



**DEPARTMENT OF
APPLIED IT**

A TRUCK DRIVER'S GUIDE TO SUSTAINABLE DRIVING

A Qualitative User Experience Evaluation of Volvo Trucks' On-Board Driver Coaching System

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Abstract

Eco-driving and ways to reduce carbon emissions is a burning topical issue. Volvo Trucks' on-board driver coaching system gives information via tips and gauges to truck drivers about how to practice sustainable driving. This qualitative study's purpose was to gather feedback from truck drivers about the user experience of and the motivation created by the system. Based on this, design implications in form of suggestions for the future development of the system were formulated. This was done by conducting semi-structured interviews with eight truck drivers and two experts. Qualitative content analysis was used, by creating themes in an inducible manner, to collect insights from the interviews. Three main themes were identified including aspects such as how the interaction with the system was perceived and how changes in the current system could benefit the user. The findings showed a range of experiences, although the experience of not fully understanding the system stood out. Design implications included three areas: to trust the truck driver's competence, clarification and transparency, and customisation. Overall, the user experience and motivational factors of the driver coaching system would benefit from being more tailored to individual drivers and to use more data for more context-precise and relevant information.

Keywords

Motivation, Driver coaching system, Eco-driving, Truck driver, User experience, Development

Titel

En lastbilschaufförs guide till hållbar körning: en kvalitativ utvärdering av användarupplevelsen av Volvo Lastvagnars driver coaching system.

Sammanfattning

Eco-driving och andra taktiker för att minska koldioxidutsläpp är ett högaktuellt ämne. Volvo Lastvagnars on-board driver coaching system ger information via tips och mätare till lastbilschaufförer om hur man bäst anammar ett hållbart körsätt. Denna kvalitativa studies syfte var att samla lastbilschaufförers åsikter angående användarupplevelsen och motivation skapad av systemet. Baserat på detta formulerades förslag för framtida utvecklingsmöjligheter för systemet. Detta gjordes genom att utföra kvalitativa semi-strukturerade intervjuer med åtta lastbilschaufförer och två experter. En kvalitativ innehållsanalys genomfördes, genom att induktivt skapa teman, för att samla insikter från intervjuerna. Tre huvudteman identifierades, vilka inkluderade aspekter såsom hur interaktionen med systemet uppfattades och hur förändringar i det nuvarande systemet skulle kunna främja användarna. Resultatet visade på en variation av upplevelser, men upplevelsen av att inte fullt ut förstå systemet var framträdande. Förslag för framtida förbättringar inkluderade tre områden: att lita på chaufförernas kompetens, förtydligande och transparens och användaranpassning. Överlag så skulle användarupplevelsen och motivationsfaktorerna inom driver coaching systemet främjas av att bli mer skraddarsydd för den enskilde chauffören samt att använda mer data för att skapa mer kontextuell och relevant information.

Nyckelord

Motivation, Driver coaching system, Eco-driving, Lastbilschaufför, Användarupplevelse, Utveckling

Foreword

As the last hooray of the Cognitive science bachelor program at Gothenburg's University, we conducted this study. It was done in collaboration with Volvo, and we would like to thank every single one who has helped us in any way to make this study happen. A special thanks to Emma Johansson, our supervisor at Volvo Group Trucks Technology (GTT) for going above and beyond to help us succeed, and to our supervisor Katerina Cerná at Gothenburg University for the helpful guidance and input throughout the process. Likewise, we want to give a special thanks to all the respondents who took time out of their schedules to be a part of this study.

Areas for theory and earlier research were divided into natural focus fields. Jenny's main responsibility for literature search and writing focused on motivational theory research, and climate research. Veronica was responsible for the more technical areas such as Volvos' vision and systems, as well as earlier research in regard to driver coaching systems and eco-driving in general. This allowed us to gain deeper understanding about a subject while dividing the work evenly and fairly between us. The workload and task assignments regarding the interviews, analysis and writing were divided equally (see the method section for more detail).

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1 Introduction

We humans are dangerous. Not least to the climate and thus also to ourselves. The earth is heating up due to our actions and if we do not act now to improve it will soon be deemed too late (IPCC, 2022). The increasing temperature is partly due to an increase in concentration of major greenhouse gases, such as CO₂, through fossil emissions (United in Science, 2021). Year 2016 entered The Paris Agreement into force, which entailed a legally binding agreement for the involved parties to work towards limiting global warming with the ultimate goal being to limit it to 1.5 degrees Celsius (United Nations Climate Change, n.d.). Practically, that would mean to limit cumulative CO₂ emissions (United in Science, 2021).

The road transportation industry accounts for a considerable part of the CO₂ pollutant emissions around the world, consuming enormous amounts of fossil fuel. In 2017, the road transport sector stood for 21 percent of the total CO₂ emissions in the EU (European Commission Climate Action, n.d). A lot of effort by companies and larger organs, such as the European Commission, has been put into improving vehicles and establishing regulations to create more eco-conscious ways for transportations. An example is Regulation (EU) 2019/1242, which came into force in 2019. It sets the CO₂ emission standards for heavy-duty vehicles and has expected outcomes that include a reduction of about 54 million tonnes on CO₂ emissions in the timespan 2020 to 2030 (European Commission Climate Action, n.d).

An often-overlooked vital factor when it comes to reducing emissions is the driver. Important factors that can be affected by eco-driving are route choice, driving speed, idling and acceleration/deceleration. Changing driving behaviour to an eco-friendlier technique is a relatively low-cost and instantaneous way of reducing fuel consumption, and thereby emissions, significantly (Huang et al., 2018).

Xu et al. (2021) conducted an extensive review on energy-saving theory and technology of eco-driving as well as its capabilities and evaluation. The study proclaims that depending on what type of vehicle being evaluated the impact differs, but for internal combustion engines (ICE) changes of 15%-25% in fuel-consumption can be reached due to differences in driving style. The authors also bring forward the importance of looking at the bigger picture instead of just a single vehicle and to evaluate not only the standard parameters but also external factors outside the driver's influence that can affect these parameters, e.g., outside temperature, traffic and road conditions etcetera. Moreover, the future of vehicle big data is discussed and described as a tool for solving problems within the eco-driving field.

In order to educate and encourage drivers to change their driving style to an eco-friendlier one, a driver coach has typically joined the driver and during the journey given them tips to think about and points on how to improve. However, this is neither cost nor time effective. Instead, the creation of on-board driver coaching systems were born, where tips and aggregated scores are calculated and displayed inside the truck. The aim of these kinds of persuasive technologies is to motivate the drivers to a more fuel-efficient way of driving.

1.1 Purpose

The purpose of this study is to capture truck drivers' experiences of an on-board driver coaching system as well as exploring truck drivers' ideas for further developments of such a system. Qualitative interviews were chosen to get a better understanding of how the system is interacted with on a daily basis and in what ways it motivates, or potentially could motivate, to more fuel-efficient driving.

Research questions:

Q1: How do truck drivers experience the driver coaching system?

Q2: How would truck drivers like the driver coaching system to be designed to increase motivation?

2 Theory

In this section, theory and frameworks regarding motivation and feedback is presented to give the reader a theoretical background on behavioural change, for which a driver coaching system is designed to induce. Also, to give theoretical background on factors explaining how truck drivers could experience the driving differently whilst using the system.

2.1 Self-Determination Theory

The self-determination theory of motivation tries to explain in what ways and why people are motivated to act (Gagné & Deci, 2005). It states that self-determination is a continuum ranging from amotivation, through four stages of extrinsic motivation, to intrinsic motivation. These two types of motivation, extrinsic and intrinsic, relate to if the motivation to act is external or internal, that is, if one engages in activity because the activity itself is interesting or one acts because there is an outside pressure to engage (Gagné & Deci, 2005). The aforementioned continuum could also be described as ranging from completely external with no intention to act (amotivation) to completely internal with intention to act (intrinsic motivation). Noteworthy is that both extrinsic and intrinsic motivation involve intention, although the motivation stems from different sources as the four stages of extrinsic motivation shows. The stages range from controlled to autonomous, in other words if one acts with a sense of external pressure or acts with a sense of volition. For people to be able to maintain an intrinsic motivation (internal, autonomous), some basic psychological needs must be met. They need to feel competent, autonomous, and part of a context (Gagné & Deci, 2005).

