

## Collecting, measuring and analyzing place based perceptions of tourists in Amsterdam using a VGI mobile application

- GIMA Master's Thesis -

**Student:** Corina Elena Bodnariuc

Email: corina.bodnariuc@gmail.com

Student numbers:

(UU) 5525411

(UT) s1600575

**Supervisor:** Arend Ligtenberg

**Professor:** Arnold Bregt



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## Abstract

The main objective of this research was to determine which emotions are related to tourists perceiving a place or location, by developing and testing a VGI mobile application to collect (data about) these emotions and to analyze them conjointly with a set of relevant contextual factors. To achieve this, a set of research questions was defined and the methodology was focused on a case study in the city of Amsterdam.

First, Paul Ekman's basic emotions model along with an invalidation based emotion - reflecting disappointment - was chosen due to aspects related to language and culture. This model was proven in prior studies to span across cultures and the emotions it includes can be labeled with simple English language words, likely to be correctly understood by a large number of tourists. These are important aspects to consider, due to the predominant number of international tourists in Amsterdam. Second of all, an in depth review of the relevant literature resulted in a number of context factors that were used to describe both the tourist and the environment or the place at the moment when emotions were experienced as a consequence of the interaction between the two.

Next, the self-report method was chosen and adapted to use in measuring emotions tourists experience about places and the relevant context factors as they are at that particular moment. This was then translated into a concept for a facilitated VGI mobile application, which was then developed using state-of-the-art tools for the Android operating system.

Once the application development was concluded, a four-stage experiment was performed in the city of Amsterdam with the purpose of collecting data about tourists' emotions in various place and the pertaining context factors. Although proof of concept was obtained for the application, the results were considered indeterminate. More data entries about a place would have been necessary in order to express some conclusions about the correlation between the reported emotions and the various context factors. An interesting finding was that all the participants reported high levels of happiness in all the places assessed. After consulting with environmental psychology expert Joske Houtkamp, this turned out to be a normal consequence of the method applied to collect the emotions data, the granularity of the measuring scale, and most importantly the fact that the respondents were tourists instead of residents of Amsterdam.

All in all, this research concluded in providing useful insight into applying a new method for measuring emotions and place-based perception of tourists using a VGI mobile application.

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# 1. Introduction to the problem and research objectives

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## 1.1 Introduction

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The World Tourism Organization defines travel or tourism as “the activity of travelers, where a traveler is someone who moves between different geographic locations, for any purpose and any duration” (UNWTO, n.d.). However, tourism or travelling is not simply a matter of going from point A to point B. There is a set of sequential activities happening in between that eventually define the tourism experience.

In recent years, this experience has been enhanced, along with the advancement of information and communication technologies (ICT) in tourism. Probably the most widely used ICT accessory by tourists is their smartphone, with the plethora of travel related applications which they can download and use for various purposes before, during and after their trip, for example: booking plane tickets, making hotel reservations, searching for the nearest restaurant and for points of interest at the destination according to a set of preferences and being able to review all the services afterwards.

The smartphone is a powerful tool for tourists, in the sense that it allows immediate access to information (including location-based) and social connections, which leads to an increased independence and more control over the unfolding of their vacation (Dickinson et al., 2014). Smartphones are equipped with mobile applications or apps, which are specific software for mobile devices, meant to deliver various services, and sensors which support some of the applications: motion sensors, position sensors and sensors which measure environmental characteristics. With the help of these tools, tourists have new capabilities of discovering and interacting with their destination of choice.

The destination place with its specific characteristics (for example: climate, geography, architecture, culture) is usually a place with which the visitors are unfamiliar and for this reason they resort to specialized guides to help them get around. Traditionally, the role of touristic guide is portrayed by people or travel books, but recently websites and mobile applications dedicated to guiding the tourist during his/her vacation are becoming more and more popular. This could be due to the low cost of receiving information (in most situations it is free) and the high accessibility in the sense that the interfaces are intuitive and easy to use, everywhere where there is a Wi-Fi connection, even though some applications are also designed to work offline.

Consequently, in tourism, a substantial amount of research is dedicated to a specific type of travel application, namely: the recommender type system. This can be a website application or a mobile application which requires some information regarding the tourist's preferences and interests (for example if he/she wants to visit a museum or would rather go to a zoo), used as input in an algorithm which generates route recommendations accordingly. Using these systems, tourists have the possibility to visit and discover places more efficiently, while the tourism authorities (referred to as Destination Marketing Organizations or DMOs) can reinforce the destination image or promote certain attraction points over others.

Furthermore, tourists also have the possibility to give feedback on their experience by rating or reviewing various places, services or aspects of the destination. This information is particularly interesting for the service providers and also for DMOs, urban planners and even policy makers. Thus, research efforts are directed towards extracting and analyzing this information.

A key element, which gives meaning to the touristic experience is the interaction between tourists and the destination as a collection of physical places:

*"...the tourism experience is a subjective performative action contextualized by the geographical characteristics of tourist destinations, which takes form in different dimensions of sensory, cognition and perception, social, and affective/emotion as a result of interactions between tourists and spaces."* (Tussyadiah & Zach, 2011, p. 281).

This affirmation is consistent with findings from the field of environmental psychology which show that people perceive their environment (meaning the place where they are at a certain moment in time) not only based on physical characteristics, but their perception is also influenced by their emotions (Klettner et al., 2011, Al-Husain et al., 2013).

The field of environmental psychology is not so much focused on applications, as it is rather oriented towards basic theory and research on how people are influenced by, think about, perceive and respond to their environments. (Clayton & Saunders, 2012) Of the most important themes in environmental psychology that were often overlooked by other areas of psychology are: recognizing the relationship between people and their environments (how people are influenced by specific places and how they change them to suit their well-being) from which practical applications are derived, and the need to link psychology with other disciplines.

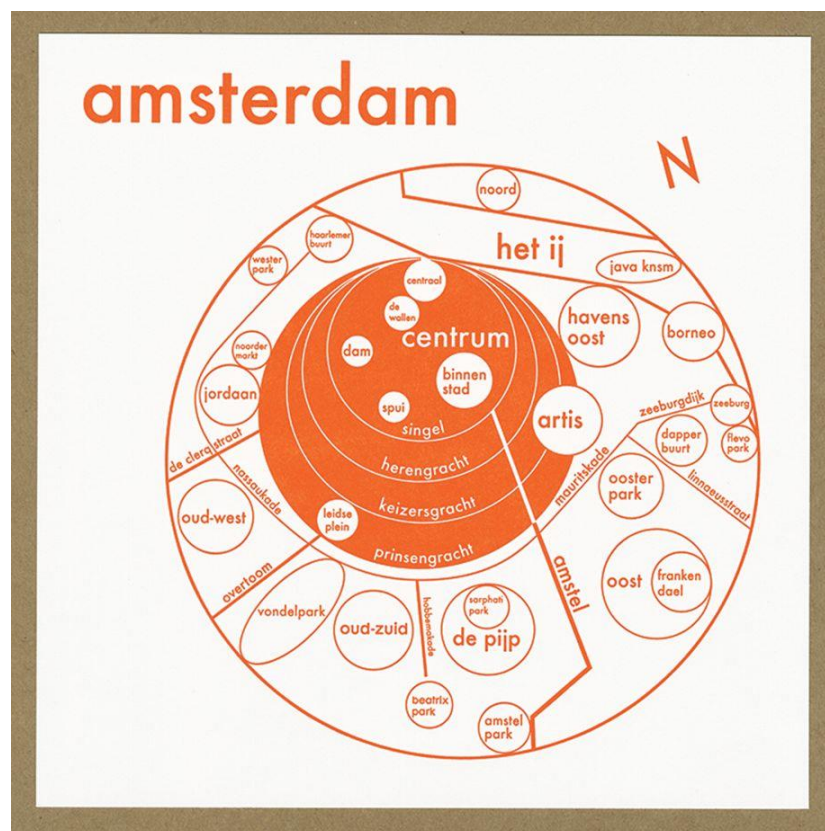
One such link between psychology and geography led to the formulation of emotion mapping. This concept revolves around collecting peoples' subjective perceptions of space and use them to generate mental maps (Gartner & Ortog, 2011). The image in figure 1 below shows a mental map of Amsterdam designed by philosopher/artist Archie Archambault.

Perception is defined as “a cognitive process that is directly involved with the detection and interpretation of sensory information” as a result of the connection between a person and what is being perceived (Lloyd, 1997, p. 5). Zadra & Clore (2011) assert that emotion can have an influence on the way people perceive their environment, and they state that the importance and value given to objects and events are determined by affective valence (whether something is perceived as attractive or aversive) and arousal (the level of excitation or relaxation).

Accordingly,

*“...for every moment a traveler sees, listens, smells, tastes and touches ‘objects’ within the destination, emotions are produced (Winkielman and Berridge 2004 in Kim & Fesenmaier, 2014, p. 282)”*

These emotions are then directly determining how tourists perceive the destination places and are thus an important source of information.



**Figure 1.1.** Mental map of Amsterdam (source:

[http://www.slate.com/blogs/the\\_eye/2013/12/02/circular\\_city\\_maps\\_archie\\_archambault\\_designs\\_minimalist\\_city\\_maps\\_printed.html](http://www.slate.com/blogs/the_eye/2013/12/02/circular_city_maps_archie_archambault_designs_minimalist_city_maps_printed.html), accessed in 02-Nov-15)



## 1.2 Problem statement

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As mentioned earlier, emotions have been shown to have a significant influence on the individuals' perception about their surrounding environment. More so, emotions evoked by visited places can play an important part in tourism experiences as a whole, due to their role in the perception process. This can then determine the level of user satisfaction and influence tourists' consumer behavior with regard to the particular destination. However, few studies have been conducted with the purpose of examining tourists' emotions on site toward their destination of choice (Hosany et al., 2014). If they were able to identify and measure the emotional state of tourists, tour operators and DMOs could adjust their services accordingly, ensuring a higher satisfaction and gain tourists' loyalty (Alzua-Sorzabal et al., 2012).

One other reason to study emotions is their presence in the relationship between service providers, the service provided and the customer, with the focus being on the customer and his/her level of satisfaction with the other two. Such is the case chosen by Dickinger & Lalicic (2014) who analyze the presence of emotions in online tourist reviews and responses from the service providers on the web platform Trip Advisor. They use the six basic types of emotions to study emotional aspects of consumer behavior. But this is just one example of study focused on tourism related user generated content (UGC) analyzed using a quantitative approach such as extracting destination ranks or keyword frequency from social media websites, and not actually looking at the content itself (De Ascaniis & Greco Morasso, 2011).

The emotions tourists associate with the destination can also determine their destination loyalty: whether they will return or not, or even whether they will recommend the destination to their social network (Li et al., 2015). Therefore, there is a tendency in studies associating emotions and tourism to look at the role emotions play in the tourism experience as a whole. But, if tourists' emotions which are prompted by the actual places they visit at the destination could be identified, measured and mapped, the resulting information might reveal interesting perception patterns about the destination space and could prove valuable in planning efforts, or reinforcing the place image. In order to ensure a high degree of reliability for this type of emotion information, a significant amount of data should be able to be collected in a standardized manner from people pertaining to a variety of social categories. This should ideally be accompanied by people's socio-demographic information and some data describing the environmental context at the moment of collection. All of these characteristics are met by the practice of Volunteered Geographic Information, briefly described in the following sub-section.

### 1.2.1 Web 2.0 and VGI

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In tourism, mobile technologies have emerged mainly as electronic tourist guides or mobile applications performing the same role, to facilitate access to information about the destination and to aid in decision making on the go (Wang & Xiang, 2012). But as mentioned before, smartphones are powerful tools, and not only for providing tourists with useful information, but also for allowing tourists themselves to generate data and information related to the destination.

The technological advances of the last decade have led to ordinary people gaining a new role in their society: that of producers of geographic data and knowledge, without requiring any formal training in this direction, all of it happening under the umbrella of the Web 2.0 and being pinpointed by the term "neogeography" (Sui & DeLyser, 2012). This is consistent with the "people as sensors" concept which stipulates the fact that people can generate datasets by recording their subjective perceptions and observations of things and are thus referred to as human sensors (Zeile et al., 2015).

*"Volunteered Geographic Information (VGI) is a human side of the sensor revolution."*  
(Song & Guibo, 2010, p.1)

Volunteered Geographic Information is given more and more importance as the role of citizens as sensors is acknowledged: observing and gathering data from the world around them in a purely altruistic manner (Goodchild, 2007). VGI is a useful provider of information for decision makers because it consists of distributed and dynamic sources, has a low cost of data collection, and it can emerge where spatial information does not exist or is not accessible (Song & Guibo, 2010).

In 2014, 82% of all international visitors to Holland owned a smart phone and/or tablet, half of which occasionally or regularly downloaded travel related applications or applications concerning the destination, but the majority used their device to connect to the internet (NBTC General Report, 2014). This situation is a favorable prerogative for the setting of this project because tourists already have the tools needed to seed subjective data, all that is needed is an appropriate medium of discovery (a mobile application) and an attractive incentive.

### 1.2.2 Amsterdam Case Study

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Studies of place image are performed in tourism in order to describe the overall destination image, because it is thought to influence people's decisions, experience and behavior with respect to the destination. Tourists stimulate economic activities at the destination and being aware of their experiences and perceptions is a key factor in the

destination's further development (Stylidis et al., 2014). So tourists' experiences are influenced by the visual identity of the destination, especially true in the case of urban environments, and each individual holds their own perception of a place, but there is also a group perception that is agreed upon by more individuals (Jutla, 2000). The essence of a place is considered to lie in great part in the sense of place that is appropriate to these individuals. This information is necessary for planners and decision makers to understand what it is that makes certain places more appealing or more successful than others, how various factors combine to provide a certain sense of place and how to bring modifications without destroying their characteristics, or even how to translate them to other places (Jutla, 2000). It is thought that in general, residents think more positively of the destination due to the "proud parent syndrome" (Stylidis et al., 2014), and this is just one example of the difference in perception between residents and tourists. Residents have the opportunity to express their opinions, experiences and perceptions about the places where they live through programs provided by their municipalities or local authorities. They can provide their input this way, but the same cannot be said of tourists. In most cases they will only interact with the places at a destination for a very short period of time, same applying for recurring visitors. The input they provide usually has to do with rating the services they consume (restaurant, attractions such as museum, the hotel and the staff they interact with) and not as much with the physical places or locations they visit in the city.

In cities that are specialized on tourism, massive influx of tourists can have negative effects on particular places and cause social problems (Sheng, 2011). In the context of a sustainable urban development, this represents a matter of concern and one of the potential solutions is to redirect the tourist flows towards new places designed for touristic consumption. Consequently, the need arises for information about how tourists perceive the places they visit at the destination in order to understand their essence and how they make sense for the tourists.

It is exactly this problem of the city center overflowing with tourists and the efforts of redirecting the flow to places situated at the outskirts of the center, which the city of Amsterdam has been dealing with for quite a while now. This is one of the main reasons for bringing Amsterdam in focus in the context of this research. Moreover, the 2014 NBTC General Report for Inbound Tourism reveals a number of facts that serve as motivation for choosing Amsterdam as a case study in this research project:

- 30 and 31 percent of all visits take place in spring and summer, but autumn and winter are registering a growth due to the popularity of city breaks, which are performed throughout the year.
- Amsterdam is the most popular Dutch destination (almost 40% of visitors stay there), hosting over 5 million visitors in 2014.

- The number of international visitors in Amsterdam has seen a 56% growth in the period between 2000 and 2014.
- City walks are the main activity of visitors in Holland. The main activity is usually one that is known beforehand and more often than not it lies at the center of various decisions that the tourist makes when planning his trip, for example booking accommodation as close to the city center as possible to ensure that a maximum number of objectives is within reasonable walking distance.
- Visitors have different motivations, but in 2014, almost a third of them mentioned that they came to discover the country, the culture, the environment and the people, correlating well with the city break holiday type.

### **1.2.3 Related work**

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The field of environmental psychology had a direct influence on the popularization of emotion studies and it led to them becoming a focus subject in other fields, some of them considering emotions together with spatial or environmental characteristics. Thus, various approaches have been employed for collecting emotion related data, some of which are exemplified in the following paragraphs.

Matei (2001) is documented in Resch et al. (2014, p.5) as the first project focused on showing emotions on a digital map with the purpose of gaining a better understanding of "geo-location of fear" in Los Angeles, USA.

In a non-scientific setting, but worth mentioning, emotions and GPS datasets are combined in an interesting art project called "Biomapping" started by Christian Nold in 2004.

Kim & Fesenmaier (2014) successfully used an approach which combines the pleasure-arousal-dominance (PAD, from environmental psychology) model and the Affective Q-sensor (wearable device used to monitor electro dermal activity - EDA) in order to measure tourists' emotions in a live setting (with 2 international subjects, in a 4-day tour in Philadelphia). However, the technology they used is not readily available and it would imply higher costs to generate an amount of data necessary for decision makers (from more subjects). Also, their research is oriented towards discrete events in the touristic experience and how the tourists use the destination to make their experience meaningful and not focused on the location itself (although an adaptation could be possible).

A similar approach is used in Alajmi et al. (2013), who used a mobile application, a biosensor to measure EDA and Near Field Communication (NFC) tags to determine the customers' proximity to stores and analyze their emotion levels in real time, while

engaged in shopping activities. Also in retail, the environmental psychology model of environment stimuli, perceptions, affect and behavior has been thoroughly explored through research, most of it showing that environmental cues impact customers' emotions and trigger an approach behavior (Dennis et al., 2010).

Alzua-Sorzabal et al. (2012) used a variation of the PAD model in an android mobile application named "Emocionometro" to measure and store in a database the emotional states of the participants of Donostia-San Sebastian during the final phase of the selection process for assigning the European Capital of Culture in 2016.

The EmoMap project relies on the premise that each person perceives places differently, influenced by his/her emotions, thus the project is set on collecting this subjective data for enhancing route calculation in pedestrian navigation systems, according to their belief that including data about emotion can lead to higher user satisfaction (Gartner & Ortog, 2011, Klettner et al., 2011, Gartner, 2012). They distinguish between emotions, which they define as feelings in space and the environment's properties (for example noise, smell, attractiveness), included in a model after applying online questionnaires to pinpoint the most relevant ones in each category. Technically, it is not clear if they use a specific emotion classification, but the application is still available in Android's Google Play probably because the project is still ongoing.

Gallegos et al. (2015), combine geo-tagged tweets (140 character messages specific to the online social networking service Twitter) with check-in data from Foursquare in the Los Angeles area and demographic United States Census data in an analysis of people's sentiments about certain places. Their conclusion is that even though the survey method might not produce very accurate data, social media data can be demographically biased, and so they recommend combining different methodologies for gaining new knowledge.

Resch et al. (2015) and Zeile et al. (2015) introduce the Urban Emotions concept in a project focused on developing a human-centered approach to extract emotion information from both technical and human sensors in context, to be used in urban planning practices. Their methodology combines extracting data using emotion sensing technology (objective measurement), using people as sensors (subjective observations using a mobile application) and data from crowdsourced social media. Their research is based on the six basic emotions model proposed by Ekman & Friesen (1971).

The studies described above show that people's emotions can offer valuable descriptions of the places they visit, and these emotions can be measured using various methodologies. However, these methods either imply the use of expensive equipment (sensors) in a controlled experiment setting which would prove difficult to extend to a larger scale (to collect enough data for use in real-life situations), or are based on

extracting emotions related information about places from crowdsourced social media. While this latter approach would seem quite appropriate and effective (also in terms of costs), there is no way of telling whether the emotions are about the actual places or they just happen coincidentally. Also, the concept of VGI is used mostly to refer to information that is crowdsourced on social media, which is then extracted based on a location of interest. There are a few exceptions, such as the EmoMap project, which apply the concept of facilitated-VGI in a mobile application that serves as a platform for people to provide contributions about their emotions related to places. Nonetheless, no study has been found to apply facilitated VGI as a method to measure emotions and to target only the tourists of a particular location. For destinations where the flow of tourists exceeds the local population (for example in large capital cities such as Amsterdam), their input as consumers of touristic places can prove to be very valuable in planning, urban expansion and further promoting the image of the destination. Furthermore, in the existing studies not enough emphasis is put on the context of emotion experience, whereas this is an important point to consider when measuring emotions about places because emotions are not isolated occurrences, they are influenced by the characteristics of the situation at hand. It is thus necessary to also analyze the context of emotions in order to gain a better understanding of their relationship with the places where they are experienced.

### **1.3 Research objectives**

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The main objective of this research is to identify which emotions are related to tourists perceiving a certain place or location, by developing and testing a VGI mobile application to collect (data about) these emotions and to analyze them conjointly with a set of relevant contextual factors.

The contextual factors refer to characteristics that are used to describe both the individual and the environment at the moment when emotions are experienced and are also considered to influence the very experience of emotions. For example, in a particular place two contrasting emotions could turn out to be dominant. One can be influenced by a characteristic of the place and one can result from a characteristic of the individual. To exemplify, tourists who are not on their first visit to a place can express happiness about the changes that have been made to make the place more attractive, while some could be slightly angered by the fact that the place is now also very crowded. As mentioned before, context is considered an important aspect when measuring emotions and its role in the experiment will be explained in detail in a separate chapter.

### **1.3.1 Research questions**

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The main research objective can be accomplished only after the following research questions are answered, each representing a distinct step that needs to be taken in the research:

1. What emotions are relevant in the interaction between tourists and places they visit?
2. Which context factors influence tourists' emotions for places at the destination (and should therefore be analyzed)?
3. How can the identified relevant emotions and context factors be measured?
4. How to develop a VGI mobile application that successfully collects data regarding tourists' emotions and apply it in an experiment on site?
5. How to analyze the emotion data and relate them to various contextual and personal factors?
6. How can the results be validated?

### **1.3.2 Research delimitations and limitations**

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#### *Delimitations*

Even though the research problem refers to elements characteristic to human nature, such as emotions and perception, it does not extend to an analysis of tourist behavior, possibly prompted by the experience of reported emotions. The scope of the research is centered on measuring emotions and evaluating the context in which they manifest by means of a VGI application. Also, a similarity to destination reviews from online social media platforms might be argued, however, the purpose of the application is not to analyze tourists' opinions of places in Amsterdam, but how they perceive the places in terms of the emotions they experience and context. With similar studies in tourism, the end result is usually a recommender type application. Likewise, this is not the case for this research. At most, it can be said that the application measures tourists' preference for certain places in terms of how they perceive them on the spot, as opposed to a recommender application which suggested specific places to visit based on the input received by tourists. Furthermore, an important aspect that contributes to the crisp delimitation of the research is the exclusion of mood and personality as factors that can influence the experience of emotions and perception. Mood is regarded as an emotional state, but different from emotion in the sense that it is less concise, while emotion is usually a response to a certain stimulus or event. It is argued that personality offers a predisposition for a specific mood or emotional response. Besides the fact that there are

numerous approaches to analyzing and understanding personality, there is quite a number of methods available for assessing personality types and traits. Also, the relevance of cross-cultural personality studies is debatable, whereas in this research the cross-cultural factor is unavoidable, considering the large number of international tourists in Amsterdam. A number of issues arise with the attempt to include a personality assessment in the VGI application. First of all, the methods that are scientifically valid require expert base knowledge for application and result interpretation. Second of all, this would lead to an increased complexity of the application usability and generate a higher degree of confusion for the users, along with raising their suspicion for sharing private information about their self. All in all, the downsides of incorporating the personality factor overcome the potential added value to the experiment.

### *Limitations*

One potential limitation could be represented by the researcher's minimal experience in developing mobile applications, however there is great potential for learning due to familiarity with HTML and CSS studied in Module 6 and Object Oriented Programming (Python in Module 5). Programming for Android requires a knowledge of XML and the Java programming language, but at the same time there is a lot of information available along with code recipes for additional help in development. Furthermore, Android Studio will be used as the Software Development Kit (SDK) of choice, with the biggest advantage being the official support from Google.

Another limitation is given by the unknown download rate and number of users of the final application. To ensure that there will be a sufficient number of entries by tourists, efforts must be directed towards promoting the application and introducing it to as many people as possible. Not having enough data entries could lead to insignificant results and ultimately delaying the project.

## **1.4 Research Methodology**

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Geography's tendency to embrace interdisciplinary research suggests that the combination of qualitative and quantitative methods can lead to better results than in the case of employing a single method (Sui & DeLyser, 2012). Such is the case of this research project which requires the application of a variety of methods, bypassing the qualitative-quantitative divide.

It is well established that a generally accepted definition of emotion has not yet been formulated. Thus, when it comes to categorizing and operationalizing emotions, there are several options, usually consistent with the specific field of research in which they are employed. For this study, it is more appropriate to look at how emotions are

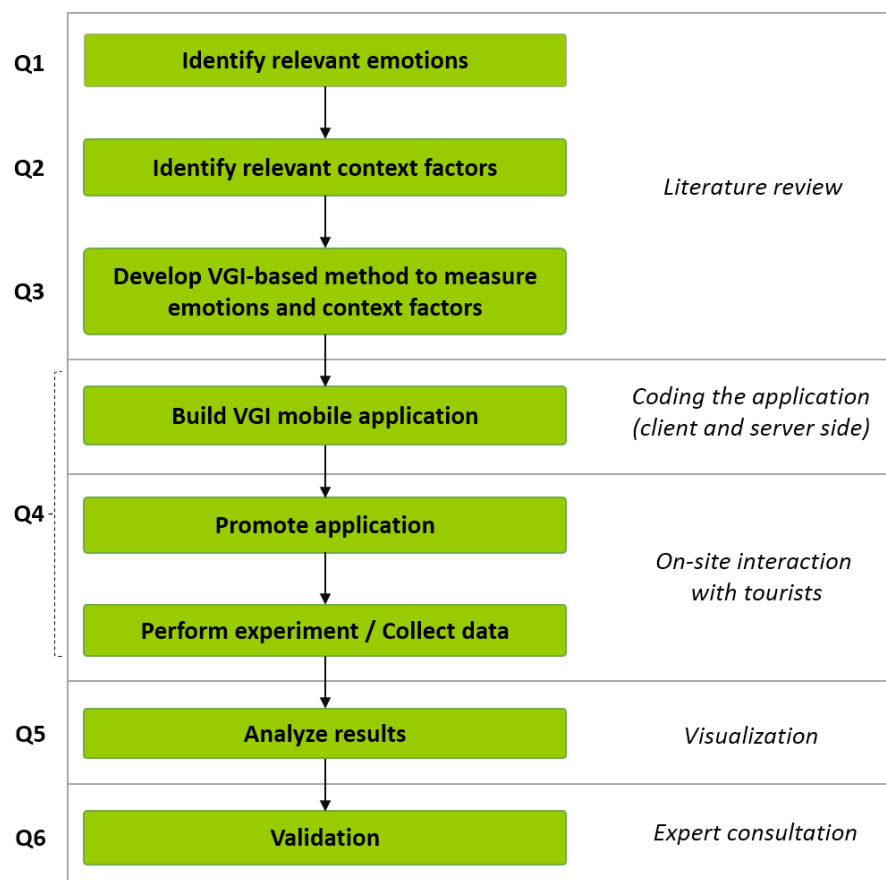


treated in the context of environmental psychology on one hand and consumer psychology on the other hand. Because the tourist is considered a “consumer” of the destination, not in the sense of his vacation package, but in the sense that the destination is a physical place, which the tourist consumes or discovers using his senses of sight, smell, touch and hearing (taste has a prevalence towards a more cultural aspect of the destination). Feyerabend (1975, in Sui & DeLyser, 2012, p.119) argued that ‘everywhere science is enriched by unscientific methods and unscientific results’.

