Tipsters: Promoting Trust in Online Tip Sharing Platforms

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Thesis to obtain the Master of Science Degree in

Information Systems and Computer Engineering

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November 2017
Acknowledgments

I would like to thank professor Hugo Nicolau for all the help granted during the realization of the project. The guidance provided was crucial in order to develop a quality work.

I would also like to thank my family and friends that have supported me throughout the development of the project, particularly to the ones that volunteered to the conducted experiment, by recording and providing personal videos of themselves, and also to the ones that closely followed the development of Tipsters.
Abstract

Sports betting is an activity with increasing popularity in our society. Many people seek help to decide where they should place their bets. We developed a platform (Tipsters) to help gamblers in this process. The main challenge that we faced was the process of building trust among users in online environments, namely in websites that involve transactions between them. We used a trust game with three reputation conditions (positive, negative and missing) and three video conditions (trustworthy, untrustworthy and missing) in a 3 x 3 within-subject design to measure the impact of seller videos and reputations scores on promoting trust. Buyers decided whether or not to buy an item from the seller and rated the trust on the seller. Reputation and videos had a significant main effect on buyers’ trust and purchase decisions. Positive reputation and trustworthy videos contributed to higher purchase rates and buyers’ trust. Trustworthy videos led to higher purchase rates and trust ratings than positive reputation and other video conditions even if they had a better reputation score. The results obtained influenced the requirements and design of our platform.

Keywords: Sports Betting, Sports Tip, Online Trust, Reputation, Video
Resumo

Apostar em eventos desportivos é uma atividade em crescimento na nossa sociedade. Muitas pessoas procuram ajuda para definir as suas apostas. Desenvolvemos uma plataforma (Tipsters) para ajudar os apostadores neste processo. Enfrentámos o desafio de promover confiança entre os utilizadores em ambientes online, nomeadamente em sites que envolvem transações entre eles. Utilizámos um jogo de confiança com três condições de reputação (positiva, negativa, ausente) e três condições de vídeo (confiável, não confiável, ausente) num design 3 x 3 within-subject para medir o impacto dos vídeos e reputação dos vendedores na promoção de confiança. Os compradores classificaram a confiança nos vendedores e decidiram se compravam um item ao vendedor. A reputação positiva e os vídeos confiáveis contribuíram para maiores taxas de compra e confiança dos compradores. Vídeos confiáveis levaram a taxas de compras mais altas e a uma maior confiança dos compradores em relação à reputação positiva e às outras condições de vídeo. Os resultados obtidos influenciaram os requisitos e o design da nossa plataforma.

Palavras-chave: Apostas desportivas, Dicas de apostas desportivas, Confiança online, Reputação, Vídeo
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Chapter 1

Introduction

The world of online sports betting is huge and continues to rise \(^1\). Sports betting is the activity of predicting sports results and placing money on the outcome. Most of the sport gamblers lose money in the long run, or in many cases in a short run. There are few gamblers that are actually profitable in sports betting. Usually these gamblers are able to achieve that profit not only through their knowledge in sports, but also by following some rules, having discipline and experience dealing with the management of their money.

Many gamblers seek help in the moment of choosing in which result they should place their bets. Usually gamblers discuss their predictions with their friends, make online searches for statistics of a specific sport event or try to find predictions made by other people for that sport event. These predictions are usually called sports tips. A tip in gambling is a bet suggested by a third party, who is perceived to be more knowledgeable about that subject.

In order to aid gamblers in accessing sports tips, we built a platform, named Tipsters, where users can share their tips, and possibly earn money by doing that. The platform follows a model of a social network, where users can follow each other. Users can use the record of tips shared by other tipsters in order to assess his competence as well as his sports and betting preferences. The tendency will be for users that are more active and competent to gain more followers. When a user shares a tip, this tip will appear in the news feed of his followers. If a user has a solid reputation and already has many followers he can decide to set a price to a tip he is going to share. Other users will only see the tip selections if they buy the tip. Typically, users with more followers and competence will have higher purchase rates.

1.1 Problem

The problem that we faced is that it is difficult to build trust among users in an online environment. In peer to peer platforms, where users are not familiar with each other, it is crucial to build trust among users.

In the context of the Tipsters platform, we address the issue of trust building in a sports tips sharing \(^1\)http://smallbusiness.co.uk/why-online-sports-betting-is-booming-in-the-uk-2517491/
platform. The users must have the perception that there are other users in the platform that possess the adequate skills and competences that will help them in his sporting bets, and therefore increase their profits.

1.2 Approach

This work addresses the problem of building trust among users in an online environment. In a platform where transactions occur between users, reputation scores are the main mechanism to build trust. In an online environment where users are not familiar with each other, providing social cues of the users are important to promote trust among them. An example of a social cue is to expose the face through a profile picture or a video to other users. While reputation scores provide logical reasons to trust or distrust in other party (cognitive trust), these social cues induce affective responses (emotional trust).

Our work focused on understanding the effects of sharing video-based social cues and reputation scores in building trust. Little is known about the impact of these two mechanisms (reputation scores and video) when co-occurring. We performed an experiment that combines three video conditions (trustworthy video, untrustworthy video and missing video) with three reputation conditions (positive reputation, negative reputation and missing reputation) in a 3 * 3 within-subject design in a standard trust game.

