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Online based environmental innovation diffusion:

A case study of Commute Greener's communication

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1. Abstract

In today's global market, companies engage in developing innovative products that they hope will give them competitive advantage. At the same time a variety of online communication channels emerged, giving the developers the possibility to reach their targets with the use of other than the established channels of mass media and word-of-mouth. This study aims to describe a specific case in which online communication is used for an environmental innovation diffusion. The case is described both from the developers and users perspective. The data was collected by the use of several research methods: document analysis, interviews and survey. Opportunities and challenges coming with engaging in online communication for innovation diffusion are presented, as well as suggestions for further research.

Keywords: application, Commute Greener, diffusion, innovation, online communication

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2. Introduction

Innovations have become a very important issue for companies that want to stay successful in today's competitive market (Pfeffermann & Hülsmann, 2011; Baregheh, Rowley & Sambrook, 2009). However introducing e.g. new products to an audience can be very challenging due to their novelty and complexity (Huck, 2006; Fidler & Johnson, 1984). To make the potential stakeholders aware of the existence of an innovation and understand its purpose it is important to communicate about it in an effective way. Despite the fact that today's technology offers new, low cost channels of communication such as e.g. social media, which can potentially be used for strategic communication of innovations (Pfeffermann & Hülsmann, 2011), up to date no specific research on the usage of online channels for innovation communication seems to be available.

The link between communication and innovation diffusion has traditionally been discussed in the context of the use of mass media and interpersonal communication. These were seen as the channels of spreading awareness about an innovation and influencing behavior change among people (Rogers, 1995). However in the past years we have experienced a tremendous growth of different communication channels thanks to the development of digital devices. The popularity of these channels have changed both the character of mass media as well as of social interactions (e.g. Amichai-Hamburger, Wainapel & Fox, 2002). All communicators have to face the challenge of choosing one of the several options given. This holds true also for communicators engaged in environmental communication.

It seems to be important to revise Rogers (1995) view on communication channel choices for innovation diffusion, especially since the new media have gained such popularity and actually have characteristics of both mass media and interpersonal communication. This need was addressed by Srivastava and Moreland (2012), who stated that there is a need for conducting such research taking into consideration the new affordances and opportunities that have come with the new media.

A case of an innovation that is being diffused mainly through online communication channels is Commute Greener – an initiative that aims to contribute to congestion reduction by influencing commuters to change their commuting behavior to more environmental friendly ones. It is an open innovation in a form of an application developed by Volvo IT. The application allows persons commuting to work to keep track of their travels and check how much impact the mode of the transportation of their choice has on the environment. It has developed throughout the past three years, first being a web based application, with the newest version embedded within the social network of Facebook, accessible both through the browser and through mobile devices. Thanks to a collaboration with Commute Greener developers we got an opportunity to look closer at the communication around this innovation, from the launch of its latest version in January 2013 until April 2013.

2.1. Aim of the study

Our study aims to give an insight into the use of online communication channels of for diffusion of a specific innovation called Commute Greener. By this the academic need of researching the potential of online communication channels for innovation diffusion is addressed as well as the practical need of evaluating the existing communication around the innovation and defining critical elements that can help to improve the communication in the future. Thanks to collaboration with the application developers we got the possibility to look into their communication work as well as get access to their user database. Therefore our research is presenting both the developers and user perspectives, with the aim of answering the research question:

RQ How can online communication be used for environmental innovation diffusion?

2.2. Limitations

The presented study has several limitations. First of all the survey which was distributed among the Commute Greener Facebook application users had a quite general character – it was addressing several issues connected to the application. This was done due to the complexity of the case, since after gaining insight into the practitioners work we understood that there are many factors that influence communication about this innovation. We were only able to provide an overview of most of these issues. Also due to the fact that we did not have control over recruitment of the respondents in our sample (it was voluntary) and the sample that has been researched is relatively small, no generalizations regarding all Commute Greener users, nor practical cases of environmental innovation diffusion can be made based on our study.

2.3. Disposition

The following Background chapter introduces the reader to the central terms such as innovation and online communication that are used in the study and the related researches about the eco-innovation and innovation communication, and the online communication. There is explained the main theoretical aspects of this study. This chapter section reveals also background information about the Commute Greener initiative by presenting the overview, the previous research, and the communication regarding this case.
The next chapter is Methodology that explains to the reader the complexity of the case study research that is investigated by using the collaborative practice research approach and such qualitative research approaches as document analysis, interviews, and a survey. The Results section is divided into two main chapters that reveal the information about the gathered data from the interviews (presenting the developers' perspective), and the survey method (presenting that showed the users' perspective). The analysis of these results is shown in the next chapter where the analysis of the interviews and the survey are presented separately.

The last chapter of this section is Common findings that emerges both developers' and users' perspectives.

The main findings and recommendations for the further research are presented in the Conclusion chapter. Thereafter follows the chapter with the acknowledgements, references and appendixes.

3. Background

3.1. Defining central terms – innovation

Before giving an overview of the innovation communication research it seems to be important to explain two central terms related to the topic, namely innovation and innovation communication.

Innovation is one of them, and there are many different views on what an innovation actually is. Baregheg, Rowley and Sambrook define it as a "multi-stage process whereby organizations transform ideas into new/improved products, services or processes in order to advance, compete and differentiate themselves successfully in their marketplace" (2009:1334). At the same time Fergusson says that innovation can be defined differently depending on the discipline and context. According to her the term can refer both to new developments and "new awareness of existing developments" (2011:232). Another perspective is presented by Luoma-aho and Halonen who take into consideration the persons involved in the innovation process and experimentation, where it's "eco-system" consists of interconnected entrepreneurs and researchers among others (2010). Rennings addressed the need for redefining innovations taking into consideration the growing interest in sustainable development (2000). He suggested the term of *eco-innovations*, which adds to the traditional types of innovations (process, product, organizational) the aspect of reducing the negative impact on the environment. He defined eco-innovations as "all measures of relevant actors (firms, politicians, unions, associations, churches, private households) which: develop new ideas, behavior, products and processes, apply or introduce them and which contribute to a reduction of environmental burdens or to ecologically specified sustainability targets" (Rennings, 2000:322).

Another central term is *innovation communication*. Due to the fact that different views on innovations present certain focus on the process, product (or service) and persons involved in it and the importance of these elements in innovation development and diffusion, and consequently innovation communication should address them. This can clearly be seen in the definition by Mast, Huck and Zerfass', who understand innovation communication as "symbolic interactions between organizations and their stakeholders, dealing with new products, services, and technologies" (2005:4).

3.2. Eco-innovation and innovation communication research

Due to the fact that the innovation we are looking into in our study has an environmental character, both web eco-innovation research and innovation communication studies can be seen as relevant for our study. Also, since the application is aiming to influence behavior change in the commute of its users to a greener one, the field of proenvironmental behavior change can also be seen as a related to the topic. Researches focusing on innovations concerned with environmental issues, also called eco, green or sustainable innovations, have presented the topic from different perspectives. Some focus on their market success (e.g. Halila & Rundquist, 2011), relations between sustainable entrepreneurship and sustainability innovation (e.g. Schaltegger & Wagner, 2011) or contribution from ecological economics (Rennings, 2000). Due to the character of eco-innovations some of them are connected to changes of lifestyles and consumer behaviors what leads us to another related fields of research, namely behavioral change and proenvironmental behavior. Several researches addressing the issues related to proenvironmental behavior change have been conducted (e.g. Cook & Berrenberg; Hines et al., 1987; De Young, 1993; Steg & Vlek, 2009). They research different ways of motivating such behavior change and making it stick. The techniques include external (e.g. feedback, material incentives and disincentives, social pressure) and internal sources of change (e.g. direct experience, commitment, sense of duty) and can be of informative character, positive motivation or coercion (DeYoung, 1993).

Research dealing with innovation communication differs depending on what stages and aspects of innovation work it focuses on. In the case of our study, the focus is on external communication, therefore researches focusing on external communication are of our main interest. Here a strong theme within innovation communication research is the one focusing on innovation diffusion, which is defined by Rogers as "a process by which an innovation is communicated through certain channels over time among the members of a social system" (1995:5). According to Rogers the four main elements in innovation diffusion are the innovation itself, communication channels, time and the social system in which the innovation appears (1995). He states that the diffusion process should be understood as information exchange concerning a new idea occurring between two individuals or between an individual and several others. The basic elements of this process are: "1) and innovation, 2) an individual or other unit of adoption that has knowledge of the innovation or experience using it, 3) another individual or other unit that does not yet have experience with the innovation, and 4) a communication channels connecting the two units" (1995:18). The communication channels are of our special interest due to the character of our study. Rogers (1995) mentioned mass media as a fast and efficient way of spreading awareness about an innovation, but he also stated that interpersonal communication is much more effective when one really wants to influence individuals to start using the innovation. According to him people are more likely to adopt an innovation based on its subjective evaluation of individuals, especially similar to themselves, who have already done it. That is why it is

considered a very social process (Rogers, 1995) and why it becomes especially interesting in the times of constantly growing social media popularity.

Another example of innovation diffusion research is Valente's analysis of social network thresholds in innovation diffusion (1996). This perspective looks at patterns of innovation diffusion, behavioral contagion, opinion leaders and followers. Some other social perspectives are as Pfeffermann and Hülsmann (2011) explain, three research fields investigating diffusion in social systems from the communication point of view: word of mouth communication, network externalities and social signals. The authors stress that especially the first one can have marketing implementation and suggest that online communities and web services should be given more attention in the future.

Another field of study that also focuses on the diffusion of innovation, but through a specific channel, namely through expert journalism is developed in German trend surveys that have been done in 2004 and 2006 under the name INNOVATE (Mast, Huck & Zerfass, 2005; Huck, 2006). In these studies journalists are seen to have an important role in "translating" the innovations into comprehensive pieces of news. The importance of keeping good relationships with media is stressed since they are seen as a crucial channel of addressing the public. Some practical suggestions for how to achieve these are given by the authors.
According to Pfefferman and Hülsmann (2011) innovation communication can also be connected to such research areas as e.g. corporate communication, marketing communication, innovation marketing or collaborative innovation.

3.3. Defining central terms – online communication

As mentioned earlier Rogers (1995) saw mass media and interpersonal communication as main channels for innovation diffusion. However, it is important to stress that in the past years new digital channels of communication have been developed and gained popularity. According to Bunz (2009) umbrella terminology is often used to describe the technologies or their process, with examples such as *online communication, digital media, information technology or computer-mediated communication*. What Marvin points out *new technologies* is a historically relative term (1988), and Bunz (2009) states that the new communication channels, are not really that new anymore. A way of looking at these channels is through describing their characteristics, as done in van Dijk's research presented below. In our paper we use the term *online communication* to describe communication that occurs through computer-mediated formats. Due to the fact that many of the channels referred to in our paper are the so called *social media platforms* it is worth explaining the social aspect of these. There are several ways of naming them, some examples are *social media or social network sites*. According to boyd and Ellison social network sides are online services that "allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system" (boyd & Ellison, 2008:211).

3.4. Online communication research

Online communication is an extremely broad area, since it refers to all communication occurring through computer-mediated formats. We will briefly present the aspects of online communication research that we see as most relevant to innovation communication research in which our paper can be placed.

According to van Dijk new media, which he states are also being called multimedia or interactive media, can be characterized by their three characteristics, two of structural character: integration and interactivity, and one of technical character, namely digital code. The integration is referring to the fact that "telecommunications, data communications and mass communications" are merged in one medium in "the process of convergence" (2006: 6-7). As the author states this procedure is possible due to the use of digital code and broadband transmission through cable and by air. Another characteristic described by him is the interactivity, which he defines as "sequence of action and interaction" and sees as four dimensional. These dimensions are spatial, time, behavioral and mental. He connects the space dimension to the affordance of providing multilateral communication, and the time dimension to the preference or availability of the interlocutors, making the interaction asynchronous at times. The behavioral dimension refers to the fact that role switching occurs freely among the sides engaged in communication when it comes to sending and receiving messages. The last dimension which is mental is seen by van Dijk as "a necessary condition for fill interactivity", since for now interactions with humans and animals with consciousness are dominant. The third characteristic of the new media according to him is digital code, which is an artificial code used instead of natural analogue codes (e.g. beams of light) used for creating and transmitting messages.

According to Bunz (2005) there are few fields of research that have not been influenced by the development of technologies connected to the internet and related "information and communication technologies" (2005:25). She states that such research fields as e.g. sociology or psychology look into it and often draw upon communication perspectives to get a better understanding of their own research area, due to the fact that internet is a communication medium. Online communication has become important in fields related to business and spreading awareness or commercial products, e.g. in marketing communications (e.g. Gurau, 2008).

What has been pointed out by researchers when talking about online communication is the fact that Internet combines in one medium the publication function, previously reserved for mass media, and individual, interpersonal communication (Feldmann & Zerdick, 2005). This is of special interest for innovation research, due to the fact that, as mentioned earlier, these two ways of communication were seen as central in innovation diffusion (Rogers, 1995). In the case described in our paper most of the online communication channels used for innovation diffusion have a social character and have the potential of spread the word-of-mouth in a similar way to interpersonal communication. Gelb and Sundaram define word-of mouth as "independent information and opinions about marketplace offerings" (2002:21) and state that its power has been recognized by marketers. They point out that today consumers are very likely to search for such information online and therefore the term has been changed into word-of-mouse instead, a term they state was first used in 1998 in the

Economist. Due to the fact that gathering and exchanging information and opinions online has become so common, it is worth researching how online communication platforms can be used not only for strictly commercial products, but also for environmental innovation diffusion such as the Commute Greener application, which is in focus of our research.

3.5. Commute Greener

3.5.1. Overview

The idea

According to the developers Commute Greener is a global solution helping cities, companies and individuals "to reduce congestion, save time and money, improve health and contribute to sustainable development" (http://commutegreenerinfo.com/?page_id=3). The idea behind the application is to encourage people to change their commuting behavior from using the car, to a more environmental friendly one, such as ridesharing, taking bus or other means of public transportation or biking. Therefore the main target for the application is car owners, who commute to work by car and enter their everyday route in the application when they start using it. To encourage the commuters to chose an alternative way of getting to work the application gives so called "improvement suggestions", such as e.g. suggesting to take the bike and getting points for it. The idea of improving ones performance is the main drive in the application, so therefore this is the only way of getting points.

Facebook application versions and features

The Facebook application is available in two versions: one available when accessing the application through a browser, and one when accessing the application through a smartphone application (available for Iphones and Androids). Due to the graphical restrictions of the smartphone application these two have a slightly different graphic design, but the features of the application remain the same.

With respect to the fact that the reader of this thesis is very likely to not be familiar with the described application or applications of similar character to the Commute Greener Facebook application, a decision to provide a comprehensive overview of the look and features of the application was made. Some of the technical terms were used in the survey and interviews and therefore are worth explaining.

Challenges are a kind of time limited competitions in which the application users can participate to either contribute to a collective goal, such as e.g. adding up to 5555 km of environmental friendly commute in the WWF challenge which result in money donation to the Swedish branch of the organization. One can also participate to win an award for oneself, such as in the GSO Play challenge where the top performer among all participants can win e.g. win tickets to the opera.

Leaderboard is a board displaying persons within the users' network with the highest point scores earned within the last 7 days.

Top performer is a category which is basically a board of the best performing users within the user's personal network, who made the longest distance by commuting in a green way. These performers are given nicknames such as e.g. Bicycle Hero, Public Star or Carpool Master reflecting their achievements.

Performance is the individual user's performance showing points and distance, with overall environmental benefits (CO2 and trees saved), economical benefits (Euros saved), and health benefits (calories and hamburgers burned) as well as commuting information (distance without no CO2 emission, kilometers driven in public transportation, carpooling and car).

Points are given to the users for each improvement that they make in their commuting behavior, e.g. by working from home instead of commuting by bus one can earn 16 points.

Badges are colorful round graphic elements that are visible only on the Facebook page based version of the Commute Greener Facebook application (as opposed to the more compact smartphone version); badges can be unlocked by taking certain actions, e.g. earning a certain amount of points or inviting a certain amount of friends to join a challenge.

Ridesharing is an option of sharing a car ride with persons who have a similar commuting pattern to the user. A matching ride is found after entering the pattern and a possibility of sending a message to the potential ridesharing person is given.

Improvement suggestions are short messages visually displayed as an orange moving box; based on the so called baseline that the user entered when starting to use the application, which is the route from home to work; the message is adjusted and suggests a way of commuting to work in a more environmental friendly way and getting points for it.

Grow the movement or *Add friends to the movement* is an option aiming to get more people to use the application. Each user has a possibility of sending out invitations to friends from his or her personal network to the application with an automatically generated message "I would like you to join Commute Greener".

3.5.2. Previous research

Commute Greener is an open innovation which means that both internal and external sources are being brought into its development (West & Gallagher, 2006). That is why the application has been looked at previously by other researchers (students) from the IT faculty of Gothenburg University. Topics that were touched upon in master thesis works were the motivation loss of the 1st generation application users (Matushkina & Nevalennaya, 2010) and online trust in the context of stickiness behavior (Dorn & Sahinyan, 2010). Also a bachelor thesis researching the issue of trust in social software based on data gathered from

the Commute Greener users (Qiu, 2009) was written. Since these researches have been conducted some years ago, they describe the case of the previous versions of the application. The newest release, namely the latest Facebook version (3.8) of the Commute Greener application was done recently, in January 2013, therefore not been previously examined in any way. Due to the contextual changes of the application, like embedding it within a social media platform several new aspects of the application and communication around it become relevant. Also the perspective of looking at Commute Greener as a environmental innovation is a new one and brings up new important issues related to communicating a behavioral changing innovation. In the next section we provide a better explanation of the Commute Greener communication, which is in focus in our study.

3.5.3. Communication

Communication regarding Commute Greener can be seen in two ways. One of them concerns the communication about the application and the other concerns the communication within the application. Due to the need of limiting the scope of the study we have concentrated our research on the first type of communication, and specifically external communication. This means that the internal communication about the application among the developer team is not of our interest. However we also have to stress that the communication within the application has an important role in users' implementation of the innovation: from the guidance given at the startup to the motivation throughout the usage. The communication coming from Commute Greener can also be divided in online communication and offline communication.

Online communication
Most of the communication about Commute Greener is concentrated online, due to several reasons: the reach (since the application is aiming for users are spread around the world), the costs (lower as compared to other channels), the context . As mentioned earlier the product itself is available in two online versions: one embedded in a web page and one embedded on the social media platform of Facebook. A more detailed description of the online channels used for communication with the way in which they are used will be provided below.

Offline communication
Though most of the communication is present online it is important to say that some other channels of communication are being used as well on a less frequent basis. The importance of keeping them in mind is the fact that very often documentation of these is presented on the online channels. An example of offline communication is during live campaigning, when the developers approach commuters directly. This was done e.g. during the period of introducing congestion charges in the city of. Such events are usually followed by press releases that sometimes result in articles published in newspapers. Other offline communication channels are leaflets, and other printed materials given out usually to persons passing by during the live campaigns or journalists. Another way of communicating about Commute Greener is through interpersonal communication during conferences,

promotion of the program at university meetings or presentation in companies. Since these ways of communicating were not accessible for our analysis we concentrated our attention on the online communication.

