TruckTett - A social multiplayer network game to connect truck drivers

Natali Bopp
Student of Stuttgart Media University
Ottheinrichstr. 16
93155 Hemau
+49 1758635829
nb076@hdm-stuttgart.de

Roman Kollatschny
Student of Stuttgart Media University
Gerlinger Weg 6 s
71254 Ditzingen
+49 151 67204424
rk056@hdm-stuttgart.de

Damaris Rothfuß
Student of Stuttgart Media University
Glockenblumenstraße 11
70563 Stuttgart
+49 15224377169
dr056@hdm-stuttgart.de

Christian Trendli
Student of Stuttgart Media University
Rosenbergstraße 83
70193 Stuttgart
+49 15221705192
ct022@hdm-stuttgart.de

ABSTRACT

A bad image within society, monotonous and lonely working periods, a busy schedule and a lack of social interaction - those are just some of the negative aspects characterizing a truck driver's profession. Classic automotive applications do not quite meet the special requirements of that user group. Therefore designing an experience that helps truck drivers satisfy their particular needs demands a different approach. In this study the concept for a location-based and game-centered social network, *TruckTett*, was designed with a focus on creating a user experience that satisfies the need for relatedness while also providing stimulation and maybe even popularity. It was evaluated in two user studies and improved by deriving design implications that were obtained through questionnaires and direct user feedback. Most notably the voice chat feature was introduced after the first iteration which enhanced the competitive spirit of the game and the feeling of together- and closeness. The overall results demonstrate that *TruckTett* has a high potential to create the desired experience in the target group.

Keywords

mobile applications; social game; deck of cards; long-distance truck driver; user experience design.

1. INTRODUCTION

Automotive applications usually focus on enhancing driving and its safety. Important aspects like the car as a personal space with room and potential for social experience are mostly left out. But especially long-distance truck drivers, who spend a considerable amount of time in their driver's cabin alone, would benefit from a relatedness driven approach. Our study focuses on the potential of a location based social network built around a classic card game that helps truck drivers to get in touch with each other and eventually overcome loneliness and boredom.

1.1 Truck drivers - the modern day cowboys?

Truck drivers, carrying goods to maintain our consumption capability play a significant role in the ecosystem. Actually, the job has various interesting facets, like internationality, autonomy and a certain degree of freedom. Truckers were often described as modern day cowboys [17]. But the current situation in this business is not quite as romantic, as the modern day cowboy metaphor.

Bad public image and staff shortage

The future of the truck driver job is threatened, due to menacing staff shortage. Besides the demographical situation, lacking attractiveness and a negative public image are the main reasons for absent young truckers in Germany [14][11] . In a survey, carried out in 2012 by the Hochschule Furtwangen University, the majority of the interviewed truck drivers, rated the image of their job with 48,48 % as poor. 22,84 % rated the job image even worse. Whereas 21,86 % rated their image as neutral, only 6,82 % said that the image of their job is quite good and no one rated it as very good [2].

Stressors of the truck-driver-profession

The reasons for the negative image are the low wage level and especially social aspects, like family-unfriendly work conditions, irregular social contact and loneliness.

First and foremost, long-distance truck drivers aren't able to give their life a regular, predictable and socially fair structure, which results in a lacking work-life-balance [14]. This situation is not only a problem for European truckers. The informa healthcare USA Inc. carried out a study about the occupational stressors and the mental health of truckers which classifies trucking as one of the highest-risk occupations in the United States. Besides the typical issues like time pressure, increasing traffic, back complaints and the lack of sleep, the study discovers that loneliness and boredom lead to poor mental health and negative lifestyle choices such as drug addiction. This vicious circle also contributes to the negative social image of truckers [16].

Social interaction among truck drivers

Additionally, a decreasing collegiality among themselves leads to the proceeding social isolation of truckers. Compared with earlier years, where communication via radio and telephone with other and strange drivers was very common, today's truck drivers communicate almost only with colleagues from the same company or close friends to exchange business and traffic-related information, against boredom and to maintain existing relationships [11]. Strongly grown competitive pressure from foreign truck drivers, mainly from Eastern Europe, who are working mostly for dumping wages[10] and uprising language barriers are the main reasons for the decrease of social contact among truckers in Germany, resulting that the majority of them spend their free- and rest times alone in their driver cabins [13][11] .

A survey within the informa study confirms this statement. Truckers were asked, from whom they get their emotional support. The majority reported "family" as main source, followed by "God" and themselves. Interestingly no one answered with "colleagues" or "other truck drivers" which confirms the impression, that lacking collegiality also leads to social isolation among truck drivers. [16] And there are no indications that this situation might change in the near future.

Experts however, agree that modern, connected technical devices and new form of networks will affect every area of the daily work life of truckers. Besides new driving assistance and real time traffic information systems to prevent accidents and traffic jams, there is also potential for the development of new communications systems and social networks for truckers, which possibly can counteract the trend of the constant isolation and loneliness [14].

1.2 Human needs and well-being

The physical and psychological well-being gets an increasing significance in our lives and in the whole society. Thus we have to question ourselves, on how to design applications and interactive systems to create an experience which contributes to the well-being of human beings.

In this context, studies and researches conducted from Marc Hassenzahl et. al. state, that the well-being of human beings can be increased through certain experiences satisfying their specific psychological needs [7]. An experience is described as a time that one went through, where sights, sounds, feeling and thoughts are connected and stored in memory. Those experiences can be relived and communicated to others to also increase their well-being [8]. In the development of applications and interactive systems, those experiences have to contribute to satisfy different needs like autonomy, competence, relatedness, popularity, stimulation and security.

Based on the lacking psychological well-being of long-distance truck drivers, relatedness, popularity and stimulation are the needs we have to focus on.

Relatedness describes the feeling in accordance to the situation if you have regular intimate social contact with other people and the feeling that someone cares about you. If you are in a situation that you are liked, respected and influenced by others and vice versa the crucial need for popularity is covered. Stimulation is the feeling when you get enjoyment and pleasure in a sufficient manner rather than feeling bored and useless [8].