In the context of our platform, it was crucial to find effective ways to promote trust among the users. The results obtained in the experiment that we conducted were extrapolated to the domain of Tipsters. After having a more clear understanding of the impacts of using video-based social cues in online contexts, we adapted our platform to use this mechanism to promote trust.

1.3 Contributions

The contributions of this work are:

- **Review of related work on building trust on online environments.** Many studies were already conducted in order to determine techniques that would increase the trust of a user in an online context. One relevant study was conducted by Bente et al. [2] that combined the effects of reputation scores and seller photos using a computer-mediated trust game. The structure of our study is based on this work. The study of Bente et al. will be further analyzed in section 2.3.4.

- **Study on the effect of videos and reputation scores on trust.** Bente et al. [2] limited their research to a specific social cue: photos. It is unclear whether a richer media source, such as videos, will have a greater impact on sellers trustworthiness. Thus, we extend previous research by studying the effect of video-based social cues and reputation scores in promoting trust. The domain that we will use in this study is a standard trust game, however the goal of the study is to be able to extrapolate the results obtained to other domains where reputations scores and videos co-occur.
• **Design and development of Tipsters.** We built Tipsters to help gamblers decide where they should place their bets. Users can share and view tips on sports events, and the best tipsters could even earn money by selling their tips. The platform allows users to connect with competent tipsters that can help them increase their profits.

## 1.4 Document structure

The rest of the report is organized as follows. In Section 2 we present all the background related with our work and its respective discussion. Section 3 describes the approach, procedures and results of the experiment we conducted to measure the impact of reputation scores and video-based social cues when co occurring in online transactions. The features and implementation details of Tipsters are described in section 4, while section 5 presents the usability tests conducted to the interface of the platform. Finally, section 6 concludes the report.
Chapter 2

Related Work

In this section we will make an overview of the related work. We will begin by analyzing the key concepts of trust. The concepts of trust will be further analyzed in an online context, where we will detail the antecedents of online trust and some mechanisms studied to promote trust.

2.1 Trust

Trust is needed when people feel vulnerable and are in an environment that is uncertain and risky[3]. Trust is an essential factor in many kinds of human interactions, allowing people to act under uncertainty and with the risk of negative consequences[4].

2.1.1 Concept of trust

The concept of trust has been the subject of many studies by researchers in different domains. Those domains cover different areas, ranging from psychology or economics to computer engineering. Therefore, it is difficult to reach a common definition of trust, since each area has its own understanding of the concept, but trust can be considered as being "...the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party"[5].

2.1.2 Trustor and Trustee

Two characteristics that most definitions of trust have in common is that there must exist two parties in any trusting relationship: a trusting party (trustor) and a party to be trusted (trustee) [6]. Trust can be developed by the trustee to positively create in trustor the perception that he possesses some characteristics that would benefit the trustor [7]. This perception is important to reduce the uncertainty and risks and can possibly create a relation between the trustee and the trustor.
2.1.3 Ability, Integrity and Benevolence

Trust can be defined in terms of ability, integrity and benevolence [8].

Ability means that the trustee possesses the adequate skills and knowledge in a specific context necessary to fulfill the tasks the trustor requests.

Integrity is whether or not the trustee follows moral and ethical principles, and keeps the promises made to the trustor and do not deceives him.

Benevolence is the trustor belief that the other party is interested in his well being and motivated to find a mutually beneficial relationship, without the intention of opportunistic behavior [9].

When the trustor perceives that the trustee possesses these described characteristics, he will believe that the trustee is trustworthy. In the context of our platform we can assume that the users will search for these features in other users. Users will try to find tipsters that have knowledge in terms of sports and in predicting sports events results, and also that are ready to help him in his needs.

2.1.4 Initial and continuance trust

Two types of trust must be distinguished, initial trust and trust based on direct experience [10]. Initial trust can be defined as the one that invokes and maintains an initial relationship before the relationship develops and become a committed one[11]. The second type, trust based on direct experience, assumes that there was an initial interaction, followed by an evaluation of the outcome. As such, it affects the long-term orientation of the relationship [10]. When users gain more direct experience, initial trust develops into continuance trust.

In the context of our platform, the initial trust assumes a crucial role in the process of developing trust among users and between the users and the platform. When the user first browses the platform he must have the perception that there are competent users present in the platform, and therefore by using our platform it is likely to have more profits. It is also important for the users that want to sell tips to gain the perception that they will find potential buyers in the platform. Regarding the relationships between users, the initial perception of trustworthiness is also crucial to begin a new relationship.

2.2 Trust in an online context

Users may feel insecure when visiting a website or application, especially if it involves online transactions. In this section regarding trust in an online context the main focus will be on e-commerce websites.

Trust plays a crucial role in human-computer interaction due to the high complexity and anonymity associated with e-commerce [6]. Users are often uncertain about the risks and consequences when transacting or visiting online websites [3].

The lack of trust towards web vendors is one of the main factors discouraging consumers to engage in online shopping [12]. Uncertainty, risk, cybercrime, identity theft and internet fraud negatively affect consumer’s readiness to shop online, which has been empirically confirmed by many researchers [13]. Under conditions of uncertainty and risk, trust is important to help consumers overcome perceptions
of risk [5]. Online trust is a competitive advantage of the companies that conduct their business over the Internet, and may determine its success or failure. There are many cues that help consumers to put their trust in an online retailer, such as the reputation information of the retailer or positive word-of-mouth recommendations.