Since most of the communication coming from Commute Greener is based on online communication platforms and these are in the center of our research, we believe it is important to briefly introduce them and explain with what frequency and purposes they are used by the developers. We present them in an alphabetical order, with the number of followers as shown on 16th of May 2013.

App Store and Google Play
Commute Greener has two smartphone application versions, for Iphones and Androids, available for downloading in App Store and Google Play. These platforms are used for providing a short description of the application as well as technical information, e.g. about the application's access requirements. Here also technical updates are described. These platforms are containing information that is not controlled by Commute Greener, namely the user reviews.

Blog
The Commute Greener Blog is used for publishing posts related to new application releases or added features and to current events, such as e.g. live campaigns. Here also inspirational posts can be found, e.g. about the Commute Greener employees commute to work

Facebook
Commute Greener has an open page on Facebook, with 707 persons "Liking" it. It is used for linking blog posts from the Commute Greener blog or linking entertaining videos, usually connected to commuting or physical activities. Information about new application features is also displayed here. Some form of visual communication (beside the videos and pictures included in links) is also present with uploaded pictures taken during the Commute Greener employees commute or pictures/graphics related to current events. This platform is also used for responding to users comments. Facebook is also of course used in a more technical way due to the embedment of the application, however such aspects as user support communication are not taken into consideration in this research.

Flickr
Flickr has been used by Commute Greener for uploading pictures from events connected to Commute Greener, e.g. Copenhagen campaign.

LinkedIn
The Commute Greener LinkedIn Group is currently an open group with 53 members. It has been used by Commute Greener for publishing short posts, e.g. linking a You Tube video presenting Commute Greener.

Twitter

Commute Greener has a Twitter account that is being observed by 427 users and is self observing 320 users. It has been used for uploading short messages, so called "Tweets" and retweeting messages connected to the topic of green commute.

Web pages

Commute Greener has two web pages. We describe them with the use of numbers for practical reasons, to make their distinction easier. The numbers are given for no particular reason, and do not indicate any relation between them.

Web page 1 (www.commutegreener.com, available in several language variants) has a more general character and is used for redirecting the interested person to the application centers from which it can be downloaded. It is also used for redirecting to the second web page where more information about the application is available and to the blog, which is embedded in the second web page.

Web page 2 (www.commutegreenerinfo.com) has a more specific character and is used for providing more detailed information about the application and its use. Also information for companies, organizations and cities is provided, as well as descriptions of campaigns that have been held. Here also links to press releases, videos, published news about Commute Greener can be found as well as the blog that is liked and embedded in this page.

YouTube

Commute Greener has a YouTube channel that has uploaded 26 videos that all together have 7597 views. It is used by Commute Greener for uploading instructions for how to use the application, videos explaining the idea of Commute Greener and presentations about Commute Greener.

4. Methodology

The research object of this study is the communication around the environmental innovation diffusion. According to Woodside (2010) a case study research is "an inquiry that focuses on describing, understanding, predicting, and/or controlling the individual" (Woodside, 2010:1) that in this case is the communication regarding Commute Greener Facebook application. Case studies due to their complexity frequently use several data sources for gaining deeper understanding of the situation and have multimethod designs (Lindlof & Taylor, 2002). Furthermore, Woodside (2010) claims that the use of multiple methods in a case study increases its accuracy.

4.1. The collaborative practice research approach

The research and data collection design was developed in a close collaboration between the researchers and the organization, taking into account both the company interests and the academic requirements. Therefore, we were using methods adherent to the collaborative

practice research approach (Mathiassen, 2002) and combined theoretical knowledge and supervision from the University of Gothenburg, and empirical knowledge gained at Volvo IT. To bring these two parties together we first spent two months in close cooperation with the Commute Greener team, working together on their campaigns, and became acquainted with the application developers' work, in particular with the external communication. It is characteristic for such work settings to have a high number of shared obligations initiated by the practitioners. However, it also raises the chance to conduct highly relevant research results due to deeper understanding of the processes in the field (Mathiassen, 2002).

4.2. Qualitative research approach

The aim of this case study is to understand how online communication can be used for environmental innovation diffusion. Therefore this study is conducted by applying the qualitative research approach that examines people experiences and perceptions in a certain context (Hennink, 2011). Furthermore this approach is also used for investigating aspects of social interaction when implementing innovations and new technologies (Lindlof & Taylor, 2002) that relates to the Commute Greener case. Lindlof and Taylor (2002) claim that this knowledge can help involved parties to identify and solve possible pressing problems.

Methods employed for this study were **document analysis**, conducting of a **survey**, and the **interview method**. The document analysis method was used firstly to broaden the understanding about the application and online communication channels and secondly to verify the information from the other methods. The interviews gave a deeper insight into the application diffusion from the Commute Greener employees' perspective, while the survey represented general tendencies of the users' perspective.

The main techniques for the data analyzing used in our study were (1) open coding, (constantly comparing the gathered data emerging from different analyzing methods), (2) constructing categories from codes by grouping them, and (3) elaborating and adding the necessary theoretical framework. Codes are essential units that repeatedly emerge from the text and give meaningful information about the studied phenomenon (Hennink, 2011). According to Lindlof and Taylor (2002), the purpose of coding is to sort and categorize the information according to code similarities. As an example all named channels (e.g., Facebook, Flickr, web page) are codes united under the sub-category "Channels" that is included in the general category "Communication". Codes link the raw data with categories displaying the general concepts that characterize the study object (Lindlof & Taylor, 2002). We first performed open coding to find all codes in the data without knowing beforehand how they will be categorized (Lindlof & Taylor, 2002). Thereafter we compared the codes emerging from all different employed methods and constructed categories. The main categories are Commute Greener team, Commute Greener initiative, Target, Application use and its features, Communication, Social aspects and motivation, Social media use, Changing behavior, and Environmental aspects. Some codes were left out since they did not fit into the categories relevant to this study, e.g. we neglected codes about internal communication due to our study focus on external communication. Thereafter we added new aspects to our initial theoretical framework about the communication around an innovation.

4.3. Document analysis

During this study we also investigated relevant information that could be found in electronic messages (e.g., Facebook and blog posts) and documents (e.g., web page). They are an important part of the qualitative analysis and are critical for understanding the background of the case (Woodside, 2010). These documents also illustrate how the Commute Greener application was communicated with the stakeholders (the application user target group, sponsors and the society in general).

The document analysis method is used for reviewing and evaluating documents that are relevant for a study. According to Bowen, this method "requires data *selection*, instead of data *collection*" (2009:31) and focuses on qualitative information and evidences they provide. Documents help to reconstruct the organization's past and ongoing activities (Lindlof & Taylor, 2002) and give insight into what online communication methods were used. Mostly document analysis is used as a complement to other qualitative research methods, for example, interviews and surveys. It can be used with all type of documents that help uncover background information and develop understanding of the phenomena (Bowen, 2009). In our case we were reviewing internet-transmitted materials spread by Commute Greener. These documents are: the Commute Greener web page, the associated Facebook page, as well as blog entries, Twitter messages, the YouTube channel, the LinkedIn profile, the App Store and Google Play application pages, and the Flickr channel. All listed documents are publicly available Internet sources [see the 10.1. Appendix: List of the reviewed document sources]. Since our study object is the communication around the Commute Greener application, we were using online information that dated back no longer than until January 2013, when the latest Facebook application version (3.8) was released. However, data from the documents were obtained as long as it was related to the evidences from other methods. Commonly the document analysis method is criticized for possibly having a biased selectivity (Bowen, 2009). However, the document selection for our study included all online platforms where Commute Greener is actively present.

Following Bowen's (2009) recommendations, the gained information from reviewed documents was used for designing the survey and interview questions as well as later for contextualization data collected from other methods. The information presented in the interview and survey analysis chapter is a combination of the data from the interviews and survey results, as well as the information from the document analysis and our own experiences being insiders (collaborative practitioners) of the company for two months.

Another reason for applying the document analysis method was for doing triangulation, which is an often used element in case studies. It involves comparison of several forms of evidence to verify the gathered information. If data from at least two methods coincide, it excludes the biases of the single method (Lindlof & Taylor, 2002). In our study we compared the data from the interviews and the survey with the information from electronic documents that cover topics related to our study object (e.g., the content of the messages created by Commute Greener, and the users' activity on the mentioned online platforms).

4.4. Interviews

The object of this study is communication about an environmental innovation (the Commute Greener application) developed by Volvo IT employees. Therefore we conducted semi-structured interviews with the Commute Greener developers, since we were interested in understanding their perspective on the communication regarding the application's diffusion and challenges that they have faced. Regarding Woodside (2010), interviews are an essential instrument for getting a deeper understanding in the individuals' way of thinking, beliefs, motivation for certain behavior, and decision making.

The respondents

For this study we interviewed all three Volvo IT employees who work with the Commute Greener initiative on regular basis in that way providing total field coverage. They all have worked with Commute Greener for at least two years and were involved in the last generation application development. Each of them is responsible for certain areas such as technical application development, strategy and vision development, partnership management, support, and communication. Since our purpose was not to compare their answers but to construct a general picture of their perspective, the interview design was slightly different for each of them. However, some general questions were similar for capturing diverse opinions since they are specialists from different fields and have different responsibilities and experiences.

Interview settings

The interviews were conducted with each employee separately at the Volvo IT office building during their working time. The chosen location was a closed-door conference room. There was a table between the interviewer and interviewee that accordingly created both physical and emotional distance. Hennink (2011) claims that such interview setting suggests an official atmosphere and can influence rapport building. Since we were already acquainted with each other due to our involvement in the company for several Commute Greener application promotion activities, it was easier to achieve a trust relationship between us. Still, the interviewer explained the purpose of the interview before starting questions and the respondents were asked to answer the questions as if the interviewer would not know the background of the researched environment. Creating distance between interviewer and respondents are preferable for gaining truthful and open responses and for minimizing research bias (Chapman, Hopwood, & Shields, 2007). Similarly, it helped us to avoid misinterpretations about the general background information and the application developers' motives and believes.

Interview design

For gaining a detailed insight into the diffusion of the environmental innovative application and to capture the role of communication from the application developers' perspective, we used a semi-structured interview guide that consisted of 15 to 20 questions [see the 10.2. Appendix: Interview Questions]. The interview guide is a recommended aid for conducting the interviews that suit the research question and objectives. It is also suggested to start an interview with a few opening questions that can help to build a rapport. Such trust relationship can enable easier turn-taking and the awareness that there is no right or wrong answers; respondents can put explanations in their own words and share their opinion (Hennink, 2011). After warming up with some small talk the interview guide split the interview in two parts that can be described as *informant interview* in the first half and as *respondent interview* in the second half.

The purpose of informant interviews is to get information about the field in general, key features, and processes. Usually respondents are members of a certain organization and have comparatively long time insider experience (Lindlof & Taylor, 2002). Our interview respondents fit to this description since they have seen different phases of the application development and can provide information about their own and other roles and responsibilities. Each of the interviewees was asked about the features that are in his or her competence and also how they perceive what the idea of the new application is and what it is aimed for. This can be seen quite specific in the interview questions [see the 10.2. Appendix]. For probing these issues, open-ended questions were used that started with *what*, *who*, and *how*.

The second part of the interviews was designed as a respondent interview that is used for clarifying the role of communication, personal attitudes towards elements of the researched phenomenon, and opinions about decisions that have been made, and performed activities (Lindlof & Taylor, 2002). In addition we also were interested in their opinion about future plans and possible application development. This part contained open ended key questions for collecting the core information to answer our research question regarding the innovation developers' perspective how the communication can be performed in the diffusion.

Interview themes

The questions in the respondent interview were designed according to the thematic probes what we wanted to examine. These themes were: the role of communication in general, the message content, tone, and attractiveness, the communication channels, the application development, the individual and social aspect of the application, the changing of behavior, motivation, and feedback. Our choice to design the interview guide using these themes is based on the previously described innovation communication aspects from the literature review. Moreover, we gained additional background knowledge after reviewing Commute Greener online documents.

The open-ended questions allowed the respondents to answer by telling their stories using their own words. Meanwhile the probes helped to drive the interview flow forward to the desired topics. We used also a few closed-ended questions with binary answers: *yes* or *no*.

Yet, they were then followed by the open-ended question *Why?* To encourage the interviewers to continue revealing the needed information the interviewer used motivational probes such as "*yes*", "*aha*", and "*Is there some reason for that?*". These phrases usually don't appear in the question guide but are used for getting additional information and as follow-up questions (Hennink, 2011).

Data collection and analysis

The interviews were recorded using two electronic devices to avoid data loss due to technical reasons. The length of the interviews varied between 30 and 45 minutes excluding the small talk in the beginning and afterwards. All three interviews were held in English being not the native language of neither interviewer nor interviewees but with sufficient language knowledge on both sides to conduct interviews without any language barrier. Thereafter they were transcribed and anonymized in a specific way adjusted to the case [anonymizing process is more disclosed below in the Ethical considerations chapter].

The next step after transcribing and anonymizing the interviews is the coding of its content. After completing the open coding process we detected two types of codes – inductive and deductive codes. The first type consists of codes that are mentioned by participants themselves. Examples for this type in our case were *infrastructure as a precondition*, *game elements, fun*, and *problems*. Deductive codes, on the other hand, were prompted by the interviewer according to the interview guide based on studied literature and theoretical background (Hennink, 2011). Some of these codes were *online communication*, *social aspect*, and *behavior changing*. Thereafter we categorized codes according the relevance to our research question and the frequency, and analyzed them.

Ethical considerations

The interview guide contained questions that cover information such as work position, responsibilities, and the period how long they have been working with the Commute Greener initiative. This kind of information was used for constructing the background knowledge of how the team working with this application looks like. However, all identifiable information was removed later from the quotations used for revealing the data in the results section, thereby no individual participant can be recognized. According to Hennink (2011) it is necessary to inform respondents how the collected data will be used afterwards and if their identity will remain anonymous. Therefore before starting each interview we explained to the participants how the interview will be conducted and what the purpose of our research is. The participants got this information also in a form of a printed document *Consent for Participation in Research Interview*. They were asked to get acquainted with the document and sign it if they agree with the conditions. This document stated that the respondents are participating on voluntary basis and that the interview will be recorded and used for a master thesis case study, but that their identity will be anonymized. The respondents also had the freedom to decline to answer any questions or to stop the interview any time, which did not happened.

4.5. Survey

The data from the interviews revealed the Commute Greener developers' perspective about the communication around the innovative environmental application, their motivation for making decisions, and expectations. Since we were interested as well in the users' perspective, we conducted a survey for disclosing the application users' experiences, opinions, and preferences. Surveys are considered to be a valuable method for exploring a situation and capturing attitudinal, behavioral, and demographic attributes, as well as for tracking opinions about the use of technology (Lindlof & Taylor, 2002).

An online survey method was employed since the target group of the application is an online community. All application users have provided their e-mail addresses to Commute Greener as a precondition for downloading and using the application. Hence we got permission to contact the participants via e-mail with Volvo IT employees' assistance. Another reason for using an online survey was that this method has no geographical restrictions and the Commute Greener application is targeting a global community. Online surveys as a method have several advantages: they are easy to conduct, especially if using survey design software, they are a cost-effective for reaching a large number of respondents, and finally, they can provide high-quality data (Aitken, Power, & Dwyer 2008). Furthermore, an online survey gives more anonymity to the participants than face-to-face data collection methods. Therefore we expected to gather more honest answers.

Survey distribution

By the time the survey was distributed the Commute Greener Facebook application had several thousand users (we are not allowed to reveal the real number of the application users due to the company restrictions). Moreover, the survey link was included in the Commute Greener newsletter and was sent out to all application users which is even a considerably higher number of recipients but also included non-Facebook users who still use an older version of the application therefore do not fit the target of our investigation. Still, the message could encourage them to try out the newest version of the application.

The first Commute Greener newsletter with the link to the survey was sent out on the 5th of April 2013. Thereafter it was promoted on the Commute Greener Facebook page through a post that was visible to all eventual application users who have "Liked" the page. The second newsletter including a survey reminder was sent out on the 7th of May. The survey was closed on the 14th of May.

Responsiveness

The survey was attended by 98 users out of which 40 were valid users for our investigation since they were using the Commute Greener Facebook application version. Although we cannot reveal the total number of the application users in this public thesis, the response rate was comparably low. According to Hoonakke and Carayon (2009), it is more complicated to estimate the real level of unresponsiveness for online surveys due to nondeliverability.

Previous research about the percentage of Internet based surveys not reaching their recipients showed that this number is between 20 and even 50 percent (Hoonakke & Carauon, 2009:351), mainly due to changed email-addresses, and various kinds of spam filters. Furthermore, the computer users have become more selective and suspicious of e-mails received from people they do not know (Hoonakke & Carauon, 2009). In addition to the delivery problem, our case included even more hindering factors. The number of Commute Greener users who have ever downloaded the application was considerably larger than the number of active users at the moment when the survey was conducted. Even after stopping to use the application, the user's e-mail stayed registered in the Commute Greener database. Therefore a possible explanation of the low response rate can be that users have downloaded the application, tested and dropped it for different reasons, long before our study was performed. In such case, the user might consider his or her answer irrelevant for our study or simply does not want to spend time to fill out a survey. Nevertheless, Krosnick claims that "surveys with very low response rates can be more accurate than surveys with much higher response rates" because unmotivated respondents can lack the accuracy for filling the survey and for finishing it at all (1999:540).

Survey design

For our study we were using an online survey that was physically placed on an online platform called surveymonkey.com. The users got a newsletter in which they were asked to help to improve the Facebook application and fill in the survey linked in the message. We were using *SurveyMonkey* as an instrument because it provides modern online based survey design solutions, data storage, and presents the overview of the collected data in a user-friendly way. This platform is recommended also by other researchers as an appropriate tool for capturing users' responses and opinions (Symonds, 2011).
Following the suggestions of Hoonakker and Carayon (2009) we used various modes to make the survey attractive and easy to use. We choose white, green, and orange colors for different text fields that are also the Commute Greener colors and implemented their logo since the survey was distributed on behalf of the company. However, it was also mentioned in the survey introduction that this data will be used both for the application improvement and a master thesis research project. The survey consisted of 23 questions [see the 10.3. Appendix: Survey Questions] out of which 9 were follow-up questions appearing depending on the respondent's previous chosen answer. For example, if a person answered "Yes" to question 14 "Do you follow the information coming from Commute Greener?" the respondent continued with question 15. But if the answer was "No" he or she was forwarded to question 19. Using such skip pattern can lead to fewer missing data because respondents are asked only those questions that are relevant for them (Hoonakker & Carayon, 2009). The survey was designed to be interactive, mostly showing one question per page and in this way not allowing the respondents to see all questions at the same time. In addition, the questions were randomized to minimize the influence of order and context (Couper, Traugott, & Lamias, 2001). The interview applied pre-coded questions with given possible answers and in most of the cases also a field for entering another option. It consisted of closed "Yes/No"

questions and open-ended "Why?" questions. In total, participants needed approximately 10 minutes fill in the entire survey.

