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Intermediate version of scenarios based on user goals and practices



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2 Introduction

Within task 4.3, 'Exploring user innovation in 3D city navigation', we investigate how people would interact and engage with 3D navigation in a city environment through explorative in-depth user research. It is only through involving users in the early phases of design and development that new products and services have a better chance to be in line with the expectations and practices of future professional and private (end) users. This fits in the current trend of user-centred design (Veryzer et al., 2005; ISO, 1999) or better 'people-centred design' (Wakeford, 2004). In this way we not only support the user-oriented development of 3D city environments, but we also inform user driven innovation and business opportunities originating from these kind of environments. For identifying this kind of business innovation, we need to start from the user practices and everyday life. In order to get an in-depth view in the latter we applied multi-method ethnographic research approach.

In order to first get a horizontal state-of-the-art overview of possible innovative domains regarding the use of 3D city environments we did a literature study, starting in April 2008. This desk research focused on current interdisciplinary views of user practices in relation to 3D worlds, navigation, mobility and city applications in several disciplines such as media and communication studies, HCI, sociology, geography, ethnography, architecture and design. The insights we gained through the desk research led to the creation of preliminary user scenarios that would form the foundation for the further empirical user research.

These draft user scenarios were then discussed in depth and revised with the (technologically oriented) project partners from research and industry (EDM and Androme) in two meetings (June 3rd and June 25th 2008). The goal of these meetings was to identify services that would offer a genuine added value for users in a 3D city environment, but that would also be in line with the technological trajectory of the project partners involved. The input from the first meeting led to the development of a first work scenario (see appendix). The (technical) feasibility and opportunities of this work scenario were discussed during the second meeting. As a result of the findings from the literature study, internal discussions and the second meeting we identified four areas within which a 3D city model and its related services could have an clear added value from the user perspective: tourism, real estate, urban planning and public transport. Based on final internal meeting with user experts and researchers,

we decided to focus on two of the four areas, namely the ones that seem to have the most potential in relation to 3D city service innovation: tourism and real estate.

- Tourism was selected because the market of (mobile) city applications is gaining momentum in the touristic sector. We find an increasing number of initiatives for applying (mobile) internet services and locative media in a tourist city environment. With the 4.3 research track we aim to analyze to what extent these kind of services can be complemented with 3D city model applications.
- Real estate was assessed as relevant by the experts from the perspective that 3D visualization of cities could offer significant added value for people looking for and assessing a house or apartment. In addition, based on our desk research, this seems to be a domain that has received very little attention in the current literature on service innovation in 3D environments.

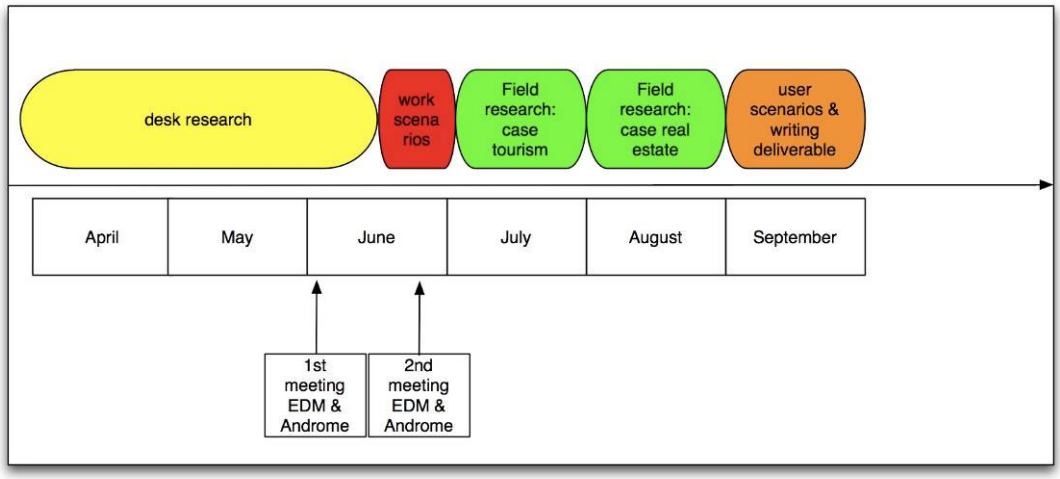
For the next step we started the empirical field research by identifying some archetypal users within the areas of tourism and real estate. This refers to the professional and private users that are viewed as the most eligible persons to engage in a 3D city environment. Within the domain of tourism, we narrowed our scope to city trips due to the fact that the URBAN project also focuses on urban environments. Within the field of city trips, we identified both the travel agencies and city trippers as archetypal users. For the real estate market, we were focussed on real estate agents as well as prospective home-buyers/renters.

	Tourism (city trips)	**Real estate**
Professional users	Travel agents	Real estate agents
Private users	City trippers	Prospective home-buyers/renters

Table 1: Overview of architypal domains and users

As soon as we identified these archetypical users, we selected and investigated representatives of these user types on different levels by means of a combination of ethnographic methods. This means we interviewed real estate agents, travel agents, tourists who were on a city trip in Brussels, tourists who just came back from a city trip and people that were looking for a house to buy or rent.

The outcome of this task is an intermediate version of user grounded scenarios that define the possibilities and constraints of a 3D digital city environment.



Picture 1: Time line of research process

In order to guide you through this report, we give an overview of the content.

First we start with findings from the general literature on the application of virtual 3D cities within various domains, such as tourism, gaming and urban planning.

Then we proceed with the two specific cases on which we have focused in the empirical research: tourism (city trips) and real estate. Each case is introduced and contextualised with findings from relevant literature before continuing with the actual findings of the field research on representatives of the archetypal user categories. Within the case-specific literature, also the most relevant case studies and related websites are highlighted.

We end with the user scenarios. The explorative literature study together with the empirical study has generated the next iteration of more user-grounded scenarios for city trips and real estate.

3 Domains of user interaction with 3D city environments

The URBAN project aims at the more effective and efficient handling of 3D data for urban environments. In this part of the report we focus on the areas of user interaction with the visualisation of virtual three-dimensional cities that we identified in the current literature. As a side remark we can say that from a societal point of view the focus on cities is well justified since the world population is migrating into urban centres at an incredible rate. According to the estimations of the United Nations, 60% will live in cities by 2030.[1] Castells (2002), geographer and one of the leading sociological thinkers on the network society, also argues that by mid century, between 2/3 and 3/4 of the total population will be living in some kind of urban agglomeration. Therefore an increasing number of citizens will experience their everyday life in a city. Given the prominence of ICT and broadband networks in these places - often acting as hubs in the network society - this will increasingly also be merged with an online experience of city environments.

According to Burigat &Chittaro (2007), 3D virtual environments are used in fields as diverse as construction, manufacturing, medicine, education and psychotherapy. However, considering the scope of URBAN, here we only focus on user interaction with 3D city visualisation. Researchers within various domains are developing and working with 3D models of cities. In this part we give a brief overview of domains where we find users interacting with 3D models of real and virtual cities. Thus the focus is on technological examples of 3D city models that are used or tested by people in real life. In our literature study we found four domains of virtual 3D cities with user interaction that are of special interest for URBAN: gaming, tourism, navigation-wayfinding and urban planning. Each of the domains is briefly discussed by way of exemplary research projects and/or business cases. This also indicates that no major projects or cases are already available on other domains than those mentioned (e.g. real estate, public transport etc.).

3.1 Gaming

The gaming industry was actually one of the first domains to experiment with 2,5D and later 3D worlds, also representing virtual 3D cities, in order to improve the user's immersive experience and enjoyment in games. Obviously player enjoyment is the single most important objective for computer games (Sweeters & Wyeth, 2005). 3D

[1] UN Department of Economic and Social Affairs. World Urbanization Prospects: The 2005 Revision, p. 1.

virtual environments (VEs) can be fictional or can simulate real world places and activities with which individuals can interact. Networked virtual environment is a software system in which multiple users from all around the world can interact with each other in real-time. In relation to games this typically refers to examples like the Massively Multiplayer Online Role-Playing Gamesor MMORPGs. The objective of these environments is to give users a sense of realism and to create an immersive experience by incorporating realistic-looking 3D graphics and sometimes even stereo sound. By doing so, the user has the feeling he is 'there', that he is actually present in the virtual world (Manninen, 2001).

Research within the domain of 3D VE computer games particularly focuses on navigations issues in VEs (Chen & Stanney, 1999; Burigat & Chittaro, 2007), the way gamers interact with VEs (Manninen, 2001), usability issues and the way gamers experience VEs.

A well-known and quite mediatised internet-based 3D virtual world game or MMORPG is Second Life, launched in June 2003. It allows users, called 'residents', to interact with each other through avatars and provides a social network service. Residents can explore, meet and communicate with other residents, socialize, participate in individual and group activities and trade services and items with each other (using Linden Dollars as virtual money). In fact the residents create most of the content of the world themselves. A 3D modelling tool, which is built into the client, enables the residents to build virtual objects. Hence user-generated content comprises a big part of the activity within Second Life.[2]



Picture 2: Screenshot Second Life

Next to these pure fictional 3D environments, there are also games that use real life city environments without (a lot of) 3D visualization. Since the end of 2005 the Belgian company La Mosca develops GPS-city games for groups. For example the location-based game 'The Target' enables groups to play police officer and robber with a smartphone within the city as setting. You can follow al the game events on the display of your mobile phone, while a GPS registers all your movements and passes them on to enemy and friend.[3] According to its inventor, Kristof Van Den

[2] http://en.wikipedia.org/wiki/Second_Life Consulted on: 30 September 2008
[3] http://www.lamosca.be/index_du.htm Consulted on: 22 September 2008

Branden, 'The Target' is the first commercial GPS-game in the world. Similar games already existed, yet they were all developed by scientific research groups or artists' collectives and thus not commercially released.[4]

Games that combine both real life city environments and 3D visualization are still quite rare.

Although the existing virtual environment applications are very diverse, some tasks, like navigation, are common to all VE applications and are crucial even when they are not the main goal of the user in a VE. Navigations aids help users perform wayfinding tasks in VEs (Burigat & Chittaro, 2007). The following two parts will elaborate on 3D tourist and wayfinding city applications that have integrated navigation aids.

3.2 Tourism and navigation

This part focuses on tourist applications that offer 3D city graphics. Clearly there exist many city applications without 3D graphics. Yet the trends and applications on the market of mobile digital city guides (without 3D graphics) will be discussed later.

Based on the literature we make a difference between different kinds of virtual environment technologies. In this section we will look at applications that work with augmented reality on the one hand and 'complete' VEs on the other hand.

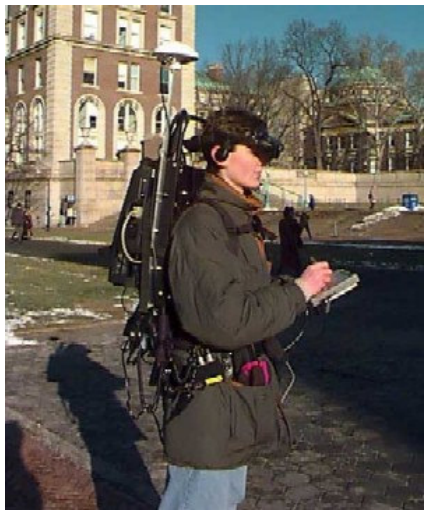
3.2.1 Augmented reality

Augmented reality (AR), '*in which 3-D virtual objects are integrated into a 3-D real environment in real time*' (Azuma, 1997:355), is a variation of virtual environments. '*AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it*' (Azuma, 1997:356). According to Azuma (1997), all AR systems have the following three characteristics: combines real and virtual, interactive in real time and registered in 3-D.

The concept of augmented reality is accomplished by using see-through displays, which enriches the user's view of the world by overlaying visual, auditory, and even haptic, material on what he experiences.

[4] Debackere (J.). Gamen in 't stad. In: *De Standaard*, 4 mei 2007, p. 36.

Within this domain Feiner et al. addressed the development of a personal 'touring machine' that provides users with information about their surroundings. The researchers created a prototype mobile, augmented reality application that explores approaches to outdoor navigation and information seeking on their university campus. The prototype assists users who are interested in the university's campus by overlaying information on the nearby buildings on the campus. The information is presented and manipulated on both a head-tracked, see-through, head-worn 3D display and an untracked, opaque, hand-held 2D display with stylus and track pad. (Feiner et al., 1997) The picture illustrates the prototype campus information system.



Picture 3: prototype campus information system

Noticeably the prototype 'touring machine' still looks very primitive and very unpractical for the user. Yet it is important to keep in mind that the prototype dates from 1997 and the field of virtual environment technology advances very rapidly.

3.2.2 'Complete' Virtual Environments

According to Vainio et al. (2002) a 3D revolution has taken place and is shifting towards hand-held devices. So the following 3D VE applications are already more advanced and do not work with augmented reality.

A good illustration of this trend is the 'Deep Map' research project, conducted by the universities of Heidelberg and Stuttgart in Germany and funded by the Klaus Tschira Foundation and some industrial sponsors. The project addressed the design of the prototype of an intelligent next generation spatial information system. It realized the vision of a future tourist guidance system that works as a mobile guide and as a web-based planning tool.

The web-based system can be used for virtual walks through today's and yesterday's Heidelberg and for pre-trip planning. The mobile version enables the user to generate personal guided city walks and aids the navigation through the city. The tour will take into account personal interests and needs, social and cultural backgrounds (e.g. gender, age, education) as well as other circumstances such as weather, time, traffic conditions, financial resources, etc. These two faces of one

system make it possible to help the user at home as well as on his visit. (Malaka & Zipf, 2000) The picture illustrates the Mobile Deep Map System (prototype) based on a wearable computer.

The 'Tre-D' research project, co-ordinated by Tampere University Hypermedialaboratory (Finland), is also situated in the domains of tourism and navigation. Tre-D was a co-operation project in the Infocity program of the eTampere project. The objective of the Infocity program was to make Tampere a model city in the development towards the information society. eTampere was an extensive collaborate project to which the local educational and research institutes, businesses, government, organisations, and communities contributed their own expertise and input.[5]

The Tre-D project ended in the beginning of 2002. It aimed at providing local residents and tourists with information on the city of Tampere. The information can be found by means of a 3D virtual model of the city that is connected to a database and a map. The database allows users to locate specific information such as buildings or company names, addresses, products, phone numbers, etc. It is also possible to just take a tour through the virtual city of Tampere (City Walk) or view the panoramas of the city.

There are two search options. '2D Map-search' enables users to search for services and locations (e.g. hotels, restaurants, public transport, etc.) in Tampere and to see the results on the city map. In '3D-search' the search results will also be in a 3-dimensional Virtual City model and you can actually walk to the place you are searching for.[6]

Within the Tre-D project, researchers have developed a 3D city info application for mobile users. The application enables to view the locations of services and real places in an intuitive and user-friendly way. The model is an early prototype of the future mobile services. The specific aim of the 3D City info model was to support users to navigate better and to learn the structure of the graphical space with the help of the real-time connection between the 2D map and the 3D model based on landmark knowledge. The researchers emphasize the importance of working with landmarks. In wayfinding, we recognize the environment with the help of landmarks. Therefore it is essential that navigation tools, such as a 2D map and a 3D world, also provide these landmarks. The research shows that search and visualization of

[5]http://e.finland.fi/netcomm/news/showarticle.asp?intNWSAID=37052 Consulted on: 30 September 2008

[6]http://www.uta.fi/hyper/projektit/tred/english/index.htm Consulted on: 4 June 2008

location-based information of a city becomes more intuitive with life-like 3D. The users recognized landmarks and found their way in cities more easily with the 3D model than with a symbolic 2D map. (Rakkolainen & Vainio, 2001)

Rakkolainen & Vainio (2001) conducted field trials and usability studies in Tampere (Finland) on the added value of 3D graphics on navigation and wayfinding in cities. Based on usability tests the researchers argue that 3D environments help in understanding spatial relations better and thus can improve task performance and navigation. (Rakkolainen & Vainio, 2001) So it is not surprising that several navigation applications are working or start to work with three-dimensional imagery, as the following part will show.

3.3 Navigation and wayfinding

Another domain where user interaction with 3D city models has particular value is basic navigation and wayfinding. Current stand-alone navigation applications, like TomTom, Mio, etc., are mainly based on 2D representation, but the trend is to transform these into 3D city models. For instance in 2007 Mio Technology, one of the producers of portable navigation devices in Europe, launched True 3D map representation. The new MioMap 2008 map software contains a thousand 3D orientation points and a 3D map representation to represent the local landscape. Consequently users can see both local geographical characteristics, like hills and valleys, and important buildings in 3D on the map.[7]



Picture 4: 3D representation in MioMap 2008

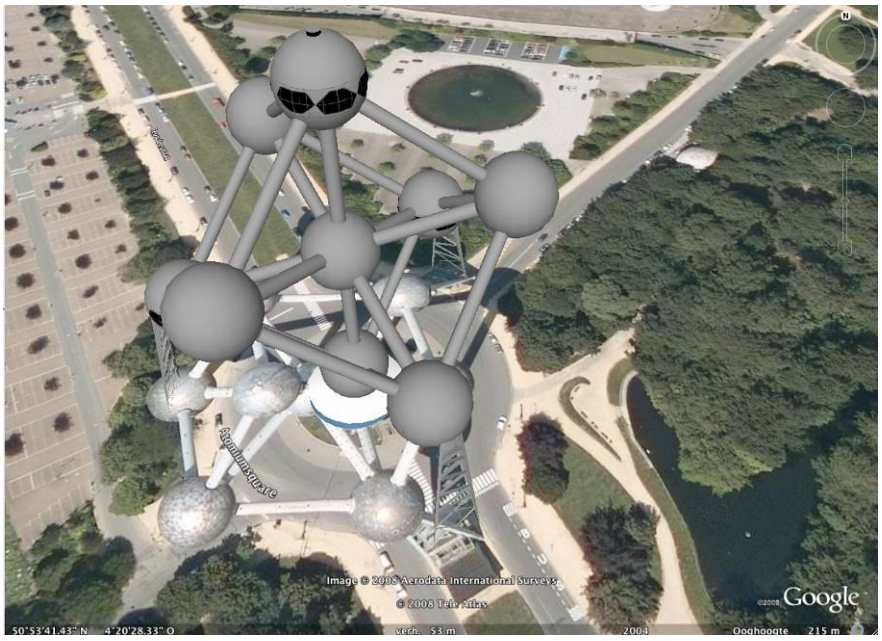
[7] http://www.mio-tech.be/nl/mio-technology-pers-berichten-mio-lanceet-True-3D-kaartweergave-C620-t-C230-P360-P560.htm Consulted on: 30 September 2008

We also see how big internet companies like Google and Yahoo! and software giant Microsoft are investing heavily to introduce the 3D experience in their desktop map services. Google Maps for example is no longer solely an application to plan your route, but also serves as a locator for urban businesses and attractions (e.g. hotels, restaurants, …). With that Google Maps introduced the street view feature in May 2007, which provides a 360° panoramic street-level view of certain American cities (New York, San Francisco, Miami, Denver, Las Vegas). In August 2008 Australia was added to the street view feature. Yet the possibility to descend to street level does not imply a virtual walk through the city. It only allows users to turn around 360 degrees at a fixed location. At the present time these fixed locations are still very limited, but more American and Canadian cities are planned in the future. Yet since its release, the street view feature has caused controversy. The uncensored nature of the panoramic photographs has lead to privacy concerns.

These kinds of PC desktop navigation services by internet companies like Google are also being extended to mobile devices. Late 2006, Google introduced the application 'Google Maps for Mobile', which runs on any Java based phone or mobile device. In November 2007 'Google Maps for Mobile 2.0' was released.[8] Furthermore Google is introducing the 3D-maps of the street view feature for smartphones. This enables pedestrians to view their destination in advance. Street view appears in an additional small screen when 360° pictures are available for a specific location.[9]

Another related product, Google Earth, offers the world in 3D. The stand-alone program enables users to fly to any place on earth to view satellite imagery, maps, terrain, 3D buildings and even galaxies in the sky. Microsoft's mapping service equivalents Live Search Maps and Virtual Earth offer similar services. Within Virtual Earth the user can chose between the imageries 'Road' view that shows a street map, 'Aerial' view that is similar to the satellite imagery of Google Earth and 'Bird's eye' view, which offers good resolution pictures of the streets and buildings. Google's competitor Yahoo! also has its own map service with Yahoo! Maps.[10]

[8] http://en.wikipedia.org/wiki/Google_Maps Consulted on: 4 June 2008
[9] http://www.zdnet.be/print.cfm?id=91502 Consulted on: 18 September 2008
[10] http://en.wikipedia.org/wiki/Google_Maps Consulted on: 4 June 2008



Picture 5: screenshot of the Atomium in 3D in Google Earth

These examples and cases show how 3D city models help users to orient themselves and to perform certain wayfinding tasks in desktop and/or mobile 3D city environments. This enables users more easily to determine where they are, where everything else is and how they can get to particular places or objects. (Burigat & Chittaro, 2007)

A last domain within which we will discuss the application of 3D city models, is the domain of urban planning and architecture.

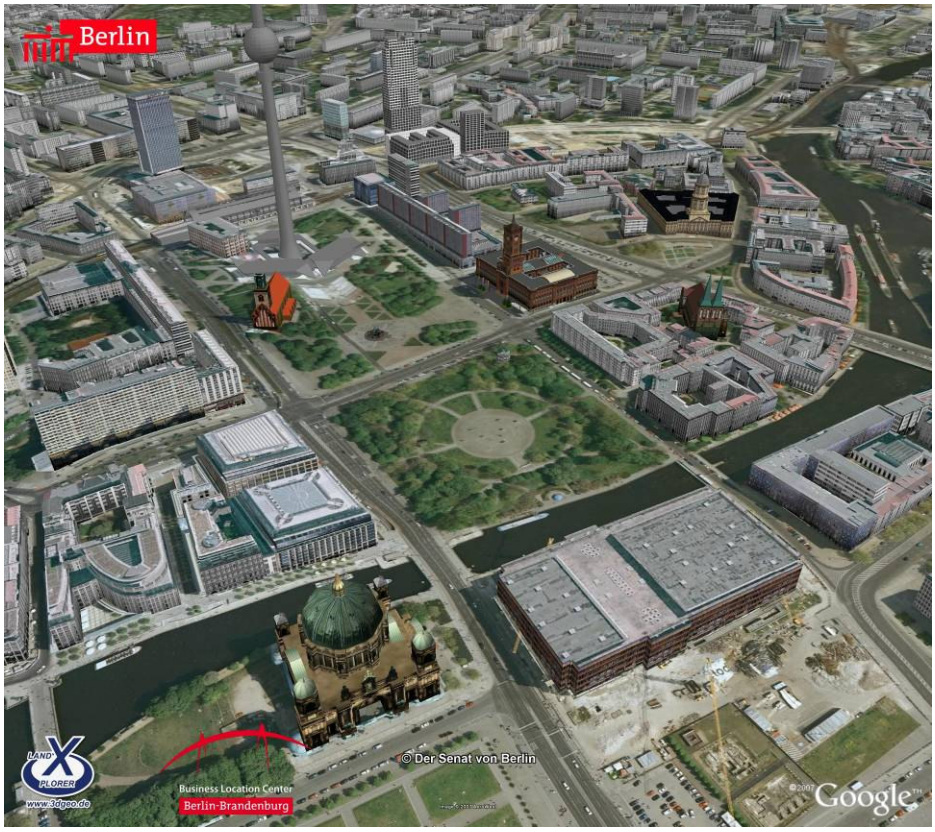
3.4 Urban planning & architectural rendering

Three-dimensional city models are also used in the context of participatory democracy and urban planning. There are for example several possibilities to present architectural and urban development designs, such as sketches, mock-ups, computer rendered movies, virtual reality applications, etc. Yet for most of these visualisations, you need some architectural knowledge to fully understand the impact of the new design on its surroundings. Virtual 3D computer models however allow people to virtually walk through the new designs as if they were already built. You no longer need an architectural background to imagine how the design will be in reality and to understand its implications on the surroundings.[11] Yet 3D city models also enables people to see how a city looked like it the past, how it looks today and how it

[11] http://www.cebra.eu/ Consulted on: 30 July 2008

could look in the future based on new plans, which was the original idea in the case of the 'Berlin 3D City Model'.