2.2.1 Model of trust for e-commerce

Egger [10] proposed a model that identifies factors that have an effect on consumer's perception of vendor’s trustworthiness.

![Figure 2.1: Overview of the Model of Trust for Electronic Commerce (MoTEC) [10]](image)

According to figure 2.1, the model is based on four dimensions:

1. Pre-interactional Filters: Individuals differ as to their general propensity to trust. People’s predisposition to trust and pre-knowledge determine an initial trust value even before accessing a web site for the first time.

2. Interface Properties: The development of trust is strongly affected by the first impression of a system. As a user explores a new site for the first time, the first impression made by a system, in terms of graphic design and usability, will lead to a re-assessment of that trust value.

3. Informational Content: As the user examines cognitively more demanding factors, such as the company’s competence or the risk of a transaction, one’s trust value is bound to change once again.

4. Relationship Management: Refers to the handling of inquiries or orders over time. Reflects the facilitating effect of timely, relevant and personalized vendor-buyer interactions on trust development (pre-purchase) and maintenance (post-purchase).
2.2.2 Initial trust in e-commerce

Initial trust in a online context refers to the trust developed during the first interaction with the website [8]. Due to the lack of previous direct experience, users may perceive great risk and uncertainty when they use website for the first time [14]. Building the user initial trust is even more critical in cases that exist similar websites that execute the same service, since the switching cost to that other website is often low or even none. Thus, service providers need to build initial trust to decrease perceived risk and to retain the users in the platform.

McKnight argue that “Initial trust between parties will not be based on any kind of experience or firsthand knowledge, rather, it will be based on an individual’s disposition to trust or on institutional cues” [15]. In online transactions where parties are unknown to each other, initial trust determines whether or not the transaction will occur [16]. Thus, the ability to build initial online trust can determine the success or failure of an online vendor.

In the physical world, a user can rely on physical cues when looking for a shop to buy a particular item. Those physical cues, such as the presence of customers inside the shop or the shop’s physical size, helps the user to assess that store’s trustworthiness. However on the internet, those physical cues are not available and a user must rely on other cues such as the privacy policy, visual aesthetics, and navigation quality of an online store to help assess that store’s trustworthiness [17].

Since trust is a dynamic process that can change over time based on experience, the website must provide a strong set of trust cues to establish an initial perception of trust, but later it must provide positive experiences for a customer in order to extend or at least maintain that initial perception of trust [17].

The customer perceptions about the website is a key determinant of gaining initial trust, followed by a development of buyer-seller relationship [18].

Antecedents of initial online trust

At an initial stage of the relationship, where the trustor and trustee are not yet familiar with each other, the antecedents of trust differ from the ones in an ongoing relationship [19]. In ongoing relationships experience is a normal condition. In situations of initial trust, parties do not have a prior mutual history and have not gained experience with each other yet. These parties have not yet gathered meaningful information about each other [19] and need to depend on other ways to verify the trustworthiness of the other party.

Due to its significant role, initial trust has received considerable attention in the online commerce context. McKnight et al. presented models of antecedents of initial trust [8, 15] that includes the following concepts: reputation, formal control structures, site quality, disposition to trust and communication.

1. Reputation: Reputation has been identified to be a significant determinant of initial trust. Due to the lack of direct experience, users may rely on third party mechanisms to build their initial trust. Reputation serves as an alternative source of trust in those cases where a party lacks experience with another party [8]. The reputation of the trustee is the accumulated experience of parties that
have been engaged in transactions with the trustee. When the trustor perceives that other parties ensure that the trustee is credible and benevolent, there is a positive impact on the perceived trustworthiness of the trustee [20].

2. Formal control structures: In an initial trust phase in an internet environment, transaction parties are separated by a social and physical distance. Formal control structures are necessary to build trust. This includes mechanisms, for example, that guarantee that a transaction will take place as promised, and for that it can be used regulations or contracts. When such mechanisms are in place, they either safeguard the trustor by ensuring that the opportunity for the trustee to behave untrustworthy is constrained or by guaranteeing that when indeed the trustee behaves opportunistically, the trustor will be compensated in a specific way [15, 20]. When the trustor perceives that such guarantees are present, these have the potential to influence trust positively.

3. Site quality: In human face-to-face contact first impressions are important in the development of initial trust [8]. In an online environment where such human interface is not available, a website interface is a significant factor affecting initial trust, since it is the interface between consumers and online vendors [21]. The website quality can be an alternative means for getting first impressions of the other party, and could give the trustor the impression that the trustee has certain qualities that make him more trustworthy [20].

Interface issues such as usability, attractiveness and perception appear are important determinants of trust, and multiple studies shows that user interface has a heavy impact on initial trust which could directly affect what will happen later [22].

The appearance of the web site affects the consumer’s initial trust of the vendor, that in turn will influence the consumer’s intention to buy from that vendor [23].

Lowry et al. [21] performed a web-based simulation of a hotel reservation web site, where the participants were randomly assigned to various treatments and found that web site quality had the strongest impact on a consumer’s initial trust of the vendor. They stated that if the consumer had a negative first impression, he would likely infer negative beliefs about the vendor. They have also pointed out the importance of linking the web site in the consumer's mind with other trusted web sites that they have had previous good experience with using [24].