The main method for collecting emotion related data from tourists is by using a VGI mobile application. However, in order to achieve the main objective of this research, a combination of methods is required, following the idea that:

*“UGC and VGI are also increasingly becoming an important data source, often mashed up with more traditional sources for geographic research.” (Sui & DeLyser, 2012, p. 118)*

In the remaining of this section, the steps needed to realize the objectives will be described according to the sequence of research questions defined in section 2. An overview of the research methodology is also provided in the figure below (figure 1.2).



**Figure 1.2.** Methodology schema

### **1) What emotions are relevant in the interaction between tourists and places they visit?**

The first step is to identify which emotions are relevant when referring to place perception and tourism. This requires a substantial literature review on emotions, with a focus on the fields of geography, environmental psychology, tourism and even marketing because as the present study is focused on how tourists experience the actual destination with the various physical places they visit, they can be seen as "consumers of place". Actually, some scholars question the appropriateness of psychology born emotion models to assess emotions in tourism settings and are inclined towards emotion models developed for use in the marketing field (Hosany et al., 2014). A reason for this could be the fact that tourists are consumers of touristic services, and these services comprise an important part of their overall experience and satisfaction.

### **2) Which context factors influence tourists' emotions for places at the destination (and should therefore be analyzed)?**

Context is defined by Song & Guibo (2010, p.3) as "any information that can be used to characterize the situation of an entity." For example a tourist's context in a particular place can be described by the geographical landscape, by the weather conditions, the specific moment in time (time of day, month, season, year), or whether they are alone or accompanied by other people.

A substantial amount of research is dedicated to the tourist's context from the perspective of context-aware applications and their role in recommender systems. Lamsfus et al. (2013) state that "location is just the very basic aspect of context and does not offer much relevant and useful information by itself" (p.7) and for this reason it should be analyzed in conjunction with other contextual variables. Additionally, Van der Spek et al. 2009 in Kim & Fesenmaier (2014) consider data obtained from GPS, media objects such as photos and videos, and other sensory data essential for providing information regarding how and why emotions are created.

However, context can also embrace the form of socio-demographic information (age, gender, level of education, social status) about the tourist as well as other subjective variables: place of origin, tourism motivation, familiarity with the destination. These factors are also considered to influence the tourists' perception of destination places (Garrod, 2007). Consequently, context information is considered a key factor in understanding tourists' place-based emotions and its inclusion in the mobile application is an essential step in the research.

One contextual factor that needs to be taken into account is comprised of the weather condition because this can act as a facilitator to make visitation activities more pleasant to the tourist (Gómez Martín 2005, in Braunhofer et al., 2014). Sunny weather is considered to enhance a positive affect state and determine a positive judgement (Clore & Sotbeck, 2006), as well as a rainy day which could make everything seem grey and induce a state of discomfort, determining tourists to spend their time indoors.

To sum up, the second step of this research consists of identifying which contextual factors can influence tourists' place-based emotions and perception. The two categories of contextual factors considered so far are the tourists' socio-demographic profile and environmental characteristics, the former being portrayed through pictures taken by the tourists and the weather conditions. Each of these factors will be described in detail and their role in the application will be motivated.

### **3) How can the identified relevant emotions and context factors be measured?**

There are several generally adopted methodologies for measuring emotions: behavioral observations, physiological response measurements (for example EDA and galvanic skin response), and self-report in the form of interviews, questionnaires, diaries, and experience logs (Gartner, 2012).

The self-report method is generally used and is probably the most popular method for measuring emotions in various fields of research. Nevertheless this method is considered to be not that accurate because there is usually a time difference between when emotions are produced and when they are reported, so tourists tend to report their retrospective thoughts about what the emotion has been instead of the actual emotion they lived (Kim & Fesenmaier, 2014). Li et al. (2015) also identify this as the main drawback of the self-report method.

An alternative to the self-report method consists of psycho-physiological methods for measuring emotional response. These are considered to be more objective and unbiased due to the direct measurement of autonomic response to stimuli (which is out of voluntary control) and have actually been successfully used in marketing studies (Li et al., 2015). However, when using these methods, data needs to be collected in a controlled laboratory setting and would not entirely reflect what happens in reality out in the field. Also, applying these methods still implies a certain hardware cost, depending on the size of the project and the amount of data that needs to be collected, and the interpretation of the data itself.

In the context of environmental psychology, emotions are measured through standardized methods in the form of questionnaires in the majority of studies, with great attention given to the reliability and validity of the scales (Kals & Muller, 2012). The

questionnaire method is often used because it is easy to develop, flexible in what items are represented, accessible for the respondents and supportive of quantitative analyses (Tonetto & Desmet, 2012).

Also, a common practice among tourism researchers is to adapt emotion models developed by psychologists to fit their specific study context (Li et al., 2015). For example, the Destination Emotion Scale (DES) (Hosany and Gilbert, 2010 in Hosany et al., 2014) consisting of three positive dimensions (joy, love and positive surprise) was constructed to measure tourists' emotional experiences at the destination. This approach is based on the fact that tourists seek only pleasurable experiences when on holiday and they tend to remember only the positive parts when assessing their vacation retrospectively.

Even though the DES was developed to measure tourists' emotion and it could be considered for the present study, there are several reasons which make it inappropriate. One of the objectives in this study is to "capture" tourists' emotions in the place they are influenced by, so their emotions reflect their perception of a specific place in time and not just any kind of experience they might have at the destination. Furthermore, it is expected that not all places will trigger positive emotions, especially in the case when tourists "wander off the beaten track" and discover places that are not part of the touristic venue.

Context information will be obtained in different ways. For the socio-demographic information, the tourists who will use the application will be able to fill in some personal data in a user profile when they first open the application. Special care must be taken at this point to secure the users' privacy and gain their trust to use the application.

For obtaining environmental related context information, smartphones hold a number of advantages. One advantage of using smartphones to collect emotion data is the granularity of the results, because a specific emotion can be associated with a point in space, surrounded by a small area (Gartner & Ortog, 2011). Another advantage consists of the various hardware components and sensors the smartphones are equipped with, which can be accessed through the application to obtain contextual data. More specifically, the smartphone's camera can be used by the tourists to take geo-tagged pictures of the various places where they fill in their emotion data in the application. This decision is inspired by the volunteer-employed photography method, consisting of providing research subjects with cameras and asking them to illustrate their subjective perceptions of their environment by taking pictures. This method is considered to hold a number of advantages and suitable for generating qualitative data in situations where words are not an appropriate medium of expression or response (Garrod, 2007). In this case, the pictures taken by the tourists supplement the information they provide in their profile and regarding their emotions, because for instance their subjective interests can

be deduced from the pictures and may help in understanding the reason why the same place triggers different emotions.

A more substantial approach is called for to collect data about the weather conditions at the time and place of emotions assessment. Even though some smartphones include various environmental sensors such as barometers, photometers, and thermometers, it is not certain whether they work properly or perhaps if they have restrictions. An alternative would be to extract weather data from a third party mobile or web application, which would mean a drop in the level of accuracy. Both methods need a more thorough consideration before reaching a compromise.

To sum up, the general consensus is that there is no standard method for measuring emotional response (Li et al., 2015, p.820) and when considering the various context factors that need to be measured, the solution lies in the use of multiple methods, combined under a VGI application.

#### **4) How to develop a VGI mobile application that successfully collects data regarding tourists' emotions and apply it in an experiment on site?**

The mobile application itself will be developed for smartphones running on the Android operating system mainly because they are more accessible programming wise and offer a higher degree of flexibility in the interaction between the application and the actual hardware, or between applications than for example Apple's iOS (Nield, 2015). The emotions identified in step one and operationalized in questionnaire form in step two will serve as the main input for building the application. Likewise the possibility to collect data regarding the contextual factors identified in step three will be implemented. These aspects will be worked out in detail during the development phase.

However, once steps one to three are complete, the starting point for this fourth step consists of making a mock-up for the application. The mock-up is a low-cost solution and common practice for visualizing how the application will look like and how all the elements fit together before the actual coding takes place. The application mock-up will be made using a combination of simple pen on paper sketches and a dedicated online solution such as: <https://www.fluidui.com/> or <https://proto.io/> (accessed 03-Nov-15). After the mock-up is complete, the actual coding can take place in Android Studio (integrated development environment – IDE for Android). When the development phase is complete, the application will be tested using real life users. Friends and acquaintances are the candidates chosen for this phase. They will be asked to write a short review for the application and give ratings based on a number of usability factors (extracted from literature), to reflect their level of satisfaction with the application. This feedback will then be analyzed to see if any changes in the design are called for.

With respect to the application itself, there are still a number of things that need to be considered. One of these things is the usability of the final application. This is important because the goal is to eventually launch the application in Google Play Store (Android's gateway for downloading applications) and make it available to a wide range of users in order to collect a sufficient amount of data. Keeping this in mind, it seems as common sense to implement reliable programming to make the application easy to use and provide it with an intuitive user-friendly interface (Wang & Xiang, 2012).

Moving on, another aspect that needs to be considered is actually bringing the application and its prospective users together. It is fair to assume that once the application is up and running, expecting the tourists in Amsterdam to simply start to use it is unproductive thinking. A strategy is needed to let the tourists know about the existence of the application and to encourage them to use it. For example, Resch et al. (2015) use information feedback as incentive, meaning that they show the users a map with all the emotions in a city, right after they have entered their emotion information, thus keeping them motivated to supply information because they know they get something in return. Another approach is demonstrated by Lamsfus et al. (2015) in a mobile application called "33 secrets of Donostia" which encourages visitors to explore the destination in order to receive interesting less-known information about various locations of it directly on their phone, this happening when they find themselves inside a preset virtual fence (established through a method called geo-fencing).

## **5) How to analyze the emotion data and relate them to various contextual and personal factors?**

The fifth step in this study calls for an analysis which brings together tourists' emotion data and contextual data for the purpose of discovering how (emotions) they perceive various places in Amsterdam and possibly why (context) they do so.

Because maps are an essential part of the geographer's methodology and language (MacKian, 2004), this will be the main means of representing tourists' perception of Amsterdam places spatially. For example, in a related study, Misue & Taguchi (2015) developed a thematic map, called "emotion-weather map", for representing complex multivariate emotions in a spatio-temporal way: isobaric lines are used to draw 2-dimensional metaballs representing emotion scores extracted from Twitter data.

## **6) How can the results be validated?**

Validation is necessary in order to establish how well tourists' emotions about places are measured by means of the VGI application and to what extent they

characterize the places in terms of tourists' perception. Since results of similar approaches are not available for comparison, an expert opinion is required as an informal yet nonetheless valuable method of validation. In this case, an experienced environmental psychologist would be most appropriate because of the assumed correlation between the emotions and the context in which they manifest. It is essential to see whether the application is indeed measuring emotions of tourists, in order to draw conclusions and characterize the places themselves according to the respective emotions that are triggered.

#### **1.4.1 Data, software and research material**

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An essential requirement for conducting this research study is having access to scientific literature from the fields of geography, information and computer science, psychology, environmental psychology, tourism and marketing. At this moment, this is possible through the Utrecht University Library. However, non-academic sources of documentation are perhaps more useful in the application development phase. The most important ones worth mentioning here are Udacity's collection of courses and tutorials, Google's documentation website for android developers and the android section of 'Stackexchange', a website where questions and answers are exchanged based on various problems.

In terms of software, the intention is to use free for use software in order to avoid unnecessary costs and to ensure a maximum reproducibility of the study. For developing the mobile application, the Android Studio IDE will be used as mentioned above. This is a powerful tool that allows the incorporation of various other elements needed to construct a fully functional application: Google Play Services for location features, Google Maps Application Program Interface – API and Cloud functionality for data storage and back-up, are just a few examples that will also be required in the application. For the final step, that of the results analysis, the Quantum GIS (qGIS) software will be used.

#### **1.5 Conclusion**

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To sum up, emotions experienced by tourists about places can be great indicators of their perception of and satisfaction at the destination and among other uses, can serve to refashion or reinforce the destination image in order to better serve tourists' expectations and increase their loyalty. A number of studies have focused on analyzing tourists' emotions following various approaches. However, analyzing, and first of all measuring this type of intangible reaction is difficult, especially due to its ephemeral characteristic. An emotion felt at a specific place and moment in time can be completely

different when reminisced after some time has passed. Also, their appearance is not an isolated event, but it is strongly connected to the surrounding environment and the individual's predisposition.

The studies performed so far don't seem to account for the context of emotion experience and some of them don't even properly justify the way they define emotions in their research. For example Resch et al. (2015) implement the notion of emotion experience in a mobile application as the level of comfort on a 7 point scale, without explaining the connection. Before attempting to measure emotions about places, it is essential to understand them as a factor in this construct along with their defining characteristics and the appropriate context of influence. Furthermore, some studies claim to rely on a VGI-based methodological approach, however, the way they collect data about emotions of places is through a form of sentiment analysis or opinion mining (extractions using text analysis and computational linguistics from social media platforms such as Twitter, Flickr or Tripadvisor), in which case users are not even aware of the fact that they are volunteering geographic information. While this approach holds its advantages, it is quite hard to determine if the resulting emotions are indeed about the places where they are experienced or if they are triggered by other circumstances and happen to be pinpointed to a location.

Seeing as VGI approaches are quite popular and successful in engaging people to contribute their knowledge and perspectives about things that take place in their proximity, it seems appropriate to turn to this medium for measuring tourists' emotions about the places they visit. The city of Amsterdam is chosen for setting up the actual experiment to measure emotions because it is the most popular Dutch destination for international visitors, who seek to discover the culture, the landscape and the people, and who tend to prefer walks around the city as their main activity. This ensures an advantage as they are likely to reach various places that are also touristic attractions or Points of Interest (POI) at a pace leisurely enough to trigger meaningful emotional reactions. At the same time, Amsterdam's "popularity" faces an uneven spatial distribution with a high concentration in the city center, attracting the majority of tourist flows, in the detriment of other places surrounding the center. Efforts are made to redirect these flows to other places in order to decongest and preserve the city center. It is in these conditions that a need arises to understand how tourists perceive places and what emotions they experience on the spot.



## 2. Perception and emotions

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This chapter starts with a brief exploration of the relationship dynamics between perception and emotions, as an important step towards understanding the mechanism behind place perception, given by the emotions experienced by tourists. The role of emotions in analyzing place-based perception is then explained and the leading theories of emotions are considered while focusing on a way to characterize real world places based on these notions. An attempt to delineate an acceptable model of emotions for characterizing the perception of places is undertaken, based on the available literature. This step is necessary in defining the framework for ultimately identifying how places are perceived because of the ephemeral quality of emotions. Even though they are short lived human states, they provide the foundation for subjectively assessing entities and situations, and allow the formation of preference opinions. Furthermore, specific aspects regarding the model's appropriateness and application in the project at hand are discussed. These consist mainly of cultural and language issues.

### 2.1 Perception and emotion (Affect-as-information)

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Perception is an adaptive process by which individuals detect and interpret information about the world around them, in accordance with their internal expectations and motivations (Storbeck and Clore, 2006). Perception is considered to be composed of 2 dimensions: a factual dimension, describing how things are in the world, and a perspectival dimension describing how things are in the world but from the point where one is standing, so from one's own perspective. In this sense, an individual's emotions track evaluative information from their perspective of what is being evaluated, or what happens to be in focus at that moment (Deonna, 2006). Some theories suggest that emotions influence perception because they are feelings about something, focused on assessing that "something" with respect to its goodness or badness and relevance for the observer's goals, attitudes and motivations (Clore et al, 2001, p.30). Other theories even go to the extent of considering emotion as a form of perception in itself.

The affect-as-information theory (or feelings-as-information) holds a long tradition in emotion research and it basically stipulates that people use their feelings as sources of information. The term "affect" designates representations of dispositions, such as

preferences and attitudes, and states: emotions and moods (Clore et al, 2001). Starting from this affect-as-information theory, Storbeck and Clore (2006) analyzed how affective factors, including emotion, have an impact on how individuals perceive the physical world, their findings suggesting that "affective feelings inform explicit measures of perception". On a similar perspective, Prinz (2006) discusses the view of emotion as a form of perception, arguing the fact that emotions have the same main defining characteristics as perception, and Clore and Storbeck (2006) propose the "risk-as-feeling model": people assess risk based on their internal feeling more than objective evidence about risk and probabilities. Nevertheless, one identified difference between perception and emotion is that some emotions can be experienced even though no senses are stimulated from the outside, so they can be directed towards imagined circumstances, while this is not the case with perception (Deonna, 2006). This claim is of course disputed as well in the literature due to the lack of evidence to support it.

For the objective of this research, the affect-as-information theory is considered since it strongly argues the role of emotions as a source of internal information to oneself about perception. The notion of perception is too broad to be operationalized efficiently and significantly, but emotions have been studied tremendously from various angles and perspectives, leading to a staggering number of definitions and a proper set of defining characteristics. The results have known multiple successful applications in various fields of research and this makes a practical reason for why emotion is considered a good indicator of place perception in this study. Further motivation regarding emotions is discussed in the following sections.

It is generally accepted that emotions are a defining characteristic of human beings. As Paul Ekman (1999, p. 54) stated: *"... emotions can occur with a very rapid onset, through automatic appraisal, with little awareness, and with involuntary changes in expression and physiology, we often experience emotions as happening to us. Emotions are unbidden, not chosen by us."*

The remaining of this chapter explores the notion of emotion with aspects related to the emotions' role in the relationship between tourists and the destination environment. Hauthal & Burghardt (2013) believe that *"emotions and space are connected fundamentally"*, due to the people receptivity to the characteristic atmosphere of locations. Places have the power to evoke various kinds of feelings, such as security, excitement, happiness, or sadness. Geographers believe emotions to reside at the confluence between the mind, body and place (Griffin & McQuoid, 2012) while providing insight into one's own judgment and their relationship with, and representation of, the environment (Castelfranchi & Miceli, 2011). San Martin & Rodriguez del Bosque, (2007, p.274) state that: *"the mental representation of a tourist destination is formed on the basis of*

*individuals' beliefs about the place (cognitive image), as well as their feelings toward it (affective image).*" Even though the importance of emotions in describing the bond between people and places is acknowledged, emotions are only briefly represented in maps and spatial data (Griffin & McQuoid, 2012). A reason for this could be the very concept of emotion itself, transient in nature even now. The multitude of approaches to study emotions and the lack of a universally accepted answer to the question of what emotions really are, brings forth a certain degree of confusion, along with the scope of understanding. Thus, giving a spatial dimension to something as ephemeral as emotions represents a noteworthy challenge.

## 2.2 Theories of emotions

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A consensual definition of emotion has not yet been established. After reviewing over a hundred different definitions of emotion considered over the years, Kleinginna & Kleinginna (1981, p.355) propose the following definition:

*"Emotion is a complex set of interactions among subjective and objective factors, mediated by neural - hormonal systems, which can:*

- (a) Give rise to affective experiences such as feelings of arousal, pleasure/displeasure;*
- (b) Generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes;*
- (c) Activate widespread physiological adjustments to the arousing conditions; and*
- (d) Lead to behavior that is often, but not always, expressive, goal directed, and adaptive."*

One important defining characteristic of emotions, which is not included in this definition, is that emotions present themselves as being directed towards something, which represents their intentional object (Reisenzein, 2015), referred to by philosophers with the term "intentionality" (Castelfranchi & Miceli, 2011). This is consistent with the affect as information hypothesis, which states that emotions (more so than other affective feelings such as mood) can influence judgments because of their intentional object: they are a reaction to what is being judged (Clore et al, 2001, Clore and Storbeck, 2006). Also, Clore et al. (2001) proposed as a sine-qua-non condition of emotions the fact that they must be experienced, and as a consequence, they provide conscious feedback to oneself

from the appraisal process which happens unconsciously. The cause of emotional appraisal is considered to be (usually) whatever is in focus at a particular moment, this explaining the immediacy characteristic of emotional reactions.

Furthermore, Reisenzein (2015) identifies the following basic facts to characterize emotions:

- emotions span over a broad palette, embracing many forms (e.g., sadness, happiness, despair, anger, fear, shame);
- different subjects can react with entirely different emotions to the same intentional object;
- the same emotion can be triggered by different intentional objects;
- the same emotional reaction can be caused by information acquired in different ways;
- if a person's opinion of a situation changes, then in most cases her emotions about the situation change as well;

The characteristics of emotions mentioned above (especially their intentional object and the fact that they are triggered involuntarily), further support the claim that emotions resemble perception up to the point where they are considered to constitute a form of perception, namely: a sensory means of gathering information about the environment (Deonna, 2006).

Given that the relation between perception and emotion is clear, it is necessary at this point to distinguish between emotions, moods, sentiments and personality. This is generally done in terms of the duration of their being experienced. As Schwarz (2010, p.8) suggests: *"emotions arise from ongoing, implicit appraisals of situations with respect to their implications for one's goals, they have an identifiable referent - what the emotion is "about"- a sharp rise time, and limited duration."* As opposed to this, moods are more diffuse and transmit generic information which lacks a clear intentional object. Ugur (2013) and Scherer (2005) as well, state that emotions have the shortest duration time and they change constantly depending on the emerging circumstances. Moods are also considered to have a short duration, but lasting longer than emotions, and sentiments and personality traits are lived for a long period of time (Ugur, 2013). Personality is considered to influence the way emotion is perceived, for example neurotic and anxious people being more sensitive to negative affective cues (loud noise, ugliness, pain, bitter taste), however, Chen and Dalton (2005) in a study about the effect of emotion and personality on olfactory perception showed that personality does not directly influence olfactory experience, except for intensity and reaction time.

Depending on the study approach, emotion is sometimes referred to as "core affect", meant to signify the specific feeling element of emotion, with roots in neurophysiological processes (Cowie et al., 2011). The word "affect" defines something

similar to emotion, but broader in some respect, and it stands at the base of a divide in emotional theories, giving rise to a multitude of theories and models of emotion (Cowie et al., 2011).

Brosch et al. (2010) review some theories of emotion by categorizing them in four large groups:

- Appraisal theories of emotion
- Constructivist theories of emotion
- Dimensional theories of emotion
- Basic emotion theories

Scherer (2000) also reviews some current psychological theories and models of emotion, which for the purpose of assessment he categorizes as: dimensional models, discrete models (including the basic emotions model), meaning oriented models and componential models. Probably the most popular models, largely discussed and adapted to various interdisciplinary studies, are the dimensional model and the discrete emotions model.

Appraisal theories of emotions are based on the idea that emotional processes unfold as people continue to evaluate the relevance of objects, behaviors and situations surrounding them, in accordance with their needs, values, goals and general well-being (Ellsworth & Scherer, 2003, in Brosch et al., 2010). A number of models have been constructed to support these theories, however, they are unfit for the purpose of this project because the focus is on explaining why people react to things differently and not on the emotional reactions themselves. So, in the context of this theoretical group, individual emotions are hard to quantify or operationalize application-wise.

Constructivist theories of emotions represent a relativistic view which stipulates that emotional experiences are man-made concepts as opposed to natural phenomena, and are strongly determined by an individual's culture, language and cognition abilities. (Brosch et al., 2010) Therefore, the emotional palette of the individuals triggered by various stimuli and how they are perceived depends on the individual's language context.

In the words of Mauss & Robinson, (2009, p.): *"Dimensional perspectives argue that emotional states are organized by underlying factors such as valence, arousal, and motivational state, while discrete emotion perspectives, by contrast, suggest that each emotion has unique experiential, physiological, and behavioral correlates."* These two perspectives are combined in Plutchik's (2001) hybrid model of emotions, represented in a diagram resembling a wheel with eight basic emotions at the center, which combine two by two to create new emotions on the outer layer of the diagram. Even though each of these perspectives differ in how they analyze emotions and how they define them, it

has been suggested that they converge on a certain level and will continue to do so until probably a consensus will be achieved. (Cornelius, 2000)

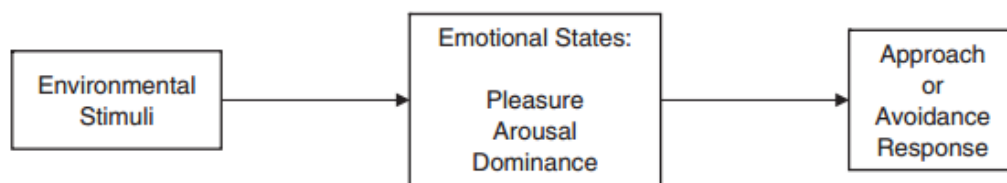
### 2.2.1 Dimensions of emotions

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The dimensional approach to model emotions is based on the idea that humans generally respond to situational affective stimuli in terms of three basic bipolar dimensions, variously referred to as: evaluation, valence or pleasure (first), activity, arousal or activation (second) and potency, power, control or dominance (third) (Russell, 1991).

Some researchers believe that this model of emotions spans over cultures because the same three dimensions are observed regardless of what language is studied (Russell, 1991). Also, it is claimed that the model described completely the space of possible emotions, however, it has been shown that qualitatively different emotions, with specific experiences, report similar positions in the dimensional model (Hauthal & Burghardt, 2013).

This model has also been adapted by Mehrabian and Russell (1974) into a theoretical model of the impact of the environment on human behavior (represented figure 2.1), stating that individuals' emotional states resulted from their relation with the environment can be one of pleasure, arousal or dominance, and these states dictate individuals' approach-avoidance behaviors. Basically, it is implied that different environments trigger different emotions, and these emotions eventually determine if people have a positive response and are manifesting an approach behavior, or if they have a negative response and prefer to avoid the environment.