In the latter German example the virtual data model of the city is used for urban development planning, for providing information about the city, and for location marketing on a building-by-building basis. Developers are currently working on further applications.[12]



Picture 6: Screenshot of Virtual Berlin

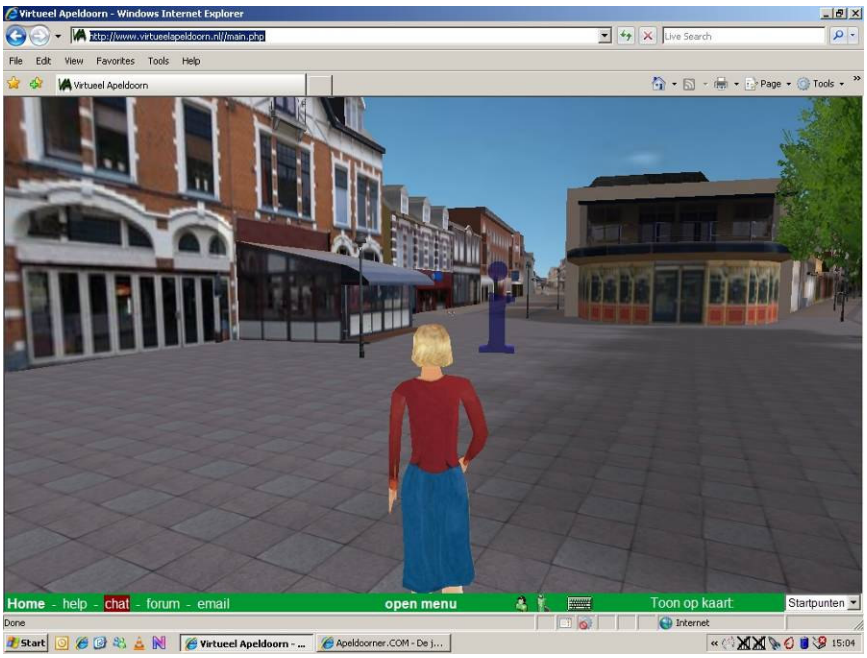
The **Virtual Cities** Helmond, Apeldoorn and Tilburg in the Netherlands utilize virtual world technology to encourage participation of their citizens in urban planning and redevelopment. Citizens are invited to the living presentation of their city where they are provided with information and insight in city reconstruction plans. Visitors of the virtual cities can give feedback and can sometimes even vote for certain alternatives. In that way they have a voice in the policy decision making processes.
Within the virtual cities visitors can chat with other visitors and enter comments in the forum. By clicking on certain objects, such as a capital I in picture 4, visitors receive additional information such as text items, URL's and video- and audio presentations.

[12] http://www.virtual-berlin.de/ Consulted on: 26 September 2008

The site is updated on a regularly basis and also mentions what's new in the virtual city (see picture 5).

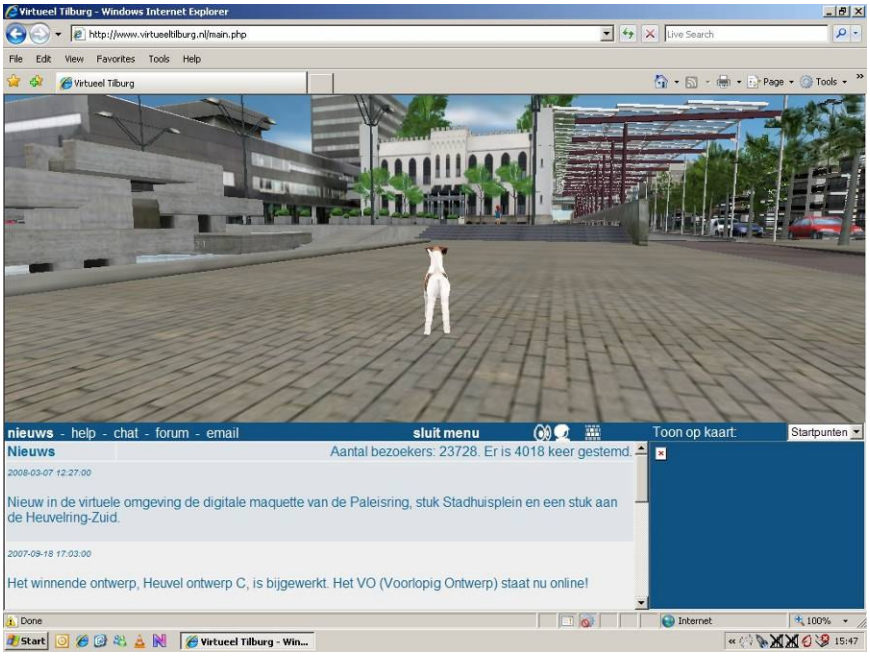
According to the makers, the power of Virtual Cities lies in the fact that[13]:

- Many people can enter the virtual 3D city simultaneously
- Visitors are able to chat with each other
- Visitors can put comments on the forum
- All kind of multimedia information can be added
- In some cases visitors can vote online after comparing alternatives, visualized in 3D



Picture 7: Screenshot of Virtueel Apeldoorn

[13] http://www.cebra.eu/; http://www.virtueelapeldoorn.nl/; http://www.virtueelhelmond.nl/; http://www.virtueeltilburg.nl/ Consulted on: 30 July 2008



Picture 8: Screenshot of Virtueel Tilburg

Now that we have elaborated on different domains within which users interact with 3D city models, we will proceed to the two areas that seem to have the most potential in relation to 3D city service innovation, namely tourism and real estate.

4 Key areas for user innovation

The horizontal scan of different domains of user interaction with 3D city model of real and virtual cities was used as input for the discussions with the project partners. This has led to the identification of two vertical areas that have the potential to generate a genuine added value for users within a 3D environment: tourism (city trips) and real estate. Both areas have been subjected to a first round of multi-method ethnographic research in order to assess the opportunities for innovation and to identify sensitizing concepts for people-centred development of 3D city services. In that way users are involved in a true source of innovation in the future design of 3D city models.

We have conducted a first explorative scan of the two vertical areas by means of a similar method mix. We first consulted relevant literature in order to get an insight in the practice of planning and going on a city trip and in the practice of searching for and purchasing a home. The literature study also gives an idea of the existing technological applications/tools that are of importance within the areas of city trips and real estate. In a next step we interviewed experts of both areas, in this case

travel agents and real estate agents. In the last step of the empirical field research, we questioned respondents who just came back from a city trip and respondents who were actively looking for a home. It is important to notice that both vertical areas will be investigated in depth in a second research phase.

In this part we first discuss the possibilities of tourism in 3D cities from a user perspective, focussing on city trips. Next we make an in-depth user-oriented analysis of real estate. Each discussion starts from past and current user practices and thus not from the technological 3D possibilities (like in the former chapter)

4.1 Tourism - city trips

4.1.1 Analyzing user practices: planning a city visit

According to Mollerup (2005) a person always thinks ahead and makes some decisions before starting a journey.

'*All journeys are planned, more or less formally, in more or less detailed ways. They are, to some extent, planned before departure and they may be further planned en route.*' (Mollerup, 2005:31)

The carefulness and the level of detail of this initial planning depend on several circumstances, such as the distance and the person's previous knowledge of possible routes. Going to the nearby bakery does not entail much planning of course. It is no more than remembering the route and taking action. Long distances and unfamiliar routes obviously demand more planning than short distances and familiar journeys. The person's knowledge can also reduce initial planning in different ways. For example a person who has thorough knowledge of the route may minimize initial planning because he is confident that he can compensate with en-route planning. An important advantage of en-route planning is that it can take ad hoc needs and wants into consideration, which the person did not have before departure. En-route planning can also benefit from contextual information that was not available for initial planning. (Mollerup, 2005)

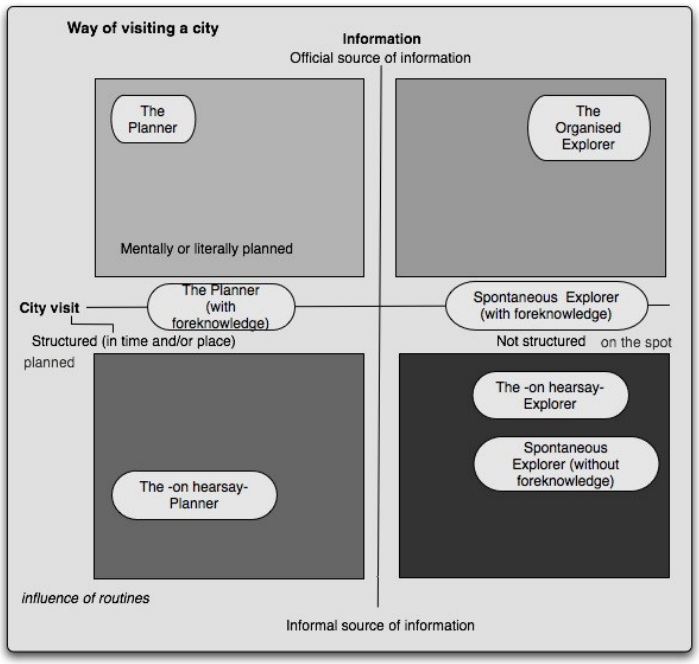
Obviously Mollerup's 'planning' refers to the planning of a route and thus to wayfinding. Yet this section deals with the planning of a city visit or city trip. However his notion on planning a route is also applicable to pre-city visit planning. For example a visit to an unfamiliar city usually asks for more planning than a trip to a city one has already visited. A recent Flemisch study on mobile city guides also

points at the available time as an important determinant for the level of detail of the initial planning of city trips. Generally a daytrip is well prepared, as people want to see as much as possible within a short time period. For a city trip of a couple of days there is usually no strict pre-planned day schedule. Visitors go to the city with a shortlist of a couple of things they definitely want to see. So the pre-trip planning can vary from a rigorous day schedule that is strictly followed, to simply strolling around and letting serendipity take the lead. In addition experience seems to play a role too. An experienced city visitor will prepare his trip thoroughly and will read a lot about the city, especially in city guides as an important information source. On the other hand the information need of the average city visitor is rather limited. He does not carry out an extensive information search beforehand, but is satisfied with some practical, quickly consumable information on the main sights of a city, for instance a brochure at the hotel desk or the tourist office.

The internet has become an important source for looking up practical, up-to-date information about a city like events, entrance tickets, opening hours, public transport, … For a lot of young people the internet even forms the main information source for planning a city trip.[14] At the same time young people are often critical against the travel information they find on the internet and they do not appreciate everything. (Rubben, 2006)

However, when we talk about planning a city visit, it is important to keep in mind that 'going into town' is a complex and dynamic experience. During a city visit, one takes up different roles, depending on the aim of the visit and the specific situation. While going into town, people can assume different roles. Consequently any typology of city visitors needs to be dynamic. Within the ROMAS project (Research On Mobile Applications and Services), researchers identified seven different roles that a person can assume when going into town. Each role can lead to specific requirements for future urban services and applications. (Pierson et al., In press:110-112)

[14] The popular websites Tripadvisor offers free reviews and information on over 400,000 locations hotel reviews to help plan a vacation. Tripadvisor was founded in 2000 and provides recommendations from real travellers for accommodations, restaurants, sights, travel packages, travel guides, flights, etc. The website is based on user generated content and stimulates travellers to share their travel experiences. http://www.tripadvisor.com/



Picture 9: Typology of roles in the practice of 'going into town'

- ***Planner***: A planner structures his/her activity depending on official information sources, e.g. a municipal website of a tourist office. He or she carefully prepares the activity/activities, which will increase the structuring in time and places to visit.
- ***'On-hearsay' planner***: He/she also structures his/her activity (in time and/or place), but will use another kind of information. He or she is more likely to depend on the advice of family, friends or acquaintances. This information can also be gathered from online social networks.
- ***Planner* (*with foreknowledge*)**: This role will also lead to the practice being well structured in time and place, yet this structuring will not be based on clearly defined outside information. Here, the planner already has a certain amount of foreknowledge due to regular visits or to being a long-time resident.
- ***Organised explorer***: He/she does not structure the practice, but will search out the official information in advance. For instance, he or she will check out a map, but will not use it to plan a specific route so he/she preserves a sufficient degree of freedom.
- '***On-hearsay' explorer***: The person does not attempt to structure the activity, but will to some extent make sure to remain informed via the non-official information channels (offline and/or online social network contacts).

- ***Spontaneous explorer* (*with foreknowledge*)**: The spontaneous explorer neither structures activities nor looks up information, since he/she is already informed. He/she avoids alien places and prefers to explore well-known localities.
- ***Spontaneous explorer* (*without foreknowledge*)**: He/she likes to be spontaneous and thus does not structure the activity. They decide on the spot where and when they want to go in the city. They want to keep their independence, without being hindered in their choice.

Although we are particularly interested in the planning of city trips/visits within the URBAN project, it is certainly interesting to look at research that studied the planning of the summer vacation by Belgian households. Decrop & Snelders (2004) did a series of in-depth interviews during the period of a year with 25 Belgian households. The research shows that vacation planning is an ongoing process that doesn't stop once the trip is booked. This especially applies to information search, which is an ongoing flow and not a well-defined stage in vacation planning. People collect information all through the year, thus before, during and after the vacation. Both high- and low-involved vacationers appeal to their sources for some information when necessary. Vacation decision-making entails a lot of adaptability and opportunism. Incidental learning actually plays a bigger role than intentional learning. The decisions are often adapted following contextual contingencies and brought about incidentally through information collection or opportunities. In addition emotional factors also guide the adaptability and opportunism. This clearly deviates from most existing decision-making models that propose a (bounded) rational, problem-solving vacationer.

Most vacationers are opportunistic in their decision-making, which means that they are always open to new information and suggestions, as long as they are not fully committed to one specific plan. Decisions about period, duration, destination and accompaniment are the least stable. This implies that vacationers may commit very tardily to these items. The researchers emphasize that the resulting late booking should not be seen as a form of impulse buying as it mainly stems from practical, situational and social constraints. So the difference between early and late bookings does not suggest segments of rational, prepared vacationers on the one hand and emotional, impulsive decision-makers on the other hand. The difference mostly lies in the extent to which they are constrained by aspects like work, the children's school results, etc. (Decrop & Snelders, 2004)

4.1.2 Mobile digital city guides

Now that we have elaborated on the planning process of a city visit, it is time to take a look at the actual city visit and applications that try to support the city visitor.

In Belgium and abroad more and more digital applications are being developed for the tourist-recreational sector. Mobile phones, MP3-players and PDA's are accompanying the city visitor during his visit to the city and to museums. (Rubben, 2006) The market of mobile digital city guides is still young, but is said to have a large potential. Here we give an overview of the current trends and evolutions.[15] This overview gives an indication in which direction the market of mobile digital city guides is evolving.

A first important trend is the transition from one-dimensional devices to multi-dimensional devices. The mobile phone has become a multifunctional, all-in-one device. Its omnipresence creates opportunities for all kinds of mobile services.

Secondly there are more and more initiatives that try to offer new ways of experiencing the city. For example in Italy it is possible to hire a real guide who will jog with you and tell stories about the city at the same time. Another way to get a new city experience are city games, like the location based game 'the target' of the Belgian company La Mosca that is already mentioned in the section on 3D visualization in gaming.

Thirdly the virtual world is entering the real world. Tagging for instance allows people to leave messages in a city. Another application is the 2D barcode that can be scanned with a smartphone in order to receive the 'hidden' information on your mobile device.

[15] The overview is based on a presentation by Marc Rubben: '*Waarheen met de digitale mobiele gids?*', at the Memori seminar day 'Digitaal de stad in!' at 29 April 2008 in Mechelen (Belgium).

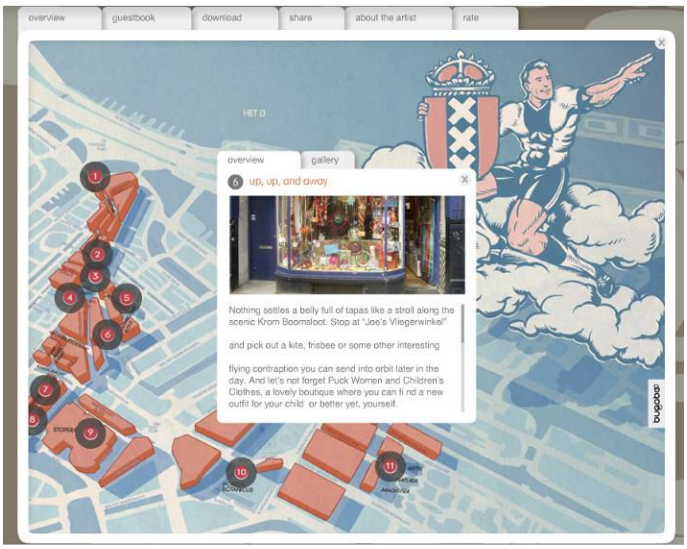


DVD Release promotion for "28 weeks later" in London

Picture 10: 2D barcode for DVD release promotion in London

Another interesting trend is the way mobile city services are anticipating on new topics that gain importance, often among specific target groups. In 2006 the Flemish city of Antwerp organised a temporary interactive walking tour dealing with environmental questions. The tour, called "PROPER!", led citizens along historic polluted sites that were being sanitized. By means of an audio guide and a map, interested visitors could follow the tour and learn how sanitation actually takes place and what will be the final result.[16] The bugaboo daytrips target parents who are planning a child friendly city trip. The individually crafted daytrips are free, downloadable and designed in collaboration with local artists and parents to help capture the imaginations of parents as well as children. The website covers multiple cities around the world, like Amsterdam (see picture 8).[17]

[16] http://users.skynet.be/emplacement/news.htm Consulted on: 26 September 2008
[17] http://www.bugaboodaytrips.com/ Consulted on: 26 september 2008



Picture 11: Screenshot of bugaboo daytrip Amsterdam

Furthermore user generated content also plays an important role in the evolution of mobile digital city guides. City visitors as well as inhabitant can create content concerning a city. For example on the American website 'MizPee' people can find the closest clean toilet in the city and it allows people to review and add toilets.[18] The interactive city guide 'Mechelen Mapt!' asks the inhabitant of Mechelen to map and if possible write about interesting places in their own town. By doing so city visitors can discover new places that they cannot find in the traditional tourist brochures.

A final trend is the desire of (some) city visitors to have a more personal city experience. The traditional guidebooks often fail to provide information about a city that is tailored to an individual's personal interests, expectations and situation. It seems that mobile city guides are trying to anticipate on this shortcoming. The website 'Visit London' provides the feature 'People Like You', which gives suggestions on what to do in London based on the user's chosen profile. Users can choose between the profiles 'Luxury London', 'Budget', 'Young London', 'Kids love London', 'Gay and Lesbian', 'Green', 'Family' and 'Business'. Within this feature one can also receive visitors' accommodation and attractions reviews and ratings through the collaboration with the popular travel website TripAdvisor. Another feature by which 'Visit London' tries to offer a more personal city experience, is 'Do London Like a Local'. The objective is to "*help you experience London like a Londoner!*"[19]. which is popular with those tourists that look for off-the-beaten-track discoveries.

[18] http://www.mizpee.com/mizpeeweb/welcome.do Consulted on: 26 September 2008
[19] http://www.visitlondon.com/people/ Consulted on: 26 September 2008

In order to collect insights on essential characteristics for innovative 3D city services relating to tourist city trips, we discuss some key findings of the Belgian 'CityInMyPocket' (CIMP) project.[20] The objective was to develop a user-based model for electronic walking guides and to apply this model on a mobile city walking guide prototype. The CIMP prototype allows users to search for nice spots in the Flemish city of Mechelen, which are presented by an inhabitant. Depending on the user's interests, he will receive a different route and list of sights, e.g. 'studentenstad' (student city), 'gezinsstad' (family city), 'cultuurstad' (culture city) or 'seniorenstad' (senior citizen city). The application also allows the user to plan his own visit and map out his personal route along several interesting places. In addition the digital walking guide also enables people to walk around freely and to ask for some information on a certain curiosity or attraction whenever they want. The mobile guide gives access to practical up-to-date information, such as opening hours, ticket prices, public transport and an event calendar, and allows you to book entrance tickets in advance.[21] (Rubben, 2006)

Besides this national example we also find international initiatives. For example the popular guidebook Lonely Planet has entered the market of mobile digital city guides with its Lonely Planet M-site (i.e. mobile site). The core of the website is the 'What's Around Me' feature that allows you to select your current or planned location and directly receive recommendations for all kinds of points of interest, such as the nearest restaurants, nightlife spots, hotels, shops and sights on your mobile phone. A dynamic map feature shows you the precise location of these points of interest and their proximity to your current location.[22] With this mobile platform Lonely Planet wants to make its services available any time and anywhere, *'because your mobile phone is carried around with you all day, every day and increasingly understands where you are*'[23], as stated by Chris Boden, Lonely Planet's director of global business development.

[20] 'CityInMyPocket' (CIMP) was a project funded by the Flemish government and took place in two phases: from October 2004 until September 2006 and from January 2007 until December 2007. The project partners were the research groups DocArch from the Catholic University of Leuven (KUL) and Memori from the Katholieke Hogeschool Mechelen.