4. Disposition to trust: Disposition to trust is the general tendency to believe that others are trustworthy [15]. A person evolves a disposition to trust if he had an overall positive experience with others [25]. When the trustor has had positive experiences with trustees in the past, he has less reason to believe that people in general are not trustworthy, and the need to worry about opportunistic behavior of the other party decreases.

5. Communication: When people enter in a cooperative relationship but have not gained experience with each other yet, communication between them builds trust. Communication gives insight into the specific roles that the trustor and the trustee are willing and intend to take during the potential cooperation [20].
Dimensions of initial online trust

The literature typically makes a distinction between three dimensions of initial online trust, namely affect-based, cognition-based, and institution-based trust [15].

1. Affect-based trust: Affect-based trust (also called emotional trust) develops from one’s instincts, intuition, or feelings concerning whether an individual, group or organization is trustworthy [26]. In online environments, visual attractiveness or social cues such as human images can be used to induce affective responses which may result in favorable attitudes toward the site [27].

2. Cognition-based trust: Cognition-based trust is defined as a consumer’s rational expectation that an online vendor has the necessary attributes to be reliable [28]. The trustor’s choice is motivated by a conscious calculation of advantages. Quality information on a website can help potential customers make rational purchasing decisions [29].

3. Institution-based trust: Institution-based trust derives from the presence of guarantees on the website, ensuring that a common standard is being followed. This guarantees can be provided by the retailer or can take the form of Web assurance seals offered by third parties.

2.3 Trust among users

Building trust in online communities and social networks is challenging due to the very limited exchange of interpersonal cues. This section will describe the factors influencing trust among users in an online context, namely in C2C (consumer-to-consumer) electronic commerce.

2.3.1 Overview of trust in C2C

Flanagin suggests that "In essence, C2C commercial transactions entail recurrent initial encounters among strangers who are at significant risk, given the financial and psychological costs of failed transactions and the relative lack of relevant, available information. Thus, engaging in C2C e-commerce requires that at least one party takes a substantial risk and invests trust in someone about whom little is known" [30].

Bolton et al. posit:“It is not just the scattering of trade in space and time that pose[s] a challenge to Internet exchange, it is also the medium of communication per se. Computer-mediated communication makes it more difficult to signal trustworthiness and to promote cooperation than ‘richer’ communication media such as face-to-face communication" [31].

The factors influencing trust in C2C commerce are different from the ones in B2C, since there can be another layer of anonymity. Trust is a more stronger issue for the buyer. Jones et al. [24] studied some factors influencing trust in C2C, including the fear of seller opportunism, information asymmetry and third party recognition.
Information asymmetry

Information asymmetry in a C2C context means that the seller of an item has more information about the product than the buyer. Information asymmetry was found to influence a buyer’s trust in C2C e-commerce [24]. In B2C e-commerce the effect of information asymmetry is alleviated because buyers are dealing with recognized business. However, in a C2C e-commerce environment if there is an issue with the transaction the buyer has less means to rectify a possible problem. Information asymmetry is difficult to alleviate since there is an inability to determine whether or not the seller is trustworthy until after the transaction is complete. The absence of information leads the buyer to take the higher risk in the transaction. Therefore it is important that the sellers provide clear and detailed information about the products in order to reduce any mistrust in the transaction, as well as to attract more buyers. By having a privacy policy, money-back guarantee, consumer can get additional information to judge, therefore, significantly influence consumer’s trust.

Fear of seller opportunism

Fear of seller opportunism is defined as the buyer fearing that the seller will behave in only his best interest after the transaction has occurred [24]. Some examples of opportunistic behavior in a e-commerce environment could be sending the wrong items in a transaction, wrong features or quality of the items or failing on the shipping terms defined. Fear of seller opportunism was found to influence a buyer’s trust in C2C e-commerce [24].

There are many ways to prevent this issue, such as the seller to display pictures of the item to be sold. This can ensure the quality of the product.

In the context of our platform one way to reduce these issues is, for example, if a purchased tip end up not winning based on the match results, part of the money invested could be refunded to the user. This will not only alleviate the fear of buying bad tips, but will also encourage the user to buy the tip.

Third Party Recognition

Third party recognition can be defined as an institution that provides a buyer with some reassurance that the transaction will occur as indicated by the seller [24]. The trust that the consumer has in this third party can be transferred to the seller Third Party Recognition programs can ensure that standards and principles are followed by the seller with regards to privacy, security, and reliability issues that may affect the buyer.

2.3.2 Influence of seller’s reputation

Reputation systems are one of the most important mechanism to build consumer trust in e-commerce. Reputation scores constitute a very influential factor in online transactions, since reputation and trust are closely related [32]. Reputation systems provide information about the past behavior of a transaction
partner and are expected to build a rational basis for trust [32]. Reputation scores constitute propositional knowledge and deliver good reasons to trust or distrust (cognitive trust) [2]. Reputation scores significantly affect purchase behavior of a consumer in online transactions. Positive reputation lead to higher purchase rates than negative and missing reputation [33].

The process of building reputation maybe be long and the cost to restart this process could be high. This may show the commitment of the seller, as a high-reputation seller does not tend to change c2c website.