In terms of designing good applications or interactive systems, it's essential to consider the needs of our target group and delivering them an experience with functionalities that cover and satisfy those needs.

1.3 Related Work

In this section we describe related work about automotive applications, work that presents ways to encourage interaction with others while driving and work which includes games designed to be played specifically by passengers.

1.3.1 Automotive and social media

As it was already mentioned above, automotive applications usually focus on the aspects of safety and driving excluding other meanings and functions of the vehicle. As Eckholdt et al. state, "the car is an extension of one's house or apartment […] which offers security" [4]. But what if your vehicle is your office? A survey

showed that 77% of truck drivers that only drive one truck would never occasionally switch their vehicle for another. That especially applies to long-distance drivers, who see their truck as their own, personal space [14]. This strong relationship indicates that a driver's cab is not only a workplace but also an extension of his or her home, a place to eat, sleep and rest.

Just as much as a car, a truck is a "shell". It marks an enclosed space that hinders its driver from communicating with the outside world. While the car still has the potential to be a social place if the passenger seat is taken by a friend to enjoy the ride with [12], the truck denies its driver having such a companion as driving as a team is not really a common practice. Thus the driver is deprived of a way to satisfy one of his most desired needs, which was also elaborated in the above: relatedness.

The clique trip approach "provides the experience of being one group even when being in different cars" through a special communication channel, making it feel "as if the interiors of the cars unite". An important technique used in this work are experience patterns that the authors established through interviews. One especially stood out as being a very suitable situation for experiencing relatedness: driving in so called "motorcades" with friends [12]. The maximum speed long-distance truck drivers are legally obliged to comply with is causing them to be severely bored by the monotonous fashion of their trip: They are forced to drive behind each other at the same speed, [11] which is in fact a motorcade. So why not turn this painful situation into a pleasure and use its potential to create an experience that also unites the truck drivers' interiors?

Taking the autonomously driving future truck in consideration this potential becomes even bigger as the driver's hands and mind are freed from the steering wheel and ready to be stimulated. This context raises an important question, also addressed by Eckholdt et al.: "What do I do, when being in a [...] [vehicle] that drives autonomously?" A quite simple answer being provided is just doing things similar to those while traveling by train or airplane. [4] That is for example playing games or spending time on social media platforms.

In their pilot study "The social car" Schroeter et al. explored the possibilities of urban focused automotive application approaches in an ideation workshop. They claim that the "[t]he car of the future will not only be safe, but also socially embedded and geo-aware." [15] Social media are usually used to share content and interact with people far away like the driver's family, but have an unexplored potential for communication with drivers and passengers nearby. The in Schroeter's et al. work elaborated future application ideas for that context featured "sharing spoken words, text, [...] tips, knowledge, reminders, games, experiences, destinations, etc., with strangers surrounding the [vehicle]." [15] And there is in fact a willingness to share those contents as web users of social media already extensively enjoy doing it. It establishes a feeling of connectivity for the individual. [15]

This approach goes one step further than the clique trip and extends the motorcade, so far consisting of friends and known drivers, through strangers. Long-distance truck drivers who will seldom be surrounded by people they are already connected with might strongly benefit from being introduced into such a community. It may provide them with the experience they need to overcome the feeling of being alone in a "shell" and feel connected and close to others.

1.3.2 Voice as a medium to create relatedness

Communication, the exchange of information between others is one of the most important social functions of humans. For truck drivers, this feature is of the greatest needs, as they sit due to their work for several hours alone in a truck. As a result, their communication to other people like their family, friends or colleagues is limited.

For truckers, however, the communication is not just an exchange of information on the conditions on the roads, but it is also often used to keep up with colleagues and to avoid social isolation [truckingtrugh.com]. Further, the communication also serves to suppress the boredom and loneliness, which arises for truckers during their daily work [11].

As communication channels, there are two channels in particular, a text based communication such as text messages and messaging services or voice based communications such as CB radio[1] or mobile phones. While the popularity of text based messaging services is among the younger generation high, many people prefer voice based communication as these are less distracting while doing something else [5]. These channels provide in contrast to the text based channels not only the advantage, that they can be used while driving but also the feeling to talk to others as they would sit next to each other. This assumption is backed up by a study on collaborative online shopping. The findings show that "[a] shopper will perceive a higher degree of presence of a shopping partner if a collaborative online shopping website provides its shopper with a richer communication channel, such as voice chat." [9]

Speaking to other people is a much more personal way of communication. It provides various things that a plain written text is not able to transfer: intonation, the warmth of a voice, the sound of a laugh. It captures the personality of an individual much truer to reality and thus has a higher potential of establishing a feeling of relatedness.

---

1 '*A system of short-distance radio communication between individuals*' https://en.wikipedia.org/wiki/Citizens_band_radio

1.3.3 Games in Vehicles

Boredom is one of the main aspects while being on the road [11]. Not only truck drivers can be bored to tears on their immense trips. All passengers who have been part of a long car journey can understand how unamusing this sometimes can be. Especially children and their parents search for diversions and solutions for stimulation. A well-working answer to boredom is playing. Therefore, verbal games are being played by many families to pass time. The well-known guessing game "I spy with my little eye…" or "I packed my bag..." encourage the interaction inside the car between the passengers. Meanwhile, ideas have come up for a lot of computer based games, to enhance the ride for passengers. Some of them are location based and integrate the players' surrounding like the Backseat Game which is an augmented reality game for car rides [3]. It was designed to entertain by using the road as a stage of a story.

With new technology, new concepts of games occur which allow to play against other car passenger on the road. One of them is Road Rager, a multiplayer game in which traffic encounters are an important issue because the meetings are supposed to create fun and compel game experience [3]. So, location based information and traffic encounters seem to raise tension and foster interaction.

Based on these findings we developed *TruckTett*. To foster interaction and to overcome boredom, we combined all these elements. As the work we discussed above did not address truck drivers, their situation and their needs, the challenge was to design a game which fits into the truck driver community. The aim was to design a game which creates the experience of being close to the other truck drivers respectively evokes the feeling of sitting at one table while playing although being far away from each other.