[21] http://www.cityinmypocket.org/ Consulted on: 4 June 2008

[22] http://www.lonelyplanet.com/mobile/lp-mobile.html Consulted on: 26 September 2008

[23] http://www.lonelyplanet.com/pressroom/news/press_release.cfm?press_release_id=370 Consulted on: 26 September 2008

So despite the fact that the URBAN research is aimed at the computer desktop, the examples show a trend of future urban (3D) services also being available on mobile devices. However it is clear from the other project findings that mobile digital city guides should not try to compete with the traditional guidebooks. One cannot simply translate the things that work well on paper and copy the content of guidebooks to for instance a PDA. (Rubben, 2006)

4.1.3 Observation

In order to get an idea of the actual information needs of city trippers, we have conducted an observation at one of the tourist offices of Brussels. A tourist office is usually the place par excellence where tourists go to for information about the city. The URBAN application can benefit from the identification of these user findings, as the latter can serve as input for the people-centred development of 3D city services.

4.1.3.1 Research set-up

The research field was the Toeristische Informatie Brussel (TIB) (tourist office[24]) at 'de Grote Markt' (in the town hall) in Brussels. The observations were done on Thursday July 17th 2008 in two periods: from 10h30 until 12h35 and from 13h45 until15h35. They were 'simple' unobtrusive observations in the sense that it was not participative or experimental. A researcher can adopt various roles during an observation, depending on the level of involvement with the study group. These roles can vary from a complete observer to a complete participant. In this case, the researcher acted as "*a fly on the wall*" in a public space and had no relation with the observed situation and subjects. A 'complete' or 'unobtrusive' observer is present on the scene, but does not participate or interact with the study group. So his/her role is to listen and observe. He/she tries to be invisible, yet at the same time ubiquitous to eavesdrop. The major disadvantage of this role is the fact that the detachment of the study group can prevent the researcher from hearing entire conversations or fully understanding a conversation. The researcher adopted the role of 'invisible' observer during her observation at TIB, but in order to (partly) bypass the disadvantage of this research method, she did have a short conversation with the people concerned after each observation. So the role 'observer-as-participant' may be more suitable to describe how we have conducted the observation. This role means that the

[24] Website: www.brusselsinternational.be

researcher is mostly involved in observing, but may conduct short interviews during the observation. (Baker, 2006)

The observation started when a subject entered TIB and ended when the subject left the tourist office. The observed tourists didn't know that they were being observed in order to disturb the natural environment and practices as less as possible. The observation focused on the practices of city trippers in the tourist office of Brussels at 'de Grote Markt'. In this context the practices involved the tourists' behaviour at the information centre, their habits and their possible conversations with the staff.

Specific points of attention during the observation were:

- What is the first thing the subject does when he enters the tourist office? Does he/she look at the exposed information or does he/she go straight to the counters to ask a question?
- What information does the subject (not) look at?
- Does the subject ask a question at the staff of the tourist office? Which question(s)?
- Does the subject take some information with him/her when he/she leaves the tourist office? Which information?

With the consent of the subject(s) in question, each observation was followed by a short ethnographic interview with the observed subject(s) in order to better frame the observation and to elaborate on possible elements that were not fully clear. During these short ethnographic interviews we probed for the pre-city trip planning, the possible conversation with the staff of the tourist office and some socio-demographic data of the tourists.

4.1.3.2 Description of the observation space

TIB is located in a small space in the city hall at 'de Grote Markt'. Big blue flags with a yellow capital 'I' make TIB recognisable as a tourist information post for city visitors. The information office is very small and thus got very crowded at certain moments. Consequently several people didn't come inside when they saw the crowd and immediately left.

When entering TIB there is a large counter at the right and a small one in front of you with a nameplate 'Hotel'. In theory the small counter is only for people who want to make a hotel reservation. In practice the counter is mainly used for general tourist information during busy moments. During the observation periods nobody made a

hotel reservation through TIB, which could implicate that city trippers usually book their hotel in advance.
At the information centre a lot of brochures, folders, posters, … are displayed. There is a stand called 'monthly events', a stand of the sightseeing tour bus, a stand with the typical sights at Brussels, … The city maps of Brussels lay on the counters next to the staff and are given on request.
Usually three people stand behind the counters at TIB to help the tourists. Other staff members walk around the city at busy places to inform people. For example one person of TIB was posted at the Central Station.

4.1.3.3 Findings of the observation

During the two time periods, we conducted 28 observations. Unfortunately not all observations could be followed up with an ethnographic interview, often due to linguistic problems. Yet the majority of the observed people (21) did agree to a short interview.
In the following part the results of the observation and the subsequent short interviews with the subject(s) will be combined since they are complementary.

A. The importance of the city map - The majority of the observed people only came to TIB to ask for a city map. The short interviews revealed that most of the people had already a travel guide of Brussels or Belgium with them that contains a city map. However, the city map in a travel guide is often perceived as too small. The city map is obviously a very important tool that people want to use during their city visit. Only two people mentioned that they used a GPS to find their way in Brussels. One person only used the GPS in the car to drive from one place to another in Brussel, the other person held the GPS in his hands while walking through the city.
A lot of people came to the information centre to ask for specific directions, for example how they can get to the Atomium by public transport. In that case the staff automatically gave the people a city map on which they marked important locations such as the nearest metro, bus, and/or train stations.
Walking routes marked on a city map seemed to be very much appreciated by the respondents. Coloured lines on the map guide the map users along the most popular sights. The city visitor has the choice between a historical tour, a shopping tour, a chocolate tour, etc. The fact that all the important sights(buildings, monuments,

museums, etc.) are marked on the city map (with small drawings on the map) is also appreciated a lot by the tourists.
So the majority of the questions tourists ask at TIB deal with navigation issues. A lot of tourists even do not take the time to look at the displayed posters and brochures. They mostly come in with a specific question, often concerning directions and public transport, and immediately leave the information centre afterwards.

B. The importance of the travel guide - The tourists who entered TIB regularly had a travel guide in their hands. During the interviews it became clear that most of the tourists had a travel guide with them. The type of guide strongly varied from the popular 'Capitool' and 'Lonely Planet' to other less known guides. The travel guide often covered Belgium as several people combined a visit to Brussels with a visit to other Belgian cities, in most cases Brugge and sometimes also Ghent and/or Antwerp.
The city trippers being interviewed had used their travel guide previously to their visit to Brussels in order to know more or less what would be worth a visit. According to the personal habits, the reading process of the travel guide at home varied from quickly browsing through the book to extensive reading. Yet the city guide also served as a support on the spot to read more about the sights in Brussels and to make a final selection of the things they wanted to see that day. Especially top 10s, the 'must sees' and 'must dos' were very popular. When tourists asked the staff of TIB for suggestions, the tourists usually followed these typically Belgian or Brussels tips of TIB (or at least said that they were going to follow them).
Only a few people, all approximately in their twenties, mentioned the internet as an information source. They used the internet to look up the most important tourist attractions in Brussels and sometimes to read reviews of people that had already visited the city. This relates to findings in other projects indicating that internet is becoming a significant information source for retrieving tourist information, in particular for young people. (Rubben, 2006)
The popularity of the walking routes, travel guides and the 10 'must see's/do's' indicates that several types of tourists like some guidance during their city trip. Of course there will always be the explorers who (almost) do not prepare their city visit and choose to wander around freely. However, as our research in ROMAS has shown, city visitors can take up different roles during a city visit. So an initial 'spontaneous explorer' might need some information at a certain point during the city trip. (Pierson et al., In press)

- The importance of the **city map** and **wayfinding** issues during a city trip implicates that user interaction with 3D city models needs to provide some kind of **navigation** support (e.g. *"How can I get from the 'Grote Markt' to the 'Louisalaan' by public transport?"),* even if that is not the main objective.
- 3D city models could anticipate on the need of tourists to know to some extent what is interesting to visit in a city prior to the actual trip. Oversized 3D images could help city trippers in their **selection of sights** that people would want to visit.

4.1.4 Expert interviews

The findings of the 'simple' observation at the tourist office of Brussels already give an idea of the pre-trip planning of city trippers and their information needs on the spot. Yet in order to get a better insight in the process of planning and booking a city trip, we have done expert interviews with travel agencies.

4.1.4.1 Description of the experts

The selection of experts is based on difference in perspective with regard to planning and booking of city trips. We interviewed two experienced travel agency manager: travel agency A in Kortrijk (general manager Hilde) and travel agency B in Wolvertem (general manager Lucia). The travel agencies serve a different clientele, which helps to generate a more complete picture of the planning and booking process by different types of tourists.

Hilde, 38 years old, in travel agency A has 20 years of experience in the tourism sector of which 13 years as a manager. The travel agency employs 10 employees, being rather big for an independent agency. The manager defines her travel agency as quite atypical because of several reasons:

- They are very service oriented. So they do not solely book the vacation, but also arrange all sorts of services for the costumers on the spot, such as restaurants and tickets.
- They have a rather wealthy clientele.
- It is a closed office in the sense that they do not have a shop window. This is to avoid people walking in and out only asking for prices and brochures.

Lucia, 45 years old, is the manager of travel agency B since 15 years and employs three clerks. During the expert interview Lucia was the main informant, yet the other three employees regularly intervened to add some information and remarks. The

agency works together with classic tour operators like Thomas Cook and Jetair, but also with more specialised tour operators such as Amazing Journeys, Exclusive Destinations, Club Med, etc. In contrast to the travel agency described above, this one can be defined as a more 'typical' travel agency.

4.1.4.2 Findings of the expert interviews

We have interviewed two travel agents to learn more about the process of planning and booking a city trip. This research phase has two aims. On the one hand we wanted to know which tools travel agents use to book city trips and how they retrieve information about the particular cities. On the other hand we want to get an idea of how tourists decide which city they want to visit, what kind of questions people ask about a city and to what extent tourists are informed about the destination of their city trip.

A. Booking a city trip: a general overview - According to travel agent Hilde city trips are a booming business, among other things caused by cheap aviation. More and more people go on a city trip at least once a year, which is a rather recent phenomenon. The offer of city trips doubles every season and new destinations enter the market. At the moment the Eastern European countries are becoming popular.

The difference between the two travel agencies is reflected in how their customers decide on the city they want to visit. Hilde mentions that her customers usually have already chosen their destination and are well informed about the city when they go to the travel agency for the first time.

"*Wij hebben heel weinig onwetende mensen die bij ons over de vloer komen en die dan vragen aan ons waar zouden wij eens naartoe gaan. (...) Ze hebben eigenlijk al gekozen voordat ze komen. (...) Wij hebben dat niet zoveel dat mensen zich eigenlijk vanaf nul moeten laten informeren door ons*." (Hilde)

Since travel agency A is a closed office, people do not walk in and out for brochures or information. The customers commonly come inside and immediately book their city trip, because they have already chosen their destination. Hilde even adds that this will probably not be the same for most other travel agencies. Lucia indeed confirms that most customers of travel agency B have not decided on the city when

they enter the agency the first time. In most cases people visit her agency to take along brochures for careful examination at home afterwards. This is discussed with their travel companions. This process is already part of the city trip experience. Next the tourists return to the travel agency for getting more information on two to three cities, like the availability of flights and hotels. Based on this information people finally book their city trip. A strong determinant in this final decision is the total price. The city itself is often not the main determinant because the city trip is seen as a break to escape from normal life. The clientele of travel agency A hardly takes the price aspect into account because they situated to a large extent in the high income category.

After the analysis of the process of booking a city trip, the following part will focus on the questions tourists ask travel agents related to a city. The objective is to get a first insight in what tourists commonly want to know about a particular city.

B. Booking a city trip: What city trippers want to know - According to Lucia of travel agency B city trippers first ask for information about the accommodations in a city, especially the location towards the city centre.

'*De eerste vraag is de accommodatie. (…) niemand wilt terecht komen in een hotel dat afgeleefd is. (…) Ik vind zelf voor een citytrip is heel belangrijk de ligging van een hotel tegenover de stad. (…) Een citytrip valt of staat met de accommodatie*' (Lucia).

The other travel agent Hilde confirms the importance of the central location of a hotel, but adds that the hotel itself is less important during a city trip because city trippers spend most of their time outside the hotel, in contrast to for example summer vacations on the beach. So the questions asked most frequently are how to get from the airport to the hotel and from the hotel to the city centre. These questions are again all related to the aspects of navigation and wayfinding, just like the questions city trippers in Brussels asked at the tourist office of Brussels. The importance of these two aspects was confirmed when we asked the experts what information should be present on a (digital) city map. Lucia mentions the location of the hotels, the most important sights of the city and the available public transport. Hilde indicates that marking distances would be very useful. In that case tourists would not

have to calculate themselves the distances between two or more locations by means of the scale on the map.

Only few customers seem to ask the travel agents what they can visit and do ina particular city. Both experts refer to the small city guides offered by the tour operators as an essential information source, which tourists receive together with their travel documents,. These city guides contain all the basic information of a city, such as its sights, walking tours, restaurants, public transport, the must see's and must do's and a small city map. According to the experts these abbreviated city guides are quite complete and up-to-date. Hilde adds that most tourists will still buy an additional travel guide after booking the city trip so they have all the information they need. The popularity of small city guides confirms earlier findings that the typical city visitor, especially in a first phase, is often satisfied with practical, quickly consumable information on the main city sights. (Rubben, 2006)

Apparently the travel agents do not consider informing tourists about what they can see and do in a city as part of their job. Based on the city guide provided by the tour operators and possibly an additional travel guide, city trippers develop their own idea of what a particular city has to offer.

The final topic that will be discussed in this part of the expert interviews concerns the work-related internet usage at the travel agents.

C. Use of internet in the workplace: the travel agent's perspective - Internet usage varies substantially between the travel agents. Their ideas about the use of the internet in the daily working practice are in some regards fundamentally different.

Like all travel agencies, Hilde and Lucia use the online reservation system set up by the tour operators, for booking flights and hotels. Lucia adds that they also use the internet to search for additional information, like hotel phone numbers when not available in the brochures. This means that the internet is used as back up medium in case the travel brochures do not provide the required information. The travel agents also consult the website of the tourist office of a particular country or city for specific information or use a search engine like Google. Yet the travel agency B never turns their computer screen towards the customer to show online information because that would take too much time. Lucia knows applications like Google Earth and admitted that it could have an added value, for example to show the location of hotels. However, when this manager talks about using the internet she always points at the time-consuming nature of the medium. She can also picture the added value of

a 3D city model on street level for both tourists and travel agents, but is not sure whether travel agents have the time to use it. Consequently the personnel at Lucia's agency prefer to work with brochures and paper city maps, which - according to Lucia - gives the customers a much better impression than the internet. A screen shot is only an image that quickly disappears and constantly returning to a webpage and opening new ones is perceived as too time-consuming. When a travel agent browses in a brochure and marks things on a paper city map, the customers get a better overview.

"*Ge moet ook rekening houden met, ik vind dat allemaal goed en allemaal wel, maar ge moet daar de tijd voor hebben. Want als ge op internet gaat gaan Googlen en gaat gaan zoeken zijt ge al gauw 20 minuten verder he. Als er dan ondertussen twee drie mensen staan te wachten gaat dat niet he. Trouwens die mogelijkheid hebben ze eigenlijk allemaal thuis he*." (Lucia)

However Hilde claims to use the internet constantly for checking all sorts of (specific) information, like the location of hotels, temporary expositions/festivities/museums, booking private guides, etc. According to Hilde the amount of information given on paper is strongly reduced, given the ease of use and speed of the internet. The latter also allows you to immediately visualize everything. This means that the computer screen is often turned towards the customer. The travel agency even notes all the relevant URL's on the customer's documents, like the website of the hotel. The fact that this could enable the customer to book the proposed hotel online by himself is not seen as a problem since the travel agent can often offer better negotiated prices than the official ones. In any case the internet seems to be very useful to search for information about hotels. The personal website of a hotel gives a much better image of the hotel than the one picture in a brochure of a tour operator. "*Sinds internet heb ik mij quasi denk ik niet meer vergist in hotels, je weet direct veel meer*." (Hilde)

Starting from a service-oriented marketing approach we see how Hilde and her employees explore and use the possibilities of internet as much as possible in order to offer the customer more and better information. This implies that they spend more time than the average travel agency in using internet for professional reasons. In addition Hilde does not see internet as a threat for her business, but as a very useful tool becoming even more useful in the future. The fact that most hotel websites contain features like a map with the exact location of the hotel, driving instructions,

satellite pictures, etc. is experienced as very convenient and time-efficient. In this way no additional websites need to be consulted to collect the necessary practical information.

"*De meeste hotels in Amerika als je op hun site gaat, de koppeling van Google Earth staat er al op, Google Maps ook, MapQuest, Mappy, dat staat er allemaal op, dat gaat ver hoor nu. Ge moet dus echt niet meer beginnen met dat zelf nog een keer in een apart programma beginnen te openen. Heel die koppeling staat er al op he, zelfs de GPS coördinaten staan er zelfs op*." (Hilde)

Finally both experts also praise the official websites of a city or country, because they are usually very complete and contain all the information that is needed.

- On the basis of their experience with city trippers, travel agents suggest a (digital) city map needs to indicate the **location** of the **hotels**, the most important **sights** and **public transport**, which all can be represented in a 3D city model.
- Considering the current economic circumstances and the high oil prices, one could say that the era of cheap aviation will soon come to an end. People may become more selective in their city trips. 3D city models and services could **help** people in **deciding which city** suits them the best.
- City trippers often struggle with two main **wayfinding issues**: how to get from the airport to the hotel and how to get from the hotel to the city centre. This indicates again that future urban applications need to incorporate **navigation** functionalities.
- Travel agents do not consider informing tourists about what they can see and do in a city as a fundamental part of their job. Future urban applications could assist city trippers in this decision-making process. However, it is important to keep the popularity and the ease of use of traditional guidebooks in mind.
- Travel agents could use online 3D city models to **visualize** (parts of) a city to customers to give them an idea of how a particular location, hotel, street, etc. looks like. Yet this type of usage is not very realistic at a travel agency such as Lucia's where there no habit to turn the computer screen towards the customer and where the internet is perceived as a time-consuming medium. However other kind of travel agencies like Hilde's, with a different market approach, might use it

in the proposed manner to provide the customer with additional information and service.

Finally we also need the tourist perception and attitude on this issue. For this in this first phase we have interviewed city trippers in depth, which will now be discussed.

4.1.5 Respondent interviews

Before continuing to the actual findings of the respondent interviews, we discuss the sampling method we used to select the respondents and the topics that were addressed during the interviews. Furthermore we give a short overview of the questioned respondents.

4.1.5.1 Description of the respondents

In this part we analyze the practice of a city trip from the perspective of tourists and the implications this has for user-centred services in 3D city models. For this we selected respondents that have a recent experience with a city trip, meaning people that just came back from a city trip. An important criterion was that it should be the respondent's first visit to the city, as literature shows that previous knowledge of a city strongly influences the planning process. Unfamiliar routes demand more planning than familiar journeys (Mollerup, 2005).

Three categories of topics were discussed in the interviews. We first investigate how and to what extent people plan their trip both in advance and on the spot. Second we asses the role and added value of internet in theses phases for those people. We collect the respondents' ideas on online applications that are seen as relevant in their practice of the city trip. Finally we discuss their ideas on the possible role of 3D city models, for which we use the example of Google Earth on street level as a probe

The respondents were recruited through purposeful sampling. For this we used the standard snowball method. We have mobilised people we know to look for people in their social networks who were going on a city trip or who just returned from a trip. A possible weakness of this sampling method is that the respondents are situated in a similar socio-cultural context as the researcher, in our case mainly young people. As we are still in the explorative phase of the research, this is not a real problem. However in the second research phase, where the practices of city trippers are studied more in depth, more variation will be required.

Before elaborating on the findings of the in-depth interviews, we give a short overview of our respondents:

Respondent 1
Name: Sophie
Birth year: 1982
Destinations: Boston and New York
Duration: 5 days and 6 days

Respondent 2
Name: Mark
Birth year: 1968
Destination: Berlin
Duration: 5 days

Respondent 3
Name: Leen
Birth year: 1981
Destination: Saint Petersburg
Duration: 4 days

Respondent 4
Name: Sven
Birth year: 1982
Destination: Barcelona
Duration: 7 days

4.1.5.2 Interview findings

The following part elaborates on how the respondents prepared and planned their city trip in advance, what kind of information and tools they used on location, how the city trippers perceive the possible strengths and weaknesses of internet in relation to citytrips and how they think about 3D city models.

A. Pre-trip planning - The relatively young age of the respondents and Mark's high ICT profile, make that internet played an substantial role in the pre-trip planning of all the respondents. All respondents have booked both their flight and their hotel through the internet. For Mark it was the first time that he did not book through a travel agency. This online booking has been a positive experience, because it went very smoothly and it is cheaper. Therefore Mark argues that in the future he will book all his city trips through the internet. The other respondents already had a lot of experience with online booking. They searched intensively on different kinds of websites, including Connections, Expedia, Airstop and the websites of every flight company, to find the cheapest flight. They are also well aware of websites that give an overview of available accommodation, like 'Tripadvisor.com' and 'Booking.com'. The respondents consult these websites to check reviews by people who already stayed at the hotel in question. A hotel might look good at first sight but the reviews of others say much more, so the respondents argue. So the city trippers book everything online, yet at the same time they are quite critical against the information

they find on the internet, which is in accordance with other research (Rubben, 2006). According to Sophie another advantage of the website 'Tripadvisor' is that it allows previous hotel guests to upload their own private pictures of the hotel. So Sophie always consults the hotel pictures on the official website of the hotel as well as those on 'Tripadvisor' since she is aware that pictures on the official hotel website can sometimes be misleading. Apparently additional visual material of the accommodation by other tourists is very welcome.

"*Hotels zoek ik meestal via Tripadvisor omdat daar zo heel veel van die recensies op staan en dat is altijd goed. (…) Daar staat ook zo bijvoorbeeld wat dat oude koppels ervan vonden, wat dat families ervan vonden en dan weet ge zo wel ongeveer wat dat ge kunt verwachten*". (Mark)

User generated content in the form of ranking and review systems, is very much influencing the hotel choice. Especially overall positive reviews by previous hotel guests are important. Another significant determinant is the centrality of the hotel location, which was already made clear by the travel agents in the expert interviews. Since they are only visiting the city for a few days, they do not want to waste time on commuting towards the city centre.

Next to online booking, all the respondents also searched the internet for specific information about the city they were going to visit. Mark and Sven simply started their search by entering keywords in Google, for example 'bezienswaardigheden Berlijn' for Mark and 'restaurants Barcelona' for Sven. In this way they discovered several interesting websites. All respondents particularly like the typical tourist websites that contain experiences and tips of other tourists and that offer a top 10 of the most interesting attractions, restaurants, bars, ... Yet the respondents did not solely rely on the internet as an information source. They all combined online sources with a traditional travel guide, like 'Lonely Planet, 'Capitool' or 'Trotter'. Both Sophie and Mark confirm that information on the most important sights to visit was rather similar on internet in comparison to the travel guides. They added these sights to their personal must see/do list. The observation study of the Brussels city trippers has also shown that top 10s are used a lot because they provide the tourist with some guidance in a big city and in an abundance of (online) tourist information.