**Figure 2.1.** *The Mehrabian-Russell Model (1974, p. 8)*

This model has been applied in a number of tourism studies (for example in Ryu & Jang, 2007), but it is inappropriate for the current research. One of the reasons is in the dimensional approach of emotions, which doesn't allow for a crisp differentiation of the various emotions, but it only describes emotional states in terms of pleasure, arousal and dominance. Another reason is the behavioral component which is beyond the purpose of

this study, although it is possible to explain the approach-avoidance behavior towards a place based on how the place is perceived emotionally. As Hobbs & Gordon (2011, p.31) state: "...emotions are viewed primarily as mediating between perception and action." For example, if a person finds herself in a busy market with a lot of people, where there is also a fish stand, producer of an unpleasant odor, the person might feel annoyed or disgusted and decide to avoid that particular market for the rest of the trip, or might even suggest to her friends to avoid it.

### **2.2.2 Basic emotions**

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Matsumoto (2000) suggests that if the conclusions drawn from the universality studies are correct, then all humans are born with the capacity to experience and express the same set of basic emotions, which are evoked by similar situations across cultures. This basic set of emotions is seen as the foundation for constructing other emotions, shaped by the various cultures.

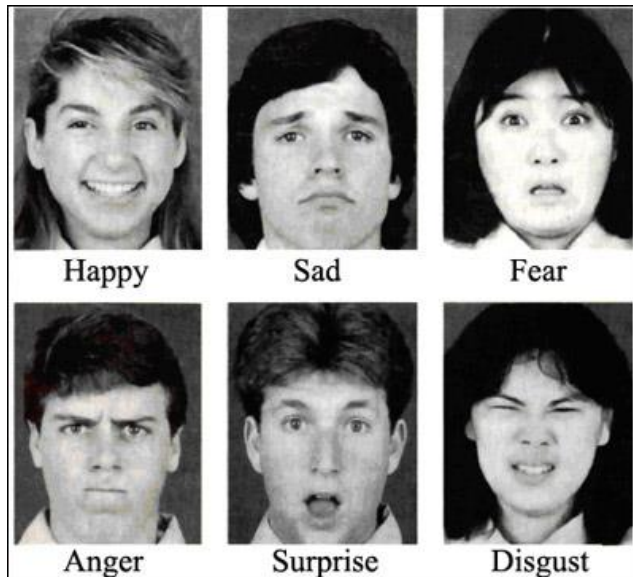
The basic emotions models are largely based on studying human facial expressions resulting from exposure to emotional stimuli. They are part of the universality studies. Facial expressions are considered a key element in the communication between human beings regardless of their language and culture and they are also thought to emerge following the interaction with the physical environment. (Coppin & Sander, 2012)

Basic emotions theories assume a set of three characteristics (Brosch et al., 2010):

- there is a number of separate emotions that differ from each other in important ways;
- evolution played an important role in shaping the features and functions of these emotions, making them universal across cultures;
- non-basic emotions are formed by combining the basic emotions;

Some researchers have adopted this approach and refined a number of models of basic emotions. Izard (1977) found interest, enjoyment, surprise, distress (sadness), anger, disgust, contempt, fear, shame/shyness, and guilt as basic emotions and used the Differential Emotions Scale to measure them, available in four forms, one of which was used frequently in emotion consumption research. However, the predominance of negative emotions calls for a broadening of emotion samples if this model is to be used in other studies (Richins, 1997). Plutchik (1980) found fear, anger, joy, sadness, acceptance, disgust, expectancy, and surprise, based on an evolutionary perspective. To measure them he used the Emotions Profile Index, consisting of 62 forced-choice questions with the responses transformed in scales representing the 8 emotions. Another measure was developed by Holbrook and Westwood: a scale with 3 adjectives for each emotions,

where respondents are required to specify the felt intensity corresponding to each adjective (Richins, 1997). Eventually, Plutchick develops the "Wheel of emotions", explaining that other emotions occur by combining two by two the ones forming the basic eight at the center of the wheel. But probably the most popular and influential research about basic emotions was carried out by Paul Ekman, who identified six basic emotions: anger, disgust, fear, happiness, sadness and surprise (figure 2.2).



**Figure 2.2.** *The six basic emotions in Ekman's model (source: © Paul Ekman. All rights reserved.)*

Ekman (1999) sees his basic emotions model as contrasting with the dimensional approaches which treat emotions as core affect in terms of intensity, pleasantness and control. He states that emotions also emerge in situations when there are no other people involved. Also, each emotion is in fact a family of related affective states, distinguished by various characteristics shared by the members. And there are more words describing emotions than actual emotions; these words are believed to be variations arisen from the different situations where the emotions have been experienced. Recently, scientific evidence has been found to support the existence of at least five distinctive basic emotions: fear, anger, disgust, sadness and happiness (Rogers & Robinson, 2014). All of these are part of Ekman's basic emotions model.

Happiness is a prevalent emotion in various research projects that aim to connect emotions with physical locations, for example "Mappiness", a project being performed in the United Kingdom (<http://www.mappiness.org.uk/>), with the purpose of understanding how people's feelings are affected by the elements of their environment. Happiness can be a good indicator of satisfaction with the intentional object and predictor of an approach



behavior or, in the case of tourists and places: the intention to recommend the place to other people and to return to that place in the future themselves.

Sadness can bring meaning to places that were indifferent to individuals, when tragic events happen in those places. Experiences of tragedy and loss can lead to the occurrence of connections with places on a profound emotional level (Manzo, 2003). These events don't necessarily need to be lived by an individual to trigger an emotional reaction. Also, depending on the scale of the event, the place where it occurred can become a symbol, carrying a particular meaning in remembrance of the event, for example: 9/11 and the World Trade Center site in New York City.

Fear is associated with the feeling of insecurity (objective and perceived risk and personal vulnerability) which is considered specific to the urban environment and it manifests strongly in cities with large populations, high residential density and ethnic heterogeneity (Robin et al., 2007).

Anger can manifest as a result of frustration, annoyance and as a response to recurring irritations. It can be the reaction to a situation where very high expectations about the world are not met or when its subject (an individual) feels they have been wronged in that situation.

When thinking about surprise as an emotion triggered by a physical place, it can actually have a dual meaning, because it can be experienced as pleasant or positive surprise or unpleasant or negative surprise. For example, this can be relevant for tourists who are not visiting Amsterdam for the first time. They may have visited the city many years ago and may be pleasantly/unpleasantly surprised to find some places that were dear to their heart, changed or transformed into something they like better/they do not like at all (perhaps something that is conflicting with their inner values and beliefs). On a different note, surprise can be viewed in relation to expectations (or the lack of any expectation). People like what they feel good about and dislike what they feel bad about, however it depends on the expectations and the value of the information: a sad movie that doesn't succeed to move one to tears, will not be liked as much, because sadness was expected (Clore and Storbeck, 2006). Therefore, it is thought that positive feelings can result in negative evaluations, in situations where negative feelings were expected (watching a sad movie or reading a sad story) (Prinz, 2006).

Disgust is elicited in the presence of stimuli that are considered repulsive or that pose a threat to the individual. It is also considered to influence moral judgment (Clore and Storbeck, 2006) and alter the perception of space surrounding the source of the stimuli, ultimately determining an avoidance behavior from the individual as a security mechanism to avert contamination with pathogens (Stefanucci et al., 2011). As such, the

distance between the individual and the source of disgust is perceived as being smaller than in reality, to encourage the individual to protect himself.

But the basic emotions model, even though it provides a foundation for identifying emotions that span across cultures, is not sufficient in assessing how tourists perceive places in terms of their emotions. Places can also evoke certain emotions in terms of what tourists expect to find at the destination and what they actually find when they arrive. This can be explained by linking anticipation with the tourism specific concept of authenticity.

The concept of authenticity, popular in the tourism literature from about 2 decades ago, is based on the idea that tourist satisfaction depends on the perceived authenticity of the site being visited, or when what is expected corresponds with the actual reality on site, satisfaction is greater than when tourists perceive the location as staged or fake. (Fridgen, 1984, Pearce, 1982, Cohen, 1979).

Castelfranchi & Miceli (2011) study the relationship between anticipation and emotion and propose two classes of emotion: expectation based and invalidation-based emotions. While expectation based emotions can be any emotions that are based on the appraisal of a future situation, invalidation-based emotions zoom in on: disappointment and relief, surprise and relief, discouragement and sense of injustice. Disappointment occurs when a positive expectation becomes negative (thinking that something enjoyable is going to happen, for example going for an evening out with a friend, who then cancels the day before the event). Disappointment with regards to touristic places is illustrated in the 2 images below. Figure 2.3 a) depicts an idyllic image of Amsterdam as advertised by a tourism website ([www.canal.nl](http://www.canal.nl), accessed 15-Aug-16), while figure 2.3 b) shows a first impression of Amsterdam, captured by the researcher's first visit on site.



**Figure 2.3 a)** Advertised image of Amsterdam (above), **b)** First impression of Amsterdam (below)



Surprise occurs when a negative expectation is not fulfilled, and the situation takes a positive turn. Surprise is actually also one of Ekman's basic emotions and is associated with unexpected happy endings. Sense of injustice is felt when a positive expectation is not validated, the stronger the expectation, the more the subject feels like it has been treated in an unfair manner. It is questionable whether sense of injustice is an actual emotion, but there is no way to tell for sure. Moreover, injustice is a construct associated with social situations, meaning it is highly likely to occur in the relation between individuals and not so much in the relation between individuals and places. A possible exception could be the manifestation of a catastrophic natural phenomenon, in which case the expectation of security is not validated and people feel wronged. However, a similar situation is least likely to occur on the perimeters of this study, so the construct of sense of injustice will be left out.

## **2.3 The role of Culture and language**

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Roberts (2012) states that a culture is an intuitive complex normative system comprising of concepts, discourse and theories, which people learn and share in order to understand other people and the world around them. It is an informal system of evaluation.

The relation between culture and emotion forms a traditional issue. Emotions are evaluated differently in different cultures, each having its own unwritten but generally

accepted rules about which emotions occupy which place, which emotions are deemed inappropriate, when it is appropriate to express certain emotions or which emotions cannot be felt (Fischer & Frijda, 1992). However, the theory of basic emotions suggests that some emotion categories (fear, anger, happiness) are culturally universal because human beings are physically and neurologically programmed for them through evolution (Roberts, 2012).

Emanation (1995) suggests that people's awareness of their own emotions is conditioned by the folk concept of emotion or culture, which influences the way they express (or don't express) their emotions or the resulting behavior. Russell (1991) concludes that there is great similarity in emotion categories across different cultures and languages and that ultimately "the meaning of a folk concept of emotion derives from its role in the folk theory of emotion." (p.445)

The concept of cultural display rules, proposed by Ekman and Friesen (1969) is supposed to explain the discrepancy between how emotions are expressed in different cultures: there are rules, learned in early childhood dictating which emotions are appropriate to be displayed in certain social circumstances.

These cultural display rules thus also explain the fact that people are more likely to admit the experience of certain emotions over others. For example they might be eager to evoke being happy somewhere in order to conform to what they think is expected of them, but they might be reluctant to admit they experience fear because it would represent a sign of weakness on their part.

Language is another important aspect when evaluating emotions because it is one of the mediums through which they can be assessed. Different languages can provide a different number of words for categorizing emotions (Russell, 1991). For example Wallace & Carson (1973) found over 2,000 words for categories of emotion in the English language, with less than 200 being part of people's everyday vocabulary, and Hoekstra (1986) found 1,501 words for various emotions in Dutch. Also some English words for emotions have no equivalent in other languages and vice versa, however, it is not so much about the word itself but the meaning that it conveys (Wierzbicka, 1986). However, many studies confirm that many of the world's cultures have a concept or a word of their own to signify "emotion", nonetheless it may not represent the same set of phenomena as the English label (Matsumoto, 2000).

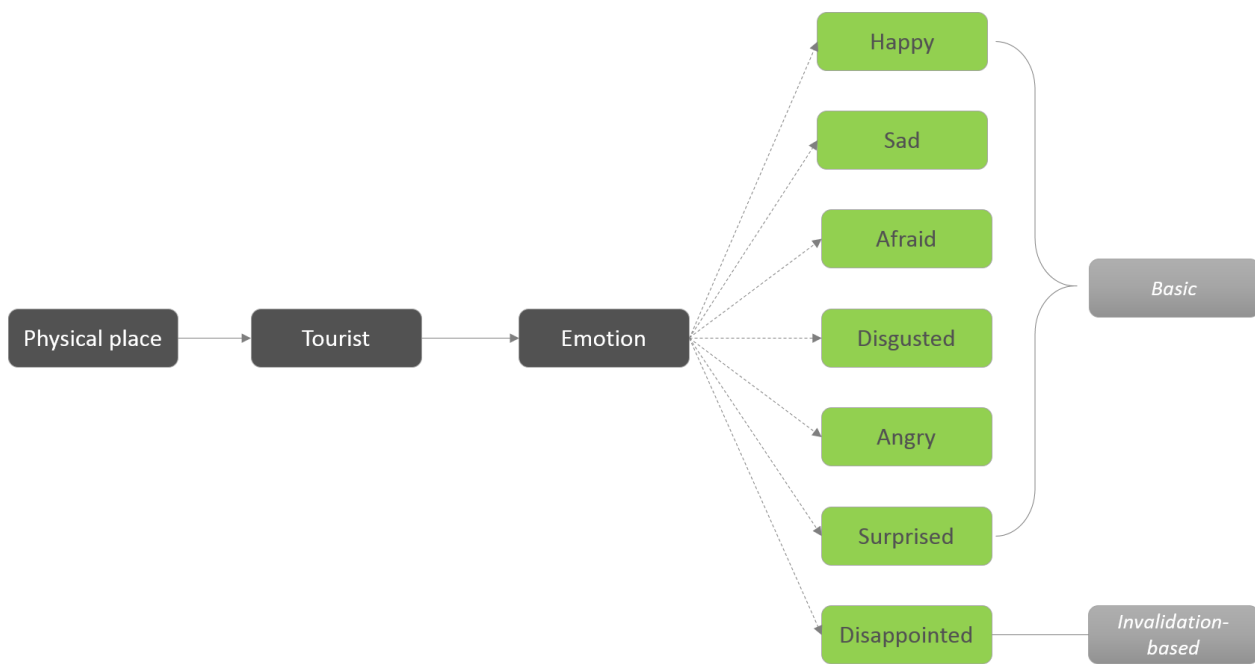
Another facet of this matter is the social media example of representing emotions using "emoji" or pictogram faces with simple expressions. This method is used in the academic context to measure emotions following the dimensional theory of emotions and is known as the Self-Assessment Manikin. It was adapted by Desmet (2005) in an

instrument to measure emotional response to products in consumer research. As a simplified way of representing emotions and at the same time of bypassing the possible language barrier, using emoji instead of actual English words for emotions seems like a good approach for this study. However, while some of the considered emotions (happy, sad, and angry) can easily be represented in this way, the other emotions (fear, disgust, disappointment, surprise) could lead to unnecessary confusion, since there are many ways to picture them. In order to avoid this, it is decided that using actual English language words for emotions is the better option, especially considering the fact that these words are part of the everyday vocabulary and are quite likely to be understood by people who have a basic understanding of the English language.

## 2.4 Conclusion

The cultural and linguistic aspects mentioned above, along with certain envisioned usability aspects concerning the application itself (offering a simple mobile platform with an uncomplicated interface and/or process behind it), motivate the decision to use Ekman's model of basic emotions along with expectation and invalidation-based emotions as a framework to identify tourist's perception of places. Therefore, the emotions considered as relevant indicators of place perception in this study are represented in the figure below (figure 2.4): anger, disgust, fear, happiness (or joy), sadness, surprise (pleasant/unpleasant), and disappointment.

**Figure 2.4** Overview of relevant emotions, which can occur as a result of the interaction between tourists and destination places



### **3. Describing context**

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In the previous chapter, emotions have been explained as a form of perception and a source of internal (to oneself) information about surrounding reality. They have been defined and characterized to some extent, and some theories and models they have given rise to in the academic context have been discussed in order to determine which would be the most appropriate to apply in this project. Some of the characteristics of emotions mentioned were: the fact that they always have an intentional object, that different individuals experience different emotions when faced with the same intentional object, but also that the same emotions can be triggered by different intentional objects, and that the same emotional experience can be derived from information acquired in different ways. The implications of these characteristics are discussed in this chapter, relating emotions of individuals (tourists) with their intentional objects by building up the construct of context.

Raw data on emotion occurrence is not enough to describe the specific location, context characteristics are needed to make it meaningful (Abdalla & Weiser, 2011) because emotions are context specific (Richins, 1997). Also, people's affective responses are reflective of the way they perceive their environment, which is shaped by their experiences and are thus highly subjective. (Huang et al., 2014) Psychological processes at the level of individual experiences are strongly influenced by sociocultural factors and form an important constitutive part of ongoing environment-individual relations. (Heft, 2013). The study of this relationship between people and their environment (physical and social) is performed by the field of environmental psychology, emerged in the 1950's (Fridgen, 1984). A series of constructs have been development to offer a better understanding of the relationship and its numerous implications for problems concerning other fields of study as well, such as leisure and tourism studies. Some of these constructs will be discussed below along with the modalities in which they fit in the tourism perspective and eventually determine specific context factors which influence the emotions, and thus individuals' perception of places.

#### **3.1 Sense of place**

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People's subjective perceptions of, and conscious or unconscious feelings for their environments are often associated with the construct of sense of place, which evolves into an emotional bond when complex experiences happen in a particular place (Hung

Lee & Ling Shen, 2013). This emotional bond is referred to as place attachment when it also involves the process of people giving a certain personal meaning to places and the object of attachment becomes the assigned meaning rather than the place itself. Furthermore, attachment can also occur in situations when people have a recent contact with places (Rollero & De Piccoli, 2010), as is the case in tourism. Even though residents and tourists are both consumers of places, the way in which they experience places, the way they make sense of places is various and different, meaning that their emotions and perception of those places differ as well.

Tourism lies at the confluence of people, space and context (Tussyadiah & Zach, 2012). Hayllar et al. (2008) discuss five different types of space: mathematical, physical, socio-economic, behavioral and experiential. Experiential space refers to space as it is used and lived and is considered the least quantifiable but the most relevant with regards to the tourism experience in this case because by being experienced by tourists it gains meaning, supporting the idea that undifferentiated space is turned into specific place when it is valued (Kyle & Chick, 2007). Williams & Lew (2015) state that recognizing the fact that places are an outcome of social relations, processes and institutions and not just stand-alone physical entities is a key step towards the modern understanding of places. Moreover, places can be seen as the collection of stimuli or contextual cues influencing people's emotional evaluation of places (Schloss et al., 2015). At the same time, places make up the tourist destination or the destination environment.

Rollero & De Piccoli (2010) assume that the individual-environment relation is made up of two intertwined dimensions: an affective one expressing place attachment and a cognitive one reflecting place identification, a construct meant to characterize the individual as a member of physical space, defined by a specific location. Building on these ideas, Casey, (1993 in Manzo, 2003, p. 52) suggests that through the practice of travelling a certain sense of commitment is established towards many heterogeneous places, different from the place of dwelling. Moreover, travelling or tourism give the individual-environment relationship a dynamic dimension, which enables personal development over time. At the same time, tourists experience the places they visit in a different manner than the inhabitants of those places, who have their lives set up there and thus already established a meaningful relationship with their environment.

Holden, (2008, p. 56) proposes four modes in which the destination environment can be experienced by tourists:

- Environment as a setting for action, due to the various functional characteristics meant for satisfying the need of relaxation or excitement;
- Environment as a social system, or a place for tourists to interact with other people;

- Environment as emotional territory, with positive emotions representing an important part of the tourist experience responsible for self-growth and a sense of well-being;
- Environment as self, through place bonding or place attachment.

So even though the modes of approach are rather different, the meaningfulness of the environment-individual relationship is emphasized in both environmental psychology and tourism studies with the concepts of emotions, sense of place and place attachment. They explore the psychological dimensions of how places are experienced, including aspects related to affect, emotions and perception, knowledge, beliefs and underlying actions and behaviors (Rollero and De Piccoli, 2010).

There is a focus in the literature on the positive feelings associated with place, which is regarded mostly as a home, or source of comfort, evoking feelings of belonging, while negative and ambivalent experiences have been ignored. But it has been demonstrated that people can exhibit feelings of attachment for places that are outside of their neighborhood or their known living space (Manzo, 2003), such as places they visit during their vacations, which leave a strong impression on them. Perhaps it is possible that their usual environment has shaped their understanding of the world and conditioned them to prefer similar places in their touristic incursions, although tourism is traditionally seen as a quest for difference and authenticity.

The usual environment or the place of usual residence is the geographical area where the tourists normally conduct their everyday life activities and is characterized by frequency and vicinity and where the people's tourist quality does not apply. (Lamsfus et al., 2015) This environment is representative for the notion of familiarity to the potential tourist because it is known to him, making him feel comfortable or at ease. This is partially explained by the place identification construct. Depending on the level of similarity between the usual environment and the destination environment, the intensity of elicited emotions is subject to variability. Of course, an influencing factor can be the tourist's motivation and his expectations. In some cases the tourist's preset expectations can cause an extreme reaction to the destination environment. Such reactions have been documented under the form of city syndromes.

The so-called city syndromes have emerged in the last few decades as a psychiatric disorder which affects tourists upon their arrival in a city that is a popular tourist destination, due to the different cultural and aesthetic aspects and the spiritual intensity of the place (Halim, 2009). Symptoms include panic attacks, anxiety, hallucinations. City syndromes have been named after the city in which they occurred and generally haven't attracted much attention outside these cities. Possibly the most known is the Paris syndrome. It has a special characteristic, mainly it affects only one



cultural group: Japanese tourists. The cause is a profound cultural shock lived by the tourists which have high expectations, cultivated over a period of years, which are shattered when they are confronted with the quotidian reality of Paris, and the differences in communication styles and public manners. Also, Florence syndrome is induced by an overwhelming aesthetic experience and theoretically it could occur anywhere tourists are faced with an environment that they perceive as immensely beautiful (Halim, 2009).

The city syndrome effect is worth mentioning as an extreme example of emotional experience between tourists and destination places, even though its manifestation is quite rare and will most probably not apply in the practical phase of the current study.

The sense of place associated with a particular tourist destination is constructed through particular touristic activities which can lead to cross-cultural conflict determined by the struggle to give meaning to a place due to different languages and ideologies. Ultimately, the meaning of a place is a highly contestable and fluid social process and little research is dedicated to this topic (Mullins, 2009). Consequently, the constructs of sense of place, place bonding or place attachment and place identity are not completely adapted to the field of tourism and there is a predominance of considering the environment as a natural resource (Kyle & Chick, 2007). Traditionally, results from landscape perception and environmental studies have been applied to tourism practices, due to a lack of direct emphasis on tourism. For example, studies have shown that people have a biased preference for nature, often reflected in their sensitivity to water elements and vegetation diversity and density (Fridgen, 1984). Also, leisure studies concerning the place constructs, regard the environment or the places as natural settings, whereas in the current study places are mainly defined as part of the urban, built environment. The places are made up by a complex synergy of elements which determine the individual's perception when being explored (Reitsamer and Brunner-Sperdin, 2015). These elements can be translated as a series of context factors.

Context represents any information that describes a specific situation of an entity at a certain time in a certain place (Song & Guibo, 2010). As such, the individual-environment or in this case, the tourist-place relationship and its perceptual connotations is characterized by a series of context factors. Some are derived from the environment or place component, some are derived from the individual or tourist component and the rest represent sensory perception (linking the individual with the environment). These factors have the virtue of offering additional insight into the expressed relationship because they can directly influence experienced emotions in reference to the relationship. It can also be said that they are derived from the intentionality characteristic of emotions and the fact that they are context dependent.

## 3.2 Context factors describing the place

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It has been argued that destination residents and tourists make sense of destination places in different ways and that they hold different values of these places. This process also influencing their emotions and perception of the places and considered as their context. In this section, some different characteristics of the places themselves are discussed from the perspective of their potential influence on tourists' emotions. The angle chosen to identify these factors is conformant with their spontaneity, meaning that they are characteristics that describe a place at a certain moment in time when tourists interacts with the place and emotion is experienced. Tourists are not required to hold any prior knowledge about the place and neither to have visited it beforehand.

### *Location*

The visitor's location represents probably the most important element in assessing the context data (Lamsfus et al., 2015). The tourist city is comprised of multiple interconnected places, each fulfilling a set of functions meant to answer the tourist's needs (for culture, entertainment, shopping, accommodation and so on) and are usually well defined as tourist zones, distinct from the city areas where there are no particular attractions and quotidian life simply follows its natural course (Williams & Lew, 2015). Knowing the location of the tourist when the place assessment occurs makes it possible to characterize the place later on and possibly explain unusual results, for example a peak in happiness levels in a particular place could be explained by the fact that the place is actually a park (in spring-summer time) and people tend to be more relaxed and enjoy themselves more in green spaces.

### *Time*

Data about the time of day, the day of the week, whether it is a week day or weekend, the month, or season is key to a deeper understanding of the visitor's perception of a place being visited. For example, a place can be considered as safe during daytime, but dangerous during the night by the same person, as well as a park in spring can be perceived as beautiful because everything is in bloom, but gloomy in the winter when all the leaves have fallen and everything is grey (Huang et al., 2014). What is more, time data allows for a systematic analysis and the identification of typical patterns

in destination places over time (Wilhelm & Grossman, 2010), for example seeing if there is a significance in the sequence of places visited and the emotions that are triggered.

### *Weather conditions*

Even though the role of climate in tourism practices has been the subject of numerous studies, especially in the branch of balneo - climatotherapy (a form of tourism dedicated to physical recuperation or recovery), research concerning the influence of weather on tourism (never mind on emotion or place perception) is rather scarce. For example, Knez & Thorsson (2006) showed that psychological and socio-cultural processes can influence the thermal and emotional perception of a physical place, but on a very general level and without explaining the implications of these findings.

In Becken (2010), a list of climate aspects along with their impact of tourists has been presented and will be adapted for the purpose of the current study. They consider aesthetic (sunshine, visibility and day length), physical (wind, rain, snow, ice, air quality and ultraviolet radiation) and thermal (air temperature, wind, solar radiation, humidity and metabolic rate – as potential for balneo - therapy) conditions. However, only some of these are considered to have an immediate influence on emotion and place perception and they are presented in the following table (table 3.1).