Resnick and Zeckhauser [34] found that eBay sellers with better reputations are more likely to enjoy a boost in sales, but not in price, than their counterparts with less good reputations.

### 2.3.3 Influence of seller’s photograph

Photos are another central feedback for trust in e-commerce. The effects of photos on trust are more subjective than the effects of reputation [35]. The effects of tacit social cues conveyed in a photo are more likely to impact our feelings and intuitive judgments of a seller’s trustworthiness (emotional trust) [2].

Exposing the face to strangers in an e-commerce site can affect trust since it signals the readiness to expose one self to others and to disclose one’s identity as well as by conveying visual cues relevant to impression formation and social judgment. This reduces interpersonal uncertainty and potentially making the discloser recognizable and appear vulnerable.

The role of photographs in social interaction has been widely studied. Willis and Todorov [36] found that as little as 100ms of exposure to a face is sufficient for people to make judgments about the person’s trustworthiness, competence, and aggressiveness.

Photos of trading partners are supposed to "re-embed" otherwise depersonalized and decontextualized online interactions and thus to build a more affective basis for trust [6].

Small and Verrochi [37] examined how the emotional expression on a victim's face in advertisements for charities affects both sympathy and giving, and reported that people were more sympathetic and more likely to donate when viewing sad expressions than when viewing happy or neutral expressions.

In a standard trust game experiment, Tortosa et al. [38] showed that participants shared more money with happy partners than with angry partners.

Xiaolan Yang [39] studied the role of photographs in online peer-to-peer lending behavior, by making an experiment that consists on showing an advertisement with a photograph and asking how much money the trustors would be willing to lend to the person in the photograph. The lending amount was higher for advertisements with a photograph rated trustworthy than for a photograph rated untrustworthy, and higher for advertisements with a photograph rated happy than for a photograph rated sad. A borrower’s photograph that is rated high for trustworthiness or happiness sends a positive signal to potential lenders and their willingness to lend is significantly improved. These results indicate that judgments of both trustworthiness and happiness as perceived in photographs play an important role influencing trust between strangers in an online environment [39]. Therefore, Yang showed that the insecurity derived...
from the lack of communication may be decreased by using photographs as a nonverbal channel for communication between strangers.

Ert et al. [40] conducted an empirical analysis of Airbnb’s data and a controlled experiment and found that the more trustworthy the host is perceived to be from his photo, the higher the price of the listing and the probability of its being chosen.

### 2.3.4 Combining seller’s photos and reputation

Bente et al. conducted a study [2] that combined the effects of reputation and seller photos, using a computer-mediated trust game that combined three photo conditions (trustworthy, untrustworthy and no seller photo) with three reputation conditions (positive, negative and no seller reputation) in a 3x3 within-subject design.

#### The standard trust game

The trust game used was designed by Bolton et al. [41], and is presented in figure 2.2.

**Step 1:**

- **Buyer (trustor)**
  - buy
  - not buy

**Step 2:**

- **Seller (trustee)**
  - ship
  - not ship

<table>
<thead>
<tr>
<th></th>
<th>Buyer</th>
<th>Seller</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buyer:</strong></td>
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</tr>
<tr>
<td><strong>Seller:</strong></td>
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</tr>
<tr>
<td><strong>Seller:</strong></td>
<td>70</td>
<td>0</td>
</tr>
</tbody>
</table>

**Figure 2.2: Standard trust game used in Bente et al.[2] experiment**

The trust game involves online transactions under monetary risk. In this standard trust game, a seller (trustee) and a buyer (trustor) are endowed with 35 units. The seller offers an item for sale at a price of 35 units. When no trade occurs they both remain with 35 units. If the buyer decides to buy the item and the seller ships the item, the buyer receives 50 units (item value for the buyer) and the seller receives 35 units (item price) at a cost of 20 units (e.g., shipping the product). In this case they both have 50 units
after the process. If the seller does not ship the product he receives the 35 units sent by the buyer plus his endowment (70 units). The buyer ends up with 0 units.

It was developed a web application for this study, which displays the seller reputations along with his photo. The software then requests the buyer decision.

There were conducted two independent pretests in order to select the appropriate reputation scores and seller photos for the main study.

Results of the experiment

The main results of the experiment conducted by Bente et al. [2] to understand the differential impact of reputation scores and seller photos are presented in figure 2.3.

Bente et al. reported that positive reputation contributed toward buyers’ trust and higher purchase rates while missing reputation performed worse than negative reputation. They also found that trustworthy photographs of sellers contributed toward buyers’ trust and higher purchase rates, revealing the potential that exposing a photo online has to foster trust and cooperative behavior in online transactions [2].

Positive reputation as well as trustworthy photos led to significantly higher trust ratings and purchases than negative or missing information. Missing reputation even led to significantly lower purchase rates than negative reputation. Completely negative information (low reputation, untrustworthy photo) resulted in significantly better trust ratings and purchase rates than completely missing information (no reputation, no photo)[2].

Surprisingly, there was no significant difference between negative and missing reputation, or between missing and untrustworthy photos. In the beginning of the study they proposed the hypothesis that “The mere presence of a photo positively influences trust: photos with a moderately untrustworthy appearing
seller produce higher trust levels and purchase rates than missing photos.” The data collected is insufficient to support this hypothesis. The hypothesis suggested that even an untrustworthy appearing seller might still receive credit for her/his readiness to expose her/himself to the buyer [2].