We already found that tourists who go on a multiple day city trip do not have a strict pre-planned day schedule but do have a shortlist of 'must sees' and 'must dos'. (Rubben, 2006) Since our respondents spent several days in a particular city, they also did not prepare a strict day schedule in advance. Based on the information they

found on internet and in the travel guides, they set up a list of things they definitely wanted to visit. Once they were on the spot, they decided what they were going to do that day according to the available time.

B. The city tripper's information needs on location - When we look at the information the respondents used and looked up on the spot, we notice the important role of the city map. This is confirmed by the observation at the tourist office in Brussels. All respondents continuously used a city map while walking through the city. Mark even used the map to follow a walking tour that guided him along the main historical sights of Berlin. In case the city map did not contain details about the public transport, the respondents additionally bought a public transport map. So the main concern of city trippers during their trip is how they get from point A to point B, on foot or by public transport.

As the city map is of great significance for city trippers, we have asked the respondents what kind of information a(traditional or digital) city map absolutely needs to contain. The first thing the respondents mentioned is public transport, followed by the main sights of a city. Additional elements depend on the personal interest of the respondent, referring to information offices, museums, restaurants, reference points and quiet non-tourist squares where you can have a drink. Sophie notes that it would be unfeasible to mark all the restaurants on a paper city map, yet on a digital map it would be possible to also mark hotels, restaurants and shops. Mark went to the Berlin tourist office to get information about the museum pass and the public transport pass. Leen tried to look for a tourist office at Saint Petersburg to ask for a large city map, but she did not find one. Both respondents claim to frequently visit a tourist centre when they are on vacation, again often with questions that concern wayfinding, transport or navigation issues.

The travel guide is not solely a tool to plan a trip. The respondents also used it on location to get some extra information about certain sights, to find nice restaurants/bars, to look up some extra activities in case they had some time left or to make a final selection of what they were going to visit in case they did not have much time left.

C. Internet & tourism: a look into the future - The respondents agree that internet is a convenient information tool to help planning a vacation. However all the respondents also used traditional travel guides to prepare their city trip. This suggests that, at least for the moment, internet cannot fully replace the travel guide. In addition the interviews show that the travel guide is also used quite a lot on

location to search for extra information. Therefore the internet might help tourists to plan several things in advance, but it cannot offer sufficient guidance on the spot.

"*Het is een interessant alternatief voor die boeken he. Je hebt die boeken van tevoren niet meer nodig dus ge kunt alles vooraf opzoeken. Ge kunt echt een volledige planning maken als ge dat wilt, zien van wat is er interessant en wat is niet interessant. (...) Maar het vervangt niet volledig die gidsen en zo die ge kunt meenemen op papier. Dat vind ik niet neen. (...) Misschien als er overal wireless verbinding is en je hebt een wireless toestelletje mee dat het wel kan, maar als je ergens staat en je hebt daar informatie nodig ja dan is een boek gemakkelijker.*" (Mark)

Although the respondents are very positive about the available online tourist information, they still see some opportunities for additional online services. The abundance of online tourist information makes it sometimes very difficult to get an overview and to find the required information. Therefore more structured online gathering places for tourist information websites that offer an overview would be helpful.

"*Alles zit er denk ik wel op, maar niet, ja zo van die overzichtssites zoals 'Expedia' of 'Tripadvisor' dat vind ik echt goeie sites en die geven ook een overzicht en zo.*" (Sophie)

In addition some respondents also experience a need for overview websites that focus on a specific theme such as accommodations (Sophie) or cheap budget travelling (Leen).

"*Misschien soms overzichtssites, maar dan eerder over specifieke dingen, dus niet zo in het algemeen. Bijvoorbeeld ik vind als ge een huisje wilt huren in België of Nederland of zo van die dingen dat er weinig overzichtssites zijn.*" (...) "*Dus als ge zo accommodation dingen intypt in uw Google komt ge wel op dingen terecht, maar in al die massa informatie om uw overzicht te vinden.*" (Sophie)

D. Future developments and 3D city environments - Finally we probed into the respondents' perceptions about future urban services. We first investigated the respondents' knowledge and usage of applications like Google Earth. Next we took a

closer look at their perceptions of 3D environments like Google Earth on street level, which allows users to virtually see a city.
All the respondents had already used Google Earth, however most of them only to try it out. For example someone just entered her address in Google Earth once to see how it works. Nevertheless the respondents can see some added value for applications like Google Earth in relation to tourism and planning vacations in general. The importance of the location of a hotel during a city trip has already been highlighted. In this regard several respondents interpret Google Earth (on street level) as a possibly useful tool to verify and explore the location of an accommodation before making a reservation.

'Maar misschien ja voor een vakantiehuis is dat misschien wel, dat ge zien als ze zeggen vlak aan de zee hoe vlak aan de zee dat dat eigenlijk wel is.' (Sophie)

It could also be used to explore the neighbourhood or the street of the hotel.

'Ik zou misschien wel voordat ik naar een stad ging zo een keer gaan zien van hoe ziet dat er eigenlijk uit in de straat van mijn hotel of hoe ziet dat eruit.' (Leen)

However both female respondents doubt if they would actually use a kind of Google Earth on street level for pre-trip planning or to look something up about a city on the spot or afterwards. They might use it once out of curiosity like they have done with Google Earth, but they expect that such applications will be too complicated to use. In addition Leen does not see the advantage of visiting a city or certain sights in a virtual environment on beforehand when you are going to see those things in reality during your trip.
The male respondents on the other hand do imagine themselves using a 3D city model for tourism purposes. Sven might use it to get an idea of how a city actually looks like before departing. Especially Mark sees great potential in 3D city applications. In fact Mark used already Google Earth during his city trip to Berlin to virtually revisit the Holocaust-Mahnmal. The monument made such a powerful impression on him that he wanted to look at it again afterwards on his computer. Similarly the real estate respondent Max (see next part) used Google Earth to look at several places in Italy that he visited during his stay there as an Erasmus student last year. Mark also confirmed that a 3D city model can be useful for the planning of a city trip, more in particular to check if something or a specific location in a city is actually worth visiting.

'*Vooraf lijkt mij zeker interessant, zeker om zo een wandeling al eens na te gaan van is dat nu echt wel de moeite om dat te gaan doen. En dan achteraf zeker ook om zaken opnieuw te zien. Een beetje als aanvulling op een fotoalbum of zo ja.' (Mark)*

However Mark emphasises an important condition for optimal user experience, namely a high level of detail for generating a realistic representation of the city. A virtual 3D city model can only have an added value if it truly shows what you would see in reality.

'Ik denk dat het interessant is dat er voldoende detail is, dat je ook effectief ziet wat er in werkelijkheid te zien zal zijn. Ge kunt een huis voorstellen met een kubus die verder op niks lijkt, maar ik denk niet dat dat dan echt veel toegevoegde waarde heeft. Ik denk dat die details er wel zouden mogen opstaan.' (Mark)

- Additional audiovisual material and user generated content (reviews, rankings, pictures, etc.) linked to tourist **accommodations** are very much appreciated. A 3D city model could be a useful tool to explore the location of an accommodation before making a reservation.
- Since the **central location** of an **accommodation** is of great significance for city trippers, future urban applications should enable people to locate a particular hotel.
- **Top 10 listings** on sights, restaurants, shops, etc. are used a lot and give tourists guidance. A 3D city model could link up with these kind of listings.
- On the spot, the classic **city map** is the vital tool for city trippers. Thus future mobile urban applications need to provide wayfinding assistance and possibly also **walking tours** along the sights of a city, a feature of the city map that is very much appreciated.
- According to city trippers, the most important things a digital city map needs to indicate are **public transport** and the main **sights** of a city.
- The respondent interviews show that virtual cities cannot only be of importance for **pre-trip planning**, but also to virtually visit a particular location during the stay in the city or after coming home from the city trip supplementing the traditional vacation pictures.

4.2 Real estate

The second specific domain in which we have tried to identify useful, potential services for a 3D city environment, is the real estate business. For this we take a look at relevant sector-specific literature and discuss two major real estate websites. Afterwards we discuss the findings of the interviews with two real estate agents and with prospective buyers and renters.

The literature that will be discussed in this section, based on the desk research, does not explore the real estate market as a whole, but particularly focuses on the use of the internet by prospective home-buyers on the one hand and by realtors on the other hand.

4.2.1 The internet and home purchase: the home buyer's perspective

The purchase of a home is mostly an important decision, involving a major financial commitment. The choice of where to live is not solely a matter of free choice, but is constrained and enabled by many factors one cannot always control, like the supply of particular types of housing at a given time and the availability of information on housing vacancies. Prospective buyers need information on the house itself (e.g. the number of rooms, style, age, …) as well as on the neighbourhood.

Many people have access to available vacancies through an informal information network of family, friends, colleagues or previous experience within the area. Prospective buyers can also appeal to more public sources such as classified advertisements, brochures/pamphlets of real estate agents and properties being announced in the show window of real estate agencies. Recently the internet has become an additional information source for searching a house. In the pre-internet era, this kind of information was not readily available. Real estate agents could order and limit the kinds of information that were accessible for prospective buyers. (Palm & Davis, 2002) In this context Crowston & Wigand (1999: 37) suggest that '*the Web-based commerce is eroding the long-enjoyed information monopoly of real-estate agents.*' With the introduction of real estate industry-sponsored websites came a vastly enriched information source on housing vacancies. According to Palm & Danis (2002), this rich information source has the potential to influence spatial patterns and processes in the search for housing by eliminating information barriers in the search process. It is even predicted that:

'(…) *with the aid of geographic information systems (GIS) and internet technologies, future home buyers will be able to search for house-specific information (…), obtain location information (…), take a computer walking tour of the communities and the targeted house, get a credit report, and even receive mortgage approval without stepping outside their homes.*' (Littlefield et al., 2000:575)

Yet the increasing availability of online real estate information does not necessarily mean that home-buyers will automatically use the internet to search for real estate information. Factors like internet access, consumer's awareness of online real estate information, age, the perceived effectiveness of the internet in aiding home purchase and the satisfaction with real estate agents determine people's use of internet in home purchases. (Littlefield et al., 2000)

In 2000 Littlefield et al. (2000) surveyed US residents in Southwest and Northern Virginia who had purchased homes during the previous two years. Of a total of 1,506 mailed questionnaires, 499 were completed. Fewer than 40 percent of the respondents searched for online real estate information during their home purchase. However, more than half of the respondents suggest that they may use the internet as an information source for home purchase in the future. Nevertheless there is still a large amount of respondents who claim not to use the internet for future home purchases. This implicates that brokers must not neglect traditional real estate information communication and should continue with traditional real estate services. Furthermore the survey results suggest that consumers who are satisfied with their brokers will prefer the personal service provided by a broker and decrease their internet use in future home purchases, even when the internet has proven to be very effective in aiding home purchase.

Palm & Danis (2002) explored the effects of using the internet on the search for new housing by home-buyers. They surveyed US movers in Wake County, North Carolina in early 2000 and compared the characteristics of web users with non-users. On the basis of these data they tested the following three hypotheses:

1. People with less prior familiarity with the destination area will make more frequent use of the internet. So the internet use will be higher for inter-urban migrants then intra-urban migrants.
2. Internet users will visit fewer houses because they will have more prior information about the market, diminishing the need for some personal home visits.
3. Internet users, equipped with more information about the house, neighbourhood, and prices of other recent sales, will pay less for the same

housing/neighbourhood bundle. The gathering of cost-free information on the internet should result in bid prices closer to the final market price, resulting in lower prices for internet-users.

The research shows that:

1. Inter-urban migrants indeed tend to use the internet more than intra-urban movers as the latter are more familiar with the area. Newcomers to the area make use of the internet to familiarise themselves with their new destination. This corresponds with the finding of Zumpano et al. (2003) that out-of-town buyers have higher information costs and are thus more likely to depend upon the internet in the search process than are local home buyers.
2. Surprisingly home-buyers who use the internet as an information source personally tend to inspect more rather than fewer houses in the search process. According to the authors, this can be explained by the fact that '*the internet permits 'shoppers', those who want more information before making a purchase decision, to gather even more information, reinforcing home visits and stimulating others rather than increasing the 'efficiency' of the search.*' (Palm & Danis, 2002:543) Zumpano et al. (2003) similarly argue that because the internet increases the search intensity, buyers are able to inspect more properties without an increase of the search duration.
3. Furthermore the use of the internet in combination with dependence on a real estate agent was found to reduce the final price for a housing bundle, whereas the use of the internet alone does not have an effect on final house price. Buyers who only used the internet and didn't find real estate agents even paid more for their homes.

Based on their results Palm & Danis (2002) conclude that at the moment the internet has had little impact on search patterns. However, it is important to keep in mind that the survey is conducted in early 2000 and thus deals with relatively early users. The use of the internet for information gathering and shopping has increased year by year.

Now we approach the topic from the realtor's perspective.

4.2.2 The internet: a threat or added value for realtors?

Internet is sometimes seen a threat for the profession of realtor.[25]The idea is that homebuyers and sellers are increasingly discovering the internet platform to do business on a peer-to-peer basis without involving realtors. However the internet can also offer an added value to the realtor.[26]

Gwin (2004) addresses one of the key questions in this 'threat or added value' discussion, namely: '*How much information should brokers supply on a website?*' The internet allows brokers to reduce the cost of providing information to potential buyers while improving the contact with the customer. In addition the internet enables buyers to match with sellers and self-select properties they are interested in and so can reduce the time and cost a broker must spend on identifying and showing properties to buyers. In other words, using the internet can save the broker time and money. Littlefield et al. (2000) foresee that in the future more of the home buying process will take place outside of the presence of brokers, resulting in fewer house showings and increased efficiency in the use of the brokers' as well as consumers' time. However, the downside is that brokers may risk disintermediation if they provide too much information. In that case the prospective buyer may try to locate and purchase the property and thus cut out the broker to save the broker's commission charges. This is one of the reasons why almost no real estate websites provide property addresses. (Gwin, 2004)

Gwin's research reveals that the amount of information that a real estate broker provides on the internet is determined by the search costs of prospective buyers. As buyer search cost increases, a broker can offer more online information while still avoiding disintermediation. If the internet reduces buyer search cost to a level that is lower than the brokerage fee, than the buyer will conduct the search and will not need a broker. An additional finding is that real estate websites in larger countries provide more information. Inhabitants of a large country have a higher search cost than people who live in a small(er) country. Consequently as buyer search cost increases, a real estate website can provide more online information without running the risk of disintermediation. (Gwin, 2004)

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[25]See for example articles like 'Internet bedreiging voor vastgoedmakelaar' ('Internet a threat for the realtor') in the newsletter '6 minutes business' http://www.6minutes.be/NL/Artikel.aspx?ArtikelID=11516&RubriekID=35&UserID=17 Consulted on: 16 July 2008

[26] See for example the Belgian internet initiative 'Next Immo', where the realtor claims to be able to make optimal use of the online business. http://www.tijd.be/nieuws/ondernemingen_media_telecom/Produpress_is_meer_dan_Immoweb_alleen.7703955-435.art Consulted on: 16 July 2008

According to Gwin brokers do take disintermediation into account when choosing the amount of information to offer on their website. Brokers must consider the risk of internet to reduce their incomes as well as the demand for their services. Many researchers suggest that full adoption of the internet may be inevitable for brokers, but according to Gwin '*the pace of that adoption may very likely depend on whether the internet is a substitute or a complement to brokerage services*.' (Gwin, 2004:19)

The idea of the internet as a threat for real estate agents can be nuanced. Brokers as well as prospective home-buyers can benefit from new technologies. It may well be that the internet is changing the role of the broker as a market intermediary. The internet appears to be used as a pre-screening tool, a function previously performed by realtors. Consequently brokers seem to be entering at a later stage of the buyer's search process, facilitating visits to properties first identified on the internet and helping to finalize the sales transaction when the right property is found. Using the internet as a search tool for home purchase does not exclude the real estate agents. The 2000 National Association of Realtors Home Buying and Selling survey even shows that 87% of the people who searched for homes on the internet eventually purchased their homes through brokers.[27] So rather than replacing brokers, the internet can be an important addition in the search process that increases the productivity of brokers and reduces search costs for buyers. However, Zumpano et al. (2003) add that the situation could change if realtors lose control of the listings that appear on the internet or if the amount of for-sale-by-owner websites increases. They suggest that brokers must maintain or even expand their online presence in order to remain a part of the home purchase process, especially as more and more consumers become internet literate and go online to search for houses.

Since the internet can serve as an important information source in the search for and purchase of a home, it is certainly interesting to take a closer look at the available online real estate information. We have chosen to study two particular real estate websites, the popular American REALTOR.com[28] and the well-known Belgian website Immoweb.be.

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[27] National Association of Realtors (2001). The 2000 NAR Home Buying and Selling survey, REALTOR.

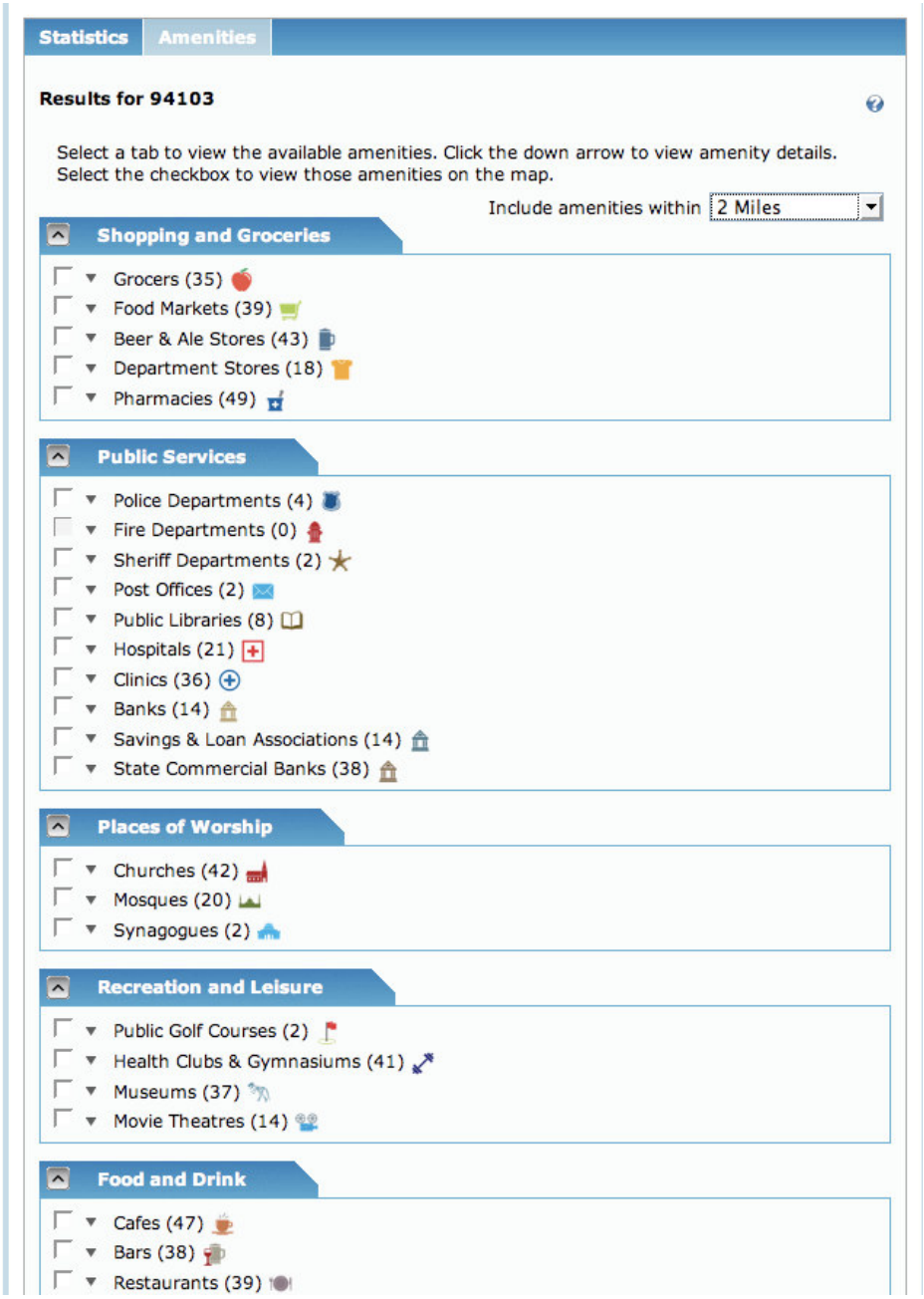
[28] See also Craigslist, the very popular website in the US, offers local classifieds and forums for more than 550 cities in over 50 countries worldwide, community moderated and largely free. The website was founded in 1995 and has over 12 billion page views per month. At Craigslist offers almost anything, from housing, jobs, goods and services to romance, local activities and advice. Its business model of free online classified ads has had a negative effect on the revenues of newspapers that only publish classified ads on payment. http://www.craigslist.com/

4.2.3 Case study: REALTOR.com

REALTOR.com, the official site of the US national association of realtors, is a very comprehensive American real estate website. The site contains information on all properties listed by the members of this organisation in every part of the US. It offers a wealth of detailed information, not only about the property itself, but also with regard to sale values of neighbourhood houses and various characteristics of the neighbourhood.