The self-determination theory is a theory of motivation that includes both external and internal sources of motivation. This is relevant in this study because it could explain how truck drivers are motivated differently and further how to sustain

different kinds of motivation. For example, if the work conditions aid the psychological needs for intrinsic motivation or not.

2.2 Motivation for Eco-Friendly Decisions

Rezvani et al. (2018) defined three factors that could impact motivations behind an, in their case, environmentally related decision, (i) gain: what are the personal gains and do the benefits outweigh the cost?, (ii) normative: the individual perception of moral incorrectness and correctness and social judgement, (iii) hedonic: is the anticipation of the decision pleasurable and would the decision improve one's feelings? Rezvani et al. specifically looked at high-involvement decisions, that is decisions that require some reasoning and investment, which may not be the kind of decisions the respondents in this study are facing and thus need to be motivated to. Nonetheless, these factors may be relevant to take in consideration anyway because of how it relates to the continuum of self-determination. For example, the normative factor being related to partly controlled extrinsic motivation, with an external pressure (social judgement) being the motivating force.

These factors were included because they could also explain why truck drivers are motivated to act in a certain way. Is it because they would personally gain from it, do they strive to follow a norm, or is just the thought of the act enough motivation?

2.3 Feedback and Task Types

What reaction to feedback humans have may be dependent on which context what type of feedback is given. Van Dijk and Kluger (2011) says the effect of positive versus negative feedback on motivation and performance is partly mediated by the type of task being carried out. The authors state that there are two types of tasks: promotion and prevention, where the former is about achievements of rewards and the latter about avoidance of punishment. Those are two ways of being motivated to a task and in each case positive or negative feedback can have different effects. The motivation is higher when the task matches which kind of feedback it is. Positive feedback fits promotion tasks, when the task requires eagerness, curiosity, creativity etc. and negative feedback fits prevention tasks, when the task requires

vigilance, adherence to rules etc. So, what type of feedback has the most motivating effect depends partly on the character of the task.

This is relevant for considering how feedback from a driver coaching system should be phrased. It also depends on how the truck drivers view the task of driving, but the main message is to match the feedback to the type of task.

2.4 Design-Framework for Feedback

Sanguinetti et al. (2018), has developed a design framework that gives guidelines on how best to present eco-feedback to consumers. Eco-feedback is defined as information about resource consumption, for example, how many kilowatts is being used in a household. This framework is however applicable to other kinds of feedback and covers design dimensions and behavioural mechanisms relevant for the ability to absorb and sustain information in general. The behavioural mechanisms are learning, attention and last but not least motivation. The different design-dimensions are information *what?*, timing *when?*, and display *how?*.

Information is about *what* message is to be conveyed, which in turn can be specified in its granularity (how detailed), metrics, valence (positive or negative framing), and contextual information available. For example, how detailed driving coaching tips given to truck drivers should be and whether they should be framed negatively or positively. Timing is about *when* the feedback best is given, with what latency, strategic timing, what frequency and duration. For example, how often and for how long should the tips be shown? Display is about *how* the message of the feedback is conveyed, which can be divided into two parts: mechanism and accessibility. The first covering what medium, modality, style, and location it should be and the latter covering the audience and response requirement. For an illustrated overview see Sanguinetti et al. (2018, p.58). To motivate you must provide meaning and understanding the target user and allowing for customization seems to be a promising strategy to get feedback across.

These factors seem important to consider when evaluating and designing a system that essentially gives feedback and this framework provides a steady ground to build from.

3 Earlier research

This section presents related research about driver coaching and how studies involving truck drivers previously have been conducted. This is to make clear what has been done, where the gaps are and what new perspectives this study tries to cover.

3.1 Driver Coaching

With little standardisation within eco-driving feedback systems, results of the systems success have been varied. Sanguinetti (2018) conducted a statistical meta-analysis of 17 eco-driving feedback studies. The goal was to get an overview and be able to conclude an estimate of the collective impact on fuel-economy along with the impact different feedback characteristics may have. To provide drivers with feedback in regard to the efficiency of their behaviour behind the wheel, is according to Sanguinetti, the standard approach to encourage eco-driving. The most common medium for feedback is described as through digital screens on-board the vehicle, and usually provided visually. To increase the effectiveness of feedback the study suggests that any standards should be adaptive, i.e., as the skill of the driver increases so should the bar for performance. Feedback standards are further described as a key aspect of successfully incorporating game elements into the design, such as levels or leaderboards. Instantaneous and accumulated feedback additionally seem to play different roles, where the direct version is better for learning new behaviour while the latter is useful for setting goals or assessing overall performance. Furthermore, Sanguinetti's results point to young drivers being more susceptible to the eco-driving feedback, and the author therefore concludes that new drivers in particular should be targeted. The conclusions also point out that feedback should include different levels of behavioural information, that driver ideals can help evaluate drivers' performances, and that element of gamification (e.g., levels, badges) should preferably be incorporated.

Gilman et al. (2018) wanted to find an answer to the challenging question of how to best support fuel-efficient driving with a persuasive system. Driver coaching systems are described as persuasive technologies in the study in order to demonstrate that their purpose is to change the users' behaviour or attitude. The authors literature review started with pinpointing features of design, safety, functional and persuasive nature. Thereafter, an analysis took place of how the state-of-the-art systems support these features in reducing consumption of fuel. Additionally, the study brings up that continuous feedback to promote eco-driving, can, after initial coaching, up to double results for fuel-efficiency in the long run. Moreover, that context-based feedback can shape driver behaviour in a positive way, even when financial gains are excluded.

3.2 Gamification

Gamification is the notion of applying game design features (e.g., levels, leaderboards, rewards, badges etcetera) to other contexts. In technology-based systems its purpose is to increase engagement and learning in training programs. An experimental study by Santhanam et al. (2016) involved a competitive trivia mini-game. This study discusses different levels of competitive game structures, i.e., to compete against a lower level, equal level as well as a higher level competitor. Further, how to adopt the competitive game design elements in order to increase learner outcomes and involvement. The mixed result from this study shows a dependency towards the goal of the training, thus highlighting the complexity of designing gamified learning.

3.3 The Life of Truck Drivers

Previous qualitative research about truck drivers' experiences is related in many cases to working conditions including perceptions of their own health and safety. Ranjbar et al. (2016) conducted semi-structured interviews with truck drivers in Iran about their experience of "life on the road" and through content analysis came to the conclusion that the truck drivers generally held a positive attitude toward their profession. Sousa and Ramos (2018) also used semi-structured interviews, among other methods, to gain insights from truck drivers about their experiences of

working conditions and health. Although physically and psychologically demanding work the truck drivers reported themselves of good health. G. Passey et al. (2014) recruited truck drivers through convenience sampling and found out through focus groups and thematic analysis that they wanted to be healthy but circumstances such as no opportunity to buy healthy food on the road hindered them.

3.4 Knowledge Gap

In summary, earlier research in the area of user experience of driver coaching systems is conducted on a larger scale in the form of meta-analyses and literature reviews. Although giving interesting insights on effectiveness on feedback in these kinds of systems, the perspective from actual users is lacking. Studies hitherto about the qualitative aspect of being a truck driver are focusing on health and working conditions, aspects outside any coaching system. There have also not been studies found that investigate gamification specifically in on-board driver coaching systems. There is a gap evident in the research. A crossover between the above mentioned earlier research could bridge the gap by evaluating a driver coaching system from the user's perspective on a smaller scale, taking the qualitative aspect of being a truck driver into consideration.

4 Method

In this section is the method of this study described, including research design, recruitment of respondents, data collection, data analysis as well as any ethical concern related. But first, an empirical context is given to give more background of the context of the current study.