1.4 The TruckTett Concept

The social game *TruckTett* is designed to introduce truck drivers into a community that revolves around a classic card game. The *TruckTett* game is a version of the well-known top trump, where each card contains numerical data, e.g. the maximum speed, weight and acceleration of a car, and players try to win their opponents' cards by strategically picking values that will trump others. But *TruckTett* cards are not just game assets: each card represents a real truck driver within the community and his vehicle with real data. Thus players have the chance to get to know several real colleagues and have an insight into their work life during one game session. Some drivers may even stand out as trumps and thus evolve to legends of the community achieving a certain popularity. Being an enthusiastic player also pays off in the *TruckTett* community as winners are listed in a weekly ranking and may become well known, admired and preferably challenged opponents.

But how do truck drivers engage into a game with each other? *TruckTett* is designed to raise the driver's interest for his or her surroundings. The home screen of the application is built around a map that shows the location of the user and other community members. It invites the drivers to explore, who is sharing the road with them and might eventually be ready to participate in a game. Moreover, the home screen provides a news feed that generates posts about community events and location based information like a friend being close. The newsfeed shares its screen area with a swipe able game cards slideshow. It gives the user suggestions on who it might be interesting to get connected with based on location, mutual friends and other parameters. The game cards are clickable and lead
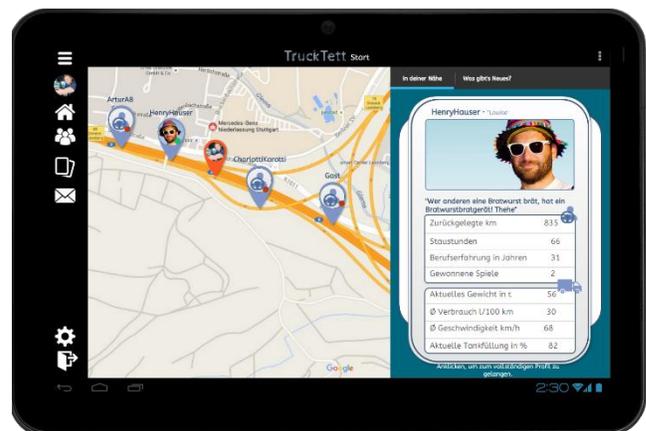
Figure 1: Interface concept of the home screen of the Trucktett high fidelity prototype

to a whole profile that portrays further personal information consisting of data like the favorite meal or favorite radio channel. As initiating a conversation, especially with strangers, might still present a hurdle we introduced the "honk" option which is an analogy to the poke feature of Facebook. It gives users a nice option to say "hi" in a simple way. For more comprehensive conversations the application will also feature a messenger.

The *TruckTett* concept takes up the challenge of connecting truck drivers preferably through location and motivating them to participate in game of top trump as an icebreaker. As it revolves around a truck driver's life and his vehicle it is designed to strengthen the community aspect of a social network and eventually create an experience that is marked by relatedness, popularity and stimulation.

2. Material and Methods

Our study does not focus usability whose aim it is to eliminate potential problems and barriers so that everyone can use the app successfully. Although this is important for our application development, in this study we want to concentrate on user experience (UX).

User experience focusses on the subjective and the personal experienced quality of the product [6]. Hassenzahl et al. mention the importance of this subjective quality as it is supposed to be crucial for the future usage and for the way people will communicate the product.

AttrakDiff

So besides the observation of the subjects during the test and recording their clicks and acting identify usability aspects, we asked questions to get to know the subjects' opinions and to find out about their product experience. To measure the quality of *TruckTett* we used the tool AttrakDiff which is a standardized questionnaire that according to its' developers can be used for evaluation of usability tests. On the one hand it includes the measurement of utilization, handling and attractiveness, on the other hand it measures quality aspects like stimulation and identity that create emotion and a bond to the product [6]. The instrument is a semantic differential which means that the interviewed person is asked to choose where his or her position lies, on a scale between two bipolar adjectives. This technique is supposed to measure opinions and attitudes. AttrakDiff could be used for free on www.attrakdiff.de till the end of January in 2016, afterwards the service was and still is available on another platform: https://esurvey.uid.com.

Additional questionnaire

To gain enough information, we also evaluated our idea with the help of a questionnaire additionally to AttrakDiff. In this we asked new questions but also took on some points of our AttrakDiff survey, to get an understanding what has been chosen by the subjects and why. It was structured in three parts, one addressing the platform, one addressing the integrated game and one to get answers to relevant questions described in the next chapter.

3. Case Study: UX Evaluation

This section details our user study. First, we introduce our pre-study with several participants who evaluated a paper prototype. Then we will focus on the user study with our high fidelity click prototype.

The main questions we addressed throughout our evaluation are:

- Do users feel connected in a *TruckTett* game?
- Is *TruckTett* a good way to get in touch?

- Did we succeed in creating a fun and collaborative experience?
- How is a truck driver affected by our game?
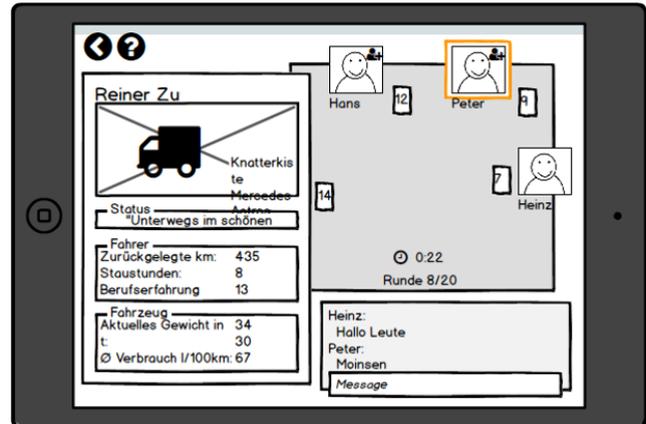
Figure 2: The first interface concept of the game screen from the paper prototype of the Trucktett application

3.1 Pre-Study: The Paper Prototype

Following the user centered design principles, we tried to involve users early in the conception of *TruckTett* to obtain feedback and improve our idea and application. In our first user test, we wanted to examine our idea after two specific targets. For one thing, we wanted to evaluate a first user interface concept of the application, whether it matches the expectations and behavior of the subjects and whether the subjects have issues with it. For the other, we wanted to estimate the acceptance of the game as a tool for the simplification of communication and socializing between different people.