To search for a home the user is asked to enter a city and state/province or a postal code. Filling in the desired minimum and maximum price and the amount of bed- and bathrooms is optional. After filling in the required data, the advanced search option provides the user with a listing that matches the entered criteria. Each listing display mentions an address, a small picture and a brief description of the property. When the browser selects an item, he can find out a lot more about the house. A small 'Virtual Earth' (Microsoft) map indicates the location of the house and the optional driving directions to the house allows potential buyers to go and inspect it on the spot. Under 'Neighbourhood Info' you can explore 'Community Information' and 'School Information'. 'Community Information' consists of the proximity of important services (airport, hospitals, groceries, churches, etc.) (see picture below) and of a whole rang of statistics.[29]

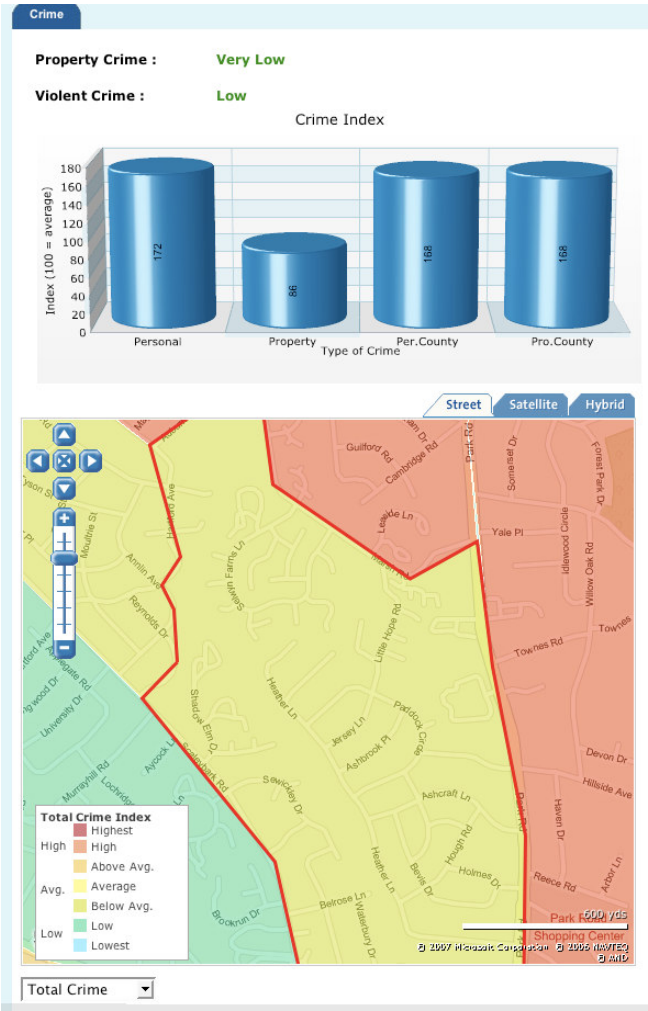
[29] This refers to statistics on the composition of the population and households, on housing (e.g. median home price, median dwelling age, …), on how the inhabitants commute to work, on the income and employment of inhabitants, on the cost of living and even on the climate.



Picture 12: screenshot of 'Community Info' feature of REALTOR.com

Besides the advanced search option, the visitor can also select a specific neighbourhood on a 'Virtual Earth' map of America through the option 'Find a neighbourhood'. Thereupon the browser explores the chosen neighbourhood and find out more about the present schools, the quality of life (indicated by average commute time in minutes, air quality index and crime index), climate data, dominant lifestyle profiles, the median household income, the level of unemployment and employment data, the composition of the population, cost of living, etc.

Next to this amount of information on the neighbourhood the website also gives more particular information on the real estate in the neighbourhood.[30]

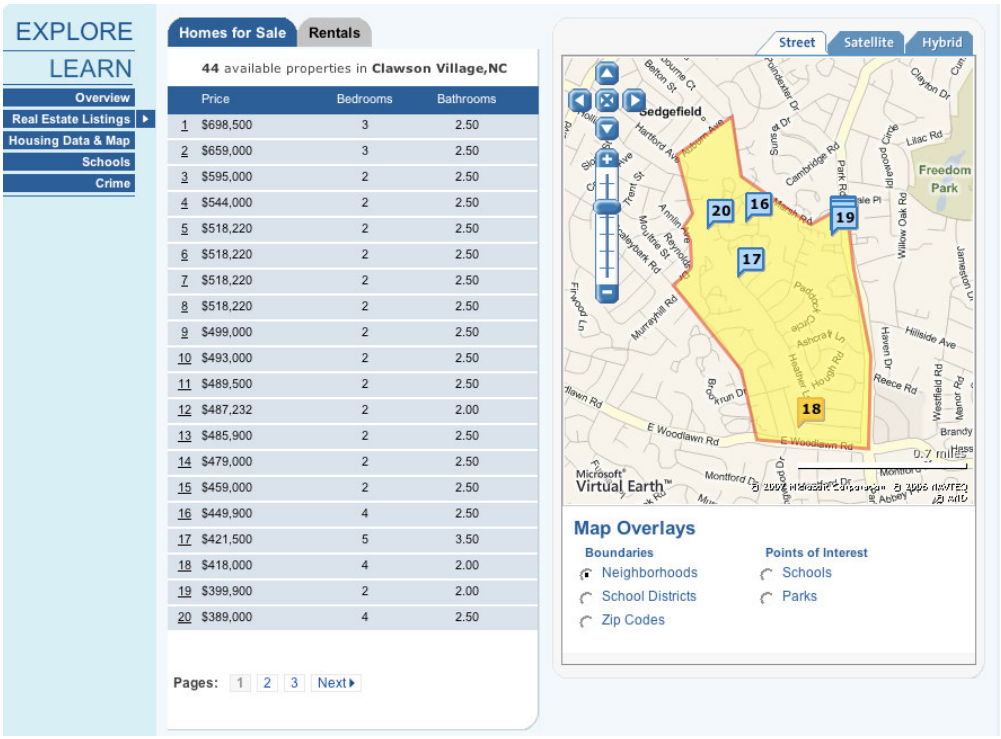


Picture 13: screenshot of crime index on REALTOR.com

It is still remarkable how much attention goes to the neighbourhood. The real estate listings give information about the price and the amount of bed- and bathrooms and locate the properties on a map. (see picture below) When you click on the number next to the price of a property, you will receive the same detailed information as with the advanced search (searching by city or postal code) mentioned above. This could mean that the neighbourhood can serve as the first criterion upon which prospective home-buyers select properties. In that case people first decide in which neighbourhood they want to live and find out a lot of details about that place(s)

[30] The particular information on the neighbourhood includes the price index that gives an idea of the average home and rental prices. Under 'Learn' one can find listings of the available properties in the neighbourhood. The locations of the houses are marked on a map and it is possible to check on the map within which crime zone a house is located (total crime index).

through the website and in a next phase they will look at the available properties in the particular neighbourhood.



Picture 14: screenshot of the real estate listings within the 'Find a neighbourhood' feature

After this comprehensive American example, we take a closer look at the most popular Belgian real estate website, Immoweb.be.

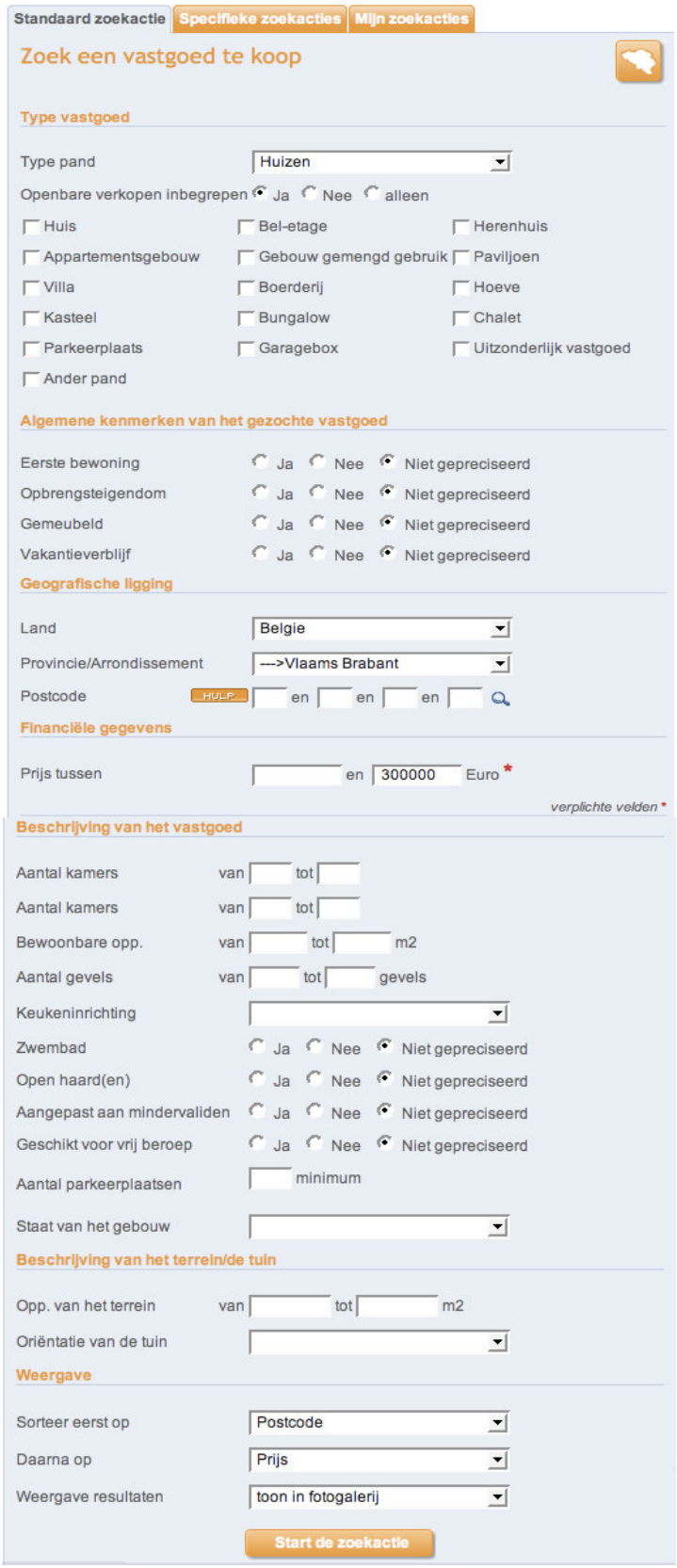
4.2.4 Case study: Immoweb.be

Immoweb.be, the undeniable leader on the Belgian real estate market, belongs to the Belgian group ProduPress and has over 130,000 visitors per day. The second largest Belgian real estate website, Vlan.be, has over 43,000 visitors per day. Immoweb exists since 1996 and covers the complete Belgian territory.[31] Yet it also offers properties and holiday residences to let and to buy abroad. The real estate website contains over one million pictures.

To search for a property, the user needs to choose between 'Te koop', 'Te huur' and 'Vakantiehuizen'. Within the standard search, filling in the maximum price is obligatory, the desired type of property, province, postal code(s) and number of rooms are optional. In the same screen the user can also decide how the listing of

[31] http://www.tijd.be/nieuws/ondernemingen_media_telecom/Produpress_is_meer_dan_Immoweb_alleen.7703955-435.art Consulted on: 16 July 2008

properties must be sorted, namely on the basis of the price, postal code, properties with pictures or new/updated properties. After entering these personal criteria, the browser gives the option to start to search for matching properties or to add additional criteria. The following screenshot shows these extra criteria to search for a property to buy.



Picture 15: screenshot of extra search criteria within the standard search on Immoweb

Each listing of the matching properties shows a small picture (usually of the building façade), the price, the total surface, the number of bedrooms and the postal code,

but no address. Clicking on a specific item leads to additional information about the selected property, just like on REALTOR.com. However, there is a vast difference in the provided extra information between the Belgian and the American real estate websites. Immoweb's description of the property is very brief, as you can see in the screenshot below.



Picture 16: screenshot of a property description on Immoweb

Next to the brief description of the selected property, one can also take a look at some additional pictures. Except from a map that indicates the location of the property, Immoweb does not offer any information on the neighbourhood of the property. This is a striking difference with the American REALTOR.com and its comprehensive 'Neighbourhood Info' feature.

Besides the standard search, the browser can also use the search option 'Specifieke zoekacties'. By means of a specific search engine, a prospective buyer can for instance specify that he is only looking for public selling or new apartments (see screenshot below). After choosing one of these specific types of properties, the search process is identical to the standard search.



Picture 17: screenshot of the specific search feature on Immoweb

4.2.5 Comparing real estate websites

The two case studies clearly show that there is a vast difference between the amount of information provided on Belgian real estate websites and on foreign websites such as REALTOR in the US, especially with regard to the neighbourhood of a property. This could relate to Gwin's (2002) finding that real estate websites in larger countries provide more information due to the search cost of its inhabitants. As buyer search cost increases, a real estate website can provide more online information without running the risk of disintermediation. Obviously in a small country like Belgium, the search cost for prospective buyers is much lower than for American citizens. In addition, traditionally Belgian citizens do not move a lot and often stay in neighbourhoods they are familiar with. So they might not be interested in a great amount of detailed information on a neighbourhood. Yet future research needs to further study these issues in depth.

As a final note it is interesting to see that most online initiatives to get to know the neighbourhood of a property are American. For instance the American website rottenneighbor.com incites people to rate and review good and bad neighbours. Yet since its introduction in 2007, nearly only slanging matches addressed to neighbours

have been posted. The website is already a success in America, Germany and France and is now also introduced in Belgium. The founders argument that the website is a good information source for people who want to move, information that you will not receive from a real estate agent. On their website the founders even argument that '*Real estate agents can also use RottenNeighbor as a tool to market their services and feel more secure about the homes they show to their clients*'[32].
The answer of the Privacy Commission to the question whether the website is a violation of the privacy in Belgium is nuanced. In principle it is not allowed to mention names and exact addresses, but the location is marked by means of Google Maps and Google Earth. In that case it is a matter to what extent the house is recognizable. If for instance an apartment building is tagged, than you can argue that personal data are not made public. As a result, the posts of American users who often mention names and exact addresses would not be allowed in Belgium.[33]

4.2.6 Expert interviews

After exploring the literature on the usage of new media and technologies in the real estate business, we have interviewed realtors to get an inside view of the daily real estate practices and processes. The next paragraphs will discuss the findings of these expert interviews in detail.

4.2.6.1 Description of the experts

The real estate market is very location specific. The real estate conditions in the Belgian and European capital Brussels for instance are totally different from those in a small village in a more rural area. This difference was used as the criterion for the selection of the realtors to be interviewed. We interviewed a realtor (Jeroen) who operates in the periphery of Brussels and a realtor (Bart) who works in Hasselt, the capital of the province of Limburg with a surface of 10,233 hectare. Bart's real estate agency covers the whole province Limburg.
Since 1995 Jeroen, 45 years old, is the manager of a real estate office that consists of three establishments, all located near Brussels, and employs 16 to 17 people in

[32] http://www.rottenneighbor.com/about.php Consulted on: 30 July 2008
[33] BDB. Buren afkraken op website kan nu ook in ons land. In: *De Morgen*, 31 juli 2008, p. 11.

total. The head office is located in Grimbergen. The manager holds a more administrative function. The real estate office offers houses for sale or to let.
Bart, 36 years old, is an independent realtor who works at the biggest real estate office of the province of Limburg (in terms of the sale and offer on the residential market). He has 12 years of experience in the real estate business. The real estate office offers houses that are for sale and only lets commercial and industrial premises. The office consists of five to six employees in total.

4.2.6.2 Findings of the expert interviews

The goal of the expert interviews is to get a better understanding of how houses are being offered on the market via offline and online tools. In addition we want to investigate the practice of how people buy a house and what kinds of (communication) means are used in this practice.

A. Presenting properties: boards and internet - When the realtors elaborate on the means they use in their daily activities, the written media are barely addressed. Both realtors confirm that they receive the most response on the boards with '*for sale*' or '*to let*', and on second place via internet.



Picture 18: 'for sale' board of a real estate agency

Bart adds that realtors thought the internet had become more effective than the boards, but recent studies have revealed that the boards generate the most response. Jeroen talks about a substantial shift during the last ten years. Whereas in the past the written media played a dominant role with the classified ads of real estate properties, nowadays real estate offices hardly receive any response through

newspapers. The vast majority of - mainly young - buyers come in contact with the real estate office through the internet and solely older people will respond on a classified advertisement in a newspaper. Bart reveals that nowadays they only publish properties in newspapers when this is explicitly requested by the owner of the property and occasionally for the branding of the office. The press seems to be too slow for the current real estate market where properties come and go constantly, in contrast to a fast medium like internet.

The fact that prospective home-buyers occasionally drive or walk around looking for real estate boards implicates that they often have already (a) particular neighbourhood(s) in their mind. Both experts confirm that people who are looking for a home have already decided where they want to go live and know what the neighbourhood(s) has to offer. So usually people do not ask a lot of questions with regard to the neighbourhood of a property because they have already explored it. The criteria that play an important role in the choice of the neighbourhood are:

- The proximity of schools, grocery shops, sport facilities, …
- The proximity of a motorway and/or train station: this can be an advantage (commuting) as well as a disadvantage (noise, busy street, …)
- The proximity of public transport
- …

When people come across houses while prospecting a specific neighbourhood, they normally only see the façade and in some cases the side-faces of the building, its front garden if present and the street. The prospective buyers usually do not go inside, unless the owner is selling or letting the property by himself and is willing to give a guided tour. In other cases interested buyers need to make an appointment with the real estate office. The success of the boards implicates that the outside of a property and thus the first look are sufficient to trigger people's interest, or else they would not call the real estate agents to make an appointment. This coincides with the fact that the façade of a premise is always the front picture on real estate websites. Bart confirms that the front view of a house is the most important picture that triggers someone's interest in the first place.

B. Internet: a threat or enrichment? The realtor's perspective - The idea of the internet as a threat for the realtor was not really present among the two brokers. They rather embrace the internet and especially Bart elaborated on the medium's advantages and opportunities. The following part gives an overview of the positive aspects of the internet in the daily professional activities of a real estate office, as mentioned by Bart.

First of all in the pre-internet decade the employees of the real estate office had to come together every week to decide which properties, usually about 20, they were going to publish in the newspapers and thus put in the spotlights. This frequently caused resentment among the owners whose properties were not selected. Nowadays the internet allows to put every house on the world wide web, which means that every property receives the same amount of exposure.

Secondly when a real estate office received a new premise, they would go and take pictures with an analogue camera. Than it would take about three weeks before the role of the camera was full and the pictures could be developed. Consequently it took a long time before the property could be presented. Currently all pictures are taken with a digital camera and the pictures are uploaded on the computer immediately and send to the particular websites. So by means of the internet a new property is presented for sale or to let worldwide within 24 hours.

The internet saves the broker time because prospective home-buyers already select which premises they are interested in based on the pictures and other information they find online. In the past the advertisements in newspapers often solely consisted of a few lines of information, which meant that people could not really form a good notion of the property. Many times the visit to a house only lasted for a few minutes because the prospective buyers expected something totally different. In such cases the visit was a waste of time for both the realtor and the visitor(s). This clearly corresponds with the findings of previous real estate research (Gwin, 2004 & Littlefield et al., 2000).

A final advantage of the internet mentioned by Bart is that the medium offers the brokers a source of potential customers. Individuals who put their properties on the internet, for example on the well-known Immoweb.be, are frequently contacted by real estate offices with the question if they want to hire a broker to sell or lent the property. During these phone calls brokers try to convince the owner of the ease of selling or letting a home through a real estate office.

Next to all these positive aspects of the internet, both brokers also indicate some negative aspects related to the online medium.

First of all the market demands that a real estate office advertises on several real estate websites. This is very expensive and the advertising prices keep on increasing. In this context Jeroen criticizes the monopoly of the website Immoweb.be and the possible abuse of its dominant position. Immoweb increases its prices towards advertisers and also allows individuals to sell or let premises online, while the realtors contributed to the success of the popular real estate website. According

to the realtor, individuals should be refused to advertise on Immoweb, which used to be the case in the early years of the website. Jeroen fears to some extent the potential of internet to bypass realtors. He foresees a fragmentation between on the one hand low budget real estate offices that will exclusively work through the internet and on the other hand real estate offices who offer more service and a personal approach, something the internet can never compete with. Jeroen also adds that those low budget realtors could give the real estate profession a bad image.
Bart nuances the risk of the internet enabling owners and buyers to do business directly with each other and thus cutting the broker out. This risk also existed with the classified advertisements in newspapers. In addition most of the time the real estate office negotiate an exclusive contract with the owner. So in that case the realtor always receives the commission, whether the owner sells the property by himself or through the realtor.

C. Virtual visits: The realtor's perspective - A final topic addressed in this part concerns the way both experts think about virtual city models. We first asked the experts about their experiences with Google Earth and then proceed with questions on the potential of a 3D city application. In this context the realtors also talked about the 360 degrees panorama pictures that allow to take a look around in the rooms of a house.
Both experts have some experience with the application that generates 360° panorama pictures and both are not really enthusiastic about this. They have used it in the past without much success and no longer provide the service. Firstly of all the real estate agent needs to hire a firm to take the pictures, which is very expensive. Secondly both realtors argument that prospective home-buyers will always prefer to walk around in a home and feel it in reality. The tool is an eye catcher, but people's interest can also be triggered by means of regular pictures. In addition Jeroen argues that people might be put off by the 360° pictures when these show an old-fashioned interior or ugly furniture. It is the job of the broker to lead potential buyers around and give suggestions on how they can turn the house into something they like. This kind of personal assistance cannot be provided by the internet and a 360° picture tool.
At the present time the most known 3D city application is Google Earth. The interviewed real estate agents have already used the application and the real estate office of Bart is even using it to mark a lot. It is the first time they use the application and they will probably use it more in the future. An important condition is that the images should be detailed enough. The advantages are its ease of use to make a link and that it is free of charge. According to Bart Google Earth could for instance be

interesting to show the beautiful and quiet location of a property. Yet an important remark by Jeroen is that this would require revealing the exact address of the property, something they usually do not do. However this obstacle could easily be overcome by making a link to the street of a property so people can already virtually explore the neighbourhood of the property. Another solution could be to only give access to potential buyers who contact the real estate office to ask for the exact location of the property.

The realtors both think that a 3D city model on street level could be interesting. The tool might help home-buyers in their selection of potentially interesting properties because it would for example enable them to look at the kind of houses that surround the property. The types of houses of the neighbours seem to have some importance in the selection process since Bart always takes pictures of the neighbourhood, especially in case of building lots. However the realtors question the added value of a 3D city model because home-buyers will always want to go visit the home and its neighbourhood on location. Bart adds that the province of Limburg is not that big so one can easily go and visit the premises by oneself.

So 3D city tools to virtually explore the outside and the neighbourhood of a property might be more interesting for larger countries where it is not that self-evident to go to all the properties that seem to be interesting at first sight. This also relates to the findings of Gwin (2004) that real estate websites in larger countries normally provide more information.

- The high response realtors receive on the boards implicates that the outside appearance and façade of a property and its neighbourhood are sufficient to trigger people's interest. These are also the kind of elements that should also be visible in a 3D city model. Thus a virtual 3D city could enable prospective buyers to **virtually prospect neighbourhoods and properties** at home from their personal computer and thus serve as a **selection tool** to identify potentially interesting properties. Obviously this requires the indication that a property is for sale or to let in the 3D city model.
- According to the real estate agents, Google Earth and thus also 3D city models can be used to show for example the beautiful and quiet location of a property.

After interviewing the real estate agents, we interviewed several prospective buyers and renters to get a better insight in the home-searching process.

