the second floor in order for the third floor to exclusively contain office space.

Moderate changes: It is difficult to change the spatial organisation without quite extensive reconstructions. What would be possible however is to make the current spatial organisation more visible. For example could the visual direction towards the trains and buses be emphasised by introducing articulations in the floors, ceilings and on the walls. By opening up the space on the second floor towards the food court and the entrance from the parking deck the visual access could be improved. The visual connection between the terminal hall and the bus terminal would be heightened by installing more transparent air locks.

Entrances

Identified problem: The main entrance is difficult to locate below the external roof along the North facade. It is also practically invisible from Järnvägs-gatan. The entrances to the bus terminal are very anonymous, and the office entrances are not distinguishable from the public ones. Further, the air locks of the main entrance are quite narrow and non-transparent.

Extensive changes: By removing the external roof towards Kungstorget and introducing stronger articulation of the main entrance it would become more visible from a distance. The terminal could also be made more visible from the South by locating a new entrance towards Järnvägs-gatan, and emphasising it with an overhang or roof protruding around the corner.

The illustrations for the new detail plan is generally good regarding entrances. In the proposal the main entrance is made more visible, and the office entrance towards Kungstorget has received a separate treatment to make it distinguishable. The main entrance is still rather invisible approaching from the South, however there is a new entrance on the East side, which makes the terminal hall easier to access from Järnvägs-gatan.

Moderate changes: Change or remove the roof over the entrance towards Kungstorget and articulate the entrance with shape, colour or lights to make it visible at a distance. Replace the air locks for one large and more transparent one. Create a new side entrance to the terminal hall directly from Järnvägs-gatan and make the entrance to the bus terminal more distinguishable from the rest of the facade along Järnvägs-gatan. Finally introduce a different articulation for the office entrances.



Figure 71

Photo from Stadsparken



Figure 72

Illustration of suggested entrance towards South

Bus terminal

Identified problem: The bus terminal is cold and dark, and the passengers have to cross the bus lane to reach the bus terminal both when approaching from Järnväggsgatan and from the main terminal hall (fig 73). The gate numbering is not logical, and some bus stops are located out on Järnväggsgatan which creates confusion. There are no ticket service or machines in the bus terminal, which is also quite isolated from the rest of Knutpunkten.

Extensive changes: By joining the bus terminal with rest of terminal and instead marking the different zones with an interior gate, both the visual and physical access would be improved (fig 74). Extend the indoor areas of the terminal parallel to Järnväggsgatan behind the shops, to create a terminal with gates on one side and commercial services on the other, similar to Nils Ericsson Terminalen. This would allow the shops along Järnväggsgatan to display their services both towards the street and towards the bus terminal.

By adapting the whole terminal to the docking system, more bus stops could be located in the terminal and the passengers would be able to wait indoors for most departures. This solution would also open up the possibility for a new entrance to the South which would make the terminal more accessible and easier to identify from the Stadsparken side. Another aspect which would be improved with this solution is the visual access and day light within the terminal when removing the enclosed waiting lounge in the middle.

Moderate changes: Make the passage between the main terminal and bus terminal more transparent, and exchange the two air locks for one. Improve the visual and physical access between the bus terminal and Järnväggsgatan and change the gate numbering to a more logical system. Try to make the outdoor space of the bus terminal lighter and friendlier by introducing colours, art and better artificial lighting.

Traffic 
Commercial 
Indoor terminal 
Outdoor terminal 
Pedestrians 
Bus stops 

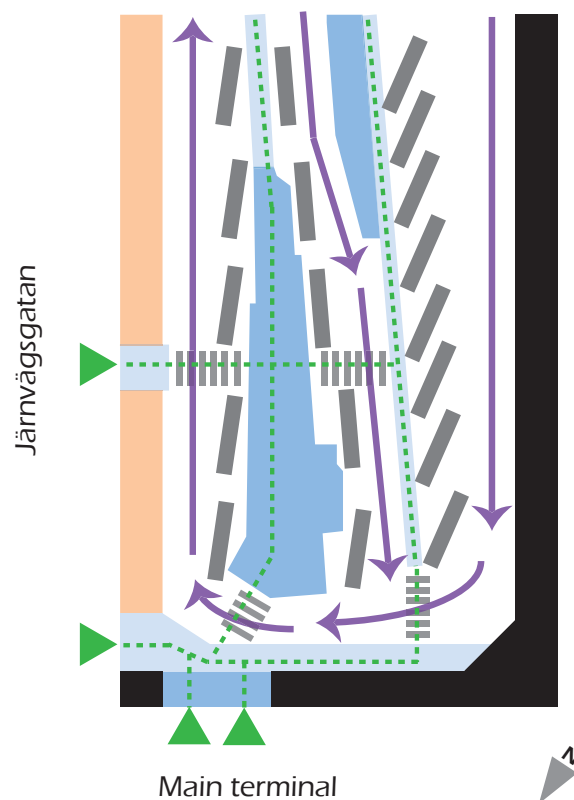


Figure 73
Diagram of existing bus terminal

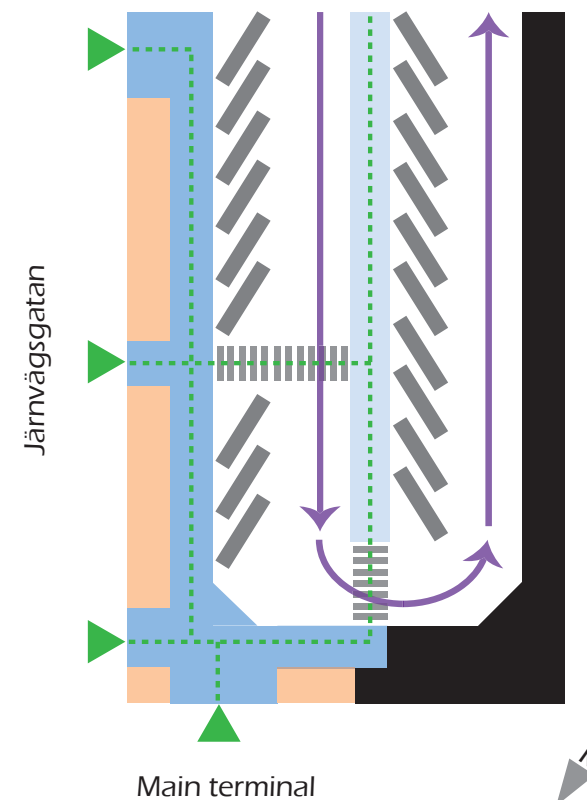


Figure 74
Diagram of suggested bus terminal,
extensive changes

Train platforms

Identified problem: It is difficult to orientate oneself when arriving by train to Knutpunkten (fig 75 and 77), and the signage for the different exits are insufficient. Since the exits from the platforms in Knutpunkten are located along the platforms, when arriving by train you might arrive behind the vertical communication. This makes wayfinding more difficult and more signs are required. The elevators are also located behind the stairs and escalators.

Extensive changes: The proposal for the Södertunneln project suggests a removal of the northern parts of the platforms and instead extending them Southwards (fig 76). This would allow the escalators and stairs to be installed beside each other at both ends of

the platforms. It would also open up the possibility to make a new entrance to the platforms on the South side towards Stadsparken. The vertical communication leading from the middle of the platforms directly to the bus terminal could be preserved. In this way, using clear signage towards each exit, orientation and visual access would be improved greatly.

Moderate changes: By placing illustrations of the sea in the train tunnel on the West walls, and illustrations of the city on the East walls, orientation towards the surroundings would be improved. The illustrations could be made to look like windows with a view either towards the sea or the city, and thus simulating surroundings as a cue for orientation. A compass rose

inserted in the floor would also aid orientation. To be able to distinguish the platforms from each other easier, different colour themes for each platform could be introduced (fig 78). Combined with the use of the same colour in stairs and escalators, as well as the signs for the platforms, this would create a consistent and clear coding system. There should however be specific elements in the design of the platforms which make them recognisable for arrivals as Helsingborg Central.

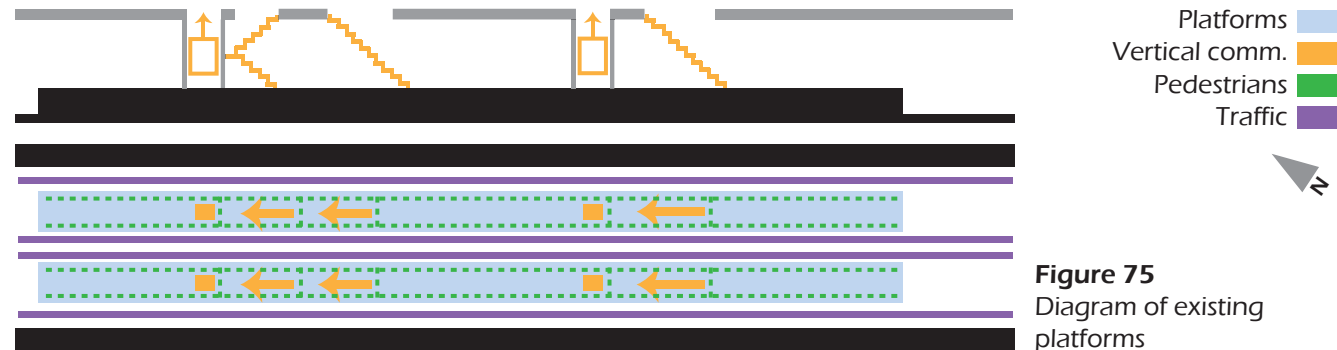


Figure 75
Diagram of existing platforms

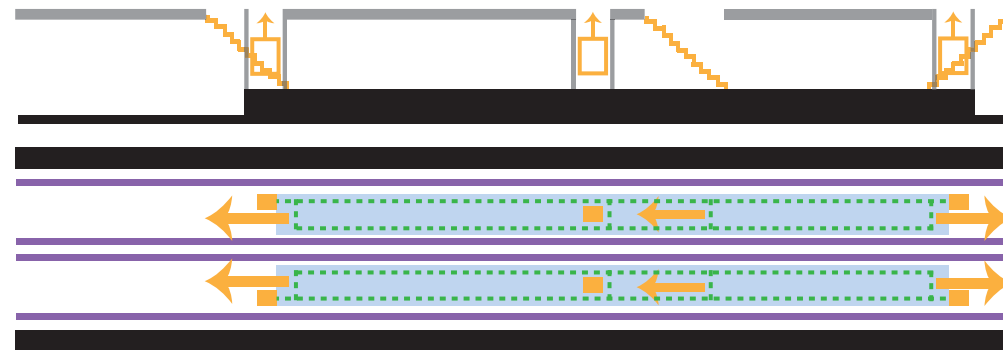


Figure 76
Diagram of suggested platforms, extensive changes



Figure 77
Photo of existing platform



Figure 78
Illustration of suggested platform, moderate changes

Main terminal - ground floor

Identified problem: The main spatial direction is towards the ferry terminal (fig 79), while the stairs and escalators down to the train platforms are not visually accessible from the main entrance. The vertical communication up to the food court and the parking deck are blocking the way towards the bus terminal. The Skånetrafiken shop is not visible from the main entrance either. The flows of people from the train platforms intersect and block the flows for the Skånetrafiken shop and Espresso House (fig 80). The current balusters around the stairs down to the platforms are non-transparent and don't provide enough contrast to the floors, and are therefore not displaying the stairs very well.

Extensive changes: The vertical communication down to the train platforms should be emphasised and reorganised to reduce intersecting flows. By shortening the North end of the platforms, the escalators, stairs and elevators from the ground floor can be placed beside each other, and thereby be more visible from the main entrance. The vertical communication could in this way also be adapted to the traffic flows of today as well as the expected increase.

The escalator which today leads up to the food court on the second floor, will be moved to line up with the entrance from the parking deck (fig 81), as well as to improve the movements between the train platforms and the second floor. The shops and services will be relocated to fit with the updated circulation system (fig 82). The main departure board will be located right in front of the main entrance. Complementary departure boards could be placed in order to be visible when approaching from the bus terminal.

Moderate changes: Increase the transparency between the terminal and the restaurant on the ground floor. Move the Skånetrafiken shop closer to the main entrance, for example to the facilities which Apoteket and Espresso House uses today. This will

Commercial ■
Indoor terminal ■
Outdoor terminal ■
Pedestrians ■
Vertical communication ■
Vertical communication from platforms ■

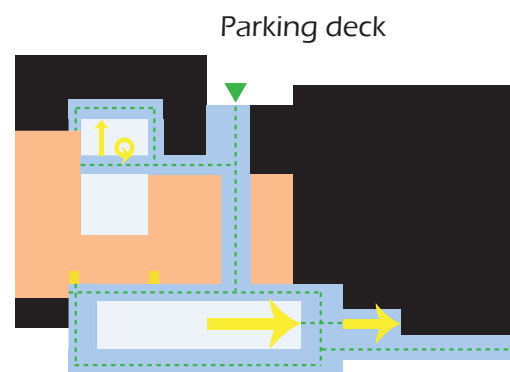


Figure 79
Existing organisation of second floor

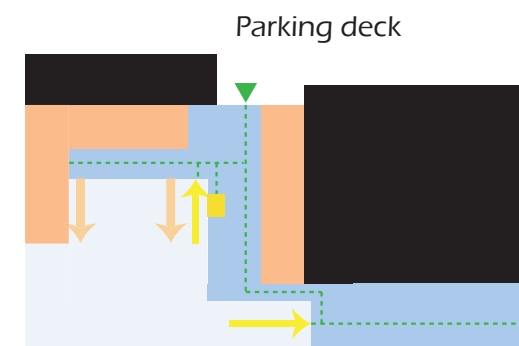


Figure 81
Suggested second floor, extensive changes

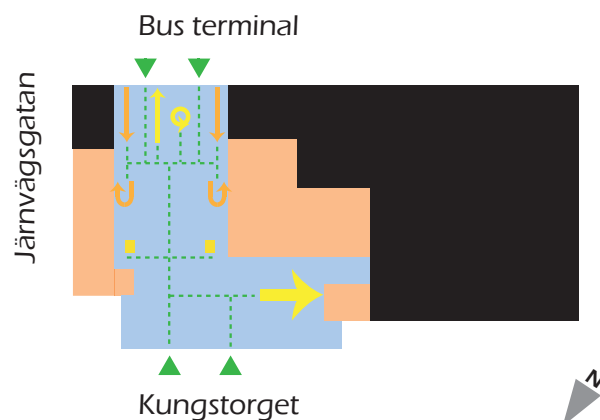


Figure 80
Existing organisation of ground floor

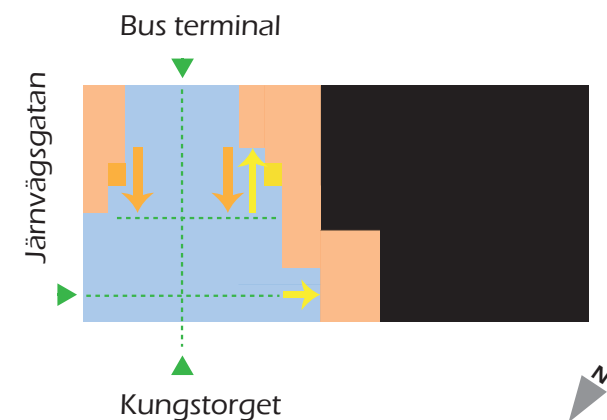


Figure 82
Suggested ground floor, extensive changes

make it more visible from the main entrance and the bus terminal. This location would also reduce the intersecting flows at the top of the escalators and stairs from the train platforms.

