INCENTIVES FOR USER-GENERATED CONTENT IN INTELLIGENT TRANSPORTATION SYSTEMS

– WHICH INCENTIVES ARE USEFUL FOR INCREASING QUALITY CONTENT IN THE FIELD OF INTELLIGENT TRANSPORTATION SYSTEM TRAFFIC APPLICATIONS?
Title: Incentives for user-generated content in intelligent transportation systems

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Authors: Arvid Wikström Wirén & Anton Kemppainen

Supervisor: Dr. Gideon Mbiydzenyuy

Abstract
For applications that rely on User-Generated Content (UGC), there is a need to find what may motivate the applications user base to consistently contribute with quality content. One category of such applications is Intelligent Transportation Systems (ITS) traffic applications, which serve a specific goal; providing useful traffic-oriented content. By implementing useful incentives into Intelligent Transportation System traffic applications, the applications can better serve their purposes, and at the same time, improve their user's experience. Incentives are intrinsic or extrinsic, i.e., the motivation comes from internal- or external stimuli, which can motivate users in different ways and produce different incentive outcomes. To find the most useful incentives, and gain a better understanding of how to best stimulate active application participation, the research question addressed by this thesis is: Which incentives are useful for increasing quality content in the field of ITS traffic applications? The main method employed to address the research question was a survey. The survey was carried out to investigate what people thought was motivating in ITS traffic applications. In addition to the survey, an interview with the project manager of a Swedish ITS traffic application was done. Previous research concludes that the gain and the incentive for people or organizations hosting UGC are apparent, but the gain for the creators is not as clearly recognized and varies in which area the content is created. The findings of this study showed, from a user perspective, an interest in helping others and monetary gain, as potential incentives for implementation. The authors concluded that intrinsic inclined incentives should work better in-line with the goal of functionality and user long-term engagement, which the authors believe would be preferable for UGC based ITS traffic applications. These findings will be useful for understanding the optimal way to increase motivation for adequate quality UGC in ITS traffic applications.

Keywords: User-generated content, intelligent transportation system, ITS, incentives, UGC, application, traffic
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Arvid Wikström Wirén & Anton Kemppainen
# Table of Contents

1. INTRODUCTION
   1.1 BACKGROUND
   1.2 RESEARCH OVERVIEW
      1.2.1 User-Generated Content
      1.2.2 Incentives
      1.2.4 Gaps in previous research
   1.3 PROBLEM DISCUSSION, STATEMENT, AND PURPOSE
   1.4 RESEARCH QUESTION
   1.5 TARGET GROUP
   1.6 DELIMITATIONS
   1.8 DISPOSITION

2 THEORETICAL FRAMEWORK
   2.1 INCENTIVES AND THEIR RELEVANCE TO ITS
   2.2 ITS INTRINSIC MOTIVATIONS
      2.2.1 The commitment to help others
      2.2.2 Feedback and acknowledgment
      2.2.3 Social aspects
   2.3 ITS EXTRINSIC MOTIVATIONS
      2.3.1 Credit, status and titles
      2.3.2 Extended access
      2.3.3 Monetary reward
      2.3.4 Raffle participation
   2.4 DOES INCENTIVES ALWAYS WORK?
      2.4.1 De-motivational factors
   2.5 QUALITY ASSURANCE FOR UGC

3. METHODOLOGY
   3.1 METHOD OVERVIEW
   3.2 STUDY OF EXISTING WORK
   3.3 RESEARCH DESIGN
      3.3.1 Qualitative method design
      3.3.2 Quantitative method design
      3.3.4 Alternative methods
   3.4 SAMPLE DESIGN
   3.5 ETHICAL ASPECTS
   3.6 RELIABILITY
   3.7 VALIDITY
   3.8 REFLECTIONS ABOUT THE METHODOLOGY

4. RESULT AND ANALYSIS
1. Introduction

The focus of this thesis is to understand the incentives for User-Generated Content (UGC) in Intelligent Transportation Systems (ITS). The study shall focus on traffic applications that allow users to contribute with information with the purpose of informing others about current traffic status. By understanding the reasons that motivate users to contribute content in these applications, developers can enhance functionalities that will enrich the quality and quantity of UGC. The introduction of this thesis will address the background, the research overview, and the research question.

1.1 Background

Some systems thrive on content generated by its users, e.g., social media networks such as Facebook. In these systems, the incentive for users to contribute content is fundamental, since the UGC fulfills the system's purpose, e.g., sharing information with others. UGC can not only be a lifeline for these systems but also progressively generate new content. UGC can be generated in the form of diverse and innovative content; something that developers sometimes fail to provide (Lukyanenko, Parsons, Wiersma & Maddah 2018). UGC can also help provide information that the managers of applications could not have obtained otherwise and expand the diversity of content available (Krumm, Davies & Narayanaswami 2008).

In ITS, UGC can derive from almost anyone who has access to the relevant applications. Furthermore, UGC contribution to ITS is increasingly becoming an integral part of future transportation applications and systems, aimed at both professional- and private drivers or traffic-related agencies and companies (Janušová & Čičmancová 2016).

Even though UGC can be a positive way to introduce diverse, and new content to systems, there are risks with solely relying on UGC. One problem is that the quality, quantity, and reliability of the UGC can be hard to moderate effectively, especially with a large and active user base (Lukyanenko & Parsons 2015). Furthermore, it can also prove difficult to provide efficient incentives for users to continuously contribute with data, or even to start contributing in the first place. The UGC impact and usage can also differ from the developers' purpose of their application, for example, cat images in a dog community application (ibid.).

Incentives are seen as factors that motivate users to, e.g., provide user-generated content to ITS applications. An incentive can be anything from interest, earning points, monetary gain, access to unique functionalities, or feeling useful from playing a positive role in society. In the scientific community, incentive systems are regarded as systems that render investment and return. Aforementioned systems are essentially boiled down to: something is invested, e.g., content by a user and something is rewarded, e.g., money, acknowledgment or feedback. In the mentioned example, the rewarded acknowledgment could be the incentive for the user, who
invested time in creating content. Essentially, the reward is what motivated the users' contributions (Latour & Woolgar 2013).

UGC is content generated by users. The generated content can be anything from a review for a restaurant, an object in a video game, or an event on a social platform (Krumm, Davies & Narayanaswami 2008). For example, in the ITS-oriented application, Live Trafik, users can notify others by making reports about traffic events, such as road work or accidents, which can impact road safety or transport efficiency. In Live Trafik, the traffic reports are the UGC (Trafikverket 2011).

ITS concerns the collection of data related to traffic. The data is collected by utilizing different sensors and data generators, e.g., users submitting content. The data is processed, and the results are delivered to users or automated road related systems, as a service. The purpose of an ITS is to support drivers, passengers or the management of transportation systems, providing road safety as well as transport efficiency (Jevinger, Davidsson, Persson, Mbiydzenyuy & Bakhtyar 2012).

In this thesis, the focus will be on one particular area of ITS, traffic applications. The primary function in ITS traffic applications is to contribute useful information about roads and traffic, to related authorities, and users of the same application. Examples of useful information in ITS traffic applications are notices about road work, traffic accidents or bad road surface.

The project manager of the application Live Trafik will be the subject of a structured interview. Live Trafik is developed and operated by The Swedish Transport Administration, Trafikverket. The interview will provide insight into Live Trafik's current standing regarding incentives, and the quality of its supplied content (Trafikverket 2011). The overseeing, administration and maintenance of the application is done by the Swedish Haulage Agency which oversees over 6000 transportation companies and over 38 000 vehicles (Sveriges Åkeriföretag 2018). The authors of this thesis consider both The Swedish Transport Administration and the Swedish Haulage Agency to be established actors in the Swedish transportation field, and the application Live Trafik to be a functional and well maintained ITS traffic application.

By understanding user incentives, how it can benefit UGC reliant application, and how it all can apply to ITS traffic applications, the authors can theorize the foundation for useful and active user-driven ITS. The findings can be used for future development in ITS and UGC related areas.

1.2 Research Overview

*Initial relevant work addresses UGC, and incentives, in the context of ITS.*
1.2.1 User-Generated Content

Either knowingly, or unknowingly, today's consumers of online information have assumed the roles of information providers (Forte & Bruckman 2005). Users create and share content on an increasing basis, making UGC a staple in today's web applications and software (Luca 2015; Grossman 2006). Examples of well-known applications utilizing UGC to drive their business model is Instagram, Facebook, and Reddit. Basically, without the UGC, the applications cannot provide the same functionality, since they are more or less dependent on content being continuously generated. UGC is also often provided free and voluntarily, which can make a business thriving on UGC generally profitable if gained enough traction (Krumm, Davies & Narayanaswami 2008). Something that can negatively impact an UGC-oriented system is inefficient, or non-existing quality control. Since UGC is virtually simple to make - i.e., users withholding any skill set or knowledge can produce content - the quality can, depending on the user's skill, differ from very poor to very good. UGC quality can ultimately decide the utility of the content. Therefore, for software that is reliant on UGC, poor quality content can be very detrimental to overall business (Kim, Jin, Kim, & Shin 2012). One can argue that content quality, is especially critical in functionality-driven applications, such as ITS traffic applications. In an application that is created to rely on UGC, if the UGC is not utilizable, the application may arguably lose its foundation.

There are different structures for collecting UGC, and these structures can directly impact the quality of UGC. The structures can be free text (e.g., A text-based post), a fixed form (e.g., A survey, images or pre-dispositioned alternatives of contribution). The structures can also be a combination of mediums, such as an image combined with text. The most suitable structure can vary depending on the application, software, or area of business (Lukyanenko & Parsons 2015).

The authors of this thesis believe that the current principal challenge for ITS traffic applications that incorporate UGC as a fundamental part is to attain a constant contribution rate of useful content of high quality. In essence, the ITS traffic applications should attract users that are active, and put time and effort, into their UGC contributions. Acquiring the formula for useful incentives may give rise to an opportunity to further incorporate them into the life of everyday traffic participants; cementing the value of ITS traffic applications in society.