We also displayed a progress indicator in the survey that informed the respondents how far they are filling in the survey and approximately how many questions remain. Since we were using the question skip pattern, we did not reveal exact numbers or the percentage of completeness. Instead, we used a visual line that indicated the approximate respondent's progress through the survey. Such indicator which provides the possibility of not answering some of the questions, is recommended for motivating the respondents to complete the survey and thereby it can reduce non-response (Couper, Traugott, & Lamias, 2001). The survey design required to fill in the most crucial questions for our study and allowed to skip some opinion questions that could be more time consuming for the respondents and not mandatory for the research purposes. This also is a technique recommended by Couper, Traugott, and Lamias (2001). In our survey the rate of the finished surveys is 81,2 percents. However, we included in our analysis also answers from the particularly finished surveys.

Survey themes

The main themes that were covered in the survey are: general information about the users' experiences with the communication of Commute Greener, the application use and its features, social aspects and motivation, and social media use, environmental aspects, and finally demographic data for establishing the image of the average Commute Greener application user. These themes were selected according to both needed data for answering our research question and the Commute Greener developers' interests to get the users' feedback, opinions, and suggestions. The questions were elaborated after reviewing the online documents and in close collaboration with the application developers.

Data collection and analysis

The survey data was collected within 1,5 months. Thereafter we did both quantitative and qualitative data analysis since we were using different types of questions. The data that disclosed the users' opinions was analyzed using the open-coding that was explained in the previous chapter. The data from the pre-coded questions was analyzed and presented using descriptive statistics (e.g., users' preferences regarding the communication channels). Descriptive statistics allow us to describe social groups with respect to key variables. It is often used to represent data gathered from surveys. We used descriptive statistics for explaining the central tendencies of the application users' behavior and preferences.

Ethical considerations

The application users were informed that this survey was conducted for improving the application and the communication around it, as well as for a master thesis study. The users could voluntarily participate and fill in the survey, but they also could stop with the survey any moment. All responses were anonymous and did not link to the participants.

5. Results

In this section we present the data collected through interviews with the developers and surveys distributed among the Commute Greener application users respectively. We show the two different perspectives on the application in general, its characteristics and use as well as on the communication concerning it.

5.1. Interview Results

The interviews were conducted with the purpose to gain insight in to the Commute Greener innovation background, the team of the developers, and their perception about the application, communication in general, chosen channels and their target group. Therefore three in-depth-interviews were conducted with all three leading Commute Greener team members to collect information for answering our research questions.

The interview results are presented together with the related questions from the interview guide wherever it is possible. However, the majority of the categories emerged from the most frequently occurring codes coming from answers to multiple different questions. In such case a direct alignment with the guideline questions was not possible. The data is presented in a narrative form.

The data from the interviews provided broader information about the issues related to the innovation diffusion due to the open nature characteristic of in-depth interviews. The respondents revealed additional information and we could ask follow-up questions and this way gain deeper understanding of the case. As a result, the rich interview data gave us the possibility to add more themes that were relevant to our research topic and helped us to answer the research question. Each of following themes outlines the main characteristic aspects of the Commute Greener initiative that relate to communication.

The interview questions were structured under the following themes: the role of communication in general, the message content, tone, and attractiveness, the communication channels, the application development, the individual and social aspect of the application, the changing of behavior, motivation, and feedback. After analyzing the gathered data, the results were categorized in the following themes:

(1) the Commute Greener team,

(2) the Commute Greener initiative,

(3) the target,

(4) the usage of the application and its features,

(5) the communication about the application,

(6) social aspects and motivation,

(7) the changing of behavior, and

(8) environmental aspects.

The following paragraphs reveal interview results categorized according to the themes listed above:

(1) Commute Greener team

From the questions "What is your role in Commute Greener?" and "How long have you been involved in Commute Greener?" we got answers that the developers' team consists of three Volvo IT employees who have been involved in this innovative initiative for two to three years. Their responsibilities and competences are distributed among the following fields: user support, external communication (both online and face-to-face interactions), partnership management, application feature design development and implementation, testing and validation, printed and online information administration, and strategy and vision development. Occasionally they employ assistants for completing certain tasks and students as interns both for software development and in the field of communication.

Regarding the question "What is the role of communication in Commute Greener?" all respondents acknowledged the essential importance of communication. However they also noticed that they experience problems with it due to multiple responsibilities and lack of time in general. One of the employees admitted that the Commute Greener team needs more workers who would have knowledge about communication on social media, and probably a sales person as well. Another mentioned challenge is the budget and the Commute Greener dependence on the Volvo business and the Volvo Group. However, human resources are the most important element for success:

> *"Of course, I want a huge budget for it, but on the other hand I think it's more relevant to work with intelligent and passionate people, because so many wonders can be done (..)"* (Developer 3, Volvo IT department)

(2) Commute Greener initiative

The respondents were asked "How would you describe what is Commute Greener?" The answers were slightly different in details but, in general, Commute Greener is a solution developed by Volvo IT that helps cities, companies, and individuals to change towards a more sustainable commuting behavior in their everyday life. As the developers claimed, the main goal of the Commute Greener initiative is to reduce CO_2 emissions, with the additional benefit to improve health, wealth and environmental care.

The developers disclosed that it is very challenging to explain to the society what the idea of the Commute Greener application is. It is much easier for people to imagine real common objects, rather than theories on climate change. The term "urban mobility" is quite abstract and complicated and therefore people need more explanations and examples:

> *"(..) when I say urban mobility or shifting to sustainable transport solutions it's not easy to get an image in your head, which means much more communication is needed to explain and make them curious."* (Developer 3, Volvo IT department)

In addition, the interview answers disclosed that Commute Greener is also an innovative environmental web application embedded in a social network that users can approach through their Facebook accounts. Commute Greener has therefore a global community. The developers cooperate with Mexico and Gothenburg municipals, as well as several companies

and universities for exploring their needs and how the innovative application can be useful for them.

The application itself is still developing, or even just an embryonic innovation idea in the incubator as all three interviewees claimed. The developers' team admits that in this phase different situational aspects and luck play a remarkable role for the innovation's successful development.

Since the Commute Greener is developed by Volvo IT one of the interview questions was: "Do you want the users to associate Commute Greener with Volvo?" with the follow-up question "Why". The answers revealed both the positive and negative aspects. In general, Commute Greener is partly a corporate social responsibility (CSR) initiative of the Volvo Group and it clearly correlates with one of the core values of Volvo, namely environmental care. However, being associated with Volvo potential users might stay back from the application considering it as "*yet another company stuff*" (Developer 3, Volvo IT department) which is mainly provided for commercial reasons. Furthermore, most of people seeing the Volvo name do not associate it with the Volvo Group or Volvo IT. Instead, they see a connection with Volvo Cars. To examine how big the possible influence of the Volvo brand is, Commute Greener launched a test application called Dadonwoo that was also placed on Facebook. It had no features indicating the connection to any company. The Dadonwoo application had similar features as the subsequent Commute Greener application and it was working for eight weeks. However, this experiment mainly showed how difficult it is to rouse interest around an application with unknown name. Balancing the mentioned considerations about the connection with Volvo, the Commute Greener developers decided not to use the Volvo name in the latest application version on Facebook. Instead the Commute Greener logo included the line "*Powered by Volvo*".

(3) Target

According to the answers to the question "Who is the target?" there are three main target groups for the application:

- Municipalities (e.g., Gothenburg city, Mexico city) that are managing transportation in urban areas and have congestion problems leading to a high level of the CO_2 emissions. The application provides them information about the commuting behavior of their inhabitants;
- Companies that can gain direct material benefit from the application users or big companies that have CSR policies and need data for their reports;
- Individuals that go to work by car every day and live in an urban area having congestion problems. There is no specified age group or gender, however, a middle age person is considered as the most relevant user of the application.

While Commute Greener is a global initiative, there is one essential precondition for enabling the opportunity of using the application. The developers stressed that the urban area should have an infrastructure that provides several alternative ways of traveling for the commuters. For example, besides roads, there are also public transport lines and bikeways available. The application can be introduced only if the users have the chance to choose an

alternative mode of transportation. The developers revealed also information what the main interests for each of the target group are.

Interests of the municipalities

The municipalities can use the Commute Greener application as an instrument for capturing inhabitants' daily traveling patterns, and for measuring CO_2 emissions. The data provided by the application can be used for infrastructure planning purposes. Furthermore, municipalities can save money on building infrastructure if they encourage people to change their commuting behavior to a more environment friendly traveling.

Interests for the companies

There are several reasons why companies are interested in the Commute Greener application. The main reason is to fulfill the CSR goals regarding the economic, social, and environmental dimension. Mostly, companies are interested in the environmental aspect of their CSR activities. In addition the application usage can be a good team-building activity. Thereby, it complies with the CSR's social dimension. By choosing cycling or walking instead of going by car employees will also improve their health, which can lead to lower number of the illness-related work absences. However, the application can only give positive results of the users' performance if the employees are interested in such *motivation games* and maybe already have tested some similar application before.

Another category of organizations that can be interested in the application are companies that have a business oriented towards commuting itself. As an example, a public transport provider can gain financial benefits by selling more bus tickets.

Interests of the individuals

The third application user group is individuals who can freely access the application through their Facebook accounts and download it from Google Play or App Store. The Commute Greener developers state three main reasons why people are interested in the application:

(1) They care about the environment;

(2) They want to save money (e.g., taking public transport or biking instead of driving a car);

(3) They want to improve their health.

According to the developers, in the most of the cases the users are interested in environmental topics or like to be active (e.g. like cycling) achieve a better health. In contrast, the financial dimension is typically not the main reason for using the application:

> *"I have never, unfortunately I would say, come across someone that says: yes, I only use Commute Greener thanks to that it saves me money."* (Developer 3, Volvo IT department)

Target group for the old application versions

Before embedding the application in the Facebook environment, it was accessible through the http://www.commutegreenerinfo.com web page. The application was mainly company-oriented and was purely focused on environmental issues.

The shift of the application to the Facebook platform brought one problem since not all of the previous application users were Facebook users as well:

> *"Now when we are embedding into Facebook we have a problem to get those who are reluctant to use Facebook, but at the other hand we have the advantage of getting those people who are using social networks features today (..)"* (Developer 1, Volvo IT department)

However, the application developers believe that new social aspects on Facebook can contribute more to the application diffusion than the previous platform.

(4) Application use and its features

Answering the questions "Could you tell about the evolution of the application? How it has changed?" the developers revealed the information about the application development. The application has had three generations so far. All of them had a similar idea – to encourage the users to change their commuting behavior. However, they had different features and ways of performance.

The previous generations of the application used the Commute Greener web platform as the main server for data collection, users' commuting behavior analysis, and the CO_2 emission calculations. The second generation included all social aspects that are characteristic for an online social community. The users could invite friends to join the application, communicate with them by sending messages, update the status of their profile, and add pictures. Nowadays Facebook contains all these elements. But at the time when the application was developed, Facebook was not so broadly used for this kind of applications and was not considered as a possible platform. Already the second generation of the application included such social interaction elements as comparing individual performance with friends, stimulating competition. However, the application users' activity level was comparably low in both changing the behavior and socializing with others. For example, most of the users never uploaded pictures on their profiles. These social features were too costly for Commute Greener.

So, the developers decided to incorporate the application into another social context that was the most mature for that moment. The developers choose Facebook since it was a well-established online social network site. They developed a browser and also a mobile version of the Commute Greener Facebook application that users could download from an App Store or Google Play. In this version, the users were using their Facebook login for the authentication.

Another reason for switching to the Facebook platform was the need to make the application *lighter* and while at the same time more attractive to use (by adding the *fun* element). The application interface also changed:

> *"(..) we wanted first to lower the barrier, to make it easier for the user to come in and start to use Commute Greener."* (Developer 1, Volvo IT department)

The developers have not observed remarkable changes of their average target users due to the above application changes. However, the new social environment can encourage more diverse people and broaden the target group.

New features

The novelty of the last (3rd) generation of the application are gamification elements. There is a new displayed point system for individual achievements, a leaderboard with the top performers, badges, challenges, and a virtual reward system that allows exchange the collected points into real values like discounts for buying food, concert tickets, and other prizes.

The new achievement system roughly works as follows: At first, the user creates a baseline by locating his or her home and work address, their usually used way of transportation, and the times when the journeys start. The application calculates based on this data how many kilometers the user commutes every day and how much CO_2 emission that causes according to chosen transportation means. The user receives suggestions how he or she can improve their performance by choosing a more environmentally friendly way of traveling. The user then later gets points for each improvement on their commuting behavior and can unlock the badges (e.g., *Carpool Starter* and *Bike Hero Starter*). The best results among friends are presented on the leaderboard to encourage the users to compete with each other. The application users can directly see the results of their performance. The application displays how many kilograms of the CO_2 emission they have saved and the resulting financial benefit, as well as how many calories they have burned, e.g., by cycling. Such results are calculated individually.

Another novelty for this application version is the introduction of so-called Challenges for those users who like competing and comparing their performance with others (not only among friends). The application offers to join Challenges where the users can win different prizes. These Challenges are elaborated together with different companies and organizations such as Mat.se, Gothenburg Symphony, WWF, and Volvo Group.

The new application version is imbedded in Facebook where the users already could use all social elements. Therefore the developers decided to add only a few communication options between the users within the application itself. There are two situations allowing the users to send a message: They can (1) send an invitation message to friends to encourage them to join the Commute Greener initiative or (2) a rideshare invitation message responding to a Commute Greener suggestion letter notifying the user who else is having similar commuting route and starting time.

The developers admitted that the application needs improvements regarding the users' motivation to continue using the application. At the moment the situation is that new users download the application, set the baseline, maybe make their first improvement but quite soon stop using the application. The developers admitted that one of the reasons could be the complexity of the application. The same problem was observed already in the previous application versions. Therefore the developers have simplified the interface of the application, added a baseline wizard, and more graphical elements to ease the understanding how to use application. As an example, one of these implemented graphical elements is a moving orange text box that suggests the user how to make a next improvement.

However, this version is still in a testing and developing process that is internally treated as an innovation in a very early stage. The developers see a great future for applications that

allow the users' mobility while using the application and are therefore accessed through smartphones.

(5) Communication

One of the interview questions was "What is the role of communication in Commute Greener?". The developers explained that it is to attract new users, to give instructions, and to motivate the old users to continue using the application. As one of the respondents claimed:

> *"It's never enough with communication. And it's a challenge to balance the interests, the easiness, and how to find relevance."* (Developer 3, Volvo IT department)

The Commute Greener team has employed diverse methods for reaching its target group. They have run several face-to-face campaigns, published articles in both printed and online media, and are using several online channels including different social platforms that are more explicitly described below.

The developers described three latest campaigns that they ran between February and April, 2013. The first one was a local campaign related to the Gothenburg congestion tax that was charged from car users driving to and from the city. The tax was introduced by the government in the beginning of the year. The aim for the Commute Greener campaign was to draw people's attention to the application that gives them points for each time when they take public transportation or choose to go by bicycle or carpooling. In this way, the application encouraged people to save the tax money that they would spend for commuting by car.

The second campaign was run on Saint Valentine's Day (14th of February 2013) with the idea of sharing the love to the environment. The main aim of it was to promote the new application by meeting car drivers at several parking lots in Gothenburg.

The third campaign was global and had more environmental character since it was related to the Earth Hour activity. The Earth Hour is a worldwide event encouraging people to turn off the lights for one hour with the purpose to raise awareness about the climate changes. This campaign was run online in cooperation with the World Wide Fund for Nature, Sweden. The aim was to encourage people to download the application and to join a special Earth Hour challenge.

Online communication channels

The answers on the questions "What channels did you use?" and "Why did you choose these specific channels for communication?" described the main features of the Commute Greener online communication. The developers provided information about the following channels:

- Web page is the main channel for providing the general information for all targeted groups. There can be found information about the application features, campaigns, motivating success stories, press releases, publications and videos, and links to the application, as well as to the Commute Greener blog. Although the information on

the web page is relevant to the latest application version's users, it still is more oriented to the previous versions and is in the upgrading process;

- Facebook page is considered to be the most effective channel for communication with the users since it provides interaction possibilities. There the Commute Greener team post about news regarding the activities and application, as well as about different topics that might be relevant for the users (mostly about environmental issues and sustainable ways of commuting);

- App Store and Googe Play. Although the information is permanent on these channels, they are considered as highly representative since all users who want to download the application for their smartphones are visiting it. These pages consist of a short general description and screenshots from the application. The information is presented both in English and Swedish;

- Twitter is not seen as a very effective channel. However, the Commute Greener team still uses it;

- Blog has a more informal tone than the web page. It contains information about the challenges, campaigns, motivating stories from the application users, their positive experience, and photos and videos from the campaigns. Sometimes these posts are stories about environmental topics, health, and congestion in general. However, the blog is considered as non-effective channel that struggles with raising the users' attention;

- Newsletters were not used for some time period. Instead, there are sent out *ride share* suggestion e-mails that are individually oriented information and can be more useful for the users.

There are few more channels used for sharing the Commute Greener information, for example, LinkedIn, YouTube, and Flickr. But they contain permanent information where the readers have pure options to interact or videos and photos that are included in posts of the other previously mentioned channels.

The developers commented also the considerations for the language choice. Since a big part of the users are living in Sweden, information targeting them, for example, the local campaign descriptions, is presented in Swedish. However, Commute Greener is a global initiative therefore the main communication language is English. It is seen as challenging to spread the same meaning in other languages and cultures:

> *"The language is another aspect, how do we use words in different languages to actually give the people the correct assumption and understanding."*
> (Developer 1, Volvo IT department)

Choice of channels

Since the Commute Greener is embedded in the Facebook settings the developers assume that the users are used to the online communication. Accordingly the Commute Greener Facebook page is used as the main communication channel. The developers see Facebook as a very popular social network that is broadly used for authorizations on different other sites

and for applications. Although new social platforms constantly emerge and raise interest for a shorter or longer time period, people still have their accounts in Facebook:

> *"Even if Instagram is catching up and perhaps people are tired of Facebook they are also on Facebook, they know their login to Facebook. (..) It's not about getting into Instagram suddenly I think or (..) being more active on our Flickr page or so on.. I think Facebook is still a bit of the de facto standard. And I think you have to act where the flow is."* (Developer 3, Volvo IT department)

However, there are some doubts between the developers about the Facebook as the most appropriate channel for communicating with companies. Therefore the suggestion proposed by one of the developers is to update the information on the web page, make it more attractive for both the companies and the individuals.

Although the blog is seen as not very popular between the users, it still is used because internally it is seen also as a diary of the application development and the Commute Greener activities.

The newsletters were not considered to be a good communication channel because of the developers' own experience with newsletters from other companies. People do not have time to read them.

According to the developers, they are still in a development phase also in the field of communication. They are testing communication through different channels and try out different approaches. The Commute Greener team wants to investigate more what channels are the most appropriate for communicating with their target group.

Content of the messages

The question "How do you choose the content of the communication?" revealed information about the content of the online messages created and shared by Commute Greener mainly cover three themes:

- Promotion of the application's newest version: information about the new features, campaigns, and related news that can encourage people to start use the application;
- Challenges: general information about them, promoting new challenges, stories from the users who have joined them and/or have won prizes;
- Environmental topics and healthier lifestyle: news from different spots of the world, personal experiences and photos shared by the Commute Greener team and the users. Currently this theme dominates.

The Commute Greener team have tried out to include different topics in their messages (e.g., music and sports) to capture what their followers' preferences are. However, the developers consider drawing more attention to other issues that can motivate individuals and companies to join the application. As an example they consider to have more posts about the social area or the financial dimension by showing how much money people actually are saving when using the application. According to the developers the communication can be better in terms of the different dimensions of CSR that could attract companies' attention.