2.3.5 Combining seller avatar and reputation

Bente et al. also conducted another similar study to the one described, but using an avatar instead of the seller photo [33]. This study also used a standard trust game and aimed to study the different contributions of seller reputations and seller avatars on purchase decisions. Bente et al. found that positive reputation as well as trustworthy avatars led to significantly higher purchase rates than negative or missing information. Missing reputation led to significantly lower purchase rates than negative reputation. Missing avatars did not lead to lower purchase rates than negative avatars [33].

2.3.6 Influence of video

Video is a rich communication setting that provides significant amounts of sensory information to viewers, since it attracts viewers’ attention, engages them, and heightens their awareness of the physical presence and characteristics of a communicator.

In an online setting it is more difficult to develop trust than face-to-face, due to the lack of communication. There has been a continuously development of techniques to virtually communicate over long distances in a way almost indistinguishable from face-to-face communication. For example, videoconferencing systems are increasingly used for tasks that demand reliable, high quality communication support. Videoconferencing has an effect on the ability of the subjects to gain a clear and detailed picture of the person at the other end [42]. This type of communication can save time and money, since it allows faster decision making, even more communication when comparing with other types of communications, such as text-based (email). Muhlfelder et al. [42] found that trust levels among video conference participants were similar to those in audio or face-to-face meetings.

Bos et al. compared the different types of communication (text, phone, video, face-to-face) and reach the evident conclusion that all had some disadvantages when compared to face-to-face communication [43]. Basing their experiment on a social dilemma game, they found that participants using text chat did the worst, having the most difficulty establishing high trust based cooperation. They found that audio and video did as well as face-to-face in overall cooperation. However, these two channels took longer to reach high levels of cooperation when comparing to face-to-face.

Elliot et al [44] examined the implications of sharing a financial restatement through video. A financial restatement is the revision of a company’s previous financial statements and it is necessary when it is determined a previous statement contains a material inaccuracy. A negative restatement often shakes investors’ confidence and causes the stock’s price to decline. To minimize the negative reactions, company’s usually make a press release explaining the reasons for the restatement. Although those explanations have been mostly via text for many years, firms have recently begun using online videos to provide those announcements. Elliot et al. [44] examined the implications of sharing the
restatement through video, and found that investors viewing the announcement online via video recommend larger investments in the firm than do investors viewing the announcement online via text. They assess that announcing a restatement online via video will more strongly influence investors’ judgments and investment decisions than will announcing the same restatement online via text.

**Video product reviews**

Many e-commerce websites give users a chance to review the products purchased in the website in order to build trust of new users. Online reviews influence the consumer perceived trustworthiness of a website and therefore his decisions to purchase products. Product reviews can be considered as the electronic equivalent of word-of-mouth. online reviews can be seen by the vendors as free advertisement, affecting consumer’s perceptions about the product based on another user’s recommendations.

Currently online product reviews are made through text, possibly containing an image of the purchased product. However, common text-based reviews have only one way of presentation with no visual cues. Therefore, increasingly more websites are providing a way to the costumers to upload video-based reviews. Video-based reviews are richer in color, realistic visual cues and dynamic movements and have a powerful impact on consumer perceptions. When comparing with the text-based reviews, video-based presentation formats increase consumer perceptions of the review[45]. Merchants are increasingly encouraging costumers to upload online reviews in video formats. An example of a merchant that recognized that this strategy is beneficial is BestBuy, having adopted this strategy and even offering incentives to costumers that post video reviews, giving them store credit.

Xu et al. studied the effect of the presentation format of the review in the consumer’s intention to purchase a product [45]. They conducted a experiment comparing the impact of online reviews on three different products. The reviews were displayed in three different presentation formats: text, image, and video. They found that video format when compared to the other presentation formats has a significant positive influence on consumer perceptions and their intentions to purchase. They also assess that despite pictures may embellish text-based reviews in practice they don’t have many effects when comparing to the video-based reviews, possibly because images of the products do not add any additional information over the descriptions given by the vendor.

Some researchers investigated the consumer perceptions about the review’s credibility, helpfulness, and persuasiveness, based on various features and components of the review such as the severity of language used or the reviewers’ identities and backgrounds, and found that those factors played an important role [46].

**Video backgrounds in web design**

Full screen video background is a design trend with growing popularity, which give the sites a fresh and modern flavor. This feature is now more used due to faster internet speeds and more advanced browsers technology. By using full screen video backgrounds it is possible to easily pass the site’s message or to evoke certain feelings in the users. In figure 2.4 we present the website of the company Design &
2.3.7 The role of mutual trust in building members’ loyalty

In C2C e-commerce, the platform provider is an intermediary and offers members nothing more than a platform for transactions. Therefore is important to find ways to build members loyalty to the platform. The loyalty to a C2C platform provider can be seen as the intention of a consumer to do more business in this platform and to recommend it to other people.

It is possible to distinguish two types of trust in C2C e-commerce, the mutual trust among members and members’ trust in the platform provider. Members’ trust in the platform provider can benefit from the mutual trust among members. Trust among members can be transferred to member’s trust in the platform provider. Trust affects loyalty since it reduces social complexity and the perceived risk of future transactions in the platform. Members who perceive trust in a C2C platform are more likely to come back to the platform to sell or purchase again [47].