1.2.2 Incentives

In “Why Do People Write for Wikipedia? Incentives to Contribute to Open-Content Publishing“, by Forte & Bruckman (2005), the authors investigate why or why not users of Wikipedia and YouTube contribute content. The findings display that the primary motivation for contributing is that the users find the activity itself is a part of the wanted fulfillment, i.e., the reward and motivation. The gain and the incentive for people or organizations hosting UGC are apparent, but the gain for the creators is not as clearly recognized and varies in which area the content is created.
In terms of incentives, there are differences in motivating factors depending on what service, and in what area the UGC is created (Stoeckl, Rohrmeier & Hess 2007). UGC production is also often without immediate profit (Benkler 2006, cited in Stoeckl, Rohrmeier & Hess 2007, p.399). Furthermore, the motive of short-term financial success does not typically guide consumers who are active but is useful for attracting new users (Stoeckl, Rohrmeier & Hess 2007).

Incentives can be intrinsic- or extrinsic. In intrinsic incentives, motivation is generated from an activity itself, i.e., the activity is fun, which motivates the activity performer. In extrinsic incentives, the motivation is created from the reward an activity, i.e., the activity is externally rewarded. A significant difference is that intrinsic motivation, in an activity, can be a never-ending supply of motivation (as long as the activity it is enjoyable), in contrast to extrinsic motivation (companies usually do not have unlimited resources to reward with). A way to overcome the problem of resources, and being able to reward extrinsically continuously, is to create a reputation- or recognition-based system, rewarding UGC with points and acknowledgment (Stoeckl, Rohrmeier & Hess 2007).

Credit is, in the area of incentive systems, more than just a reward for users’ contributions. It is a way to refer to a user’s social standing in the community the user is participating in; marking the users standing, credibility and past contributions.

Regarding recognition systems, credit is seen as one of the most crucial organs in a user rewarding incentive system. Forte & Bruckman (2005) argues that “In its fullest sense, credit is not something that is given or received by individuals in the community, but a measure of power and efficacy.” (Forte & Bruckman 2005, p.2).

The authors have not found any correlative research regarding previously brought up incentives and ITS. However, since the incentives are found in similar environments, where the incentives are applied to exhort users to contribute with content, the authors see this as an opportunity to see if it is possible to apply the incentives into ITS traffic applications.

1.2.4 Gaps in previous research

Prior research provides a considerable amount of insight into UGC, incentives and ITS, but a combination of the aforementioned is hard to come by (Forte & Bruckman 2005; Stoeckl, Rohrmeier & Hess 2007; Kim, Jin, Kim, & Shin 2012). The authors of this thesis could not find any qualitative-, nor quantitative data, regarding user incentives for contributing UGC in ITS traffic applications.

Based on the lack of research of the combination of the aforementioned areas, there is an incentive, and room, for the authors of this report to investigate useful incentives for UGC in ITS traffic applications, such as Live Trafik.
1.3 Problem discussion, -Statement, and Purpose

When applying UGC into system models, issues can appear if the content is not of adequate quality or -function, i.e., the UGC is not well made, or not in-line with an application’s purpose. The consequences of incorrect information, or the absence of UGC, could result in users being deceived, or not provided with enough information to find a certain application worth using. A further consequence could also be users abandoning the application. Therefore, a critical question is: How can companies assure that incentives provide UGC of quality and reliability? Also, how can companies count on their business model to ensure, that users, continuously submit content? For a UGC-based business model to work, a company must be able to ensure that their user base will submit enough content, for the majority of users to find the software worth using, and create a functional and attractive UGC ecosystem (Luca 2015; Grossman 2006).

Organizations are increasingly interested in UGC since the information, which can be produced by anyone, usually is cost-free and not necessarily affiliated with the organization (Grossman 2006). Organizations can find great value in UGC through the development of custom information systems that collect specific kinds of data from contributors external to the organization (ibid.). The authors of this thesis, believe that in applications like Live Trafik, the amount of high-quality UGC supplied is critical for overall success. Since the Live Trafik application solemnly depends on providing reliable and relevant traffic information, the application would arguably lose its function without an adequate amount of quality UGC to utilize. Therefore, finding useful incentives for users to generate useful UGC is an essential part of enhancing ITS traffic applications. Furthermore, gains and incentives for users to generate content vary from different applications or contexts which underlines differences in UGC incentives, in different environments, which opens up for investigating ITS UGC incentives (Forte & Bruckman 2005).

Incentives for users to contribute content to a user-driven application could, ultimately, be a deciding factor in how the application performs. Therefore, UGC is arguably critical for certain applications, e.g., Live Trafik. If there is a lack of UGC in the applications, it could fail due to the low functionality, since there is no UGC to utilize. However, even if there is an abundance of UGC, but the quality is poor, or the information is false, there can be dramatic consequences for other users by following false or unreliable instructions. Poor quality content could also serve no purpose, or be counterproductive; resulting in the same consequences as mentioned above. Therefore, there is a need for users providing adequate and high-quality UGC, even though it often requires significant time- and effort costs for the provider (Lukyanenko, Parsons & Wiersma 2014).

The implementation of quality control mechanisms is also an essential factor for the success of a system. An example of quality control is user-generated control, relying on direct feedback from other users to rate content and remove those with poor ratings. For the users to consider the time cost worth it, the motivation to contribute should preferably be well willed, i.e., the
user should want to contribute quality content for the better of overall user experience. Hence, knowing what truly motivates the users, allows for quality and quantity to be improved at designing time (Lin, Li, Zhai, Qi 2014; Kim, Jin, Kim, & Shin 2012).

To further increase the creation of diverse contributed quality content in ITS, the incentives that motivate users to contribute must be identified and analyzed. Therefore, by knowing the most effective ways to motivate users of ITS traffic applications relying on UGC; road-safety, management, and quality can be improved.

The overall objective of this thesis is to identify incentive mechanisms for UGC in general, identify those that apply to ITS, and understand the effect of incentives on UGC. In order to achieve this, it is important to collect data regarding users’, and potential users’ preferences and experiences regarding incentives, and UGC contributions.

The purpose of this study is to identify and analyze incentives for UGC. As well as, analyze which of the investigated incentives are suitable for generating functional quality content to ITS traffic applications. In order to achieve the set objective, there is a need for first- and second-hand data from the investigated areas, which can help conclude the research question of this thesis.

1.4 Research question

In order to address the problem discussed above, the following research question is formulated:

*Which incentives are useful for increasing quality content in the field of ITS traffic applications?*

Regarding which incentives, the authors of this thesis have made a selection of motivating factors that were compiled from secondary data concerning incentives for user-generated content, and an interview with an actor in the field.

The authors define a *useful incentive*, in the area of content contribution, as something motivating consistent contributions of useful content.

*Quality content* is, in this thesis, defined as content that is beneficial and useful for the application, in the form of functionality, construction, and motivation behind contribution.

1.5 Target Group
The work of this thesis is aimed at being of use for developers of ITS oriented applications; providing data which could help them during the design- and development process. Researchers in the area of incentives, UGC or ITS, can use this thesis for further research. The research can also support future development, concerning the efficiency of possible incentives, in ITS traffic-oriented applications that rely on UGC.

1.6 Delimitations

The main area, of this thesis, surrounds incentives for UGC in ITS. To narrow the investigated area, the authors chose to limit the study to ITS traffic applications relying on UGC, contributed by users, to alert other users of anomalies along the road. For the survey, the most commonly used applications fitting in the description of the study were chosen. These are Waze and Live Trafik. The main focus, during this thesis, was on the application Live Trafik.

1.8 Disposition

This thesis is structured as follows:

**Chapter 1: Introduction, problem-discussion & statement and research question.**
In the first chapter, the introductory parts of the thesis are presented. This includes the background, the problem-discussion, and statement as well as the research question.

**Chapter 2: Theoretical framework**
In the second chapter, relevant theory, research and concepts regarding incentives, ITS, and UGC are presented and described.

**Chapter 3: Methodology**
In the third chapter, the chosen research methods, sample selection, validity, and reliability are presented and reflected upon.

**Chapter 4: Results and analysis**
In the fourth chapter, the results from the structured interview and the survey is presented, as well as analysis of the presented results.

**Chapter 5: Discussion**
In the fifth chapter, the authors discuss the results, analysis, and previous theory.

**Chapter 6: Conclusion & further research**
In the sixth chapter of the thesis, the conclusion, as well as the authors' thoughts regarding further research, is presented.
Chapter 7: References
In the seventh chapter, the references for the resources used in this thesis is presented.

Chapter 8: Appendix
In the final chapter, the appendix of this thesis is presented.
2 Theoretical framework

What are some of the incentives driving developments in UGC in general and for ITS in particular? What can we learn from existing research? Which already known incentives for UGC can be applied in the field of ITS?

2.1 Incentives and their relevance to ITS

Intelligent Transportation Systems are made and appreciated for increasing the efficiency of traffic; helping people and organizations dependent on effective traffic flow. To help others, and in turn expect them to help back, is believed to be one of the number one incentives for users to contribute to UGC-reliant environments in general. Therefore, the authors planned to investigate if the same incentives applied to ITS traffic applications that rely on User-Generated Content (Forte & Bruckman 2005).

Latour and Woolgar (2013) found that the most critical organ of the incentive system in the scientific community is the cycle of credit. It refers to two dimensions of social status in the community. First of, and fundamentally, it is linked with an individual’s ability to act in the community and effect change through the assertion of claims. The incentive system that motivates users to write for Wikipedia also resembles this (Forte & Bruckman 2005). Since the scientific community, the Wikipedia community, and the community found in applications mediating traffic information are driven towards helping others, it is possible to see that helping the community out is a strong drive for users to contribute with information (ibid.). Therefore, presenting an opportunity to investigate if it is applied in ITS traffic applications. In the second dimension, credit is a reward mechanism to demonstrate one’s past contributions. It is possible to speculate that achieving extrinsic motivation, through credit, could also be a useful incentive for users to contribute UGC to ITS traffic applications. e.g., through community titles and credit scores.

Latour and Woolgar (2013) first observed that the term credit was used to describe something given or received. However, through the course of their studies, they realized that the term was more complex and stood for much more than the metric of a straightforward reward system. It seemed what drove, and motivated scientists was a sense of credibility that allowed them to assume more resources and central roles in the community. It is possible to investigate if this can be applied into ITS traffic applications by rewarding top tier users with access to exclusive content, e.g., early access to new applications or functions, or receiving a “trusted member” title which gives more in application privileges.