Strengthen and visualise the direction towards the bus terminal (fig 83) by introducing articulation in the ceiling as well as on the wall and balconies above the train and bus terminal. Instead of the horizontal lines pointing towards the ferries, introduce vertical articulation indicating the direction towards the bus terminal. Changing the floor material and pattern could be an additional way to emphasise the direction towards the trains and buses, and visualise the different building functions.

Relocate the luggage storage as well as the toilets in the basement to assign the office staircase a solely private function. Reduce the visual noise by stripping away unnecessary signs, advertisements, phone booths etcetera.

To make the stairs and escalators down to the train platforms more visible, replace the balusters for transparent ones (fig 84). Introduce contrasting handrails or divisions to aid the visually impaired. The vertical communication could also be emphasised visually by articulating the direction of the escalators with colours on the walls next to them.

Main terminal - second floor

Identified problem: The entrance from the parking deck is quite clearly articulated on the exterior, which makes the corridor behind it seem misplaced. The space indicates a very strong direction forwards with the ceiling articulation and the shape as well as the light at the end. But when you reach the end of it, you

walk into a baluster. The movement and direction are interrupted because you have to go to the left to reach the escalator leading down. The food court is not visible from the main hall (fig 85), and the communication to get there is indirect.

Extensive changes: Remove the unused balconies along the facade towards Kungstorget as well as the balcony between the two atriums. This would join the atriums into one and display the food court better, as well as change the dominant spatial direction in the terminal hall. Widen the balcony above the bus terminal entrance, and remove the gangway in the middle of the food court. Remove the spiral staircase and move the escalator towards the corridor, in order for it to be used by people entering from the parking deck to get down to the trains and buses. Open up the narrow corridor from the parking deck entrance. Join departures and arrivals of the ferry terminal on the second floor.

Moderate changes: Open up the area between the two atriums to increase the visual access towards the food court. Articulate the remaining walls towards the main entrance hall to differentiate it from the balconies directed towards the ferry terminal (fig 86). Activate the corridor from the parking deck entrance by locating a service there, perhaps a VIP lounge for the train travellers. Reduce the size and increase the transparency of the restaurants located towards the corridor. Remove the spiral staircase and move the escalator closer to the entrance from the parking deck. Change the escalators towards the ferry terminal to service both the second and third floor going up and down.



Figure 83
Photo of existing ground floor



Figure 84
Illustration of suggested ground floor,
moderate changes

Signage

Identified problem: The signage assumes the visitor to be familiar with the system. People who are not familiar with the local public transport might not know which services the Skånetrafiken shop offers, or that the symbol of an airplane means the bus transfer towards the airport. In general the signage consists only of symbols and arrows, and no complementary verbal information. The only destinations written are “Campus” and “Kungstorget”, which makes you think that they must be very important places. The arrows pointing up or down are used strictly and are not adapted to each situation (fig 85). The main departure board is facing the arrivals from the ferry terminal, but not the bus terminal or main entrance.

Changes: Complement the symbols in signage with words and names of common destinations, such as Stadsparken, Järnvägsgatan and Norra Hamnen. Place a clear sign for tickets visible from the main entrance and explain the function of the Skånetrafiken shop on a sign, for example “tickets and information”.

Be flexible in the use of arrows on the signs (fig 86) and adapt them to suit the location in best way possible. This is particularly important in connection to the vertical communication. As an example, there is an arrow pointing down at the bottom of the stairs towards the ferry terminal, when it is obvious that there is no way to proceed downwards. In addition, the escalator in connection to that sign, is actually going down, and not up, which makes the location of that sign very confusing.

Improve the signage towards the bus terminal and main terminal on the train platforms. Add the names of important destinations, for example Kungstorget, Stadsparken etcetera on the directional signs. Take inspiration from metro stations, where the signs on the platforms let the travellers know which exit leads to which street or place.

Relocate the departure board, and try to create a calmer waiting area in connection to it. Possible locations for the departure board are either above the passage to the bus terminal, or right in front of the main entrance on the balcony. However, locating the departure board in front of the main entrance, would make it invisible for people arriving from the bus terminal, and it would need to be complemented with a departure board directed in that way. Locate directional signs below the departure board.

Place the city map in connection to the other information such as time tables and ticket purchases, and complement it with the bus network as well as a “you are here”-dot. Orientation maps over the terminal should be placed in order to be visible when entering through the main entrance, from the parking deck and from the bus terminal.



Figure 85
Photo of existing main terminal



Figure 86
Illustration of suggested main terminal,
moderate changes



6

DISCUSSION

In this chapter the results of the theoretical studies, empirical observations as well as the case study are discussed, reflected upon and the findings are presented.

Spatial perception

Arthur and Passini highlight the importance of providing good wayfinding conditions in public settings since noise affect perceptions substantially, which was also confirmed during the conducted observations. Extreme temperatures, a lot of people moving, too much visual information, hunger, tiredness, audible noise, stress among other factors affect our wayfinding capabilities. The fact that people generally are stressed at public transport centres, makes intuitive wayfinding even more important particularly at these settings. The feeling of safety is also an aspect concerning wayfinding, since stress levels increase when we feel unsafe.

Another realisation made during the observations is that the visual system seems to be the most used sense by unimpaired people when wayfinding. Auditory perceptions, such as announcements via loudspeakers, are mainly used to confirm the visual impressions, while olfactory perceptions turned out not to impact wayfinding significantly.

Regarding visual perception light is of great importance. Both too much and too little light can be an issue, and for some people a lower level of light might work better while for others the case is the opposite. A general rule is to avoid strong contrasts in light, in order to give the eyes enough time to adapt to the current light level. An example of insufficient planning concerning light contrasts is a departure display found at Copenhagen Central station (fig 87). The strong daylight behind the display makes the information difficult to perceive even for the unimpaired.

Arthur and Passini writes that daylight can be used as a cue for an exit, but I found that artificial light also can be used as a signal of an entrance, for example when approaching a building at night time. A glazed doorway signals an exit from the interior during the day, and an entrance from the exterior during the dark hours.

Perceptions of light can also be used to communicate an exit in a more indirect way. In the book *Stations-Guide* (Hultgren, 2002) the station at Zurich Airport is mentioned as an example where the walls are painted in darker colours closer to the ends of the platforms, and lighter colours closer to the vertical communication and the exits. This makes the passengers move in the right direction subconsciously, and could be an alternative for the train platforms in Knutpunkten.

Information, in particular graphic information, should be designed for normal environmental perception, the scanning and glancing process which is described by Arthur and Passini. People tend to ignore information displays that are not designed appropriately, which means that these signs in the best case are of no use, and in the worst might even increase the confusion by contributing to the visual noise. During an indirect observation I found that the same applies to scrolling displays containing a lot of information. Signs which are swopping between several messages risk that the users don't find it worth the time to wait for the information relevant to them. These kind of signs are better suited for advertising than for crucial wayfinding information.

Moreover, it is important to remember that when choosing colours for colour coding and signage, some colours which westerners can separate easily like green and blue, might actually be perceived as the same colour by other cultures, such as the Himbas (Do you see what I see? 2011). As designers and planners, we have to try to keep an objective mind.



Figure 87
Example of strong contrasts in light making a display less legible, Copenhagen Central station



Figure 88
Schönhauser Tor in Berlin affords you to go around the corner (L'Aventure the Corsair, 2012)

Affordance

Affordance is an important part of intuitive wayfinding since we often interact with spaces and building elements on a subconscious level. I agree with Koutamanis' statement that we shouldn't have to think about how to use a building, it should be understood intuitively. This is particularly true for public buildings, where a lot of users are unfamiliar with the setting. In addition, when an element of a building doesn't indicate how to use it just by looking at it, for example a door which opens in the "wrong" direction, these little miss-affordances create stress and distract the wayfinder from the task at hand.

An example of how building elements can communicate on an indirect level is the entrance of the Schönhäuser Tor in Berlin, figure 88. The articulation on the facade indicates where the main entrance is and affords the visitor to go around the corner without showing the entrance directly or using any signs. As Hultgren states, signage should only be used to confirm what the passenger has already guessed or perceived from a space or body language of a building (Hultgren, 2002).

Different spaces also afford different activities. A large space affords for example public gatherings, general information or train tracks, while a small and intimate space affords private meetings or for example lavatories. To make a setting feel logical and intuitive, the shape and size of the spaces have to correspond to the function of the space, and the same goes for the connections between the spaces. It is about what we expect from a space, which of course depends on the individual, though much of it is based on human attributes and instincts that work in the same way for everyone. As argued by Koutamanis, most misaffordances are not due to individual differences but rather faulty design.

For example did both me and my travel partner expect to find the metro underground during the

observations, and were quite confused at Berlin Hauptbahnhof where the local trains depart from the top floor. Confusion would also be the result if, when looking for the exit of a setting, you are directed through a dark and narrow passage with no light at the end of it. At that point you probably think that you are heading for the toilets or luggage storage.

There are of course situations when the affordances of a space are deliberately misleading. By playing with the assumptions we have of certain spaces, interesting effects and spatial tension can be created. That is however, a subject for a different thesis.

Wayfinding

To provide efficient wayfinding in a large setting, it is important to find a balance of information, as described by Arthur and Passini and confirmed during the empirical observations. There should be enough information to get people around and confirm their impressions regularly, in order for them to feel secure that they are on the right track, but not too much or too repetitive information since that makes people stop paying attention. For example, constant loud speaker announcements at public transport centres make people stop listening after a while, which leads to relevant or urgent information not being registered either.

Information mediated through signage can be directed to reduce the risk of overload and confusion. For example are the signs on a railway platform turned either towards the tracks or towards the length of the platform. The information which is relevant to arrivals, such as the name of the station and the directions of exits, are turned towards the trains, while information important for departures are turned to face the length of the platform, for example the number of the platform, the clocks and the departure boards.

It is easy to draw the conclusion that a simple spatial organisation automatically provides good wayfinding, however a monotonous or repetitive setting does the exact opposite. Train stations with a large number of platforms next to each other can serve as an example. The wayfinder understands the system of space, but is not able to discern the relevant platform from the other. Thus, a clear and readable spatial organisation does aid wayfinding, but only if the spaces or zones are distinguishable from each other and have their own identity. This could be achieved by architectural elements which work as landmarks, differences in colour or surface materials.

Landmarks or anchor points are key for orientation within concentric circulation systems as well, and especially the loop system. The advantage of loop systems is that there are no dead ends and whichever way you chose you will get to your destination eventually. However repeatedly choosing the wrong direction and ending up taking the longest path creates stress and frustration. Everyone who has visited the upper floors of the A-building at Chalmers knows how annoying this is. By introducing separate identities to the different corridors or staircases this source of irritation could easily be reduced.

According to Arthur and Passini, the building volumes can and should communicate the main circulation system and spatial organisation of a setting. An example of this found during my study is the Berlin Hauptbahnhof, where you clearly see the direction of the trains and the volumes of the office buildings which also indicate the location of the main entrance.

On a glass facade where the volumes don't communicate the entrance, it can be articulated by creating contrasts instead. I have found that a common way to emphasise an entrance is to make a frame around the doors, which in some cases also functions as a roof over the entrance.

The entrance to the Nils Ericsson Terminal is an example of this kind of entrance.

Hultgren argues that visual access within a setting is much more efficient regarding orientation than signs. He writes that you, in order to keep oriented, should see the tracks through the building directly when entering a train station and that overview is crucial for orientation. Generally speaking I agree with Hultgren, though during the observations I realised that in large stations it is almost impossible to provide direct visual access to the tracks. In Berlin Hauptbahnhof the visual access is unexpectedly sufficient for being such a large and complex structure, while Prague Main train station provides no visual access between the terminal hall and the platforms whatsoever. I also found that if the spaces leading to the tracks provide visual connection between them and if they are perceived as logical, finding the way to the platforms doesn't have to be difficult, despite the lack of direct visual access.

Furthermore, Hultgren writes that footbridges leading to the platforms are better for wayfinding than underpasses, and that they should be glazed to increase orientation. He argues that in a tunnel you no longer know where North or South is or if your train is about to depart, which creates stress for the passengers.

On the other hand, for example at Prague Main train station, once you have reached the underpass it is very easy to find the platforms, since the movement forward in a tunnel is logical and the stairs to the platforms appear on the sides in numerical order. In addition, my impression is that people in general see bridges as a bigger mental barrier than an underpass.

During the walk-through evaluation of Prague Main train station I also noticed the floor pattern, figure 89, which is a clever way to emphasise the circulation system, especially when the visual access is limited. The most easily navigable settings are the ones where

wayfinding has been considered throughout the planning, construction and management process. The optimum would be to start the design process from the spatial organisation and circulation system, however I am aware that the design process rarely is that linear and more often uses a concept or spatial idea as a starting point. Accessibility for the impaired is another issue which should be included in the planning from start in order to be as integrated and intuitive as possible. This shouldn't be seen as a necessary evil though, because a building which works well for the impaired, generally provides good wayfinding conditions for the unimpaired as well.

Public transport centres

There is paradox in the fact that public transport centres should be easy to identify in the urban structure and clearly display its functions, while at the same time they are gradually developing into shopping malls and business centres, like Bakerson describes. How can the shopping and office complex which also contains a public transport centre be discerned from all the other shopping and office complexes? Hultgren mentions that the large clock and the logotypes of the servicing transport companies on the main facade work as symbols for travel centres, and are often used in combination with the local name of the station to identify public transport centres from other public buildings. In some cases when the station is particularly difficult to locate, for example an overbuilt station, the clock can be placed on a pillar to increase the visibility. The station of Cergy Saint Christophe in France (fig 90) is an example of a station where the clock is used as an overly clear cue both for the location of the entrance and the function as a public transport centre.