4.1 Empirical Context

4.1.1 Volvo Group

Volvo Group's vision is to reduce carbon emissions and their environmental footprint while continuing their long-standing tradition of working on the improvement of safety and reduction of accidents. In accordance with the climate change goals of the Paris Agreements, Volvo aims to create energy- and fuel-efficient solutions and products. This creates savings for customers while at the same time lessens the climate impact, and better the environmental performance.

Volvo's climate strategy is to develop solutions and products that reduce the CO₂ footprint, hence the targets set by Volvo are both in line with what is deemed necessary by the latest climate science but also ambitious and innovative.

4.1.2 Volvo Trucks' Driver Coaching System

Looking from a lifecycle perspective, most of the emissions are generated during the product's use phase, developing solutions that lessens the carbon emissions from transportation and machinery are therefore a priority (Volvo, n.d).

Volvo Trucks offers today on-board and off-board coaching products and services targeting both the individual driver as well as the fleet and fleet owner. On-board coaching in order to drive fuel efficiently is done via the instrument cluster (IC), as well as in the secondary information display (SID). The driver receives tips in the IC on how to change their way of driving, for example "Reduce speed to save fuel" (Figure 1). In the SID there are gauges showing aggregated scores for fuel

consumption based on a number of Key Performance Indicators (KPIs) (Figure 2). There are four main KPI groups 'Engine and Gear', 'Speed', 'Anticipation' and 'Standstill', each of them containing several sub-KPIs that are combined to create the scores.

Off-board coaching is done via Volvo Connect, a web application, and here the fleet operator has access to e.g., fuel consumption data.

Figure 1

The view of the instrument cluster with tips centred at the bottom.



Figure 2

The view of the secondary display with the gauges



Comment: The numbers represent points, and the colours show how good the score is, red: needs to be improved, yellow: acceptable but could be improved and green: good level.

4.2 Research Design

The choice of a qualitative method was based upon the aim to study, in depth and detail, the truck drivers' experiences with the driver coaching system (Patton, 2001, p.14). For this qualitative study a semi-structured interview was chosen in order to allow for an interview guide of what subject areas to include while allowing for exploration of thoughts and beliefs held by the respondent (Preece et al., 2015, p. 234). Both open-ended and closed questions were included, and no answers were predefined. It is said to be an advantage for the interviewer to have an understanding of the area being researched (Patel & Davidson, 2011). In this case this was done by collecting information about the driver coaching system from both developers, designers, and experts before the start of the study. Two interview guides were then created, one for the experts and one for the truck drivers. The expert interview guide (Appendix 1) included background questions, questions about the driver coaching system, as well as a few questions regarding motivational factors which were discussed in the end. The interview guide for the truck drivers (Appendix 2) started off with background questions and then shifted focus over to questions about thoughts on the current driver coaching system. Next came a chapter about how it is to be a truck driver and motivational aspects related to driving fuel-efficient, and the interview guide ended with a chapter discussing truck drivers' ideas for improving the driver coaching system.

4.3 Respondents

A total of 10 respondents took part in the study, including eight truck drivers (one female, seven males) and two experts (one male and one female) in driver coaching and functionality of the system. The truck drivers' ages ranged between 28 and 60 years old ($M(39,63) \pm SD(10,48)$). Below, Table 1 gives an overview of background information of the respondents, including experience and current work situation. Working hours were between 8-12 hours for the truck drivers and the

three most common types of driving environment were listed as country roads being the most common, followed by highways and city traffic.

Table 1

Background information about the respondents

Respondent	Background
FA	Has 14 years of experience as a professional truck driver and is currently working at a proving ground.
FB	Has around 23 years of experience as a professional truck driver and mainly transports various goods.
FC	Has 10 years of experience as a professional truck driver currently working at a proving ground.
FD	Has 39 years of experience as a professional truck driver and transports consumables.
FE	Has 12 years of experience as a professional truck driver and transports timber.
FF	Has 10 years of experience as a professional truck driver and previously transported various goods, is currently working at a proving ground.
FG	Has 17 years of experience as a professional truck driver and transports recycled material.
FH	Has 12 years of experience as a professional truck driver and transports biofertilizer.
Expert function	Is the main responsible for the driver coaching system and has previous experience as a system engineer, with software development, automatic gear selection and product evaluation.

Respondent	Background
Expert driver coaching	Has worked with the driver coaching system for around eight years, alongside with educating trainers as well as physical driver training. Previously worked as a truck driver for eight years.

The majority of respondents described the reasons behind using the driver coaching system in line with being curious and wanting to try it out. The timeframe for using the system was varied, with the longest being about nine years and the shortest around one month.

4.4 Recruitment

The truck driver respondents were selected using convenience sampling (Shaughnessy et al., 2014) with the inclusion criteria to have experience with the system. Using convenience sampling rather than for example random selection was the best option given the time constraints, while also being sufficient for the purpose of the study. Contact information (name and phone number) to potential truck driver respondents was supplied by Volvo GTT. Drivers were called to first receive an introduction to the study, and they were then asked if they use the system and would be willing to participate. The introduction of the study contained information about the purpose, the interviewers, that the interviews would be audio recorded and that the respondent would remain anonymous. For those who agreed to be interviewed, an appointment was booked for the interview, and they were given a digital informed consent form. The expert respondents were selected based on their area of expertise to give different perspectives. They were contacted through internal channels at Volvo GTT, introduced to the study and asked if they would agree to be interviewed.

4.5 Data Collection

The data collection took place during a two-week period. The two expert interviews were conducted first in order to gain a deeper understanding of the system before interviewing the truck drivers. One expert interview took place in

person and the other via video call. Both authors, as well as the Volvo GTT supervisor, were present and the expert interview guide (Appendix 1) was followed. The expert interviews each lasted for approximately 60 minutes. The conduction of the truck driver interviews was divided equally. Using the same interview guide (Appendix 2) for all, enabled consistency in content and thus possibility for comparison of answers. The typical proceeding for each truck driver interview consisted of a short introduction of the study, informing the respondent of the interview being audio recorded and thereafter the interview guide was followed. Five truck driver interviews were conducted in person, of which two during a so-called ride-along. That is, the interview was conducted in the truck during a normal work shift. The ride-alongs lasted between 3-4 hours and the purpose of this was to get more context of the setting that the truck driver interacts with the system in and an insight into a normal workday. Three truck driver interviews were conducted over the phone due to inability to meet in person. The truck driver interviews lasted between 17 and 37 minutes.

4.6 Data Analysis

First is a theoretical background of the method of analysis provided, followed by the procedure.

4.6.1 Qualitative Content Analysis & Affinity Diagrams

In respect to the qualitative nature of the data, qualitative content analysis and affinity diagramming as analysis methods were chosen to extract insights from the interview material. Qualitative content analysis is a method where you make sense of a larger body of qualitative material (such as semi-structured interviews) by organising it into smaller units of related meaning, also called meaning units, each given a code (Graneheim & Lundman, 2004). These codes are then organised in categories based on common relations between them, and later also themes. These relations can be interpreted from the material's manifest or latent content, in other words what is being explicitly said or what emerges between the lines (Graneheim & Lundman, 2004). The manifest content was mostly taken into consideration while not excluding any latent content interpreted.

Affinity diagrams are suitable for organising data in their natural groups and since the codes were not defined beforehand and the data was approached in an inductive manner, this was found to be an appropriate method. Part of that method is also to go through the data one piece at a time, which was done (Preece et al., 2015, p. 291-292).