3.1.1 Paper Prototype Concept

Therefore, we decided to create a paper prototype for the user test. By the simplicity of the approach of a paper prototype, we were able to create and perform the test relatively early.

On the one hand we developed the prototype to test the navigation flow of the application's interface. On the other hand, the prototype was used to evaluate the idea of the game in our application. So we had to create a prototype with all the main functionality but also with the game in detail.

The tests were conducted with 6 different subjects, including three males and also three females across different ages. Since no subjects of the target group were available for the test, we had to conduct the test with students and teachers. The subjects were individually performing the test in a prepared room. In addition to the subjects, a moderator, an observer and another person, who performed the tasks of the computer, were present. To analyze afterwards, an audio recording was taken throughout the test. After an introduction to the topic by the moderator the subjects had to accomplish four different tasks which can be reviewed in our paper prototype walkthrough video that is available at

https://www.youtube.com/watch?v=Nm0bMha9s-M.

Subsequent to going through the tasks, the subjects were requested to take the above-quoted AttrakDiff survey.

3.1.2 Paper Prototype Results

With the Paper Prototype we could detect a lot of usability problems by asking and observing the subjects. We got plenty of ideas how to change small details or bigger issues about the implementation. But most important was gaining information about the idea and its quality. As mentioned before, AttrakDiff was used to get the following information:

- Altogether, the subjects found the project idea very attractive.
- They could put themselves into the situation.
- The three important attributes we wished to arouse, were confirmed by the subjects: connective, inviting and involving.
- But room for improvement was clearly given, concerning handling and design.
- Also did the paper prototype not motivate and attract the subjects sufficiently.

To sum up, the first attempt to place a classic card game into a social network to encourage the interaction of truck drivers proved to be successful or rather seemed to be a good idea.

3.2 Evaluation of the high fidelity prototype

Subsequently we went one step further and developed a high fidelity prototype in which we embedded all the findings of the pre-study.

3.2.1 High fidelity prototype conception

Though the paper prototype was an efficient and quick way to judge whether the idea had the potential we saw in it or not, the paper as a medium itself failed to provide certain aspects of an immersive card game. A card game is fast-paced and of a highly interactive nature. In reality players flip their cards, hold them in their hands and pick an attribute that is most likely to beat other players' cards. They may build up some tension and make some witty remarks to their opponents across the table before finally revealing their card. After that whoever loses has to give away his or her card and the winner gets to collect them all. But it is not only the game itself that marks the experience, what happens on the side also matters. Two or more individuals share a table, food and have some drinks aside from talking to each other. In order to create a similar experience and bring reality onto a tablet we made certain design changes and included following extra features:

1. swipe gestures
2. voice chat
3. interactive gimmicks

To imitate the haptic experience of a card game we introduced swipe gestures. Each player turns his next card through pulling it from the deck by swiping left or right. After the attribute was picked and all cards are revealed on the table, whoever wins gets to collect all cards by swiping them into his deck and the unfortunate ones have to actively swipe their card into the winner's deck also. By introducing those interactions, we hoped to capture the pleasure and the pain of winning and losing and thus create a more immersive
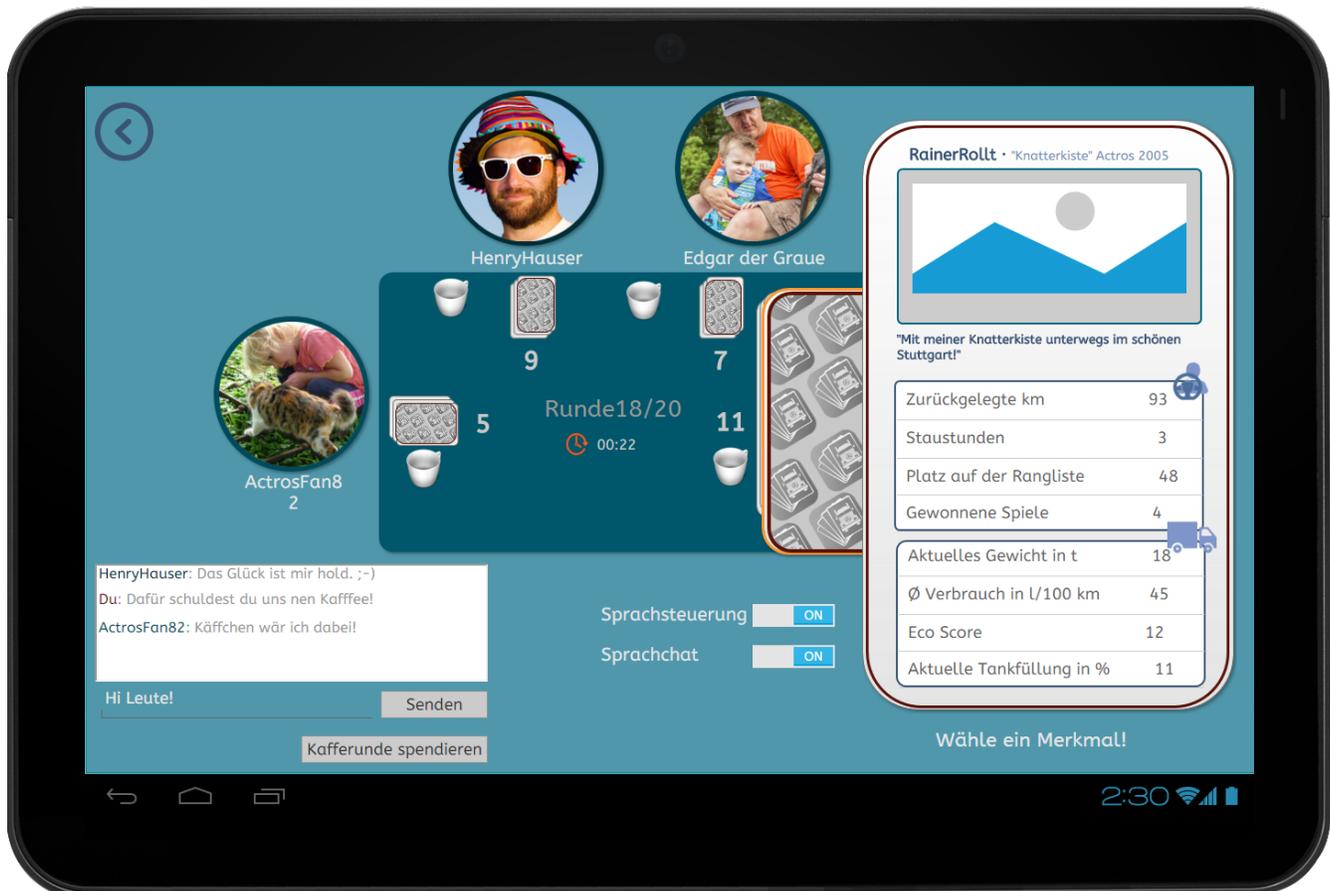
Figure 3: The interface concept of the game screen of the high fidelity prototype of the Trucktett application