According to Hultgren, the current time always appears analogous while scheduled times are shown



Figure 89
Indicative floor pattern at Prague Main Train station



Figure 90
Cergy Saint Christophe
(Wikimedia commons, 2011)

digitally in public transport centres. This is an efficient way to reduce confusion for example on platforms, but is also why the clock on the facade above the main entrance should be an analogue one, and not a digital one like above the main entrance of Copenhagen Central station.

The Berlin Hauptbahnhof is recognised as a public transport centre because of the visible elevated tracks, but without that cue, the building could easily be mistaken for an office centre. While approaching Copenhagen Central station you don't see the tracks or trains, but the building itself communicates the public function, despite the lack of signs on the facade. A clock on the facade towards Bernstrorffsgade would strengthen the station's identity even more however.

I found that the traditional station, like Copenhagen Central station, is generally quite easy to navigate through because of its' size and simple organisation. The modern public transport centres however are developing into more complex structures harbouring several different functions and means of transport. They nowadays serve not only travellers but also commuters, tourists, office workers, shoppers and staff. This creates complex movement patterns for users with different goals and makes planning for efficient wayfinding a challenge. The tendency to locate stations underground complicates the issue further.

Compared to the organisation of other public facilities which require good wayfinding conditions, such as airports and hospitals, public transport centres are generally located centrally in the cities and are therefore restricted in area. Tracks are often located underground to reduce the impact on the urban structure and the circulation system and terminals are compressed onto a limited surface. One could argue that wayfinding in for example airports is easier, with their long straight terminals and gates in line where it

is impossible to get lost. However this kind of spatial organisation requires large areas rarely found centrally in a city, as well as creates long distances for travellers to walk which would not be suitable for commuting.

Both airports and hospitals are similar to public transport centres in the sense that they have a large variety of users and that many of these users are stressed or worried. Users of hospitals however, generally only need to find their way from the entrance inwards, since they can retrace their steps to reach the exit. The exception being patients who arrived through the emergency room by ambulance. Hospitals, which like public transport centres consists of many repetitive elements, also require a clear circulation system and architectural or colour features in order to discern the spaces from each other.

Arthur and Passini writes that in settings with only one entrance and exit, generally it is not necessary to articulate the door in the interior, since most people are capable of retracing their own steps and find the point where they entered the building. However in large public buildings which often have several entrances and exits, such as public transport centres, the articulation of the exits are as important as of the entrances. People might not use the same doorway to leave as when they arrived, or as in the case of the public transport centre, the visitor might have arrived to the building via train or metro and is looking for the exit as a first time visitor, which we experienced during the observations. Visible exits and clear signage towards them are also important for emergency evacuation reasons according to Arthur and Passini.

Another issue of importance concluded during the walk-through evaluation of Helsinki Central station, is that the signage in public transport centres should direct you through the same route as the regular users take. As a first time visitor it is very confusing if the signs tell you to proceed in one direction, but you

notice that the people who seems to be commuters all move in the opposite direction. The wayfinding cues in that case contradict each other, and the visitor is left with the choice of which cue to trust.

A dilemma regarding public transport centres is the question of identity versus recognition. Passengers generally feel more comfortable and relaxed if they recognise the graphic theme and systems of the transport company when travelling, but at the same time it should be possible to discern which station you have arrived to just by looking out through the window of the train. An example is the metro in Stockholm where all the metro stations have their own design and decoration.

At the next level there is the recognition of the station versus the identity of the different platforms. Wayfinding for people departing would be improved if the different platforms were given a separate identity. All of these concerns have to be balanced when designing a station. A suggestion is to implement the same idea as in the directed signage. The walls which are visible for people arriving could communicate the identity of the station as well as the transport company, while the floors could have different colour and patterns for each platform.

Observations

During the empirical observations I found that the flows of people is one of the most effective wayfinding cues in public transport centres. However settings should obviously be navigable even when depopulated, for example at night time.

Compared to the platforms at metro stations where the exits generally are situated at both ends, the exits at train stations with underground tracks often seem to be located in the middle of the platform, like the

underground platforms at Berlin Hauptbahnhof. This might be due to the organisation of the station buildings and the surrounding urban structure. The metro stations are generally integrated in the urban structure, and the entrances and exits can be located quite some distance apart. While train stations generally involve a single detached building, which doesn't allow for separate entrances or exits.

As stated previously, visual access is crucial for efficient wayfinding, however only when combined with physical access. At Berlin Hauptbahnhof for example (fig 91), there is good visual access between the different floors, but if the vertical communication wouldn't be clearly visible as well, you still wouldn't have known how to get there. The user should see the destination as well as the path to reach it.

Another example from Berlin Hauptbahnhof is the difficulty facing visitors of a symmetrical building. Even though the spatial organisation is clear and the vertical communication visible, it is almost impossible to situate oneself on a map of the setting or point out the direction towards something in the surroundings due to the symmetry of the floor plans. The disorientation is increased further when moving between the floors and having to make 180 degree turns at every escalator. In these cases it is crucial to make the different sides identifiable, for example by using colour coding or other types of architectural articulation.

Consistency in signage is very important for travellers to be able to recognise and follow a directed route. The use of symbols and colours on the signs should be the same throughout the setting, but also the location of the signs should be consistent, and the trail of signs should lead you the whole way to the destination. Several times during the walk-through evaluations, when following a trail of signs towards for example the metro, we were suddenly left without any further

directions or not recognising the signs anymore due to a change in design. For example at Helsinki Central station where the signs for the metro in the main terminal hall are red with a white M on them, but when you arrive to the metro station, the ticket machines are light blue and pink. Naturally we were looking for ticket machines with the same symbol or colour that had been used in the signage, and didn't understand that the machines belonged to the metro system.

During the observations I also realised that my travel partners were mainly referring to the signage and flows of people as wayfinding cues, and only commented on the spatial or architectural cues on direct questions from me. This might be explained by the fact that they actually mostly used signs and flows of people to solve their wayfinding problems, or it could also be because the architectural and spatial cues are perceived subconsciously, and are therefore more difficult to formulate.

Another observation is that people when in doubt, tend to ask other people rather than looking for information themselves, perhaps because it is faster. People are not very patient when it comes to important information. Though oral information is more difficult to remember, might be hard to understand and is not always reliable. We trust written information more than information from another visitor, however oral information given by staff is perceived as even more reliable than written information. It is important to be able to confirm the information to feel sure that you took the right decision. For example when the oral information is confirmed by a sign.

Time seems to be a significant factor regarding wayfinding in public transport centres. A very clear and readable original organisation of a setting, might get lost over time due to renovations and extensions. One station which I believe have become more complicated

to navigate with time is Helsinki Central station. The opening to the Asematunnelin as well as the added tracks have made wayfinding there more complex. Another factor affecting wayfinding is the changes of the surrounding urban structure, like in Helsinki where what was originally intended as a side entrance has become the main entrance.

It will be interesting to see the development of the new metro station and the integration between it and the Central station in Copenhagen. Whether they will be connected with a tunnel or function as two separate stations, the chosen solution will make a big difference regarding wayfinding.

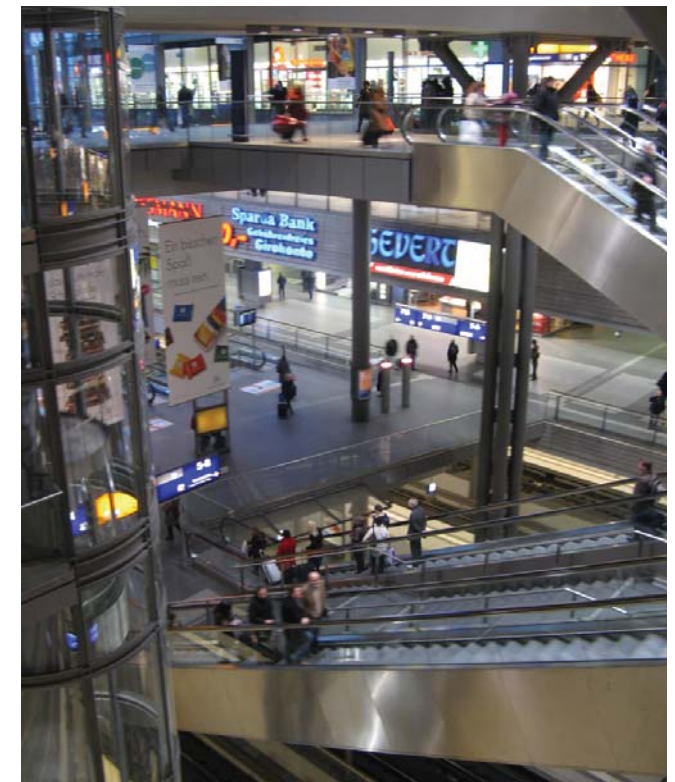


Figure 91
Visual and physical access at Berlin Hauptbahnhof

Case study

During the study of Knutpunkten I found that because priorities and travel habits may change over time, a public transport centre benefits from long term, standard solutions when it comes to the main spatial structure. I was surprised to find that Knutpunkten, which is only 22 years old, is so much more outdated and inefficient than for example the central stations of Helsinki and Copenhagen which were built around a hundred years ago. It seems like the classic axial layout is both more resistant and versatile through time.

One of the major issues regarding Knutpunkten is the lack of identity as a public transport centre. For being a central station in a reasonably large city, it doesn't communicate any of the authority often associated with central stations. Maybe if the idea of combining the terminal functions with commercial such as restaurants and shops had worked out better, the building wouldn't feel so lost of identity. The current situation however with large, empty communication areas and ferry terminal in combination with the undersized train and bus terminal, the building complex give an odd and rather sad impression.

Hultgren mentions different names of the same place, for example Stockholm Central station versus Cityterminalen or Gothenburg Central station versus Nils Ericsson Terminalen, as a cause of confusion for passengers. He writes that the different names indicate that there are actually two different destinations, and to reduce any misunderstandings, all transport leading to same station should be signed with the same name. This is also the case in Helsingborg. The building is generally known as Knutpunkten, while both Skånetrafiken and Öresundstågen call the destination Helsingborg C, which can create confusion and misunderstandings. To clarify the distinction between the two, I believe that the terminal functions and main entrances should be signed Helsingborg Central, while the whole

building complex including offices and car park may be referred to as Knutpunkten.

As stated previously visual access is crucial for efficient wayfinding. In Knutpunkten however, the main terminal and the bus terminal are not visually connected very well, despite being located on the same floor. Here it would be beneficial to adopt a similar solution to the one between Gothenburg Central station and the Nils Ericsson terminal, described in the chapter about indirect observations. The visual access between the main terminal and the train platforms is also very limited, but the visual and audible connection between the platforms is improved thanks to the opening in the tunnel wall.

Another method to improve orientation underground is to use illustrations on the tunnel wall of what is located behind it. As examples, Hultgren mentions Utrecht CS and Rotterdam Blaak where the trains running in a tunnel behind the wall or below the floor are illustrated in the tile pattern. This is a similar idea to the suggestion for illustrations of the sea and the city at Knutpunkten which is presented previously in this thesis.

Findings

This study shows that some factors are particularly important for efficient and intuitive wayfinding within public transport centres. The first one is identity; a public transport centre should clearly display its function to be identifiable in the urban structure and also the functions within the building should be distinguishable from each other.

Furthermore, a clear and readable spatial organisation and circulation system is crucial for understanding

and constructing a cognitive map of a setting. Sufficient visual and audible access in combination with physical access, both between different levels and different functions of the building, is important for the same reason.

As a complement to the body language of the building and to confirm the wayfinder's perceptions, there should be consistent and reliable signage which is based on the theory of the wayfinding process. The information mediated through signage should be carefully located and directed to avoid overload and general confusion.

Another important factor is to provide good wayfinding conditions, such as temperature, soundscape and light, throughout the setting. It is important that the spaces and building elements of the public transport centre are affordance based and correspond to their function, in order to enable intuitive movement and interaction.

The final factor for efficient wayfinding is that the building envelope should allow the use of the surroundings as a reference for orientation, or when not possible for example at underground settings, orientation should be aided by simulating these kind of cues.



7

FINAL CONCLUSIONS

As stated previously the aim of this master thesis is to answer the question of which are the main factors important regarding intuitive and efficient wayfinding within public transport centres, as well as to raise the question of wayfinding within the discourse of architecture.

During this study I have realised that wayfinding largely is about what you expect from a building or space, which is based on our previous knowledge and experiences. As an individual you expect to find a certain kind of space when entering a public transport centre. You expect certain information and certain services, and you expect to be able to find them without too much of a hassle. When the space doesn't immediately deliver what you expect, you get confused and keep searching in the hope of finding it. Even if it might not be there. Another person probably expects something else from the same building.

Despite the diversity in expectations we might have of a building and despite the fact that we are all different individuals with different backgrounds and preconditions, I have found that the wayfinding process is surprisingly similar for everyone. It is to a great extent based on biological factors of the human body and brain. Therefore it is possible to plan and design buildings which the large majority of people manage to navigate through intuitively.

The findings from this study indicate that the most important factors regarding wayfinding for first time visitors within public transport centres include, but are not limited to: identity -the building should be identifiable within the urban structure and the different functions should be identifiable within the building, clear and readable spatial organisation, visual and audible access combined with physical access, consistent and reliable signage, affordance

based spaces and building elements which are perceived as logical and intuitive, and finally the possibility to use the surrounding as cues for orientation.

Thus it can be concluded that when wayfinding has been considered from the start of the design process, it can be an integrated part of a well functioning building where the users don't even realise how they found their way. They just did, by intuition. It is however possible to improve intuitive wayfinding in existing structures as well, by for example visualising the circulation system, making entrances distinguishable and emphasising the identities of the different zones of the setting.

Consequently, the main recommendations for improved wayfinding prior to the upcoming reconstruction of Knutpunkten are as following. The facades need to express a stronger identity for Knutpunkten to be identifiable as a public transport centre. This could be done by placing a large and visible clock above the main entrance combined with a clear sign for Helsingborg Central, as well as displaying the logos of the servicing transport companies.

In order for visitors to understand which parts are public and which are private of Knutpunkten, the building volumes should display the separate functions better. The same applies to the entrances. It should be possible to intuitively know which entrances that lead to the terminal functions and which that lead to offices. The spatial organisation and circulation system should be made more direct and visible as well as adapted to current passenger flows.