4.6.2 Procedure

To enable analysis, all interviews were transcribed verbatim. Whoever conducted the interview typically transcribed it. All respondents were given a random ID with which the corresponding transcript was marked with while all other names were masked out. All transcripts were coded separately without predetermined codes. This was done by reading through the transcript, deciding on what sections or sentences could bring insights, condensing the text to find the meaning of it and then deciding on a code to represent it (see Table 2). Two different mediums were used for coding; digitally with the qualitative research software Nvivo (released in March 2020) and with pen and paper. Then all code documents created in Nvivo were printed and each code from both versions cut out, resulting in two versions of coding for all interviews, with potentially the same paragraphs coded differently. Next, one code at a time was discussed and compared until agreement on a common code was reached. The purpose of the separate coding and later discussion of each code was to give the data more validity and to reduce individual biases in interpretation. This process generated several new codes, which were divided equally and then separately organised into subcodes to create more specific groups of code. Again, without any predetermined definitions to find natural clusters in the data. All groups of codes were titled for each step, in order to always keep an overview of the process and the development of identified clusters. The next step in analysis was to create categories. To do this the authors went through each current code cluster together, one by one to finally reach a total of seven categories. These categories were then organised into three themes, for an example of the process see Table 3. Each theme was not mutually exclusive, i.e., one category could fit into more than one theme, but all content within each theme shared an underlying meaning.

Table 2*Example of the development of codes*

Meaning unit	Condensed meaning unit	Code
“I think because I have driven for so long, I know eco-driving inside out.”	Driving experience entails knowledge about eco-driving	Eco-driving experience
“Yeah, I think I’m doing a good job and that I drive safely and economically”	Happy with the way I drive	Feeling able
“From that you come in in the morning until you get home it’s just stress, stress, stress, chase, chase, chase, ten hours a day”	It is stressful the entire workday	Stressful schedule

Table 3*Example of the development of theme*

Theme	The human outside the system					
Category	Self-perception		Working conditions		Psychological aspects	
Sub-category	Experienced	Positive self-image	Stress	Support from employer	Motivation from within	Types of drivers
Codes	Eco-driving experience becomes a habit	Professional and competent	Stress from the fleet operator	Flexibility Support	Need to want to change,	Different personalities
	Good foresight	Like to be on the move	Need to drive in a calm way	Focus on driving in a good and safe way	Own responsibility	Driving styles
	Automatic	I’m the best	Time stress		To find balance	Openness to guidance
	A lot of miles driven	Feeling able	Stressful schedule		Insight	Willingness to improve
						Interest in your own

	Confident in a heavy vehicle					impact
	Not stressing in the traffic					

4.7 Ethical Concerns

Before any of the interviews were conducted, a verbal agreement was sought from the respondents to participate in the study, and they were informed that the interview would be recorded during this first contact. The respondents that agreed to be interviewed were then sent a digital informed consent form where they had to state that they agreed to be interviewed and acknowledged that audio-recording would be collected. All contact details to truck drivers that Volvo provided (i.e., in our case names and phone numbers) belonged to truck drivers that have given their consent to Volvo to be part of test and evaluation studies. The information that all answers were anonymised before shared with either the university or Volvo, were given to the respondents before the interviews. This was done to ensure that the respondents got the opportunity to speak freely and give their thoughts and opinions on the system without any concerns for repercussions.

5 Results

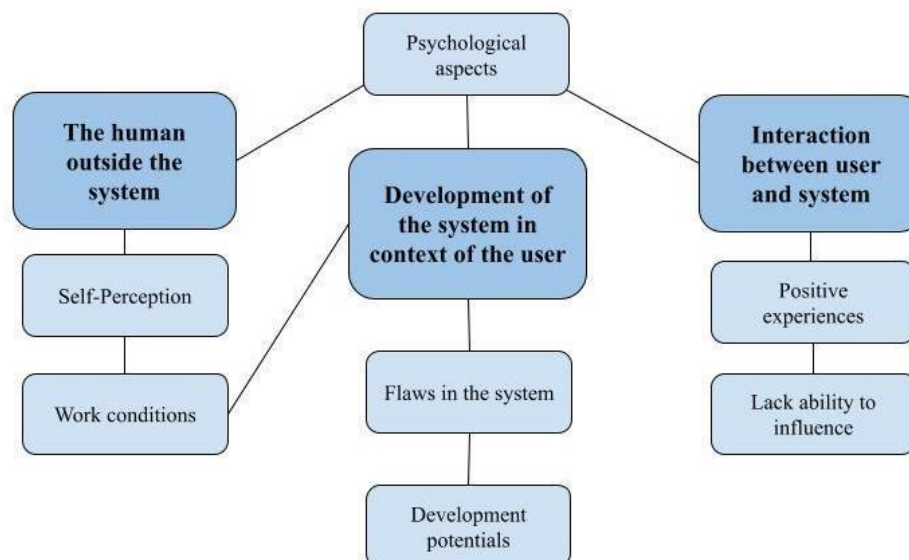
The results of the analysis are presented in this section. First an overview of the themes and categories and how they are related to each other, thereafter a deeper presentation of the separate themes.

5.1 Themes and Categories

Presented below (Figure 3) are the three identified themes with its categories. Each theme is described and insights connecting to each theme is presented with support from the gathered data¹.

Figure 3

The themes and categories, where one category can belong to more than one theme.



¹ See Appendix 3 for quotes that have been translated to English from its original language Swedish.

5.1.1 Theme 1: The Human Outside the System

This theme concerns the aspects of driving behaviour not directly connected to the system. In other words what may affect and motivate the drivers and their work other than the driver coaching system. What goes into being motivated to drive fuel efficiently is more than following the guidance of a coaching system. There is a complex context to take into consideration; how the truck driver is feeling that day, how the truck driver is being treated by his or her employer and all other things going on in life.

The categories belonging to this theme are ‘Self-perception’, ‘Work conditions’ and ‘Psychological aspects’. ‘Self-perception’ concerns how the respondents expressed views of themselves in their professional role and can be linked to intrinsic motivation of self-determination theory. The respondents reported a positive self-image and expressed feeling calm and safe whilst driving, which points to a feeling of competence; one of the psychological needs for intrinsic motivation.

“I think I am a good truck driver. Not many have complained at least, and I feel safe when I am out driving. I think that is the most important, to feel safe and driving a heavy vehicle.” - Respondent FA

“I view myself as a good driver who is professional and competent.” - Respondent FG

The category of ‘Work conditions’ contains reports of the truck driving profession per se. Here, an overall positive attitude towards the truck driving profession was evident. The feeling of freedom and meaningfulness in the work are two examples of what makes the truck drivers like their occupation. This could also be connected to one of the psychological needs for intrinsic motivation: feeling autonomous.

“I love my job and driving trucks” - Respondent FH

“I like my job . . . it is a liberation” - Respondent FA

“It is a job that is important to society. If we within recycling would park our vehicles, then Sweden would stop functioning pretty quickly within a few days” - Respondent FG

Although an overall positive attitude, stress in the workday was also reported. Stress connects more to extrinsic motivation in that a time pressure and/or heavy work-load acts as an external source of motivation to act. For example, if the truck driver would face repercussions for being late, it is motivating to act to avoid that punishment.

“It is often a stressful job in my opinion.” - Respondent FF

Included in ‘Work conditions’ were also more explicit reports of external sources of motivation. That is, what the respondents viewed as motivating factors whilst driving, of which to get home earlier and money was mentioned. As Respondent FF put it:

“By some [employers] it was a bit like you go home when you are done . . . then I don’t want to waste time in the truck.” - Respondent FF

Regarding money, Respondent FD view was that eco-driving training is only effective when money is involved, otherwise there is no motivation to learn:

“Some kind of carrot then, but only money counts then . . . then they get some money if they drive fuel efficiently, that is the only time it sticks really, otherwise it disappears if you don’t have a real interest in it.” - Respondent FD

The category of ‘Psychological aspects’ relating to this theme is also connected to perceived motivational factors. However, instead of external sources of motivation,

it is about how the motivational force is being reported as coming from the respondents themselves. Respondent Expert driver coaching expresses the importance of an internal force of motivation. That is that you must want to change a behaviour yourself for it to actually change:

“Nobody can come from above and say that ‘now you need to start doing like this’. You really need to want to do it on your own.” - Respondent Expert driver coaching

Respondent FB describes how she/he one day decided to always drive calmly and not stress in traffic no matter the circumstances. Driving fuel efficiently is then just a side effect that does not have to be actively considered.