The developers explained that the online communication around the previous application versions was more environmental oriented and targeted at people who care about these

issues. In contrast, the communication regarding the new application version is more diverse since the target group is broader. There are also more messages about the application itself (e.g., new features and challenges).

Message attractiveness and tone

The interviews revealed answers also to these questions: "How do you try to make your messages more attractive?" and "Is there an overall tone of the messages that you create?"
The Commute Greener team members who have worked with the online message creation have observed that the users prefer short messages with little text and preferably with a personal, informal tone. Another aspect that the Commute Greener members have noticed is that the followers prefer short and simple posts probably due to the lack of time and interest to read long texts. The implicit test feedback is gained from the statistical information on the online platforms that shows how many people are reached by each message and which messages are the most "Liked", commented and shared. Before joining Facebook the developers thought that it will be easier to encourage people to interact, and to get them to "Like" a page:

> *"In some way we thought that it will be easier to get these "Likes" but it is quite hard. It's not so easy. And also to get people "Like" our posts, comments, that is very hard."* (Developer 2, Volvo IT department)

According to the application developers, people are tired to hear negative news that they can get from media and other sources all the time therefore they choose to create messages with positive tone. The application should be associated with positive experiences and fun.
The Commute Greener team admitted that it is a hard task to keep the online communication easy and simple, and to create short, interesting and meaningful messages. This task is especially challenging due to the complexity of the application. At the moment the developers are not sure if they are succeeding with the online communication. A more structured and strategic communication plan is needed from their point of view. As a first step in that direction, they are testing different methods and observing what messages are more attractive to the users.

Application as a communication channel

Previously we described the external communication performed on different online channels. One of their main tasks is to explain how to use the application. However, during the interviews emerged the developers' opinion that the application itself can also be seen as a channel of communication:

> *"It (the communication) is a mix of things outside of the application and in the application because the user needs to get the information at the right spot."* (Developer 1, Volvo IT department)

The interface is designed in a way that leads the users through the application, raises their curiosity and encourages them to do improvements by changing their behavior. However, the developers acknowledge that many users might not know about the other channels, for example, the Facebook page where are posted more information and links to the instructions

about the new features. Currently the developers are testing what the best recipe of human-computer interface for this case is.

Instructions how to use the application

All respondents were asked: "Do you think more communication about the Commute Greener application and its features is needed?" According to the opinions gathered from the interviews, the messages probably lack information about what is expected from the users, in particular, how they could continue using the application. All interview respondents acknowledged that there is need for more information about the challenges and other features of the application, and how to use it. But it is challenging to figure out in what way this information should best be presented and through which channels.

> *"A big challenge is that this is a consumer application (..), for individuals which have very different age and very different knowledge about using technology, using applications. And then it's also an application which is difficult to compare to others."* (Developer 1, Volvo IT department)

The developers are working on improving the information both within the application and on the online social platforms. Even if the information about how to start using the application is explained to a sufficient level, there can still be many questions that probably need more explanations:

> *"I think we have a very big challenge to get them to understand (..) how to use the rest of the functions, (..) that they should aim against badges, and that they can invite friends and then compete against those friends in the leaderboards. How do they understand the difference between the top performers and the leaderboards? (..) How do they understand the point system and what the challenges are about?"* (Developer 1, Volvo IT department)

From the developers point of view the successful communication can be created only if it is easy for the user to understand and use the application itself:

> *"It doesn't matter if you have fantastic communication (..) if you have an application that is hard to use."* (Developer 2, Volvo IT department)

(6) Social aspects and motivation

The developers consider that the social aspects of Facebook can raise the users' motivation and also help to promote the application. The previous version of the application was settled on an independent web platform and had several features itself for creating a social community of the application users. They could invite friends, send messages, and connect them into a group. But the users' activity was not sufficient:

> *"(..) very few of them (users) have any profile picture. And that means that they have not even cared about adding a profile picture. So we had an application with a lot of social context, but the user group didn't use it."* (Developer 1, Volvo IT department)

Therefore the developers assumed that the previous version was more used as individual rather than social application. They also understood that people are very reluctant to join new communities and to invite all their friends there. However, the developers wanted to make the application more social and decided to embed it in an existing social community. They chose Facebook because it is a well established online social area.

The answer to the interview question "Do you perceive the application as an individual or social tool?" confirmed that the latest Commute Greener version is seen by the team as a social application. According to the developers the social aspects that the users are encouraged to use are:

- Inviting friends;
- Sharing their improvements, information about the gained badges;
- Sharing their experiences and opinions;
- Competing on the leaderboard and for challenges;
- Using ride-share opportunities.

The Commute Greener developers see the social aspects as essentially important for raising others' interest and to grow the movement:

> *"Those who discovered it from a friend, I assume, have a larger part of trust or relation thanks to that their friend has a big reputation (..)."*(Developer 3, Volvo IT department)

However, it is complicated for Commute Greener to reach the target group. Therefore the developers would like to encourage active people who could spread the word further:

> *"It's lots of explaining, attracting, making people curious, finding the pioneers, the champions to help spread it until everybody knows. Which means much more communication is needed to explain and make it curious."*
> (Developer 3, 2013 Volvo IT department)

According to the developers, there are three main motivations why people use the Commute Greener application: environment issues, better health, and financial benefits by saving money on fuel.

However, the developers have learned that these basic motivations are not sufficient for social activity. The users need to be encouraged for more activity. Therefore the developers intentionally included gamification elements. The developers assume that the users need to have the chance to compete against something and to be rewarded:

> *"(..) we need to have a flow of interesting challenges coming into the application which people can join to actually make use or the improvements that they make and exchange the points into something valuable. Otherwise they will leave the application again."* (Developer 1, Volvo IT department)

(7) Changing behavior

The respondents' answering to the question "What are the most important factors in motivating people to change their behavior to greener one?" mentioned raising users' awareness as the most important factor. The Commute Greener initiative tries to raise this awareness by communicating with the society through the online channels to provide

additional information about environmental issues, how to improve health, and save money on fuel. The developers admit that it is hard to change the people's behavior because it is working with their lifestyles.

Commute Greener is using different gamification elements (e.g. challenges, badges, points, and leaderboard) for motivating people to keep using the application and to make long-term changes. The developers added gamification elements expecting that the people will be more willing to change their behavior if it will be more fun to use the application.

In addition to the previously described reasons that can motivate users for such change (environmental care, better health, saved money on fuel), the Commute Greener team stresses also social aspect as an important benefit:

> *"It's much more social to go on a bus or a public transport and not to be isolated in a car when going through the city, but actually walk a bit to the bus stop or pass a local grocery store or salad bar or listen to (..) street musicians or open air festivals and so on."* (Developer 3, Volvo IT department)

(8) Environmental aspects

One of the interview questions was "Do you think the application users are interested in environmental topics in general?" The developers presume that most of the application users are interested in the environmental topics. Therefore their online communication contains messages about these themes. Although the interest in environmental care is not the only motivation for people to use the application, it is a common linking factor. The developers added that also for companies that encourage their employees to use the application the main aim is to gather the data for their CSR environment dimension.

5.2. Survey Results

The survey was conducted for disclosing the application users' perspective. The answers disclosed their experiences, opinions, and preferences regarding the application and online communication in general. The questions were categorized in the following themes:
(a) the respondents,
(b) the testing question,
(1) the communication Commute Greener,
(2) the application use and features,
(3) social aspects and motivation,
(4) the social media use, and
(5) environmental aspects.

The number of the specific responses to the questions is presented from the highest to the lowest number. Please note that since the number of respondents varies in most questions, the percentage relates only to all answers to that specific question. Some of the questions were related to previous answers making the number of relevant respondents lower than the

general number of respondents. Therefore for each question the number of respondents who answered the question is provided as well as the corresponding number of respondents to each of the options given, usually presented in brackets. All the presented follow up questions had an open character.

(a) Respondents

Since our study does not focus on cultural, age or gender differences the questions related to demographic data were meant to only give us some overview of the heterogeneity or diversity of the respondents. The questions were not compulsory. Out of 40 Commute Greener Facebook application users who entered the survey 29 decided to answer the gender question. Out of them 58,6% (17) were male, while 41,4% (12) were female. When it comes to the nationality of the respondents they were coming from a variety of countries like China, France, Germany, India, USA, Mexico, Sweden, Bulgaria and others. The average age of the respondents was 36 years, with the youngest being 24 years old and the oldest being 61 years old.

(a) Testing question

Q1 Have you ever used Commute Greener Facebook application?
In total 98 respondents entered our survey. Unfortunately 59,2% (58 respondents) of them were not Commute Greener Facebook application users and could not provide valuable information for us, since this was our specific group of interest. The remaining 40,8% (40 respondents) were using the Facebook version of the application.

(1) Communication Commute Greener

Q2 How did you get to know about Commute Greener?
39 respondents answered this question. 35,9% (14 respondents) of them claimed that they got to know about Commute Greener through Facebook, while 25,6% (10 respondents) stated that they learned about the initiative at their workplace. 17,9% of them (7 respondents) chose the option called "other" where they were asked to specify themselves how they got to know about Commute Greener. Here such answers as friends (3 respondents), Volvo (1 respondent), and lecture at school or university (2 respondents) and another company (1 respondent) were given. 10,3% (4 respondents) stated that they learned about the initiative from a web page, and equal 2,6% (1 respondent to each answer) that they got to know about it from a newspaper or from a blog. None of the respondents chose the available options of Twitter or YouTube.

User engagement/ responsiveness

Several questions related to communication were addressing the user engagement in communication, or their responsiveness. These were:

Q3 Have you "Liked" the Commute Greener Facebook page?

38 respondents answered this question and 68,4% of them (26 respondents) claimed that they have "Liked" the Commute Greener Facebook page, while 31,6% (12 respondents) said they have not.

Q14 Do you follow the information coming from Commute Greener?

33 respondents answered this question and out of them 69,7% (23 respondents) stated that they do follow the information coming from Commute Greener, while 30,3% (10 respondents) said they did not. As a follow up to question 14 we asked the users why they do not follow the information coming from Commute Greener. This was an open, non compulsory question.

Q19 Why do you not follow the information coming from Commute Greener? (follow up question to No answer to Q14).

9 respondents answered this question. The answers given were: not knowing about the information coming from Commute Greener (1 respondent), having general negative opinion about the application (1 respondent), stating that the information is "too bulky" (1 respondent) , that the information is not valuable for him/her (1 respondent), that they have stopped using it (1 respondent), not having time (1 respondent), information overload (1 respondents), while 1 respondents provided an answer that was not really relevant to the question and 1 respondent stated that he/she does not understand the question.

Q15 On which channel do you follow the information coming from Commute Greener? (follow up question to Yes answer to Q14)

23 respondents answered this question. 73,9% of them (17 respondents) stated that they follow the information coming from Commute Greener on Facebook. 26,1% answered they follow the web page (6 respondents), while 17,4% (4 respondents) stated that they follow information on the blog. 13% (3 respondents) chose the option of "other", where they had to specify the answer themselves. Here such options as application and newsletter (1 respondent), work place (1 respondent) and e-mail (1 respondent) were given. 4,3% (1 respondent) answered that he/she follows information coming from Commute Greener on Twitter. None of the respondents chose the option of YouTube.

Q20 Do you ever respond (comment, share, "Like") to Commute Greener online posts?

In total 33 respondents answered this question. Out of them the majority of 54,5% (18 respondents) answered that they do not respond to the Commute Greener online posts, while 45,5% (15 respondents) stated that they do.

As a follow up there were 2 questions in the survey addressing the issue why the person is or is not responsive. These questions were open and non-compulsory.

Q21 Why do you respond to Commute Greener online posts? (Follow up question to Yes answer to Q20)

14 respondents answered this question. The answers given were to show support (2 respondents), knowing people who work there and wanting to promote the posts they like

(1 respondent), getting points and rewards (1 respondent), not remembering why (1 respondent), responsibility as a human being (1 respondent), liking some of them (1 respondent), liking discussions (1 respondent), sharing good examples (1 respondent) and expressing one's opinions or preferences (1 respondent), sharing good examples (1 respondent), spreading the word (2 respondents), while 1 answer was unclear.

Q22 Why do you not respond to Commute Greener online posts? (Follow up question to No answer to Q20)
12 respondents answered this question. Not wanting to share or like information was one of the given reasons (4 respondents), not liking it was another answer (2 respondents), seeing the information as irrelevant for the user (1 respondent), information not showing up on Facebook (1 respondent), language (1 respondent), not using internet in such way (1 respondent), while two respondents did not give a very specific answer ("why why…", "why would I").

Q24 Would you be interested in receiving a newsletter about issues related to Commute Greener?
33 respondents answered this question. Out of them 75,8% (25 respondents) answered that they would be interested in receiving a newsletter about issues related to Commute Greener, while 24,2% (8 respondents) stated that they are not interested in receiving it.

(2) Application use and features

Q4 How often do you use Commute Greener application?
37 respondents answered this question. Out of them 32,4% (12 respondents) answered that they have stopped using the application. 27% (10 respondents) stated that they use the application every week and 16,2% (6 respondents) answered that every month. 13,5% (5 respondents) claimed that they use it every work day. 8,1% (3 respondents) answered that they use it less than once a half year and 2,7% (1 respondent) said he/she uses it every 3 months. None of the respondents stated that they use the application every 6 months.

Q12 Which features of the application motivate you to use it?
Please note that in this question the users were free to choose several options. A total number of 34 respondents answered this question. Out of them an equal percentage of 47,1% (16 respondents to each of the answer) stated that they are motivated by the challenges and feedback about the performance respectively. Also an equal percentage of 41,2% (14 respondents to each answer) answered that they are most motivated by rideshare suggestions and improvement suggestions. 32,4% (11 respondents) stated that they are motivated by points, while 29,4% (10 respondents) said that they are motivated by badges. 14,7% (5 respondents) of the respondents answered that the results comparison with others on the leaderboard motivates them. The respondents were also given the possibility to chose an option "other", where they were asked to specify the answer themselves. 8,8% (3 respondents) chose this option. The answers given were: none (2 respondents) and the possibility to use the mobile version (1 respondent).

Q23 Do you feel that you need more instructions regarding how to use the Commute Greener application?

20 respondents answered this question. Out of them 50% (10 respondents) answered that they need more instructions regarding how to use the Commute Greener application and the same 50% (10 respondents) answered that they do not.

(3) Social aspects and motivation

Q5 Do you perceive Commute Greener application more as a tool for individual use or as a social tool?

A total number of 36 respondents answered this question. Out of them 58,3% (21 respondents) answered that they perceive the Commute Greener application as a tool for individual use, while 41,7% of them (15 respondents) stated that they see it as a social tool.

Q10 Which aspect motivates you the most to change your commuting behavior?

A total number of 34 respondents answered this question. Out of them 32,4% (11 respondents) were saying that money is the most motivating aspect for changing their commuting behavior. 29,4% (10 respondents) were seeing better health as the most motivating, while 26,5% (9 respondents) were most motivated by the perspective of contributing to a cleaner environment. An equal number of 5,9% (2 respondent to each answer) gave the answer of being perceived as environmental friendly as more motivating and the same number chose the option "other". The respondents specified the answer as exercising (1 respondent)and feeling the pollution while biking (1 respondent).

Q11 Is the social aspect of the application, e.g. inviting friend, competing and comparing yourself with others etc. important for you?

34 respondents answered this question. Out of them 52,9% (18 respondents) answered that the social aspect of the application is important for them, while 47,1% (16 respondents) answered that the social aspect is not important for them.

Q13 Do you think that exchanging experiences with other Commute Greener users would motivate you more to change your commuting behavior?

A total number of 33 respondents answered this question. 72,7% of them (24 respondents) answered that they think that exchanging experiences with other Commute Greener users would motivate them more to change their commuting behavior. 27,3% (9 respondents) answered that they do not think that it would.

(4) Social media use

Q9 How often do you use social media?

A total number of 34 respondents answered this question. Since they were given the opportunity to choose more than one answer this has to be taken into consideration while

looking at the results. The answers are presented according to the order in which the communication channel appeared in the survey.

Facebook: 79,4% (27 respondents) answered that they use it every day, 11,8% (4 respondents) answered that they use it more than once a week. An equal percentage of 2,9% (1 respondent in each answer) answered that they use it more than once a month, once a month or less than once a month. None of the respondents stated that they do not use Facebook.

Twitter: 35,3% (12 respondents) answered that they do not use it at all, while 20,6% (7 respondents) answered that they use it more than once a week. 14,7% (5 respondents) claimed that they use it more than once a month. An equal percentage of 11,8% (4 respondents in each answer) answered that they use it once a week and once a month. 5,9% (2 respondents) answered that they use Twitter every day. None of the respondents chose the answer of using it once a month.

Blogs: 32,4% (11 respondents) claimed that they use blogs more than once a week, 17,6% (6 respondents) that they use them every day. An equal number of 11,8% (4 respondents to each answer) said that they use blogs once a week and once a month. The same number of 8,8% (3 respondents to each answer) claimed that they use them more than once a month, less than once a month and that they do not use them at all.

YouTube: 41,2% (14 respondents) answered that they use YouTube more than once a week and 26,5% (9 respondents) that they use it every day. 14,7% (5 respondents) stated that they use YouTube more than once a month. 11,8% (4 respondents) claimed that they use it once a week. An equal percentage of 2,9% (1 respondent in each of the answers) claimed that they use YouTube once a month and less than once a month. None of the respondents stated that they do not use it at all.

LinkedIn: 41,2% (14 respondents) answered that they use LinkedIn once a week, while 23,5% (8 respondents) answered that they use it more than once a week. 14,7% (5 respondents) claimed that they use it more than once a month. 8,8% (3 respondents) answered that they do not use LinkedIn at all, while an equal number of 2,9% (1 respondent to each of the answers) stated that they use it every day and less than once a month.

Other: An equal number of 26,5% (9 respondents to each answer) of the users chose the answer stating that they use every day some social media platform that was not included in the options and the option of not using any other platform at all. The same number of 14,7% (5 respondents per answer) stated that they use another platform once a week and once a month. 11,8% (4 respondents) answered that they use another platform more than once a week, while 5,9% (2 respondents) answered that they use other social media more than once a month. None of the respondents stated that they use another platform less than once a month.

(5) Environmental aspects

Q6 Are you interested in environmental issues?
A total number of 35 respondents answered this question and 100% of them stated that they are interested in environmental issues.

Q7 How do you keep yourself updated on environmental topics?

20 respondents answered this question. Since it had an open character there was a variety of answers to it, some specific and some more general. Many mentioned several ways in which they keep themselves updated. Some of the most often mentioned were related to the internet (13 respondents), to news in general of unspecified type (9 respondents), to newspapers (2 respondents), TV (2 respondents), talking with people (3 respondents), implementing (2 respondents), work (1 respondent), reading (2 respondents).

Q8 What communication platforms do you prefer for receiving information about environmental topics?