and engaging experience. In order to increase the feeling of togetherness and to support the competitive card game experience we augmented the application through the voice chat feature. The voice chat is supposed to support the feeling of sitting at a table with fellow players and to enhance the entertainment value of the card game itself as the voice gives players the opportunity to build up tension and to express their happiness and frustration. Lastly to increase interaction on the table itself we introduced the coffee cups. They represent a series of gimmicks that should keep players entertained during the game and motivate them to playfully interact with their opponents just like they would on a real table. The empty cups can be filled by the players through "buying" their opponents a round of coffee. The coffee will disappear in a short amount of time imitating a drinking process.

3.2.2 Test setting

With the thoughts in mind, that the truck driver cabin is kind of a second home for most of the drivers, our aim for the usability and UX-test was to create an authentic setting for the test situation. Since we did not have the possibility to test our application in a real world truck cockpit-setting, we used a driving simulator, which consists of several parts of a real truck cockpit, such as a steering rack with the steering wheel, the indicator controls, the pedals and three widescreen displays as windows. The simulator is located at the Stuttgart Media University. For a further realistic setting and to provide a more authentic experience, we decorated the simulator

with some usual gadgets like trucker magazines, a nodder, a truckercap and little snacks for the test subjects, as well as visual protection for a spatial definition of the driver cabin.

3.2.3 Technical setup

To integrate the subject completely in the following test scenarios, a real world dashcam-video of a long drive on the autobahn was shown on the wide screen displays. Furthermore, we installed a microphone and a set of speakers in our test setting to simulate the built-in voice-chat-functionality of the application and two cameras to document the whole test procedure. Since the focus was on testing the UX of *TruckTett*, we purposely renounced an active driving simulator because the usage of the application is only intended for autonomous drives and resting situations.

3.2.4 Scenario and tasks

Altogether we acquired nine subjects for our test scenarios. The subjects had to put themselves in the position of a truck driver, whose truck drives autonomously, so that he can attend his time to other things. In our scenario, it should be of course on our application, which was recommended from some colleagues and is already installed at the tablet in the driver cabin, but still unexplored by the subject.
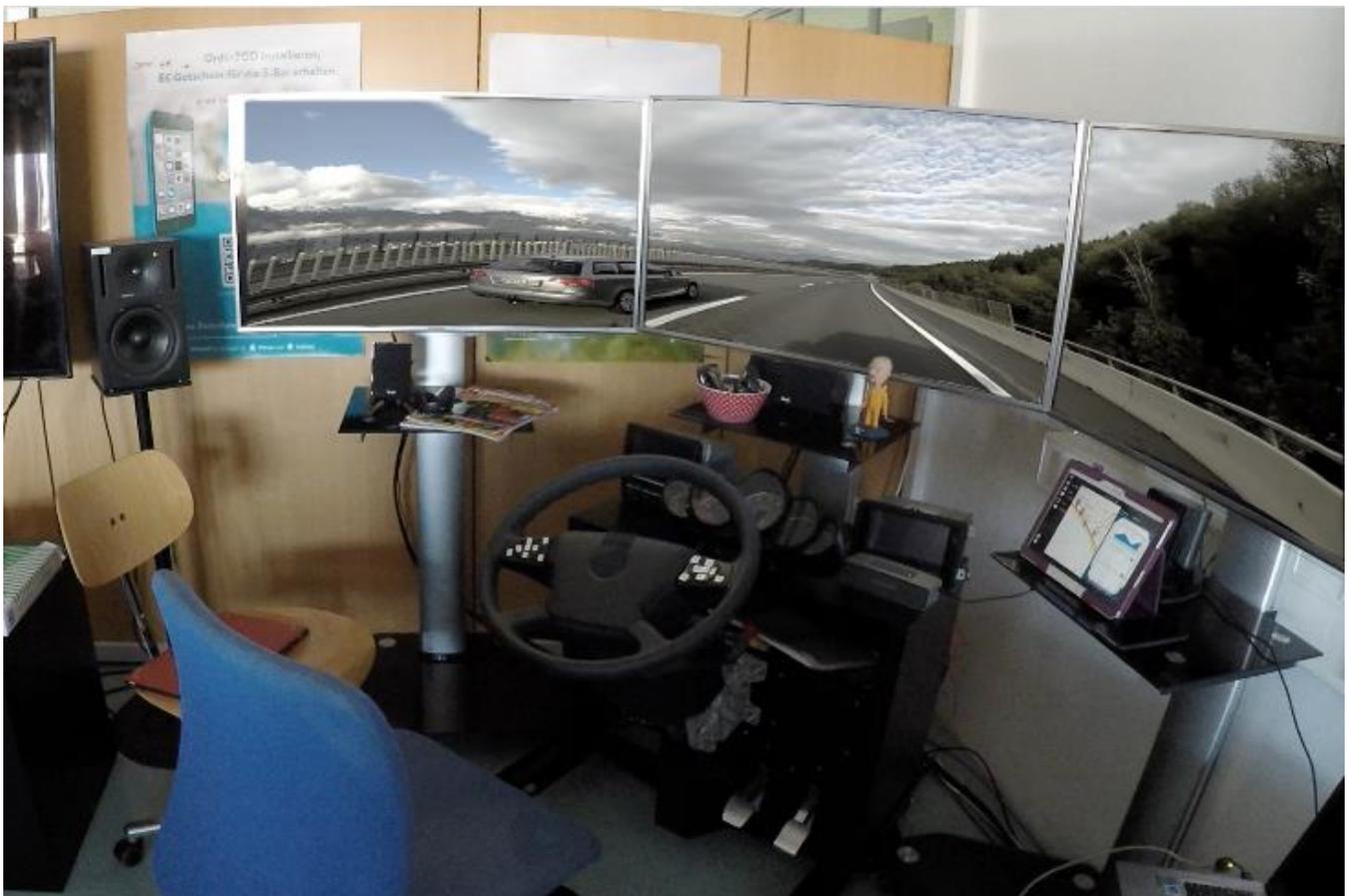
Figure 4: Image of the test setting for the user tests of the high fidelity prototype