4.2.7 Respondent interviews

4.2.7.1 Description of the respondents

In this part we analyze the practice of searching a home from the perspective of prospective buyers and renters and the implications this has for user-centred services in 3D city models. For this we selected respondents who were looking for a home to rent or to buy at the moment of the interviews. Since there can be a difference in the search process between prospective renters and buyers, we have conducted explorative interviews with both groups to get a complete picture. An important condition was that the respondents were still searching for a property. If the respondents had already found a home, they might have answered the questions biased in relation to the found property and have tried to justify their choice for that particular property.

We addressed several topics in the interviews. We first elaborate on the different means and media people use in their search for a home. Furthermore we investigate the role property pictures play in this search. Thirdly we take a closer look at the practice of home visits and its added value in the search for a home. Finally we discuss the respondents' ideas on virtual visits, using the example of Google Earth on street level as a probe.

The respondents were recruited through purposeful sampling. For this we used the standard snowball method. We have mobilised people we know to look for people in their social networks who were looking for a home to buy or to rent. A possible weakness of this sampling method is that the respondents are situated in a similar socio-cultural context as the researcher, in our case mainly young people. So the sampling method again let to a dominantly young group of respondents. As we are still in the explorative phase of the research, this is not a real problem. However in the second research phase, where the practices of prospective home buyers and renters are studied more in depth, more variation will be required.

Before continuing to the actual findings of the respondent interviews, we will shortly describe the interviewed prospective buyers and renters.

- ***Interview 1***

Names: Goedele & Rob

Birth years: 1981 & 1980

Looking for: a house to buy in the neighbourhood of Leuven
Active search period: for the past 6 months

- ***Interview 2***

Names: Joke & Max
Birth years: 1982
Looking for: an apartment or house to rent (for 4 friends and 1 boyfriend) in Brussels
Active search period: for the past 5 months

- ***Interview 3***

Name: Bas
Birth year: 1982
Looking for: an apartment or small house to rent together with his girlfriend in GentBrugge, Ledeberg or Sint-Amandsberg
Active search period: for the past 3 months

- ***Interview 4***

Name: Annelies
Birth year: 1980
Looking for: an apartment or small house to buy in the city centre of Ghent or Brussels
Active search period: for the past 4 to 5 months.

4.2.7.2 Findings of the respondent interviews

The following part discusses the search practice of the prospective buyers and renters in detail, including the media and other means they use in their search, their search criteria, the importance of the pictures of houses, the course of house visits, etc. Furthermore the interviews also probed into the way the respondents think about 3D city models and the possible added value of such applications in their search for a new home.

A. Searching for a home - While searching for a home, most people combine several search methods in order to find the perfect property. We elaborate on the different search tools the respondents have put forward:

- **Internet**. As we deal with a young group of respondents, the high internet literacy among the interviewees is not surprising. All the respondents use the internet on

a daily base, for work as well as for entertainment purposes. Consequently the internet was the first thing to be mentioned when we asked the respondents how they were searching for a home. The dominant position of Immoweb is again confirmed. The interviewees prefer the popular website for its ease of use and because it contains (almost) all the properties that are spread over the other real estate websites.

'*Via internet. Eerst ben ik beginnen zoeken op verschillende immo-sites, maar als je daar zo een eind op zoekt dan zie je wel dat de meeste dingen ook allemaal op Immoweb staan he. Dus eigenlijk is dat wel de belangrijkste zoeker (...).*'(Annelies)

'Alle huizen die te koop zijn, al die dat via internet te koop zijn. Ik heb nog nooit ergens één gevonden ergens anders dat niet op Immoweb stond.' (Goedele)

Immoweb offers the users the possibility to make a personal search. In that case a user only has to enter his or her search criteria once and than regularly receives an email with the properties that match the personal criteria. Surprisingly only Rob & Goedele and Max made use of this option, which saves them a lot of time. The other respondents entered their personal criteria every time they visited Immoweb.

Other common used real estate websites among the respondents are Vlan, Hebbes and Notarim[34] or other websites of local notaries for public selling. Vlan and Hebbes both have a published offline counterpart, yet all the prospective buyers and renters solely consulted the online version. Only Goedele & Rob mentioned 'De Streekkrant' as a published information source in their search for a home. So the fact that all the other respondents do not use written media confirms the shift from the classified ads in the press towards the internet, as stated by both real estate experts. However we need to take into account that we interviewed young respondents, because the internet usage among older age groups is still remarkably different.

- **Word-of-mouth advertising**. One topic that was not really present in the real estate literature and the expert interviews, but does seem to play an important role in the search for a home, is the involvement of family, friends and colleagues. As soon as Bas started to search for an apartment with his girlfriend,

[34] www.vlan.be; www.hebbes.be; www.notarim.be

he sent an email to all his friends and family with the message that they were looking for a modern apartment or small house with 2 bedrooms, a terrace and a maximum price in 3 specific municipalities.

'*Eigenlijk is dat wel een heel goede tactiek hebben wij gemerkt omdat ge allez wel af en toe iets te horen kreeg*.' (Bas)

Obviously Bas could mobilise his family and friends to keep their eyes open for properties that matched these criteria since they all live in the destination area. Goedele & Rob however do not have any family and only a few friends who live in the neighbourhood of Leuven so they could not call in that kind of help.
From her personal experience Annelies is even convinced that word-of-mouth advertising may be the best search method to find a home. When you know a specific property that is or will soon be available and the owner has not yet put it online, you have a bigger chance to get it as the availability of the home is not yet generally known.

'*Een andere zoekwijze, vind ik eigenlijk nog de beste, is tegen veel mensen zeggen dat ge op zoek zijt naar iets en als ze iets weten in de buurt dat ze het u zo snel mogelijk signaleren en eigenlijk heb ik daar nog de beste reacties van gehad. Omdat uiteindelijk degenen die al op internet komen dat zijn er waar heel veel volk op afkomt. Als je er bij de eerste bij zijt voordat het op Immoweb komt is dat altijd interessant he*.' (Annelies)

The prospective buyers and renters did not only ask family and friends to keep their eyes and ears open for interesting properties. They also explored the neighbourhoods they had in mind by themselves, by scouting around for boards with '*for sale*' or '*to let*'.

- **Wandering through a neighbourhood**. Although the real estate experts claim to receive the best response through the boards, not all respondents are convinced of the benefits of walking or driving through a neighbourhood. Joke & Max and Bas both used this search method in the past when they were looking for their current homes, but at the present time they do not explore the neighbourhoods they are interested in as this is too time-consuming and thus too difficult to combine with their jobs. Bas actually found his current home by cycling around and calling the telephone numbers that were marked on the '*to let*' boards, but

Joke did not have any success with this method so she does not have the time anymore to wander through the neighbourhoods.

'*Ik weet dat wij vorig jaar ook gezocht hebben door gewoon zo rond te wandelen en alle uithangbordjes dat we zagen gewoon op te schrijven en telefoneren, maar toen hadden we daar tijd voor. Toen waren we nog niet aan het werken, maar nu is dat zo tijdsintensief dat we dat eigenlijk niet meer.' (…) 'Uiteindelijk hebben we een maand echt intensief zitten rondwandelen en zo eigenlijk niks gevonden*.' (Joke)

Goedele & Rob have driven around four times in some neighbourhoods of Leuven, yet when they saw an interesting property and called the telephone number on the '*for sale*' board the price was usually above their budget so Goedele concludes: '*Ja dat valt altijd tegen eigenlijk*'. Especially for Annelies wandering through the city centre of Ghent and Brussels, the two areas where she wants to buy a home, is an obvious search method. When doing a house visit, she also walks through the streets around that property to look for additional '*for sale*' boards.

'*Maar ja en naast internet ben ik natuurlijk ook zelf dikwijls toertjes gaan doen in de buurt waar dat ik eventueel wel iets wil kopen*.' (Annelies)

- **The broker**. We noticed an rather negative attitude towards brokers. No one of the interviewees has taken the initiative to go to a real estate agency to get informed about available properties. Joke even describes going to a real estate agency as '*a strange idea*'.

'*Goh, wij vonden dat eigenlijk een raar idee om zoiets te doen, maar dan hadden we ooit eens naar zo'n bureautje gebeld en die zei van je moet bij ons op bezoek komen.*' (Joke)

All the respondents prefer to have immediate contact with the owner of a property and do not like the intermediation of a broker. Bas found several properties on the internet that were let by a real estate agency. In those cases he had to go to the agency and received a small paper with the exact address of the apartment and the telephone number of the current tenant to make an appointment with the latter. Bas sees this is as a cumbersome procedure.

'*Het eenvoudigste vond ik dat we gewoon konden bellen naar de eigenaar en dan konden gaan kijken*.' (Bas)

Next to the perception that working through a broker can be cumbersome, we also came across a feeling of distrust towards brokers. Especially Goedele & Rob and Annelies criticize the obtrusiveness of brokers, based on their personal experiences. Goedele is convinced that the owner of a house will give a potential buyer more honest information than a broker.

'Die mensen van het immo-kantoor die zijn het zo gewoon van hun boel te proberen verkopen dat die durven gewoon liegen he tegen u. Ik denk dat iemand die zo zijn huis verkoopt (...) ge gaat toch eerlijkere informatie krijgen denk ik.'(Goedele)

Annelies prefers to make her own selection of possibly interesting properties by means of online information and pictures as previous brokers always tried to force uninteresting properties upon her. This confirms the conclusion from the literature and the expert interviews that the internet is used as a pre-screening tool, which changes the role of the broker as a market intermediary. The internet enables movers to self-select properties, which reduces the time and cost realtors spend on identifying and showing properties to buyers. (Gwin, 2004)

'*Ze weten dat je op zoek bentnaar iets en die willen u dan echt zo van alles opdringen en ik zoek dat liever zelf. Ge krijgt dan zo de sleutel van allerlei huizen waar dat ge eigenlijk moest ge ze op internet zien nooit naar zou gaan kijken omdat dat toch niks is dat u aanstaat*.' (Annelies)

In this self-selecting process, the online pictures of properties seem to be of great importance. We have probed into the respondents' usage and perception of online visual information of properties.

B. Significance of pictures - The respondents often contradict themselves when talking about to what extent they rely on the online pictures of properties in their selection. Several respondents make the remark that pictures are often not representative for the reality and thus can be misleading.

'Soms geeft u dat een verkeerd beeld he want ja die foto's dat is ook niet altijd, allez sommige zijn super mooi genomen maar in werkelijkheid ziet dat dan eigenlijk wel niet zo mooi uit, maar ge hebt ook het tegenovergestelde he.''*Ze tonen altijd wat dat er mooi is he.*' (Annelies)

'*Ze zijn daar toch wel goed in heb ik de indruk om foto's zo te maken en zo te arrangeren zodat het veel chiquer en groter lijkt*.' (Goedele)

Yet at the same time the interviews indicate that the respondents heavily rely on the online pictures to make a selection. The façade of a premise is always the front picture on real estate websites. Several respondents admit to make a first selection based on this picture. Annelies and Bas, both looking for an apartment, loose interest in a property when they see a picture of a big apartment complex. This coincides with the statement of real estate expert Bart who claims that the picture of the front view of a house is the main 'entrance' to somebody's interest in the first place. In a next step, if the façade picture triggers the attention, the respondents closely examine the rest of the pictures in order to be able to decide if the property would be worth to visit.

'*Je ziet dan al onmiddellijk in de fotootjes van ja dat is zeker al niks, zo van die heel grote buildings daar wil ik zeker nooit in. (...) Dus dan ging ik eigenlijk wel voort op die foto's voor de eerste screening.*'(Annelies)

'*Je gaat nooit iets toezeggen op foto's. Foto's zijn enkel richtinggevend om te zien gaan we daar de moeite voor doen om te gaan kijken.*'(Bas)

'Als ge uit de foto's al ziet dat het niks is, dan doe ik ook wel niet de moeite om te zitten kijken waar dat het ligt.'(Goedele)

It is interesting how Max claimed pictures were not important in his search for an apartment, but at the same time he mentioned that pictures often make him fantasize about the property and increase his hope of finding something suitable. So obviously online property pictures do significantly influence movers' first selection, even if they are not always aware of it.

'*Niet belangrijk. Het is niet als er geen foto's staan dat ge niet gaat kijken. Maar het is wel leuk natuurlijk he, ge kunt gemakkelijker wegdromen*.' (Max)

Even though the respondents strongly relied on the online pictures to select possibly interesting properties, they all agree that pictures cannot replace an actual visit to a home. The next part will discuss the practice and added value of home visits, as described by the interviewees.

C. Added value of home visits - According to the respondents there are many things one cannot infer on the basis of the online information and pictures of a property. Consequently nothing can truly replace an actual visit to the property if you want to have a complete picture of the building and its surrounding.

'*Maar er zijn heel veel dingen die ge gewoon niet kunt erop zetten(op internet). Er is niks dat vergelijkt met door een huis wandelen en het zelf zien*.' (Rob)

'*Meestal komt ge pas alles te weten als ge er geweest zijt he*.' (Joke)

'*Die bezoeken zijn eigenlijk super belangrijk vind ik. Omdat je er totaal geen beeld van hebt via foto of via. (...) ge moet er zo een keer in gelopen hebben en zo het gevoel hebben van ja ik zou hier wel nog kunnen wonen. En ook ge ziet dan een keer de buurt, ge ziet ja zou ik mij hier kunnen goed voelen, ge kunt u dan zo een keer inbeelden hoe dat het zou kunnen zijn. Maar via een foto ja, ge hebt er zo heel die entourage niet bij he, ik vind dat toch wel helemaal anders.*'(Annelies)

Obviously the online pictures of a property do not enable the respondents to feel the atmosphere in a particular neighbourhood. '*Ge kunt moeilijk opzoeken welke sfeer dat er daar hangt of welk soort mensen dat er daar rondhangen he.*'(Annelies)So Joke & Max and Annelies always wander around in the neighbourhood want they go to visit a property in order to see and feel if it is a fun and cosy neighbourhood. The three of them want to live in or nearby a city centre so they pay also attention to the proximity of public transport, grocery and other shops, cafes and restaurants. However because Joke & Max have been looking for a 4-bedroom apartment for the past 5 months, but still have not found anything. That is why they have now lowered their expectations towards the neighbourhood. The proximity of a train station is their only remaining requirement. In a similar way Bas mentions that he and his girlfriend have also made their criteria more flexible after searching for months without any result, for example no terrace or only one bedroom. Yet the predefined neighbourhood (the 3 municipalities) is the sole criterion they definitely want to stick to.

'*Ik denk dat dat uiteindelijk één van de minder belangrijke criteria is, allez op het punt dat we nu gekomen zijn he. Het is altijd leuker om in een leuke buurt te zitten. Zoals hier, ik vind dit te afgelegen, maar stel dat we nu hier iets zouden vinden en iedereen vindt dat goed dan zou ik bereid zijn dat te nemen.*' (Max)

People who are looking for a home to rent are possibly more likely to lower their expectations than people who want to buy a property. Goedele & Rob as well as Annelies have also been looking for some time and they are not (yet) prepared for doing concessions. The prospective buyers have already spent a lot of time on exploring the neighbourhood of an interesting home.
While browsing for available properties on the internet, the respondents also looked up the location by means of online maps if they did not know the street name or neighbourhood. The use of these online map applications will be described next when we talk about virtual visits. Essential here is that the respondents differ in their expectations towards the neighbourhood of a property. They also pay attention to different things on an online map and during a home visit. Goedele & Rob and Bas for example are looking for a quiet neighbourhood and do not want a railway or busy street in the immediate vicinity of their house. Yet they do want a nearby motorway with a good connection to Brussels. So they do not look for a neighbourhood with a lot of shops, cafes, restaurants and public transport like Joke & Max and Annelies do. During a home visit the prospective movers also pay attention to different things inside the house. Yet there are some similarities in the answers of the interviewees. They all agree there are multiple things you cannot see on the online pictures of a property. The most important thing the home visitors want to check is the condition of a house. This involves checking possible humidity problems, which seems to be an important point of attention, if renovation is required, the condition of the electricity and heating, the presence of double-glazing, etc. Additional features the respondents pay attention to and that cannot be assessed on the basis of the online pictures are the presence of sufficient daylight in the rooms, the size of the rooms and the practical arrangement of the rooms.

D. Virtual visits: The home-buyer's perspective - The final part will elaborate on the perception of the prospective movers on virtual visits. This involves the interviewees' experience with and attitude towards 360° panorama pictures and online wayfinding/navigation applications like Google Maps and Google Earth as well as their opinion about future 3D city models:

- **360° panorama pictures**. Although both real estate experts stopped offering 360° panorama pictures, all the respondents, except Bas, already came across this virtual tour application. Max and Annelies are quite enthusiastic about the application as it enables you to get a better idea of the size of the different rooms and thus of what you can expect in reality. They conclude that 360° panorama pictures are more representative than regular pictures. Goedele adds that it would be useful and interesting if someone would just walk through a property with a video camera to film all the rooms.

  '*Je hebt zo het gevoel dat je er middenin staat he. Met een foto ja ge kunt zo juist het mooie hoekje in dat huis trekken maar voor de rest is het misschien allemaal niet in heel goeie staat en is het voor de rest misschien niet zo mooi. Dus als je heel het huis kan zien of een hele kamer. Je hebt ook zo dat ruimtegevoel he, hoe groot dat het is en ge kunt u zo meer inleven in die ruimte. Ik vind dat wel helemaal anders*.' (Annelies)

  Yet Bas thinks the regular pictures are sufficient to assess whether a property is interesting enough to go and visit. Bas argues that one is not going to buy or rent a property solely on the basis of the pictures, they are only give a better idea whether or not to visit the property. Regular pictures can also fulfil this guiding role.

  'Je gaat nooit iets toezeggen op foto's. Foto's zijn enkel richtinggevend om te zien gaan we daar de moeite voor doen om te gaan kijken. En dan denk ik niet dat je meer nodig hebt dan foto's.' (Bas)

- **Online wayfinding/navigation applications**. The previous part already briefly mentioned the usage of online wayfinding/navigation applications such as Google Maps to locate a certain property. Rob & Goedele always enter the address or the street name of a property in Google maps when the description and pictures on Immoweb looked interesting. Within Google maps they both use the function 'satellite view' to see if there is a busy street or railway close to the house, if there is a motorway in the proximity and Goedele even checks if there is a river nearby the house that could cause flooding. The couple argues that the application can save a lot of time because the satellite pictures help in assessing the suitability, for example to check if the house is located next to a motorway.

'*Ja het maakt het veel gemakkelijker. Je spaart daar tijd mee uit he want er zijn een deel huizen waar we niet naar gaan kijken zijn omdat we op voorhand gezien hadden dat we het toch niet gingen nemen, (...) zo die langs de autostrade lagen en zo*.' (Goedele)

However Rob is less convinced of the importance of applications like Google Maps because the house numbers are often not correct so you can get an idea of where the property is more or less located, but you are never sure of the exact location. Therefore he does not really rely on the application. '*Maar nog eens zo heel belangrijk is dat nu ook weer niet, dat is een hulp he die kaarten en zo.*' (Rob)

While looking for an apartment, Max always used Maporama and Mappy, both online applications for route descriptions. He entered the address of a property in one of the two applications to calculate the distance to the city centre of Brussels. He also takes a good lookat the city map that comes together with the route description so he can better locate the property. Recently Max uses more the city map of Google Maps because the enlargement of the Maporama city map often does not work.

As Bas is looking for an apartment in the area where he grew up, he did not really need an additional tool to locate a property. Only exceptionally he came across a street name he did not know. In that case he clicked on the function '*Ligging*' in Immoweb to get a city map.

- **Three-Dimensional city models**. All the respondents know and often have already used the Google Earth application. Yet apart from Annelies, none of them have used the tool in their search for a new home. Annelies used Google Earth to show other people an interesting apartment that she had visited in the centre of Brussels. The pictures were quite detailed since the city centre of Brussels is well covered by Google Earth. She could show the apartment from different angles. However Bas did not see any added value in this kind of application since he knows the neighbourhood very well. So according to him Google Earth could be interesting in case you are not familiar with the neighbourhood. This coincides with previous studies that out-of-town movers will probably depend more upon the internet in the search process as they have higher information needs than local movers (Zumpano et al., 2003 & Palm & Danis, 2002).

'*Stel inderdaad dat wij hier in Brussel of zoiets iets moeten zoeken, dan denkt ik dat je dat eerder zult gebruiken omdat we Brussel niet zo goed kennen.*' (Bas)

Joke & Max also argue that Google Earth is not really useful for them because the neighbourhood of an apartment is no longer important to them, only the proximity of a train station matters. In addition Max states that using Google Earth in his online search for a property would only mean an extra effort. Also entering the address of a property in the 3D application would be too much hassle.

'*Dat kan inderdaad misschien wel interessant zijn als ge echt op zoek zijn naar groene plekjes in de buurt of speeltuintjes of weet ik veel wat. Dat zijn allemaal criteria die ons niet, allez we zijn zo wanhopig dat we eigenlijk gewoon geen criteria meer hebben naast kamers, prijs en station in de buurt.*' (Joke)

Finally we also asked the respondents' opinion about a tool that would resemble Google Earth and enable the user to virtually wander through the streets and take a look around.
Joke wonders what would be the added value of virtually exploring a neighbourhood of a property, if she will visit the house in any case. '*Ge moet er toch sowieso naartoe he en dan zie je het wel gewoon in het echt.*' (Joke) A similar observation was made by Leen in the part on city trips and 3D city models. However Joke admits that it might be interesting to virtually wander through the neighbourhood on beforehand to see if it is a nice street when you have the intention to buy the house. '*Ik kan mij inbeelden moest ik ooit een huis kopen of zo dat dat dan wel belangrijk zou worden.*' (Joke) So we might assume that future 3D city models are particularly interesting for prospective buyers in comparison to renters as they are often more demanding towards both the property and its neighbourhood.
It is important to notice that Joke is currently living in Brussels and is looking for an apartment in that same area. Consequently is not a big effort for her to go and visit an interesting property and its neighbourhood in person. This relates to Gwin's finding that real estate websites in larger countries usually provide more information since the search cost for movers there is much higher. (Gwin, 2004) So the possibility of virtually exploring the neighbourhood of a property on beforehand has more added value for prospective movers who are not familiar with the destination area and/or who live far away. Bas formulates a similar argumentation:

'*Zou je dat een interessante tool vinden?'*(Interviewer)*'Absoluut, maar ik zeg het ook voor als je zoekt in een buurt die je niet goed kent. Allez voor ons was dat niet echt van toepassing, maar het klinkt wel geweldig.'*(Bas)

Goedele & Rob as well as Annelies perceive a 3D city model on street level as a useful tool in the online pre-selection process of possibly interesting properties. Goedele would use the tool to explore and get a feel of the atmosphere of a neighbourhood, to see if there is enough green in the surroundings of the property and to check the availability of parking space in the street of the property. Annelies also pays a lot of attention to the available parking space when she goes to visit an apartment in the city centre of Ghent or Brussels.