34 respondents answered this question. Out of them the majority of 79,4% (27 respondents) answered that they prefer receiving information about environmental topics from traditional media (newspaper, TV, radio), while 64,7% (22 respondents) answered that they prefer Facebook. 50,0% (17 respondents) stated that they prefer web pages and 35,3% (12 respondents) that they prefer blogs. 32,4% (11 respondents) claimed that they prefer newsletter and 23,5% (8 respondents) stated that they favor Twitter. The same number of 20,6% (7 respondents in each answer) said that they prefer YouTube and face to face communication. 14,7% (5 respondents) said they favor LinkedIn, 8,8% (3 respondents stated that posters and leaflets would be of their preference and 2,9% (1 respondent) chose the option of other and specified it as TED talks.

Q 28 If you have any additional comments, please write them here.

The last part of the survey was an open space in which the respondents were free to give any kind of feedback. 13 respondents decided to give additional feedback. Most of the comments were addressing the application itself, but some were addressing the communication about it. Some of the respondents gave several suggestions. The given feedback can be grouped in general statements: need for technical improvements (4 respondents), good initiative/idea (3 respondents), suggesting adding a possibility to improve performance for bikers (3 respondents), experiencing technical difficulties (2 respondents), good application (1 respondents), using an alternative application (1 respondent), agreeing with the need of spreading information about Commute (1 respondent) and addressing the need of having bigger variety in communication (1 respondents).

6. Analysis

This chapter provides separately the analysis for the interview and survey results. The gained data discloses characteristic elements from both perspectives. The developers' perspective and the main challenges in their work with the innovative application are described in the Interview Analysis chapter. The users' perspective is presented in the Survey Analysis chapter. The last chapter General Findings brings both perspectives together and compares the developers' perception about the application's features and communication around them with the users' experiences and preferences.

6.1. Interview Analysis

The interview analysis is described following the same eight themes that were presented in the Interview Results section. The analysis brings together both the information gained from the interviews, and document analysis, as well as our own observations while working in the company in a close collaboration with the developers. The additional background information is used for better explanations of the interview results and for presenting the whole picture of the developers' perspective regarding the Commute Greener communication.

(1) Commute Greener team

Although the main focus of this study was on external communication, the information about the application developers' team also helped to understand the main internal challenges and problems that the team experienced. Such internal aspects also influence the external communication around the application in the innovation diffusion.

According to the Interview Results, the Commute Greener team consists of three employees responsible for different spheres. The constant change of the application requires new skills from the team members especially in the field of communication.

Challenge:

- Human resources. According to the Interview Results, the developers experience problems with external communication due to multiple responsibilities, lack of time, and insufficient knowledge about online communication. Therefore the solutions can be learning about the new communication aspects, analyzing own performance, and observing other similar product performances and learning from their experiences.

(2) Commute Greener initiative

The interview respondents were asked to describe what the Commute Greener initiative is. Different explanations were given probably due to the complexity of this innovative application and the broad target group. According to the developers' descriptions the Commute Greener application is an open innovation that aims to integrate external and internal stakeholders within its development process. These two aspects are also mentioned by Bruhn and Ahlers (2011) as characteristic for an open innovation. That can be observed through the Commute Greener cooperation with several stakeholders for improving the application and to conduct the content for communication on diverse online platforms. According to the Interview Results, the developers have collaborated with several municipalities, companies, and universities in the application development process. Furthermore some companies (e.g. Gothenburg Symphony and Mat.se) have contributed to the application content as sponsors for the challenges. Accordingly they have influenced the content of the communication as well. Another aspect of being an open innovation is the

possibility for the society to contribute to the content of the Commute Greener online platforms by adding their pictures and stories, and sharing their opinions.

Being an innovation brings also several challenges that the developers are dealing with.

Challenges:

- <u>The need to change the individual commuting behavior due to global environmental problems as an emerging topic.</u> Although there are lots of discussions about the global climate change and the need to change our behavior to minimize the negative impact on the environment, it is still a very new topic especially when it comes to real action regarding urban mobility. The motivation to choose alternative ways of travelling instead of taking a car is seen as an embryonic idea in its early phase.

- <u>Applications' incubation phase.</u> According to the Interview Results, the Commute Greener application itself is still in a developing phase and the same holds true for its communication that experiments with the message content and tries out different ways about how to better approach new users and to maintain the motivation of the current ones. According to previously done empirical studies, there is no guarantee that an innovation will reach success (Pfeffermann & Hülsmann, 2011). Also the developers stressed the importance of luck and circumstances.

- <u>Commercialization of the innovation.</u> An innovation can be seen as a product that tries to take a position in the market. For promoting the innovation marketing strategies can be used (Pfeffermann & Hülsmann, 2011). According to the Interview Results, Commute Greener needs more strategic business plan and communication strategy for promoting the application. The Commute Greener initiative is financially dependent of the Volvo Group. By commercializing the application the developers can gain independent resources and a bigger budget that would enable more possibilities for the further development.

- <u>Connotations with Volvo.</u> The Commute Greener initiative is created by Volvo IT which comes with both positive and negative aspects. From the perspective that both Commute Greener and the Volvo Group have environmental care as their core value (Volvo Group CSR and Sustainability Report 2011), there are no contradictions of Commute Greener being embedded in the Volvo Group instead of being an independent business unit. However, some users associate the application wrongly with Volvo Cars in the first place leading to the contradictory perception why a car company would run an initiative such as Commute Greener encouraging people to use cars less.

  Although the developers have removed the line "*Powered by Volvo*" from the Facebook application, the Volvo name emerges in the application's content, for example, there are Volvo challenges and rewards to the best performers.

(3) Target

According to the Interview Results, the application has three main target groups: municipalities, companies, and individuals.

Using such a soft measure as the Commute Greener application municipalities can raise their inhabitants' awareness about the congestion problems and promote alternatives to going by car. By changing commuters' behavior and attitudes towards using public transportation, cycling, walking, and carpooling the municipalities can save resources of building new roads.

The companies, by encouraging employees to use the Commute Greener application, will receive concrete data regarding the environmental influence of this activity. If the employees are interested in joining the activity and to compete with their colleagues, they can change their commuting behavior and reduce the CO_2 emission. Thus, the company can claim in their CSR and sustainability report that it has contributed to environmental development.

The individuals, by choosing to cycle instead of driving a car, will improve their health, save money on fuel, possibly reduce time and stress spend in queues, and contribute to a better environment. Moreover, the newly added competing features and chances to win real prizes (e.g., backpacks, concert tickets, and vouchers for buying food on an online food store) can also been seen as benefits that are expected to raise the users' motivation to join the Commute Greener movement.

The first two groups (municipalities and companies) are business to business clients that as agreed with Commute Greener try to encourage their inhabitants or employees to use the application. In contrary, the third group consists of direct users of the application and is approached directly through Commute Greener online channels and campaigns. Even when targeting municipalities and companies, the direct application user is an individual who probably is interested in at least one of previously named issues.

Challenges:

- <u>The diversity of the target groups</u> is quite challenging for the communication perspective. According to the Interview Results the biggest challenge is to adjust the messages and the communication channels to each of them: municipalities, companies, and individuals.

- <u>The users' motivation to switch to the Facebook application.</u> The application shift to Facebook brought one serious challenge: How to motivate the users from the previous version of the application to use their Facebook accounts instead. There is a solution for those users who have not switched to the new social platform. They can still use their accounts on the Commute Greener web page.

(4) Application use and features

Commute Greener is an online solution that encourages users to change their behavior in a real, non-virtual environment. These are also important gamification elements: the point

system, badges for certain achievements, the leaderboard, challenges, and other rewards. The point exchange system into real value, such as prizes and discounts from sponsors could be explained better to the target groups. According to Zichermann and Cunningham (2011) games in general are good motivators that bring pleasure and rewards in the focus. They also claim that "games are able to get people to take actions that they don't always know they want to take (..)" (Zichermann & Cunningham, 2011:15). It follows that the gamification elements can be beneficial in both ways – for increasing the application's popularity and for encouraging the users to change their behavior. These elements can add a different dimension to a product (the application in our case). However, they can bring success only if the product itself is well developed and needed in the market: "(..) if you expect gamification to fix your business' core problems – bad products or poor product-market fit – it will not." (Zichermann & Cunningham, 2011: XViii). Quite similar information was given in the Interview Results regarding the communication. The developers admitted that the communication can be successful only if there are no complications with the application and it is easy to use.

Challenges

- Users' motivation to continue using the application. As the Interview Results showed, the application can not maintain users' interest for a longer period. The developers have added the gamification elements that are seen as useful tools for engagement (Zichermann & Cunningham, 2011). However, possibly the users only lack the information how to continue or don't completely understand the idea of the application. There is still need for more explanatory elements like tutorials and newsletters with links to the web page where more information can be found.

- Unclear connection between the application and the Facebook page. Another challenge is that there is no clear connection between the application and the Commute Greener Facebook page. The application users might not know about the Facebook page where more explicit information is distributed. Therefore, the only information channels for them are newsletters and the application itself. At the same time, the Commute Greener Facebook visitors might follow the messages, to "Like" them, but don't use the application itself even when being provided with the information how to find and use it.

(5) Communication

Communication plays an essential role for the application diffusion. The aim of the online communication is to increase the amount of users and to encourage them to change their behavior. These channels are used both to provide information about the application and Commute Greener activities, and to encourage users to share their experiences, feedback, and to ask questions.

The Commute Greener team has used both online and offline communication approaches. The aim of the physical, offline campaigns is to attract people's interest at a specific

geographical point and time. In the Interview Results section is described face-to-face campaign related to the Gothenburg congestion tax. This campaign drew media attention that resulted in two published articles in local newspapers (e.g., *Göteborg-Posten*). As a result, the people's activity was high. During these days the number of downloaded applications raised and that can be clearly correlated with the campaign activities. People were active also on the Commute Greener Facebook page and "Liked" the pictures and posts, and wrote comments to them. The second campaign that was run at the Saint Valentine's Day also raised the users' activity on the Commute Greener Facebook page. However, the gain was lower from this campaign as compared to the previous and next one. The last described campaign (The Earth Hour Challenge) was run online. In this way the Commute Greener team promoted the application and draw the users' attention to a new feature, namely the – challenges. This campaign succeeded to keep a high users' attention level for two weeks being the whole period the campaign was run. The success of the first and the third campaign can be correlated to the fact that they were more connected to the main user motivators for using the application, namely the financial benefit by saving money for taking bus due to the congestion tax for cars, and the environmental interests regarding the WWF activity. The Saint Valentine's Day campaign had the least connection to the Commute Greener idea.

The users' and followers' feedback differed from campaign to campaign. The messages from the first campaign were shared, "Liked" and commented considerably more than from any of the other campaigns. However, the messages from the last campaign gained the highest reach. In other words, these messages were the most viewed by the Facebook users. But the campaign did not considerably increase the number of people joining the Earth Hour challenge as compared to the other Commute Greener challenges. Though the Commute Greener campaigns were held both physically and online, the main communication was performed exclusively online due to the application itself being an online solution targeting Facebook users that are used to communicating online.

According to the Interview Results, the main communication channels are the Commute Greener Facebook page, blog and the web page. Even if the blog is not seen by the developers as an effective channel, almost every new blog post is promoted with a post on the Facebook page. In this way the Commute Greener Facebook page followers always can see short headlines of the news and can click on the blog link if they are interested to read more. Twitter is not seen as effective channel although during the time period from the January to April there were posted in average 20 messages per month. Some of them included links to the latest blog posts. Another tool for sharing the links to the news and important application instructions can be newsletters. Furthermore, newsletters could motivate the users to return to the application. However, according the Interview Results, they are not considered to be a good communication channel. Nowadays people are overloaded with different information and often get too many e-mails that they do not check due to the lack of time (O'Hair, 2011).

Regarding the content of the online communication, the Interview Results showed three main themes: promotion of the application and its features, challenges, and environmental topics and healthier lifestyle. Overall the environmental theme dominates due to the serious impact on nature by the transportations. One of the main tasks of the communication is to

raise users' awareness. And environmental care is also the core value of the Commute Greener. Occasionally they are posting information that is not fitting in these three themes but might be interesting for the readers, for example, a funny video to cheer up the users and to wish a nice weekend.

Reviewing the online posts we could observe that the followers have shown more attention to the messages that contain photos and videos of people who were involved in the activity. For example, the posts from the campaigns displaying pictures with the campaign team members and the people that were met were much more "Liked" and commented than professional promotion images. The tone of the messages is mostly positive drawing the readers' attention to the benefits what they can gain from using the app instead of stressing the harm what they do to the environment if they will not change the commuting behavior. Communication is critical to persuade people. Therefore the Commute Greener team is sharing messages their own and the users' positive experiences.

An important aspect of communication is feedback (O'Hair, 2011). It is also an important element for motivating to change behavior (Osbaldiston & Schott, 2012). In the context of the application it can be seen in two ways. One way is the feedback the Commute Greener application provides to the users by showing the results of their performance. The feedback is an essential feature of the application because it gives the users the reassurance that they can make a change. The opportunity to compare these results can give the feeling of belonging to a group. Knowing that you are not alone but that there are others who also take a part in the activity can be a good motivation for continuing to improve the performance.

According to Zhao, Lu, Wang, Chau and Zhang (2012) the feeling of belonging to a virtual community raises users' trust and commitment to the group. It can also encourage them to become more active participants and share their own knowledge and experiences (Zhao, Lu, Wang, Chau & Zhang, 2012).

Another way of feedback is the users' communication within the Commute Greener channels. By sharing, "Liking", and commenting posts they can express their opinion, share ideas, and thereby give the feedback to the Commute Greener team about their attitudes.

Challenges:

- <u>Instructions on how to use the application.</u> According to the Interview Results the developers consider that the application is complicated, therefore users lose interest to continue to use the Commute Greener application. Possibly, users simply don't understand what they can use the application for. If the application is introduced to some company it is also possible to train the employees by meeting them face-to-face or giving the instructions to the responsible person at the company. But when an independent individual joins the Commute Greener application, he or she needs to get the information otherwise. There is a Frequently Asked Questions guide on the Commute Greener web page but it does not answer all of these questions. Partly, these answers are given on the Commute Greener Facebook page and the blog. In addition, the users have the chance to start a dialogue there and ask concrete questions. Therefore, the online communication on these platforms plays an essential role.

- Lack of interrelation between the application and other informative channels. According to the Interview Results the developers admit the need to improve the communication within the application. The communication directly in the application is essential because there are users who don't know about or don't use the other information channels and therefore can't get additional information through them. These users possibly got to know about the application via e-mail from their employer or friends or read about Commute Greener in press. Thereafter they went to the App Store or Google Play page where they can read the general information and see some screenshots, and download the application. Then the next step and communication is already within the application. A simple wizard helps the user to create a baseline and gives first suggestion about what to do next. The visual elements in combination with short text messages giving instructions on how to start using the application and what to do next. There is also movement added to the most important elements to draw the users' attention. The user can always find additional information in the form of a tutorial video or a manual in PDF format, or to send a letter to the support. However, there still is space for improvements in linking the different information channels.

- Diversity of the target group. The main reason for the Commute Greener Facebook page is to maintain communication with the users and to encourage new people to join the initiative. Although the Facebook settings are seen as good for reaching a wide target group it is challenging to combine messages for both the individuals and for business to business clients. Both of them should receive information that is relevant and attractive to them. At the moment, the information on the social platforms is more targeting individuals than companies. It should be investigated if Facebook is the best channel for targeting companies. As for now, more information for companies is found mainly on the Commute Greener web page.

- Keeping messages simple. The information presented in the Interview Results section showed that the Commute Greener team has not found the right way yet how to communicate with the society about their complex innovation. The messages spread by Commute Greener should be easy to read and to understand. The presented information should attract the readers' attention and raise their curiosity to go further and read more or to check out the application. A message could, for example, present what the new challenge is about.

- Difficulty to get "Likes". According to the data from interviews the developers are aiming to have more interaction with the users. The Commute Greener team expects users to show their attitudes by "Liking", sharing and commenting the posts. At the moment, the followers of the Commute Greener channels are rather passive in "Liking", commenting and sharing messages spread by Commute Greener team. For Facebook posts made in the time period between January and April 2013 the maximum amount of "Likes" for a post was 22. In average there were 3,4 "Likes", 0,26 comments, and 0,25 shares per post. These numbers are seen as low considering that there were around 700 followers of the Commute Greener Facebook page. On

the other hand, it still can be regarded as a positive result, since the communication approach is still in its testing phase, and because of the short time period, and the novelty and complexity of the application.

- <u>Language</u> is another challenging aspect. Commute Greener is a global initiative, mainly communicating in English, except the descriptions about the local Swedish campaigns (*Sundsvall*, *Göteborg* and *Volvo Tuve*) on the web page and some short messages on Twitter and Facebook that are in Swedish. Although there are localized versions of the first page of the Commute Greener web page in several languages. One more aspect regarding the language issue is that English is used as the only language within the application. The interviewees mention it as a possible problem for some part of the users since the majority of them probably does not have English as their mother-tongue.

- <u>Communicating marketing.</u> According to the developers' opinion, communication probably is not selling enough. Currently the communication is diverse and spread over several different channels. A common communication and marketing strategy is needed which would improve the communication in general and accordingly promote the application.

(6) Social aspects and motivation

As shown in the Interview Results the main Commute Greener communication flow is presented online. Using social platforms such as Facebook and Twitter the information can reach broader audience and desirably increase the number of the application users. The users of these platforms can share their experiences about the application thereby they may raise curiosity of their followers (e.g., friends, colleagues, and other people who are interested in this person's attitudes and activities). The online social environment fulfills to a great extent the need of socializing and spreading ideas as it is in the physical environment where the word-of-mouth communication is used as an effective marketing instrument in a product promotion (Pfeffermann & Hülsmann, 2011). Also the Commute Greener developers admitted that they need to find pioneers who could try out the application and spread the message of his or her positive experience further.

The idea behind the new application version was that the users enjoy doing things together, competing with each other, and enjoy the community feedback. In the current application version users are firstly compared with their Facebook friends who have also joined the application. These users can see how many points his or her friends have got, and what their position on the leaderboard is in comparison with these friends. The next level of competing is joining the challenges. The users can join there the local and global challenges and compete against all other users who also have joined these challenges. If the user is an employee of a company that is using the Commute Greener application, he or she has a chance to join a special challenge that is activated only within the company and is not publicly visible. In this case the user's performance is seen only for the members of the participants of this particular challenge. However, the feedback about the users' performance

remains always individual. If the user does not want to interact with others, he or she can easily deny sharing options. In this way the application can be used more as an individual tool for measuring and improving the one's commuting behavior.

Still, the application aims to be more of a social tool than an individual one. Especially the ride-share option encourages people to socialize with each other and to share their trip to or from work. The idea is that the users will use this opportunity for sharing a car and thereby save the money and reduce the CO_2 emission by half.

Both online and real life social aspects can have a powerful influence on raising the users' motivation to try out the application. If a company has started to use the Commute Greener application and introduces it to the employees, the informal interactions are often even more effective. For example, the employees will talk about it during coffee breaks, share their experiences, and in this way encourage also others to try it out. In the same way the information spreading works on the social platforms. If the user shares information about the Commute Greener initiative, for example, about own improvements or challenges, on Facebook or Twitter, his or her friends and colleagues will see that and can also get curious about the application.