“I just do it like this now. I make up my mind, and then my view is that all this about driving fuel efficiently doesn’t affect me in the same way.”- Respondent FB

5.1.2 Theme 2: Interaction Between User and System

The second theme looks at the interaction between the user, in our case the truck drivers, and the system considering both the positive and negative aspects. Also, whether the current interaction is perceived as motivating. This theme includes three categories: ‘Psychological aspects’, ‘Positive experiences’ and ‘Lack ability to influence’.

The first is ‘Psychological aspects’, a consideration for the fact that all users are different and with that, so are their perspectives and thoughts on the driver coaching system. One example of different perspectives could be drivers of different ages, where the older generation has grown up without being surrounded by technology; especially technology that tries to guide your behaviour. Younger drivers who have grown up in a more digitalised world, might be more used to persuasive technologies and might be more comfortable trusting systems. This highlights the importance of adaptability and consideration of different needs for

the feedback to make sense in order to better be received by different users.

Respondent FG describes his view on the matter like this:

“I am a wooden old man in a way, I do in a way like technology in all its forms but probably not in the same way as a young driver in their early twenties who has grown up in a different time and is used to everything around him or her being electronic and digitised.” - Respondent FG

The expert on driver coaching brought up the importance of different personality traits and internal motivation when it comes to accepting and complying with coaching, regardless if the coaching comes from an expert or a system. Here, is described the grouping of drivers that they use for the physical driver coaching training.

I took the liberty to divide all the drivers into three different categories The red . . . as I call him, is truly ignorant and doesn't really care a shit about anything Orange category where we have, they're a little bit better at driving and a little bit more motivated but they are suspicious whether the tips that were given to them would benefit them Green driver who is at quite a high level already and it's harder to save fuel but they want to have the tips so it is a little bit controversial. - Respondent Expert driver coaching

One section of the interview included asking the drivers about their idea about the current system, for example what they thought about it in general, and if and how different aspects of it were motivational for them. ‘Positive experiences’, the second category, sheds light on things that have been brought up by the drivers that they think are good and that they like about the system. An example of a recurring subject is that it is good to get more of an overview. Several drivers also described the system as easy to understand and navigate, that it is a good reminder, and that it increases the motivation for driving in a more fuel-efficient way.

“That is what drives this whole thing forward, and it has also developed my style of eco-driving that I drive . . . thanks to the systems that exist you have learned how you are supposed to do.” - Respondent FD

“[You] understand that aha this is to save fuel, if we drive with the foot we should release here before the hill, or I don't need to accelerate over the hilltop for example, so you do understand how you are supposed to do.” - Respondent FA

Lastly, we have the category: ‘Lack ability to influence’. To feel autonomous, competent, and part of the context is one of the basic psychological aspects to maintain intrinsic motivation (Gagné & Deci, 2005). Here is described how drivers perceive that in certain cases they have no means to affect the scoring done by the system. This belief was held by more than one driver and corroborated with the experts’ answers to similar questions. The most frequent mention being that of a good truck driver being graded badly by the system, for one reason or another.

“It is a little bit problematic that we always give these tips after the event since it doesn't really give the driver anything to work with.” - Respondent Expert driver coaching

“This really good driver . . . would still receive worthless scores in this system, because he might have driven in manual maybe and things like that.” - Respondent Expert function

“Some colleague that doesn't use the cruise control very much and he maybe doesn't have so high scores but his fuel-consumption on his truck is absolutely not bad.” - Respondent FB

Overall, the thoughts on the quality of interactions with the driver coaching system vary depending on a range of factors. Comments from the truck drivers included being very pleased with it and praising the value it gives them and finding it to

increase their motivation to drive in a more fuel-efficient way. While other mentions described it as unhelpful and not useful.

5.1.3 Theme 3: Development of the System in Context of the User

This complex theme aspires to bring forward both the perceived pains and possible gains of the driver coaching system. It incorporates the categories of ‘Flaws in the system’, ‘Development potential’, ‘Psychological aspects’ and ‘Working conditions’. Combined, these themes aim to give an idea of what parts, and possibly how, the driver coaching system could be tweaked to further include the truck drivers’ perspective and needs. This is done by considering not only how the truck drivers perceive the system but also the working conditions and environments that the truck driver must navigate.

The category ‘Flaws in the system’, aims to give an overview of possible improvement points. Comments on parts that could be improved in the driver coaching system were spread throughout the interview and touched upon several details of it. Some of the most frequently mentioned by the experts were issues regarding a lack of updates of the system. Both truck drivers and experts have discussed situations where the driver coaching system is working against other systems in the truck, as well as the truck itself. It is not always clear what the system is measuring and bases the KPI (Key Performance Indicator) scores on. Further, the current adaptations towards the driving environment are not optimal. Several respondents also described a lack of understanding of some of the KPIs resulting in parts of the driver coaching system having an unclear purpose.

We are now evaluating data that trucks were pushing out 20-15 years ago and a lot of these parameters have nothing to do with driver behaviour . . . we can't trigger very advanced tips for the drivers. That's where we stand and it is not an ideal situation. - Respondent Expert driver coaching

“I do not really agree with the KPIs we have today.” - Respondent Expert function

I find it a little bit hard to always understand what you are supposed to do since it is supposed to coach you to drive better, to ninety percent you drive with cruise control for example then and still you get red results when it is really the truck that is supposed to call the shots and pull the strings. - Respondent FA

The category of ‘Development potentials’ contains expressed improvement suggestions for the system, thoughts on how to externally motivate truck drivers using game inspired elements, such as ability to compare KPI scores, and overall potentials for the system in the future. Both truck driver respondents and expert respondents suggested receiving positive feedback from the system as an improvement.

“Now it is predominantly lecturing pointers I would say, and I believe more in positive feedback.” - Respondent Expert function

“But I would like it to be more positive.” - Respondent FC

All respondents were asked about their view on gamification as a mean to motivate desired driving behaviour. The opinions were not unanimous. Some expressed an overall negative attitude, some an overall positive attitude, and some expressed a positive attitude for certain types of gamifications (e.g. positive about competing with yourself but not against others).

“Other truck drivers’ scores? No, I’m not interested in that, no I wouldn’t want that.”- Respondent FD

“It would be fun actually, if the truck would have been so smart that you could connect . . . so you could go in and see how the others have been driving.” - Respondent FC

Ideas and thoughts on potential technical improvements for the future were mostly contributed by the experts, such as to take advantage of data that is already being collected in new ways or the possibility of real-time feedback.

“There is already a lot of data today to look at really, if we only learn how to use it.”- Respondent Expert function

A potential use of real-time feedback was described as “micro-learning” by one expert, which is to give the truck drivers who want to improve small tasks to solve as if a real-life driver coach was in the passenger seat. All in accordance with the current traffic situation, weather, and other real-time information necessary.

“We give you heads up that now you're coming into an area where you could actually exercise this and then after the event we give you feedback on how did it go.” - Respondent Expert driver coaching

The category ‘Psychological aspects’ fits under this theme as well since the notion of different users with different needs can be discussed from various perspectives. While developing with the user in mind, it is important to accommodate for the different needs to benefit the actual user. More specifically, a system needs to cater to the different sources of motivation of the user. What will be motivating for one user will not always be motivating for another. The Respondent Expert function commented about how the current driver coaching system caters more to one kind of truck drivers than others:

“A system like this is more for improving the worst [drivers] than improving the best [drivers].” - Respondent Expert function

On the other hand, Respondent FG views it as being difficult to externally change someone's attitude and behaviour regarding fuel efficient driving:

“I think it's hard to influence truck drivers to save fuel, either you have that in you . . . or you're the type of person who ignores all that stuff.” - Respondent FG

‘Working conditions’ is the last category here and refers to external influences that could affect the truck drivers working environment. Multiple mentions included conflicting targets such as time versus money, which here represent fuel consumption. Respondent FC described it as:

“Time and money never go hand in hand, if you want to be quick it’s gonna cost, and if it’s supposed to go slowly you save money, but you might not make it.”- Respondent FC

Several truck drivers further described that their aim is to drive as fuel-efficient as possible, but the driving environment makes that difficult to achieve in some instances. In other words, they have internal motivation but external factors outside their control act as an obstacle. Respondent FG declared that:

“I drive as cheaply as I possibly can, but it’s hard to get the consumption down in city traffic when there are so many starts and stops.”- Respondent FG

The working environment for a truck driver also includes the truck itself. Worth remembering is that the driver coaching is a complex system that ought to take into account several other systems and features of the truck when calculating the scores. For example, when talking about how the system interacts with the truck Respondent FB mentioned that:

If you are idling and are trying to raise the air pressure in the morning and then it pops up that you shouldn't idle it should be something built-in in that case, that it can sense that there is no air pressure and that it has to idle. - Respondent FB

6 Discussion

Themes and categories were described in the previous section; this next part will be dedicated to discussing them and answer the research questions.