'Ik zou dat interessant vinden eigenlijk, dat je kunt rondkijken en dat je de buurt ziet. Ja, de omgeving gewoon he.' (...) 'Ge ziet toch hoe groot dat dat daar allemaal is, of dat er een fabriek tegenover ligt want dat ziet ge niet he op foto's.' (Goedele)

An important condition for Rob is that the application allows you to generate detailed pictures of a property and its surroundings in bird view. According to Rob, bird view allows you to see much more than the street level, for instance the main traffic routes. Consequently 2D images would be sufficient for Rob. Though he adds that a 3D model on street level could be interesting to see how much traffic passes in the street of the property. Clearly traffic nuisance and other noises seem to be important in the property choices of prospective movers.

'Maar wat ik het interessantste zou vinden is dat ge gewoon de bovenkant gedetailleerd ziet omdat dan ziet ge de grensbepalingen, dan ziet ge de wegen, dan ziet ge eigenlijk het meeste wat dat ge denk ik moet hebben.' (Rob)

However at the same time the respondents curb their enthusiasm about 3D city models to some extent. They state that they will not fully depend on online information about a property to make a final purchase decision. Littlefield et al. (2000: 590) define this as follows: '*Regardless of the extent to which we can provide information about the house in question, its location and environment, people will still want to go in person. We want to smell the place, to look at the*

neighbours' gardens, to assess the traffic and to get a feel for what it is really like.'

Or in the words of one of our respondents.

'*Ah ja misschien dat dat wel leuk is, allez voor zo een selectie te maken he. (...) Maar ik denk dat dat sowieso niet in de weg staat dat ge daar echt wel een keer moet naar gaan kijken voordat ge iets koopt. Allez ik denk niet dat ge met enkel internet kunt zeggen van. Allez ook al zie je van die foto's waar dat je de volledige ruimte kunt in zien of met Google Earth heel de straat, ik denk dat dat toch nog altijd niet voldoende is.*' (Annelies)

- The internet, and especially Immoweb, plays a dominant role in the search for a home. Yet Immoweb does not offer a lot of information on the neighbourhood of a property. Prospective movers often prefer to make their own selection of possibly interesting properties and do not like the intermediation of a broker. Online property pictures are of great importance in this self-selecting process. 3D city models could serve as an additional online visual information source to prospect the neighbourhood of a property and to locate a property for people who are not familiar with the neighbourhood.
- A 3D city model should indicate possible noise factors like busy streets/motorways, railways, etc. and facilities like public transport and grocery shops.
- The positive opinion on the 360° panorama pictures indicates that next to **virtually exploring the neighbourhood of a property**, a 3D tour inside a premise would also hit the popular fancy. It enables prospective movers to get a better idea of the size of the rooms and thus of what they can expect in reality.
- A 3D city model can play a role in the selection process of prospective movers just like the internet already does, but it cannot replace a real home visit and should not have the objective to do so. Prospective buyers will probably use a virtual 3D city in the same way as they currently use the online property pictures, namely as a tool to **pre-select possibly interesting premises**.

5 Conclusion

The URBAN project aims at the more effective and efficient handling of 3D data for urban environments. Our dominant research question within Task 4.3 was "*Which services could offer a genuine added value for users in a 3D city environment?*" The research is starts from the People-Centred Development approach (Wakeford, 2004). In order to first get a horizontal state-of-the-art overview of possible innovative domains regarding the use of 3D city environments, we first did a literature study. During this desk research, we identified several domains in which users interact with 3D models of real and virtual cities, namely tourism, gaming, navigation and urban planning. Hence we focused on technological examples of 3D city models that are used or tested by people in real life. Secondly we held expert meetings with the project partners EDM & Androme. The objective here was to identify services that would be an added value for users in a 3D city environment, but that would also be in line with the technological trajectory of the project partners involved.

Based on this research, we identified four vertical areas within which a 3D city model and its related services offer opportunities and added value for users, namely tourism, real estate, urban planning and public transport. In this report, we have focused on the two areas that seem to have the most potential in relation to 3D city service innovation, which are tourism and real estate.

- Tourism was selected because the market of (mobile) city applications is gaining momentum in the touristic sector. We find an increasing number of initiatives for applying (mobile) internet services and locative media in a tourist city environment. With the 4.3 research track we aim to analyze to what extent these kind of services can be complemented with 3D city model applications.
- Real estate was assessed as relevant by the experts from the perspective that 3D visualization of cities could offer significant added value for people looking for and assessing a house or apartment. In addition, based on our desk research, this seems to be a domain that has receive very little attention in the current literature on service innovation in 3D environments.

Both areas have been subjected to a first round of multi-method ethnographic research in order to assess the opportunities for innovation and to identify sensitizing concepts for people-centred development of 3D city services. As for tourism we find that:

1. City trippers often struggle with **wayfinding** issues. While preparing their city trip, people often look up or ask their travel agent how they can get from

the airport to the hotel and from the hotel to the city centre. Once on the spot, city trippers mainly go to the tourist office to ask for directions and/or a city map. Consequently future (mobile) urban applications need to provide navigation support, even if that is not the main objective of the application.

2. City trippers often **combine** online tourist **information**, especially user generated content (reviews, rankings, etc.) with a traditional guidebook to get an idea of what would be interesting to do in a city. Particularly top 10 listings of restaurants, bars, shops, hotels, etc. are perceived as important since they provide some guidance in an abundance of (online) tourist information. Future urban applications could assist city trippers in their selection of possibly interesting places, during their planning as well as on the spot in case of mobile applications. Oversized 3D images could help city trippers in their **selection of sights** that people would want to visit.

3D city models enable users to virtually visit particular places and sights in advance in order to assess whether it would be worth a visit. In addition the 3D model could also highlight the 10 most popular hotels, restaurants, shops, etc. Furthermore the empirical data show that a 3D urban application needs to indicate the position of accommodations with respect to the city centre, public transport and the most important sights. The ability to virtually explore the street and if possible the inside of hotels before making a reservation is perceived as very useful. For the travel agencies, 3D city models could be used to visualize (parts of) a city, hotels, a street, etc. to customers. Yet this type of usage requires sharing the computer screen with the customer, a practice that is not common to all travel agencies. In addition this type of usage is in some cases also perceived as too time-consuming.

Within the domain of real estate, we have also been able to identify potential services that could have an added value for users in a 3D city environment:

1. The outside appearance and façade of a property and its neighbourhood seem to be the trigger for people's interest and is the first selection criterion. Prospective movers could use a 3D city application to virtually prospect neighbourhoods and properties at home from their personal computer and thus serve as a selection tool to identify potentially interesting properties. In order to do so, the 3D application needs to highlight the properties that are for sale or to let.
2. As people really appreciate 360° panorama pictures indicates that - next to virtually exploring the neighbourhood of a property - a 3D tour inside a premise would also appeal to users. It enables prospective movers to get a

better idea of the size of the different rooms and thus of what they can expect in reality.

3. Finally a 3D city model could also be used by the real estate agencies to visualize the pleasant and/or quiet location of a property or a lot. In addition, as prospective movers could use a 3D city model as a pre-selecting tool, it also saves the broker time and money.

These findings have enabled us to identify and draft user grounded scenarios. They define the possibilities and constraints of a 3D digital city environment. Within this report we have developed two specific scenario's: one related to city trips and one within the domain of real estate. These scenarios will serve as guidelines for the user-centred technological development of the Urban technologies (cfr. task 4.4.). These scenarios point out the technological requirements and challenges from a user point of view.

These user scenarios are a starting point for iteration and further development in the project. In the next research phase a co-design approach will be set up. First we need to identify how these findings are implemented in the research and development process of the project. Based on these findings we will set-up participative co-design meetings for relevant partners. This process will on the one hand enable us to fine-tune the user scenarios from a technological and business perspective, in order to optimally guide the development process. On the other hand a technological assessment of the user needs and requirements will identify to what extent the user scenario input can effectively be incorporated.

6 User scenarios

6.1 User Scenario City trips

User Scenario	Technical requirements/challenges
Bart and Evi have planned a city trip to Brussels. Both of them have never been in Brussels so they do not quite know what to expect. A friend of Bart, who has lived and studied in Brussels, gave him some suggestions, such as a visit to the Marollen and Sint-Katelijne.	
Bart would like some additional information on Brussels and thus starts up his computer and opens the internet browser. He enters 'bezienswaardigheden Brussel' as query in Google.	
On top of the listing with the search results appears 'Top 10 bezienswaardigheden van Brussel'. Bart goes to the website and reads the 10 suggestions. They seem very interesting so Bart prints the webpage.	
One of the top 10 sights is the Marollen. The website claims it is a sociable and authentic district of Brussels. Still Bart wanders if it would actually be worth a visit. So Bart decides to open the 3D city application and enters 'Marollen Brussel'.	The ability to enter queries in a virtual 3D city.
Bart now sees the Marollen in bird's eye view and notices that the district is near to the Palace of Justice, which is enlarged.	Bird's eye view & enlarging points of interest/sights to support the orientation of users in a virtual 3D urban environment.
Bart descends to the steet level and virtually walks through the Marollen district. He did not know there were so many antique shops in this area. This will definitely interest Evi. Bart puts the district on his to do/see list.	Virtual walks through a particular district of a city while doing some window shopping.
Bart's friend told him there are a lot of excellent restaurants in Brussels. So Bart decides to click on the feature 'Top 10 Belgian restaurants' in the 3D city application. Ten buildings colour green in the bird's eye view of the city centre.	Top 10 listings feature incorporated in the 3D city application & colouring of the search results.

Bart double clicks on one restaurant and descends to steet level. He takes a look around. The restaurant, called 'In 't spinnekopke', looks very cosy from the outside and is located on a pretty little square with apparently a pleasant atmosphere. Bart clicks on the restaurant and the following message appears: "*In 't spinnekopke welcomes you every day of the week, except on official holidays. Go to our website for some additional information and to consult our authentic Belgian menu card*."	Switch over easily from bird's eye view to street level & receive feedback/messages when clicking on a building.
Bart selects the note icon that is attached to the restaurant and receives the most recent restaurant reviews of former visitors and a general score that is based on all the reviews.	The ability to read user generated content (reviews, rankings, ...) of restaurants, bars, hotels, etc in a 3D city.
Evi and Bart will take the train to Brussels to avoid possible parking problems. Bart marks the central station of Brussels as starting point on the 3D city map and some places he has put on his to do/see list. Now he clicks on 'simulate route'.	The ability to simulate a route after selecting your own personal points of interest.
He automatically walks out of the train station, crosses a big street and follows a descending street. He arrives at a big square which is marked with 'Grote Markt' in grey letters.	(Important) street/square names in grey letters.
Bart clicks on the event icon that he sees on the 'Grote Markt' and receives the message: "*Every saturday of July free jazz concert on the Grote Markt*". That is good to know.	Up-to-date feedback, real timeness aspect.
Evi has offered to search for a nice hotel in Brussels. She opens the internet browser and goes to Tripadvisor.com. She clicks on 'Hotels and accommodations' and enters Brussels as city. Evi carefully looks at the most popular hotels and reads the reviews of former guests.	
Hotel Bloom receives overall positive reviews and seems very trendy. Yet the most important requirement for Evi is the central location of a hotel. Thus Evi opens the 3D city application and enters 'Hotel Bloom Brussels'.	The ability to enter queries, e.g. hotel names, in a virtual 3D city
Evi now sees the hotel coloured green from bird's eye view. She immediately notices the proximity of the royal palace and the central station, which are both enlarged, so the hotel is well located. She can also easily measure the distance between her hotel and the central station.	Bird's eye view & enlarging/highlighting points of interest/sights to support the orientation of users in a virtual 3D urban environment.

Even though the central train station is not that far away from the hotel, Evi does not want to walk the end with all her luggage. That is way Evi goes to bird's eye view and selects the central station as starting point and the hotel as end point. Now she clicks on the feature 'public transport'. Within a few seconds Evi receives the time tables of the busses and trams that connect the two locations.

A public transport feature in a 3D city application.

Once arrived at Brussels, Bart suggests they first go for lunch. What was the name again of that authentic Belgian restaurant on that pretty little square? And where is it located? Bart quickly takes out his PDA and opens the 3D city application. He clicks on 'Top 10 Belgian restaurants' and again sees the 10 restaurants coloured green.

A mobile 3D city application.

The GPS receiver of Bart's mobile phone locates Bart and Evi's current position. The 3D city application generates a route that will bring Bart and Evi to the restaurant.

Mobile navigation support.

6.2 User scenario real estate

User Scenario	**Technical requirements/challenges**
Bart and Evi are searching for a spacious family house outside the busy city centre of Brussels. For the last few months, Bart has been browsing Immoweb.be. As a daily habit, Bart starts up his computer and goes to Immoweb.	
Bart enters his personal criteria, asks to only show the updated/new properties and starts the search.	
In the following listings of properties that match the entered criteria, the picture of the façade of a house in Vilvoorde catches Bart's eye. So Bart clicks on the listing display in question and receives additional information on the property. Bart closely examines all the property pictures. The pictures look promising so Bart also reads the short description of the property.	
Yet Bart is also interested in the location of the property. He clicks on 'ligging' in Immoweb and receives a road map of Vilvoorde with a small balloon that locates the property. However this does not offer Bart a lot of help since he does not know Vilvoorde that well.	

So Bart clicks on 'ligging in 3D' and receives Vilvoorde in bird's eye view. The position of the property in indicated with a small balloon.	Immoweb as entry for a 3D city model and bird's eye view
Bart notices that the property is nearby the church of Vilvoorde, which is enlarged. He remembers that the church is located next to the shopping street where he and Evi sometimes go to. Now he can locate the property within Vilvoorde.	Enlarging points of interest to support the orientation of users in a virtual 3D urban environment.
Evi and Bart want to get away from the noise in the city centre of Brussels. Thus Bart looks at the distance between the motorway and the property. The property is located perfectly: far enough from the motorway to avoid noise nuisance and close enough to go to work.	A tool to measure distances
In contrast to Bart, Evi prefers to take the train to work. So the proximity of a train station would be an advantage. So Bart enters 'train station Vilvoorde' as query in the search box.	The possibility to enter search queries in a 3D city model
The position of the train station is indicated with a small balloon. The distance between the property and the train station is approximately 1 kilometre so Evi will love to hear that.	A tool to measure distances
Bart now descends to street level. The façade of the property and its front garden seem well looked after. The houses of the neighbours also look very pretty.	Detailled images of the façades of premises
Bart takes a virtual walk through the street of the property. He comes across a little playground, the children will love that. At the corner of the street, Bart passes a bakery and GB Express.	Clearly indicate POI's, e.g. shops, schools, parking space, playgrounds, ...
Bart walks back to the property. He notices that the property does not have a garage, yet the street is broad enough to park cars on both sides of the street.	
At the moment, Bart still has one question: is it a busy street? So he clicks on 'omni-directional video' and chooses 6 p.m as time of the day. An additional screen appears and shows the 360° images that are recorded in the street of the property at 6 p.m. The street is not jammed by traffic, definitely a big difference with their current place of residence.	Omni-directional video to assess the traffic that passes in a street.
Bart has seen enough. The property looks really interesting so he immediately dials the telephone number of the property owner that is mentioned on Immoweb to make an appointment for a home visit.	

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8 Appendix

Work scenario discussed during meeting with EDM and Androme on June 25th

Observation protocol tourist office Brussels (TIB)

Observation files tourist office Brussels (TIB) (observation fill-in file & questionnaire interview after observation)

Questionnaire of expert interviews city trips

Questionnaire of expert interviews real estate

Questionnaire of respondent interviews city trips

Questionnaire of respondent interviews real estate

8.1 Work Scenario URBAN: Draft 3

1) **Wat is technisch (on)mogelijk?**
2) **Indien onmogelijk: Welke (technische) oplossing of alternatieven zie je?**

Scenario	*Uitdagingen*
Als zelfstandige bakker probeert Bart wekelijks volop te genieten van de enige vrije dag waarop zijn bakkerij gesloten is, de maandag. Morgen hebben Bart en Evi dan ook een daguitstap naar Hasselt gepland. Het is voor beiden hun eerste bezoek aan Hasselt en Bart zou dan ook op voorhand een eerste indruk willen opdoen van hetgeen de Limburgse hoofdstad zoal te bieden heeft. Vrienden hebben hem al enkele tips gegeven zoals een bezoek aan de Japanse tuin, het Jenevermuseum en de Grote Markt. Bart surft naar hasselt.be voor bijkomende informatie en klikt met de muis op 'Toerisme'. Evi kijkt over zijn schouders mee en vraagt de rubriek 'Mode & Shopping' aan te klikken. Blijkbaar is er een modemuseum in Hasselt, dat lijkt haar wel interessant. De website verwijst hen door naar modemuseumhasselt.be. Zouden er in de buurt dan ook winkels van bekende ontwerpers liggen, vraagt Evi zich af? Bart klikt op 'bekijk het modemuseum en omgeving in 3D'. Het modemuseum is grijs gekleurd. Bart gaat met de muis over het gebouw en er verschijnt de melding "*Het modemuseum is gesloten op zondag en maandag. Wij ontvangen u graag van dinsdag t/m zaterdag van 9u30 – 18u.*" Dat is jammer. Bart wandelt de straat van het modemuseum af en slaat vervolgens de hoek om. Blijkbaar zijn er in deze omgeving geen kledingwinkels te bespeuren. Op de stadskaart in de rechter benedenhoek dat hun huidige positie aanduidt blijkt trouwens dat het modemuseum ver van de Grote Markt ligt. Deze bestemming wordt dus alvast van het lijstje geschrapt. Bart duidt op de 3D stadskaart het treinstation van Hasselt als vertrekpunt aan en vervolgens de plekken die ze zeker willen	Website van stad als entry voor toeristische info Nood aan API Gesloten = grijs of verkleind Het belang van feedback Kaart duidt huidige positie aan voor oriëntatie

bezoeken. Bart klikt op 'simulatie route'. Hij wandelt doorheen de Stationsstraat tot aan een drukke weg. Hij steekt de drukke weg over en komt in een smal straatje terecht. Hij volgt het straatje een eindje en komt op een groot plein uit. Op dit plein staat in grijze letters 'Grote Markt'. Het station ligt dus wel een hele eind van de Grote Markt en onderweg is Bart geen interessante bezienswaardigheid tegengekomen. Dit is dus een stuk van de route die ze beter met de bus kunnen doen. Bart bekijkt daarom de stad vanuit de lucht, trekt een lijn van het treinstation tot aan de Grote Markt en klikt op 'openbaar vervoer'. Na enkele seconden krijgt hij de lijnnummers en de dienstregeling van de bussen die de twee plekken verbinden. Het Jenevermuseum is de volgende bezienswaardigheid. Bart vertrekt van op de grote markt richting het jenevermuseum. Bart heeft geen zin meer om de hele route reeds te doorwandelen. Hij wilt een meer overzichtelijk beeld krijgen en snel van de ene bezienswaardigheid naar de andere gaan. Hij verlaat dus het straatniveau en kijkt in vogelvlucht naar de stad. Het jenevermuseum staat goed zichtbaar uitvergroot. Hij klikt het jenevermuseum aan en staat vervolgens voor de poort van het museum. Hij komt met de muis over het gebouw en er verschijnt de melding "*Iedere maandag van 13u – 15u gratis jeneverproeverij*". Interessant. Bart klikt vervolgens op het icoontje van forum op het museum en leest de overwegend positieve reacties die bezoekers hebben achtergelaten. Daarna wandelt hij in de straat rond en merkt dat dit een heel gezellige buurt is. Hier komen ze morgen zeker naartoe! Eindelijk een dagje erop uit na een druk weekend in de bakkerij. Evi en Bart komen toe in het station van Hasselt en nemen de bus tot op de Grote Markt. Evi wandelt de ene kledingwinkel na de andere uit, maar Bart kijkt vooral uit naar de jeneverproeverij. Om hoe laat ging die alweer door? En waar lag het jenevermuseum nu weer ten opzichte van de Grote Markt? Bart kijkt het snel even na op zijn PDA. Hij komt over het vergrootte	Mogelijkheid tot simulatie van route Straatnamen weergeven want helpt bij oriëntatie (zie ook Google Maps Street View) Overgaan tot vogelvlucht Opvragen dienstregeling openbaar vervoer Applicatie navigeert je van de ene POI naar de andere Overgaan tot flightmodus + vogelvlucht POI's uitvergroten, afhankelijk van de context Verschijnen van promoties Tagging of forum: reacties achterlaten

jenevermuseum en ziet opnieuw de melding "*Iedere maandag van 13u – 15u gratis jeneverproeverij*". Door de 3D weergave van Hasselt kan hij het jenevermuseum terug plaatsen ten opzichte van de Grote Markt. Het is al 13u dus snel daarheen!	Informatie die je thuis opzoekt moet je kunnen meenemen. Mobiel (downloaden of via netwerk)
Met een tweede kind op komst zijn Bart en Evi dringend op zoek naar een ruime gezinswoning buiten het drukke stadscentrum van Brussel. Al een maand lang schuimt Bart dagelijks immoweb.be af. Vandaag valt zijn oog op een nieuw pand gelegen te Vilvoorde. Immoweb.be biedt hem een virtuele rondleiding doorheen het huis aan. De beelden zien er alvast veelbelovend uit. Na een klik met de muis op 'ligging' verschijnt er een kaart van Vilvoorde en omstreken met een balonnetje waar het huis gelegen is. Hierdoor weet Bart niet veel meer want hij kent de streek van Vilvoorde nauwelijks. Bart klikt dan maar op 'Vilvoorde virtueel' om de buurt rondom het huis in 3D te verkennen. Hij wandelt de straat af en komt op de hoek van de straat een speelplein tegen, dat is al interessant. Bart slaat de hoek om en passeert een bakker en een GB Express, dat zal Evi graag horen. Het huis ligt blijkbaar ook dicht bij de kerk van Vilvoorde want het gebouw is uitvergroot te zien in de verte. Nu rinkelt er bij Bart een belletje. Hij herinnert zich dat de kerk op het marktplein staat waar het 's zaterdags markt is. Nu kan hij het huis binnen Vilvoorde oriënteren. Rustig rondkijkend wandelt Bart terug naar het huis.	Nood aan API Uitvergroten van karakteriserende gebouwen voor oriëntatie! Lijn met de reeds afgelegde weg: makkelijk om terug te keren naar een bep. punt
Het huis heeft geen garage, maar Bart merkt op dat aan beide zijdes van de straat parkeervakken staan aangeduid. Zo moeilijk zal het vinden van een nabije parkeerplaats dus wel niet zijn. Bart heeft genoeg gezien. Hij sluit de applicatie af en belt onmiddellijk het telefoonnummer van de makelaar dat vermeld staat op immoweb.be voor het maken van een afspraak.	Waar zijn parkeerplaatsen?
Terwijl Bart gepassioneerd is door brood en banket, is Evi als stedenbouwkundige gebeten door de stad. Ze is onder andere verantwoordelijk voor de heraanleg van enkele Brusselse	

wijken. Op vraag van het gemeentebestuur van Jette maakt Evi een plan voor de aanleg van een nieuw speelplein. Ze opent de 3D stadsapplicatie en gaat van start met het kiezen van de mogelijke vormen voor het speelplein. Op basis van de plannen lijkt een ovaal speelplein Evi de beste optie. De schommel plaatst ze samen met een klimrek uiterst rechts en de skateramp uiterst links aangezien deze een andere leeftijdsgroep zullen aantrekken. Na wat berekend puzzelwerk laadt Evi haar plan op de website www.virtueelbrussel.be op. Daar kan ze eveneens de plannen die haar collega's hebben gemaakt voor het speelplein bekijken. Benieuwd wat de bewoners van Jette van haar voorstel zullen vinden.	Voorgedefinieerde vormen en voorwerpen?
Twee dagen later surft Evi ongeduldig naar www.virtueelbrussel.be. Haar plan is duidelijk in de smaak gevallen want maar liefst 60% van de websitebezoekers heeft voor haar plan gestemd. Ze bestudeert ook nauwkeurig welke aanpassingen enkele bewoners hebben gemaakt op het plan en leest vervolgens de achtergelaten comments over haar plan op het forum. Op basis van deze input past Evi haar plan aan. Ze laadt haar tweede versie opnieuw online op. Onder de rubriek 'Info' op www.virtueelbrussel.be verschijnt er het volgende bericht: "*Evi heeft een nieuw plan voor het project 'Speelplein Jette' opgeladen. Klik hier om het te bekijken.*" Hopelijk valt haar nieuw plan nog meer in de smaak!	Burgerparticipatie in urban planning en herontwikkeling Nood aan input van de burger: comments (forum?) & (eventueel) planaanpassingen Melding: "*What's new?"*

8.2 Observatieprotocol toeristische dienst Brussel

Waar observeren?