The first task in the usability and UX-test was about exploring the start page. The subject was invited to think aloud about observations, perceptions, feelings and experiences.

After the introduction in form of exploring, the next task was the first step into the social cross-linkage and communication with other truckers. Target of this task was the identification of drivers in the geographical proximity on a map, the exploration of the profile view of one certain driver and sending him or her a friend request.

To provide an insight into the social settings of the application, the subject had to share the own *TruckTett* playing card with its data for other users within the community. Besides the emphasis of the community aspect, this task should demonstrate the importance and our thoughts about privacy and data protection on social media platforms to create a more authentic experience for the subject in our test procedure.

The main part of the high fidelity prototype test consisted of playing the actual game to acquire realistic feedback on the whole concept and the methodology creating a certain amount of relatedness with other users. To start a game, the subject had to choose three fellow players from a pool of available virtual community members. After the subject chose his or her fellow players, he or she landed in the last but two round of a whole *TruckTett* game. We chose this procedure to create a more intensive experience and to shorten the time. In order to increase the motivation for the game we scripted the first round to be lost to a certain opponent who will be the main person to interact with. Subsequently the last two decisive rounds are won by the subject. Besides the whole game mechanism and principle, the focus on this task lied on the exploration of social communication features such as the text chat, spending coffee rounds and the voice chat. Creating an authentic card game table situation, we simulated a real existing fellow player, who was located in another room and interacted with the subject via voice chat and screencast.

Our main motive lied in creating a preferably realistic and authentic card game situation with a high amount of inclusion and social communication using the possible technical tools.

4. Results and discussion

We have demonstrated how a mobile social game can be designed to let drivers communicate and get closer to each other. The question is: does this concept create the experience we wanted it to?

4.1 Observations and user feedback

The players' facial expressions differed between the exploration of the app and playing the game. Switching to the game the persons suddenly became active and more involved, which was visible in their facial expressions, their body movements and got more obvious through their expressed statements during the test.

The game-setting was instantly identified as a table inspired by real life and also reminded one subject of a poker setup. Another subject described the situation as „I can see the table, where we're all sitting and playing". The choice of words already indicates that establishing the table metaphor was successful. In that context the coffee cups were pointed out as a "nice gimmick" with a wish for more of its kind. Regarding the swipe gestures that were introduced in the second iteration we observed that the subjects had an intense feeling of winning while collecting their opponents' cards. This was for example expressed through statements like "Ich habe total abgesahnt.", which means something similar to "I really cleaned up." in

German. Having to give away their card to their opponent, subjects reacted in a disappointed manner and complained about "how mean" they felt their opponent was. Overall we observed a highly competitive spirit that was also fueled by the voice chat feature. Being able to express their opinions and feelings in real-time with another person giving instant acoustic feedback had a positive effect on the subjects' involvement into and enthusiasm for the game. They engaged into conversations about various topics like the game, traffic and the whole scenario of driving an autonomous truck. Some games even ended with an agreement on meeting up for coffee at the next stop. The feeling of togetherness and relatedness was expressed by a subject with the words "We are spending time together, even if it's just playing a game." The importance of the map showing close community members being in focus, was emphasized by a subject through the statement: "I am able to talk about different topics with people nearby than with my friends at home". Other community members who are sharing the road with you may also share your concerns and feelings in that moment, which was proved by the subjects using the voice chat during the game to discuss various also not-game-related topics with their opponent. Lastly the "honk" feature was positively pointed out as nice and fun way to initiate contact.

In summary we were able to observe the subjects having a positive experience that was underlined by being stimulated by the game and by feeling related most notably during the voice chat. The results we obtained through the tools we chose to measure the experience, the above mentioned AttrakDiff and additional questionnaire, corresponded with our observations and are presented in the following.