Unseasonably sunny weather is considered to elicit positive affect (Clore and Storbeck, 2006) and could potentially increase the place attractiveness, while cloudiness could have the opposite effect. Veitch and Arkkelin (1995, in Hauthal & Burghardt, 2013) found that strong wind gives people a feeling of loss of control and causes an increasing degree of arousal rooted in discomfort and the hindrance of tourists' activities. This can also be the case with rain and snow, which could also have an impact on the place attractiveness and place experience. Temperature is seen as a partial indicator of comfort in this case and also as a potential cause of physical stress.

These weather characteristics may not be part of the places themselves, but they are considered to influence emotions and perception by their manifestation in places at the moment when they are experienced by tourists. An interesting example in the literature on the influence of weather characteristics on the human psyche is the seasonal affective disorder (SAD). This is a form of depression associated with lack of light (causing substantial drops in serotonin levels) in the cold seasons and places located further away from the Equator. However, the duration of tourists' stay at the destination is usually too short for the development of SAD to occur, and even less so in the individual places they visit.

	Factor	Potential Impact
Aesthetic	Sunshine/Cloudiness	Increasing or decreasing the place attractiveness
Physical	Wind	Loss of control, annoyance
	Rain	Reduced visibility, inconvenience
	Snow	Increasing or decreasing the place attractiveness
Thermal	Temperature	Environmental stress, level of comfort

**Table 3.1.** Weather characteristics adapted for context factors (adapted from Becken, 2010, p. 5)

### *Crowdedness*

The crowding concept emerged from environmental and behavioral psychology, denoting a stress situation resulted from constricted social activities due to spatial limitations over time, and "leading to a negative affective response to social density" (Neuts & Nijkamp, 2011, p. 2). Crowding phenomena seem to occur in popular tourism destinations which attract a large number of visitors (Pearce, 1982). Hayllar et al. (2008), state that tourist visitation at the destination is concentrated along cultural landmarks, iconic sights, shopping areas, or places with historical significance which are recognized as tourist areas, specialized tourist zones or tourist districts. These places are constantly in the heart of the conflict between the need for business and the negative effects of overuse (site deterioration and even loss of touristic value) (Fridgen, 1984).

Being a popular destination (usually over-exploited and advertised), city centers attract large number of tourists giving rise to crowding phenomena, concept founded in environmental and behavioral psychology. Crowding is defined as a stress situation which develops in time as a result of spatial constraints on social activities and is believed to cause emotional discomfort in some cases. Neuts and Nijkamp (2012) demonstrated that the perceived level of crowdedness is influenced by variables taking the form of the physical characteristics of place (its design) and one's own traits and those of others (for example, the similarity in the origin or culture of tourists). The main implication of their findings is that crowdedness monitoring should be done from the individual perspective,

due to the importance of perception; the sustainability level is better indicated by the affective reaction to the crowding situation.

As with the influence of weather conditions, the specific case of perception of tourist crowding in the urban environment has received little attention in scientific research. Therefore, it is assumed that crowding perception is influenced by the tourist's open mindedness towards other cultures, their expectations and their behavior, which can lead to conflicts when not aligned with one's own norms and values. Also, a high level of crowdedness can generate feelings of discomfort and ultimately annoyance and possibly even fear (that ones' belongings might get stolen or that one might get lost or separated from their companions).

### *Cleanliness*

Cleanliness is discussed in Hall & Page (2002) as one of the influencing factors of the quality of tourism experience. Unclean places can trigger a feeling of disgust and even disappointment especially if the tourists' expectation was to enjoy the sight and experience of a neat place. This construct is relatively straightforward, although of course it depends on ones' inner values, beliefs and experiences.

## **3.3 Context factors describing the individual**

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Experience, beliefs, values, attitudes, and personality influence perception and cognition to such an extent that in the end "humans only see what they want to see" in their interaction with their environment (Hall & Page, 2002). For this reason it is also crucial to consider context factors that describe the individual in order to understand their perception of places.

In tourism literature, (city) tourists are classified into types, based on various criteria: motivation, perception, preferences, attitudes, or behaviors (Mazanec & Zins, 2010). Because it is known that visitors do not form one big homogenous group: "different tourists may not only seek different benefits from a destination, they might have different perceptions of the same destination which will affect their evaluation and the probability of them visiting the destination." (Dolnicar & Huybers, 2010, p. 127)

Previous experience and other social characteristics have been shown to have an influence on how the image of a tourist destination is being perceived (San Martin &

Rodriguez del Bosque, 2007). Huang et al. (2014) also believe that people's interpretation and perception of their environment is dynamic and context-dependent and they are subject to change along with the degree of exposure to the respective environment. In this respect it is noteworthy to distinguish between tourists visiting a place for the first time and tourists making recurrent visits. Returning visitors have already established a sense of attachment with the destination place(s) and have different expectations than first time visitors (Neuts & Nijkamp, 2011). Continuing on this train of thought, Clore et al (2001) likewise believe that perception of objects as a result of emotion information is always determined by a network of causal beliefs, so depending on the personal characteristics of the individuals. These assertions are largely based on the 1950's movement of the "New Look in perception", proposing that perception is not only influenced by outside factors, but also by inside factors which characterize the individual: motivation, experience, beliefs and affect, to name just a few (Kitayama, 1997). The fact that perception of place is influenced by both the information provided by the environment and information about the individuals themselves was verified by Rollero (2013) in a study comparing touristic and residents' perception of places.

The various characteristics of tourists that are considered to influence their emotions and perception of places are discussed in the following subsections.

#### *Gender, Age, Education, Occupation*

Pearce (2005) discussed gender, age, education and occupation as demographic descriptors that influence tourists' behavior. These characteristics are also considered to have an influence on individual place perception.

Gender refers to the different ways of looking at the environment based on the different experiences and the very nature of being male or being female. For example, women were associated with private, domestic places and men with public places, because public places were considered unsafe for women, which eventually proved to be a motivation for women travelers to venture "outside" and explore (Pearce, 2005).

Age as a demographic descriptor is also used as a substitute for physical fitness, particular interests and previous travel experiences or experience in general. Age can also suggest the susceptibility of an individual to certain stimuli, in terms with the social and cultural changes in society that dictate various trends over extensive periods of time (Holden, 2008). Older people have more life experience and a broader palette of knowledge, values, beliefs and memories because they have witnessed first-hand the world changing over the passing of time. For example, this can make them more

pragmatic and less impressionable by the places they visit, as opposed to young people who are still discovering the world and "developing" their own person. On this view, the level of education complements age, because it indicates the knowledge available (preconceptions, values, attitudes, open mindedness) to the individual when they experience places and emotion and perception is elicited.

Occupation can perhaps elicit a certain predisposition or preference for a particular attraction, compared to which, others seem just a waste of time. Likewise, it can determine specific emotional reactions to places that hold no particular meaning for other visitors. For example an architect feeling joy when seeing a spotlessly designed building on the verge of being finished constructing in an area with no other attraction of interest.

#### *Motivation (scope of visit)*

Motivations are a driving force and represent needs that are satisfied through tourism (Holden, 2008). For example: escape, search for novelty and experience, being with friends and togetherness, adventure and excitement, just doing nothing or performing seasonal sports, sightseeing, seeking a learning experience and self-development by undertaking cultural activities.

It is important to know whether the tourist is at his first visit or if he is a recurrent visitor, or if he has a vast experience in travelling (meaning he travels a lot) or if he rarely travels. Also, knowing what kind of locations were visited before, if there are any similarities, or what locations are of particular interest. Fridgen (1984) considers that those who had travelled more, have accumulated a set of experiences that broaden their outlook, make them more tolerant, open-minded and receptive to the current destination, something that Pearce (1982, p. 112) calls "sympathetic environmental awareness".

#### *Culture, nationality or place of origin*

Since individuals are closely connected to their societies, culture can be a defining constitutive trait of the individual and play an important role in influencing one's perception. Perception is defined in the literature as the process through which individuals select, organize and interpret any kind of physical, visual (sensory) or verbal stimuli (San Martin & Rodriguez del Bosque, 2007), including the information encoded in their emotions.

In the field of tourism, cultures is considered in accordance with the geographical origin of tourists, proposing a close relationship between the two. It has been established that tourists from different countries have heterogeneous cultural values, and consequently, a different perception of the same tourist destination (Holden, 2008). San Martin & Rodriguez del Bosque (2007) proved that the shorter the cultural distance (the degree of similarity between the tourist's cultural values and the culture of a tourist destination) between destination and tourist, the more favorable the cognitive/affective image of the tourist destination because individuals might have more confidence in those tourist destinations with cultures similar to their own cultural values (Ugur, 2013).

Nationality is widely used as demographic descriptor in tourism studies, often to indicate the cultural origin of tourists and is measured by establishing their countries of residence, even though this is not always accurate because there are situations where inside a country multiple ethnic identities can be found which hold true to different cultural values, customs, norms and beliefs (Pearce, 2005).

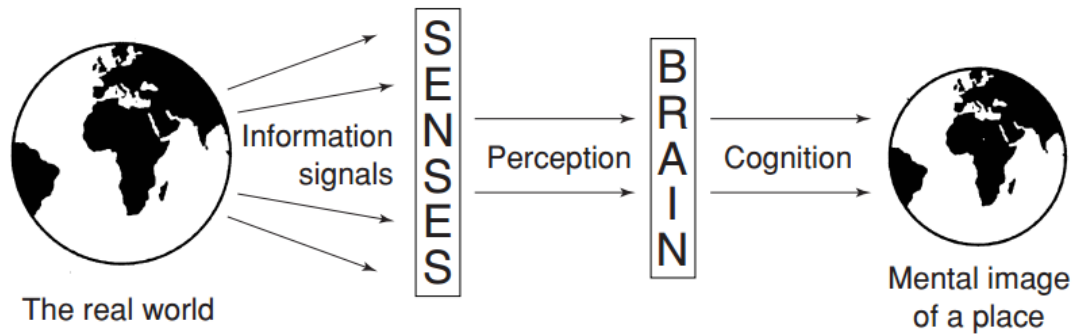
### **3.4 Sensory perception of places**

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Generally, theories of emotions are more concerned with the emotional responses than with the stimuli or the way the stimuli are perceived, if emotional or not (Brosch et al., 2010). However, it is generally accepted that emotions are triggered once an outside stimulus is perceived by the subject (bear in mind the fact that emotion is considered as a form of perception). This type of perception is characterized by the sensory process which initiates when one or more of the human body's sense receptors are activated and eventually leads to the experience of an emotion (Ugur, 2013). For example the smell of fresh croissants coming from a nearby bakery can elicit a feeling of joy to a hungry tourist looking to stop for a coffee break from his explorations of the city, or the smell of garbage rotting in the sun might determine one to distance themselves as far away from the source as possible, driven by a feeling of disgust and fear of contamination.

In a simplified view, different individuals have different images of urban places due to the mental filtering of information received through their senses, a process referred to as sensory perception. The information is then related to knowledge, values, attitudes and preferences in the brain (cognition), with the final outcome being the emergence of a mental image of a place as perceived by the individual (Hall & Page, 2002).





**Figure 3.1.** Perception of place (source: Hall & Page, 2002, pg. 195)

Most person-environment relationships manifest themselves on location, which is perceived and evaluated when information is available from all senses (Gifford & Fan Ng, 1982). Sensory perception is regarded as a function of the senses and in relation with the concept of ambient stressors which refers to the total physical negative environmental conditions which affect the individuals but are out of their control (Robin et al., 2007). These are also considered as factors describing the environment in context, which would be impossible to quantify as individual sources of influence of the general perception of a place.

### *Sight*

Of the five traditionally recognized senses, sight determines visual perception and it is an essential aspect of emotion appraisal (Ugur, 2013). It is believed that people's perceptive judgement is highly influenced by the visual information, even when combined with auditory cues, these tend to be ignored in favor of the visual input (Gifford & Fan Ng, 1982). Visualizing something pleasant, beautiful or something which has a remarkable aesthetic quality, can evoke one or a series of positive emotions, like for example: wonder, admiration or fascination (Scherer, 2005). Also, visual perception helps people associate things with meanings and symbols and appreciate their inherent qualities. This is consistent with the concept of tourist gaze, emphasizing the visual elements which characterize the destination, giving it a sense of authenticity along with its importance in the tourist experience of places (Tussyadiah & Zach, 2012). By consuming places visually, most tourists form a significant relation with some of the visited places, a process influenced by personal cultural filters that dictate what places are considered interesting and held dear and what places are disregarded altogether (Williams & Lew, 2015).

## *Noise*

It is believed that when sight and hearing are combined as emotional stimuli, they have a power to reinforce each other, gaining a higher influence on the brain area evoking emotions (Baumgartner et al., 2006). In what hearing is concerned, the sound characteristics responsible for its excitation: loudness, pitch, or timbre, can determine the level of sensory pleasantness (Ugur, 2013). Noise is considered a permanent stimulus of urban space, which can facilitate the increase of aggression, especially when coming from an uncontrollable source. This type of stimuli is one that is in a continuous state of change and in various degrees of intensity, associated with the great number of people making use of the urban space (Hauthal & Burghardt, 2013).

Gifford & Fan Ng (1982) tried to determine in their study if different people with different receptivity to sound: sensitive to noise, neutral and non-sensitive (Jones et al., 1981), process visual and auditory information under different weighting ratios. The results showed that people are predominantly influenced by visual information (in comparing only visual and auditory information without the other senses taken into consideration) when assessing an environmental setting, except the situations where auditory cues have an extraordinary affective quality, such as unpleasant and loud construction site noise or high-pitched alarm.

Jones et al. (1981) propose three factors that are supposed to represent the foundation for the theory of the social effects of noise:

- regular sounds are masked, thus social interaction is disrupted;
- weighting of interpersonal judgement is changed;
- noisy settings are perceived as aggressive;

These factors easily apply to the tourism setting where interaction is the "heart" of the cultural transaction between visitors and locals and visitors and places. From the tourists' point of view, the regular sounds of a place are part of its authenticity, so when this regularity is interrupted, their experience of that place is hindered and their assessment is compromised. Also, if the level of the "alien" noise crosses a certain threshold, this might reflect poorly on the place, or might determine tourists to depart altogether.

## *Smell*

Schloss et al. (2015) reported in an empirical study that people's preference for familiar odors is largely determined by the preference for all the objects and entities associated with the respective odors. These are sometimes perceived unconsciously. Odor preferences can be manipulated by negative experiences and people's evaluation of a stimulus can be influenced by the pleasantness of the odor.

The influence of odors which are present in a place can be associated with their level of pleasantness or unpleasantness in determining feelings of comfort or disgust.

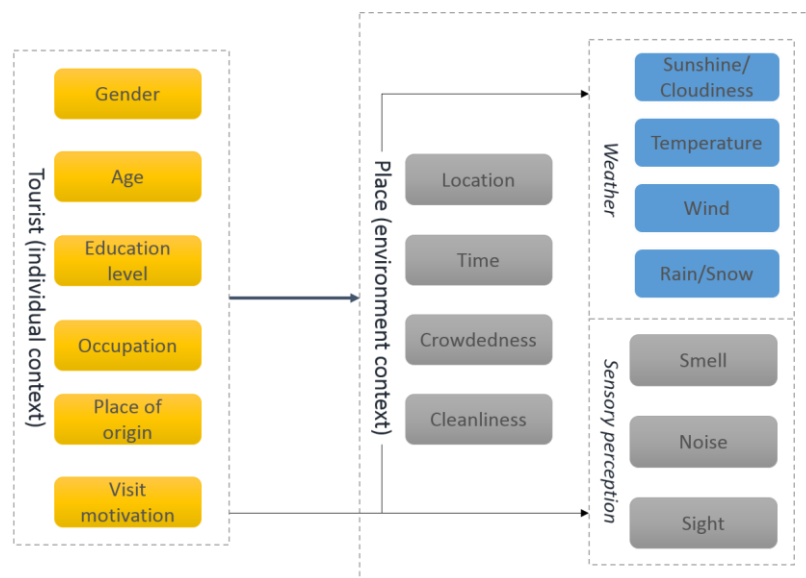
### *Touch and Taste*

Touch is the sense that allows humans to perceive their environment from a very close distance, requiring an intimate interaction, which can in some circumstances evoke strong emotions. This can happen either by perceiving the physical environment through touch or by social touch (Ugur, 2013). The constructs of touch and taste will not be considered in this study because they imply a certain level of intimacy between the tourist and the places being assessed, which is not entirely possible to grasp in a quantitative manner, nor will they supply a sufficient added value to justify doing so.

## 3.5 Conclusion

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Motivated by the concepts explored in the beginning of this chapter and by the heterogeneous literature sources describing the various degrees of influence of several context elements, these elements have been translated into concrete factors which are considered to influence the experience of emotions related to different places and ultimately their perception by tourists. The context factors pertain to both the tourists – as demographic characteristics – and to the environment as well as the tourist's sensory perception of it. They are represented in an overview in figure 3.2 below.



**Figure 3.2.** Schematic representation of the relevant context factors

## 4. Methodological framework

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### 4.1 Introduction

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In the previous chapters, the questions of which emotions can be relevant in the interaction between tourists and places and which context factors can influence the eliciting of these emotions, have been discussed. A number of seven emotions (happiness, sadness, anger, fear, disgust, disappointment and surprise) and three categories of context factors (personal, environmental and sensory) have been chosen to be representative for the relation between emotions for places and the way places are perceived. The first part of the present chapter is focused on describing some methods for measuring emotions and context factors, followed by a section revolving around how to best perform the measurements under the VGI paradigm, and finally how the experiment of measuring emotions and perception of places using VGI comes together in a conceptual mobile application.

Individual and collective perceptions of particular places, constituting the images of places, are a driving force for the practice of tourism (Williams & Lew, 2015). People evaluate landscapes differently, depending on their prior labelling or promoted image and the context in which they are viewed (Fridgen, 1984). Studies about the combined effect of various environment elements on the human psychology are scarce. But this is important to understand, especially for tourism (Ryu & Jang, 2007). Researchers believe that studying the various situations of quotidian life, including volatile constructs such as elicited emotions or perceptions of places holds many potentials for understanding, planning and designing the urban environment (Zeile et al., 2009). It is assumed that the most important factor influencing the planning process is the information that is able to be obtained about an area and its interpretation (Abdalla & Weiser, 2011). In this respect, VGI allows the collecting of data about locations, more meaningful than when the data is collected by professional effort (Hauthal & Burghardt, 2013), because an important characteristic of data acquired through VGI is its potentially subjective nature: namely presenting features of reality as they are perceived by the observer (who fills the role of supplier of that data).

It is also argued that the combination of mobile and Web 2.0 technologies with GIS is an efficient method for producing and handling emotion or perception based data concerning city places, seeing as there is currently no general method to address this particular situation (Abdalla & Weiser, 2011). Furthermore, as expressed by Dunkel (2015, p.173): *“Compared to traditional data sources, such as census data made available by*

*governments, crowdsourced geodata provides an otherwise unavailable perspective on the complex connections between space, identity, and personal perception."*

The term VGI was coined by Goodchild (2007) and is used as a reference to the activity of free-sharing a vast assortment of information, set in a geographic context, by entities ranging from untrained individuals to public and private sectors (Scassa, 2013). The VGI phenomenon is endorsed by the increasing accessibility to the Internet, which is the main medium of dissemination, and the rise of the Web 2.0 as an environment where individuals can contribute content and become producers of geographic information. VGI represents a growing resource for information. Jones & Weber (2012) identify 2 other main drivers of VGI success, alongside the availability to Internet access which facilitates mass collaborations: web mapping technologies and services such as Google Maps, and smartphones equipped with GPS capabilities.

By now it is widely agreed that VGI enhances the body of overall knowledge about the environment, providing information about a great variety of themes and topics. In many cases, individuals can be the best source of information regarding local conditions. Oftentimes, their indigenous experience and understanding of a particular physical location presents a natural advantage over authoritative information (Flanagin & Metzger, 2008). Following this rationale, VGI is also considered to be the human side of the sensor revolution: whether individuals are equipped with actual physical sensors or simply relying on their own 5 (human) senses and the cognitive ability to compile and interpret information from the world around them, they have the advantage of being in and experiencing various places on the surface of the Earth and to partake in a sensor network that has the very purpose of observing the real world (Goodchild, 2007). From an urban environment perspective, sensors are considered entry points to observations of life in the city. In Koch et al. (2013) sensors are classified into 2 categories: intentional and non-intentional. Intentional sensors require user intervention for collecting observations, in which case a data entry interface is also required, while non-intentional sensors collect data from the environment automatically. This humans as sensors perspective, has also evolved as a component of citizen science (the term describes communities or networks of citizens who act as observers in some domain of science, (Goodchild, 2007)). It is referred to as "participatory sensing" and performed mainly using the sensing capabilities of mobile phones (Haklay, 2013).

It is partly for the reasons mentioned above that VGI is chosen as the medium for performing this experiment. An advantage is constituted by its high usability, not only for professionals but also for the common layman, and its "elasticity" with respect to the theme of (spatial) data that can be collected. The later in particular allows for the combination of various methods of assessing and measuring aspects of the real world.

Since in the current study these aspects are mainly constituted by the emotions people experience in certain places and factors that determine how they perceive those places (which also partly influence their emotions), it is necessary to look at established methods for measuring emotions and of how places are perceived. The methods which are found to be applicable can then be adapted and implemented with VGI.

## **4.2 Existing methods for measuring emotions**

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Because emotions are considered to occur as the result of the interactions between cognitive, physiological or environmental parameters and are manifested through multiple, various reactions: behavioral, expressive, physiological, or subjective feelings, there are also numerous approaches to measure them, even though in some cases the instruments that claim to measure emotions, in fact measure one of their reactions (facial expression, speech, gestures) (Desmet, 2005, Ugur, 2013). Mauss and Robinson in their review of measures of emotions (2009) distinguish: self-report measures of emotions, autonomic measures of emotions (related to the autonomic nervous system, commonly assessing electro-dermal and cardiovascular responses to stimuli, for example skin conductance level, heart rate, blood pressure), startle response magnitude (commonly assessing eye blink magnitude), brain states (through electroencephalography - EEG, functional magnetic resonance imaging - fMRI, and positron emission tomography - PET), and behavior as a measure of emotion (vocal characteristics, facial expressions, body posture).

Desmet (2005) distinguishes between non-verbal (objective) instruments and verbal (subjective) instruments to measure emotions, corresponding to the psychophysiological methods and self-report methods respectively. These methods are the most common or popular, at least according to the number of studies dedicated to each category of measures of emotions, or to the number of applications they have been utilized in. However, there is still an amount of ongoing research on how best to measure emotions in a wide array of fields and applications, for example Philips is interested in the role of emotions in consumer-product relationships (Schut et. al., 2010).

### **4.2.1 The psychophysiological methods**

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Emotions are accompanied by a variety of physiological manifestations (e.g. increases in heart rate) which are changes in the activity of the autonomic nervous system and can be measured with a diverse array of techniques. Examples are instruments that

measure blood pressure responses, skin responses, pupillary responses, brain waves, and heart responses, in relation to a stimulus that is supposed to trigger emotions (Desmet, 2005).

The main advantage of these methods lies in the fact that the individual is not required to recognize and interpret his emotions (Hauthal & Burghardt, 2013), nor does he have the opportunity to “filter” them through his own interpretation of what is expected in terms of his emotions, referred to as ‘display rules’ or constraints emerged from social desirability (Reisenzein, 2015). In other words, when applying psychophysiological methods of measurement, cognitive bias caused by mentally processing the emotions is avoided, thus obtaining exactly the measure of the emotion that has been experienced (Li et al., 2015).

Another advantage lies in the fact that these methods can track tourists’ psychophysiological reactions continuously, and it makes it therefore possible to identify emotional peaks in their assessment of places (Li et al., 2015). However, these emotional peaks might not always be caused by the actual places which are being visited but by other events that can occur at the same time. For example, the subject could receive a phone call through which they are given distressing (or exciting) news about losing (or winning) a great sum of money, causing them to experience emotions which have nothing to do with the place they are in (from which they would even be temporarily and virtually transported). For this reason, a major disadvantage of the psychophysiological methods lies in the fact that it is rather difficult to assess which particular emotion is being experienced. Also, not all emotional experiences are accompanied by physiological changes and vice-versa: physiological activity can occur in the absence of emotion. Furthermore, these methods for measuring emotions require a lot of equipment and expert efforts in interpreting the results or a certain level of training or experience (Mesken, 2002). For example, the figure below (figure 4.1) depicts the Affectiva Q sensor, which is worn on the wrist and measures electro dermal activity (EDA). EDA is an indicator of emotional arousal, increased cognitive workload or physical activity, where a high level could mean arousal from stress or excitement and a low level could come from relaxation, calm or even boredom.



**Figure 4.1.** Affectiva Q sensor used to measure EDA  
(source: <http://qsensor-support.affectiva.com/customer/en/portal/articles/1539375-q-user-manual>, accessed: 15-Aug-16)

Since the current study relies on the model of basic emotions, and thus a pre-defined set of emotions, it is important to know which of these emotions are experienced in various places of interest. Also, it is essential at this point to differentiate between measurements of emotions performed by psychologists and measuring emotions in the current study, which to be clearer, refers to assessing the subjective feeling of emotions in a given situation, and as a response to a set of environmental stimuli. The subjective feeling is the conscious awareness of the emotional state one is in, and according to Desmet (2005), can only be measured through self-report. Therefore, the purpose is not to re-invent the wheel in psychological emotion theory, but to apply existent knowledge about emotions in a way that best fits the purpose of this experiment.

#### **4.2.2 The self-report methods**

---

Self-report methods are comprised of so-called affective reports, through which respondents are asked to answer open-ended questions about the emotions they experience in a given situation or rate their emotional state using a set of items describing various combinations of emotions (Li et al., 2015). These methods were among the first to be adopted in tourism research and are still commonly used in emotion research also because they are convenient, cheap, and accessible, they don't require much equipment and they provide insight into subjective experiences unobservable otherwise.

The main disadvantage of these methods consists in the fact that they are applied after the emotion has occurred and respondents are asked to recall it, thus increasing the risk of providing inaccurate responses. But by implementing the self-report method in the VGI application, which is used in real-time, this disadvantage disappears or is negated, making this method appropriate for use. The self-report methods were commonly applied using either an interviewer who would pose the questions to respondents or by providing individuals with questionnaires which they had to fill in. There was also a specific situation for which emotions were assessed, either past or present. This form of practice would have the effect of disrupting the natural course of the situation in which respondents were experiencing emotions and having them deal with the questions in front of them, leading to potentially biased responses (Rogers & Robinson, 2014). Nonetheless, by employing a self-report method in the VGI application, respondents are not required to interact with any other person in order to report on their emotions, because they are able to do this directly on their mobile phone, in an activity probably no more complex than communicating on social media. Presumably, a sense of privacy is also established, encouraging the individual to provide an honest assessment of their



emotions, which they might otherwise avoid in the interaction with another person. They might become too self-aware of that person's judgement.