A reorganisation of the bus terminal into the docking system would give a more direct, safe and comfortable solution. Opening a new entrance to the bus terminal towards South would make the terminal visible and

accessible from Stadsparken as well. In order to facilitate orientation on the underground train platforms illustrations on the walls, colour themes and compass roses should be introduced. Finally complementing the pictographs in the signage with text would improve the perception of information.



8

BIBLIOGRAPHY

- Arthur, Paul & Passini, Romedi: *Wayfinding: People, Signs and Architecture*, 2002, Focus Strategic Communications Inc
- Bakerson, Aram: *Den moderna järnvägsstationen som kommunikationsnod i staden*, 2009, Chalmers Tekniska Högskola, Sandstens Tryckeri AB
- Barlex, M J: *Guide to Post Occupancy Evaluation*, 2006, Higher Education Funding Council for England, University of Westminster
- Bensdorp-Redestan, B & Welin, C: *Begäran om planändring, Fastigheten Terminalen 1 m.fl. Centrum, Helsingborgs stad*, 2011, Stadsbyggnadsförvaltningen Helsingborgs stad
- Bensdorp-Redestam, B, Welin, C, Lönnerholm, E & Hedström, N: *Samrådshandling, Detaljplan för del av fastigheten Terminalen 1 m.fl. Centrum, Helsingborgs stad*, 2012, Stadsbyggnadsförvaltningen Helsingborgs stad
- Bergström, Inger: *Rummet och människans rörelsen*, 1996, Chalmers Tekniska Högskola, Graphic Systems
- Björk, L & Räisänen, C: *Academic writing - a university writing course*, 1997, Studentlitteratur Lund
- Bryman, Alan: *Social Research Methods*, 2008, Oxford University Press, Third Edition
- de Laval, Suzanne: *Gåtur, metod för utvärdering av detaljplaner*, 1998, Nordisk Arkitekturforskning nummer 4
- Dictionary.com, 2013, *Wayfinding*, viewed on 2013-04-25, <http://dictionary.reference.com/browse/wayfinding>
- Do you see what I see?*, 2011, documentary from BBC Two Horizon
- Exhibition posters, 2012, exhibition about the new detail plan at Knutpunkten, viewed on 2013-02-27
- Ferrarini, Alessia: *Railway stations - From the Gare de L'est to Penn Station*, 2005, Phaidon Press
- Gibson, James J: *Våra sinnen som perceptuella system*, 1969, Beckmans
- Hausen, Mikkola, Arnberg & Valto: *Eliel Saarinen - Projects 1896-1923*, 1990, Museum of Finnish Architecture
- Heft, Harry: *Affordances and the body: An Intentional Analysis of Gibson's Ecological Approach to Visual Perception*, 1989, Journal for the Theory of Social Behaviour 19:1
- Helsingborg, *Buss, båt och tåg*, viewed on 2013-03-27, <http://www.helsingborg.se/Medborgare/Trafik-och-stadsplanering/Buss-bat-och-tag/>
- Helsingborg, *Öresundsregionen*, viewed on 2013-03-12, <http://www.helsingborg.se/Foretagare/Naring-slivet-i-Helsingborg/Oresundsregionen/>
- Helsingborgs Dagblad, 2012, "Bombastisk trendarkitektur", viewed on 2013-04-27, <http://hd.se/helsingborg/2012/09/28/bombastisk-trendarkitektur/>
- Helsingborgs Dagblad, 2012, *Plåster på stans sår*, viewed on 2013-04-25, <http://mobil.hd.se/kultur/2012/09/29/plaster-pa-stans-sar/>
- Hirtle, Stephen C: *Wayfinding, landmarks*, 2008, in Shekhar, S. & Xiong, H. Encyclopedia of Geographic Information Science, p 1246-1248, Springer, New York
- Hultgren, Kurt: *Stations-Guide Inter-modal travel centres*, 2002, Stationsrådet, Tierps Tryckeri AB
- Irving, Mark: *1001 byggnader du måste se innan du dör*, 2009, Bonnier Fakta
- ISO 9241-11:1998(E) *Guidance on Usability*, 1998
- Klasander, Anna-Johanna: *Suburban Navigation - Structural Coherence and Visual Appearance in Urban Design*, 2003, Chalmers Tekniska Högskola
- Koutamanis, Alexander: *Buildings and affordances*, 2006, Delft University of Technology, Springer Netherlands
- Kupé, *Starkare grepp kring miljöfrågor*, 2013, Kupé nytt & kort, april nummer 4:2013
- Lind, O & Lund, A: *Copenhagen Architecture Guide*, 1996, Arkitektens Forlag
- Linde Bjur, Gunilla & Engström, Krister: *Stationshus - Järnvägsarkitektur i Sverige*, 2010, Balkong Förlag, Stockholm
- Ljunggren, Monö, Nordström & Svedmyr: *Trevlig resa: våra sinnens perceptioner och deras effekter på beteende i kollektivtrafikens rumsliga miljö*, 1998, Kommunikationsforskningsberedningen
- Lynch, Kevin: *The image of the city*, 1960, MIT Press
- M, *Vi bygger ny metro*, viewed on 2013-03-12, <http://www.m.dk/#!/om+metroen/metrobyggeriet/metrobyggeri>
- Maier, Jonatan R A & Fadel, Georges M: *An affordance-based approach to architectural theory, design and practice*, 2009, Design Studies volume 30, issue 4

Mynewsdesk, 2008, *Västtrafik bygger om Kampenhofs bussterminal*, viewed on 2013-04-14, <http://www.mynewsdesk.com/se/pressroom/vasttrafik/pressrelease/view/vaesttrafik-bygger-om-kampenhofs-bussterminal-227254>

Nationalencyklopedin, 2013, *Helsingborg*, viewed on 2013-04-06, <http://www.ne.se/helsingborg/201209>
Nationalencyklopedin, 2013, *Helsingborg historia*, viewed on 2013-04-06, <http://www.ne.se/helsingborg/historia>

Oxford Dictionaries, 2013, *Cognition*, viewed on 2013-04-25, <http://oxforddictionaries.com/definition/english/cognition>, 2013-03-25

Oxford Dictionaries, 2013, *Impaired*, viewed on 2013-04-25, <http://oxforddictionaries.com/definition/english/impaired>

Oxford Dictionaries, 2013, *Perception*, viewed on 2013-04-25, <http://oxforddictionaries.com/definition/english/perception>

Parissien, Steven: *Station to Station*, 1997, Phaidon Press

Partnersamverkan för en fördubblad kollektivtrafik, *Om fördubblingen*, viewed on 2013-03-27, <http://www.svenskkollektivtrafik.se/fordubbling/Om-For-dubblaprojektet/>

Raubal, Martin: *Human wayfinding in unfamiliar buildings: a simulation with a cognizing agent*, 2001, Cognitive Processing (2-3), p 363-388

Raubal, Martin: *Wayfinding: Affordances and agent simulation*, 2008, in Shekhar, S. & Xiong, H. Encyclopedia of Geographic Information Science, p 1243-1246, Springer, New York

Sauri, Pekka: *Detaljplaneändring för gatuområde och öppen plats, utrymmet ovanför nivån -11.0, i Gloet (Stationstunneln, biljetthallen på Järnvägstorgets metrostation)*, 2012, Helsingfors stad Stadsfullmäktige Protokoll

The Scandinavian 8 million city, *Den skandinaviska 8 miljonersstaden*, viewed on 2013-04-17, <http://www.8millioncity.com/index>
Space Syntax, 2013, 2001, viewed on 2013-04-11, <http://www.spacesyntax.com/projects-clients-partners/archives/year-2001/>

Stationsinfo, *Helsingborg centralstation*, viewed on 2013-04-04, <http://www.stationsinfo.se/station/HelsingborgCentral>

Svensk Kollektivtrafik, *Statistikportal*, viewed on 2013-04-25, <http://svenskkollektivtrafik.se/Statistikportal/Oversikt/>

Svensson, Elisabet: *Bygg ikapp - för ökad tillgänglighet och användbarhet för personer med funktionsnedsättning*, 2012, AB Svensk Byggtjänst

The free dictionary, 2013, *Terminus*, viewed on 2013-04-01, <http://www.thefreedictionary.com/terminus>

Theinhardt, Markéta & Varejka, Pascal: *Prague - Hidden splendors*, 1994, Flammarion

Trafikförsörjningsprogram för Skåne 2012, Region Skåne, Regionfullmäktige 2012-05-08

Trafikverket, 2012, *Jämför trafikslag*, viewed on 2013-04-25, <http://www.trafikverket.se/Privat/Miljo-och-halsa/Dina-val-gor-skillnad/Jamfor-trafikslag/>

Trafikverket, 2013, *Om Västlänken*, viewed on 2013-04-09, <http://www.trafikverket.se/Privat/Projekt/Vastra-Gotaland/Vastlanken---smidigare-pendling-och-effektivare-trafik/Om-Vastlanken/>

Vikman, Per-Åke & Kallander, Lennart: *Bantrafik 2011, Statistik 2012:22*, 2012, Trafikanalys

Väst kustbanan, *Historik*, viewed on 2013-03-27, http://www.vastkustbanan.nu/index.php?id=cetest_firstpage

Wikipedia, 2013, *Centrumslingan*, viewed on 2013-03-12, <http://sv.wikipedia.org/wiki/Pisarabanan>
Wikipedia, 2013, *Helsingfors centralstation*, viewed on 2013-03-12, http://sv.wikipedia.org/wiki/Helsingfors_centralstation

Wikipedia, 2013, *Helsingborgs stadstrafik*, viewed on 2013-04-21, http://sv.wikipedia.org/wiki/Helsingborgs_stadstrafik

Öresundskomiteen, *Tillgänglighet och mobilitet*, viewed on 2013-03-27, <http://www.oresundskomiteen.org/tillganglighet-och-mobilitet/>

Interviews

Interview with planning architect Carl Welin and project leader at Wihlborgs Lena Åberg at Helsingborgs Stads Stadsbyggnadsförvaltning, 2013-02-27

Interview with Ivar Krepp at Bastugatan 33, Stockholm, 2013-03-29

Images

Bensdorp-Redestam, B, Welin, C, Lönnerholm, E & Hedström, N: Samrådshandling, *Detaljplan för del av fastigheten Terminalen 1 m.fl. Centrum, Helsingborgs stad*, 2012, Stadsbyggnadsförvaltningen Helsingborgs stad, illustrations of the new detail plan

Casopis stavebnictvi, 2007, Nadrazi je vnitromest-ske letiste, *floor plans of Prague Main train station* retrieved on 2013-02-15, <http://www.casopisstavebnictvi.cz/clanek.php?detail=122>

Google maps, 2013

Google streetview, 2013

Hausen, Mikkola, Arnberg & Valto: Eliel Saarinen - Projects 1896-1923, 1990, Museum of Finnish Architecture, *floor plan of Helsinki Central Station*

Helsingborgs Dagblad, 2012, Knutpunkten växer och byter skepnad, *perspective from Kungstorget* retrieved on 2013-04-16, <http://hd.se/helsingborg/2012/09/27/knutpunkten-vaxer-och-byter/>

Helsingborgs Stadsbyggnadsförvaltning, plan *drawings of Knutpunkten* received on 2013-02-27, Järnvägsgatan 22, Helsingborg

Infrastrukturnyheter.se, 2010, Projekt H+: startskott för Helsingborgs metamorfos, *aerial view over Knutpunkten and illustration for the H+ project* retrieved on 2013-04-16, <http://www.infrastrukturnyheter.se/2010/06/projekt-h-startskott-f-r-helsingborgs-metamorfos>

Krepp, Ivar, 1991, *perspective section of Knutpunkten*, received on 2013-04-15

L'Aventure du Corsair, 2012, USMLE Step 1: Thoughts on Berlin, *photo of Schönhauser Tor* retrieved on 2013-04-27, <http://laventureducorsair.blogspot.se/2012/07/usmle-step-1-thoughts-on-berlin.html>

Lind, O & Lund, A: Copenhagen Architecture Guide, 1996, Arkitektens Forlag, *floor plan of Copenhagen Central station*

Otso Kivenäs, 2010, Asematunnelin asemakaava, *floor plans of metro station Järnvägstorget* retrieved on 2013-02-15, <http://otsokivekas.fi/tag/helsingin-historia/>

SadGoth.com, Berlin to Leipzig, *floor plans of Berlin Hauptbahnhof* retrieved on 2013-02-15, <http://sadgoth.com/overview-gettingtoleipzig-berlintoleipzig.html>

Svensk Kollektivtrafik, Statistikportal resenärsperspektiv, *diagram* retrieved on 2013-04-25, <http://www.svenskkollektivtrafik.se/Statistikportal/Resenarsperspektiv/>

Trafikverket, 2012, Jämför trafikslag, *diagram* retrieved on 2013-04-25, <http://www.trafikverket.se/Privat/Miljo-och-halsa/Dina-val-gor-skillnad/Jamfor-trafikslag/>

Wikimapia, Central Railway Station (Hauptbahnhof) (Vienna), 2011, *illustration of Vienna Hauptbahnhof* retrieved on 2013-04-27

Wikimedia commons, 2011, *File: Gare de Cergy-Saint-Christophe 01.jpg*, retrieved on 2013-05-08, http://commons.wikimedia.org/wiki/File:Gare_de_Cergy-Saint-Christophe_01.jpg



9 APPENDIX

Walk-through evaluation Helsinki Central station 2013-02-22

Route 1

Starting point

Partner: She noticed the tower as a sign of an important building, and the “large semicircle” as a sign of the entrance.

Me: The tower informs you of a landmark building, but it doesn't identify it as a train station. It could just as well be a city hall or a church. The main entrance is clearly articulated through the shape of the building. In particular the arch, which implies a direction.

Stopping point 1

Partner: When we got closer she identified the building as a train station by the clock above the entrance, and a sign saying “Järnvägsstation”.

Me: You don't know for sure that it is a train station until you get rather close to the entrance and see the clock and the sign. Most people approach the entrance from an angle and not straight ahead, due to the urban structure, however this doesn't make the entrance more difficult to spot. The entrance doors are a bit unclear since they're not transparent and do not open automatically.

Stopping point 2

Partner: Noticed some tickets machines obliquely to the left, but prefers getting service at a counter. After spotting a large green sign saying “VR”, she pointed out that since she knows that VR have something to do with trains in Finland, she assumes they sell tickets, but if you however would be in Finland for the first time, there is no way to know where to go to purchase a ticket from a counter. There are no signs indicating tickets.