Op de toeristische dienst van Brussel. Er wordt geobserveerd hoe toeristen omgaan met toeristische informatie. Dit betreft enerzijds de omgang met de uitgestalde informatie zoals brochures, posters, stadsplannen, etc en anderzijds het eventuele gesprek met het baliepersoneel.

Wie observeren?

Toeristen die binnenstappen in de toeristische dienst.

Wat krijgt de aandacht?

- Bekijkt de persoon als hij binnenkomt eerst de aanwezige uitgestelde informatie? Wat doet hij ermee? (bv. onmiddellijk in zijn zak steken of eerst lezen)
- Welke informatie bekijkt de geobserveerde en/of neemt hij mee?
- Neemt de persoon informatie mee als hij de toeristische dienst verlaat? (brochures, stadsplan, ...)
- Gaat de persoon een vraag/vragen stellen aan de balie?
    - Welke vragen stelt/stellen de persoon/personen aan het baliepersoneel?
    - Wat en hoe antwoordt het baliepersoneel hierop?
    - Wat doet de persoon na het gesprek met het baliepersoneel?

Etnografisch interview

Waarom?

De observatie wordt gevolgd door een kort etnografisch interview met de geobserveerde(n), mits toestemming van de betrokkene(n). Dit heeft tot doel de observatie beter te plaatsen en in te gaan op mogelijke onduidelijkheden tijdens de observatie.

Vragen?

Socio-demografisch

- Leeftijd?
- Van welk land afkomstig?
- Bent u op citytrip in Brussel?

- Is dit uw eerste bezoek aan Brussel?
- Met wie bent u op vakantie? (alleen, in groep, ...)
- Hoe lang verblijft u in Brussel?
- Gaat u nog andere (Europese) steden bezoeken?

Voorafgaande planning citytrip

- Heeft u op voorhand informatie opgezocht over Brussel?
    - Indien ja, wat voor informatie?
    - Indien ja, via welke weg opgezocht?
    - Indien nee, waarom niet?
- Heeft u een reisgids van Brussel/België bij?
    - Wat zoekt u daarin op?
- Gaat u nog verder op zoek gaan naar informatie?

Opmerkingen omtrent de hele dag (wat is opgevallen?)

.....
.....
.....
.....
.....
.....

8.3 Observatie schema

Tijdstip: *Observatienummer:* *Aantal personen:*
Acties:

8.4 Vragenlijst interview na observatie

Observatienummer:

Socio-demografisch

- Op citytrip in BXL?.....
- Met wie? (alleen, in groep, ...) .....
- Leeftijd: .....
- Land van herkomst: .....
- Eerste bezoek aan BLX? .....
- Verblijfsduur? .....
- Nog andere (Europese) steden bezoeken? .....

Voorafgaande planning citytrip

- Heeft u op voorhand informatie opgezocht over Brussel? .....
    - Indien ja, wat voor informatie en via welke weg? .....

.....

.....

    - Indien nee, waarom niet? .....

.....

- Heeft u een reisgids van Brussel/België bij? .....
    - Indien ja: Wat zoekt u daarin op? .....

.....

- Heeft u een stadsplan van Brussel bij? .....
- Gaat u nog verder op zoek gaan naar informatie? .....

.....

- Weet u al wat u allemaal gaat bekijken of bezoeken in Brussel? .....

.....

    - Indien ja: Waar baseert u zich op? .....

.....

- Gaat u altijd naar de toeristische dienst van een stad wanneer u op citytrip bent? Waarom?

  .....

Gesprek baliepersoneel (indien niet kunnen volgen)

- Welke vraag/vragen heeft u gesteld aan het baliepersoneel? .....

.....

.....

- Heeft het baliepersoneel u verder kunnen helpen met uw vraag/vragen? .....

.....

.....

8.5 Vragenlijst experteninterview city trips

Focus: Wat willen mensen weten over een stad die ze nog niet kennen en eventueel willen bezoeken?

Socio-demografisch

- Aantal jaren werkervaring binnen toeristische sector?
- Functie?
- Grootte reisbureau? (aantal werknemers)

Algemeen

- Welke middelen gebruikt u allemaal voor het boeken van een vakantie? Wat heeft u allemaal ter beschikking? (officiële brochures, eigen website, ...)
- In welke mate maakt u gebruik van het internet in uw contact met klanten en in het aanbieden van informatie?

Wat?

- Wat zijn de meest voorkomende vragen die mensen vragen wanneer ze een citytrip boeken met betrekking tot een stad als Barcelona of Londen?
    - In welke mate verschillen deze vragen tov het boeken van andere vakanties (zoals strandvakantie)?
- Hoe specifiek zijn de vragen die mensen stellen over een stad?
- Vragen mensen vaak naar beeldmateriaal van een stad? (foto's, folders, ...)
- Hoe vragen mensen informatie over een stad (via telefoon, mail, in het reisbureau zelf, ...)?
- Waar haalt u de informatie vandaan om te antwoorden op de vragen die klanten hebben over een stad? (eigen kennis, websites, brochures, ...)
    - Verwijst u hen soms verder door?
- Stellen mensen wel eens vragen over een stad waar u het antwoord niet op kent?
    - Indien ja, wat voor soort vragen zijn dit dan?
- Wat voor informatie vindt u dat u als reisbureau moet kunnen meegeven aan een klant over een specifieke stad?
- Wat voor informatie over een stad dienen toeristen via andere wegen op te zoeken?

    - Via welke kanalen kunnen zij dit dan doen?
- Welke info geeft u mensen die op een citytrip vertrekken altijd mee? (Bepaalde basisinfo die u van iedere stad kent?)
- Hebben mensen als ze bij u op het reisbureau binnenstappen vaak al een specifieke stad voor ogen?
- Hoe komen ze meestal op die stad (hoe kiezen ze de stad)?
- Wat zijn de belangrijkste criteria waarop mensen zich baseren om voor een bepaalde stad te kiezen? (culturele activiteiten, shoppen, erfgoed, ...)
- Hoe weten mensen wat er in een bepaalde stad allemaal te beleven en te zien valt?
- Welke info willen mensen op voorhand hebben over het hotel voor een citytrip?
    - Vragen ze ook om foto's van hotel en stad?

Profielen

- Wat voor types toeristen komen een citytrip boeken? (twijfelaars, snelle beslissers, impulsieven, ...)
- Beslissen mensen doorgaans snel welke citytrip het precies wordt?
- Zijn er doorgaans veel contactmomenten tussen het eerste contact met de klant en het boeken zelf?
    - Welke tussenvragen worden er zoal gesteld?
    - Welke informatie geeft u dan door?
    - Wanneer en op basis waarvan maakt de klant zijn definitieve beslissing?
- Boeken mensen een citytrip lang op voorhand?
- Komen mensen meestal ongepland binnen of hebben ze al wat info opgezocht?
    - Indien ja, welke info hebben ze dan zoal op voorhand opgezocht?
    - Waar zijn mensen doorgaans nog niet van op de hoogte?
- Komen er wel eens mensen binnen die reeds een reisgids zoals Trotter of Lonely Planet bij zich hebben of een stadsplan van de stad die ze willen bezoeken?
    - Welke dingen wil men dan vooral bezoeken?

Een blik op de toekomst: 3D stad

- Welke bestaande of nog onbestaande online diensten zouden volgens u zinvol kunnen zijn voor een klant om zich te informeren omtrent een stad?
- Welke informatie zou er zeker op een stadskaart (al dan niet digitaal) moeten vermeld worden? (bv. niet alleen de lokaties van restaurants, maar ook hun menu-kaart, dagmenu, openingsuren,...)
- Heeft u al eens gehoord van Google Earth of Virtual Earth?

    - Indien ja, ziet u een meerwaarde in dit soort applicaties voor de toeristische sector?
    - Indien nee: Het gaat er in feite om dat je via de pc kan inzoomen op eender welke plaats op de wereld door sattelietbeelden. Ziet u een meerwaarde in dit soort dingen voor de toeristische sector?
- Indien het mogelijk zou zijn om een stad in 3D weergave op straatniveau te verkennen via de computer, zou u deze tool dan zelf willen gebruiken of aanraden aan toeristen die een citytrip boeken?

8.6 Vragenlijst experteninterview vastgoed

Focus: Wat willen mensen allemaal weten over woningen en hun rondomliggende buurten? En waarom? Hoe ziet u de toekomst van de vastgoedsector?

Socio-demografisch

- Aantal jaren werkervaring binnen vastgoedsector?
- Functie?
- Grootte vastgoedkantoor?
- Contact met klanten? Buitendienst

Algemeen

- Welke middelen gebruikt u als makelaar in uw dagdagelijkse werking? Voor wat?
- Wat bieden jullie allemaal aan via de eigen website?
    - Geen informatie omtrent de buurt op de website, noch een adres. Waarom?
    - Zijn er dingen die u nog graag zou toevoegen aan de website?
- Via welke wegen gaan mensen op zoek naar een woning?
- Is er een verschil tussen het zoeken naar een appartement tov een huis mbt hun zoekproces?
- In welke mate is het gebruik van foto's (en meer bepaald foto's van de buitenzijde/omgeving) belangrijk?

The neighbourhood

- Wat willen mensen allemaal weten over de buurt van de woning?
- Hoe specifiek zijn de vragen die mensen stellen over de buurt?
- Stellen mensen wel eens vragen over een buurt waar u het antwoord niet op kent?
    - Indien ja, wat voor soort vragen zijn dit dan?
- Is er een verschil tussen groepen van mensen? Bv. mensen met kinderen hebben misschien andere eisen dan mensen zonder. Mensen met een hoog budget vs mensen met een laag budget.
    - Hoe belangrijk zijn dan de andere factoren?
- Waar halen jullie de informatie (en welke info is dat dan) over de buurten van de woningen vandaan om te kunnen antwoorden op de vragen van jullie klanten?

- Doen jullie zelf 'buurtonderzoek'? Wat houdt dit dan in?
- Hoe belangrijk is de buurt van een woning in de selectie van mensen?
- Wat zijn de belangrijkste criteria waar mensen op letten mbt de buurt en de buitenzijde van de woning?
- Wat voor informatie vindt u dat u als vastgoedkantoor moet kunnen meegeven aan een klant over de omgeving van de woning?
- Wat voor informatie over de woning en diens omgeving dienen mensen via andere wegen op te zoeken?
    - Verwijst u hen soms verder door?
- Is er een verschil tussen het zoeken naar een appartement tov een huis mbt de eisen die mensen stellen aangaande de buurt?

Profielen

- Met wat voor types kopers komt u hier in contact?
- In welke mate zijn de mensen al geïnformeerd over de vastgoedmarkt als ze voor het eerst bij u langskomen? Wat weten ze al/nog niet?
- In hoeverre weten mensen al waar ze precies naar op zoek zijn als ze bij u langskomen?
    - Veel tussencontacten tot uiteindelijke aankoop?

Internet

- Verwijzing naar artikel: "*Internet bedreiging voor vastgoedmakelaar*". Via internet zouden verkopers en kopers rechtstreeks zaken met elkaar kunnen doen. Hoe ervaart u dit?
- Wat zijn volgens u de belangrijkste immosites binnen de vastgoedsector?
- Volgens sommigen heeft internet (via bv. Immoweb) een belangrijke impact gehad op de vastgoedmarkt. Klopt dit volgens u? Hoe ervaart u dit?
    - Denkt u dat het internet de sector nog eens op zo'n manier kan beïnvloeden?
    - Zo ja, hoe?
- Is het gedrag van mensen volgens u veranderd onder invloed van het internet?
    - Zo ja, hoe?
- Heeft u al eens gehoord van Google Earth of Virtual Earth?
    - Indien ja, ziet u een meerwaarde in dit soort applicaties voor de vastgoedsector?

    - Indien nee: Het gaat er in feite om dat je via de pc kan inzoomen op eender welke plaats op de wereld adhv satellietbeelden of luchtfoto's. Ziet u een meerwaarde in dit soort dingen voor de vastgoedsector?
- Indien het mogelijk zou zijn om een stad in 3D weergave op straatniveau te verkennen via de computer, zou u deze tool dan zelf willen gebruiken of aanraden aan mensen die een woning zoeken?

8.7 Vragenlijst respondenten city trips

Focus: In welke mate en op welke manier heeft u uw citytrip voor vertrek en tijdens uw verblijf gepland?
Criterium voor interview: eerste bezoek aan de stad

Algemeen

- Bestemming(en)?
- Verblijfsduur?
- Met wie?
- Leeftijd?

Voorafgaande planning

- Wat dient een stad voor u te bieden?
- Waarom voor die stad/steden gekozen?
- Kon u zich op voorhand al een beeld vormen van hoe de stad eruit zou zien?
    - Indien ja: Waarop was dit beeld gebaseerd?
    - Indien ja: Kwam dit beeld overeen met de werkelijkheid?
    - Vindt u het belangrijk dat u op voorhand al een idee heeft van hoe een stad er ongeveer zal uitzien?
    - Indien nee: Had je dit graag gehad?
- Heeft u op voorhand informatie opgezocht over de bestemming?
    - Indien ja: Wat voor informatie? Via welke weg opgezocht?
    - Indien nee, waarom niet?
- Wist u op voorhand al wat u allemaal wou zien of bezoeken in de stad?
    - Waarop baseerde u zich hiervoor?
    - Wat voor activiteiten en bezienswaardigheden primeerden?
- Heeft u voor uw vertrek enkele tips gekregen van vrienden?
    - Indien ja: Wat heeft u met deze tips gedaan? (eerst gaan verifiëren?)
- Heeft u een reisgids meegenomen? (de welke?)
    - Indien ja: Wat heeft u er wanneer in opgezocht?
    - Indien ja: Welke informatie ontbrak?
    - Indien ja: Wanneer aangeschaft? (voor of na boeken)
- Heeft u een stadsplan meegenomen?
    - Indien ja: In welke situaties heeft u die gebruikt?

    - Indien nee: Hoe heeft u zich georiënteerd in de stad?
- Heeft u op voorhand bepaalde wegbeschrijvingen opgezocht?
- Op basis waarvan heeft u gekozen voor het hotel/jeugdherberg/... waar u verbleef?
- Wat verwacht u van een hotel wanneer u op citytrip gaat? Wat is belangrijk?
- Heeft u foto's bekeken van uw hotel?

Planning ter plaatse

- Bent u ter plaatse tijdens uw citytrip een toeristische dienst binnengestapt?
    - Indien ja: Waarom, met welke vragen? Doet u dat vaker?
    - Indien nee: Doet u dat anders wel soms?
- Heeft u andere info-punten bezocht of informatie opgevraagd aan de balie van het hotel?
- Heeft u in de stad wel eens een voorbijganger aangesproken om iets te vragen?
    - Indien ja: Met welke vragen?
- Heeft u tijdens uw verblijf ter plaatse nog extra informatie opgezocht?
    - Indien ja: Wat voor informatie en via welke weg?
- Hoe heeft u zich in de stad georiënteerd?
- Hoe heeft u zich hoofdzakelijk doorheen de stad verplaatst? (openbaar vervoer?)
    - Heeft u zich hierover geïnformeerd?

Na afloop

- Was u na afloop tevreden over uw citytrip?
- Heeft u het gevoel dat meer voorbereiding of opzoekingswerk misschien handig zou geweest zijn?
- Heeft u na uw thuiskomst nog iets opgezocht of bekeken over de stad waar u bent geweest?
- Heeft u een reisverslag gemaakt en/of een fotoalbum gecreëerd?

Een blik op de toekomst: 3D stad

- Hoe denkt u dat internet u de dag van vandaag kan helpen om u voor en tijdens uw reis te helpen?
    - Is er al genoeg voorhanden op het internet? (wat is dit dan allemaal?)
    - Op welke nood zou het internet voor u nog mogen inspelen?
- Welke informatie zou er zeker op een stadskaart (al dan niet digitaal) moeten vermeld worden? (bv. niet alleen de lokaties van restaurants, maar ook hun menu-kaart, dagmenu, openingsuren,...)

    - Op welke manier dient die informatie erop de staan?
    - Mag er voor u persoonlijk nog bijkomende, specifieke info op staan?
- Heeft u al eens gehoord van Google Earth of Virtual Earth?
    - Indien ja, ziet u als stadsbezoeker een meerwaarde in dit soort applicaties?
    - Indien ja: Heeft u er gebruik van gemaakt voor uw stadsbezoek?
    - Indien nee: Het gaat er in feite om dat je via de pc kan inzoomen op eender welke plaats op de wereld door sattelietbeelden. Ziet u een meerwaarde in dit soort dingen voor u als stadsbezoeker?
- Indien het mogelijk zou zijn om een stad in 3D weergave op straatniveau te verkennen via de computer, zou u deze tool dan zelf willen gebruiken?
    - Aan wat moet de applicatie zoal voldoen volgens u?

Boeking

- Via welke weg heeft u de citytrip (**vlucht + hotel**) geboekt? (reisbureau, internet, ...)
    - Waarom niet via een andere weg?
    - Hoe boekt u uw vakantie gewoonlijk? (reeds ervaring met internet boeking?)
- Indien via internet:
    - Via welke websites?
    - Hoe ben je bij deze sites terecht gekomen?
- Indien via reisbureau: wat heeft u allemaal ontvangen bij uw reisdocumenten? (toeristische info?)
    - Indien toeristische info: heeft u deze ook gelezen/gebruikt?

8.8 Vragenlijst respondenten vastgoed

Focus: Wat willen jullie allemaal weten over de beschikbare woningen en hun rondomliggende buurt? Op welke manier zoeken jullie naar deze informatie?

Context

- Leeftijd?
- Hoe lang al op zoek?
- Op zoek naar wat?
- Hoe vaak gebruikt u het internet?
    - Voor privé en/of professionele doeleinden?

Zoekproces

- Via welke wegen zoekt u naar een woning? (kranten, websites, borden, ...)
    - Waarom via deze weg(en)?
- Rijden jullie wel eens rond in een bepaalde buurt om beschikbare woningen te zoeken?
- Reeds bij makelaar langs geweest?
    - Waarom (niet)?
    - Wat verwachten jullie van een makelaar?
- Als u op immo-websites zoekt, welke criteria geeft u dan in?
    - Welke gegevens wilt u eerst zien? (prijs, foto, ...)
- Reeds huisbezoeken gedaan?

    Indien ja:
    - Waarom net die woningen?
    - Hoe gevonden?
    - Voldeden deze woningen aan jullie verwachtingen?
    - Waar letten jullie vooral op tijdens het huisbezoek?
    - Wat bent u adhv het bezoek meer te weten gekomen?
    - Heeft u achteraf nog meer informatie opgezocht of gekregen over de woning?

    Indien nee:
    - Waarom niet?
    - Hoe bepaalt u of u een woning al dan niet gaan bezoeken?
    - Waar zouden jullie tijdens een huisbezoek vooral op letten?

- Hoe belangrijk zijn de foto's die u tegenkomt tijdens het zoeken?
    - Schrikken foto's u wel eens af om niet verder te kijken?
    - Vindt u dat er genoeg visueel materiaal wordt aangeboden?
        - Indien nee: Wat zou u nog graag zien?
- Heeft u al een woning bekeken die een virtuele tour binnenshuis aanbood?
    - Indien ja: Wat vond u hiervan?
    - Indien nee: Zou u graag 360° foto's bekijken of zeggen gewone foto's voldoende?
- Zoekt u apart of samen met uw partner naar een woning?
    - Zoeken jullie op dezelfde criteria?
    - Letten jullie op dezelfde dingen mbt het pand en de buurt?
- Hebben jullie vrienden, familie en/of collega's ingeschakeld in jullie zoektocht naar een woning?
    - Indien ja:
    - Welke informatie geven jullie dan mee aan vrienden/familie?
    - Sturen zij jullie wel eens iets door? Wat precies?
    - Welke vragen stellen jullie dan aan hen over hetgeen ze doorsturen?

The neighbourhood

- Hoe belangrijk is de omliggende buurt van een woning?
- Wat wilt u allemaal weten over de buurt van een woning?
    - Hoe komt u dit te weten?
- Wat zijn de belangrijkste criteria waar u op let mbt de buurt en buitenzijde van een woning?
- Vindt u meestal alle informatie die u wilt hebben over de buurt van een woning?
    - Via welke weg(en)?

3D

- Heeft u al eens gehoord van Google Earth of Virtual Earth?
    - Indien ja, ziet u een meerwaarde in dit soort applicaties voor het zoeken naar een woning?
    - Indien nee: Het gaat er in feite om dat je via de pc kan inzoomen op eender welke plaats op de wereld adhv satellietbeelden of luchtfoto's. Ziet u een meerwaarde in dit soort dingen voor het zoeken naar een woning?
- Indien het mogelijk zou zijn om een stad in 3D weergave op straatniveau te verkennen via de computer, zou u deze tool dan zelf willen gebruiken in uw zoektocht naar een woning?