The first theme, 'The human outside the system', essentially covers the aspects that could affect the truck drivers' driving behaviour other than the driver coaching system. Examples are external aspects such as their working conditions, and internal aspects such as the truck-drivers' self-image. The main point of this theme is that the truck drivers expressed satisfaction regarding both the truck driver profession and also their own self-image as truck drivers. This could be interpreted as pointing to a baseline motivation for desirable driving, which a driver coaching system should utilise and maintain.

The second theme 'Interaction Between User and System' focuses on capturing the diversity of interactions between the truck drivers and the driver coaching system. Truck drivers' different personalities, beliefs and motivational grounds were considered. In addition, the drivers' perceived ability to influence were taken into account, i.e., if they felt autonomous, competent, and part of the context (Gagné & Deci, 2005). A choice was made to predominantly focus on the positive experiences with the driver coaching system in this theme since negative experiences points to parts that need improvement. This theme suggests that even though today's driver coaching system is adequate, there is still much that can be done to improve the interaction.

The theme 'Development of the System in Context of the User' contained the largest number of categories, subcategories, and code. It is a complex theme that aspires to shed light on both the pains and potential gains of the driver coaching system. This involves considering both the users' experience of the system, but also the working conditions and the driving environment. There are several parts of

the driver coaching system that could be improved. The development suggestions for the driver coaching system boils down to a wish for an updated system with larger customization possibilities to accommodate the drivers' and the contexts' different needs.

Q1: How do truck drivers experience the driver coaching system?

We contribute to this body of research by showing that attitudes amongst the drivers varied a lot, opinions ranged from considering the driver coaching system completely unnecessary to praising it as a great motivational tool to help reduce fuel-consumption. However, no matter the overall standpoint all truck drivers had something they thought could be improved.

The outlook the truck driver will have towards the system is largely determined by if it is perceived as intrinsic or extrinsic motivation to comply with the system's coaching tips (Gagné & Deci, 2005). For example, truck drivers mentioned how the system supports internal motivation when viewing the tips as learning possibilities given that the truck drivers want to improve themselves. Further, the truck drivers expressed a desire to increase their scores, which connects to extrinsic motivation since the scores are rated on a predetermined assessment scale. When designing a driver coaching system it is also a fine balance between promotion and prevention, i.e., to encourage and at the same time ensure adherence. For truck drivers to be motivated by the feedback it is necessary to ensure that the feedback corresponds with the task at hand (Van Dijk & Kluger, 2011). Furthermore, the question if all truck drivers should be equally targeted could be raised, for example it might be better to mainly target new and younger drivers which Sanguinettis' (2018) results pointed towards.

Q2: How would truck drivers like the driver coaching system to be designed to increase motivation?

We contribute to this body of research by shedding light on what the truck drivers' wishes regarding the design of the system are. Elements of gamification and an emphasis on customisation could increase motivation created by the system if the

users' opinions are to be heard. However, there is no single answer on how a system should be designed to motivate desired behaviour, instead there is a myriad of correct answers. A possibility to tailor the system's design after the truck driver and driving context could provide a more motivating user experience.

The complexity of creating a design to fit different kinds of users also is described by Santhanam et al. (2016), where gamification as a tool to motivate learners was studied. Further, Rezvani et al. (2018) present factors that could impact motivation, which could be taken into consideration in a design to increase said motivation. How the truck driver would like the driver coaching system to be designed might be influenced by how they perceive personal gains using the system, which is one of the motivational factors. For example, if they perceive the scoring to be fair, and the score is high, the personal gain could be that it confirms their competence and boost their confidence. Another motivational factor is about norms, morale, and social judgement. The truck drivers in this study describe that there are conversations about fuel-efficient driving to some degree today. However, to have a greater impact on driving behaviour more conversations on all levels might be needed to apply social pressure and make eco-driving normative. The importance and potential of customisation is also evident in the design framework by Sanguinetti et al. (2018). Motivation is one of the behavioural mechanisms in the framework, to which meaning is closely connected. That means that the information conveyed by a system should be of meaning to the user, which of course could be different for all users. Hence, customisation is crucial for success.

6.1 Limitations

Firstly, using convenience sampling when recruiting respondents could impact the quality of the study because the respondents that happen to be available, willing to participate and also fulfil the inclusion criteria do not necessarily represent the population. However, the intention is not to generalise the findings to the whole population, and it suffices for the purpose of this study. Related is the aspect of time and resource constraint. The dependency on Volvo to supply potential respondents during a short time frame, could be considered limiting. With more

time and possibility of recruiting without intermediators, the sample may have been more representative and nuanced.

Secondly, regarding the conduction of the interviews there are aspects that could be a source of skewness in the data. Using different mediums (i.e., in person, video call and phone call) may have affected how the respondents answered depending on if they could pick up facial expressions and body signals from the interviewer. In addition, all but two respondents were interviewed during their working hours, possibly affecting how elaborate answers they could give, due to time constraints or other tasks demanding attention. Also, since the conduction of the interviews were divided between the authors, each could possibly carry out the interview in different ways. There were no strict rules agreed upon about how the interviews should be conducted other than to follow the interview guides.

Lastly, the analysis of qualitative data is always ambient since it depends upon individual interpretations of subjective expressions. Thus, the reliability of the data may be compromised because it is virtually impossible to reproduce the exact proceedings of data collection and analysis including the biases and world views held by the authors that inevitably colour any interpretations. To increase trustworthiness and as an effort to balance individual biases during the analysis, an iterative process of individual work and subsequent comparison and discussion was used.

7 Design Implications

Based on the identified themes and categories, its building blocks being the respondents' attitudes and opinions, we have used these insights to inspire the following suggestions for future development of the driver coaching system as presented below. Most inspiration was taken from what was mentioned as current flaws and future potential by the experts and truck drivers themselves. These suggestions are however not to be taken as a guarantee for improved user experience nor to be successfully applicable to all users without further adaptations. First presented are three main areas the suggestions are about and below that a table of all suggestions (Table 4).

7.1 Trust the Truck Driver's Competence

Truck drivers taking part in this study overall were happy and content being truck drivers and a sense of pride for the truck driving profession was evident. A future version of the driver coaching system should accommodate that to enable intrinsic motivation, as feeling competent is one of the psychological needs that needs to be fulfilled for that purpose (Gagné & Deci, 2005). That relates for example to the expressed current lack of positive feedback and the overall negative perception of how the system lectures the truck drivers and more or less tells them what to do. Sanguetti et al. (2018) propose that the valence of the message being positive could work as a positive reinforcement and enhance user experience. In other words, a reformulation of some feedback given by the system in more positive manners may lead to an improved experience with, and higher motivation by, the system.