Me: The large hall is flanked on both sides by two more halls of similar size. The one to the left has a green sign saying VR and the sign above the hall to the right is purple and says Eliel. Straight ahead there are large windows and some directional signs suggesting an additional hall, however the connection is not very clear.

Stopping point 3

Partner: Once inside the hall marked VR, there's still no sign saying tickets. However the large numbers of service desks and a queue number dispenser suggests that this is where you can purchase tickets. We imagine that we're taking a train to Åbo.

Me: Clear organization with service desks along one of the long sides of the hall, and waiting area in the middle. The queue number dispenser is placed strategically straight in front of the entrance, however it doesn't state what you are queuing for. Large windows connect you with the outside and helps to keep you oriented.

Stopping point 4

Partner: We walked up to the departure boards above the ticket machines which were spotted from point 2, and noticed that the train to Åbo departs from track 13. We follow a sign pointing to all tracks straight ahead.

Me: The departure boards are rather small and placed too high, which makes them unreadable to elderly and people in wheelchairs. They are also rather reflective which makes the information even more difficult to perceive. Despite their size they were quite easy to spot from a distance. A sign on the wall declares the direction to the

platforms, which feels a bit contradictory since it leads you through a rather narrow opening on the side and not through the main passage in the middle of the hall. It does give you the sense of moving in the right direction though, based on the axial line from the main entrance from which we arrived.

Stopping point 5

Partner: Found a more detailed sign in English, Swedish and Finnish. Track 1-19 are shown to be straight ahead. She tells me that the architecture doesn't lead her, but thanks to the sign and the stream of people walking in that direction, she understands where to go.

Me: We are now in a narrow passage between the two larger halls of the station. The signs are clear, but also the shape of the room gives you direction, since there is nowhere to go but ahead or backwards. People are moving along the same axial line in both directions.

Stopping point 6

Partner: Found it odd that now that we've entered a second hall, somewhat smaller than the first, we see a large and clear departure board above the main exit to the tracks. Why was this board not in the first hall? She also noticed more ticket machines, which are better signed than the ones in the first hall. From this point it is possible to see out through the glass doors and spot the tracks and trains. People in this hall are moving both on the axial line from the main entrance towards the tracks, as well as on a perpendicular line along the rather narrow hall. A sign above the exit doors tells you that to reach tracks 12-19 you should take left.

Me: This second hall we entered seems to be more used and more informative than the first one, which creates some confusion since the architecture implies that the first hall is the main one. The large windows and glazed doors show the tracks and trains just outside. The many little kiosks along the sides of the hall makes it more difficult to perceive the whole space, and creates some visual and auditory noise. The sign pointing to the left for tracks 12-19 is a bit confusing, since you get the impression that all tracks are right in front of you. Additional confusion is created since the tracks are numbered from right to left, instead of from left to right which would have felt more intuitive.

Stopping point 7

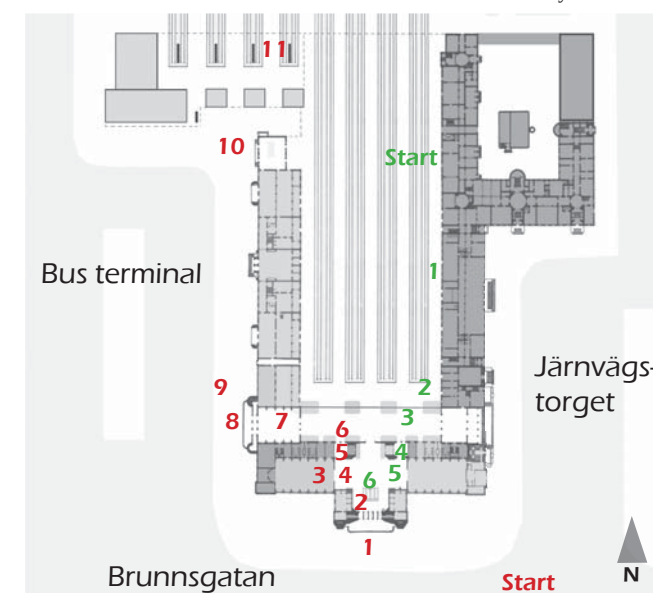
Partner: In this smaller department to the left of the previous hall, the signage is less clear. My partner finds signs leading to a cafeteria and other station services, but she doesn't understand how to get to the tracks from here. Eventually she finds a sign for tracks 12-19 above the exit which makes her wonder if she really should exit the station building to reach the tracks.

Me: This side hall is smaller and darker than the previous one, and the space is largely occupied by exhibition screens which disturb the perception of the space. Since we saw some tracks in the previous hall, it seems logical that tracks 12-19 would be on the same side. Therefore we look for signs on the right wall of the hall, which declares cafeteria, luggage storage and other station services, but no tracks. When moving further into the hall a sign above the exit straight ahead is noticed despite the contrast in light which makes it

almost unreadable. This sign says “tracks 12-19 -->”, which makes us think that we have to exit the building to reach the tracks. These perceptions are very contradictory; the architecture tells you one thing, and the signs tell you the opposite. However a lot of people seem to be using this exit/entrance, which makes you think that maybe you're on the right way after all.

Stopping point 8

Partner: Having exited the station building and found herself on a square next to an outdoor bus terminal, the confusion is increased. Looking right she spotted a sign which she believes is saying track 15 and 16. She tells me that if she would have been in a hurry at this



Helsinki Central station

point she would start to panic since she is not sure which way to go, especially since she cannot spot a sign for track 13.

Me: Once you exit the station building there are no signs straight in front of you giving you direction. You find yourself on a square next to a parking and an outdoor bus terminal. For people with good vision it is possible to spot a sign for tracks 15 and 16 hiding under a rather new building far to the right. At night time, or for people with impaired vision, this information would not be legible though. The spontaneous reaction when not seeing any further signs for the tracks, would be to reenter the station and find someone to ask. But if in a hurry for a departure this would take too much time. There are no apparent stream of people which could give you a hint of direction either.

Stopping point 9

Partner: Walking a bit to the right she found a sign for tracks 12-19, and a digital departure board. The train to Åbo is not on that board however which makes her even more confused. After a while she realizes that the departure board is only showing “närtrafik” which can be translated to commuter trains. As a tourist, she points out, it is impossible to know whether Åbo counts as commuter traffic or not. She decides to follow her gut feeling and starts walking along the outside of the west wing of the station building.

Me: The only sign you see after exiting the station building is the departure board for the commuter traffic. We conclude that the train to Åbo is not a commuter train, and are therefore left with no further information. Having some sort of sense of direction, the impression is that the tracks should be to the right of the door from which we exited. Walking along the outside of the west wing of the station building, passing the bus square, we start to distinguish some signs for tracks and after a while it is also possible to spot some trains through a tunnel under another building. At the middle of the west wing of the station building we find a narrow tunnel through the wing which seem to lead to the tracks we spotted from the station hall earlier. There is a sign in the tunnel pointing to tracks 11-19, but a sign just outside the tunnel says tracks 1-11 straight through the tunnel and 12-19 to the left. This creates additional confusion. We also see a stream of people walking in the same direction as us, however on the inside of the west wing. This makes you feel as you've been tricked to go in the wrong direction and the signs have been taking you on a detour.

Stopping point 10- goal

Partner: Once we reach the building straight ahead, she spotted a sign showing us that tracks 11-14 are to the right, and just after that we spot track 13 through the tunnel under the building. She concludes that it was difficult to find the platform and it was a long walk to get there.

Me: Very unclear and little signage, and since everyone who knows the station are walking on the inside of the west wing, instead of following the signs like we did, there are very few people to follow here. As a conclusion; if people who know their way around a place are consistently taking other routes than the ones following signs, there is clearly something wrong with the signage. The rather modern building perpendicular to the west wing of the station, effectively

hides tracks 11-19 which are reached through a rather dark tunnel/ opening of the ground floor. Once you get close enough to the tracks there are however sufficient displays showing track number and the next train to depart.

Route 2

Starting point

Partner: Arrival with train from Riihimäki. All the people getting off the train are walking in one direction along the platform. She draws the conclusion that they probably are walking towards the train station and the exit, and that's the way we should take as well.

Me: Looking towards both ends of the platform, there are no apparent architectural cues to lead you. It looks more or less the same, except that the light is a bit brighter looking backwards in the train direction. This suggests that you would find an exit that way. However the large crowd of people getting off the train, are all moving in the opposite direction, towards what you can assume to be the station building. With all these people on the platform it is difficult to see the sign at the end of the tracks stating which platform you've arrived to. There are no signs on the wall next to the platform, except for a “smoking” one.

Stopping point 1

Partner: As we walk along the platform she starts to distinguish the station hall. Mid-way down the platform we stop at some digital signs on the wall. It turns out to be departure boards for “närståg”. Information not relevant to us since we are looking for the metro. She points out that the text on the boards is rather small, and the glazed surface reflect light which makes them hard to read.

Me: I note the same things as my partner. It would have been reassuring to see a directional sign somewhere along the way along the platform. If it weren't for the stream of people moving the same way, I wouldn't be so sure that I'm going in the right direction.

Stopping point 2

Partner: From this point she spots a large departure board on the wall of the main hall. There is also a large sign telling you that you have arrived to Helsinki/Helsingfors. There are three separate entrance doors to the building, above which there are directional signs. Above the closest door the sign says M, which she believes might mean metro. The sign also points to information in the same direction, in through the door. In front of the middle door there's an additional information pillar.

Me: It is quite clear which way you should go, since there is no option once you've got this far. The station building is surrounding you, and the logical way is forward in through the doors straight in front of you. It is however not legible from the outside that all three doors lead to the same hall. They could just as well lead to three separate rooms, in which case it would be crucial to choose the right door. The large departure board above the middle door is clearly visible, however not legible from all angles due to reflections in the glass. The information pillar is visible from a reasonable distance, but to be able to read the information you need to stand quite close to it.

Stopping point 3

Partner: The majority of people in the hall we have just entered, are

moving along an axial line perpendicular to the tracks we arrived from. Many of them are walking left towards what seems to be an exit. Straight in front of us my partner spots a red sign saying Metro. On the same sign there's also an arrow towards information. In the direction which the sign is telling us to go there are not so many people moving. It is also pointing towards a rather narrow opening, which wouldn't be the logical choice to use if it weren't for the sign. From this point we don't see any other entrances to move further into the station.

Me: The hall we have entered is rather noisy, both auditory and visually. There are quite a lot of people moving along the length of the hall, which is perpendicular to the tracks. A sign for metro and information is directing us towards a narrow passage through which there are not that many people moving. Concluding that the smaller division of the hall to the left seems to lead to an exit, I assume it is through this opening we have to go. The bright light in the hall makes the signs difficult to read. Due to the kiosks blocking the view, the main entrance between the two station halls are not visible from this point. Looking carefully though, you might see that there is a stream of people who used the middle door from the tracks, moving straight ahead towards what you can assume would be a main hall. The windows above this opening is also a cue, however very subtle.

Stopping point 4

Partner: We find a large information board/map on the side of the passage. The metro stations are marked on the city map, but there is no route map for the metro. The goal is to take the metro to Gräsviken. Now in the narrow passage there are no additional signs towards the metro, so my partner continues in the direction we were heading before we looked at the information board. A few people are moving through the passage.

Me: It would have been useful to have a map over the station here as well, and not just over the city. For people planning to walk from here, it might be hard to orient themselves since there are three different exits, all on different sides of the building. Seeing an orientation map over the station would help to guide you towards the right exit. With only the map over the city it is very hard to know if you are exiting the station on the north, south, east or west side. It is quite dark in this part of the passage and in addition the contrast and colour of the map has faded.

Stopping point 5

Partner: Since the metro usually runs underground, my partner is looking for a way to get downstairs. From this point of the large hall, which the passage ended up in, she spots escalators going down into an opening in the floor in the middle of the hall. She assumes that these escalators lead to the metro, but she's not sure since there's no sign visible from here.

Me: The hall we've ended up in after moving through the passage, seems to be the main hall of the station, however there are a lot less people here than in the first hall we arrived to. This hall is a lot

less visually polluted, and therefore easier to get an overview of. The people who are moving through the hall are mainly taking the escalators downstairs, but a few are using the doors behind to exit the building. Almost everyone are entering the hall from the middle passage from the previous hall, and not using the passage on the side which we arrived through. From this you can understand that there are two main axial lines through the station building; one going straight from the tracks through the first hall and towards the escalators and front doors, and the other one perpendicular, crossing the first hall from the two exits on either side of the building. There are very few signs visible from this point. The one I spot above the exit doors are too far away to be legible. No sign for the metro, which creates confusion since we followed the trail of signs towards the metro so far, and here it seems to stop suddenly.

Stopping point 6

Partner: Now standing in front of the stairs and escalators going down, we see a sign for the metro. It is placed very low and it is only visible when approaching from straight in front. The people moving up and down the stairs block the view of the sign.

Me: Mainly thanks to the stream of people moving up and down the stairs we can assume that the metro is located down these stairs. The sign should however have been placed at a higher altitude to be visible from the large hall of the train station. As it is located now, you don't see it until you are already on your way downstairs. If the main passage between the two halls of the train station would have been more articulated, the location of the stairs and escalators would be very clear and logical, along the same axial line. As it is now, a lot of people approach from the sides which makes the stairs a lot less visible.

Stopping point 7

Partner: When we got to the bottom of the escalators another sign points for the metro down to the right. That is also the direction most of the people are moving to and from, so she draws the conclusion that it is the right way to go, despite not seeing more than a couple of meters ahead due to the pillar construction.

Me: It is very difficult to get an overview of the space due to several rows of massive pillars in this rather narrow passage. Straight ahead you see a wall for a shop, but you don't see any opening through which you can proceed until you've passed the pillar structure.

Stopping point 8

Partner: After proceeding through the pillar structure we found ourselves on some sort of half storey, where the ceiling height is very low and no signs are visible from this point. It is still the movement of the people guiding us forward, since the architecture or the signs do not.

Me: No signs are visible from this point, but looking down the half storey ahead, you can hint some kind of indoor square. The low ceiling height limits the views.

Stopping point 9

Partner: Here, suddenly, you see no less than four signs showing you that the metro is located to your right, down another escalator. It would have been helpful if at least one of these signs were placed earlier along the route, to make you understand that this is where

you were heading.

Me: From not receiving almost any information at stopping point 8, to suddenly seeing a massive amount of signs within a very small area pointing towards the same function is a bit odd. Especially since the metro is already visible from this point. There are no connections with the outside, and the space, however rather wide, feels very enclosed mainly due to the ceiling.