The UGC, in itself, can also be rewarded, which in turn can create a sense of the content provider being noticed and appreciated. The reward of points can be used to reward, not only quality contributions but also a way to create a sense of community in the ITS traffic applications (Latour & Woolgar 2013).
For some users, the participation in an application is a reward in itself, which for some services may be optimal since the users’ own actions motivate themselves, through intrinsic motivation. For those users, the functionality and design of the service may be crucial for their continuous activity and self-motivation. Applications usually serve a specific function, and if it the function in itself is the inciting part for users to contribute, then the evolution, management, and maintenance, to uphold the quality of said functionality, may be crucial for the application’s success (Ryan & Deci 2000).

ITS can be seen as societal contributing services, mainly in cases where the aim is to ease the strain traffic is exposed to, e.g., potholes, accidents, and dangerous road conditions. Applications such as Waze and Live Trafik serve those specific cases and can, therefore, arguably, be seen as applications contributing to society.

The notion of serving a higher purpose and helping others can be an incentive for some users, e.g., writing articles in Wikipedia or reporting traffic conditions in ITS traffic applications (Forte & Bruckman 2005). In those cases, not only is the usefulness and functionality of the service important, but a crucial factor is that the users, that contribute towards society’s well-being, feel that their contributions are received and make an impact. For users to know that what they have given made an effect, the feedback from the people in charge of the applications must be efficient and reach back to the users (Hattie & Timperley 2007).

2.2 ITS intrinsic motivations

Intrinsic motivation, in an ITS traffic application, would be a motivation that stems from the usage of the application itself. Research shows that intrinsic motivation enhances performance, persistence, and creativity, which can be crucial in UGC driven environments, and probably in ITS applications as well (Ryan & Deci 2000). Active usage, motivated intrinsically, could positively impact the usefulness of the application. The usefulness, combined with how easy the applications are to use, can be a potent combination of intrinsic motivation. Arguably, intrinsic motivation is, therefore, most probably found in users engaging in well-functioning applications. Therefore, using an efficient application could make the user want to motivate itself to actively participate, even more, in the application (Lukyanenko et al. 2018). Furthermore, by making ITS traffic applications well-designed and useful for the user, the intrinsic motivation can be nourished (ibid.).

This thesis focus on three types of intrinsic motivation incentives. The three incentives have been categorized as the notion of helping, feedback and acknowledgment and social aspects.
2.2.1 The commitment to help others

Coleman (1990), describes commitment as feeling a duty to be engaged continuously. Commitment can be applied both to collective and individual action, e.g., an ITS user base or a single user. In a collective commitment, there may be a collective sense of responsibility to help each other, based on being from the same collective, e.g., being from the same user-base of an application. Earlier research points to, that in groups, individuals with the goal of helping provide information to a collective based on a moral sense of obligation (Constant, Kiesler, Sproull 1996). Furthermore, individuals that previously have been helped by a collective may also feel a moral sense of obligation to return the favors gained, for example, through providing UGC (Wasko & Faraj 2000).

Individuals participating in an online collective, that feel a commitment to the said group e.g., individuals in a traffic-oriented online community, is more probable to give back to others from the same group. This leads to an investigation of how strong the drive to help others is as an incentive in a road based community, such as the community of ITS traffic applications. Prior research indicates that knowledge sharing in online collectives is facilitated by a strong sense of reciprocity-favors given and received along with a strong sense of fairness (Wasko & Faraj 2000). Thus, when there is a strong norm of reciprocity in the collective, individuals trust that their contribution efforts will be reciprocated, rewarding individual efforts and ensuring ongoing contribution, seemingly intrinsically motivated.

2.2.2 Feedback and acknowledgment

For users to receive feedback when submitting content, it is necessary to convey, that what they have provided is received by the application management and taken into account. According to Hattie & Timperley (2007) “The main purpose of feedback is to reduce discrepancies between current understandings and performance and a goal.” Feedback can, therefore, arguably, be used as a powerful tool to reduce discrepancies between what users UGC currently submit and the application's ideal UGC (Hattie & Timperley 2007).

Feedback can also be utilized as a way to further encourage users to perform well, regarding UGC contributions. In a study about the effect of feedback on intrinsic motivation, by Noels, Clément & Pelletier (1999), the authors found that feedback may lead to self-determined motivation and experiencing less anxiety, as well as a greater focus on performing well in their school activities. Overall, the study subjects who received feedback generally felt less class anxiety, a higher motivational intensity, greater intention to continue, better self-evaluation, and a higher final grade (Noels, Clément, & Pelletier 1999). Even though a school environment differs from ITS traffic application, feedback can arguably work the same, and reach the same outcome; positively affecting the user.
Findings mentioned above point to that feedback, as a tool, could be used to not only critique and improve poor UGC. Feedback can also be used to enhance the impact of intrinsic motivations by providing better user experience, making the users actively strive for more frequent, and higher quality, contributions. (Hattie & Timperley 2007; Noels, Clément & Pelletier 1999).

2.2.3 Social aspects

The possibility of belonging in a community, and feeling affiliated with other people, can be seen as a reward. A community based around an ITS traffic application can be described as an electronic network of practice. Electronic networks of practice are online-based forums that mainly focus on provided space for like-minded individuals and often a common subject, e.g., people interested in traffic (Wasko & Faraj 2000).

Networks of practice can consist of a loosely knit, geographically distributed group of individuals engaged in a shared practice or interest, in the case of ITS applications, often individuals spending time on the road. Since driving oriented occupations are often one-person jobs, it can become lonely at times. To partake in these communities, the users can see the opportunity to feel belongingness and affiliation (ibid.). The online medium able the individuals to reach each other while not being physically close, e.g., through their smart devices or computers, making the networks of practices possible almost anytime and anywhere. Furthermore, since such communities often are open to anyone, people often start as strangers with no prior relationship (ibid.).

The participants of these communities have no control over who partakes in discussions, as well as the quality of such. Some participants may draw upon the information presented without ever providing anything themselves (ibid.). All of these points sharply contrasts with how traditional communities often work, communities where the participants often know each other and share their knowledge face-to-face. In such traditional settings, there is often an expectation of obligation and reciprocity that is created through the relationships the participants bear. Earlier research point to the sharing of knowledge is related to strong ties (Wellman & Wortley 1990), similar location (Allen 1977; Kraut, Fish, Root & Chalfonte 1990), same or similar demographic (Pelled 1996), status identity (Cohen & Zhou 1991), and earlier established relationship (Krackhardt 1992), which are factors not ordinarily found in online-based networks of practice. Concerning incentives, one may ask how motivating the social aspects of a community are for users in ITS traffic applications, i.e., if the social aspects could act as an initiative for users to gravitate towards giving back, and encourage other users to do the same.

2.3 ITS extrinsic motivations
Extrinsic motivation, in ITS, is the motivation created in response to something apart from the use of the ITS, i.e., the extrinsic motivations are external stimuli, e.g., monetary rewards. An extrinsic motivational perspective, on UGC, would be UGC driven by the contributions perceived values and benefits derived (Lee, Cheung, and Chen 2005).

In this thesis, there are four chosen categories that are seen as extrinsic motivations. The categories are credit, statuses and titles, extended access, monetary reward, and raffle participation.

2.3.1 Credit, status and titles

Receiving credit and acknowledgment to demonstrate a person's past contributions is a common factor that has caused people to put in much time into work that others can see and appreciate. With this in mind, the authors predict that features that help display contributions and activity could be a sufficient incentive for ITS traffic application users. Instances of this could be through a credit score system that gives the user a score based on the number of posts and how well received their contributions have been. Another example is through granting privilege-titles and -icons to specific users who have performed well in regards to application activity.

2.3.2 Extended access

The reward of exclusive access to specific functions, or the possibility to use new features before release, could be an incentive for users to submit content. In some applications, functions are put behind a sort of progression bar, to unlock these functions will then act as a goal for the users. The sense of progression is a common incentive and is often found in applications today, e.g., leveling-up in games (Wang & Sun 2011). The users will be able to gain access to the functions through their accomplishment and achievements. The unlocked features could either help the users functionality in the application or be more cosmetically inclined, i.e., different color themes in the application (Wang & Sun 2011). In applications such as Live Trafik, where the more usable the content is, the more it fulfills the functional goal of the application, prohibiting users to use the application fully from the start may be detrimental to the purpose of the application, but may still be an attractive incentive for users.

2.3.3 Monetary reward

A way to reward participation in applications in general, commonly seen today in online surveys, is a monetary reward. The reward is usually in the form of money or gift cards, which the user can then collect after active participation. A monetary reward can be successful for attracting users, though a question a developer can ask themselves is if users, mainly motivated
by monetary rewards, will be the type of users the application need and if the attracted users will stay active without the monetary rewards (Stoeckl, Rohrmeier & Hess 2007).

In a study by Chylinski (2010), students were exposed to a participation money stimulus. The student's participation increased but the participation quality was seen as somewhat poorer, pointing at that the monetary stimulus increased participation but at a poorer implementation. For applications that depend on user contributions, a monetary reward may lead to continuing rewarding the user for increased participation, while disregarding the quality of said participation, i.e., motivating quantity before quality regarding contributions (ibid.). A way to implement a monetary reward into an ITS traffic application, and at the same time counteract the potential drop in quality, could be a form of quality control. A potential guard towards poor quality UGC, combined with a monetary reward system, could be to monitor UGC regularly and only reward quality contributions, which could though, prove resource- and time-consuming.

2.3.4 Raffle participation

The possibility, not the guarantee, to receive a reward could be inviting for some users to participate in ITS traffic applications actively. This could be done by providing a chance to participate in raffles, through application content submission. A company could let their users, and potential users know, that by using their service or being active in their product, the users have a chance to win a prize through a raffle. One could argue that this would bring the same conditions, both good and bad, as monetary rewards, regarding quality and quantity of provided UGC. The difference from a monetary reward would be that the rewards probably would not be as direct, which could potentially bore the user from further participation. The reward could, however, be more significant, since not everyone receives it, only the raffle winners. Furthermore, research shows that, even though one may lose in, for example, a raffle, the near miss of winning can be motivating in itself for further participation (Reid 1986).