4.2 AttrakDiff results

AttrakDiff was very helpful to prove our concept. After the test the subjects estimated *TruckTett* by rating the defined 28 seven-step items whose poles are opposite adjectives (e.g. "conservative - innovative", "ordinary - novel"). The method records the so called pragmatic quality (usability), the hedonic quality (stimulation and identity) and the attractiveness. To get a value for these quality aspects, the 28 items are splitted in four groups with seven items whose middle values creates the scale value.
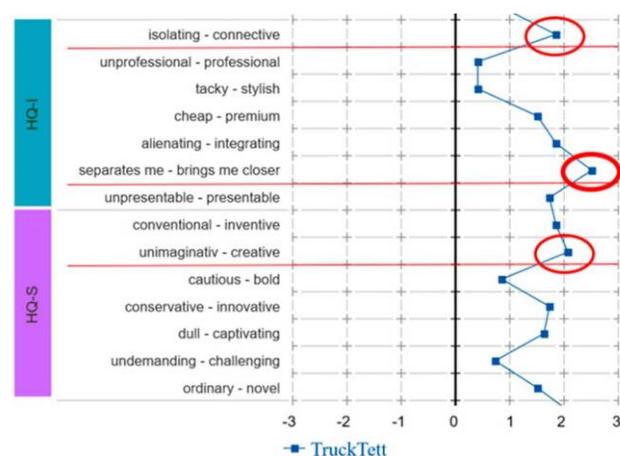

Figure 5: Diagram of average AttrakDiff-values for the paper and high fidelity prototype

The diagram below shows the average values for the paper proto-type (orange line) and also for the high fidelity prototype (blue line). With both we achieved only positive values for the hedonic quality (HQ), the pragmatic quality (PQ) and attractiveness (ATT), which means that the overall quality of our product is good. The comparison of the two lines gives evidence that we could improve the concept of *TruckTett* from the first iteration to the second being more stimulating and attractive.
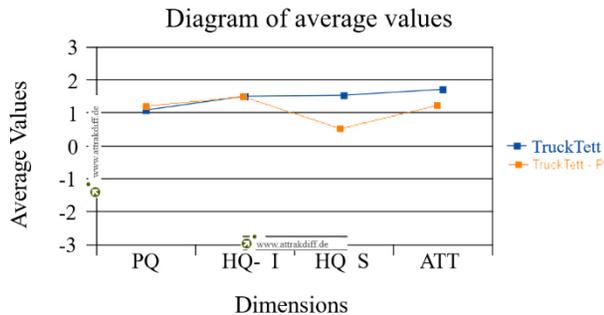

Figure 6: Diagram of average AttrakDiff-values for the paper and high fidelity prototype

Although we let the subjects evaluate each item there was an amount of adjectives we were particularly interested in. These items have to do with connection, relatedness and attraction and give answers to our opening questions. The following picture shows an excerpt of the 28 item with the most important adjectives for our study including HQ excluding PQ and ATT.

Do users feel connected? If we look at the top of the item list, the subjects stated that *TruckTett* is connective. They also clearly decided that the application is able to bring people close together which is a great result in this evaluation. Does *TruckTett* stimulate the users? As the subjects find it innovative and creative and challenging, it stimulates the users and reaches a high desirability.

4.3 Questionnaire results

Evaluating AttrakDiff gives results but not the answer how and why users decide. Therefore, we developed the mentioned questionnaire to get answers:

About connectivity

- Seven subjects told they would definitely use *TruckTett* to connect if they were truck drivers. The other two were quite sure they would as well.
- For the majority of the subjects it plays a role for contacting if the other person is close by. 56 % said they would rather connect with truck drivers around. 22 % also had this tendency and another 22 % had a neutral opinion.
- Two subjects would certainly write messages to strangers but five subjects would certainly invite strangers for a *TruckTett* game. This supports our thesis that the game reduces the obstruction to contact strangers. To be sure about this, we asked the question directly and all subjects stated they have the feeling it is easier to connect by a *TruckTett* Game.

About relatedness

According to AttrakDiff the application brings people closer. But what made the test users feel being connected and close to the others?

- A few persons mentioned that the profile/game cards give nice and personal information about a stranger which makes them

feel familiar. One person said another player gets a personality thereby.
- Many subjects named the map as a connective piece because it shows people nearby, experiencing the same road and journey conditions and meeting similar problems on the road (scenes of accident, traffic jams and controls). Additionally, the users saw the potential for face-to-face encounters.
- Of course the game was mentioned as the most important place for interaction and connectivity. This was not just achieved by the game itself but by all the elements attached to it, like the chat window, the coffee gimmick and the real-time voice chat.
- The real-time voice chat was brought out by nearly every test taker as the most important built-in to support the interaction and thus connection. They saw the chance to share experience while playing, to have a nice small talk or to just pass the time together.

About enjoyment

In general, the subjects displayed amusement. Their answers in the questionnaire verified that they all had fun and confirmed our observations. We further asked them why:

- Many test persons mentioned the real and actual data as a source of fun because they liked the fact to beat the other players with their own truck data. And they were affected by the possibility of examining data of others.
- Additionally, the fact of up-to-date data pleases the subjects. They mentioned the data on the game cards never get boring.
- Several subjects described *TruckTett* as facetious and entertaining.
- The subjects liked the feeling in the game, sitting at one table with the cards and a coffee. One of them compared it with the feeling of playing poker together.
- As assumed, the game made them enjoy *TruckTett*. The subjects claimed that playing is fun.
- Although some of them supposed that the game could get boring after a while because of its simplicity, they said the interaction with the other players would keep it entertaining.

Even though the feedback was so positive, it appeared that the game has to be extended to keep the fun factor over a long period of time. Several test persons suggested to embed other games to the application.

Why using TruckTett?

Concluding the questionnaire, we asked the subjects to answer why they would use *TruckTett* and the answers proved our idea of *Truck-Tett*. They would use the application to:

- get to know their colleagues
- talk to friends and other drivers
- find out who is on the road
- to pass the time
- to have fun and be distracted in a positive way

5. Discussion of the study results

As described in the previous chapter, the results of the users' test proof, that the initial idea of a social network for truck drivers was received positively. Especially the well-known classic card game and the attached voice chat ensured a higher social interaction amongst the users. We observed that the implications we derived from the first iteration and incorporated into the high fidelity prototype lead to much more satisfying results.