Stopping point 10

Partner: A board showing the departure times is very visible straight in front of you when you get down the escalators. However there doesn't seem to be any information about the metro lines or how to buy tickets. No cashiers or service points visible from here. She spots some machines which might be ticket machines for the metro.

Me: I don't quite understand if I have reached the entrance to the metro yet, or if I need to proceed down another sets of escalators to get to there. A lot of people are moving back and forth here. To the left there are a number of machines which are light blue and pink. This makes me unsure whether they belong to the metro system or not, since all the signs for the metro have been red so far.

Stopping point 11-goal

Partner: She assumes that the ticket machines are for the metro since they are placed close to the entrance, but it doesn't say anywhere. Looking around to see if she can spot an information desk or a map over the metro lines, eventually she finds a map over the public transport system hidden behind a corner.

Me: Here we also realize that the elevator to reach street level is located in the most remote and hidden away corner of the station. If you don't manage to buy your ticket from the machine and you would like personal service, we eventually find out that you have to reverse your steps up to the level of stopping point 9, and instead of taking the escalator down, proceed to the far end of that level. In the right corner there is a service shop for the public transport system. This is completely impossible to find until you learn the symbol for the public transport company, and manage to spot it on the far end wall, behind the crowd of people.

Walk-through evaluation Prague main train station 2013-03-08

Route 1

Starting point

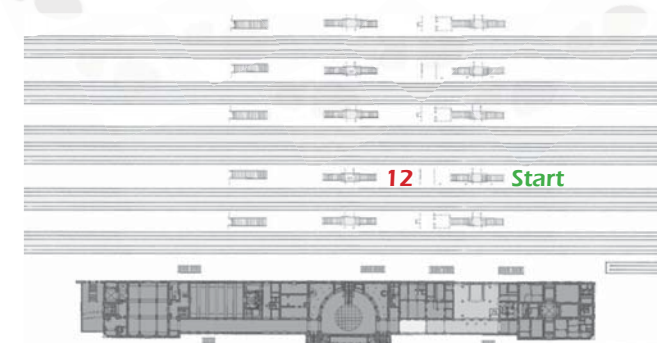
Partner: Follow other people to find the entrance in the park.

Me: The flow of people indicate where the station is located in the park. The glazed elevator shafts up to the parking deck are visible from quite a distance and can be used as directional cues to the station.

Stopping point 1

Partner: Sign with pictogram towards cathedral which looks like the train station, or sign saying Nadrazi? Recognize name Nadrazi, might mean central station, so decide for that option.

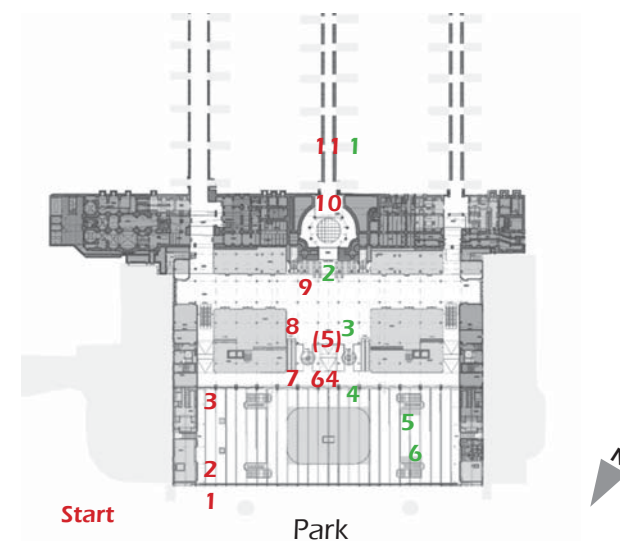
Me: A big blue sign saying Praha hlavní nadrazi and showing a symbol of a train tells you that this is a train station and where the entrance is. There are also markings in the pavement indicating the



Wilsonova road

Bus stops

Parking deck



Start

Park

Prague Main train station

entrance. The red symbol with an arrow is not understandable for people who're not familiar with the system though. There is also a column with a clock on top in front of the entrance indicating the terminal functions of the building.

Stopping point 2

Partner: Once inside past the entrance, looking for tickets. See sign with a lot of symbols straight in front. Proceed forward to look for a ticket symbol.

Me: There are no directional signs legible from the point just inside the entrance. They are all located further ahead in the large hall. Openings for what is assumed to be stairs down to the metro is visible to the right. From this point there are no clues for where the trains are located. We have to proceed forward to read the signs.

Stopping point 3

Partner: The sign says tickets in English towards right. The sign also shows the symbol looking like a cathedral, and one with a train pointing to the right, which confirms the decision.

Me: Flows of people move in different directions here, which means you have to rely on the signage. Platforms are signed both to the right and straight forward which might be confusing. We're looking for tickets first though, so we chose to take right. In this part of the terminal you get the feeling of being in a shopping mall rather than a train station.

Stopping point 4

Partner: We found the ticket office which is located half a storey down. By the size of the ticket office we are pretty sure that these are the tickets for trains and not the metro.

Me: The directional sign says "tickets" and "info" but above the doors to the actual office it only says CD Centrum which would be confusing if the counters weren't clearly visible inside.

Stopping point 5

Partner: We don't know which queue to chose in the ticket office. There are many different displays, and no queue number system. It seems to be different queues for different trains, and not a lot of information in English. We're not patient enough to try to figure out which queue, so we would just go to a counter and ask where to get the ticket for our train.

Once the ticket is bought we try to figure out where to go to catch the train. The displays are unclear and in Czech. It is difficult to understand which column that means platform. We don't understand what are trains and what are buses or anything from the cryptic monitors.

Me: If you're in a hurry it would be stressful not understanding the signs and displays. We guess that the blue lines are trains, and think that the train to Vienna departs from platform 2S, so we'll look for that platform. Just when we're about to leave the ticket office we see that there is actually an information desk in a corner of the room. Obviously it is not visible enough, since we've been in here for around 10 min without seeing it.

Stopping point 6

Partner: South is signed with J and North with S, which is confusing since S normally means south. Since we don't have any other clues we guess that we should proceed towards S, which is North.

Architecturally there are still no clues for trains or platforms. We cannot distinguish any useful clues from the space, so we follow the signs.

Me: The sign makes us hesitate whether we'll reach all platforms both going left or right, or whether you have to chose the right escalator already at this point. We don't want to risk it, so take the right escalator towards S.

Stopping point 7

Partner: The sign with a train and the word platforms directs us up the escalator. This sign doesn't say anything about S or J though, which makes us wonder.

Me: There is an orientation board next to the escalators, however it only shows the directions for different brands of shops, and not the functions of the stations. The elevators are clearly visible, and don't require any detours.

Stopping point 8

Partner: Looking for the platform. Straight in front a lot of signs with departures and times so proceed to that sign to see what information can be received from there.

Me: Again, there are no directional signs legible from this point and we have to move further through the room to read the departure boards. There are a lot of people waiting here, and it is very warm. No clear directions are visible from here, and no platforms or trains either.

Stopping point 9

Partner: There is information in English on this departure board. It confirms our guess that the train for Vienna departs from platform 2S. However there is another sign pointing for platforms both to the left and straight ahead, but it doesn't say which tracks are reached in which direction. Possibly all platforms are reached both ways, but why then sign for South and North if it doesn't make a difference? We chose the middle pathway since it feels most central and it is more populated than the other ones.

Me: The departure times on the board are displayed in the right column why it takes some time for us to figure it out. The boards are located above the shop front to a bakery which creates somewhat of a visual noise. The boards are well lit and has sufficient contrasts though, which make them legible despite this. The markings in the floor indicate openings and passages.

Stopping point 10

Partner: Here there is a sign for 1A and 1B to left and right, so we guess that the platforms come in order so the next one should be platform 2. We proceed forward.

Me: In the tunnel below the tracks the contrast in light is insufficient, which makes signs difficult to read for visually impaired. The ceiling is very low and the tunnel give an unwelcoming impression, probably even more so at night time. The signs are not very well lit and are easy to miss if you don't pay attention.

Stopping point 11

Partner: The next platform was number 2. There are two signs for platform 2. On one of the displays it says Vienna, so we proceed up the stairs to the platform. On the one side there is stairs and on the other an escalator, though the signs indicate that the train to Vienna

is only reached by the stairs, but we assume that you'd reach the same platform also via the escalator on the other side.

Me: The light is better at this junction because the platform is open almost the whole way between the stairs to the left and the escalator to the right. This also increases the visual access between the levels. The signs with the platform number on the walls of the tunnel are displayed at each corner of the opening, facing both the length of the tunnel and the vertical communication, which make them very visible.

Stopping point 12 -goal

Partner: We've reached our goal. On the platform it is a bit unclear from which side of the platform our train departs. The signs here say south and north instead of J and S, which is a bit inconsistent. On the train itself there are no signs of its' destination. There are loud-speaker announcements both in Czech and English, which is good.

Me: Both tracks are called 2, which makes it difficult to know from which side the train departs. The digital display is legible, but the other signs on the platforms are very few and small.

Route 2

Starting point

Partner: We have arrived by train and are going to take the metro to our hotel. We follow the people down the stairs. There doesn't seem to be any other way to get off the platform than down the stairs, so it is pretty straight forward.

Me: The light on the platforms are sufficient and there is good visual access between the platforms. However the signs are not very distinguishable.

Stopping point 1

Partner: There's a sign above the stairs when moving down towards the tunnel, with an arrow pointing to the left and a lot of strange symbols. There are also more people to the left than right, so we assume we should proceed to the left.

Me: The symbols on the sign are not understandable, so we follow the people to the left. The spatial direction in a tunnel is very clear.

Stopping point 2

Partner: We see a sign with a lot of symbols and arrows, and an "i" pointing straight forward, but no sign for the metro. So we proceed towards the information.

Me: The sign is packed with symbols and arrows, but the grouping of information makes it quite easy to read anyway. However some symbols require some thinking before understanding what they mean. There is actually a symbol for the metro, the red one with an arrow, but since we're not familiar with the system we don't understand what that symbol means. The markings on the floor indicate movement to the sides, but the sign tell us to go straight forward for info. There is a lot of people and we don't see any opening or communication path.

Stopping point 3

Partner: We find an information board, however it is facing the wrong direction so we almost missed it. It tells us that the red symbol with a white arrow means metro. We spot an escalator going

down and a sign with the symbol for the metro so we proceed forward.

Me: The information board carries a lot of information but is quite clear once you've spent some time looking at it. From here you also see the escalator and elevator going down, and signs telling you that information, exit and metro is located in that direction.

Stopping point 4

Partner: Looking around for clues, when turning around we spot a sign for information. But we decide not to follow the sign for the main information desk, since we guess that information regards the trains and not the metro. We assume that the metro is down stairs somewhere, so we try to look for it ourselves before asking at the main info.

Me: From this point we finally spot some daylight. The trail of signs for the metro has ended though. We see some railings in the middle of the open space of the hall which could be stairs leading down, so we proceed in that direction. If the railings would have been transparent it would have been a lot clearer though.

Stopping point 5

Partner: We find a tourist information and some ticket machines, but we need to ask at the counter which metro line and station to take to get to our hotel. We don't see any map over the metro lines in the city. There are several openings down to the metro, and we don't understand if they all lead to the same place or if you have to choose the right one to get to the desired metro line.

Me: It might be because we don't trust our capabilities in Czech, that we'd feel better asking for information rather than trying to figure out the way ourselves.

Stopping point 6 -goal

Partner: Opposite the tourist information we find another kiosk where they sell tickets for the metro, as well as a better map over the metro lines. The stairs to the metro is just next to it, so we've reached our goal.

Me: It is rather unnecessary that the kiosk with metro tickets is not better signed, so people have to ask at the tourist information to be referred to another counter just 20 meters across the hall. It is good however that there are many staffed desks where you can ask for information, which feels more reliable and is quicker than figuring things out by yourself.

Walk-through evaluation Berlin Hauptbahnhof 2013-03-08

Route 1

Starting point

Partner: We arrived by train to track 8, and are looking to take the metro to Ostkreutz. Most people move towards the escalators, so we follow them. It is very cold here.

Me: I assume that we have to move upwards from here, since there doesn't seem to be any other way off the platform. When we got off the train I was a bit unsure if we got off at the right station, since there was no clear sign with the name of the station. There is good visual access between the platforms, however from this particular

platform you don't see the levels above through the atrium in the middle of the building.

Stopping point 1

Partner: In front of the escalators there are some information signs. We don't see any direct information for the metro, but for exit, service and information, so we proceed up the escalator.

Me: The sign is quite clear with large numbers and enough contrast. The visual access between the floors are limited here though.

Stopping point 2

Partner: We follow the signs towards the exit and travel centre.

The signs are quite clear and provide information both in German, English and French.

Me: There seem to be blue signs for station related services and places, while other services such as police and parking, are displayed on yellow signs. Still no sign for the metro though.

Stopping point 3

Partner: At the next sign one arrow points towards travel centre and in other direction one points towards the exit. We hesitate since we assume that the metro is located within the building and that we shouldn't have to exit it to find the metro. However the travel centre is not exactly what we're looking for either. We decide to follow the people upwards towards the exit. There also signs for S, U and buses etc. in that direction, so we chose that option instead of the travel centre. However it does feel a bit illogical for the metro to be upstairs. But we can hear trains above us, and it looks like there are platforms above us as well, so we proceed upwards.

Me: The vertical communication is clearly visible in the centre of the open space. Since we arrived at the bottom floor, we don't think that there is where the metro is. We don't know if we're looking for S or U either, or what those letters mean.

Stopping point 4

Partner: There are no trains or metro in this level either so we continue upstairs.

Me: It is difficult to keep orientation when changing the direction of movement at every level. I can no longer tell on what side we arrived, since both sides look very similar. The visual and audible access between the floors is good.

Stopping point 5

Partner: We have to stop and rethink since we still haven't seen any signs for the metro and it is very unclear where we should be heading. There are a lot of people moving in all directions. We find a map, which turns out to be for emergency routes, and no line map. So we decide to go to the travel centre and ask. We're getting tired and cold.