Belonging to a group gives additional motivation for the application users. For example, the releasing of the WWF challenge encouraged users to join and invite other friends. The more users were participating, the more sponsors' money was transferred for charity. Another example of belonging to a group is campaigns within an organization. In such case, the employees who are using the application are contributing to the organizational goal (e.g. to save a certain amount of CO_2 emission).

Challenges

- <u>The users' motivation to join the challenges.</u> The challenges can be a good motivation for users to continue using the application. The number of users joining the challenges constantly grows. Still, adding more explanations about how challenges function and how people can get the prizes is seen as necessary to keep users active. The users' group is quite wide regarding their age and gender. Therefore, the rewards should either be attractive to all of them or the users should have an option to choose their prizes. The point and prize exchange system needs be explained and publicly available.

(7) Changing of behavior

According to the Interview Results the Commute Greener team believes that the application motivates users to change their commuting behavior to a greener one.

The changing behavior in general cannot be seen as a short-term goal, since it requires a long process to sustainably change habits First of all, the users should be aware that there is a need for changing their commuting habits. The application measures the users' performance and gives feedback showing how beneficial their improvements are both for the environment, health, and financial benefits. Besides the amount of the saved CO_2 , the performance feedback shows the improvements comparing them with real life amounts

such as saved trees, burned calories and hamburgers, as well as saved EUR on the fuel. The developers assume to create a better understanding by translating the performance into such real-life comparison amounts.

However, additional motivating factors are needed to increase the users' long-term activity.

Challenge

- <u>Hard to change behavior.</u> The application tries to encourage people to change their usual commuting behavior which is habitual and gives comfort. It is not easy to persuade them to altruistically leave their comfort zone (e.g., car) for a common benefit (e.g., minimizing congestion caused problems). Therefore it can be effective to stress in the Commute Greener communication personal benefits for the application users, such as health, money saving, and prizes from the challenges.

(8) Environmental aspects

Most interview answers involved environmental issues due to the tight connection between the Commute Greener goals and environmental care being the core value driving the application. The main task for this initiative is to stimulate positive climate changes by reducing CO_2 emissions. The application's linkage to environmental issues is also present in its name: Commute *Greener*.

Challenge

- <u>Environmentally friendly commuters are not targeted.</u> The idea of the application is to change commuting behavior. Hence it is mostly targeting people who are using a car on their daily basis. If a person who already uses a bike for commuting to work wants to join the application, he or she cannot make any improvements or get points. Although these people are very interested in the environmental issues, they are not fitting in the Commute Greener target group.

6.2. Survey Analysis

In the survey analysis the data collected among users, showing their perspective on the application design and communication around it, is discussed in relation to relevant research as well as the contextual information about the application.

(1) Communication Commute Greener

One of the themes in our survey referred to the existing communication coming from Commute Greener. A sort of evaluation of how the user got to know about the application as well as how engaged he or she is in the communication was possible thanks to the answers given by the respondents (Q2). Many of them (35,9%;14 respondents) got to know about the application through Facebook. This is the main channel on which the communication coming from Commute Greener is placed and which has most frequent updates. However

this platform is not actively promoted in other places, e.g. on Facebook pages of initiatives with a similar focus or aim as Commute Greener's. This means that to come across the Facebook page the user has to search for it through the Facebook searching engine or see it because persons in their personal network performed an activity on it and kept it visible on their Facebook profile. Another option that received a relatively high percentage of answers (25,6%; 10 respondents) was workplace as a source of information about Commute Greener. This could be due to the fact that Commute Greener started off as an internal initiative within Volvo IT, it is still promoted internally through newsletters and internal press releases and is used by its employees. Another possibility could be that the users do not work in Volvo IT but in one of the other companies with which Commute Greener collaborates, such as e.g. Volvo Group or the Gothenburg Symphonic Orchestra among others. An explanation to this is that Commute Greener is targeting both individual users as well as companies and municipalities. The respondents were also free to choose an answer called "other" where they had to specify the source of information. 17,9% , which is 7 respondents, chose this option, and 5 out of them mentioned interpersonal communication. The Commute Greener web page, which is the channel on which most of the organized and official communication about Commute Greener can be found was the source of information for 10,3% (4 respondents). In the case of a web page the most likely way of finding it is through a search for keywords in one of the online searching engines. Since we did not ask the respondents to answer precisely how they come across the different channels (e.g. through searching, hyperlinks), we do not have information regarding this. However, it is likely to be possible to track down the sources for the Commute Greener employees, since web pages and blog often have an option of checking the sources from which the readers were directed from. Other options, that did not receive a high percentage of answers were life campaigning (5,1%; 2 respondents), blog (2,6%; 1 respondent) and newspaper (2,6%; 1 respondent). Two of these answers are not particularly surprising since as mentioned earlier most of the communication coming from Commute Greener is based online, and the probability of getting to know about the innovation through life campaigning or newspaper articles that are usually coming in hand with them is relatively low, since they are seldom performed. What can be surprising however is the fact that relatively few people got to know about it through the blog, since it is the second most often used communication platform. A possible interpretation of this data could be the fact that the blog is embedded in the Commute Greener web page and therefore might be difficult for the reader to separate these two. Though its layout is definitely resembling a typical blog (with the date in one of the corners, headers, pictures, possibility to comment), on the left side of the blog categories of the web page are visible. This could make the readers state that they have got to know about Commute Greener through the web page, even if they actually did it through the blog.

Since new media, on which Commute Greener is active, are often discussed in the context of interactivity and user engagement in communication (e.g. Crawford, 2009) several questions relating to their responsiveness and activity were asked. One of the questions was addressing the fact of "Liking" the Commute Greener Facebook page (Q3). The majority of 68,4% users that answered this question (26 respondents) stated that they have "Liked" the page. Since the respondents are using the application version available on Facebook, it can be expected that this is the platform on which they would also receive more information about

the innovation, though to do it they have to kind of "subscribe" to it, by liking the Facebook page. 31,6% of them however (12 respondents) answered that they have not done that. A possible reason for that will be shown later on when describing some of the answers to a question regarding interactivity.

The users were asked if they follow the communication coming from Commute Greener (Q14). By following we understand keeping oneself updated by reading the available information, but not necessarily responding to it. This word is somewhat established in social media terminology, since one of the biggest micro-blogging platforms Twitter is using it to describe the activity of subscribing to another Twitter user activity and allowing to let these activities show up on one's newsfeed. Though the term can be somewhat vague to persons that are not active social media users, we made an assumption that our respondents, being active social media users (we already knew they use Facebook) should understand the term. It also became clear in our research that most of the respondents are active on several social media platforms including Twitter, and were most likely familiar with this meaning of the word.

The majority of our respondents, almost 69,7% (23 respondents), said that they do follow it, while 30,3% (10 respondents) said they do not. Of course here such aspects as feeling that it might be right to answer yes could appear, though a relatively high number stated they do not. However from another question addressing the application use (Q4), we could see that 32,4% (12 respondents out of 37) claimed that they have stopped using the application. Despite the fact that a lower number or users answered the question relating to following the communication (Q14; 33 respondents) than the question related to the application use (Q4; 37 respondents) in both cases around 30% claimed that they do not follow the information and that they have stopped using the application. It is likely that most of the respondents who do not use the application any more are not interested in communication coming from Commute Greener. To get a better insight into the reasons why the users do or do not follow the information, depending on their answers they got a follow up question regarding the channels on which they follow the information (Q15) in case of a positive answer and an open question addressing the reasons for why they do not follow it (Q19) in case of an negative answer. To the first question most of the users answered that they follow information published on the three platforms that are the most frequently used by Commute Greener: on Facebook (almost 74%; 17 respondents), web page (26%; 6 respondents) and blog (17,4%; 4 respondents). A relatively high number of 13% (3 respondents) chose the option of "other" and was asked to specify and here such answers as newsletter and workplace were given. No respondents chose Twitter or YouTube as an option. Though Twitter has been quite frequently used it is likely that the application users were not aware of the fact that it exists, since the links to the Twitter account on other communication platforms are weak. Only the Facebook application browser version and the Facebook page have a direct link in it to Twitter (among others: Facebook page and YouTube channel) account clearly displayed. It is not added to the Commute Greener web page, blog (though linked in one of the old blogposts) nor to the mobile version of the application. Similarly a link to the YouTube channel is visible only on the browser version of the application, in the Facebook fan page description, on the Commute Greener's 2nd web page. Though YouTube gives the possibility of subscription, users tend to use this option mainly for channels that

have frequent updates, which is not the case of the Commute Greener YouTube channel. Since the YouTube videos are also often being linked on the Commute Greener Facebook page it is also likely that the users watch them directly on that page without going to the YouTube account.

The users that stated that they do not follow the information were asked to motivate their answer in an open question (Q19). Here a variety of reasons were given, such as e.g. flaws in the application, not knowing about the information, having no time for it or information overload. Here especially valuable is an answer coming from a user that stated that there is no pop-up information within the application and therefore he/she did not know about it. As stated earlier the link between the Facebook application and communication channels used by Commute Greener is weak, with links to chosen communication channels (Facebook page, YouTube channel, Twitter account) being visible only in the browser Facebook application version page, but not in the mobile version of it.

Since we see following the information as a rather passive activity, especially since the majority of the users follow the information on Facebook which makes it very likely that the information appears on their newsfeed automatically, to check whether the respondents make use of the interactive features of the communication platforms we asked them if they ever respond to the communication, e.g. through commenting, sharing or "Liking" the online posts (Q20). Though the interactivity is seen as a very important feature of social media platforms, especially in the context of media and consumer behavior, several researchers have stated that these functions are being given too much attention in the social media discourse (Abe, 2009; Crawford, 2009). Abe goes even as far as stating that there has been created a myth of interactivity around technological innovations (2009:73). Crawford states that a lot of value has been given to the possibility to voice out one's opinion online, and this activity has been seen as primary, while research shows that actually up till 90% of the internet users will practice only light online activity, if any (2009). She referred to research that claimed that so called "lurkers" have always been the majority among online platform users and that non-active participation in the communication is just a form of "listening" adapted to our times (Crawford, 2009). This could suggest that receiving a high number of respondents saying that they do not actively participate in the communication or do not respond to it should not be surprising. Among the respondents the majority, namely 54,5% (18 respondents) answered that they do not respond to the posts, while 45,5% (15 respondents) claimed that they do.

To understand why the users chose to be engaged in a kind of more or less engaging dialogue with Commute Greener we asked the users to motivate their answer by asking them why follow up questions. Several different reasons were given for sharing the information (Q21), with repeated more general answers such as showing support (also for people who work in Commute Greener) and spreading the information, or more individual like expressing their opinion or liking discussions. It can be understood that persons that think of the bigger idea behind Commute Greener, which is reducing the personal impact on the environment seem to be responsive to the communication. When it comes to the motivations for negative answers (Q22) the users stated that they do not like it or do not practice sharing and liking, especially information coming from companies. The answer regarding information coming from companies is interesting, since Commute Greener is a free

application and does not expose the connection to Volvo IT in the Facebook application at the moment. The information is available in the application description in Google Play, App Store, Facebook App Centre, as well as on the Commute Greener's 2nd web page and consequently on the blog. The link with Volvo in the application can also be seen e.g. through having a challenge in cooperation with Volvo Group. In some of these cases it is just a short information about who has developed or owns the application, in some it is a longer description of the support and contribution of Volvo IT.

(2) Communication content

Commute Greener focuses its communication on issues related to green commuting, with few exceptions of presenting information related to nature, sport activities or commuting in general. The majority of the information is related to the application itself, such as e.g. updated features, opening new challenges.

To understand how the content of online communication coming from Commute Greener is meeting the expectations of its users we asked them whether they are satisfied with it (Q16). Most of the users, 65,2 % (15 respondents) answered that they are satisfied with it, while 34,8% (8 respondents) stated that they are not. Since the question had a polar character we wanted to get to know what should be kept and what should be improved in the communication, therefore follow up questions to the positive (Q18) and negative (Q17) answers were asked. Since these questions were not compulsory, relatively few respondents answered these them (11 and 6 respectively). The users who were satisfied with the content stated that the information was interesting, made them learn new things or helped to be a part of the initiative. A valuable answer came from one of the respondents who has stopped using the application itself but still follows the online information spread by Commute Greener. This suggests that the strategy of communicating not only about the application itself, but also about more general issues related to green commute is good. It might help to keep persons interested in the topic. Potentially even if they stopped using the application they might be persuaded to test the new versions of it.

The users who were not satisfied with the content were relating to the fact that the communication is focusing much on the application itself, while they would like to see more general environmental topics or they did not see it as relevant. Though this type of information is included in the posts coming from Commute Greener, it seems to be not satisfying for these respondents. Though it should be remembered that the main goal of the communication is to spread the knowledge about the application and persuade more persons to use it, rather than creating a community of people with environmental interest around it. When it comes to reaching new potential users an aspect that was pointed out by one of the respondents was the language choice. He or she specifically asked for adding Spanish to the communication. The comment regarding the language choice is justifiable since the application has a global reach and one of the goals of its developers is to cooperate with municipalities and companies around the world to reduce congestion as well as getting as many individual users as possible. Although considering having different language choices within the application could probably be worth it, having all other information in several languages would require much more resources and would raise the costs. One of the benefits

of using online communication is the wide reach and relatively low costs. The decision of communicating in English (and partly in Swedish) is understandable and since not many respondents saw the language as a problem, for now it seems to be the well motivated choice.

Commute Greener has been sending out newsletters to its users, but not on a regular basis. To see whether it would be worth starting to use this channel in a more organized manner, the respondents were asked whether they would be interested in receiving it from Commute Greener. A vast majority of 75,8 % (25 respondents) answered that they would be interested, while 24,2% (8 respondents) answered that they would not be interested. Due to the fact that it is an open innovation and an application that is undergoing constant changes a newsletter send out to all registered users would potentially be a good way of reminding old users that have probably stopped using the application about the existence of Commute Greener. Until now the newsletter has been send out to all registered application users, who were not asked whether they would like to receive a newsletter. In the times of information overload, the users have to be given the possibility to subscribe and unsubscribe to it. Since the interest in the newsletter is relatively big, this channel of communication should be considered for strategic communication in the future, especially since much of the content that could be used in the newsletter is very likely to be prepared for publishing on such channels as the web page or blog anyways.

(3) Application use and features

One of our survey questions was addressing the application usage frequency. Here the respondents were asked to estimate how often they use the Commute Greener Facebook application (Q4). It should be remembered that answers to this question are based on individual's estimation, and where not tested by the researchers. This means that in reality they might use it differently than they stated. However as shown in the results section among the respondents of our survey there was a quite big spread when it comes to the frequency of application usage, with over one third (32,4%; 12 respondents) of them having stopped using it. This is seen by us as making the responses more valuable, since they are not so likely to be biased by overly positive or negative attitudes. However what should also be taken into consideration is the fact that persons that do not find the application useful and are discouraged to use it are less likely to follow the communication coming from Commute Greener. Therefore we see it as a positive sign that still quite many of them were motivated enough to fill in our survey. It could suggest that they see the communication as an important aspect in the application development or that they see the initiative as valuable and recognize the need for improvements.

To see what aspects of the application should be strategically stressed in the messages coming from Commute Greener or in the application design we asked a question related to motivating application features (Q12). Here the answers were spread quite evenly between the different features, but especially challenges (47,1%; 16 respondents), which give the chances for the users to win real life rewards and feedback about the performance (47,1%; 16 respondents) were seen as motivating. Rideshare suggestions (41,2%; 14 respondents) and improvement suggestions (41,2%; 14 respondents) also received a high number of

responses, while around one third of the users saw the points (32,4%; 11 respondents) and badges (29,4%; 10 respondents) as motivating. Comparing results with others in the leaderboard was not as motivating (14,7%; 5 respondents). The respondents who chose other option as an answer said that the possibility to use the mobile version of the app motivates them, while other said that none of the features is motivating. What is worth mentioning here is that the challenges are a quite recent addition to the application features, and therefore is can be quite surprising that they are so motivating. Since by participating in the challenges the users can get real life awards that are basically incentives for their performance it proves that in this case the strategy works well. However the problems with providing real life rewards is the costs – the awards have to be sponsored by organizations or companies that see a value in the work done by Commute Greener. The use of incentives for proenvironmental behavioral change has been researched earlier and according to some proves to be not so effective and very costly in a long run, however a powerful motivation in the beginning (DeYoung, 1993). It is definitely a feature that seems to be attractive for the users and should be still stressed in the communication around the application.

Since the communication coming from Commute Greener often regards the application use, e.g. instructions for how to use new features added to the application it seemed to be important to check whether the users thought that the information is sufficient. This information was gathered through answers to the question regarding the need of receiving more instructions regarding to use the Commute Greener application (Q23). Out of the 20 respondents who answered this question, 50% (10 respondents) stated that they feel that the amount of application use instructions is sufficient, while the other 50% (10 respondents) answered that they feel that more information is needed. Since the answers are not giving any clear picture of whether more instructions should be given or not a follow up on this topic should be considered.

(4) Social aspects and motivation

Commute Greener has been developing throughout the past three years into a more social application. In the beginning it did not have any social aspects, since it was meant to be more for individual use. With time several social aspects such as the possibility to create one owns network and inviting friends were added. However the developers observed a tendency among users for not utilizing the social aspects of the application. Users did not even personalize their own profiles by adding a picture, which was seen as requiring minimal effort. Meanwhile the importance of certain social media grew tremendously, with Facebook reaching 483 million users active on a daily basis in January 2012 and 900 million registered users in May 2012 (Alec, 2012:118). The decision to embed Commute Greener within Facebook took the burden of creating one's own online social network around the application off the developer's shoulders. Facebook users are already somewhat familiar with different types of Facebook applications, especially games. Also today many smartphone applications give the possibility to log into the application through Facebook instead of registering a new account. This is due to several reasons. One of them is the fact that today internet users are often active on several different platforms and networks. Creating different accounts requiring new usernames and passwords becomes an obstacle,

since people basically forget them. Using Facebook login becomes a way of simplifying this process. On the other hand the developers of the applications see this as an opportunity to gather demographic data and to get access to the network of the application users, as this is usually one of the terms of the application use that one has to agree on when registering. Some applications even ask for the permission to publish messages on the user's Facebook profile in their name. Of course the decision to create an application embedded within Facebook brings some risk as well. Persons that do not use this social medium or are reluctant to share their login and password with the application developers or basically do not like using Facebook applications will most likely lose interest in the product. Commute Greener is up to date available in two versions – for persons who want to use it only via the Commute Greener web page as well as via Facebook. Since only the latter one is being researched in our thesis, we asked questions regarding the social aspects of the application. One of the questions was addressing the perception of the application as a tool for individual use or as a social tool (Q5). The majority of the 36 respondents, namely 58,3% (21 respondents) who answered this question perceived it as a tool for individual use, while 41,7% (15 respondents) saw it more as a social tool. This is quite interesting if we consider the fact that the application is embedded in a social network, and several features of the application design have a social aspect, such as challenges in which one competes with others or works toward a common goal, rideshare options, leaderboard or best performers board. Some social aspects connected to Facebook are the possibility of inviting one's friends to use the application or to publish information on one's Facebook profile about the improvement one has done. The application itself can also be seen as social due to the idea behind it – caring about one's impact on the environment has also a social context to it, since the results influence others as well. Last, but not least the application actually encourages users to not isolate themselves by driving a car, but to take public transportation, cycle or share their care ride with others – these aspects stimulate social interaction in real life. However the core of the application is based on individual impact on the environment and measuring ones performance. If the user does not invite her/his friends to using the application then he only a few other users are displayed on her/his profile. This can also make the impression that the application is not really social.