Members can build mutual trust toward each other through social interaction. These interactions and relationships among members are crucial to the success of C2C e-commerce. Social interactions facilitate the development of new interpersonal relationships among members. This mutual trust will give the perception to the members that the platform providers have the ability to gather trustable members. Therefore this mutual trust can be transferred to members’ trust in the platform provider [47].

1 http://dsnmfg.com/
2.3.8 Impulse buying in social commerce

Social commerce is a phenomenon that consists in using using social networking sites, such as Facebook, to conduct commercial activities. Chen et al. investigated online impulse buying in a social commerce context [48], by studying commercial activities on Facebook groups. This type of group is called as a C2C Facebook “buy and sell” group, where users post advertisements and then buy or sell items from each other. Chen et al. studied the effect of the information quality of the advertisement, the trait of the impulsiveness, and the number of “Likes” it receives on consumers’ urge to buy impulsively [48]. Their findings suggest that in order to increase consumers’ urge to buy, textual information in the advertisements posted on a C2C Facebook “buy and sell” group should be highly relevant, easy to understand, accurate, complete, well-formatted, and current. The number of “Likes” represents a positive indicator for consumers, as it can increase consumers’ urge to buy. However, they found no interaction effect between the number of “Likes” and the trait of impulsiveness influencing consumers’ UBI.

2.4 Discussion

In this section we will make an overview of the related work presented and evaluate the influence that this work have on our proposal. This section also discusses some of the features that platforms should have to promote trust, namely the Tipsters platform.

Based on the studies presented it is clear the relevance of trust in environments of risk. In an online environment, there are many risks to the consumer, so trust plays a crucial role in order to gain and retain consumers in a platform. In the related work it was presented studies on how trust can be built in these environments.

Reputation systems were the subject of many studies, and its importance for establishing a base of trust among users is widely recognized by online vendors. One of the key concepts of trust is the ability of the trusted party. Reputations systems provide a clear way to ensure the ability of the trustee. In the context of our platform, it is crucial to provide a reputation system that allows users to evaluate the knowledge and skills of other users in terms of sports betting. It should be possible to see the other users past experience in the platform, by showing their tips record and respective outcome. It is also useful to display relevant user statistics as well as an easy way to see the user current form.

One of the main issues when establishing trust in an online setting is the lack of communication. Interactions among users are crucial to the success of a platform. Social interactions facilitate, in a easy way, the development of online relationships among users. Therefore it is important that the platform provide ways for the users to interact. For example, it should be possible for the users to send messages between each other or to comment on each other tips.

Besides these text-based interactions, we have analyzed studies about social cues that can help reduce the anonymity between the users of the platform and therefore increase the mutual trust among them. One important social cue is the user profile picture. The presence of a profile picture have been shown to positively influence the perceptions of another user’s trustworthiness. Our platform should
strongly encourage the users to upload a profile picture, or even an avatar. An avatar profile picture
have also been shown to have a positive influence on building trust.

Bente et al. study [2] combined the effects of profile pictures and reputation scores on trust building,
using a standard trust game (section 2.3.4), and found that positive reputation as well as trustworthy
photos led to significantly higher trust ratings and purchases than negative or missing information.

The influence of video in building trust among people has been widely studied. The use of video
in videoconferencing has been shown to have positive influence in the communication between users,
when comparing to text-based communication, for example. Online e-commerce companies are in-
creasingly allowing and encouraging users to upload videos reviews of purchased products in order to
increase buyers trust.
Chapter 3

Influence of seller videos and reputation on buyer trust and purchase behavior

Our work addresses the problem of building trust among users in an online environment. We conducted a study to understand the effects of videos and reputation scores when co-occurring in online transactions. In this section we describe the specifications of the study as well as the results and discussion of the results.

Several studies [2, 10, 32, 33, 39] have been conducted in order to understand how trust can be built in online environments. Researchers distinguished two key concepts of trust: cognitive trust and emotional trust.

Cognitive trust provides logical reasons to trust or distrust in other party. Reputation scores are the central feedback mechanism used to establish a base of trust among the users, providing these rational reasons.

Emotional trust induce affective responses in the trustor. For example, providing social cues in an online context, such as a profile picture, can be used to mitigate the anonymity between users, and thus influencing the process of building trust among the users.

The impact of using reputations scores and social cues in online transactions when these two mechanisms co-occur has already been studied. Bente et al. conducted a study [2] that combined the use of reputations scores and social cues (photos) to promote trust (see section 2.3.4) in online transactions.

The use of video as a social cue has been studied in different contexts, such as videoconferencing [42]. However, there have not been made many studies regarding the influence of video in online commerce, namely in C2C commerce, and, to the best of our knowledge, no empirical study has combined the effect of video and reputation scores in those environments. Thus, we extended previous research by studying the effect of video-based social cues and reputation scores on promoting trust in online transactions.
3.1 Study Design

To understand the impact of videos and reputation scores on trust and purchase behavior in online transactions, we used a standard trust game to combine three video conditions (trustworthy video, untrustworthy video and missing video) with three reputation conditions (positive reputation, negative reputation and missing reputation) in a 3 * 3 within-subject design.