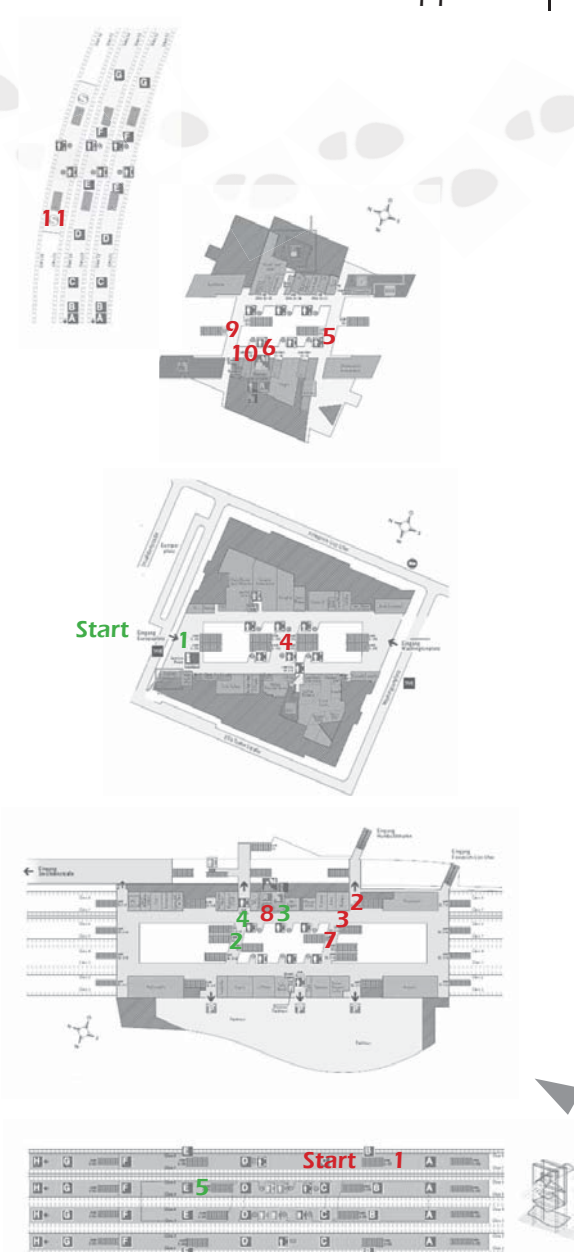
Me: On the floor above us we see and hear trains which according to the sign are the S-bahn. Is that the metro?

Stopping point 6

Partner: After asking at the travel centre we find out that the U is the metro. So we return back down to stopping point 3 where we saw a sign for U.

Me: There seem to be travel centres on each floor. They are well signed and easy to find.

Stopping point 7



Partner: Back at stopping point 3 we find the sign towards U, but we hesitate since there are no people moving in that direction.

Me: It seems like you have to move through a deserted long corridor leading out from the station to go to the U trains, so we chose to ask someone instead. Germans turn out to be kind but they speak very little English, however we think we understand that there is no metro running from here. We get very confused since that is contradictory info to what we received earlier. We figure out that if we're not taking the U trains, it has to be the S trains which we previously saw are running from the top floor. But to be sure we decide to consult the travel centre again.

It is very confusing trying to retrace one's steps up and down through the middle open space since it is symmetrical, and you turn direction at every escalator. The different floors are also very similar, so despite good visual and physical access it is quite difficult to orientate oneself.

Stopping point 8

Partner: Back at the travel centre, there seems to be just a queue for tickets but not for information. So we look for the info ourselves in the ticket machines. They tell us we should take the S-trains. So we proceed up to the top floor again.

Me: The station is very cold, which disrupts our perceptions and wayfinding capabilities. There are loudspeaker announcements, however only in German.

Stopping point 9

Partner: There are a lot of people as we get closer to the S-trains which make us believe that we're on the right track. We're looking for a route map to find out which train we're taking and from what platform.

Me: Once you know that it is the S-trains you're looking for, it is fairly easy to locate them in the station. There should however be explanations in English letting tourists know what kind of trains the U and S lines are.

Stopping point 10

Partner: We've found a passenger centre for the S-trains, by coincidence. Apparently the passenger centre is not the same as the travel centre we visited previously. At the passenger centre we find a fairly logical route map. We conclude that we can take train S5 or S7. The next task is to find a departure board. In here it's warm at least!

Me: At the passenger centre there are manual desks for ticket purchases, which is good for confused tourists like us. Just outside the passenger centre we accidentally find our train on a departure board which is specific for each platform. It would have been better with a large departure board for all platforms. It could have been located for example in or just outside of the passenger centre.

Stopping point 11 -goal!

Partner: We have finally reached our goal, after 45 minutes! On

Me: On the platform the signs for the tracks and departures are fairly clear. We also find printed time tables and a route map. The sign with the name of the station is clear and easy to read. The elevator shafts and railings are glazed so they don't block the view along the platforms.

Route 2

Starting point

Partner: This route starts outside the main entrance of the station. We're looking to buy tickets for the train to Hamburg.

Me: The building volumes lead you towards the entrance, even though the glazed facade doesn't reveal exactly where the doors are until you get closer. There is a clock on the facade, however it looks rather small compared to the building. The name of the station is written on the glass facade but it is not very visible due to the lack in contrast.

Stopping point 1

Partner: The first thing we see after entering the station is a large information desk. However we also see a sign for a travel centre upstairs, so we proceed there to buy tickets. To the right there is a large departure board. Our train departs 18.16. The board is easy to understand since the departure times are stated in the left column as we are used to. Now we spot a sign for a travel centre downstairs as well, which makes us hesitate since we don't know if our train departs from the lower level or above us where we can see trains. When we move a little further towards the escalators we see a map over the station, and also what seems to be regional or national trains at the bottom floor.

Me: Most people move upstairs, so we decide to follow them, despite the contradictory signs for travel centre both up and downstairs. However when we reach the stairs we spot trains below us, change our minds and head for the travel centre at the lower level instead. It is good that you immediately after entering the station realize that the trains are running both on the bottom and top floor. This gives you instant cues for your internal map.

Stopping point 2

Partner: Once at the bottom of the escalator the trail of signs for the travel centre end. So we stop and look around, and behind a column we spot what seems to be a service centre for DB Bahn. We assume it is the travel centre and go there.

Me: If you don't know that DB Bahn is the company running the trains, it would have been difficult to spot the travel centre since the word "Reisezentrum" on the sign was hidden behind a column. The sign above the actual travel centre should be complemented with the name in English as well to be consistent with the directional signs that led you there.

Stopping point 3

Partner: At the travel centre we buy tickets and find information that the train departs from platform 6.

Me: There are some departure boards in the travel centre, however it is not possible to approach them, which make them very difficult to read.

Stopping point 4

Partner: The signs with platform numbers are large and easy to read. When we approach the escalators going down we see a departure board telling us which trains depart from that platform, which confirms us being on the right track.

Me: If you know that the trains are running from the bottom floor, you can figure out that the signs with the numbers are for the plat

forms of those trains. But if you wouldn't see the trains down there, it would be difficult to understand what those numbers stand for. The S on the sign is also confusing to people who don't know that it means the S-bahn. It seems illogical that the local transport runs from the top floor and the national trains run underground.

Stopping point 5 -goal!

Partner: We've reached our goal without too much of a hassle.

Me: The signs on the platforms with the numbers of the tracks and the ones with the letters for the platform position look the same in both size and colour, which makes them more difficult to distinguish from each other. The signs informing you about the position on the platform could have been smaller, since that information is not as relevant at a first stage when arriving at the platform. The signs for the elevators are pretty clear.

Walk-through evaluation Copenhagen Central station 2013-03-10

Route 1

Starting point

Partner: When departing the train we end up behind an escalator in a dark and hidden part of the platform. We're looking to take a bus. All the people are moving in the same direction so we follow them.

Me: We have to walk around the escalator to be able to use it to move upstairs, and the platform is rather narrow on the sides. The visual access is pretty bad since the escalator is quite wide. Behind the escalator the light contrast is bad and signs are difficult to read. The sign with the name of the station is practically invisible in the dark even for unimpaired people. This is also where the elevator is located.

Stopping point 1

Partner: Everyone on the platform takes the escalator upstairs, so we move along the stream.

Me: There is better light on this side of the escalator, however the tube holding the escalator is quite dark as well. There are no signs telling you where this escalator takes you, but it seems to be the only way to exit the platform. The visual access to the station hall is not sufficient.

Stopping point 2

Partner: When looking carefully we eventually spot a sign for tourist information to the right, at quite a distance though. On the same sign it also says "bus", so we move in that direction.

Me: The sign for no smoking is stealing attention from more relevant signs. We also spot a sign for DSB information. If you're not familiar with the system in Denmark it is impossible to know what DSB means. People here are moving in all directions, and cannot be used as a wayfinding cue.

Stopping point 3

Partner: Once we've reached the sign where it said tourist information, we can't find it! There's only a map over the station. Eventually

we realize that the tourist information is located outside the station on the other side of the street. That's not what we're looking for, so we head for the DSB information and ticket office instead, of which we figure out the location from the map. We assume that DSB also run the buses.

Me: There is not any "you are here"-dot on the station map, otherwise the map is quite clear. The signs disappear a little in the visual noise, which might make them difficult to distinguish for visually impaired. If you are not good at reading maps it would have been a bit tricky to find the ticket office from this spot. However at stopping point 2 the signs for it were pretty clear.

Stopping point 4

Partner: Since we know Swedish we figure out that "billetsalg" means ticket office, but there are no signs in English.

Me: The signs for the ticket office are facing just one direction, which made them difficult to spot at the angle we approached from. We also realize that there are two different signs for "billetsalg", which makes us wonder if they lead to the same ticket office, or which one you're supposed to use. We decide on the closest one.

Stopping point 5

Partner: We find some ticket machines, but we don't really know how to use them or if they're for the bus traffic or not, so we go to the staffed desk to ask how to buy tickets for the buses.

Me: It is darker than in the main hall so it takes some time for the eyes to adapt. There are also quite strong contrasts in light in this part of the terminal hall.

Stopping point 6

Partner: Just inside the doors to the ticket office we find a staff member who we ask for information. She told us that you can pay directly on the bus with cash.

Me: It is very warm in here which we appreciate. Apparently the system is not clear enough cause they have had to put up a sign explaining which counters are for which services, and that there is no queue number system. They use different colours to distinguish the different types of counters. There are departure boards for trains in the ticket office but not for the buses.

Stopping point 7

Partner: We remember that we saw signs for the buses when we were looking for the tourist information previously, so we move in that direction.

Me: One of the doors to the ticket office is not adapted for the mobility impaired, which means that they have to use the other more hidden door around the corner.

Stopping point 8

Partner: We don't find a route map for the buses just outside the exit of the station, but assume we'll find that information if we proceed forward to the closest bus stop.

Me: We both see and hear the buses just outside the exit, so they are easy to locate.

Stopping point 9

Partner: After crossing the bus lane we find a route map and time tables at the bus stop. However there are no street names on the map. We eventually figure out that we should take bus 40.

Me: There is a terminal map with the different bus stops and bus lines, so we figure out from which stop bus 40 departs. On the terminal map we see that there should be an information board just outside the entrance to the train station, which is a good idea and location, however the display was not working and therefore of no use.

Stopping point 10- goal

Partner: At the bus stop we find a time table for bus 40, and we've reached our goal.

Me: The digital displays on the bus stops are very small, unclear and provide insufficient contrast.

Route 2

Starting point

Partner: The starting point for route two is in front of the main entrance, and we're looking for the train to Kastrup airport.

Me: The main entrance is well articulated, however when approaching the station from the city centre you approach at an angle which makes the main entrance less visible behind the wing of the station. You have to walk around the corner of the building opposite to enter the parking lot in front of the main entrance. Once you've entered this open space though, the main entrance is easy to locate. The side entrance seems to be the most used entrance. There is a digital clock above the entrance, however barely visible. Wayfinding would have been improved if the front doors were more transparent.

Stopping point 1

Partner: Directly in front of you once entered the main entrance you see some departure boards, and ticket machines on the left side.

Since we assume that the airport is a quite common destination we believe we'll be able to buy our tickets at the machine, so we try.

Me: To the left there is also a ticket office, which is not very visible from this point. One of the machines block the revolving door to it and the only visible sign says "stationskontor" which doesn't tell you anything about tickets.

Stopping point 2

Partner: There are a few different ticket machines, which might be confusing if you don't know which company it is that run the trains to the airport. However there are more DSB machines and they're also larger than the others. It seems to be quite easy to buy tickets from the machine, though the machine doesn't tell you exactly which train to take or from which platform. We decide to ask in the ticket office.

Me: Now once we have moved a bit further we see that it says ticket office on the revolving door, but that sign is not visible from the entrance.

Stopping point 3

Partner: The staff at the ticket office tell us that the tickets are valid for one hour after purchase, which was not mediated at the machines. We check the departure boards in the ticket office for the platform number.

Me: It is good that the ticket machines are complemented by staffed desks, since oral information is quicker and more reliable in some cases.

Stopping point 4

Partner: Having exited the ticket office we don't see the escalators to

the tracks directly due to the shops located in the middle of the station hall, but we do spot signs for our platform, number 5.

Me: From this point you don't understand architecturally where the tracks are or in what direction they run. The visual and audible access between the station hall and the platforms are not sufficient.

Stopping point 5

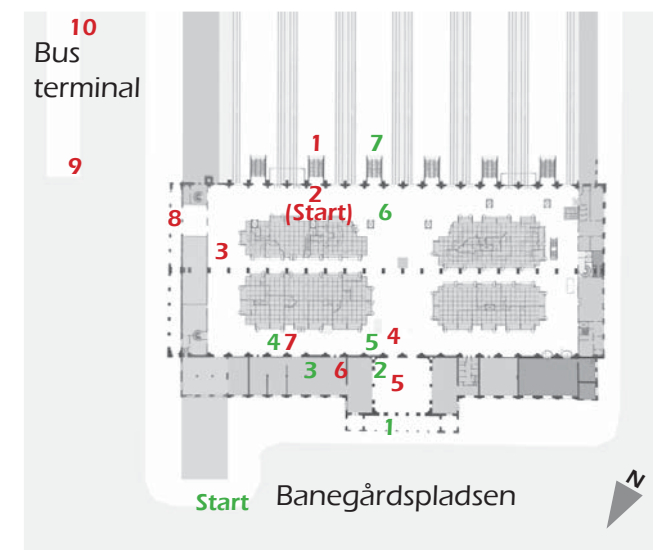
Partner: We have found a stair leading down to platform 5, but it looks very narrow and dark. We decide to look for an escalator.

Me: The display is difficult to read due to the strong light in the background. It feels wrong to take a narrow and dark stair down, where you don't see the platform or where the stairs leads from this point. If you have a lot of luggage or are mobility impaired, and would like to use an elevator or escalator instead, those are difficult to spot from here. From this point you don't know that there are other ways to get down to the platform, and if you're in a hurry you might not want to risk looking for another communication even if you'd prefer not taking the stairs.