2.4 Does incentives always work?

An important aspect of incentives is that there are both wanted and unwanted outcomes. It is essential to find motives for UGC contribution that generate a favorable outcome, i.e., the UGC is of value and not something that serves detrimental-, or no purpose. For example, a company may intend to create incentives that motivate users to produce high-quality content, but the outcome is low-quality content or content that negatively affect a company's image. Some incentives may as well lead to the opposite of the intended effect (Kohn 1993). A statement one may ponder is:

“Do rewards work? The answers depend on what we mean by “work”” (Kohn 1993, p.3).
Rewards, just as punishments, often provide temporary compliance (Kohn 1993). For long term solutions, commitment should come from the users themselves (ibid.). Extrinsic incentives could, therefore, arguably, create an enduring relationship between the user and the commitment; dependence on the reward to fulfill the intended action (ibid.). A relationship, between an extrinsically motivated user and an ITS traffic application, could, therefore, offer no commitment towards active participation when the extrinsic reward ends or is not deemed valuable by the user anymore (ibid.).

2.4.1 De-motivational factors

Just as positive incentives influence people to use an application actively, negative incentives may, for example, push people away from using an application. Incentives are also not universally applicable. Some incentives may work well within a specific setting but provide the opposite of the wanted effect within another. As explained by Stoeckl, Rohrmeier & Hess (2007), failing to understand the needed incentives can be very detrimental. It could ultimately lead to the investment of wrong motives, which in turn could lead to users not using an ITS traffic application.

2.5 Quality Assurance for UGC

High-quality UGC only occupies a small part of the entirety of UGC in all applications today. Therefore, there is a need to continually evaluate UGC quality, and optimize the overall quality level of available content. With efficient quality evaluation and -control, the high-quality content can be extracted, and low-quality content can be dismissed. Traditional methods for quality evaluation utilizes keywords and link analysis while some newer methods add other users into the equation and evaluate the quality with features of three aspects, i.e., contents, structures, and users (Lin, Li, Zhai, Qi 2014).

To combat poor UGC quality, one must know the root causes of it, which are not yet fully understood. Researchers and practitioners are continuing to discover and explain the root causes of poor quality data so that the systems that collect, process, and disseminate data can be improved (Wang, Fisher, Zwass 2005).

Casual users providing UGC on crowdsourcing platforms can be unfamiliar with, not willing, or unfit, to satisfy the quality requirements for contributing to the platform. To assist organizations in leveraging UGC, functioning information quality metrics are needed for evaluating quality while under the assumption of several, evolving and unanticipated uses. For cases where organizations sponsor UGC projects, an important question is how to design effective collection mechanisms and engage contributors (Lukyanenko, Parsons 2015). Intrinsic motivations should enhance performance (quality), and persistence in the creation of UGC (Ryan & Deci 2000). By utilizing and enhancing the intrinsic experience, the motivation itself
could lead to a quality control system to an extent, creating the opportunity to investigate if it is applicable in ITS applications as well. Relying on crowdsourced validation of content is also a possible mechanism that the authors want to research.
3. Methodology

In this chapter, the authors present, motivate and reflect upon the chosen research methods and how they are employed in realizing this thesis. The authors reflect upon alternative methods, choice of sample design, ethical aspects, reliability, validity, and the chosen method.

3.1 Method Overview

For this thesis, a dependent methodology was required to correctly gather and analyze theory relevant to the research question. For gathering theory, the authors employed an incremental-, iterative-, and deductive approach, meaning the authors iteratively established a theoretical base, which was tested and continuously built upon (Bryman & Bell 2011). The collected theory stems from research in areas of incentives and motivation, User-Generated Content, and Intelligent Transportation Systems. The theory is the groundwork for how the data collection was executed; for example, how the questions were shaped in the interview and the survey. The research design is descriptive-, exploratory-, and cross-sectional. The reasons for choosing a cross-sectional study is that data collection has been carried out under a short period, resulting in that collected theory data can be seen as relatable to each other (Bryman & Bell 2011).

For this thesis, the authors used a mixed method. A further explanation would be that the thesis mainly used a quantitative method in the form of a survey, supplemented by a qualitative method in the form of a structured interview. The qualitative method was added to support the quantitative survey method, and to fill potential gaps that may arise through only relying on only the quantitative method. The mixed research strategy enables this study to gain different aspects through cross-comparisons of the qualitative and quantitative data (Bryman & Bell 2011).

The qualitative- and the quantitative method, in this study, are classified as complimentary according to Hammersley (1996). To fulfill the objective of the thesis, the authors believe that the need for first-hand data, regarding user incentives, from a high quantity of users, was required. Thus, the quantitative survey method was required to collect empirical data and support the objective of answering the research question. The qualitative interview method was deemed necessary since the authors believed they needed further insight, into ITS traffic applications, to be able to construct the survey questions and -design better.

If the thesis would have only used quantitative research, the context or setting in which data is collected could prove hard to understand. Furthermore, if only performing a qualitative study, biases due to the interview effect could affect the research, and the qualitative data could prove harder to analyze statistically (Bryman and Bell 2011). The authors deemed a mixed method strategy to be able to combat these weaknesses and allow both exploration and analysis in the same study. The different research methods were integrated and used to complement each other.
and help conclude this thesis. Therefore, the methods should not be seen as separate elements. The authors of this thesis believe the chosen research methods to be suitable for each other (Bryman and Bell 2011).

3.2 Study of existing work

To gather secondary data, and theorize which incentives are effective for increasing quality content in the field of ITS traffic applications, a selection of databases for journals, dissertations, and other scientific papers was used. The databases the authors used was: Google Scholar, the online library of The University of Borås, Taylor and Francis online. Keywords used in the searches were: *Intelligent Transportation Systems, User-Generated Content, Incentives, Information Quality, and Quality.*

3.3 Research design

The design of this thesis is descriptive and exploratory. A qualitative- and quantitative design is utilized, consisting of a structured interview, and a survey with a cross-sectional sample grouping.

3.3.1 Qualitative method design

To answer the research question, which incentives are useful for increasing quality content in the field of ITS traffic applications, a structured interview was conducted with the project manager of the development of the ITS traffic application, Live Trafik. The interview was performed to provide insight regarding developers’ of ITS traffic applications thoughts, on incentives, and how different incentives were working out for their application. This would lead to new perspectives and concepts that could be brought up and examined through the survey.

The structured interview questions were created through discussion between the authors of this thesis and their supervisor. The interview was carried out through email correspondence with the regional manager of The Swedish Haulage Agency. The e-mail based interview enabled the respondent to reflect on the interview questions, and -answers, under no time constraint and allowed the authors to ask follow-up questions if needed, also under no time constraint (O’Connor, Madge, Shaw and Wellens 2008). In the email, a brief introduction to the research scope was included to provide context for the situation. The choice of performing the interview through email was due to the geographical- and schedule hindrances, and the decrease in risks to misinterpret answers. The whole interview is presented in full, both in Swedish and English, in the appendix.
3.3.2 Quantitative method design

In the quantitative survey, potential and active users, of ITS traffic applications, were surveyed. The reason for performing a survey was because it is a suitable tool to sample a cross-section of users from a given population in order to understand what constitutes as motivating, and potential incentives for UGC in ITS, both in applications in general, as well as in ITS traffic applications. The qualitative structured interview, that was to be completed before the survey, was used to help the authors to gain additional insight into how to create the survey questionnaire.

The quantitative survey method was used to understand the different perspectives that groups of potential- and active users of ITS traffic applications had on UGC motivation. The quantitative data, collected from the survey, can provide statistics regarding potential incentives for ITS traffic applications. By carrying out the survey online, it would be able to reach a wide array of different population segments in Sweden. The access to numerous respondents in Sweden was a significant deciding factor in the choice of survey method.

The survey was split up into seven different segments: Demographic questions, driving habits, application knowledge, opinions of what motivates the respondent, the experience of those who had contributed, the reasons behind not contributing of those who had not, and finally, an open question for any thoughts or opinions. The survey was web-based and executed with the software Google Forms. It was shared in different internet communities, such as different Facebook groups and Reddit boards, and directly shared to acquaintances. The goal was to reach out to as many respondents as possible that was aware of ITS traffic applications.

Most of the survey questions were up to the respondents of the survey to understand to avoid the interview effect, which is a side effect of the researcher's presence impacting the respondents' truthfulness. However, used terminology was explained to minimize the occurrence of misinterpretations (Bryman & Bell 2011). Some of the questions were described more clearly to avoid confusion, and this was deemed necessary by the authors, to ensure consistency in that particular survey question.

During the creation of the survey, the authors made sure that no questions were too long or complicated, to avoid inconsistency from respondents interpreting the questions differently. The authors believed that direct and concise questions would ensure that the survey participants understood what they were answering, and were not discouraged enough to end the survey before completion.

The survey collected different attitudes and preferences, guided by the closed- and open-ended survey, regarding applications in general, and in ITS traffic applications. For questions regarding respondents experience in the applications and what they see as motivating incentives, a 7-point Likert Scale was utilized to capture the opinions. A Likert Scale is a common way to measure answers in survey methods, where answers are numbered along a set
The range is usually from one-to-three, one-to-five, or one-to-seven (Allen & Seaman 2007). The authors considered a 7-point scale to be optimal since it allowed for a neutral option, and provided a more accurate measure of the respondents’ correct evaluations, than a 5-point scale, and was considered appropriate for the electronically distributed and unsupervised survey. A neutral option was deemed necessary for those respondents who were unsure of what to answer, resulting in less faulty data (Finstad 2010).

The survey mainly contained closed questions, to ensure consistency, except for the ability to add additional answers - to further minimize the risk of question misunderstanding. The respondents were informed of approximately how long the survey would take to complete, to minimize the risk of the respondents abruptly exiting the survey. The survey was shared online, with the goal of reaching an acceptable quantity of respondents.

Before the survey was made public, it was tested on a pilot crowd of friends, colleagues, and the supervisor of this thesis. Through performing a pilot experiment, the authors could, with greater certainty, validate the reliability of the survey questions and -design. The comments and opinions, collected from the test surveys, helped the authors make sure that the survey would perform as intended and optimal as possible. The pilot experiment could have been carried out through handing out the survey to people unfamiliar with the researchers, to avoid biased feedback impacted by the relations, between the pilot testers and the researchers. However, people with no relation with the authors could also be afraid of telling the truth. Therefore, it was deemed appropriate to utilize acquaintances for the pilot study. Parts of the first drafted survey were simplified, others were removed on account of the pilot experiment of the survey.