Due to the fact that behavioral change research often refers to the social aspects of the process, such as e.g. commitment as an important motivational factor (Osbaldiston & Schott, 2011) it seemed to be important to see if the users are motivated by these aspects. This issue was addressed in Q11. Most of the 34 respondents who answered this question, namely 52,9% (18 respondents) stated that the social aspects, such as e.g. inviting friends or comparing their performance with others is important for them. Not that much less though, namely 47,1% (16 respondents) stated that it is not important for them. This seems to be somewhat contradicting with the answer to the earlier mentioned question regarding the application perception, since most of the users see it as an individual tool. It could also mean that the users see the potential in the social aspects of it, and suggest that these should be further developed or more utilized. It could also mean that the users think that the social aspects are important for the developers and that they should answer the question in a certain way. However since the answers are quite divided, this might not be the case.

A general question regarding behavioral change motivation was asked in Q10. The options given as possibilities refer to the most commonly discussed when talking about using alternative ways of transportation: health reasons, economical reasons, environmental reasons. 34 respondents answered this question and money saving was the most motivating for changing commuting behavior for 32,4% of them (11 respondents), while better health was most motivating for 29,4% (10 respondents). The third most motivating aspect was cleaner environment with 26,5% (9 respondents). An answer also connected to the environmental issues, but with an individual gain was being perceived by others as environmental friendly was chosen by 5,9% (2 respondents). The same number of respondents gave other reasons, such as literally feeling the negative impact of the car use while biking and also exercising. These motivational aspects are quite general, and some have a more individual characters (exercising, personal economy), and some a more social (environmental care). What can be seen in these answers is that most respondents are motivated by some individual gain they have from commuting greener. Since they all stated that they are interested in environmental issues this is especially interesting. It shows that even people who care about the environment, might see their contribution to a cleaner environment as a side effect of things they do for more personal reasons. The health, economical and environmental benefits of commuting green are strongly stressed in the communication coming from Commute Greener. Since these were also the reasons most often given by the 34 respondents who answered the question, the strategy of stressing these seems to be right.

(5) Social media use

To get a better understanding of how active on social media the Commute Greener Facebook application users are, we asked them a question in which they were to evaluate the frequency with which they use specific social media platforms on which Commute Greener is present, such as Facebook, Twitter, Blogs, YouTube, LinkedIn (Q9). The respondents were also given the possibility to choose and option of other since, we could not include all available social media platforms. Facebook turned out to be the most frequently used platform, with 79,4% (27) of all the 34 respondents who answered the question stating that they use it every day. It should not come as a surprise that the respondents are active Facebook users, since the application that we do research on is embedded in this social media platform, and its users have their profiles on Facebook. Twitter turned out to be the platform that many of the users did not use at all (35,3%; 12 respondents). YouTube and blogs were mostly used more than once a week (41,2%; 14 respondents and 32,4%; 11 respondents respectively) and LinkedIn once a week (41,2%; 14 respondents). It seems that the match between the platforms on which Commute Greener is active and the ones the respondents use is quite good. However people might not use these channels for the same purposes, due to their different character. Facebook for example has a more private aspect and is used for creating a private network, YouTube usually is a source of entertainment, while LinkedIn is seen as a tool for creating one's professional online profile. This means that potentially not all of these platforms are seen by the users as sources of environmental related messages. To check where the users

look for information from this field we asked several questions regarding the environmental aspects.

(6) Environmental aspects

A general question regarding respondents' interest in environmental issues was asked (Q6). Here all 100% (35) respondents who answered the question stated that they are interested in them. Since it was a dichotomous question it should be taken into consideration that it brought the risk of making the respondents answer in a certain way. In the past years the general awareness of the importance of environmental care has rise and in many countries a sort of social pressure for being interested in these issues has come (Lundqvist, 2000). This could influence the respondents answer. However since Commute Greener is actually and environmental innovation and the green aspect of is it is displayed throughout the name, design and communication about it we assumed that most of its users should be interested in environmental topics to start using it. We did not aim to measure the degree of the environmental interest of the users, this is a topic that could potentially be given more attention in the future. Commute Greener itself is not aiming only at persons with big interest in the topic, and as can be seen from our previously presented answers even among our respondents there seem to be persons with smaller and bigger interest in it. This could be seen in the answers to the question regarding motivational aspects (Q10), since some more individual aspects such as better health or economical reasons are also important for its users. Therefore they are a valuable source of information.

Since the objective of our research is to find out what is the potential use of online communication for diffusion of an environmental innovation we wanted to check how the respondents keep themselves updated on environmental topics. We addressed this issue through an open question regarding this (Q7). 20 respondents answered this question and many of them gave several answers. What can be seen as a trend here is that most of them refer to online channels in different forms, from social media to online news as well as to more traditional channels of mass media, like newspapers or TV. Also interpersonal communication was mentioned a few times in the form of discussions with friends. One of the respondents gave an answer "*random fb [Facebook] posts and news, I don't hunt for news myself*" which shows that some internet users believe that the important news will reach them even if they do not look for them themselves.

To see whether the ways respondents keep themselves updated on environmental issues match the way they would *like* to be updated on them, a question about preferred communication platforms for receiving information about environmental topics was asked (Q8). Here the respondents were given the opportunity to chose specific channels of communication. Including new media such as social media (Facebook and LinkedIn among others), as well as web page or blog, or more traditional media category (newspapers, TV, radio), printed media (posters, leaflets). Also face-to-face communication, newsletters and on open category of other platforms was added. The channels chosen for online communication refer to the channels that Commute Greener is active at, therefore the possible answers were more specific than in the other media, where they were somewhat gathered into groups of traditional broadcasting media and printed media and general

interpersonal communication. The respondents were given the possibility of choosing several answers, since it is common today to have the communication multichanneled as well as internet users usually seek information from different sources themselves. This phenomenon is called media convergence, which according to Jurin, Roush and Dante can refer to both the flow of information coming from different channels as well as well as to the practice of audiences that search for information (and often entertainment) on several platforms (2010). Among them the most frequently chosen answer was the general category of traditional media: newspapers, TV, radio, which was chosen by 79,4% (27 respondents) of the respondents that answered this question However the way in which this answer was created has it weakness, since no division into the different channels was provided. This can be seen as a limitation with potential influence on the answers. However these channels are seen as more external to the organization responsible for communication and therefore cannot really be controlled in such way as the other channels. Still we thought it was important to include them, due to the fact that they are so established. As Adomßent and Godemann state, mass media have an important role in environmental communication since they can "select and amplify the attention paid to a given topic and so influence public" (2011:29). The fact that the respondents chose this answer suggests that the information about environmental issues that they refer to is most likely seen as a piece of news. This brings certain challenges to the creation of communication about topics related to environmental issues that are relevant and important over a long time, but not necessarily as catchy and new as one would expect news to be. As Adams and Gynnild put it "making such messages captivating and interesting" can be difficult (2013:114). Of course in cases of environmental innovations such as Commute Greener Facebook application efforts towards establishing and keeping good relationships with journalists would be recommended. Here especially putting the innovation in some local or actual context can be beneficial. One such example coming from Commute Greener was a life campaign done during the time when congestion chargers were introduced in the city of Gothenburg. To show that Commute Greener rewards commuters instead of "punishing" them (since the congestion charges were creating a lot of negative emotions and were seen by many as a punishment) a campaign in which symbolic carrots were given to commuters leaving their car at a parking lot in the outskirts of the city and changing to busses was held. Before the campaign launch a press release was send out to local media and resulted with two published articles. This was due to the current interest of local media in commuting issues.

It can be seen as quite surprising that 64,7% (22 respondents) chose Facebook as a preferred channel for receiving messages about environmental topics. This channel is still used mainly for interpersonal communication, and to some extent for marketing communications for companies or organizations, including environmental ones. Though information/news are circulating on Facebook they are usually being entered by private persons in their status updates or linked or shared by them. For environmental information to become "popular" on such platform as Facebook it has to be presented in a creative way, to be worth sharing. Otherwise the respondents who would like to receive such information on social media platforms would have to somehow subscribe to a source of such information, e.g. a Facebook page of an environmental organization. This however means that they would have to know about if on forehand. For innovations such as Commute Greener information about

the user interest in receiving environmental information on Facebook should be seen as an opportunity for utilizing the fact that the product is already embedded in the platform. Stronger links from the application itself to the Commute Greener page should be created, so the users will not be left without knowing about the opportunity of "subscribing" to the information by "Liking" the page. Also cooperating with influential persons interested in the topic with a wide network could be beneficial for spreading information.

The objective of our study was to present the case of Commute Greener's diffusion as thoroughly as possible, through showing how communication practitioners responsible for an environmental innovation can make use of online communication, how the application users respond to it and what are their preferences.

As it can be seen in our study, the online communication environment seems to be a new sphere that can be used for innovation diffusion. Probably one of the most interesting aspects of online communication, especially performed on social media is the fact that it can be placed in an area between mass media and interpersonal communication. This brings new opportunities for innovation diffusion, due to the fact that the cost of communication can be reduced and the former used word-of-mouth can be changed into the word-of-mouse (Gelb & Sundaram, 2002), which can have a much wider, global reach. However to make full use of this potential, some background knowledge about the mechanisms of message spreading on these platforms as well as user preferences should be gained. What can be seen as especially challenging is fulfilling the expectations of being active on several communication platforms, while still keeping them integrated and linked. Our research showed that Commute Greener is spreading information about the application through several online communication channels, while the users are sometimes not even aware of their (channels) existence. This is due to the fact that they were not informed about them or that the product did not have any clear connection these channels. Another challenge of keeping the communication multichanneled is that it is possible to discourage product users, by providing too much information, since some of the respondents pointed out that it is impossible to keep up with all the communication that comes to them from different sources. It is important to understand the different needs and expectations of the users, since they have different motivations for starting to use the application and different levels of familiarity with similar products.

Another important issue regarding online communication is the use of the interactive features of social media. It seems that by deciding to place communication on these platforms expectations for engaging in a sort of a dialogue with the users arise. However as it can be seen in this case study it is not that easy to get feedback in the form of comments or even "Likes" on Facebook. Our study shows that most of the users are passively following the communication coming from the application developers. One of the reasons behind this, that can also be seen as a challenge, is the fact that users are not so open to supporting commercial initiatives on these platforms.

To sum up our research has shown that online communication for innovation diffusion, especially of an online based product such as Commute Greener has great potential, since most of the users are very active on several online communication platforms. However to make the right choices when it comes to suiting the message and channel to the target group it is important to conduct more research among the potential and current users, as well as

learn from previous experience and then create a communication strategy for the innovation diffusion.

6.3. Common findings

Our chosen research methods gave data for constructing two different perspectives. The interviews revealed information about the developers' expectations and motivation of choosing the communication channels and message content. But the survey captured the users' perspective by presenting their experience and preferences regarding online communication both in general and specifically regarding the Commute Greener application. Since the aim of this study was to examine and present how an online communication can be used for environmental innovation, both perspectives were analyzed separately to capture the main viewpoints in detail. Therefore in this chapter we present the common findings of both perspectives that explain which developers' expectations are met and what can be improved regarding to the users' preferences.

(1) Commute Greener user

The developer team claimed that their targeted individuals are middle age persons. The survey respondents fit into this category because the average age of the users was 36 years. They were representing countries from Europe, North America and Asia confirming the developers' claim that Commute Greener is a global initiative.
The survey did not clarify if the respondents are independent individuals or if they belong to a certain company and are using it because the employer is offering some company campaigns. However, 25,6% of the respondents answered that they got to know about the Commute Greener activities at their work place. It would be useful for the developers to investigate the perception of companies which is claimed to be the main target for Commute Greener. The Facebook page apparently works good for the independent individuals but it is not clear about its appropriateness for the business clients.

(2) Social vs. individual

The latest version of the application is embedded in a social online platform (namely Facebook) where the users can invite friends, share information about their improvements, and interact with each other on the Commute Greener page. Therefore all three developers see the application as a social tool. However, the survey results showed the opposite. Majority of the users (58,3%) sees it as an application for individual use. This was confirmed also by other questions. When the users were asked about the most motivating features of the application, they named the challenges, the feedback about their performance, improvement suggestions, rideshare suggestions, and points and badges. Here we can see that these elements except the challenges and rideshare suggestions are individual. However, the majority of the users answered that such social aspects as sharing experiences and having an online community within the application can raise their motivation for continuing

to use it. The application already contains several social features and the users can use the Facebook page for interacting with each other but they are not actively used. It could be that the users do not have enough information about the social features that already exist in the application.

(3) Users' motivation

The Commute Greener team stated that there are three main motivations why people are interested in the application. Those are better health, saving money, and environmental care. Currently the Commute Greener communication focuses mostly on the environmental topics. That seems to be a good strategy since all their users are interested in environmental issues as confirmed by the survey. However, another survey question showed that users in general are more interested in individual benefits than common ones. They stated that saving money and better health are more motivating reasons for changing their commuting behavior than a cleaner environment. It is partly in contradiction with the developers assumptions since one of them claimed that no one uses the application just because of the financial benefits. According to the survey, it proved to be the most important aspect for the users. From the other hand, the developers might be right that this aspect works only in combination with other motivating factors. However, we recommend to the developers to emphasize more the financially positive effects.

(4) Gamification

As the developers have experienced, the financial benefits, better health, and cleaner environment are not strong enough motivations for keeping the users' interest for a longer period. After trying out the application they considerably soon drop off. Also 32,4% of the survey respondents have completely stopped using it. Therefore the developers have added gamification elements that are seen as a good instrument for raising the users' long-term engagement (Zichermann & Cunningham, 2011). The survey confirmed the success of this move since the challenges, points, and badges were named between the most motivating elements of the application.

(5) Complexity of the application

From the developers' point of view the complexity of the application can be the reason that hinders the users to continue use it. As we got to know from the survey, few users have experienced technical difficulties that might be a reason for stopping to use the application. Also few users claimed that the application needs technical improvements.
All three developers claimed that there should be more communication about the application and its features. In fact, half of the application users claimed that there is not enough information about how to use the application which supports the developers' point of view
Communication can reveal more information about the application by explaining its features and functions. However, messages purely explaining the usage of an application are not always read by users, neither are they considered as very attractive to read in general. In this

line, one of the interviewees claimed that the communication can be successful only if the application itself is easy to use. Also users wrote in the survey that the application needs technical improvements. Therefore our suggestion for the developers would be to improve the usability of the application, making it even simpler, rather than adding more explanatory posts or messages Another way could be to (re-)introduce features while promoting new campaigns, or challenges, by just explaining the needed new functions.

(6) Content of the communication

The developers said that the content of the messages spread by Commute Greener is mostly about the application itself and the topics related to environmental care, active lifestyle, and commuting options. The majority of the users answered that in general they are satisfied with the content of the messages. However, it seems that those posts and activities that are closer related to the main users' motivation (financial benefits, environmental care and better health) are more attractive. The live campaigns that were more directly oriented on saving money (Gothenburg congestion tax campaign) and environmental issues (Earth Hour campaign) gained larger popularity than a campaign (St. Valentine's campaign) with weaker linkage to the application's main focus themes. The survey showed that the "better health" aspect as a motivation for changing users' behaviour takes the second place after the money aspect. Therefore we would recommend to the developers to try out to promote more healthier lifestyle elements. That could be done by introducing a challenge that mainly focuses on this topic (e.g., the users could aim for the most burned calories).

(7) Choice of the communication channels

Developers see the web page as the main channel for the general information and the Facebook page as the main platform for communication and interaction with the users. According the survey, 10,3% of the users got to know about the Commute Greener from the web page, and 26,1% of all users are following the information about the Commute Greener on this page. Here we should remind that it is possible that users perceive the blog as part of the web page, and the newest updates are provided exactly there. 17% of the users claimed that they are following the information on the blog. The most popular answer (35,9% of the users) was that they got to know about the Commute Greener via Facebook and 73,9% of all users are following the information spread by Commute Greener on Facebook. Another question about how often the users use different online platforms showed that 79,4% of the respondents are using Facebook every day . In addition, majority claimed that they would like to receive information about environmental issues via Facebook. Since environmental care is one of the Commute Greener main focus themes. It is reasonable to consider the Facebook page as the main communication channel. However, the linkage between the different channels should be provided more often. Otherwise the users who are using the application might not even be aware of the Facebook page and miss important information about the newest application features that could encourage them to maintain using the application.

(8) Newsletter

As previously mentioned the users lack information about all different channels the Commute Greener team are using. One effective method to inform all users about the Commute Greener news is by using a newsletter. It can contain information about the novelties of the application and new challenges, and provide links to the other channels, e.g., the Facebook page, the blog and the web page where the users can find more information.

In the Commute Greener case this can be an effective instrument for raising the interest about the application even between those people who have stopped using the application because their e-mail addresses still are in the users' database. Therefore a newsletter, send to everyone can raise their interest to go back to the application and check the new features. Also the survey for this research was distributed by using a newsletter and the results showed that many of the respondents have stopped using the application but still were interested to share their opinion. Another interesting aspect is that 59,2% of all the people who responded to the survey answered "No" to the first question that was "Have you ever used the Commute Greener Facebook application?". They could not continue the survey because we were targeting the users of the latest application version. However this shows that many respondents probably did not know about the Facebook applications existence at all. That might explain one of the possible reasons why the users of the previous version do not switch to the newest one. The difficulty to encourage the users to change the versions was mentioned by the developers as one of the biggest challenges. It is possible that the users get interested to try new features of the application and become more active if they would be more informed about the changes and novelties. Also 75,8% of the survey respondents said that they would like to receive newsletters. Therefore a newsletter is recommended.

However, the application users should have a chance to resign from the Commute Greener mailing list which is not possible at the moment.

(9) Users' interaction on online platforms

From the developers point of view a post is successful if it is "Liked", shared and commented. According to the survey, 68,4% of the users claimed that they have "Liked" the Commute Greener Facebook page and 69,7% are following the Facebook page and the information spread by Commute Greener but they are not sharing, "Liking" or commenting the posts (54,5%). The mentioned reasons were that they usually do not interact in this way on Facebook (or the internet in general) or that they are not spreading information coming from a company.

Recent research done by Crawford (2009) on people's activities on the internet showed that actually 90% of them were following passively the coming information. Accordingly the majority of the online-platform users are non-active participants. In the terms of communication this non-activeness can be seen as "listening" (Crawford, 2009). Therefore the number of comments, shares, and "Likes" on the Commute Greener channels is not the only signal that should be taken into account when evaluating the Facebook messages.

(10) Message attractiveness

The developers stated that one of the biggest communication challenges is to create interesting messages for the users. That is especially hard when having a broad and diverse target group. The developers claimed that people nowadays do not have time for reading long texts. They are information overloaded. Similar answers are provided by the survey respondents when explaining why they don't follow the information spread by Commute Greener due to the lack of time.

However, the developers have learned that short and attractive messages having a positive tone work best. In most of the cases the attractiveness is reached by adding a picture showing Commute Greener team members in action, campaign activities, or the image of a challenge winner.