Stopping point 6

Partner: Proceeding through the middle of the station hall we find the elevators and escalators down to the different platforms. However not sufficiently signed.

Me: There is no main departure board where most people would stand or sit and wait, but many small ones here and there. In the middle of the station hall there is a staffed information desk. The text on the information booth is a bit difficult to read due to the shiny letters on the glass background.



Copenhagen Central station

Stopping point 7 -goal!

Partner: We've reached our goal and our train to the airport.

Me: The signs for the track numbers are very small and discrete while the signs with letters for the different positions at the platform are large and clearly visible. I believe that the track numbers are more relevant and should be displayed more clear. The visual access between the platforms is good.

Interview with Carl Welin and Lena Åberg 2013-02-27

Bussterminalen ingår inte i den nya detaljplanen. Den renoverades och gjordes om runt 2006. Nu håller dom på att göra konstruktion-sundersökningar, geundersökningar etc... Dom tittar på hur dom ska kunna flytta funktioner, jobbar parallellt (?)

Varför göra om nu? Knutpunkten ritad för en annan tid, mkt ytor som inte är utnyttjade idag. Det ska bli en byggnad som är bra för staden, identiteter, volymer, struktur(??) idag: svårt att identifiera var stationsfunktioner vs kontor är. Det ska bli tydligare ingångar till olika funktioner.

Rulltrappor, hissar, trappor som går ner till perrongerna ägs och underhålls av Trafikverket. (dåligt städade?) Knutpunkten öppen dygnet runt. Medför problem vissa tider på dygnet...

Tidigare ägare var Nordic Land (?). Många kortsiktiga tidigare ägare/investerare... inte varit bra i längden... Den tydliga baksidan är ett problem, särskilt i framtiden när områden på pirerna kommer utvecklas/exploateras.

Det var många problem från början med Knutpunkten, det byggdes inte som det var ritat. Pengarna tog slut. Blev klart precis i lågkonjunktturen... Reseströmmarna har ändrats sen dess, då dominerade färjetrafiken. Inte alls mkt tåg från början. Öresundstågen och Väst-kustbanan kom 1999-2000. Då uppsving för tågen. Bilen dominerade planerna när knutpunkten byggdes. All parkering utnyttjas inte idag.

“Helsingborg blev en stor stad när Knutpunkten kom”. Före sin tid, kombinera trafikslag. Mkt uppmärksamhet när byggdes. Från början butiker i 3 plan. Genomgående trafik, centralt läge och samlar alla trafikslag: före sin tid.

Referens Amsterdam, som kommer nu! Knutpunkten mkt tidigare! Terminalen 3 har en annan ägare. Wihlborgs äger Terminalen 1, 2, 4 och 5 (?)

Vid detaljplanearbetet: Helsingborg stad och Wihlborgs började väldigt långt från varandra. Men bra arbetsmetod, hittat viktiga

värden innan man började skissa/rita, blev bra till slut!

Ska bli tydligare identitet, orientera byggnaden 360 grader i staden. Inga baksidor! Modellbyggande under processen. Planeras en bro mellan piren och Knutpunkten. Färjetrafiken är riksintresse: garantera vissa strömmar/trafik/funktion. Mest godstrafik idag. Kanske tunnel mellan Helsingborg och Helsingör, söder om city. Men långt fram i tiden!

Enkätundersökningar? Samverkansgrupper. Nöjd kund/resenär undersökningar av andra aktörer. Invändig utveckling (?) Stationsförvaltare: Torgny Johansson. Hemsida om projektet på G.

Malmö C stängs av delar inuti under nattetid. Kanske kan göra samma sak på knutpunkten? t.ex. restaurangdelen...

Interview with Ivar Krepp 2013-03-29

Tågplattformarna och tågtunneln ingick inte i tävlingsprogrammet för Knutpunkten. Trafikverket stod för utformningen av plattformarna. Tunnelbygget var redan igång när arkitekttävlingen startade.

Kvarteren och gatustrukturen i staden styrde indelningen av de olika byggrätterna/byggnadsvolymerna av kontorshusen. Beställaren var kommunen. Byggherren var ett konsortium (kon-sortiet) som bestod av JM, MPL, Riksbyggen och Peab. Dessa bolag stod för byggandet och VBB (Sweco) ansvarade för arkitekturtrin-garna.

Tunnelbygget: under havsnivån, vilket skapar ett stort uppåttryck. Detta gjorde att man var tvungen att förankra tunneln i berg-grunden. Först lera, sen sandsten 5-6m ner. “Vi” fick inte arbetet med Globen, men blev inbjuden att presentera ett förslag för Helsingborgs kommun till Knutpunkten. Det är bara vissa stora kontor som klarar av så

stora projekt. Men VBB sa att det skulle kosta 2,5 ggr så mkt för ritningsarbetet än kommunen hade erbjudit. Därför tackade “jag” nej till att vara med i tävlingen. Ingen idé att vara med i en tävling som man inte är ganska säker på att vinna eftersom det kostar mkt pengar. VBB hade förlorat pengar på Globen-tävlingen som dom inte vann. Men kommunen ringde och bad dom vara med i tävlingen ändå. I slutänden kostade ritningsarbetet hela 5 ggr så mkt som ursprungspriset p.g.a. en utdragen process. Leif Augustsson var projektledare på kommunen. Unikt för Helsing-borg att moderaterna och Sossarna samarbetar, vilket medför att det blir mkt gjort i kommunen. Man kan satsa mer långsiktigt.

Den krökta glasfasaden bryter upp byggnadshöjden mot torget, visar kommunikationsstråket och ska associera till sjöfarten. Den nya terminalen skulle vara ett ansikte mot staden. Knutpunkten utfor-mades främst som en färjeterminal, därför marin inspiration.

Konstruktionen: stål och prefabricerade element. Rumsligt tydlig riktning mot färjorna. Terminalen dimensionerades för färjetrafiken.

VBB vann tävlingen tack vare schemat över flödena. Man skulle inte behöva röra sig genom huset för att orientera sig, utan kunna se alla riktningar från en punkt när man kom in genom huvudentrén. Lätt orientering, man skulle se rulltrapporna upp till färjeterminalen, rulltrapporna ner till tågen och rakt fram till bussterminalen från samma punkt. Den centrala hallen är där man fattar beslut, alltså viktig. När “jag” var där för 10 år sedan hade dom proppat fullt med små kiosker, holkar, i terminalen. Inte tanken från början! Rörigt!

När ritades så var det många små restauranger som skulle hyra på andra våningen. Men precis när bygget var klart så hade många av dom “försunnit”. Istället hyrde McDonald's en yta, som med tiden expanderades. Kommersiellt koncept, för att tjäna så mkt pengar som möjligt. Men det var inte ursprungsidén. Bara stora företag som har råd med hyran, och ägaren till huset ville tjäna pengar. För att det ska fungera med små företag behöver dom varandra, annars har dom inte råd med hyran.

Under projektets gång började nya färjor gå till Helsingör. De gamla färjorna hade tagit ca 30 min, och många Helsingborgare “turade”, alltså åkte fram och tillbaka. Då blev det lagom lång tid för att t.ex. äta middag på ca 70 min. Men de nya färjorna tar bara 20 min. Då föll hela idén med restaurangerna (borde de inte va tvärtom föresten??).

Bara VBB's förslag som lyckades lösa allt i en punkt, i en central hall. De andra förslagen lyckades inte knyta ihop det. Kommunen ville ha ett hotell, som i programmet var föreslaget att placeras i ett av de som idag är kontorshus. Men VBB bestämde sig för att bryta mot programmet och placera det på ett annat ställe. Det blev en ekonomisk fråga tillslut. Ett hotell vid vattnet är värt med pengar!

I programmet stod det att man fick bygga fram till ca 12 m från kajen, och alla de andra förslagen hade placerat terminalen så långt fram. Men VBB tyckte att det skulle vara bra med ett torg framför ingången. Funkade bra med korttidsparkering där också. Dom placerade hotellet vid vattnet, men bröt mot programmet för det låg för nära kajen. Men kunde motivera det med att den allmänna ytan fortfarande var lika stor, bara på en annan plats. Ett torg istället för en lång kaj. Ett motiv var också att minska det mentala avståndet från staden till färjorna. Om man la en byggnad emellan så upplevs avståndet som kortare, eftersom staden då går ner hela vägen.

Höjden motiverades med att ett fungerande hotell måste ha minst

200 rum, samt att den följde höjdsplanen i området, husen och båtarna (de nya färjorna är större dock). På den tiden fick man inte ens ta upp diskussionen om att bygga på höjden. Ett förslag med ett 14 våningshus blev ratat direkt. Man fick inte bryta stadens siluett från vattnet... inte "störa stadsprofilen".

Effektiv beslutsprocess, Ivar hade bara möten med beslutsfattare/direktörerna på bolagen i konsortiet. Kapar beslutsprocessen, effektivt att få besked direkt. Bara 5-6 personer på varje möte. Då kunde man inte komma med några ursäkter som att man inte varit med på det mötet etc...

Anledningen att man placerade kontor också mot vattnet var att man tyckte att parkeringsdäcket såg så fult ut från havet och färjorna. Så man placerade ett kontorshus som blockerade det fula däck. Blev bra för det visade sig att tullen behövde lokaler. Man hade också en idé om att man skulle kunna åka in i parkeringshuset från torget, för t.ex. hotellgäster.

Angående kommunens planer på att exploatera pirerna, och då måste bygga bort baksidan på Knutpunkten samt eventuellt bygga en bro mellan piren och Knutpunkten, menar Ivar att folk inte vill gå på broar. Det blåser och upplevs som längre än det är. Då tycker han att det skulle vara bättre att fylla igen den hamnbassängen och bygga hus hela vägen, så att staden fortsätter fram till vattnet. Eftersom kontorshuset av Knutpunkten visuellt hör till staden och inte till hamnen.

Tanken med bussterminalen var att man skulle se bussarna från gatan genom öppningarna. Och att ankommande med buss snabbt ska komma ut på stan. Det "nya" sättet att organisera bussterminaler med så kallad dockning var inte utvecklat på den tiden. Den första sådana terminal var i Uddevalla. Det godkändes av facket till slut, men bussarna blev utrustade med backkamera.

Knutpunkten skulle varit för trångt för dockningsterminal, samt att det skulle ta mkt yta eftersom bussarna då skulle behöva vända inne i terminalen för att kunna köra ut igen.

Högst upp i lyktan, där det är plastikkirurgmottagning nu, var det konferens- och kurslokaler för kontoren i Knutpunkten. Tanken var också att man skulle kunna gå ut i lyktan på avgångs och ankomstvåningarna för att titta ut. Men det är stängt för alla som inte har biljett till färjan nu.

Gångbron på andra våningen över Järnvägsgatan var ett krav från kommunen från början. Någon trafikniss hade kommit fram till att det var för mkt trafik på Järnvägsgatan för att folk skulle vilja vänta vid övergångsstället. Så då skulle man istället ta en gångbro. Men VBB argumenterade att folk ogärna vill röra sig på höjden, varken på bro eller tunnel. En meter i höjd känns lika långt som att röra sig 100 m horisontalt. Folk vill se målet och vägen dit, och röra sig i det rummet, och fatta beslut där. Visuell access. VBB vann argumentationen genom att jämföra med Drottninggatan/Klarabergsgatan i Stockholm som har mkt mer trafik. Där skulle folk aldrig gå ner i

tunneln under bara för att komma över gatan. Men de landgångar på andra våningen inne i terminalen blev kvar även efter att gångbron slopats. Man tänkte att man skulle kunna möblera dessa, t.ex. med bord från restaurangerna och kanske någon buffédisk eller bar, för att befolka rummet. Men sen föll som sagt restaurangkonceptet, och idag är dessa ytor dåligt nyttjade.

Ivar menar att restaurangidén inte fungerade för att ägarna/förvaltarna hade för kommersiella intressen och ville ta ut så höga hyror som möjligt. Kortsiktigt tänkande för att tjäna pengar.

Anledningen till det långa taket längs fasaden på entrésidan var att turistbussar och avlämning och upphämtning av passagerare skulle ske där. Och att man då skulle stå under tak och vänta med sitt bagage. Därför blev taket så långt, för att bussarna tog mkt plats. Andra våningen vid restaurangerna var mkt öppnare från början. Skulle vara mer som ett öppet långt rum ovanför "tågterminalen". Personalrum för restaurangerna låg då samlat en våning upp. u har man byggt för på andra våningen med toaletter och personalrum. Kommunen som ville ha separat trappa och rulltrappa upp till restaurangerna (vid utgången till bussarna). Ivar håller med om att utrymmet bakom spiraltrappan blivit konstigt... som en tom glasbubbla ingen använder.

Anledningen att det är dålig visuell access mellan terminalen och tågplattformarna är att man inte ville ha in ljudet från tågen in i terminalen. Skulle vara en trevligare miljö i terminalen. Bussterminalens inomhusdel krympte under projektets gång för man insåg att det inte behövde så många busshållplatser. Skulle vara öppet i varje "gatt" till bussterminalen. Idag bara en öppning. Tågspåren för godståg fram till färjorna fick inte flyttas på en mm! Det skulle vara en blomsteraffär vid entrén från parkeringen, med dubbel takhöjd i "glasbubblan". Så man skulle se grönt från parkeringen. Det var också tänkt att vara mkt träd på parkeringsdäcket. Och en trevlig miljö för de som jobbade i kontorshuset och hade entré från parkeringsdäcket (eftersom svårt att stanna/parkera på gatan framför byggnaden). Skulle se havet därifrån, därför inget mer parkeringshus, istället det stora däck. Trapphusen i kontorshuset i liv med gatan för att komma ner till gatunivå.

Biljettförsäljning/service skulle ha mkt yta och i ett bra läge. Tydligt från entrén. Nuvarande placering av Skånetrafiken-butiken dålig. Gömd bakom grejer...

Fanns tre armar från lyktan till olika färjor. Idag bara en? När det fanns tre var det en vits att fördela flödena i en lykta. Men om bara en, så är den ju onödig.

Egen entré till kontoren (vid bagageförvaringen), men man kan också komma dit inifrån terminalen.

När planerade Knutpunkten kunde man inte veta att flödena skulle ändras så mkt så snabbt. Man planerade för de trafikflöden som var

då. Sen när Öresundsbron byggdes minskade färjetrafiken mkt. Ivar tycker ändå att Knutpunkten stått sig bra i så pass många år, nästan 25!

Trafikflöden då:

Färja 44%, Buss 15%, Bil 23%, Tåg 4%, Gång/cykel 14%