The authors, of this thesis, summarized and interpreted the results to answer the research question. The collected data was analyzed in Google Sheets and IBM SPSS Statistics after the collected survey data quantity, and quality was deemed satisfactory.

### 3.3.4 Alternative methods

An alternative research method to the survey method used in this thesis was focus groups. Through focus groups, the collected data can potentially be more detailed and complex; providing deeper understanding. Since focus groups not only provide answers to questions, but also create discussion in the group, focus groups can lead to answers that would not surface in any other setting (Bryman & Bell 2011). The authors of this paper concluded that setting up a focus group could have been a viable method, but would not be as time efficient as the chosen survey method. In contrast to a survey, focus groups can generally be more complicated and may take more time to orchestrate correctly (ibid.). Therefore, a survey method was deemed a better choice for this thesis. Another reason that the authors did not choose a focus group is that the unknown factor would be hard to uphold in a group setting, which could impact how the participants answer questions. The authors deemed the notion of being completely anonymous
as a positively contributing point, in participants answering without holding back anything, thanks to the unknown factor providing no pressure or reserve (ibid.).

An alternative to the single structured interview that was chosen for this thesis could be reaching out to more ITS development actors, not only Live Trafik. Interviewing more ITS actors could provide a more multifaceted, and extensive understanding, of the current ITS application climate. Even though performing other interviews could be very beneficial, the authors chose not to go through with such a plan since it could potentially, as mentioned earlier, prove more time-consuming to arrange. Instead, the authors deemed the interview, with Live Trafik, enough to gain insight into an established ITS traffic application and provided enough theoretical base for the survey design. The performed interview could have been, instead of a structured interview, either semi-structured or unstructured. The reason for the chosen interview structure is because a non-structured interview could potentially not provide the security that we gained what we needed (Bryman & Bell 2011). A semi-structured could’ve been a viable choice but the interviewed company representative was not in the vicinity, as well as the possibility of needing following-up questions, the chosen structured was used to simplify and ease the interview process for all parties involved.

3.4 Sample design

The selected research population is people in Sweden. This thesis used a non-probability sample since the participating population was quite small. The sampling in this thesis could be identified as a convenience sampling since the sample population was mainly gathered from the same source, online, although from different websites. There were no requirements for respondents to answer. For example, we chose not to exclude those without a driver’s license because passengers can use the applications as well. The survey was entirely voluntary (Bryman & Bell 2011). The authors shared the survey on the websites Reddit and Facebook. For the survey to reach out to as many people as possible, who had used ITS traffic applications, the survey was posted in online community groups consisting of people who spend much time on the roads. Through Facebook, the survey was, not only shared directly but also shared further by earlier survey respondents.

The criteria to choose a company for the structured interview was that the interviewed company was to be directly involved with an ITS traffic application project. The respondent for our interview was the regional manager of The Swedish Haulage Agency, as well as project manager for the development of The Swedish Transport Administration’s application, Live Trafik. The authors believed the interviewed to be a suitable pick since the interviewed not only oversaw and had, arguably, more insight into one of the most prominent Swedish ITS applications than anyone else in Sweden. The interviewed was also someone well versed, and professionally engaged, in IT and Transportation.
3.5 Ethical aspects

The ethical aspects taken into account, in this study, is mainly the anonymity of the conducted survey. All survey respondents were completely anonymous, which the authors informed the participants of before participation. The authors of this paper believe that the anonymous aspect of the survey made the respondents more at ease, willing to answer truthfully, and complete the survey. There were questions in the survey who were not mandatory to answer, in case the respondent did not feel comfortable answering them, or could not take a stand in a particular query. At the end of the survey, respondents could leave a comment on the survey, in whole, or a particular part.

The authors believe that during the structured interview, no significant ethical factors had to be considered. The authors also stated, that the respondent, did not have to answer questions that the respondent did not wish to answer. During the structured interview, no personal questions without relation to ITS, UGC or incentives were presented to the respondent, as seen in the appendix.

3.6 Reliability

Reliability is a term describing the replicability of this thesis results, which includes if the results will be valid over time, i.e., if research conducted by others, with the same data, reach the same conclusion. Reliability includes internal reliability, which indicates if the terminology used is consistent, so respondents do not misinterpret the research results (Bryman & Bell 2011). The authors believe that the performed survey, in this thesis, has high reliability, since it was created in such a way where respondents of the survey would understand the terminology and questions. The authors have concluded, as such, based on the success of the pilot trials of the survey.

When the quality of quantitative research is measured, the used terms differ from the measurement of qualitative research, for them to be more relevant. According to LeCompte and Goetz (1982), reliability is transformed into external- and internal- reliability. External reliability is to which degree the study can be replicated. Though, it is assumed impossible to reach complete replicability in qualitative research since it is improbable to exclude specific social- environment and context during the research. Internal replicability relies on all members of the conducted research to have the same perspective and goal in mind during the research (ibid.). The authors believe the conducted structured interview, of this thesis, has high reliability since it was conducted through email, the questions and answers were entirely transcribed from the start; decreasing the room for misinterpretation.
3.7 Validity

The validity of research concerns how in-line the measurements made during the research was with what was intended. Measurement validity is reached, if the measuring instrument, correctly measures the concepts that were meant to be measured. Internal validity is reached if one can prove that an independent variable can be directly linked to another independent variable, which measures the conducted research causality. External validity concerns if the research has generalizability or not. Ecological validity is if the research results have validity in the real world, i.e., if the research is applicable in real life-settings (Bryman & Bell 2011). The authors of this study believe that the survey, in this thesis, measures the concepts that were intended to be measured, since connections can be drawn, and analyzed, from the survey results. There is also, arguably, an ecological validity, since the survey was conducted with no requirements regarding who partook in the survey. The internal validity has not been fully realized, but the authors have neither found any factor that may have affected the results. External validity has not either been realized since the sample selection is not generalizable. The authors view the non-generalizability as the greatest lacking aspect of this thesis.

Similar to the term reliability, validity can also be divided into external- and internal validity in qualitative research, according to LeCompte and Goetz (1982). Internal validity is achieved when there is a provable connection between the research data collection and the theories presented in the study. External validity concerns which degree the results are generalizable between different social environments (ibid.). The authors, of this thesis, believe that the structured interview reached internal validity since it was with a serious actor. External validity has not been realized in the interview but it was not necessary to achieve since the interview was mainly conducted to provide new insight for the authors to research.

3.8 Reflections about the methodology

A negative aspect of a mixed method is that researchers can have too much confidence regarding their measuring instruments and procedures. The results of a survey may not necessarily reflect reality since it is nothing but a theory based on the collected data (Bryman & Bell 2011).

An obstacle that can appear through the use of a survey is the lack of information in the study area, among the survey participants. For example, the respondents may not have a clear picture of how ITS traffic application works, even though the subject is explained, before, and during the survey. Another potential problem is survey participants misinterpreting a denomination or question (Bryman & Bell 2011). By clearly explaining the critical terms of the survey, in the survey text, the survey participants will hopefully interpret the critical terms in the survey the same as the authors, and each other (ibid). It is also hard to ensure that the survey question design and -phrasing yield useful and valid data. In some context, respondents can say, because
of poor introspective capabilities, that they do something they do not do. This can, however, be applied to all methods; the authors cannot control all aspects of human psychology.

During an interview, the asked questions can be misunderstood. To combat the potential misunderstanding of asked questions, the thesis scope and goal, as well as the questions, were carefully explained to the interviewed. Since the interview was carried out through email, a potential loss was that follow-up questions could not be asked right away. Follow-up questions can be an efficient way to extract more in-depth information, and validate earlier answers (Bryman & Bell 2011).

Without being face to face, non-verbal cues were not presented, which also could have led to a deeper understanding of the interview respondent, and better communication (Bryman & Bell 2011). If the interview would have been semi- or non-structured, the interview could have led to more information being presented, through an active conversation, since the questions asked through email can be seen as somewhat closed, even if the asked questions are formatted as being open (ibid).
4. Result and analysis

This chapter is split up into two chapters, one for each method that was utilized for inquiring data. The following result was generated from conducting surveys and pilot interviews after implementing the methodology in the previous chapter. Some parts of the survey results were deemed unnecessary, and are solely presented in 8.4, Appendix 3.

4.1 Survey result and analysis

In order to increase readability of the survey result, the demographics of the respondents are first presented, followed by, 1) their knowledge about ITS traffic applications, 2) Incentive levels of why users contribute to quality content in ITS, 3) Users experiences from submitting UGC into ITS traffic applications. Each segment presents the results with an explanation and analysis of the data.

4.1.1 Demographics of the respondents

To understand the context of the results, it is essential to understand the sample population demographics. Questions were included in the survey to help gather demographic information.

<table>
<thead>
<tr>
<th>Table 1 Demographic Questions</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your highest level of education (completed)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>10</td>
<td>9.3%</td>
</tr>
<tr>
<td>High school</td>
<td>65</td>
<td>60.2%</td>
</tr>
<tr>
<td>University/College (Bachelor degree or less)</td>
<td>17</td>
<td>15.7%</td>
</tr>
<tr>
<td>University/College (Higher than bachelor degree)</td>
<td>15</td>
<td>13.9%</td>
</tr>
<tr>
<td>I don't want to answer</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do you have a driver’s license?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>93</td>
<td>86.1%</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>13.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is your occupation driving oriented?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>31</td>
<td>28.7%</td>
</tr>
<tr>
<td>No, but I spend a lot of work time on the road</td>
<td>8</td>
<td>7.4%</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>50%</td>
</tr>
<tr>
<td>No license</td>
<td>15</td>
<td>13.9%</td>
</tr>
</tbody>
</table>
How often do you drive?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>54</td>
</tr>
<tr>
<td>At least once a week</td>
<td>11</td>
</tr>
<tr>
<td>At least once a month</td>
<td>9</td>
</tr>
<tr>
<td>More seldom than once a month</td>
<td>19</td>
</tr>
<tr>
<td>No license</td>
<td>15</td>
</tr>
</tbody>
</table>

How often do you drive outside of your hometown?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>28</td>
</tr>
<tr>
<td>At least once a week</td>
<td>14</td>
</tr>
<tr>
<td>At least once a month</td>
<td>17</td>
</tr>
<tr>
<td>More seldom than once a month</td>
<td>34</td>
</tr>
<tr>
<td>No License</td>
<td>15</td>
</tr>
</tbody>
</table>

Out of the 108 responses received, 93 (86%) had a driver’s license. The result shows that over 60% of the respondents drive more often than once a week, which arguably, raise the likelihood of them using the type of applications inquired about in the survey since they have the most use of it. The ones who did not have a driver’s license were automatically referred, in the survey, to the questions related to traffic applications. The respondents who had a driver's license first got to answer three questions regarding their driving habits: How often do you drive? How often do you drive outside of your hometown? Is your occupation driving oriented?