It is not uncommon that sometimes social desirability and lexical meanings, consistent with the folk model of emotion, can influence the results. For example, in different cultures people are encouraged to express certain types of emotions and suppress or hide others and at the same time, the same emotion type might have a different meaning (Mesken, 2002). Also, different individuals manifest a different level of awareness for their experienced emotions or they might not know how to interpret or express in a quantifiable manner what they are feeling (Mauss & Robinson, 2009).

These aspects are also taken into account when choosing to work with the model of basic emotions. As discussed in chapter 2, the basic emotions are considered to be consistent across cultures. This model, when utilized through self-report is straightforward enough as to leave respondents with little room for reflecting on their emotions in terms of what is expected of them or how will an answer or other make them look to other people (Stefanucci et al., 2011). For example, a person might be completely ignorant of architectural styles and experience no emotions when faced with an old building that another person passionate about architecture will find incredible and would feel happy to see in real life. However, the first person could be inclined to express a false admiration in order to conform to a desired social status for fear of being thought of as less cultured.

The self-report methods not only provide a means for measuring discrete emotional states, but they are also adaptable in terms of application and very accessible for the respondents due to their low degree of complexity. For this study, the self-report holds the most advantages when compared with other methods and is thus chosen as the main means of measuring emotions.

### **4.2.3 Scales for measuring emotions**

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Self-report methods are often based on pre-defined scales for measuring a certain range of emotions. For example, the Pleasure-Arousal-Dominance (PAD) scale (corresponding to the model), which is developed in accordance with the dimensional theory of emotions (and indeed is more closely associated with psychophysiological methods), does not measure emotions but it rather provides an assessment of the individual's response to a set of stimuli in terms of pleasure, arousal and dominance and

it is not a solution to extract specific emotion states experienced by the participant (Richins, 1997), as is desired in this study. It is possible to implement a scale based on the three dimensions in a self-report method, however, asking the individual to break down his emotions into three abstract dimensions (and assume that they are correctly understood) is sure to introduce unwanted distortions in the results. A variation of this tool exists, which uses graphics to depict the dimensions on a nine-point scale, called the Self-Assessment Manikin and is applicable across cultures, but it does not measure or differentiate between specific emotions.

Verbal emotions measurement scales usually take the form of a questionnaire with multiple questions or categories of emotions which respondents are asked to rate according to the intensity with which they experience (if they do) those emotions. These scales tend to include a long list of items or affective adjectives, which can determine the appearance of fatigue on the respondents' part due to the complexity of the rating process (Li et al., 2015). This form of practice is valuable when assessing how individuals feel in just one particular place, and they only need to fill in the questionnaire once. For example, Ryu and Jang (2007) used such a questionnaire to test a conceptual model regarding the relationships between the perception of the physical environment, the customers' (of an upscale restaurant) emotions and the nature of their behavioral response: approach or avoidance.

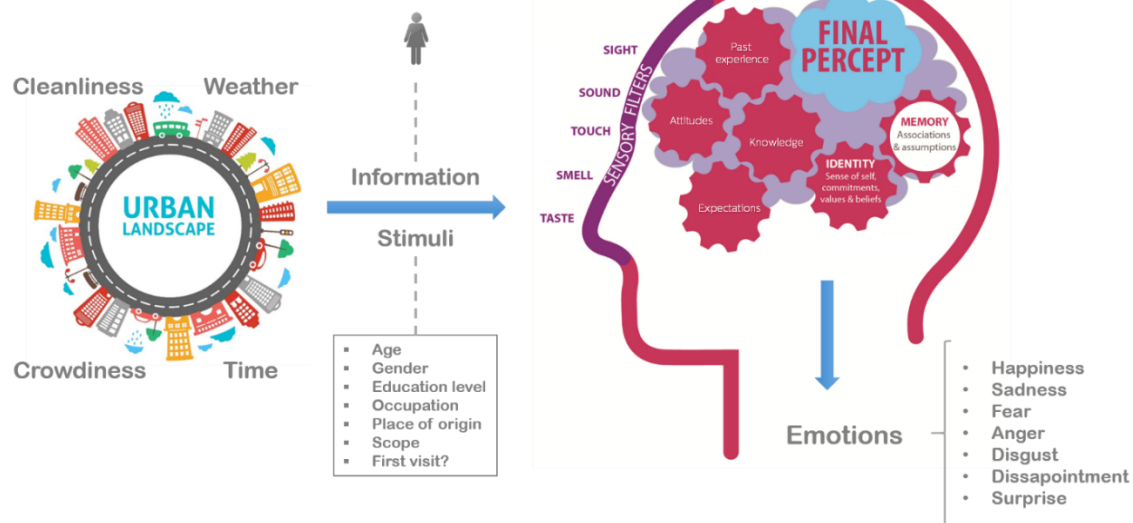
Also, most of the existent (verbal) emotions measurement scales contain words that are not part of people's everyday vocabulary and some of them are seen as being quite confusing (Richins, 1997), making them inappropriate for unassisted application, especially in a cross-cultural situation. Whereas, Russell (1991) believes that words for emotions play a central role in surveys and questionnaires and that we must understand the vocabularies of all people if we want an accurate assessment of their emotions. Therefore, it is perhaps a best practice to refer to emotions using basic, widespread vocabulary words. Also, the number of items included in the measure should be kept at a minimum in order to be relatively easy to use in a field study. The basic emotions (plus disappointment) provide a good palette for describing the subjective experience of places, and can be easily assessed through self-report. Essentially, the seven emotions (joy, sadness, fear, annoyance, disgust, surprise and disappointment) identified in chapter 2 as relevant for the study will be addressed in the experiment through a form of self-report. Tourists will be able to indicate which emotions they experience in a place and with which intensity, represented with a scale from 1 to 5, where 1 means least intensity and 5 is a very intense experience.

It is possible that certain places might evoke emotions that could be seen as outside the range of these basic emotions, such as guilt or embarrassment. A

representative example would be the Red Light District in Amsterdam which could trigger embarrassment for unassuming individuals. However, first of all, the model of basic emotions views the six emotions as categories or families of emotions (implying that one emotion, e.g. happiness, includes every other emotion related to it in terms of meaning or concept, e.g. delight, elation, joy, euphoria, glee, pleasure, well-being) and second of all, this particular experiment situation calls for a trade-off between how much data can one participant provide and how many participants will have the patience to provide complete and accurate data. For these reasons, it is considered more beneficial to keep the emotions categories at a reasonable number, to make it less time-consuming for participants to evaluate their emotions and expect them to evaluate more places.

Additionally, the emotions are not treated as bipolar constructs, because for example, the absence of happiness does not imply the presence of sadness. People can experience a combination of conflicting emotions at the same time, such as the so-called paradoxical emotions. They refer to the experience of positive and negative emotions simultaneously, or otherwise put, experiencing positive emotions because negative emotions are experienced, a process thoroughly enjoyed in certain situations, such as admiring a piece of art (Frijda and Schram ,1995 in Desmet, 2005). In fact, the surprise construct will actually be treated as two dimensional, because it has two possible connotations, namely pleasant or unpleasant surprise.

Nevertheless, only asking users to rate their emotions about a place is not enough for actually understanding their responses. It is interesting to learn why a specific emotion is evoked in a certain place or to investigate possible patterns. As explained in the previous chapter, emotions are highly influenced by the individuals' demographic backgrounds, as well as their immediate environment and especially how they perceive it through their senses. This is referred to as their context, which can be described by various factors. These factors act as stimuli for the individual who is experiencing the environment according to his/her personal filters: past experience, attitudes, associations and assumptions, knowledge, values, beliefs, identity and expectations. The assumption is that these filters are determined by the individual's demographic characteristics and play a significant role in processing the information received from the environment and translating it into subjective emotion, which will eventually influence their perception in relation to that same environment. The process is represented in figure 4.2 below.



**Figure 4.2.** Schematic representation of the relationship between emotion, perception and context

The context factors are not determined in an objective way, such as extracting the environment conditions from datasets (weather, crowdedness) for those places and moments in time when emotion entries are provided. Because they make the subject of perception, these factors can affect different people to different extents (some might be very bothered by rainy weather, others might find it comfortable) it is more relevant to establish how the individuals perceive the places in regards to these characteristics (e.g. cleanliness, crowding) than to assume everyone having the same perception of them and being influenced similarly.

Following the same self-report method used for measuring emotions, constructs regarding context factors can be seamlessly incorporated. The factors representing the demographic characteristics of each participant can only be provided by the participants themselves. For environment and sensory factors, this is done by adding multiple choice questions for each factor, where the choices represent the intensity as perceived by the participant for said factor.

However, for two of the context factors, namely location and time, participants are not required to provide them, because they can be extracted automatically at the moment when they provide input for a place. Of these factors, location in particular and the way it is determined, contributes to the uniqueness of this experiment approach, by linking concepts from environmental psychology with tourism in a VGI oriented application.

## 4.3 Using VGI to collect perception information

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When discussing the subject of VGI value, the evidence either points out to the case of OpenStreetMap (descriptive VGI) or those projects that support crisis mapping, humanitarian aid and disaster relief, such as Ushahidi-Haiti (experiential VGI). (Feick & Roche, 2013) The use of VGI around these topics is quite well documented.

The basic application of VGI is to describe places and events and monitor changes in the real world. However, in some cases, physical features are quite well-known, and the actual need that arises is for perception information regarding those features and their geographic context (Sheppard, 2012). This is especially true in tourism, where the "atmosphere" and the image of places can be their main selling point, making the difference between failure and success as a tourism destination.

However, perception information cannot easily be collected using traditional methods or extracted from an automated process. And it is in this situation that VGI reinforces its value, having the potential to fill this information gap.

Another aspect to reflect upon when discussing VGI is that traditionally, VGI applications are commonly focused on the "community" and the "citizens", which are considered valuable sources of local knowledge, based on the citizens' familiarity and experience of a certain place. But in this case, tourists are the source of information, which is focused on their perception and not on how well they know the location. In some cases there can be prior experience of a place, if the individual has visited before, yet it is not relevant as an indicator of information quality or credibility here. Of course there is some concern about vandalism and false information, although mostly regarding the emotions input and photographs, where individuals might submit false emotions and upload irrelevant (or even indecent) photos. Otherwise, no one is objectively right or wrong in the information they submit, because it is about how they experience the real world and the value and quality of the information lies in providing their personal input with honesty and accuracy (Flanagin & Metzger, 2008). Also, the spatial component of the information is handled automatically in the application.

Lastly, it is worth noting on the issue of privacy and personal information regarding VGI (Scassa, 2013). Even though the information that is collected is very personal to the individuals (some demographic characteristics and their emotions), no personal information in the sense of information that can lead to an identifiable individual is acquired, (even though some users might take photos of themselves or their friends).

Their submitted locations (along with context information about themselves and the environment) cannot be used to discover their identities.

#### 4.3.1 f-Vgi

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Attempts have been made to classify VGI based on various criteria, from the sources of information (Harvey, 2013), to the ways (or circumstances in which) the information is collected and the theme of the information itself. This is broadly illustrated in the dissolution of VGI in 2 categories:

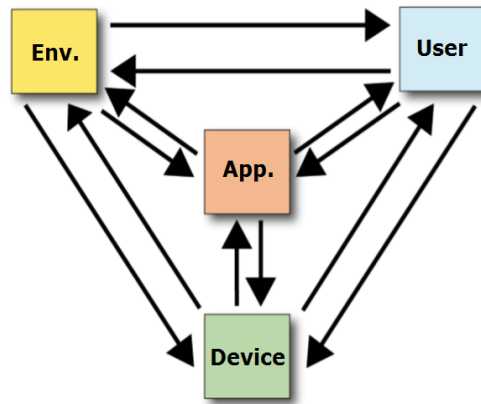
- Descriptive VGI: composed of geometric features, together with a set of attributes, having a general purpose usefulness;
- Experiential VGI: does not contain geometry, with the exception of points representing locations and which are characterized by attributes and timestamps; is more topical than descriptive VGI (Sheppard, 2012).

Seeger (2008) distinguishes facilitated-VGI or f-VGI as the form of VGI characterized by using online mapping interfaces to allow the public to contribute information to be located on a map. The information to be contributed is bound by a set of criteria or a specific research question or a precise geographic extent.

*"In f-VGI, the facilitator establishes the parameters of the project and recruits volunteers through advertising in local media or through random sample selection."* (p. 200)

Through f-VGI, information can be collected from a large group of individuals, in order to seek out and extract shared definitions, meanings and insight into their perceptions and experience. The characteristics of f-VGI are in alignment with the established goals of this research and the type of information that is collected falls under the category of experiential VGI.

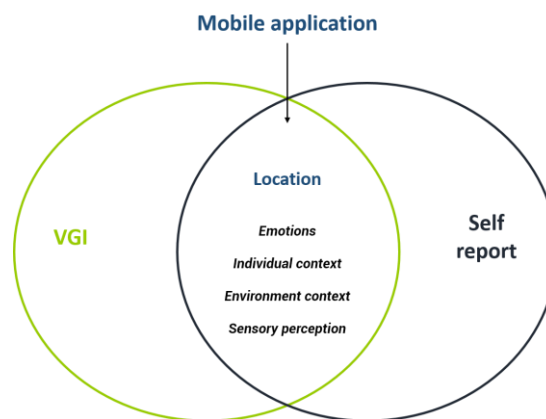
Therefore, in accordance with (the main component of) f-VGI, the mobile application which is proposed in this case serves as a mapping interface for the individuals to contribute information regarding their emotions and their context (personal and environmental), about places in the city of Amsterdam, in order to establish their perceptions of those places. Thus the application can be seen as a task-dependent interaction between the user (the individual tourist contributing information), the device (smartphone) and the environment (places in Amsterdam), as shown in figure 4.3 (adapted from Hirtle & Raubal, 2013, p. 149).



**Figure 4.3** Representation of the mobile application

VGI as asserted information (individual knowledge of local geographical phenomenon obtained through in situ lived experience), taking the form of tags, text, video, audio, images that are linked to a spatial reference contributed in an online environment which can be accessed by the public, provides unique insight that wouldn't be available otherwise. While on one hand, one of the strengths of VGI is subjectivity, on the other hand, an issue is digital literacy (Ricker et al., 2013). Because only those who are digitally literate are able to contribute their insight.

For performing this experiment, the self-report method of measuring emotions, extended to extract information about specific context factors and sensory perception of places, is wrapped in a VGI based mobile application, where location data is the common denominator. This is summarized in figure 4.4, below. The application concept is described in detail in the following section.



**Figure 4.4.** The mobile application concept as the common denominator between VGI and self-report method

## 4.4 The Mobile Application concept

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The mobile application in this case is a facilitated-VGI platform which can be used by tourists to contribute input about the emotions they experience in a place, immediately as this occurs, in that very location. Each time they make a contribution they can also visualize the emotions reported thus far for every place. The key element of the application is showing the tourists current location on a map and storing it in a database, so it can be associated with further input about the place. This is done programmatically, allowing the tourist to focus on his emotions and the place. Because emotions and context factors are measured through self-report, this takes the form of a short survey that is implemented seamlessly in the application and the tourists need to fill in for every place they choose to assess. The actual questions as they will be included in the application are provided in table 4.1 below. Also, for the visual aspect of sensory perception, after they answer the questions, tourists have the possibility to take a picture of the place. This is achieved by accessing the device's camera to take the picture, which is then also sent to the database and linked with the entry for the place.

The concept for the application, basically what it needs to do and under what form is envisioned through the mock-up method. The mockup can be done in various ways, from simple pen and paper sketches to using designated software. In this case, a free for use GUI prototyping tool named "Pencil" was used (<http://pencil.evolus.vn/>, accessed: 15-Aug-16). The mockup can be seen in the appendix, and it serves as guideline or "blueprint" for the actual development (which will be explained in detail in the next chapter). The main theme of the application, without which it could not perform its desired objective is showing the current location of the user on a map, while also storing it in an external database on a server. This will be done by incorporating the Google Maps and Fused Location Provider APIs. So every time the user opens the application it will display their current location on a map and will allow them to provide their input for that particular location (which is also sent to the database).

How does this place make you feel?	
Happy	1 - 5
Sad	1 - 5
Afraid	1 - 5
Disgusted	1 - 5
Angry	1 - 5
Disappointed	1 - 5
Surprised	(Unpleasant / Pleasant ) 1 - 5
You are here:	
	alone



	With family
	With friends
	With a random group of people
	With pet
Describe the place	
How crowded is it?	Empty
	Few people
	Don't know
	Somewhat crowded
	Crowded
How clean is it?	Very dirty
	Dirty
	Don't know
	Clean
	Very clean
How noisy is it?	Very quiet
	Quiet
	Don't know
	Noisy
	Very noisy
How does it smell?	Very unpleasant
	Unpleasant
	Don't know
	Pleasant
	Very pleasant
How is the weather?	
Sunshine/Cloudiness	Cloudy
	Somewhat cloudy
	Don't know
	Somewhat sunny
	Clear and sunny
Temperature	Cold
	Cool
	Don't know
	Warm
	Hot
Wind	Calm
	Light breeze
	Don't know
	Strong wind
	storm
Precipitation	Rain
	Snow

**Table 4.1.** Context factors (including sensory perception) expressed as questions tourists are required to answer in the application for every place they assess.

However, when the application is used for the first time on a device, the user is asked to fill in his/her profile and provide the following information about themselves, corresponding to the factors about individual context:

- Age
- Gender
- Occupation or profession
- Level of education
- Place of origin
- Whether it is a first visit to this destination or a recurrent visit
- Scope or travelling motivation, for example: business, leisure, visiting friends.

In addition, they are asked to set up a username for themselves, which "is remembered" by the application and used in the background process for storing and relating data in the external database. No password or login activity is required in order to simplify the process and because authentication is considered to discourage users from participating (Zhou, 2014).

This action is performed only once when the application is started but it is required in order to continue to the next activity in the application, making sure that the user does not skip this step altogether by "leaving it for later". Also, with the completion of this step, a sense of commitment and curiosity can arise for the users, motivating them to continue.

Furthermore, location and time data can be extracted automatically using the sensors already incorporated in the mobile phone when the application is in use. This increases usability and simplicity by relieving the participant of the task of manually registering his location and time every time he evaluates a place.

The context factors which are used to describe the environment at the moment when users are evaluating their emotions for that location, are: crowding, cleanliness, sensory perception stimuli noise and smell and weather elements such as sunshine or cloudiness, temperature, wind and precipitation. These factors are assessed using multiple choice questions, with the possible choices representing the intensity of a given factor, kept as simple as possible in order to avoid the users' misunderstandings or misinterpretations.

The visual aspects of the tourist's context can be captured through photographs, which represents a phenomenon in itself, considered a componential part of the travelling culture (Larsen, 2006). Additionally, the process of taking photographs is to some extent reflective of the relationship between the object being photographed (in this case the physical place) and the photographer's subjective perception of the environment (Dunkel, 2015). Photography is also considered to offer an idealized view of places in the way scenes are selected and images are composed (Williams & Lew, 2015).

*"From a performance perspective, tourist photography does not so much mirror – good or poor – realities as it creates new ones. Photographing is about producing rather than consuming geographies." (Larsen, 2006, p. 250)*

Accordingly, participants will be asked through the application to take a photograph of each place for which they also rate their emotions. These photographs can prove valuable as an additional source of data for identifying distinctive results, because they can show exactly what the tourist saw at the moment of experiencing a certain combination of emotions.

After completing all these steps (filling in profile information - required only once, viewing their location on the map, providing input regarding their emotions and place context and taking a photograph of that place), the user can view some feedback with the tap of a button. A new screen is rendered with a map of Amsterdam's center area, on which markers are displayed with different colors for different emotions reported. Only emotions which received a score of 3 or higher are displayed in order to avoid illegibility of the map due to cluttering, even though things become clearer when zooming in.

Users can view the feedback screen only after providing some input for a place of their choosing. They can do this for any place they want in Amsterdam (or outside Amsterdam, even in other countries, although the data would be outside the case study limits). However, for the purpose of having a relevant dataset in a short period of time, a number of 10 places that are considered popular touristic attractions or POIs in the city of Amsterdam have been chosen as targets for assessment: Museumplein, Dam Square, Vondelpark, Nieuwmarkt, Maritime museum, De Oude Kerk, Kalverstraat, Central Station, Amstelpark and Bloemenmarkt. This is necessary in order to avoid a multitude of random places assessed by tourist and to focus on getting a higher number of entries for the same places, making the results more robust. How this will work: the tourists will receive a notification on their smartphone when they reach the area surrounding a pre-defined POI in the database (enabled through geo-fencing), asking them to take a moment and assess their emotions for that particular place. The 10 places have been chosen due to their recognized popularity with tourists and based on the particular touristic theme or activity which they portray: parks and recreation, shopping, cultural activities, and the concept of "square" as a meeting point.

## 4.5 Conclusions

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To round up, the evaluation of emotions and context factors will be performed using an extended rendition of the self-report method wrapped in a VGI mobile application. This way, no immediate supervision is required and participants are left to provide the necessary data on their own, by only interacting with their mobile phone. Disturbances from the researcher are non-existent and the possible discomfort determined by having to discuss something as intimate as one's emotions is limited due to the privacy this method ensures: because the users remain anonymous at all times.

Additionally, as Wilhelm & Grossman (2010) suggest, designing an experimental situation in a real-world environment can pose a series of challenges due to the multitude of stimulant factors that can influence and compromise the results, especially when people are the subjects in question. The possibility of other context factors influencing participants' emotions that are not taken into account in the study is very real. However, in this particular type of situation a balance must be found and maintained between the amount of data which can be requested from a single response and the generated number of responses. It is considered more valuable here to aim for a high response rate than to saturate the application with endless questions, given that the response happens in real-time and is a crucial aspect of the experiment. People should find the application easy to use, interesting, and not as a nuisance to their activity.

Finally, the measuring of emotions and context factors in particular, seeks to operationalize people's subjective emotions and perceptions about the places they visit and is supplemented by photographs of those places, allowing them to be viewed to a certain extent through the eyes of the people.

## 5. Mobile Application development

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This chapter describes the concept implementation with the overall steps and tools used in the process of developing and distributing the mobile application. Choices are motivated regarding the development platform, the system architecture, and the specific interface and functionality of the application. The chapter concludes with a summary of the efforts directed towards distributing the application and engaging with tourists in the field.

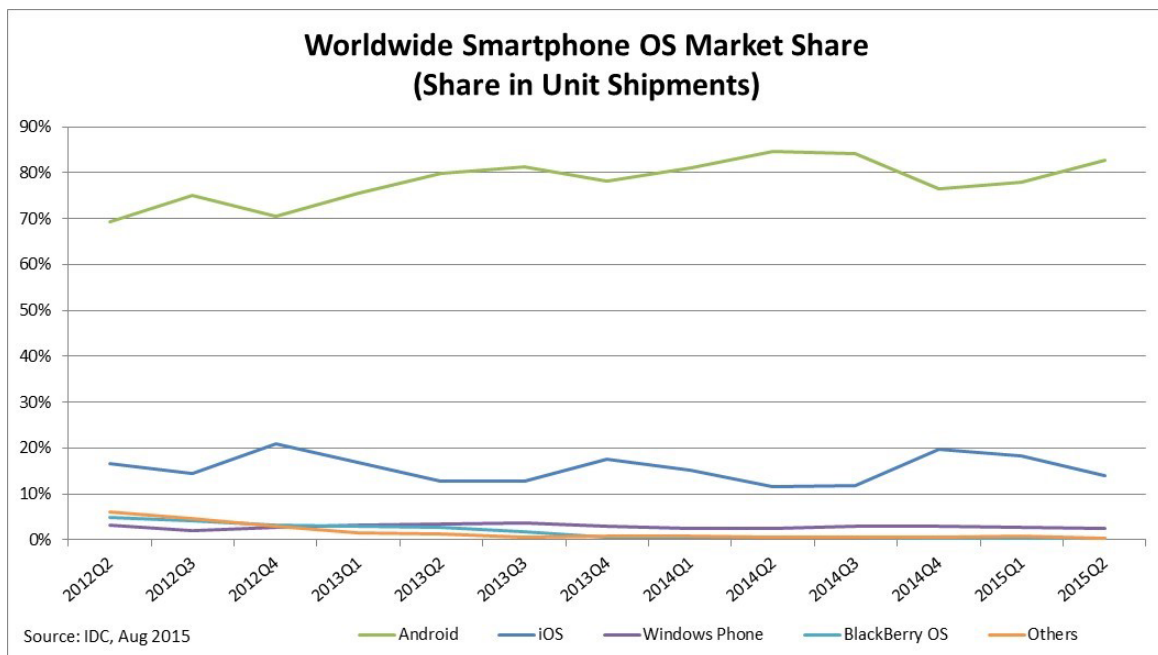
### 5.1 Choosing an os platform for development (Why android?)

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Smartphone technology has been available to the general public for not such a long period of time: the first models were introduced in the late 1990s and early 2000s and were focused on business solutions, the first iPhone was unveiled in 2007 and the first android device in 2008. However, smartphones have been successfully assimilated and their popularity has increased significantly, due to their accessibility, user-friendly interfaces which makes them easy to learn to operate and use and their underlying functionality, which can be provide all sorts of solutions through various applications, ranging from communication, entertainment, Internet access, to work and productivity. This is also true for mobile applications which include map visualizations, navigation and location services in general.

In the context of VGI, applications are traditionally deployed through web browsers and built using scripting libraries such as JavaScript and third party APIs (e.g. Google Maps, OpenStreetMap, and Flickr). Research regarding the applicability of VGI on smartphones is rather scarce (although there are some examples of tourism applications which incorporate spatial information, such as recommender systems, offline/online interactive thematic maps, and tour guides, they don't incorporate VGI). For the purpose of this research, it is essential that the application can run on mobile devices. Even though now all smartphones are equipped with web browsers, they are seen as uncharted territories when it comes to VGI applications. For example, some features still pose problems, such as accessing the device sensors or hardware parts (camera) (Hirtle & Raubal, 2013).