(11) Language

Localization is a strategy for more direct targeting (Cheung, 2009). The Commute Greener team is already using some localizations, e.g., when referring to the local campaigns (e.g. the information about the Gothenburg campaigns is provided in Swedish language) and by the localized front page of the Commute Greener web page translating the English version into Spanish (for users in Spain and Mexico), German, French, and Swedish. The developers still see it quite challenging to translate the whole information into other languages due to the complexity and amount of the text. Still, one survey respondent claimed that it would be good to have more information in other languages.

7. Conclusion

The objective of our study was to present the case of Commute Greener's diffusion as thoroughly as possible, through showing how communication practitioners responsible for an environmental innovation can make use of online communication, how the application users respond to it and what are their preferences. By doing this both an academic contribution to the innovation communication research as well as a practical one for the application developers were done.

As it can be seen in our study, the online communication environment seems to be a new sphere that can be used for innovation diffusion. Probably one of the most interesting aspects of online communication, especially performed on social media is the fact that it can be placed in an area between mass media and interpersonal communication. This brings new opportunities for innovation diffusion, due to the fact that the cost of communication can be reduced and the former used word-of-mouth can be changed into the word-of-mouse, which can have a much wider, global reach. However to make full use of this potential, some background knowledge about the mechanisms of message spreading on these platforms as well as user preferences should be gained. What can be seen as especially challenging is fulfilling the expectations of being active on several communication platforms, while still keeping them integrated and linked. Our research showed that Commute Greener is

spreading information about the application through several online communication channels, while the users are sometimes not even aware of their (channels) existence. This is due to the fact that they were not informed about them or that the product did not have any clear connection these channels. Another challenge of keeping the communication multichanneled is that it is possible to discourage product users, by providing too much information, since some of the respondents pointed out that it is impossible to keep up with all the communication that comes to them from different sources. It is important to understand the different needs and expectations of the users, since they have different motivations for starting to use the application and different levels of familiarity with similar products.

Another important issue regarding online communication is the use of the interactive features of social media. It seems that by deciding to in communication on these platforms expectations for engaging in a sort of a dialogue with the users arise. However as it can be seen in this case study it is not that easy to get feedback in the form of comments or even "Likes" on Facebook. Our study shows that most of the users are passively following the communication coming from the application developers. One of the reasons behind this, that can also be seen as a challenge, is the fact that users are not so open to supporting commercial initiatives on these platforms.

To sum up our research has shown that online communication for innovation diffusion, especially of an online based product such as Commute Greener has great potential, since most of the users are very active on several online communication platforms. However to make the right choices when it comes to suiting the message and channel to the target group it is important to conduct more research among the potential and current users, as well as learn from previous experience and then create a communication strategy for the innovation diffusion.

7.1. Our study as a pilot study

This research can be seen as a pilot case study in communication research on environmental innovation diffusion with the use of online communication channels – an area that has not been given attention before, therefore is lacking a framework for analysis. We believe that our study shows the complexity of innovation diffusion in an online communication environment, and we suggest that this topic should be given more attention in future. This can be done through taking several perspectives as proposed below.

7.2. Recommendations for further research

Due to the fact that the environmental aspect of this specific innovation is of great importance many of the issues addressed in our research were regarding environmental communication in general as well as aspects of proenvironmetal behavior change. We would suggest that in the future the application could be researched using environmental communication perspective or proenvironmental behavior change frameworks. All of these elements can be seen in the design and communication of Commute Greener, and would

require a deeper research both in into the technical features of it and the developer's motivation for implementing them.

Another perspective from which the application could be researched is marketing communications, which could possibly lead to a better understanding of the effectiveness of different channels. Here however there can be a possible obstacle of operating with numbers that are protected by the company due to its business interests.

Last but not least a view that could be interesting to take would be a cultural perspective. Due the different contextual settings in which the users live and test the application they might have very different perceptions of the idea behind it, its design and communication needs. However since up to date the application developers did not have the resources to examine or adapt the application and communication around it to the local needs of its users, which are spread around the world, such input would probably be very much needed.

8. Acknowledgements

9. References

Abe, K. (2009). The Myth of Media Interactivity: Technology, Communications and Surveillance in Japan. *Theory, Culture & Society,* vol. 26, no. 2-3, pp. 73-88.

Adams, P.C. and Gynnild, A. (2013). Environmental Messages in Online Media: The Role of Place. Environmental Communication. *A Journal of Nature and Culture*, vol.7, no.1, pp. 113-130.

Adomssent, M. and Godemann, J. (2011), Sustainability Communication: An Integrative Approach. In Godemann, J., & Michelsen, G. (Eds.), Sustainability Communication Interdisciplinary Perspectives and Theoretical Foundation (Chapter 3), Springer Science+Business Media B.V.

Aitken, C., Power, R. and Dwyer, R. (2008). A very low response rate in an on-line survey of medical practitioners. *Australian and New Zealand Journal of Public Health*, vol. 32, issue 3, pp. 288-289.

Alec, C. (2012). Interactivity: New Media, Politics and Society. Lang, Peter. AG. Internationaler Verlag der Wissenschaften.

Amichai-Hamburger, Y., Wainapel, G. and Fox, S. (2002). On the Internet no one knows I'm an introvert: extroversion, neuroticism, and Internet interaction. *Cyberpsychology & behavior: the impact of the Internet, multimedia and virtual reality on behavior and society*, vol. 5, no. 2, pp. 125-128.

Baregheh, A., Rowley, J. and Sambrook , S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision,* vol. 47, no. 8, pp. 132-139.

Bowen, G.A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, vol. 9, no. 2, pp. 27-40.

boyd, d.m. and Ellison, N.B. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, vol. 13, no. 1, pp. 210-230.

Bruhn, M. and Ahlers, G.M. (2011). An Integrated Approach to Communications in the Open Innovation Process. In Hülsmann, M., and Pfeffermann, N. (2011) (eds.), Strategies and Communications for Innovations (Chapter 10). Springer.

Bunz, U. (2005). The Word of Mouse on Internet Research. *Review of Communication*, vol. 5, no. 1, pp. 25-35.

Chapman, C.S., Hopwood, A.G. and Shields, M.D. (2007). Handbook of Management Accounting Research, vol. 1. Elsevier Limited.

Cheung, M. (2009). The globalization and localization of persuasive marketing communication: A cross-linguistic socio-cultural analysis. *Journal of Pragmatics*, vol. 42, pp. 354-376.

Couper, M.P., Traugott, M.W. and Lamias, M.J. (2001). Web Survey Design and Administration. *The Public Opinion Quarterly*, vol. 65, no. 2, pp. 230-253.

Crawford, K. (2009). Following you: Disciplines of listening in social media. *Continuum*, vol. 23, no. 4, pp. 525-535.

DeYoung, R. (1993). Changing Behavior and Making it Stick: The Coceptualization and Management of Conservation Behavior. *Environment and Behavior,* vol. 25, no. 3, pp. 485-505.

Dijk, S. van (2006), The Network Society: Social Aspects of New Media. Sage Publications.

Dorn, E. and Sahinyan, A. (2010). Online trust and CommuteGreener! Is online trust enough to generate stickiness behavior?. Master thesis, University of Gothenburg, Gothenburg, Sweden.

Feagin, J.R., Orum, A.M. and Sjoberg, G. (1991). A Case for the Case Study. The University of North Carolina Press.

Feldmann, V. and Zerdick, A. (2005). E-Merging Media: The Future of Communication, in Zerdick, V. A., Picot, A., Schrape, K., Burgelman, J., Silverstone, R., Feldmann, Wernick, C., Wolff, C. (Eds.) E-Merging Media Communication and the Media Economy of the Future, European Communication Council report. Springer.

Fidler, L. A. and Johnson, J. D. (1984). Communication and Innovation Implementation. *Academy of Management Review*, vol. 9, no. 4, pp. 704-711.

Gelb, B. D. and Sundaram, S. (2002). Adapting to "word of mouse". *Business Horizons*, vol. 45, no. 4, pp. 21-25.

Gurau, C. (2008). Integrated online marketing communication: implementation and management. *Journal of Communication Management*, vol. 12, no. 2, pp. 169-184.

Halila, F. and Rundquist, J. (2011). The development and market success of eco-innovations: A comparative study of eco-innovations and "other" innovations in Sweden. *European Journal of Innovation Management*, vol. 14, no. 3, pp. 278-302.

Hennink, M., Hutter, I. and Bailey, A. (2011). Qualitative research methods, SAGE publications.

Hines, J. M., Hungerford, H. R. and Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education*, vol. 18, no. 2, pp. 1-8.

Hoonakke, P. and Carayon, P. (2009). Questionnaire Survey Nonresponse: A Comparison of Postal Mail and Internet Surveys. *International Journal of Human-Computer Interaction*, vol. 25, no. 5, pp. 348-373.

Huck, S. (2006). New Perspectives on Innovation Communication Findings from Germany's Survey INNOVATE 2006, *Innovation Journalism*, vol. 3, no. 4, pp.1-20.

Jurin, R.R., Roush, D. and Danter, J. (2010). Environmental Communication. Second Edition: Skills and Principles for Natural Resource Managers, Scientists, and Engineers. Springer Science+Business Media B.V.

Krosnick, J.A. (1999). Survey Research. *Annual Reviews Psychology*, vol. 50, pp. 537-567.

Lindlof, T.R. and Taylor, B.C. (2002). Qualitative Communication Research Methods. Second edition. Sage Publications.

Lundqvist, L. (2000). Capacity-building or social construction? Explaining Sweden's shift towards ecological modernization. *Geogorum*, vol 31, no 1, pp. 21-32.

Luoma-aho, V. and Halonen, S. (2010). Intangibles & Innovation: The Role of Communication in the Innovation Ecosystem. *Innovation Journalism,* vol. 7 no. 2, pp. 3-20.

Marvin, C. (1988). When old technologies were new: thinking about electric communication in the late nineteenth century. Oxford University Press.

Mast, C., Huck, S. and Zerfass, A. (2005). Innovation Communication, Outline of the Concept and Empirical Findings from Germany. *Innovation Journalism*, vol. 2, no. 7, pp. 1-14.

Mathiassen, L. (2002). Collaborative Practice Research. *Information Technology & People*, vol. 15, no. 4, pp. 321-345.

Matushkina, E. and Nevalennaya, A. (2010). Motivating contributions to Commute Greener! Nature of motivation and motivation loss. Master Thesis, University of Gothenburg, Gothenburg, Sweden.

O'Hair, D. (2011). Strategic Communication in Business and the Professions. 7th ed. Pearson.

Osbaldiston, R. and Schott, J.P. (2012). Environmental Sustainability and Behavioral Science: Meta-Analysis of Proenvironmental Behavior Experiments. *Environment and Behavior*, vol. 44, no. 2, pp. 257-299.

Pfeffermann, N., and Hülsmann, M. (2011). Communication of Innovation: Marketing, Diffusion, and Frameworks. In Hülsmann, M. and Pfeffermann , N.(2011) (Eds.), Strategies and Communications for Innovations (Chapter 7). Berlin, Germany: Springer.

Qiu, J. J. (2009), Trust In Social Software. A survey of trust on Commute Greener!, at Volvo IT. Bachelor thesis, University of Gothenburg, Gothenburg, Sweden.

Rennings, K. (2000). Redefining innovation – eco-innovation research and the contribution from ecological economics. *Ecological Economics*, vol. 32, no. 2, pp. 319-332.

Rogers, E. M. (1995). Diffusion of Innovations. The Free Press.

Schaltegger, S. and Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business Strategy and the Environment,* vol. 20, no. 4, pp. 222-237.

Symonds, E. (2011). A practical application of SurveyMonkey as a remote usability-testing tool. *Emerald*, vol. 29, no. 3, pp. 436-445.

West, J., and Gallagher, S. (2006), Challenges of open innovation: the paradox of firm investment in open-source software, Chapter 5 in Chesbrough, H., Vanhaverbeke, W. and West, J. (eds), Open Innovation: Researching a New Paradigm. Oxford University Press.

Woodside, A. (2010). Case Study Research: Theory, Methods and Practice. Emerald Group Publishing Limited.

Zhao, L., Lu, Y., Wang, B., Chau, P.Y.K. and Zhang, L. (2012). Cultivating the sense of belonging and motivating user participation in virtual communities: A social capital perspective. *International Journal of Information Management*, vol. 32, no. 6, pp. 574-588.

Zichermann, G. and Cunningham, C. (2011). Gamification by Design. O'Reilly Media.

10. Appendixes

10.1. Appendix: List of the reviewed document sources

Accessed 27.05.2013

1. Web page
   1) http://commutegreener.com
   (available also with the endings: .se, .de, .fr, .es, .mx)
   2) http://commutegreenerinfo.com
2. Blog
   http://commutegreenerinfo.com
3. Facebook page
   https://www.facebook.com/commutegreener
4. Twitter
   https://twitter.com/CommuteGreener
5. YouTube
   http://www.youtube.com/user/CommuteGreener
6. LinkedIn
   http://www.linkedin.com/groups/Commute-Greener-
   2171348?home=&gid=2171348&trk=anet_ug_hm
7. App Store
   1) https://itunes.apple.com/app/commute-greener-smarter-
      ways/id587749651?ls=1&mt=8
   2) https://itunes.apple.com/us/app/commute-greener!/id339635647?mt=8
8. Google Play
   https://play.google.com/store/apps/details?id=com.commutegreener.facebook
9. Flickr
   http://www.flickr.com/photos/commutegreener

10.2. Appendix: Interview Questions

Interview I

Personal

Q1 What is your role in Commute Greener?
(follow up: Are you the only person responsible for that?)

Q2 How long have you been involved in Commute Greener?

General

Q3 How would you describe what is Commute Greener?

Q4 Who is the target?

Communication in general

Q5 Can you describe the communication connected to Commute Greener?

Q6 What is the aim of Commute Greener online communication?
(promotion, maintaining?)

Q7 Why did you choose mainly online communication?

Channels

Q8 What channels did you use?

Q9 Why did you choose these specific channels for communication?
(follow up: do you think it's enough?/they're many?)

Q10 Which channel do you see as the most effective (online)?

Q11 What are the biggest challenges in communicating about Commute Greener?

Content

Environment

Q12 How do you choose the content of the communication?

Q13 Do you think the application users are interested in environmental topics in general?

Q14 How do you respond to this through your communication?

Tone

Q15 Is there an overall tone of the messages that you create?
(negative, positive? Rhetoric/strategic communication?)

Attractiveness

Q16 How do you try to make your message more attractive?
(videos, photos, storytelling, style..)

Behavior

Q17 How do you see the role of communication in supporting behavioral change among the application users?

Motivation

Q18 How do you motivate people to continue using the application?

Q19 Do you think more communication about CG/application use/feedback/challenges the application is needed?

Q20 Is there any way of communicating that you would like to try out to promote Commute Greener?

Interview II

Personal
- Q1 What is your role in Commute Greener?
  (follow up: Are you the only person responsible for that?)
- Q2 How long have you been involved in Commute Greener?

General
- Q3 How would you describe what is Commute Greener?
- Q4 Who is the target? Who is the ideal Commute Greener user that you're aiming for?

Evolution to the Facebook application
- Q5 Could you tell about the evolution of the application? How it has changed?
- Q6 Why Facebook?
- Q7 How do you think it influenced the user group?
  (How does the typical user look like now?)

Environment
- Q8 Do you think that technology will be used to a wider extent to address environmental issues in the future? Why?

Individual/ Social aspects
- Q9 Do you perceive the application as an individual or social tool?
  (if social: Why can't a user interact directly with other users by sending private messages to them <beside rideshare>?)
- Q10 What are Social and individual aspects of the application?

Feedback
- Q11 How does the Commute Greener application give individual feedback to the users? *(performance)*

Motivation Behavior
- Q12 What is the biggest challenge in working with Commute Greener?
- Q13 How do you motivate people to continue using the application?
- Q14 Do you think any visual elements of the application can motivate users to change their behavior?

- Q15 Do you think more communication about Commute Greener/application use/feedback/challenges the application is needed?

Interview III

Personal
- Q1 What is your role in Commute Greener?
  (follow up: Are you the only person responsible for that?)
- Q2 How long have you been involved in Commute Greener?

General
- Q3 How would you describe what is Commute Greener?
- Q4 Who is the target?

Q5 What is the biggest challenge in working with CG?

Communication in general
- Q6 What is the role of communication in CG?
  (aim: promotion, maintaining?)
- Q7 Why did you choose mainly online communication?
  Why these channels?

Facebook
- Q8 Do you think the evolution of the application to the Facebook application has influenced the user character?
  (the type of users, demographics, interests)

Environment
- Q9 Do you think the application users are interested in environmental topics in general? *(follow up: which ones?)*
- Q10 Do you think that technology will be used to a wider extent to address environmental issues in the future? Why?

Behavior Motivation
- Q11 What are the most important factors in motivating people to change their behavior to greener one?
- Q12 How communication can support these in some way?

Communication in general 2
- Q13 Is there an overall tone of the messages that are spread by Commute Greener?
  (negative, positive? Rhetoric/strategic comm..?)
- Q14 How to make the messages more attractive?
  (videos, photos, storytelling, style..)
- Q15 Is there any way of communicating that you would like to try out to promote Commute Greener?
- Q16 Do you think more communication about Commute Greener/application use/feedback/challenges the application is needed?

Q17 Do you want the users to associate Commute Greener with Volvo? Why?

10.3. Appendix: Survey Questions

Q1   Have you ever used Commute Greener Facebook application?
Q2   How did you get to know about Commute Greener?
Q3   Have you "Liked" the Commute Greener Facebook page?
Q4   How often do you use Commute Greener application?
Q5   Do you perceive Commute Greener application more as a tool for individual use or as a social tool?
Q6   Are you interested in environmental issues?
Q7   How do you keep yourself updated on environmental topics?
Q8   What communication platforms do you prefer for receiving information about environmental topics?
Q9   How often do you use social media?
Q10   Which aspect motivates you the most to change your commuting behavior?
Q11   Is the social aspect of the application, e.g. inviting friend, competing and comparing yourself with others etc. important for you?
Q12   Which features if the application motivates you to use it?
Q13   Do you think that exchanging experiences with other Commute Greener users would motivate you more to change your commuting behavior?
Q14   Do you follow the information coming from Commute Greener?
Q15   On which channel do you follow the information coming from Commute Greener? (follow up question to Yes answer to Q14)
Q16   Are you satisfied with the content of online information spread by Commute Greener?
Q17   Why are you satisfied with the content of online information spread by Commute Greener? (Follow up question to Yes answer to Q16)
Q18   Why are you not satisfied with the content of online information spread by Commute Greener? (Follow up question to No answer to Q16)
Q19   Why do you not follow the information coming from Commute Greener? (follow up question to No answer to Q14)
Q20   Do you ever respond (comment, share, "Like") to Commute Greener online posts?
Q21   Why do you respond to Commute Greener online posts? (Follow up question to Yes answer to Q20)
Q22   Why do you not respond to Commute Greener online posts? (Follow up question to No answer to Q20)
Q23   Do you feel that you need more instructions regarding to use the Commute Greener application?
Q24   Would you be interested in receiving a newsletter about issues related to Commute Greener?
Q25   Please write the year of your birth (e.g. 1980)
Q26   Gender
Q27   Nationality
Q28   If you have any additional comments, please write them here.