4.1.2 Respondents knowledge about traffic applications

To find out about the awareness of Intelligent Transportation System (ITS) applications among the respondents, two multiple choice questions were asked as indicated on, in Table 2. Since the participants could choose several alternatives, the total counted answers for the first two questions were 137, and 116, which exceeded the number of participants.

<table>
<thead>
<tr>
<th>Traffic application knowledge</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which applications do you know of?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waze</td>
<td>68</td>
<td>62,9%</td>
</tr>
<tr>
<td>Live Trafik</td>
<td>25</td>
<td>23,1%</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>11,1%</td>
</tr>
<tr>
<td>None</td>
<td>32</td>
<td>29,6%</td>
</tr>
</tbody>
</table>
Which applications have you used?

<table>
<thead>
<tr>
<th>Application</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waze</td>
<td>44</td>
<td>40.7%</td>
</tr>
<tr>
<td>Live Trafik</td>
<td>13</td>
<td>12%</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>5.5%</td>
</tr>
<tr>
<td>None</td>
<td>53</td>
<td>49.1%</td>
</tr>
</tbody>
</table>

Did you know that users can submit content to these applications for others to see?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>61</td>
<td>56.5%</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>43.5%</td>
</tr>
</tbody>
</table>

Have you contributed with content in any way to any of the applications?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>25%</td>
</tr>
<tr>
<td>No</td>
<td>79</td>
<td>73.1%</td>
</tr>
<tr>
<td>No, but I’ve considered it</td>
<td>2</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

4.1.3 Incentive levels of why users contribute to quality content in ITS

The respondents were asked to answer how motivating they found each incentive on a scale from 1 to 7. Answering “1” means “I don't find it motivating”, answering “7” means “I find this very motivating”.

![Graph showing incentive levels of why users contribute to quality content in ITS](image-url)
Figure 1. The box plot above represents how motivating users feel about contributing UGC to applications. The colored boxes represent the interquartile range, which means that it represents 25% of the answers below the median and 25% of the answers above. The x-markings represent the mean value of each incentive and the intersecting line in each box represent the median. The whiskers (straight vertical lines) show the distribution of the answers since they cover the whole span outside of the boxes, this shows that at least one response was submitted for every scale in every question.

All respondents generally favor monetary rewards (third bar), mean value 4,76, and the notion of contributing with helpful UGC (sixth bar), mean value 4,72, as motivating incentives for contributing UGC to applications in general.

Figure 2. The box plot above represents how motivating users (who have contributed UGC to ITS traffic applications) see certain incentives for contributing UGC to applications. The outliers (the dots seen in the box plot) show values who lie out of range from the interquartile range, i.e., values that lie more than 1,5 times the box’s length from either side. These dots lie outside the range of which values are expected.

The respondents, who have contributed to ITS traffic applications, generally favor communication with administrators (fifth bar, mean value 5,19), and being helpful to others (sixth bar, mean value 5,41), as motivating incentives for contributing UGC to applications in general.

The median and mean were close to 4 (neutral value) on every question. However, when comparing the answers between the respondents who drive a lot and those who rarely drive, one may find the responses were grouped in two opposites (see Figure 3 & Figure 4). The chance to participate in raffles had the most varied answers with a high amount of responses in
the 4 outer options and less in the middle. It had a median of 4.37 while the most common answer was 1. What one could speculate from this is that people either like it greatly or dislike it a lot. The three incentives that respondents rated the highest was, in descending order, based on average value: Compensation in the form of money or gift cards, the notion of contributions being helpful for others, and participating in raffles through contributing.

The widespread answers collected, from the survey question about how motivating the chance to participate in raffles is, leads to the speculation whether the quality of the UGC would be of decent quality. With many respondents showing no interest at all, those who could see it as interesting are those who are more likely not to submit quality content.

From the results, it is possible to decipher a difference, regarding incentives, between professional and non-professional drivers. The respondents with a driving-oriented occupation valued the intrinsic motivations higher than those who only drove outside of work, while they saw monetary rewards as much less motivational. It is an interesting correlation to observe, but since this is not a statistical study, an empirically authenticated conclusion cannot be drawn.

![Figure 3](image-url)
Figure 4.
Two simplified Figures over respondents in two groups. People who do not drive at work includes respondents without a license as well as those who replied no to the question if their profession was driving oriented. People who do drive at work includes respondents who drive professionally as well as spends a lot of time driving during work.

4.1.4 Users experiences from submitting UGC into ITS traffic applications

To see what the overall opinion of contributing in the ITS applications was, the respondents who previously had responded that they had provided content to the applications before, were asked about their ITS traffic application experience. Arguably, if the user experience of the applications was poor, it could be essential to enhance the user experience, or else the current incentives would not appear as motivating as they potentially could be.

<table>
<thead>
<tr>
<th>How do you generally feel about contributing to traffic-oriented applications?</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find it difficult or confusing to contribute to traffic-oriented applications.</td>
<td>3,0</td>
<td>3</td>
</tr>
<tr>
<td>I find it rewarding to contribute to traffic-oriented applications.</td>
<td>5,0</td>
<td>5</td>
</tr>
<tr>
<td>It feels insignificant/unnecessary to contribute with content in the applications.</td>
<td>2,1</td>
<td>2</td>
</tr>
</tbody>
</table>
I find it interesting to contribute to traffic-oriented applications  

<table>
<thead>
<tr>
<th></th>
<th>4.8</th>
<th>5</th>
</tr>
</thead>
</table>

I find it fun to contribute to traffic-oriented applications.  

<table>
<thead>
<tr>
<th></th>
<th>4.7</th>
<th>4</th>
</tr>
</thead>
</table>

I find it helpful (to others) to contribute to traffic-oriented applications  

<table>
<thead>
<tr>
<th></th>
<th>6.0</th>
<th>6</th>
</tr>
</thead>
</table>

The experience that users relate to the most is that their contributions feel helpful, with a high average rating of 6. The result seems to be valid since the responses of “It feels insignificant/unnecessary to contribute with content in the applications” has a mean value of 2.

**Do you like contributing to the application?**

11 respondents claimed that they always enjoy contributing to ITS traffic applications, 16 respondents claimed they enjoy it sometimes and not a single respondent claimed that they never have enjoyed it.

**What made your experience positive or negative?**

<table>
<thead>
<tr>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Good:</strong></td>
</tr>
<tr>
<td>-Helping others</td>
</tr>
<tr>
<td>-The fact that helping a community not only helps me but others as well.</td>
</tr>
<tr>
<td>-It's nice to others.</td>
</tr>
<tr>
<td>-Giving back since you use the information that others have contributed with.</td>
</tr>
<tr>
<td>-Good to be able to see if there is trouble on the road before the radio warns about it.</td>
</tr>
<tr>
<td>-Good to help others.</td>
</tr>
<tr>
<td>-Helping others.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>-A clean interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-I don't like that the information might still be there even though the problem has been taken care of.</td>
</tr>
<tr>
<td></td>
<td>-I like it because if important information is missing, I would have wanted to have access to it if I didn't know it myself.</td>
</tr>
<tr>
<td></td>
<td>-It feels like my contributions can be helpful.</td>
</tr>
<tr>
<td></td>
<td>-It is fun.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Bad:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>-It's completely out of the question to fiddle with the phone while I'm driving.</td>
</tr>
<tr>
<td>-It's illegal to fiddle with the phone while driving.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>-Complicated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-Difficult sometimes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Unclear/mixed:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>-When you drive</td>
</tr>
<tr>
<td>-I don't know</td>
</tr>
<tr>
<td>-Contribute with information</td>
</tr>
<tr>
<td>-If the application already is started.</td>
</tr>
</tbody>
</table>

|                           | -If I'm stressed or not on my way to work I contribute less than if I'm for example on vacation |
Eight out of the twelve positive responses regarding the respondents' experience was oriented around helping others. A pattern can be seen from table 4, that out of those who have contributed, the drive behind contributing has been to help others.

4.2 Interview Result

The structured interview with the project manager for the development of the application Live Trafik, from the Swedish Haulage Agency, consisted of eight questions. The following text is the English translation of the structured interview.

1. Question: What's your attitude, in general, to motivate users to contribute with content? What do you see as the pros and cons with using systems relying on user-generated content?
Response: We see feedback from us to the users submitting content as an important motivator and as a user receiving notice that problems reported actually get rectified, alternatively being able to see the status of the reports you’ve sent in. Up until now, we haven’t had any feedback loops from Trafikverket, where a user is able to know what happens with the information you’ve sent in. Starting from February 2019, we will begin testing a new solution in a research project with Trafikverket.

2. Question: During the development process of the application, which incentives did you estimate to be the most suiting and motivating incentives for users to contribute to the application?
Response: Together with Trafikverket, we looked at the most common traffic problems and tried to implement a framework that would correspond well to those particular problems.

3. Question: Was the current incentive-system a clear choice or were there other plausible choices? (Do you think the current system was the best choice?)
Response: The system we have today hasn’t performed as well as we’ve hoped, especially since users do not receive a response to their contributions.

4. Question: Is there any current development towards increasing the number of user contributions?
Response: No, currently there is no on-going development. We’ve also noticed the number of contributions decreasing which is probably thanks to earlier mentioned reasons, I presume.

5. Question: How do you perceive the current incentives in the Live Traffic application?
Response: It is not working well. I would like to see something more than the High Score-list for user contributions that we have today.

6. Question: Is there a way to ensure the quality of user contributions today?
Response: We have no quality assurance on contributed content, except that contributions from new users aren’t sent to Trafikverket; users have to do a couple of contributions before we send them to Trafikverket.