Smartphones operating systems are dominated by Android, iOS and Windows, although, as can be seen in figure 5.1, Android is the distinguished leader in the global market share with an 82.8% share in the second quarter of 2015 and an overall increase since 2012. This entails that worldwide, people are more likely to own a mobile device running on Android OS rather than one of the other operating systems. When considering the development of a VGI application, one should target a widespread availability, hence the preference for web browser deployment. Choosing a native environment such as Android for developing the application can limit the number of users by automatically excluding those not using that environment. Also, it is considered to imply a lot of time invested in the actual development process (Hirtle & Raubal, 2013). For these reasons, a number of “ready to use” solutions are proposed, such as Open Data Kit and Appcelerator, through which arguably the final application could be deployed on multiple platforms, notwithstanding the fact that most of the time these solutions also imply additional runtime features that need to be installed on the individual devices to make the application work. As it is, these solutions are merely reshaping the problem into a different form. Their potential added value is not considered significant to the goals of this research, where a key element is to have an application that is convenient and easy to use and be able to support all the proposed functionalities. In this case, the optimal choice is to prefer a native environment for development, namely the Android platform.



**Figure 5.1.** Worldwide Smartphone OS market share from 2012 to 2015. ( Source: <http://www.idc.com/prodserv/smartphone-os-market-share.jsp#>, accessed: 15-Aug-16)

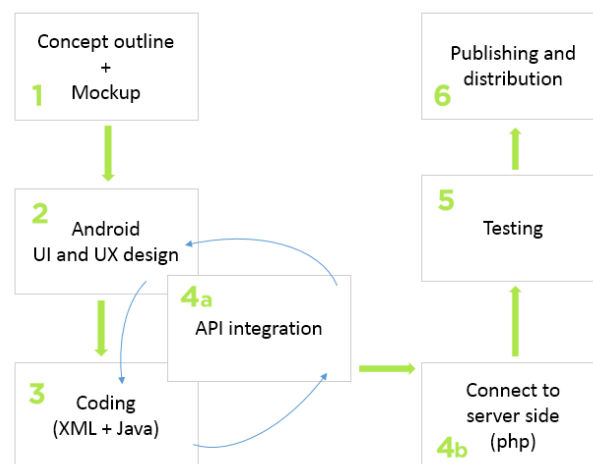
The decision to use this particular environment is also fueled more or less by the following reasons:

- It is open-source and there are also devices running unofficially on forked versions of Android (e.g. CyanogenMod, SlimKat), which actually increases the number of devices in use on which the application would also run;
- It has a dedicated Integrated Development Environment (IDE) with an intuitive user interface;
- There is a strong community of developers at various stages of learning, and therefore an abundant amount of tutorials and information regarding the development process, including the official documentation (<https://developer.android.com/index.html>)
- It benefits from an application distribution platform that is available on all android devices (Google Play Store);
- Anyone can publish applications on this platform, given they hold a developer account (lifetime account for a fee of \$25, compared to Apple iOS developers which are required to pay \$100 per year);
- The publishing process is simple and it only takes a few hours for the application to be available on the Play Store.

## 5.2 Application development process overview

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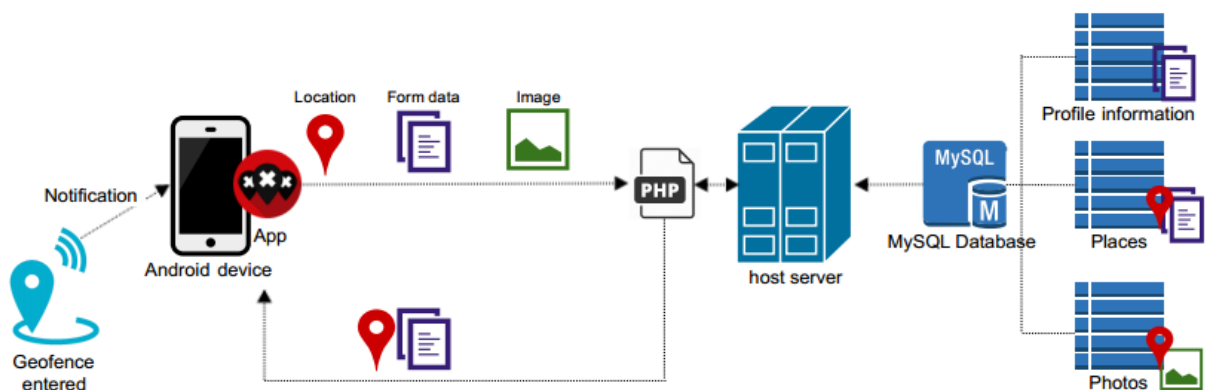
The overall process of developing the application (represented in figure 5.2) is broken down into 6 consecutive steps.



**Figure 5.2.** Application development process

The first step is to establish the concept of the application: its main goal and target users, the range of capabilities which it will require to achieve that goal and all the elements needed to engage the user to interact with the application. An important aspect to consider at this stage is how to achieve a balance between an appealing user interface and the components needed for VGI. As part of the first step, an essential deliverable is a mockup of the application, which should give an idea about the desired aspect and how the various elements fit together to result in the desired outcome. Basically, deciding how the application should look like, what it should be able to do and how. This was established in the last section from the previous chapter, describing the concept of the application.

The figure below (figure 5.3) compliments and extends the mockup by depicting how the application (representing the client side) connects with the server side and the types of information that are exchanged within the architecture, on a more technical and practical level.



**Figure 5.3.** Application to server architecture

The figure depicts the scenario where the user already installed the application on their device and started using it. They are asked to provide some demographic information about themselves, which is sent to the server as form data. They carry on with their planned touristic activities around Amsterdam. Then a point with a preset geofence around it is reached where a notification is triggered on the device telling the user where they are and asking how they feel in that place. The user then needs to fill in the form with information about the emotions which are experienced, some context information about the place and to take a picture there. The form data, location data and pictures are sent to the host server. The connection between client and server is performed using the Volley library on Android side and php scripts on the server side. The data is sent as String



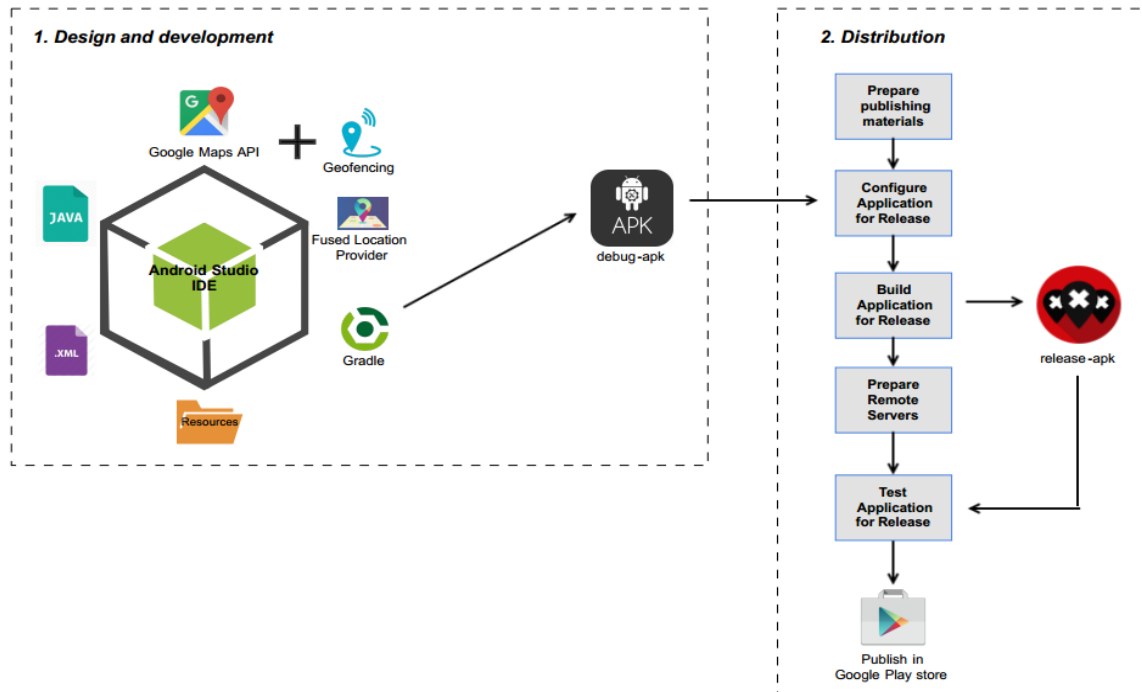
format (in the case of the photographs, they are first compressed and converted to Base64 format on the client side) and then stored in a MySQL database, composed of 3 tables: one for profile or demographic information and username (used as unique identifier and migrated to the other tables along with location data), one for the emotions and context characteristics describing each place that is assessed, and the last for storing the paths on the server to the photographs sent by users.

The next 3 steps (2, 3 and 4a) are done roughly at the same time, because their results are dependent on each other and they are all required to shape the application at this point. The UI and UX elements must connect harmoniously with the underlying functionality, including the APIs such as Google Maps API, Geofencing API and the Fused location provider. These steps are described in more detail in the sections below.

Next, the application is connected to a remote server using php scripts. Hosting is purchased on an Apache server provided by [www.awardspace.com](http://www.awardspace.com) (a fee of only 1.99 euro is required for a basic hosting plan for a duration of 1 year). A domain is set up (at [www.amsterdaming.dx.am](http://www.amsterdaming.dx.am)) and linked with a MySQL database, used for storing (and retrieving) the collected information using the application.

The next step is to perform some final testing and debugging of the application. This is done using the official documentation guidelines on testing procedures, available at: <https://developer.android.com/distribute/essentials/quality/core.html#tests> (accessed: 15-Aug-16). A group of friends will be asked to participate, providing feedback for tests performed on 6 mobile devices running 4 different versions of Android OS. When everything is in order, the final step can be performed: publish the application and make it available to tourists in Amsterdam.

The following sections describe in more detail the various tools needed to develop the application, the system architecture on which the application is based and the steps needed to publish it. The figure below (figure 5.4) depicts the application development as a 2-phase process, based on the deliverables.



**Figure 5.4.** App development as a 2-phase process

The first section (1. Design and development) refers mainly to the tools used and components that are integrated in the application, resulting in a debug version. The second section refers to the distribution process of the application and takes as input the result from the first section. In this phase the debug version is prepared for release, along with other promotional materials (screenshots, text descriptions, instructions, and other graphics). A keystore and a release certificate is created in order to generate a signed version of the application, ready to be published.

### 5.2.1 Design and development

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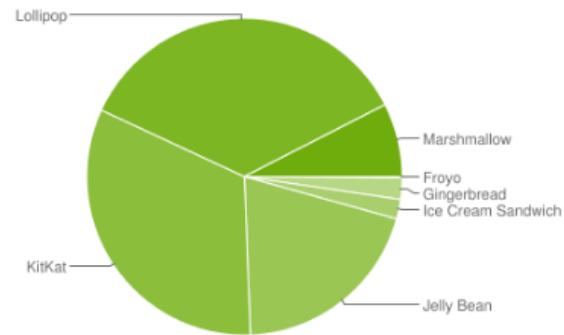
As of 2013, Android Studio is the official Google IDE for developing native android applications. Based on the IntelliJ Idea software, it is designed in coordination with the Android platform and has a number of features such as: code editor, analysis tools, project build support (Gradle), emulator for testing and signing and versioning with multiple APK generation, which make it the state of the art IDE for developing applications. Also, it is available for free under the Apache License 2.0. (<http://android-developers.blogspot.nl/2016/04/android-studio-2-0.html>)

A prerequisite for using Android Studio is to have Java installed on the system. In this case the system used is Windows, on which the Java Development Kit was installed.

With Android Studio, the application can be developed from scratch by creating a new project. At this point, a decision must be made regarding the functionality and availability of the new application on various versions of android, by choosing an API level for development. The latest version is now (20-May-2016) Android 6.0 Marshmallow supporting API level 23. The API level corresponds to the specific functionality embedded in an android version, given by the API framework. With each new version of Android, updates are added to the underlying API framework. Therefore, when building an application, some functions may only be available for newer versions of android. So for example if API level 19 is chosen for the application development, the application would not be able to run on API level 18 or lower. Keeping in mind that some smartphones are still running older android versions, this means that the application should ideally run on the highest available API level, while also being backwards compatible to an API level that covers a maximum range of devices and still be able to implement the desired functionality. (<https://developer.android.com/guide/topics/manifest/uses-sdk-element.html>) Figure 5.5 shows the current distribution of android versions. The majority of devices are still running Android 4.4 Kit Kat (32.5%), followed by Android 5.1 Lollipop (19.4%) and 5.0 Lollipop (16.2%).

Based on this information, the API level 15 (corresponding to android version 4.0.3-4.0.4 Ice Cream Sandwich) is chosen for developing the application, while also targeting the highest available API level 23. APIs lower than 15 raise a number of compatibility issues, mainly because some features have become obsolete or deprecated over time, with the release of new updates and improvement of smartphones' hardware components.

Version	Codename	API	Distribution
2.2	Froyo	8	0.1%
2.3.3 - 2.3.7	Gingerbread	10	2.2%
4.0.3 - 4.0.4	Ice Cream Sandwich	15	2.0%
4.1.x	Jelly Bean	16	7.2%
4.2.x		17	10.0%
4.3		18	2.9%
4.4	KitKat	19	32.5%
5.0	Lollipop	21	16.2%
5.1		22	19.4%
6.0	Marshmallow	23	7.5%



Data collected during a 7-day period ending on May 2, 2016.

Any versions with less than 0.1% distribution are not shown.

**Figure 5.5.** Platform version distribution

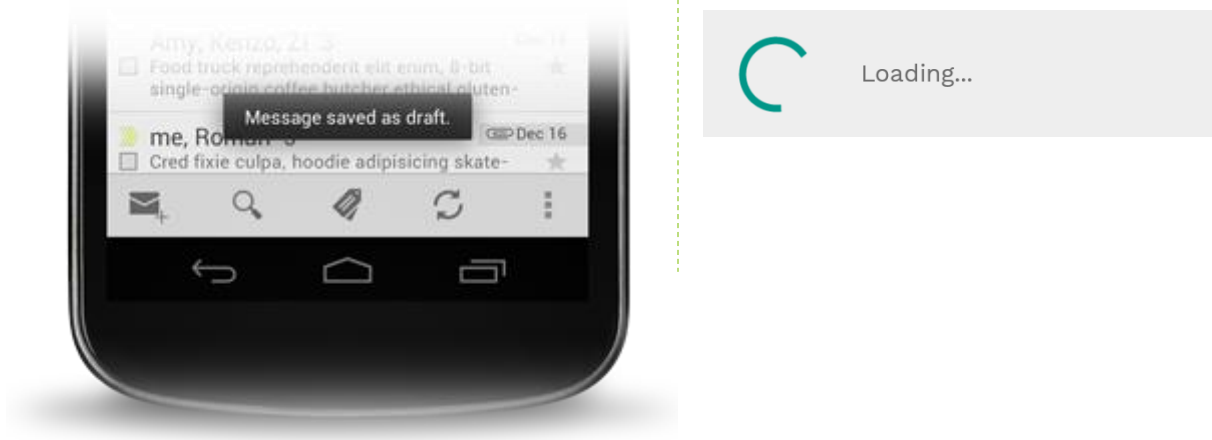
(<https://developer.android.com/about/dashboards/index.html>)

### User Interface (UI)

After creating the project and choosing the API level, the next step is to create the user interface. This phase is particularly important because it can affect the level of user participation. The UI should be at least easy to use and intuitive (ideally it should also have an aspect that draws the eye, since most humans are receptive to visual cues), otherwise individuals can skip parts they find difficult to handle or stop participating altogether. A solution that can be applied to make the UI user-friendly is to incorporate conventional standards used in application design that users are likely to be familiar with, and also provide a high-quality base map (Seeger, 2008).

Jones & Weber (2012) analyzed the usability of VGI interfaces, focusing on user interactions and learnability, with a case study on Open Street Map. According to their results, some of the limitations of VGI interfaces lie in hidden functionalities, lack of user feedback between interactions or tasks and inefficient location of controls, such as buttons.

The UI is created using XML (Extensible Markup Language). The application is composed of a series of activities, each activity representing a thing that the user can do at one time, usually presented as a full-screen window. So for each activity, an XML layout file is created. The limitations mentioned earlier are considered and solutions are implemented to avoid them. First of all, no functionality that the users are required to interact with is hidden from them and a Help button has been included in the Activity bar menu, which provides extra details about the task at hand when tapped. This button is present in almost all activities and has been included on the activity bar so as to not draw attention from the buttons representing the main tasks, which are conventionally represented by large square shapes located either at the bottom or top of the screen and named intuitively ("Save", "Next"). Then, whenever the user performs a task, either a clear result of his action appears on the screen, such as the next activity, or he receives feedback through a short Toast message (figure 5.6) or a dialog message. A Toast is a small popup which appears on the screen to provide simple feedback about an action and disappears after a timeout. A dialog message is a bit more complex and can implement more features.



**Figure 5.6.** a) Toast message b) Dialog  
<https://developer.android.com/images/toast.png>,  
<http://stackoverflow.com/questions/34018157/how-to-change-default-progressdialog-circle-color-in-android>)

XML is also used to define the application manifest file, which contains information needed by the android system present on the device in order to run the application code.

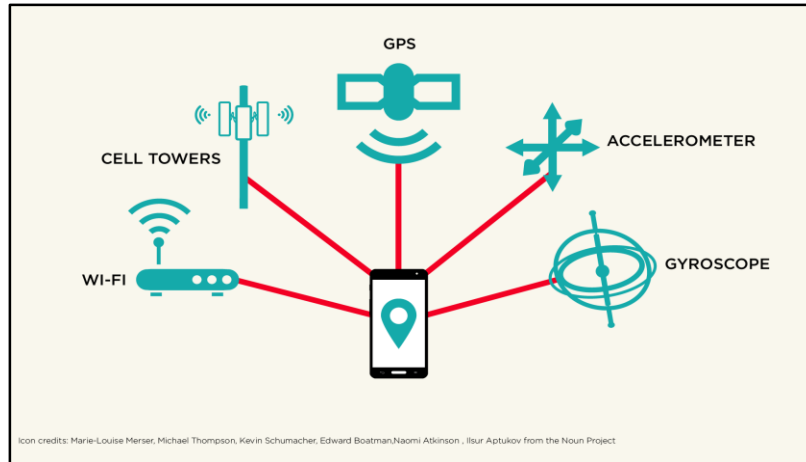
The Java programming language is used for coding the application features which correspond to the UI elements, the processes that run in the background (unseen by the user) and the overall behavior of the application.

Along with the XML and Java files, there is a resources directory which contains all the graphic assets (such as images, icons, custom colors and themes), values for strings, dimensions, menus and raw files, which are needed in the application. It is considered a best practice to keep all the resources externally and access them in code using resource IDs.

Furthermore, an important component of this application is the Google Maps API, along with the Geofencing and Fused Location provider. The API can be used after obtaining a specific API key from the Google Developer Console. (<https://console.developers.google.com/apis>). The Geofencing API and Fused Location Provider are dependent on the Google Play Services library and the main gateway to use them is by implementing the library as a Gradle dependency in the application and making a call to the Google API Client in code. One potential downside to this would be that Google Play services also need to be installed on the actual device. However, most smartphones running android tend to have Google Play services installed by default. If that is not the case, the application does not run until the user installs Google Play services.

#### *Fused Location Provider (FLP)*

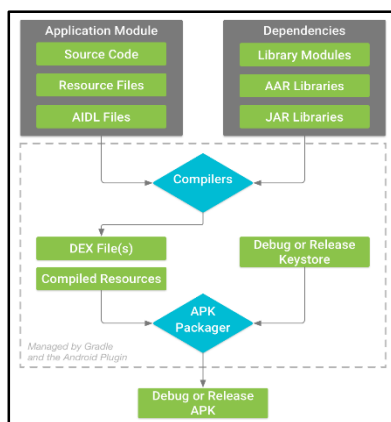
There are 2 main frameworks for providing location services in an android app: Location Manager and the Fused Location Provider (FLP). The Location Manager is a class which uses 3 sensors available on the device to determine location updates: a built-in GPS receiver, cellular tower signals and Wi-Fi access points. It is not always very accurate, doesn't work well indoors and drains the battery quite fast (Sauter, 2012). The FLP provides location updates by switching between GPS and Wi-Fi (also cell towers and sensors, hence the name) in order to get the best available location, as depicted in the following figure (figure 5.7).



**Figure 5.7.** Fused location provider elements (<https://mapzen.com/blog/lets-get-lost/>)

This way the most recent location is immediately available and makes the application more power-efficient, minimizing battery drain. Accuracy is determined by permissions and options set in code (ACCESS\_COARSE\_LOCATION, ACCESS\_FINE\_LOCATION, "high accuracy", "low power") according to the goal at hand (for example highly accurate location or just periodic updates with less power consumption). Also, FLP uses locations cached by other applications, in order to minimize redundancy and unnecessarily determining the location. If the current location is already available in another application, it will just use it instead of going again through the process of determining the location.

## Gradle

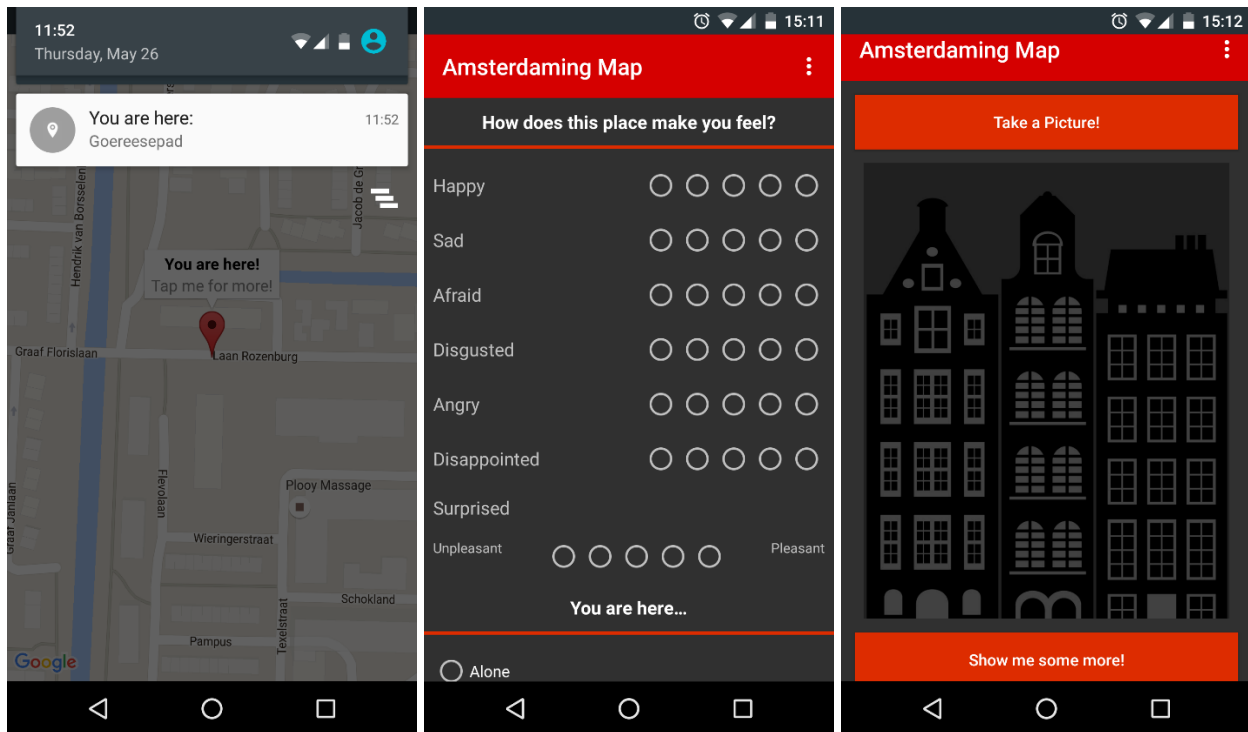


Gradle is an open-source build automation software integrated with Android Studio through the Android Gradle plugin. It fulfills the role of automating the process of compiling computer source code and app resources into APK packages, whether for debug or release version.

In this case, Gradle functionality is used to compile the final or release version of the application. Once this is done, the application can be signed and distributed to the users. Some screenshots of the actual application are provided in figure 5.9 a, b and c, below. Screenshots for all

activities in the application along with a more detailed description of their particular functionality can be found in appendix II.

**Figure 5.8.** The build process of an application as executed by the Gradle plugin for Android (source: <https://developer.android.com/studio/build/index.html>)



**Figure 5.9.** *a) Geofence activated, showing the users' location on the map  
b) Screen containing the questions that the user needs to answer in order to assess that location  
c) The user can choose to access the camera and take a picture of the place (top button) and / or go to the feedback screen (bottom button)*

## 5.2.2 Distribution

The main difference between the debug version and the release version of the application is the key with which they are signed. For the debug version, the SDK automatically generates a key. Without this key, the application cannot run on the emulator or on a testing device. However, the application cannot be published with this debug key, because the release version needs to be signed with a certificate identifying the developer (which holds the private key). The certificate and the private keystore are also needed when updating the application (Cruz Zapata, 2015).

The application can be distributed through various sources, including Google Play Store, Amazon App Store, and Opera Mobile Store or simply by direct email to the users. The last option is not applicable here since the users are unknown. As for the other possible distribution channels, Google Play Store is the best choice, considering that it's



free of charge (excluding the \$25 developer fee) and that android devices are set by default to block the installation of applications from sources other than the Play store. The restriction can be disabled by navigating to Settings - Security and checking Unknown Sources on the individual devices. However, it represents an unrequited hassle for this particular case, so Google Play store is chosen for distributing the application to the users.

Once the application is approved for release and available in the Play store anyone with an android device (running on OS version Ice Cream Sandwich and newer) can download and use it. It can be found under the name of "Amsterdaming Map". Keywords such as "Amsterdam", "map" and "emotion" are included several times in the application description in order to increase visibility when users perform searches in the Play store using those keywords. Also, some efforts were invested in obtaining high ratings, which also help to increase visibility among search results.

## **5.3 The on-site experiment**

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The on-site experiment was performed in 4 consecutive stages, because the strategy applied to determine tourists to participate had to be revisited due to poor results. The initial goal was set at about 100 tourists using the application on their own devices and in at least one place each, in order to generate enough data to be able to draw some relevant conclusions about how places are perceived, considering tourists' emotions, their demographic characteristics and the environment context. To somewhat ensure a significant number of reports per place (instead of having the reports scattered all over various Amsterdam places), geofences have been hardcoded in the application around a number of 10 places, as was described in chapter 4. So after tourists installed the application and filled in their profile details, even if they closed the application immediately, if they happened to enter a geofence, they would receive a notification on their device, asking them about their emotions in that place. Due to the fact that the application was developed specifically for Android devices, only tourists with smartphones running a version of Android OS could use the application and participate in the experiment, and of course only if they were just visiting and not be residents of Amsterdam, but otherwise regardless of other demographic characteristics.