7.2 Clarification & Transparency

To strive for consistency and clearness are often a part of user-interface design guidelines such as Schneiderman & Plaisants (2005) and Nielsen & Molichs (1990), which are two of the best-known. A recurring matter brought up by truck

drivers as well as the experts, was aspects of the driver coaching system being perceived as unclear and/or difficult to understand. A desire for a higher degree of simplicity in the SID was brought forward, to focus on parts that the drivers have most influence over. A chance to receive explanations to better understand the calculations for the scoring, and how to increase the score was another example. One truck driver also expressed a wish to be able to see the settings for the truck, i.e., if it is set to “long-haul”, “distribution” or similar, which today can only be seen and set in the back-office. The wish is grounded in that the different settings affect how the algorithm calculates the truck drivers score, which means that if the truck has the wrong setting for the environment it is being used in, there is nothing the truck drivers can do to get their scores up.

7.3 Customisation

Since every truck driver and the operating context is different, it makes sense for an evaluating system to take those factors into account, when calculating the score and providing appropriate feedback. However, opinions about the current system highlights its inability to adapt with consequences such as perceived unfair evaluation of the truck driver. The importance of understanding the user is evident when choosing metrics and presentation strategy since motivational factors vary and the ability to customise should not be underestimated (Sanguinetti et al., 2018).

Table 4

Suggestions for the future development and design of the system

Trust the truck drivers' competence	Clarification and transparency	Customisation
Incorporate positive feedback to encourage desired behaviours	Better transparency for the scoring calculations	Use adaptable references of ideal driving or adaptable goals given the type of truck driver
Focus the coaching on areas that needs improvement to	Make the interface more simplistic and approachable	Possibility to individually

Trust the truck drivers' competence	Clarification and transparency	Customisation
not overwhelm the driver	Update the scoring algorithm to work with the	save driving history
Trust the drivers' judgement and provide an option to override a tip and turn the current notification off	truck's other systems Provide explanations for how to improve the score	Use data from other systems to gain a more complete current context when evaluating, such as I-see and pulse-and-glide
Do not judge the driver on things out of their control	Provide information on what setting the truck has	Incorporate map-data
Do not repeat a tip to often	Highlight what matters, such as points of improvement for the drivers	Provide drivers in need of coaching with micro-learning sessions while driving and give feedback on the result
When tips have been followed, remove them from the IC	Provide real-time feedback	
Limit the time frame for displaying a tip in the IC	A heads-up tip for upcoming event where the driver could benefit from coaching A real-time feedback gauge Have the overall score gauge as a small (optional) feature in the IC to make it easier to keep an eye on	Make sure the system remembers the driver so that the system does not start from zero every time Be able to choose the priority of that route (e.g., drive faster and catch the ferry or drive slower and save fuel)
	Option to have the scores as percentages	Save route data to be able to compare both different and individual drivers

Trust the truck drivers' competence	Clarification and transparency	Customisation
		Include a choice and ability of competing with yourself or others
		Game element: Levels with different focus areas

8 Conclusion

In the earlier sections we have discussed the limitations of the present study, the research questions that were brought forward, as well as design implications based on our findings. Conclusions that can be drawn from the data regarding the current driver coaching system is that the truck drivers' opinions differ a lot. However, the truck drivers unanimously believe that several aspects of the coaching system could benefit from an update, a similar opinion was held by the experts. The answer to the question of how truck drivers would like the driver coaching system to be designed in order to increase motivation, is multifaceted but the data points to personalising it to suit them as individuals better as an important element. Furthermore, the judgement of the algorithms should be updated, to better take into account the drivers, the driving environment and the other systems of the truck. In addition, they would like more engagement features in the coaching system, such as the possibility to compete against oneself.

User experience is without a doubt an important area since more and more of our daily interactions are with increasingly advanced technology. However, it is important to remember that it is not easy as a developer or designer to understand every single aspect and take everything into consideration. If you have extensive knowledge about a system, it can be very difficult to imagine how someone with zero or very limited knowledge would look at the same thing. Different perspectives also highlight different highs and lows, which is why testing and evaluating, especially from the end user perspective, is crucial in any developmental process.

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10 Appendices

10.1 Appendix 1: Interview Questions Experts

Bakgrund

- Vad är din professionella roll och kompetensområde?
- Hur lång erfarenhet har du av driver coaching?
 - Hur omfattande är din kunskap om driver coaching systemet?

Driver coaching system

- Varför tror du att coaching system behövs?
- Kan du förklara mer om KPIerna som används idag?
- Är det möjligt att anpassa systemet efter individuella förare?
- Skulle du vilja förändra något i det nuvarande systemet? Om ja, vad?
- Vad är några fördelar som du ser med det nuvarande systemet?
- Vad är några nackdelar?
- Vad är logiken bakom systemet?
- Vad är tanken med dagen presentationen av coachningen, toastsen/score?
- Feedback i realtid: Tidigare grafer - ideal?, "Sweetspot"

Motivation

- Vad tror du skulle vara bästa sättet att designa systemet så att det passar olika förare?
- Enligt din uppfattning, vilken del av coaching systemet är minst intuitivt idag?
- Vilka tror du är de största motivationsfaktorerna för förarna att köra med bränsleeffektivt?
- Vad är din syn på gamification om man ser till driver coaching systemet?

10.2 Appendix 2: Interview Questions Truck Drivers

Bakgrund - Vi börjar med några allmänna frågor bara för att få en bättre bild av er förare

1. Namn (Kommer anonymiseras):

2. Ålder:

3. Antal år som yrkesförare (lastbil):

4. Din vanligaste typ av körning:

Distribution

Long-haul

Anläggning

Annat

5. Din vanligaste typ av last

6. Vad kör du på för typ av vägar?

Motorväg

Landsväg

Stadstrafik

På byggarbetsplats

I skogen

7. Hur långt (i timmar) är ett vanligt skift för dig?

8. Vilka arbetsuppgifter har du under en vanlig dag?

9. Ungefär hur är arbetsuppgifterna fördelade?

10. Hur länge har du kört med driver coaching systemet?

11. Är det ditt eget val att använda driver coaching systemet?

Ideas on current system:

11. Vad tycker du om driver coaching i allmänhet?

- Vad är det bästa?
- Vad är det sämsta?

12. Kommer dagens tips vid rätt tidpunkt och situation?

13. Motiverar tipsen i instrumentklustret (IC), själva toastsen, dig att förändra din körning?
Om ja: På vilket sätt? Om nej: Varför inte?

14. Motiverar formuleringen av dagens tips dig att minska din bränsleförbrukning?
Om ja: På vilket sätt? Om nej: Varför inte?

15. Blir du motiverad av att kunna se mätarna i sekundärdisplayen (SID) förändras beroende på hur du kör?
Om ja: Hur? Om nej: Varför inte?

16. Känner du att det är tydligt vad mätarna står för och hur du påverkar dem?

17. Upplever du driver coaching systemet som störande på något sätt?

18. Känner du att någon information saknas i sekundärdisplayen som du hade velat se?
Känner du att någon information saknas i instrumentklustret?

19. Prata lite om om de olika kategorierna (KPI): Hastighet, Anticipation, Motor och växlar, Tomgång

Motivational factors

20. Hur är det att vara lastbilsförare? /Vad tycker du om ditt jobb?/Hur upplever du en vanlig arbetsdag?

21. Hur upplever du balansen under en arbetsdag? Om man ser till att hinna med det man ska, och samtidigt köra så energisnålt som möjligt, samt att allt ska ske på ett så säkert sätt som möjligt.

22. Hur ser du dig själv som förare? (Vad motiverar dig?)

Locus of control:

23. Upplever du att du kan påverka hur din arbetsdag ser ut?

Om ja: Hur? Om nej: Varför inte?

24. Hur upplever du din bränsleförbrukning idag? Kan du påverka den?

Om ja: Hur? Om nej: Varför inte?

25. Pratas det om bränsleförbrukning kollegor emellan?

Om ja: På vilket sätt? Om nej: varför inte?

26. Har ni något typ av incitamentsprogram på arbetsplatsen?

Re-design, re-package design:

27. Hur skulle du vilja att coachningen eller tipsen var utformade för att motivera dig?

28. Hur ställer du dig till att se andras poäng?

29. Skulle det motivera dig att kunna tävla mot andra eller dig själv? /Se en poängtabell?

30. Egna förslag på förbättringar?

Avslut/Övrigt:

Finns det något du vill lyfta fram som inte tagits upp?