7. Question: What do you consider as problems with user contributions?
Response: A problem is that some users make poor quality test contributions. Other than that we usually receive legit contributions. That is our current experience at least.

8. Question: What do you see as positive with a system based on user contributions towards road-data?
Response: There are many positive things, but mainly one thing: We can receive contributions from people in Traffic in the whole of Sweden, not from just a particular region. Unfortunately, we do not know where the users that contribute are from.

4.2.1 Interview analysis

The interviewee stated that the current system does not work as well as they hoped and believed that a feedback loop was necessary to implement and keep the users motivated to contribute to the application. A problem that has appeared is new users that contribute for the sake of trying out the function without having any valuable information, leading to low quality and misconceiving contributions. Except for the problems mentioned above, the quality of UGC, that the application collects, has been seen as adequate. It is hard to determine what factor has led most of the contributions to be of adequate quality. However, since the cause of most contributors to contribute is to help others (see table 5, Figure 2), it could be perceived as a correlation between the incentive and high-quality UGC.
5. Discussion

Results, as seen in figure 1, show that the most favored incentives are monetary rewards and the notion of submitting helpful UGC. As shown in figure 2, for respondents who have contributed to ITS traffic applications, the results differ a bit. Those respondents primarily favor the notion of being helpful to others, followed up by communication with administrators. Furthermore, for the users who have contributed to ITS traffic applications, when asked about how they generally feel about contributing to traffic-oriented applications, they responded that they actually felt like their UGC contributions were helpful.

With the notion of being helpful being the overall favored incentive, one could argue that the results show strong gratitude towards intrinsic motivations. Based on the collected theory, a focus on improved feedback and display of helpfulness could be successful, since it leads to an enhanced experience of self-fulfillment and acknowledgment for the UGC contributing users. Previous research also implies that an enhanced motivation towards helping others has proven to result in high-quality contributions, which is beneficial since UGC for ITS traffic applications is meant to be useful (Noels, Clément, & Pelletier 1999). As previous research indicates, by increasing the norm of reciprocity between the users, the trust that helpful UGC will be reciprocated can also increase. This will arguably push the notion of collective helpfulness in ITS traffic application, which according to the results is the overall favored incentive (Wasko & Faraj 2000).

Implementation of new incentives into a system can though prove to be a challenge if the UGC derived from the new incentives is not controlled, and quality checked. Furthermore, promising rewards to new users can prove to be detrimental, if the new users solely use the application for the reward, at the cost of quality UGC contributions (Lin, Li, Zhai & Qi 2014). The authors believe that intrinsic incentives could counter the challenges mentioned above. Since the reward would be administered from the users themselves, to themselves, the application developers can focus on developing application functionality, and acknowledging quality UGC. Therefore, by letting the users nourish their intrinsic motivation by themselves - through using a useful and functional application, and helping others - the most favored incentive should be gratified.

Some respondents expressed a negative attitude toward smartphone applications, in the traffic in general, since they believe that one should not use the phone while driving. This is true, besides, using the phone while driving is illegal in Sweden. However, there are possibilities for a passenger to do the reporting or for the driver to submit the report at a rest area or while standing still in traffic, i.e., if the traffic is completely jammed. There are also functions available to save the current geographical position, with the press of one button, so that if a user encounters something on the road the user can save the position where the problem appeared, and later submit the information at a more appropriate opportunity. To set co-passengers as an additional target group for the application audience could lead to interesting results, regarding the quality in the content generated, since the passengers have more time on their hand.
6. Conclusion & further research

Our primary objective in this thesis was to investigate which incentives that are suitable for generating useful quality content, to Intelligent Transportation System traffic applications. To achieve this objective, a research question was formulated, thus: "Which incentives are useful for increasing quality content in the field of ITS traffic applications?"

The predominant method employed to answer the research question was a quantitative survey, which was supplemented by a qualitative structured interview. The main results following the method were that out of the incentives investigated, in this thesis, the most favored incentives was monetary rewards, and that the provided User-Generated Content would be helpful for others.

The main contribution of this thesis is the insight provided into incentives for UGC in ITS traffic applications. The conclusions presented in the following section and future work are based on further analysis of the results.

6.1 Conclusion

According to the survey respondents: Monetary rewards and, the notion of helping others, are two of the favored incentives for contributing content. Since the authors believe extrinsic incentives could lead to users spamming UGC, or simply them contributing with low-quality content. Thus, a push towards intrinsic motivations should, arguably, be good for consistent and adequate contributions. Furthermore, to ensure that users feel acknowledged from assisting others, the authors believe feedback is a necessary complement. Feedback could be utilized through communication between both users to users, and users to the people in charge of the application, e.g., through direct feedback in interactive contributions, so that the user becomes aware that the information has been received. For example in the case of Swedish Traffic Administrations application Live Trafik, the information you submit is directly sent to the authorities, and if there has been an accident or road damage, they can use the contributed information to fix the issue, e.g., repairing the street or sending help to the location of the accident.

Intrinsic oriented incentives (motivation through internal stimuli) are seen as more likely to motivate users to provide content that is helpful and good, quality-wise. Users who use the applications actively need quality content since, without it, the application would not provide the designed functionality. There is also a need for users who do not use the applications selflessly, i.e., users who interact with the applications as an invest and reward system; contributing quality UGC and receiving the same from other users. As the survey results show, extrinsic incentives may be a sufficient incentive to attract new users, but the attracted users may not necessarily provide the content the applications need. The authors believe that since the motivation was not usefulness oriented, and more oriented around the extrinsic reward, the
monetary incentive may negatively impact the application functionality. The shift from functionality to external reward may result in less focus on the quality of contributed UGC and more on the quantity. Therefore, users motivated extrinsically may be inclined more towards short-term use, rather than long-term use.

The allurement from monetary rewards is noteworthy. It could be large enough to draw new users to the applications and to get them to provide with content. However, such a strong draw force could lead to the rise of spamming content into the application, i.e., content that does not provide value, in the form of usefulness and functionality. Therefore, if a monetary reward system is implemented into an application, quality control becomes even more critical. There are several ways to assure, or at least test, the quality of the provided UGC. Direct interaction is one alternative, which could be in the shape of likes, ratings or comments from other users, where the information has to pass a certain rate-threshold for the user to receive a reward from it. Another alternative could be administrator control, where administrators could examine the quality of the content, before displaying the content openly in the application.

To summarize, the authors conclude monetary rewards, and mentioned extrinsic incentives, to be insufficient for ITS traffic applications to gain UGC of adequate quality. The incentives deemed adequate is the intrinsic incentives, where focus lie on being rewarded, through the use of the application, and helping others.

We believe that the research question was answered to the extent of finding, as defined by the authors, useful incentives for user-generated content of adequate quality for intelligent transportation systems.

6.2 Further research

The research, analysis, discussion, and conclusion of this thesis, while providing a perspective on incentives and UGC in ITS traffic applications, is still in need of further research. While the survey and interview, together with the collected theory, made the authors of this thesis reach a conclusion, the participation was still lacking quantity-wise in providing statistical evidence. To achieve a more generalizable result, the authors of this thesis recommend studying a larger and more representative population sample, and through A-B testing of recommended incentives, further test the conclusion of this thesis.

If the authors of this thesis could have changed anything regarding the overall execution of research, the authors would have done changes in the methodology. The main regret of the authors is the exclusion of questions regarding feedback in the survey questionnaire. Some of the asked questions, later came to not serve the purpose the authors thought from the beginning. In the questionnaire, the authors would also have changed some of the demographic questions regarding driving habits. For example, instead of, or in addition to asking how often the
respondents drive outside of their hometown, a question regarding how many hours per week would have given a more accurate description of the driver’s habits.
7. References

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8. Appendix

In the appendix, the survey- & interview questions, as well as some results, are presented.

8.1 Survey - Swedish

Enkätundersökning om användarinnehåll i ITS-trafikapplikationer

I appar som till exempel trafikverkets app "live traffic" kan användare göra andra användare medvetna om avvikande vägförhållanden som t.ex. vägolyckor, halka eller trafikköer. Denna undersökning görs för att kunna analysera vad som bidrar till ökad rapportering/bidragande med information i appar med detta syfte.

Vilken är din högst avslutade utbildning?
Grundskola
Gymnasium
Högskola/universitet 180 poäng eller mindre
Högskola/universitet över 180 poäng
Vill inte svara

Har du körkort?
Ja
Nej
Har haft
Vill inte svara

(Om Ja på Körkort) Hur ofta kör du bil?
Varje dag.
Minst en gång i veckan.
Minst en gång i månaden.
Mer sällan än en gång i månaden.

(Om Ja på Körkort) Hur ofta kör du bortom din hemstad/ort?
Varje dag.
Minst en gång i veckan.
Mer sällan än en gång i veckan.
Mer sällan än en gång i månaden.

(Om Ja på Körkort) Kör du professionellt?
Ja
Nej
Nej, men det ingår mycket tid på vägen i mitt arbete (Där jag själv kör).
Känner du till någon av följande trafik-appar? (eller liknande?) (flervalsfråga)  
(I apparna kan man som användare kan lägga till information om vägförhållanden och -avvikelser)  
Waze  
Live trafik (Trafikverket)  
V-Traffic  
Ingen  
Annan trafikapp (fritext)  

Har du använt/använder någon av dessa appar? Om ja, vilka? (flervalsfråga)  
Waze  
Live trafik  
V-traffic  
Inte använt  
Annan trafikapp (fritext)  

Visste du att du själv kan lägga in innehåll om vägförhållanden t.ex. Halka, bilköer eller vägarbete i dessa appar?  
Ja  
Nej  

Hur motiverande tycker du följande alternativ är för att bidra med innehåll till applikationer?  
Att bidra med innehåll är till exempel att ladda upp en bild, skriva en kommentar eller rapportera en incident i en trafik-app.  
Vänligen ange hur motiverande du finner följande alternativ i en skala från (1) till (7).  
(1) - innebär att du ej finner det motiverande.  
(7) - innebär att du finner det väldigt motiverande.  

Ifall det är någon fråga du inte kan svara på kan du lämna den obesvarad.  