### 5.3.1 Stage 1

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In the first stage, the focus was on promoting the application and making it known to people visiting Amsterdam at that time. To help in the actual process of engaging with tourists on site, a flyer was created (provided here in digital form in appendix) along with a QR code (figure 5.9) which contains a link to the application listing in the Play Store, also included on the flyer. So tourists who have a QR code scanner app on their device can access the app listing immediately by scanning it on the flyer.



**Figure 5.10.** QR code with link to the application listing in Google Play Store.

At the same time, messages were posted about the experiment on travel forums and Facebook pages dedicated to tourism activities in Amsterdam. The forum messages were taken down shortly by administrators under the pretense that it was against their rules, due to the marketing nature of the messages. At a more local level, tour operators were contacted (in person and by email) and a number of fliers were left for display at 360 Amsterdam Tours, located in Dam Square in Amsterdam. Otherwise, they shared no sign of support for the experiment. Also, the I Amsterdam visitor's point near Central Station was uncooperative, although they did provide a link to the results of their own marketing studies of tourists in Amsterdam: <http://www.iamsterdam.com/nl/amsterdam-marketing/dienstverlening/kenniscentrum/boma>, last accessed: 15-aug-16.

### 5.3.2 Stage 2

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In the second stage of the experiment, tourists were approached individually and the experiment was explained to them. Some agreed to participate but they were

reluctant to do this on the spot. So they received a flier and committed to install and use the application in at least 2 places in Amsterdam. Quite a few of the tourists that were approached were willing to participate but they did not have an Android device and others were skeptical at the idea of installing something on their phone, even though it was through a verified and official channel: the Google Play Store. Because this approach did not yield a good response rate – only one person used the application, by filling in the profile information and then taking a picture of themselves with a group of friends, without providing any assessment of the place they were at – a revision of the strategy was needed.

### 5.3.3 Stage 3

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In the third stage, a new smaller version of the flyer was prepared containing the minimum of information with which the application could be discovered, represented in



figure 5.10.

**Figure 5.11.** *The simplified version of the application flyer, recto and verso*

Tourists were approached and presented with the opportunity to win a gift card on Amazon worth 35 dollars when they use the application in at least 2 places in Amsterdam. In order to do this, they had to provide their email address and the username which they would use in the application. This was thought as a way to make them more accountable for their initial commitment to use the application. After about a week, only one person had used the application, by uploading a picture of a corner of the van Gogh Museum. All tourists who provided their email addresses at this stage were contacted and asked

about their experience with the application, in the idea that maybe something was not going well from a technological point of view, although no significant issues were found in the testing phase. No reply was received.

#### **5.3.4 Stage 4**

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In the fourth and last stage of the experiment, the concept was adapted and the application was used as a tool for the researcher to gather data in the field. Tourists were approached and asked to assess the place they were at on the spot, while the information was filled in on the researcher's Android device. The profile information was collected in a separate spreadsheet, as it was not considered feasible time-wise at this point to go back and update the application for this purpose. This stage of the experiment was ended when data was collected from 81 tourists in Amsterdam places that represent the touristic activities mentioned in a previous section: parks and recreation, shopping, culture and the square place. At this point saturation was observed, caused by a repeated pattern in the data. One thing to mention is that there are no two places assessed by the same tourist. The idea was proposed to those who seemed most excited about the experiment but it resulted in crossing an invisible personal boundary because every one of them found a good excuse to break the interaction with the researcher at that time. The idea to be followed around during their sightseeing in the city by a stranger and asked about their emotions did not seem to appeal to them.

The data that was collected is analyzed and the results are presented in the next chapter, along with an attempt of validation. Even though the collection method did not follow the ideal situation, some interesting observations can be made.

## 6. Results analysis and Validation

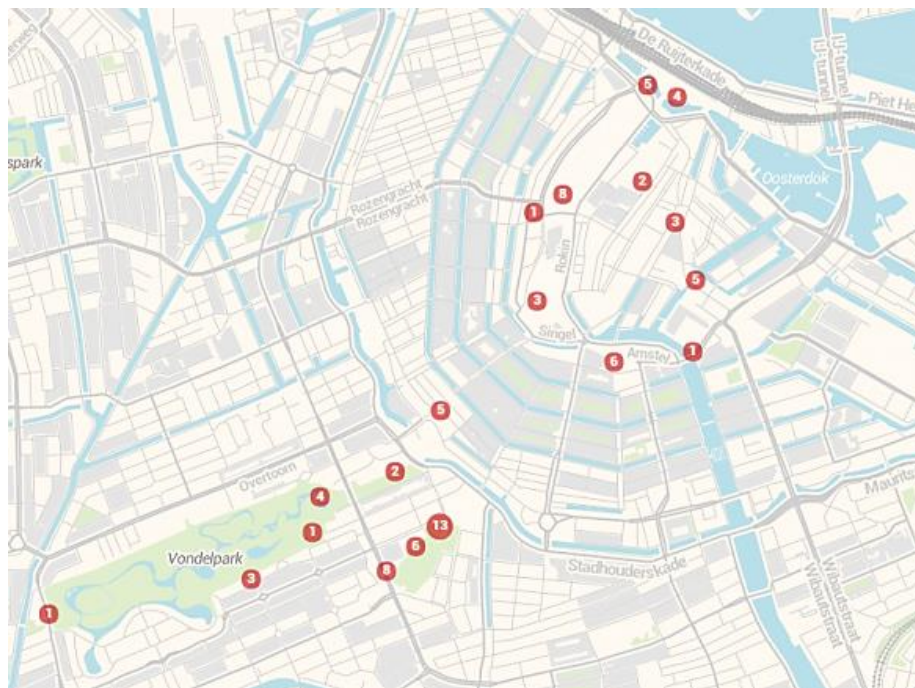
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While the experiment was performed on site in the touristic area of Amsterdam, 81 tourists agreed to participate in the project and provide input about themselves, their emotions and their perception of places, on the spot. The distribution of contributions can be seen in figures 6.1 and 6.2 below, the first one in cluster form and the latter representing a heat map of the actual locations about which data was collected. For aesthetic purposes the web service MapsData ([www.mapsdata.co.uk](http://www.mapsdata.co.uk), accessed: 15-aug-16) was used to visualize the data at this point. The largest number of responses can be observed in the Museumplein area (27), followed by Vondelpark (11), Central Station (9), and Dam Square (9). The number of responses for each place can also be viewed in the following table (table 6.1). Data was not collected for some of the places that were targeted initially with geofences in the application (Bloemenmarkt, Kalverstraat) because tourists either refused to participate or were very scarce, making it time consuming to get data for those places. So, efforts were directed to places where tourists could gather and hang around in groups since this was found to lead to a higher response rate than approaching people who were alone.

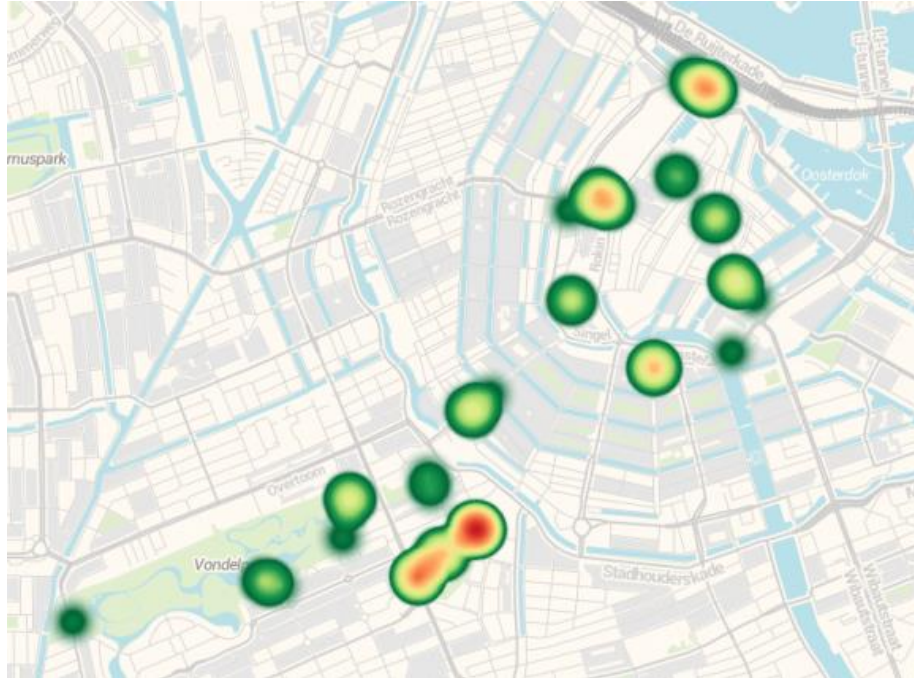
POI area	Number of contributions
<b><i>Museumplein</i></b>	27
<b><i>Vondelpark</i></b>	11
<b><i>Central Station</i></b>	9
<b><i>Dam Square</i></b>	9
<b><i>Waterlooplein</i></b>	6
<b><i>Rembrandtplein</i></b>	6
<b><i>Leidseplein</i></b>	5
<b><i>Nieuwmarkt</i></b>	3
<b><i>Spui</i></b>	3
<b><i>De Oude Kerk</i></b>	2
<b>Total</b>	81

**Table 6.1.** List of all the places assessed and their respective number of entries

Data was collected in vector form, as point shapes with a series of attributes and stored in an external MySQL database on a shared hosting platform (awardspace.com), sent by the application through php scripts in three separate tables: one for the respondents' profile information, one for the places being assessed and a separate one for the photographs' paths on the server. The database was managed using an instance of PhpMyAdmin, provided free of charge along with the hosting service. Once the on-site phase of the experiment was completed, the collected data was downloaded in csv (comma separated values) format. Because of the applied collection method, for every participant there was only one place assessed, so the two tables for profile and places could be merged based on the "username" column which was present in both tables. After that, the data were inserted in a new qGIS project, referenced using the WGS 84 coordinate reference system (EPSG: 4326) and displayed on top of an instance of Google Street Maps as a base layer (using the OpenLayers plugin in qGIS). Because of the relatively low number of data points and the fact that places to be assessed were controlled by the researcher on-site, it was straightforward to identify which data points belonged to which place. The places were not considered with a pre-defined rigid boundary, but with a certain degree of fuzziness, given by the fact that they are all open spaces in the city, surrounded by attractive buildings or canals. The data points were thus clustered together based on their immediate location, in order to characterize the places of which they are part of. This is done in the following sections of this chapter.



**Figure 6.1.** Cluster map of responses' locations



**Figure 6.2.** Heat map showing number of responses

## 6.1 The tourists' (context) characteristics

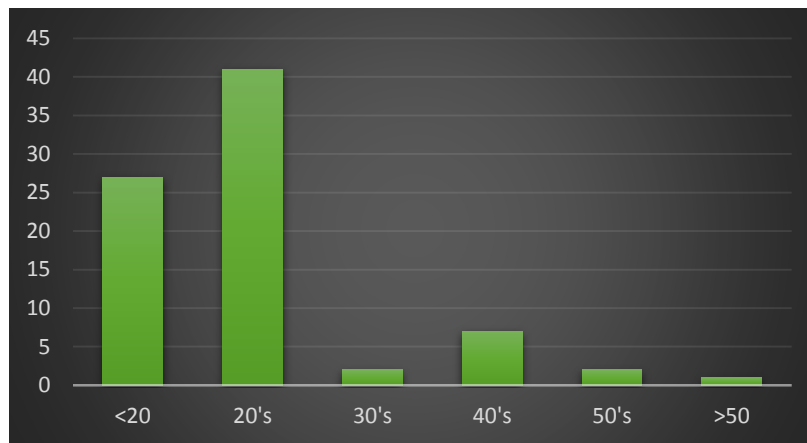
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The participants for the experiment were selected randomly in the central area of Amsterdam which is most popular with tourists. Because in the last stage of the experiment the data was collected on the spot using the application on the researcher's device, even those tourists who did not own an android device (not to mention digital literacy) could participate and provide their input. From the total of 81 tourists, 52 were female and 29 were male. This can also be observed in the figure below (figure 6.3).



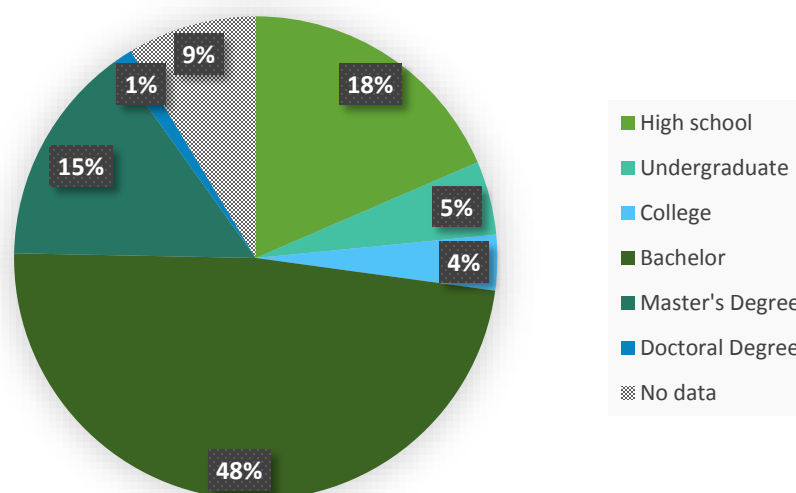
**Figure 6.3.** Gender

Age-wise, the majority of participants were in their 20's, followed by teenagers and people in their 40's. At first glance this distribution (represented in figure 6.4) might seem biased, due to the researcher being in the same age group and predisposed to approach more people in their 20's. However, according to the visitors survey performed in 2016 by Amsterdam Marketing, the majority of Amsterdam visitors pertains to this age group (32% - <http://amsterdam-marketing.instantmagazine.com/kerncijfers-2016/boma-2016-english#!/leeftijd-en-reisgezelschap-copy>).



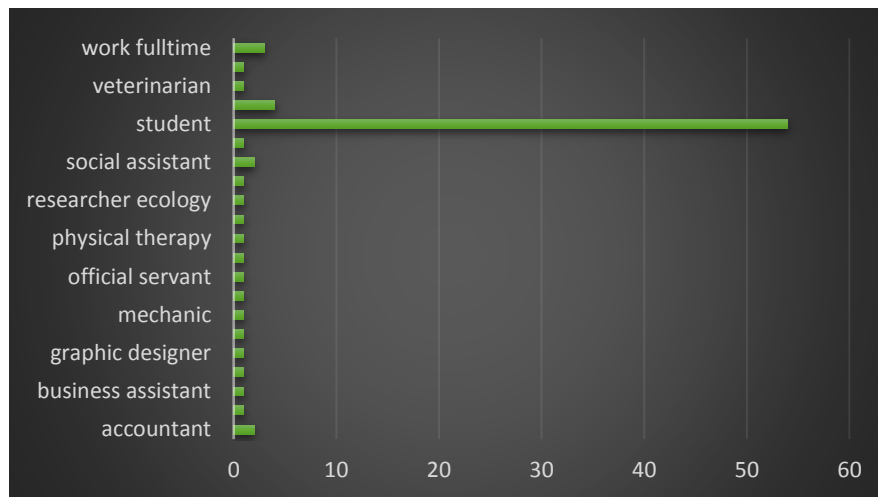
**Figure 6.4.** Age distribution

Consequently to the age distribution, the majority of participants had just finished or were undergoing Bachelor level studies and the preponderant occupation was "student". The participants' level of education and occupation distribution can be observed in figure 6.5 and figure 6.6 respectively.



**Figure 6.5.** Participants' level of education





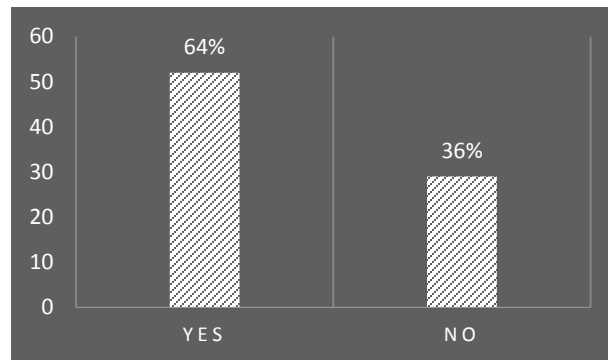
**Figure 6.6.** Participants' occupation

The participants were also required to specify their place of origin (also to make sure that they are indeed tourists and not inhabitants of Amsterdam), represented as flow lines from their respective countries to Amsterdam, on the map in figure 6.7.



**Figure 6.7.** Flow lines representing participants' countries of origin

Following this information about themselves, the tourists were also asked if it was their first visit to Amsterdam or whether they had visited the city before: 64% stated that they were visiting the city for the first time.



**Figure 6.8.** First time visitors vs. recurrent visitors in Amsterdam

Lastly on this theme, tourists were asked about their purpose for visiting Amsterdam, or what made them decide to visit Amsterdam. A surprising number of participants hadn't come for Amsterdam in particular, but it was just a stop on their way to more exotic destinations, like South America, or part of a larger self-organized tour of Europe. Their responses have been captured and represented in a word cloud (figure 6.9).



**Figure 6.9.** Word cloud of the participant's motivations for visiting Amsterdam

## 6.2 Emotions and Place perception results

The initial goal of the experiment was for the application to be used by tourists themselves in various (and specifically targeted) places in Amsterdam, and for them to only interact with their devices in order to assess those places. However, because the efforts directed towards this situation were unsuccessful, the strategy needed to be altered in order to collect some data and obtain proof of concept for the project. Consequently, the application was used as a tool for the researcher to collect perception data on site. While this approach was successful for obtaining data and proving feasibility of the application, results and conclusions must be formulated carefully, due to the nature of the data.

For all of the 10 assessed places, the average score (based on a Likert scale from 1 to 5) was calculated for each emotion, represented in table x, below. It can already be observed that none of the 81 respondents reported being angry, and all of them reported a high level of happiness, even though in some cases accompanied by other emotions, such as sadness, fear, disgust and disappointment. Also, many respondents reported being surprised, whether pleasantly or unpleasantly (however, when asked why that was the case, some of them were quite confused and didn't actually have an answer).

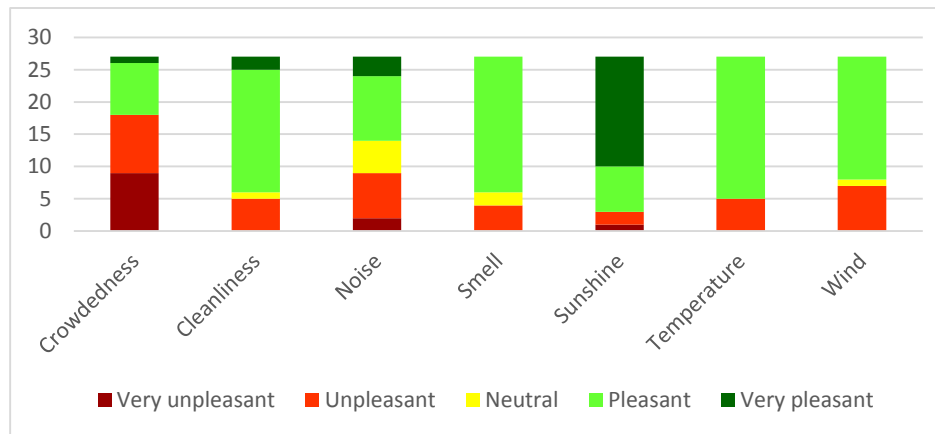
	Happy	Sad	Afraid	Disgusted	Angry	Disappointed	Surprised
Museumplein	4.59	0.11	0.11	0.00	0.00	0.11	2.96
Vondelpark	4.70	0.00	0.00	0.10	0.00	0.00	3.80
Central Station	4.22	0.00	0.44	0.11	0.00	0.33	1.78
Dam Square	4.33	0.00	0.11	0.00	0.00	0.00	3.00
Waterlooplein	4.33	0.00	0.33	0.00	0.00	0.50	1.17
Rembrandtplein	4.17	0.33	0.33	0.33	0.00	0.17	0.67
Leidseplein	4.00	0.00	0.00	0.00	0.00	0.00	1.20
Nieuwmarkt	4.00	0.00	0.00	0.00	0.00	1.33	2.00
Spui	4.33	0.00	0.00	0.33	0.00	0.33	2.67
De Oude Kerk	3.50	0.00	0.00	0.00	0.00	0.00	3.50

	- High emotion score
	- Absence of emotion

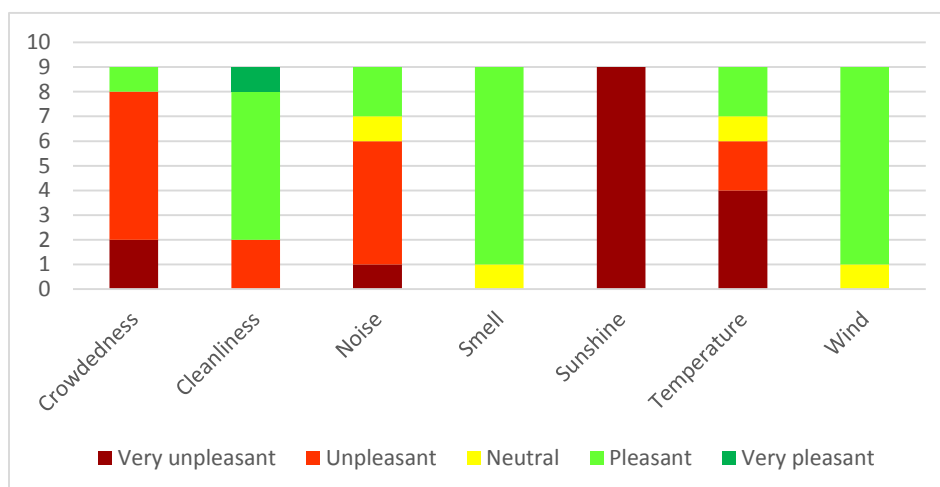
**Table 6.2.** Average emotions scores for each of the 10 places

Of the 10 different places for which contributions were made using the application, Museumplein had the highest number of entries (27).

All the participants reported a happiness score of 4 or 5 for this place, leading to an average happiness level of 4.59. Only 2 people reported being sad and disappointed with scores of 1 and 2 (although still reporting a happiness score of 4) and 1 person reported being afraid (but also a happiness score of 5), possibly explained by the fact that she was there alone (all other respondents there reported being accompanied by friends or family). Nobody reported to be angry or disgusted. 3 people were unpleasantly surprised in Museumplein, while 16 people reported to be pleasantly surprised by the place. The context factors describing the place were operationalized on a “comfort” scale from 1 to 5 (where a value of 1 means “very unpleasant” and 5 means “very pleasant”) and are shown in the figure below (figure 6.10). It can be seen that more than half of the respondents perceive Museumplein as unpleasantly crowded. However, when looking back at the emotions scores, this does not seem to influence the respondent's level of happiness. In fact, in all places included in the experiment, happiness was the most pervasive emotion reported and always with a score of 3 or (usually) higher.



**Figure 6.10.**  
Museumplein as characterized by the respondents, using the application context factors



**Figure 6.11.** Dam Square as characterized by the respondents, using the application context factors

For example, in Dam Square only one person reported being afraid (with the lowest score of 1, although in this case she was accompanied by friends), while at the same time reporting a score of 5 for happiness and being pleasantly surprised. In addition, all the respondents were pleasantly surprised by this place. The operationalized context factors can be observed in figure 6.11.

As was the case with Museumplein, Dam Square is also perceived as unpleasantly crowded. Furthermore, all the data for this place was collected in times of cloudiness, weighing in on the level of unpleasantness. However, this does not seem to affect the tourists' emotions, since all of them reported high levels of happiness. The predominance of happiness in spite of unpleasant levels for the place context factors and the low number of reports for the other emotions was an interesting observation, even from the beginning. For this reason, it was interesting to collect some data in more random touristic places in Amsterdam, to see if this situation was recurring, which it did. This is also the reason for which the chosen places do not have an equal number of entries, even though with the collection method applied in the end this could have made for a better comparison between places. Also, because of the low number of responses per place (and the collection method), it is considered unfeasible at this point to characterize in detail all the places assessed, as this would not generate any added value to the study. It was thought of as more relevant to test if the "happiness pattern" occurs in different places and to make more general observations about the emotions and perception data generated using the mobile application.

Another interesting observation is represented by the fact that not a single person reported being angry. This could also be a result of the data collection method, because the respondent had to interact with the researcher, instead of just with their own mobile device, in which case the reporting could have been the result of a spontaneous decision. But in this case the interaction had to be agreed upon by the respondent, making it least likely that an angry tourist would be willing to stop in their track to participate in the study.

## 6.3 "Seeing" places

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In order to get a glimpse (and ultimately a better understanding) of what the tourists see at the time and in the place they provide input for, they are asked in the last step of assessment to take a picture of the view that struck them in a particular way in that location. The first photographs were submitted by 2 separate participants in the second phase of the experiment, however with no emotions – perception input for the

places. The first photo was taken in Dam Square on the 12<sup>th</sup> of June (and the participant either completely missed the point of the application or they are trying to emphasize the importance of people in places) and the second one was taken in Museumplein on the 15<sup>th</sup> of June.



**Figure 6.12.** First photographs submitted by tourists

In the phase of the experiment when data was collected by the researcher, a few tourists were asked to take a picture (within the application) that captured something that struck them most in the place they were at that moment. The pictures are provided below (figure 6.13). **Figure 6.13.** Photographs taken by tourists using the application





The first two pictures on the top row were taken in the Waterlooplein area, next to the Rembrandthuis Museum, by different participants at different moments (a two hour difference, on the same day), but it is clear that the central theme of the pictures is made up of the canal and the typical Dutch style house on the right-hand side. The third picture on the top row however, strays from this conventional theme of Amsterdam, though not very far, considering the popularity of the Red Light District concept for Amsterdam. This was taken in the Ouder Kerk area by a female student from Mexico, who reported a happiness level of 3 (relatively low compared to the general happiness reports) and at the same time being very pleasantly surprised by the place.