Especially the voice chat is an important improvement in terms of motivation and communication in the application. Once the users perceived their opponent's voice, a conversation usually developed very quickly and the subjects engaged into chitchat with the fellow *TruckTett* community member. The game itself happened much more together, feeling as there is indeed a fun game happening between friends at a table. All users became more active and get themselves even more into the game and the other users. Through our test it also turned out, that some users have problems to pay attention on the tablet the truck at once. For some it was difficult to give attention to the device while playing and the truck while it's moving through the environment. As experienced by the interview with the expert and our test, there is still a lack of confidence in the new technology of self-driving vehicles. This in mind, there should be a revision of the interface and its design, which adepts the context of the use better.

6. Conclusion and Future Work

We have presented a concept for a social game which is designed to be played by truck drivers to overcome boredom and primary, to combat loneliness by connecting with their colleagues. A test of a high fidelity prototype has provided promising results, as stated in the last chapter.

Our attempt to draw the players' attention to the tablet and not to the street worked well in our test setting. However, we assume that in a real truck driving on the road, this situation would change. For this setting which would be the next step, the design must be developed to prevent the driver's distraction from the game to the road and if needed the other way round. Our idea to solve this problem is to either integrate the street as a livestream into a small window on the tablet screen or to integrate the tablet's view maybe as a projection into the truck's front shield.

Another way to improve the handling on the road could be the insert of voice control to navigate the app and to play the game. We think this would at the same time increase the feeling of playing cards in reality where players also choose their attributes via voice. Additionally, to the voice control and voice chat, a face to face video live stream with the other players on the table would also increase the feeling of playing a real card game and thus the feeling of relatedness. In term of projecting the whole application onto a Head-Up-Display in the front shield, the greatly enlarged representation of the game setting would also contribute to a more authentic card game experience. To create a more authentic experience in controlling the application and the card game itself, there should be the possibility to interact with gestures.

Future research should focus on studies involving implemented technology. Because our study is based on hypothetical services, the findings do not necessarily reflect users' behaviour in a real setting, so it's necessary to conduct the UX-tests in a real world setting with expanded functionalities concerning the social interaction to get a more realistic feedback about the methodologies and functionalities to cover and satisfy the human needs we want to address. It is also important to mention that - although we put a lot of effort into making them feel that way - our subjects were not real truck drivers. In order to provide more reliable findings we recommend further tests to be conducted with former or actual truck drivers as subjects.

7. Acknowledgements

Figure 7: Example of an augmented reality implementation of TruckTett

8. REFERENCES

[1] Ashelman, D., *The need for communication*, on http://www.truckingtruth.com/trucking_blogs/Article-3513/the-need-for-communication

[2] Baier, J., Hochschule Furtwangen, 2012, *Trends im Straßengüterverkehr - Aktueller Status und Meinungen der Berufskraftfahrer in Deutschland*.

[3] Brunnberg, L. op. 2008. Playing with the highway experience. Pervasive games on the road. *Studies in applied information technology 6*. Department of Applied Information Technology, IT University of Göteborg, Göteborg.

[4] Eckoldt, K., Hassenzahl, M., Laschke, M., Knobel, M., 2013, *Alternatives: Exploring the Car's Design Space from an Experience-Oriented Perspective*

[5] Geerts, D., 2006, *Comparing voice chat and text chat in a communication tool for interactive television*

[6] Hassenzahl, M., Burmester, M. & Koller, F. (2008) Der User Experience (UX) auf der Spur: Zum Einsatz von www.attrakdiff.de In: Brau, H., Diefenbach, S., Hassenzahl, M., Koller, F., Peissner, M. & Röse, K. (Hrsg.): *Usability Professionals 2008*, S. 78-82. Stuttgart: German Chapter der Usability Professionals Association.

[7] Hassenzahl, M., Diefenbach, S., 2012, Well-being, need fulfillment, and Experience Design. In: *Designing Well-being Workshop*. Retrieved August 2012

[8] Hassenzahl, M., Eckoldt, K., Diefenbach, S., Laschke, M., Lenz, E., Kim, J. (2013). Designing moments of meaning and pleasure: Experience design and happiness. *International Journal of Design*, 7(3), p. 21-31.

[9] Hongki, K., Kil-Soo, S., Un-Kon, L., (2013) Effects of collaborative online shopping on shopping experience through social and relational perspectives. *Information & Management vol. 50* (4) p. 169-180

[10] Europäische Transportarbeiter Förderation (ETF), 2012, *Moderne Sklaverei im heutigen Europa?* Bericht der ETF über

die Arbeits- und Lebensbedingungen von Berfuskraftfahrern in Europa.

[11] Klimmer, M. 2016. Experteninterview: TruckTett - ein soziales Netzwerk für Berufskraftfahrer. Hintergrund, Nutzung, Wirkung, Bad Friedrichshall.

[12] Knobel, M., Hassenzahl, M., Lamara, M., Sattler, T., Schumann, J., Eckoldt, K., Butz, A., 2012, *Clique Trip: Feeling related in different cars*

[13] Kölner Stadt-Anzeiger, 2012, *Das Leben im Lastwagen* http://www.ksta.de/region/fernfahrer-das-leben-im lastwagen,15189102,11965324.html#plx1934013600

[14] Lohre, D., Bernecker, T., Düsseldorff, K., & Stock, W., 2014, ZF-Zukunftsstudie Fernfahrer 2.0. *Der Mensch im Transport-und Logistikmarkt*, Friedrichshafen et al.

[15] Schroeter, R., Rakotonirainy, A., Foth, M. 2012. The social car: new interactive vehicular applications derived from social media and urban informatics. In *Proceedings of the 4th International Conference on Automotive User Interfaces and Interactive Vehicular Applications* (AutomotiveUI '12). ACM, New York, NY, USA, 107-110.

[16] Shattell, M., Apostolopoulos, Y., Sönmez, S., Griffin, M., 2010, informa healthcare USA Inc. *Occupational Stressors and the Mental Health of Truckers*

[17] Ufberg, R., The Guardian, 2015, *Does it really take a special breed to be a truck driving man?* http://www.theguardian.com/us-news/2015/may/24/truck-driving-man-truckers-long-distance