Jag upplever belöningar i form av titlar och statussymboler som motiverande för att bidra med innehåll i applikationer (Exempelvis: Ett visst engagemang ger din användarprofil en statussymbol eller titel som syns utåt för andra.).  
( (1.) Håller inte med alls -> (7.) Håller med fullständigt )  

Jag upplever belöningar i form av poäng som motiverande för att bidra med innehåll i applikationer. (Exempelvis: Du blir belönad med poäng efter ditt engagemang, som exempelvis kan synas i en "High Score".)  
( (1.) Håller inte med alls -> (7.) Håller med fullständigt )  

Jag upplever belöningar i form av pengar, presentkort eller dylikt som motiverande för att bidra med innehåll i applikationer.  
( (1.) Håller inte med alls -> (7.) Håller med fullständigt )

45
Jag upplever chansen att få medverka i utlottning av priser som motiverande för att bidra med innehåll i applikationer.
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever möjligheten att direkt rapportera till ansvariga för applikation som motiverande för att bidra med innehåll i applikationer. (Där till exempel varje bidrag ökar vinstchansen.)
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever möjligheten att direkt rapportera till ansvariga för applikationer som motiverande för att bidra med innehåll i applikationer.
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever möjligheten att bidra till samhälls- och egennytta som motiverande för att bidra med innehåll i applikationer.
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever medverkan en social miljö som motiverande för att bidra med innehåll i applikationer.
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever tillgång till extra funktioner eller tjänster som motiverande för att bidra med innehåll i applikationer. (Till exempel att, genom aktivt engagemang i applikationen, få tillgång till funktioner eller tjänster som andra användare ej har tillgång till.)
((1.) Håller inte med alls -> (7.) Håller med fullständigt)

Jag upplever ANNAT som motiverande för att bidra med innehåll i applikationer. (Här kan man lägga in (t.ex.) upp till 3 andra anledningar man tycker är motiverande. (Fritext).

Har du lagt in innehåll i någon av dessa appar?
(T.ex. lagt in en kommentar, en bild, eller rapporterat vägförhållanden)
Ja
Nej
Nej, men har övervägt

Om ja, hur känner du generellt om att bidra inom Trafik-appen eller -apparna?
Tycker du om att bidra med innehåll i appen/apparna?
Jag tycker alltid om att bidra med innehåll i apparna.
Jag tycker ibland om att bidra med innehåll i apparna.
Jag tycker aldrig om att bidra med innehåll i apparna.
Vad får dig att tycka om/inte tycka om att bidra i appen/apparna? (free text)

Det känns krångligt att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt (1 -> 7))

Det känns givande att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt (1 -> 7))

Det känns obetydligt/onödigt att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt (1 -> 7))

Det är intressant att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt (1 -> 7))

Det är roligt att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt (1 -> 7))

Det känns hjälpsamt att lägga in innehåll i apparna
(Håller inte med alls -> Håller med fullständigt)

Vilka metoder för rapportering föredrar du vid rapportering om t.ex. väg- eller trafiktillstånd inom trafik-appen eller -apparna?

Fritext
(Föredrar inte alls -> Föredrar väldigt mycket (1 -> 7))

Förbestämda alternativ
(Föredrar inte alls -> Föredrar väldigt mycket (1 -> 7))

Other(fri text)

(Har du lagt in innehåll i någon av dessa appar?)

Om nej, varför inte?
Jag har ej använt denna app
Jag gillar inte att lämna ut information
Jag kan spendera min tid mer effektivt på något annat
Det känns obetydligt
Det känns jobbigt/svårt att genomföra
Jag har inte varit medveten om den funktionen
Jag har inte ännu, men planerat att göra det
Jag har inte ännu, men kanske kommer göra det
Jag vet inte hur man gör
Annan: (fritext)
Brukar du bidra med innehåll i andra applikationer eller hemsidor där andra användare kan nytta informationen du bidragit? (Exempelvis: Artiklar på Wikipedia, resetips i Trip Advisor eller online-recensioner.)

Ja
Nej

Har du några övriga synpunkter?

8.2 Interview - Swedish

1. Vad är er inställning i överlag till att motivera användare att bidra med innehåll? Vad tror ni är fördelar samt nackdelar med sådana system? (Vad tycker de om incitament?)

2. När ni utvecklade appen, vilka incitament bedömde ni var mest passande/givande för att användare skulle bidra med information? (Vad övervägde de under utveckling?)

3. Gjorde ni något övervägande om att implementera ett annat incitamentsystem än det ni använder idag eller var valet självklart? (Vad tycker de om valet av incitamentsmodell idag?)

4. Utför ni något arbete nu(eller senaste/kommande året) för att uppmuntra/öka bidrag?

5. Hur tycker ni de incitament ni har inom er applikation fungerar idag? (Hur funkar det som används idag?)

6. Hur ser ni till att inlagd data är korrekt? (ensure quality of data)

7. Vad anser ni det finns för problem/nackdelar med användarbidrag?

8. Vad ser ni som fördelar med ett system baserat på användarbidrag för vägdata?

8.3 Interview - English

1. Question: What’s your attitude, in general, to motivate users to contribute with content? What do you see as the pros and cons with using systems relying on user-generated content?

2. Question: During the development process of the application, which incitatives did you estimate to be the most suiting and motivating incentives for users to contribute to the application?
3. Question: Was the current incentive-system a clear choice or were there other plausible choices? (Do you think the current system was the best choice?)

4. Question: Is there any current development towards increasing the number of user contributions?.

5. Question: How do you perceive the current incentives in the Live Traffic application?

6. Question: Is there a way to ensure the quality of user contributions today?

7. Question: What do you consider as problems with user contributions?

8. Question: What do you see as positive with a system based on user contributions towards road-data?

8.4 Other results

<table>
<thead>
<tr>
<th>Table 3</th>
<th>How motivating is each incentive?</th>
<th>Mean</th>
<th>Median</th>
<th>Most common answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I find rewards in the form of titles or status symbols to be motivating.</td>
<td>3,12</td>
<td>4</td>
<td>5 (24,1%)</td>
</tr>
<tr>
<td></td>
<td>I find rewards in the form of in-application points to be motivating.</td>
<td>3,25</td>
<td>4</td>
<td>5 (22,2%)</td>
</tr>
<tr>
<td></td>
<td>I find rewards in the form of money, gift cards or similar to be motivating.</td>
<td>4,83</td>
<td>5</td>
<td>7 (25,9%)</td>
</tr>
<tr>
<td></td>
<td>I find the chance to participate in raffles motivating.</td>
<td>4,37</td>
<td>4</td>
<td>1 (19,4%)</td>
</tr>
<tr>
<td></td>
<td>I find the ability to reach the creators and administrators of the application motivating.</td>
<td>4</td>
<td>4</td>
<td>5 (28,7%)</td>
</tr>
<tr>
<td></td>
<td>I find the notion that my contributions can be helpful, to society and others, to be motivating.</td>
<td>4,75</td>
<td>5</td>
<td>6 (21,3%)</td>
</tr>
<tr>
<td></td>
<td>I find the opportunity to, through my contributions, take part in a social environment motivating.</td>
<td>3,42</td>
<td>4</td>
<td>4 (27,7%)</td>
</tr>
</tbody>
</table>
I find that, through my contributions, receiving access to extra/hidden functions or participate in test groups to be motivating.

<table>
<thead>
<tr>
<th></th>
<th>Waze</th>
<th>Live Trafik</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have not used this application</td>
<td>50</td>
<td>64</td>
<td>26</td>
</tr>
<tr>
<td>I don’t like giving out information</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>My time could be spent better elsewhere</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>I don’t find it meaningful</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>It feels complicated/hard to do</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>I was not aware it was possible</td>
<td>11</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>I haven’t yet but I’m planning to</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>I haven’t yet but I might</td>
<td>9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>I don’t know how to</td>
<td>11</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Do you contribute with content in other applications or websites where other users can make use of the information/content you have contributed with? For example, submitting to Wikipedia articles or restaurant reviews?

44 respondents answered yes, while 37 respondents answered no.
User experience from contributing

Which content-submitting structures do you prefer?
When asked which method for submitting UGC the respondent prefers. Five respondents answered free text submissions, and 19 answered choosing from a list of alternatives. Two respondents also answered that they prefer premade alternatives with free text submissions as an alternative. The response “premade alternatives with free text submissions as an alternative” was not a selectable option among the options presented to the respondents, but was submitted through an “other” option.

Other user opinions regarding the survey questions
To see if there were anything that the authors had missed to bring up that could be useful in the research, a concluding question was asked whether the respondent had any other feedback or opinions that had not been brought up previously in the survey.

Difficult sometimes.  
The fact that helping a community not only helps me but others as well  
Unfortunately, I did not know about these applications but I will check out The Swedish Transport Administration application directly.  
People put too much energy into applications.  
Nothing compares to driving actively and in control. Are there any applications for using the blinkers?  
The question if my work is driving oriented was a bit unclear. Additionally, I mostly use Google Maps for navigation  
If you're creating an application for the sake of god don't have a banner of adds that takes up a fourth of the screen  
To fiddle with the phone to report when you're driving increases the risks of accidents a lot.  
Waze helps criminals to avoid the police.
University of Borås is a modern university in the city center. We give education programs and courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

At the Department of Information Technology, we have focused on the students' future needs. Therefore, we have created programs in which employability is a keyword. Subject integration, wholeness and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our courses and programs with a major in informatics are centered around basic concepts as system development and business development. In our wide range of specializations there is everything from programming advanced systems, analyze the needs and requirements of businesses, to conduct integrated IT and business development, with the common purpose of promoting good use of IT in enterprises and organizations.

The department is carrying out IT-related research within the university's research area called Business and IT. In terms of field, the research activities are mainly within computer and systems science. Particular areas of focus are data science and information systems science. Both scientifically and professionally-oriented research are performed, which among other things is manifested through that research is often conducted based on domain specific needs of business and government organizations at local, national and international arena. The professionally-oriented research is also often manifested through our participation in the Swedish Institute for Innovative Retailing (SIIR), which is a research center at the University with the aim of contributing to commerce and society with the development of innovative and sustainable trade.

VISITING ADDRESS: JÄRNVÄSGATAN 5 · POSTAL ADDRESS: ALLÉGATAN 1, SE-501 90 BORÅS
PHONE: + 46 33 435 40 00 · E-MAIL: INST.HIT@HB.SE · WEB: WWW.HB.SE/HIT