The pictures in the second row were also taken by different respondents around the Waterlooplein area. In the first picture the focus is again on the canal, while in the other two the main theme is represented by the typical buildings. Although these pictures can be used to uncover popular themes with tourists in Amsterdam, the emotion and perception information associated with them is not out of the ordinary. All participants reported high happiness levels and no sadness, disgust or anger. The person who took the last picture reported experiencing some fear and found the place to be dirty and noisy, although not very crowded. Nonetheless, the photographs can prove to be valuable in illustrating extreme values for emotions other than happiness or even for the environment context factors. Also, they can indicate the weather conditions at the moment when a place is being assessed.

## 6.4 Validation

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For the validation part of this research, because there are no known results from a prior similar study against which a comparison can be made, the most suitable option was considered to appeal to the opinion of an expert environmental psychologist. To fulfill this role, Dr. Joske Houtkamp was contacted, and she agreed to provide some comments. In terms of content validation (concretely if the elements of the application are essential to the intended measurement of place perception), one important aspect was raised about the tourists' mood, which is believed to have a strong influence on perception, but not considered as a source of emotion in the measurement. There is no way of telling in reality whether the emotions reported were triggered by the places or if they were a residual mood influence projected on the environment. Another aspect is related to the various factors chosen to describe the context. The factors included in the application are agreed upon to be relevant, due to their proven (in separate other studies) influence on emotions and perception. However, it is quite difficult to predict which factors have an influence in which place and related to which participants. Because of the complexities posed by such a multidirectional model, a more appropriate approach would have been to focus on a single relation and try to find the most determinant factor.

Moreover, it is Dr. Houtkamp's personal opinion that there are emotions scales more suitable for this type of experiment, for example the dimensional model of emotions is finer grained and also accounts for mood dispositions. Ekman's basic model of emotions which was chosen as the core emotions model for this study, relies on specific emotions, which could not always be very logical for tourists. The model is not sensitive enough to distinguish between crisp emotions in a city like Amsterdam (where the atmosphere is quite enjoyable, relaxed and relatively safe) and also pick up the differences between places. Consequently, the context factors are also leveled out by each other, the tourists' core affect (mood) and the environment characteristics that are not accounted for. Following with the results analysis, Dr. Houtkamp highlighted the fact that the results are not out of the ordinary. The reported high level of happiness in all the places, by all the respondents is most likely to be determined by their role of tourists, the fact that they are people on vacation and thus tend to be generally more relaxed about what is happening around them. There could of course be other possible reasons, but this is considered the dominant factor, since there is no possibility to compare with, for example, a general level of happiness for those same places.

The low levels reported for the other emotions is also an expected consequence. Tourists aren't very likely to experience strong negative emotions in the course of their vacation unless extreme circumstances apply (for example a natural calamity or a terrorist attack). Additionally, the small differences in the other emotions reported between places tend to be overruled in this case by the general level of happiness. Furthermore, as anticipated, the method applied for data collection had some influence on the reported emotions. Because tourists had to interact with the researcher, they were likely to feel a certain degree of social pressure to report being happy in a place, even though that might not have been entirely the case. Also, choosing the participants could have been unconsciously biased by the researcher, who would unintentionally be drawn to people that were being perceived as more lively, open and more likely to participate in the experiment.

On a side note, by using this method of approaching tourists in person and having them report to the researcher, the risk of misuse – providing negative input or low scores on purpose to undermine the research - is avoided. In fact, most of the tourists' reaction to the concept of the application and the background of the experiment was positive and they appeared supportive towards the research. However, this is a very small, if not negligible advantage, since Dr. Houtkamp also agreed that the original strategy of having tourists report their emotions using the application by themselves would have led to improved validity of the results.



# 7. Discussion and Conclusions

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## 7.1 Discussion

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Even though this research project was performed under the umbrella of GIS, it showed from the beginning to have a pronounced interdisciplinary character, combining elements from psychology, environmental psychology, tourism and mobile application development, all linked through the concept of VGI. This final section of the project presents a reflection on the methods applied to accomplish the proposed research objectives, the various decisions made along the way, the challenges encountered and the obtained results.

The focus point of the project was to measure place-based perception of tourists using a VGI mobile application, in a case study for the city of Amsterdam. To achieve this, first the concept of perception was discussed and how to adapt it in order to describe touristic places. It was decided, based on the literature, that emotion can be seen as a form of perception and several models of emotions have been explored, according to their relevance for use in the study. Due to some specific characteristics of emotions, such as the fact that they always have an intentional object and are context dependent, it was deemed important to consider a number of context factors that could influence emotions on site. These factors were mainly derived from literature. The next step was to explore some ways of measuring emotions while also considering the various context factors, and to adapt a method to be used in a VGI mobile application.

Although the decision to focus on emotions as descriptors of perception of places was meant to lead to a deeper understanding of the way tourists perceive places in terms of their internal affect, measuring emotions about places proves to be a challenge in itself. From the fact that there are numerous accepted views on how emotions are defined, categorized and represented in models, to their pertaining to the concept of core affect, which makes it quite complicated to determine the intentional object of emotions. To put it more concretely for the case at hand, it is not always possible to determine whether emotions are about places, or just a reflection of the tourists' affective state or general mood at the moment when they visit places. Also part of this challenge of measuring emotions is trying to determine which emotions scale would be more appropriate for the task at hand, considering that there is usually no wrong answer. A strong point of this research is thus the implementation of state-of-the-art concepts in almost unexplored territory, while building a bridge between otherwise basically unrelated fields of study, as mentioned in the beginning of this section.

Moving on, once the mobile application was developed and launched, the actual on-site experiment phase of the project began. The experiment was performed in multiple stages because the approach had to be re-adapted due to a very low participation rate. It was desired in the beginning that tourists install the application and use it unattended on their own devices. Advertising efforts were directed towards this goal and even a prize was offered for the participants, but the response rate remained too low. This situation is actually the main challenge of performing a VGI experiment: getting users to actually use the application. First of all, even though the application was distributed through an official channel (Google Play Store) and a lot of time was invested in advertising and making the interface uncomplicated, user-friendly and as intuitively as possible, it was still a hassle to determine tourists to install it on their devices. Not even providing quick feedback in the application seemed to be enough of an incentive. Also, there is a great number of other free applications focused on pushing information towards the tourists, making for a rough competition and harder for the tourists to stop at this particular application. Considering these aspects, it is safe to assume that this situation is part of the general problem of making VGI applications successful. Due to the rising competition, users expect a certain level of quality and usability, both of the platform elements and the content represented by the data. The content should probably be represented by useful information to the people, that they cannot get anywhere else more accurately or with the same level of insight. Also, the incentive to provide input and create content should be either attractive enough or personally rewarding, to motivate individuals to invest their time, energy and skills for the public use.

Considering the main problem faced in this project: the lack of users, some research is called towards identifying ways to engage with potential users, especially when considering mobile VGI applications. One way to make them more attractive would be to envelop the desired concept in the form of games, thus users could provide input (knowingly) while playing. For example, in the case of tourists, some elements can be adapted from geocaching to transform data collection in a "treasure hunt". Also, more aspects could be uncovered by analyzing applications which combine gaming and location data. This information could then be used in developing VGI (mobile) applications with a higher success rate in attracting users and content.

Although in the design phase of this study the biggest limitation was considered to be related to the application development and the researcher's minimal experience in this area, the actual most significant limitation was determining tourists to participate in the experiment and use the application by themselves. Tour operators in Amsterdam practice a "free-tour" activity, which they advertise in various locations (restaurants, hotels, cafes) and tourists can gather on a designated meeting point in Amsterdam where they

are greeted by a local guide and offered a small tour of a few Amsterdam places on a tip basis. Such tour operators were contacted and asked for a collaboration in order to facilitate the use of the application by tourists (even in one of their tours), but this led to no results because they did not wish to get involved. Hence, as previously explained, the data collection method had to be adapted, and the application ended up fulfilling the role as tool for the researcher on site. Despite the fact that data was collected and proof of concept was obtained, this shift in the strategy is assumed to have influenced the results. Consequently, it would be useful to compare the results from the two different collection methods: the application as a tool for the researcher, and the application as facilitated VGI, where tourists use it themselves, with no assistance. It would be interesting to see if the same trends occur.

In order for the experiment to progress as desired, the “right” users probably had to be found, those with an interest to spend their time to provide input for the cause described by the application and to remain engaged to use the application more than once. However, since this ideal situation did not happen, the strategy needed to be adapted and the application was used as a tool by the researcher in the field to collect the emotion / perception data. It was at this point in the research that the concepts implemented in the application proved their flexibility and adaptability to the situation at hand. Additionally, the application itself also provides a certain degree of flexibility. For example, updates can be made to reflect changes pertaining to a future study following this topic, without having to reconstruct the entire application. What is more, the application can be adapted to focus on a different destination as a case study or even encompass more than one destination.

When analyzed, the data collected in this way revealed some interesting results, the most striking being the pervasiveness of high happiness scores reported by all respondents in all the places that were assessed, even when other emotions were reported as well, although with the lowest scores. On one hand it is assumed that these results are determined by the data collection method, in which the respondents interact with the researcher and perhaps tend to provide responses which they think they are expected to give (social pressure). These aspects were actually discussed in chapter 2, in the section about the language and cultural elements related to emotions and emotion reporting, and the unassisted use of the application was identified as an advantage in collecting more accurate data about tourists' actual experienced emotions.

On the other hand, this particular trend in the results (prevalent high happiness scores) could be explained by the very role of tourists embraced by the participants. After all, the very purpose of vacations, holidays and tourism is to allow people to detach themselves from their everyday routines, concerns and problems and to relax, to

broaden their views of the world and to experience new places and cultures. It is perhaps this "disconnection" aspect of tourism that gives rise to a new concept of "place detachment", where people feel more free to explore and experience places, without being burdened by the cares and necessities of everyday life. Furthermore, they might experience happiness in places that are not necessarily clean or peaceful, or places that are crowded and even when the weather conditions are not favorable, simply because they know that they have a minimal attachment to those places, they are not there to stay.

## 7.2 Conclusions

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In this final section of the project the research questions proposed in the beginning of the study are revisited and provided with their respective answers.

*Q1. What emotions are relevant in the interaction between tourists and places they visit?*

Emotions have been described, following the concept of affect-as-information as a notable source of internal information about perception and even considered as a form of perception, applicable in the relation between tourists and the various places they visit at the destination. A literature review was conducted, and of the numerous theories and models of emotions encountered, Paul Ekman's basic emotions model and the dimensional model of emotions have been analyzed in more detail for the purpose of determining which one was more appropriate for the study at hand. It was concluded that the basic emotions model would be more relevant, partly because concrete emotions could be defined and labeled with simple English language words, likely to be correctly understood by a large number of tourists (pertaining to various cultures) and partly because these emotions were also considered as categories for all the other adjacent emotional states (for example happiness encompassing joy, well-being, bliss, delight, pleasure). However, for the expressed interaction between tourists and places they visit, fueled by the concept of authenticity and anticipation in tourism, an expectation and invalidation based emotion was necessary in the form of disappointment. Therefore, the emotions that were considered to be relevant in this situation are represented by: happiness, sadness, anger, disgust, fear, surprise (motivated to be potentially expressed with a pleasant or an unpleasant connotation), and disappointment.

*Q2. Which context factors influence tourists' emotions for places at the destination (and should therefore be analyzed)?*

For this research question the literature review was extended to encompass the most important context factors which were considered to influence the experience of emotions and ultimately the perception of places visited by tourists. Concepts such as sense of place and place attachment were explored in order to gain an insight into the relationship between tourists, the places they visit and the emotions they experience. In accordance, context was described in terms of a series of demographic characteristics of the tourists, a series of characteristics of the environment or the place being visited and elements of sensory perception of the places by the tourists. Ultimately this was translated into concrete context factors, of the tourist: gender, age, education level, occupation, place of origin and motivation for visiting Amsterdam (also whether it was a first visit or a recurring visit), and of the environment or place: location, time, crowdedness, cleanliness, level of sunshine or cloudiness, temperature, wind, precipitation, smell, noise and sight.

*Q3. How can the identified relevant emotions and context factors be measured?*

After the relevant emotions and context factors have been identified, proper literature has been consulted regarding the ways in which they could be measured. An analysis of available and established methods resulted in choosing the self-report method as most appropriate for the experiment at hand. Because the self-report method resembles the form of a survey or questionnaire, it could seamlessly be adapted to include elements or questions about the identified context factors. Thus, if experienced, particular emotions were measured using an intensity scale from 1 to 5, where 1 represented the emotion experience at a very low level, and 5 at a very high level. Closed questions were constructed for the context factors, with the available answer options also based on a Likert scale from 1 to 5. These constructs were then translated into a facilitated-VGI mobile application concept.

*Q4. How to develop a VGI mobile application that successfully collects data regarding tourists' emotions and apply it in an experiment on site?*

For this research question, part of the answer lies in the mobile application itself with the embedded functionality, as a deliverable for this step. The application concept proposed in the previous research step was implemented in the development of an actual android application. To do this, state of the art software was used, namely Android Studio, and once the application was finalized and tested for bugs and inconsistencies it was released through an official distribution channel for android applications: Google Play Store. The other part of the answer to this question is given by the on-site experiment. Due to challenges encountered in convincing tourists to participate in the experiment by installing and using the application on their devices, in spite of applied advertising efforts, the strategy for using the application to collect data had to be adapted. Therefore, the

experiment was performed with direct participation of the researcher. Tourists were approached and asked to provide input on the spot, using the application on the researcher's device. This change of strategy is assumed to have influenced the resulting emotions reports to some extent.

*Q5. How to analyze the emotion data and relate them to various contextual and personal factors?*

Even though the data collection method did not follow the initial plan that the application was intended for, some interesting observations could still be made from the results. Probably the most striking aspect was the prevalence of high levels of happiness reported by all the participants and in all the 10 places that were assessed. In some places, other emotions were reported as well, although in very low levels, and still accompanied by happiness. For two of the places (Museumplein and Dam Square), the context factors were also operationalized on a 1 to 5 comfort scale and analyzed against the average emotions scores for those places. Although it is accepted that context factors can have an important influence on emotions experienced, the data obtained in the experiment is considered insufficient to draw conclusions about the correlation between emotions and context factors. First of all, the difference between the numbers of reports for each place is quite high (27 entries for Museumplein and just 2 entries for De Oude Kerk), and second of all, even if correlations were tested for the place with the largest number of reports, it would still not be enough to draw a relevant conclusion. This would only be possible once more data is collected.

*Q6. How can the results be validated?*

Due to the fact that there was no possibility to compare the results of this experiment with established results or previous datasets, the most appropriate way to obtain validation was to consult an expert environmental psychologist. Dr. Joske Houtkamp fulfilled this role and made some important points about the application as a tourists' emotions (and context) measuring instrument. First of all, the application concept is good, even though the granularity of the emotions scale used is too rough to pick up on differences between distinct emotions and places. Overall, the context factors included, have an important influence on emotions, although they level each other out. Also, there is no way of telling in reality whether the emotions that are measured with the application are indeed triggered by the places that the tourists are visiting or are just a projection of their core affect on the environment.

Nonetheless, the patterns observed in the results, namely the predominance of high happiness levels and the few reports of the other emotions (in low levels) are a normal consequence of the emotions' scale granularity, the method applied for collecting the data, and most importantly, of the fact that the respondents are tourists,

who tend to be more relaxed and happy to be on vacation. A good way to obtain validation of current results would be to have the experiment performed again in the future following the original strategy. That way, data obtained by interaction with the researcher could be compared against emotion reports provided by tourists using the mobile application themselves, unassisted.

To conclude, this research project generated some valuable insight into previously only superficially explored relationships and interactions, specifically between tourists, the places they visit, the emotions they experience there and ultimately their perception of those places. This was round up in a VGI mobile application developed for the Android operating system, and made available for use to the general public, even though for the purpose of the project, only tourists of Amsterdam were considered in the experiment. The on-site experiment in Amsterdam provided proof of concept for this novel method of measuring place-based perception of tourists using VGI. Notwithstanding the few shortcomings identified in the application concept, this method exercise establishes a precedent and at the very least draws attention upon the immense value of VGI as a source of unconventional spatial information provided by the people.

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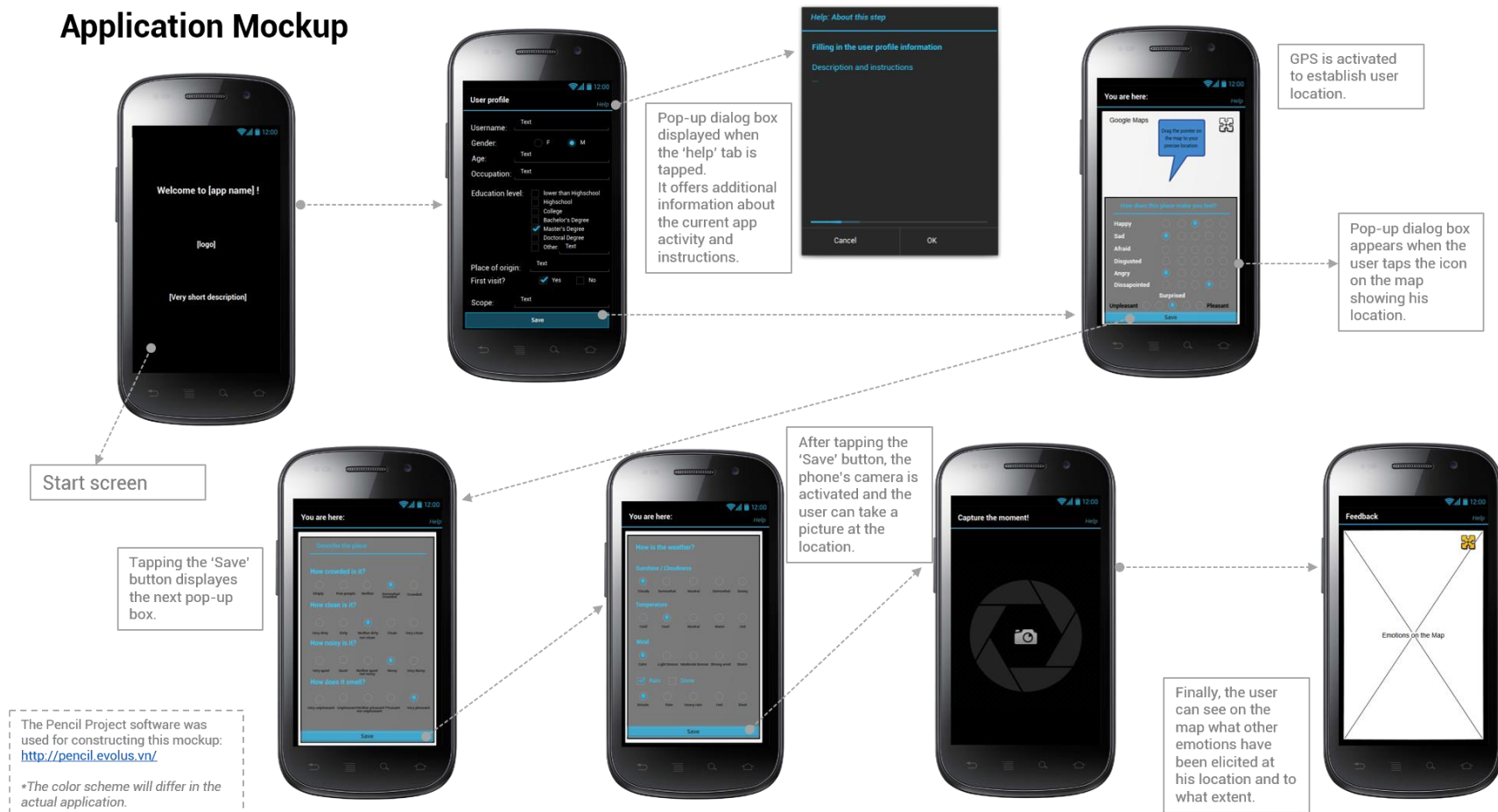


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# Appendix I: The Application Mock-up

## Application Mockup



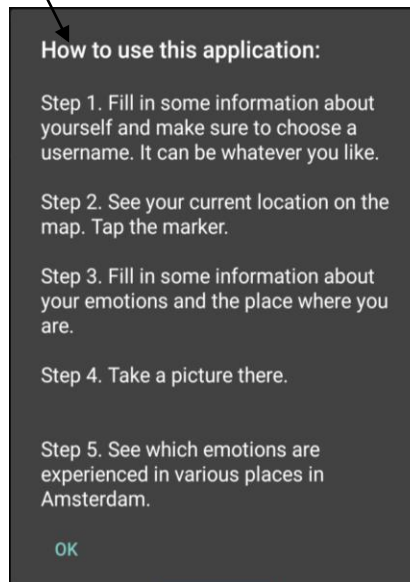
The Pencil Project software was used for constructing this mockup: <http://pencil.evolus.vn/>

\*The color scheme will differ in the actual application.

Corina Bodnariuc, 2015

## Appendix II: Screenshots of the application

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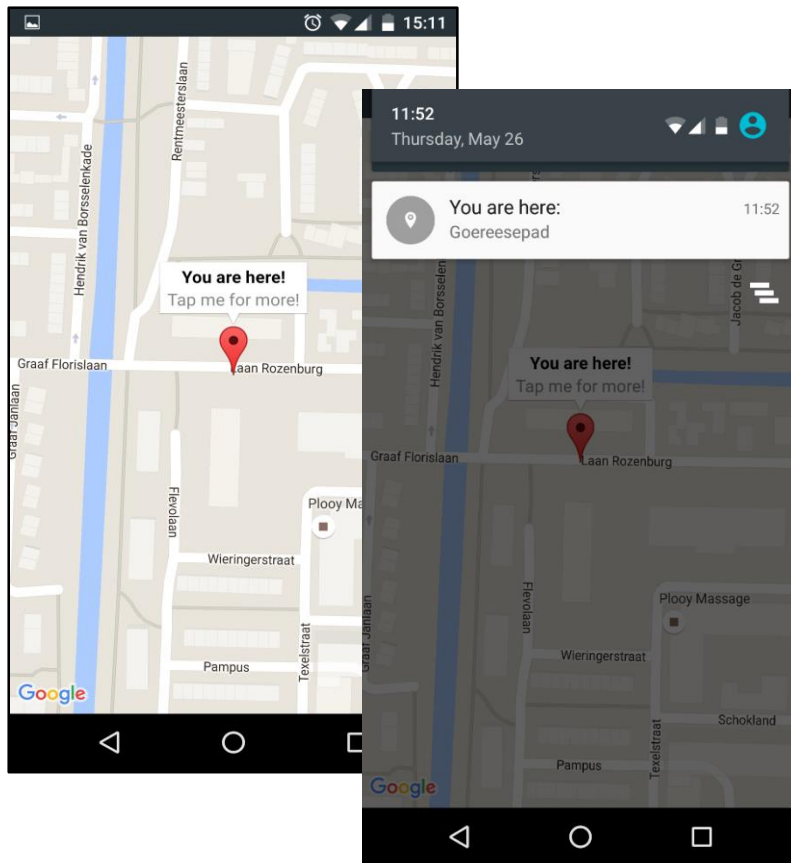


This is the application's main activity. It is the first thing the user sees when opening the application.

It may appear redundant, however, this activity fulfills 2 important background tasks:

- It allows to set a preference for the next activity (for profile information) to be launched only once when the app is first used,
- It allows to ask the users of android 6.0 for permission to access location

Also, the Help button on the Action bar contains instructions on how to use the application. This button is present in all activities (except the Maps views) and provides more specific details about each activity.



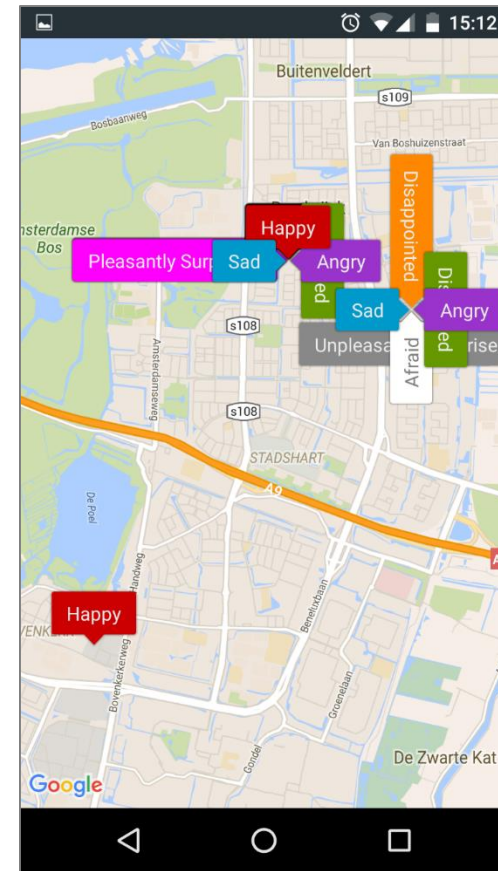
When they enter one of the designated geofences, users receive a notification on their phone. The notification can be tapped to open the application to show their current location on a Google Maps view. Otherwise, whenever they start the application, it will display their location (or a toast message asking them to make sure the Location option is enabled if it isn't already.)



Tapping the location marker opens an activity which basically appears like a form to the users. Here they are asked to assess which of the given emotions they experience in that place and how intensely on a 5 point scale. They are also asked to provide some input about the place itself and the weather characteristics at that moment.

The window is scrollable on an actual device, so not all the form elements are visible in this screenshot.

At the very bottom there are 2 buttons, one for saving the input information to the database (Save) and one for continuing to the next activity (Next).




With this activity, there is a button on the top, which when pressed opens the device's camera, so the user can take a photo of the place where he/she is. The photo is then displayed over the space below the button and immediately uploaded to the database. This is shown in a dialog window with a progress circle, asking the user to wait until the upload is finished before performing another action. The bottom button, when pressed opens the last activity.

This last activity is again a Google Maps view on which the emotions experienced by users are displayed. However, only the emotions that have an intensity of 3 or higher are considered in order to avoid a potential cluttering of the map.



## Appendix III: The First Flyer Version (recto and verso)

# Do you Amsterdam?



Do you have an android device and want to participate in a cool research project? Your views, feelings and perceptions are important! You will visit and help science at the same time!



### What is it for?

This android application is part of a research project. The main goal is to collect data about how tourists perceive various places in Amsterdam.

### Who can participate?

Everyone who is visiting Amsterdam. No identity required. The data is used for academic research purposes only.



### Where can I get it?

Available for free in Google Play Store. Just search for "Amsterdamming Map" or use your smartphone to scan the QR code below.



### What's in it for me?

You can see an updated map of the emotions people (including yourself) experienced in Amsterdam places.



Test now or download from:  Google Play