10.3 Appendix 3: Translations of Quotes

“I think I am a good truck driver. Not many have complained at least and I feel safe when I am out driving. I think that is the most important, to feel safe and driving a heavy vehicle.” - Respondent FA

“Jag tror jag är en bra lastbilsförare tror jag. Det är inte många som har klagat i alla fall, och jag känner mig trygg när jag är ute och kör. Jag tror det är det viktigaste, att känna sig trygg och köra ett tungt fordon” - Respondent FA

“I view myself as a good driver who is professional and competent.” - Respondent FG

“Jag ser mig själv som en bra förare, som är professionell och kompetent.” - Respondent FG

“I love my job and driving trucks.” - Respondent FH

“Jag älskar mitt jobb och köra lastbil.” - Respondent FH

“I like my job . . . it is a liberation.” - Respondent FA

“Jag gillar mitt jobb . . . det är en befrielse.” - Respondent FA

“It is a job that is important to society. If we within recycling would park our cars, then Sweden would stop functioning pretty quickly within a few days.” - Respondent FG

“Det är ett samhällsviktigt jobb, om vi inom återvinningen ställde bilarna då skulle Sverige sluta fungera ganska snabbt inom några dygn.” - Respondent FG

“It is often a stressful job in my opinion.” - Respondent FF

“Det är ju ofta ett stressigt arbete kan jag tycka.” - Respondent FF

“By some [employer] was it a bit like you go home when you are done . . . then I don't want to waste time in the truck.” - Respondent FF

“Hos vissa [arbetsgivare] var det ju lite så att du går hem när du är klar . . . då vill ju inte jag slösa tid i bilen.” -Respondent FF

“Some kind of carrot then, but only money counts then . . . then they get some money if they drive fuel efficiently, that is the only time it sticks really, otherwise it disappears if you don't have a real interest in it.” - Respondent FD

“nån typ av morot då men det är ju bara pengar som gäller då . . . de får nån krona för att de kör bränslesnålt och då, det är ju enda gången det sitter kvar då egentligen annars försvinner det ju om du inte har ett riktigt intresse för det” - Respondent FD

“I just do it like this now. I make up my mind, and then my view is that all this about driving fuel efficiently doesn't affect me in the same way.”- Respondent FB

“Nu gör jag bara såhär, jag bestämmer mig och då tycker jag nog att just det att köra ekonomiskt inte påverkar mig på det viset.” - Respondent FB

“I am a wooden old man in a way, I do in a way like technology in all its forms but probably not in the same way as a young driver in their early twenties who has grown up in a different time and is used to everything around him or her being electronic and digitised.” - Respondent FG

“Jag är ju en gammal träig gubbe på ett sätt, jag gillar ju visserligen teknik i alla former men förmodligen inte på samma sätt som en ung chaufför i unga tjugo som har växt upp en annan tid o är van att allt runtomkring honom eller henne är elektroniskt och digitaliserat.”- Respondent FG

“That is what drives this whole thing forward, and it has also developed my style of eco-driving that I drive . . . thanks to the systems that exist you have learned how you are supposed to do.” - Respondent FD

“det är ju det som driver hela det här framåt, och det har även utvecklat min typ av eco-driving som jag kör . . . tack vare dom systemen som finns har man ju lärt sig hur man ska göra” - Respondent FD

“[You] understand that aha this is to save fuel, if we drive with the foot we should release here before the hill, or I don't need to accelerate over the hilltop for example so you do understand how you are supposed to do.” - Respondent FA

“This really good driver . . . would still receive worthless scores“så förstår man att aha det här är för att spara bränsle, om vi kör på foten ska vi släppa av här innan backen eller jag behöver inte gasa över krönet till exempel så att man förstår ju ändå hur man ska göra” - Respondent FA

“ in this system, because he might have driven in manual maybe and things like that.” - Respondent Expert function

“Den här jätteduktiga chauffören . . . skulle ju ändå få värdelösa score i det här systemet, för att han har kört på manuell kanske och lite så.” - Respondent Expert function

“Some colleague that doesn't use the cruise control very much and he maybe doesn't have so high scores but his fuel-consumption on his truck is absolutely not bad.”
- Respondent FB

“Nån kollega som inte använder farthållaren jättemycket och han kanske inte har så höga poäng men bränsleförbrukningen på hans bil är absolut inte dålig.”- Respondent FB

“I don't really agree with the KPIs we have today.” - Respondent Expert function

“Jag är inte riktigt överens med de KPIerna vi har idag.” - Respondent Expert function

“I find it a little bit hard to always understand what you are supposed to do since it is supposed to coach you to drive better, to ninety percent you drive with cruise control for example then and still you get red results when it is really the truck that is supposed to call the shots and pull the strings.” - Respondent FA

“Jag tycker att det är lite svårt att förstå alltid vad man ska göra eftersom den ändå ska coacha en till att köra bättre, till 90 procent kör man ju på farthållare till exempel då o ändå får man röda resultat när det ändå är bilen som ska styra och ställa då.” - Respondent FA

“Now it is predominantly lecturing pointers I would say and I believe more in positive feedback.”- Respondent expert function

“Nu är det ju framförallt pekpinna skulle jag vilja säga och jag tror ju mer på positiv feedback.” - Respondent Expert Function

“I would like it to be more positive.” - Respondent FC

“Jag vill ju ha mer att det ska vara positivt.” - Respondent FC

“Other truck drivers’ scores? No I’m not interested in that, no I wouldn’t want that.” - Respondent FD

“Andra förarens poäng? Nej det är jag inte intresserad av, nej det skulle jag inte vilja ha” - Respondent FD

“It would be fun actually, if the truck would have been so smart that you could connect . . . so you could go in and see how the others have been driving.” - Respondent FC

“Det hade vart kul faktiskt om bilen hade varit så smart att man hade kopplat upp sig då . . . så kan man gå in och kolla hur dom andra har kört.” - Respondent FC

“There is already a lot of data today to look at really, if we only learn how to use it.” - Respondent expert function

“Det finns redan idag mycket data egentligen o titta på, om vi bara lär oss att använda den.” - Respondent Expert function

“A system like this is more for improving the worst [drivers] than improving the best [drivers].” - Respondent expert function

“Ett sånt här system är mer till för att lyfta de sämsta [förarna] än att förbättra de bästa [förarna].” - Respondent Expert function

“I think it's hard to influence truck drivers to save fuel, either you have that in you [...] or you're the type of person who ignores all that stuff [...]” - Respondent FG

“Jag tror det är svårt att påverka chaufförer att spara bränsle, antingen har man det där i sig . .
. eller så är du den typen av person som struntar i allt sånt där.” - Respondent FG

“Time and money never goes hand in hand, if you want to be quick it’s gonna cost, and if it’s
supposed to go slowly you save money but you might not make it.” - Respondent FC

“Tid och pengar går ju då aldrig hand i hand, ska det gå fort då kostar det, ska det gå långsamt
så spar du pengar men du kanske inte hinner fram.” - Respondent FC

“I drive as cheaply as I possibly can, but it’s hard to get the consumption down in city traffic
when it is so many starts and stops.” - Respondent FG

“ Jag kör ju så snålt jag kan, men det är svårt att få ner förbrukningen i stadstrafik när det är så
mycket start och stopp.” - Respondent FG

“If you are idling and are trying to raise the air pressure in the morning then it pops up that
you shouldn’t idle it should be something built-in in that case, that it can sense that there is
no air pressure and that it has to idle.” - Respondent FB

“Står man på tomgång o ska försöka få upp lufttrycket på morgonen det kommer upp att
man inte ska köra på tomgång det skulle vara nåt inbyggt i så fall, att den känner av att inte
lufttrycket finns o den måste liksom gå på tomgång.” - Respondent FB