Bente et al.[2] combined effects of a profile photo and reputation scores of a seller in online transactions using a standard trust game. We proposed to extend this experiment by using a richer media source (videos) as the mechanism to stimulate emotional trust of the buyer. Following Bente et. al experiment, we also used a standard trust game in our study.

We consider the hypothesis of using a more specific domain for the experiment, namely the Tipsters platform. However in such platforms there are other cues that influence the perception of trust. In order to measure the impact of the mechanisms in study, it is important to reduce the complexity of these mechanisms. If we intend to use the domain of the Tipsters platform to conduct the study of combining the effect reputation scores and user videos, other factors had to be taken in consideration. For instance, we might have used a video of a user explaining a tip shared on a given event. The videos used to explain the tip would be very subjective to each user, depending on their knowledge and understandings regarding the sport event used in the tip. It would be very difficult to determine what would be or not a trustworthy video, so the results would not be reliable. Given these reasons, we considered that would be more appropriate to use the standard trust game to isolate the effects of both cognitive and emotional trust.

3.1.1 Standard trust game

In section 2.3.4 we described the standard trust game, used in Bente et al.[2] experiment. However in this section we will review and make a more detailed description of what consists this standard trust game.

The trust game involves online transactions under monetary risk. There are two parties involved in this trust game: a seller (trustee) and a buyer (trustor). This game models a trust situation where the buyer and the seller will be involved in a sales transaction. There are not actually real products being exchanged, only its monetary equivalents.

Initially both parties, seller and buyer, are endowed with 35 units. The seller will offer an item for sale at a price of 35 units. At this moment, the buyer must take the decision whether to buy or not the item from the seller. When no trade occurs they both remain with 35 units. If the buyer decides to buy the item, the seller will then make the decision to ship or to do not ship the item, resulting in the following scenarios:

• Seller ships the item: The seller receives 35 units (item price) at a cost of 20 units (costs of shipping the product), ending up with 50 units. The buyer receives 50 units (for the buyer the item has a value of 50 units). Thus, each trade where the seller and the buyer decide to cooperate they both have 15 units of profit, now owning 50 units each, instead of the 35 units when no trade occurs.
• Seller does not ship the item: The seller receives the 35 units sent by the buyer plus his initial endowment, ending up with a total of 70 units. The buyer loses his initial endowment ending up with 0 units.

### 3.1.2 Study application

We developed a web application to run the trust game and to collect and store the data from the participants.

The application has full control over the 3 * 3 study matrix, presenting the profile video and the reputation score of the seller for each entry of the matrix. The order in which each entry is presented is randomly assigned. The application also prompts for buying decisions and trust ratings and stores the responses in the server.

The interface of the application is presented in figure 3.1. We used traditional web development languages (HTML, JavaScript and CSS), complemented with additional libraries and frameworks.

![Study application screenshot](image)

**Figure 3.1: Study application screenshot**

The back end of the application was responsible for storing the data collected in the study. The server was developed in Node.js and used a NoSQL database (MongoDB) to persist the data.

The study application also contained a tutorial. This tutorial was presented to the participants in the beginning of the test. The tutorial contained a set of slides that described in detail each step of the standard trust game as well the expected actions of the users during the test. A screenshot of a slide of this tutorial is presented in figure 3.2.
3.2 Pretests

To select appropriate seller videos for the trust game we conducted a pretest. The appropriate reputations scores were reused from the pretests made by Bente et al.[2]. These pretests are useful to avoid the selection of videos or reputation scores that produce extreme trust or distrust. The goal is to select items that provide moderate levels of trust and distrust.

3.2.1 Reputation scores

The appropriate reputations scores were reused from the pretests conducted by Bente et al.[2]. The reputations scores used in the pretests were presented in a commonly used five-star-index. Each of the five star corresponded to a percentage of previous trades in which the seller shipped the product after the buyer decided to buy the item:

- 1 star: 0-20%;
- 2 stars: 21-40%;
- 3 stars: 41-60%;
- 4 stars: 61-80%;
- 5 stars: 81-100%;

Thirty users rated their trust ratings for each star on a 7-point-scale, where 1 represented high distrust, 7 high trust, with 4 representing the neutral scale mean.

Bente et al.[2] reported that it was appropriate to use three stars for moderate distrust (average trust rating = 2.9; SD=1.3) and four stars for moderate trust (average trust rating = 5.03; SD=1.22). They conducted a t-test comparison of these two trust ratings which revealed a significant difference ($t$(29)=8.95; $p < 0.001, d=1.7$).
3.2.2 Videos

We conducted a pretest in order to select 6 videos: 3 trustworthy and 3 untrustworthy. For each video condition the videos had to have a similar trustworthiness ratings, with no statically significant difference. Furthermore, the videos should have a low standard deviation.

We gathered a set of 21 videos for the pretest, from family members and friends. These volunteers were asked to record a short video in which they introduce themselves, providing their name, age, local of residence and two hobbies. The hobbies included activities such as playing sports or hanging out with friends. The duration of the clips ranged from 10 to 15 seconds. From the set of volunteers, some were asked to act in a way that would generate distrust. For instance, they were told neither to look directly at the camera nor smile.

The pretest to determine the appropriate seller videos took place at Instituto Superior Técnico. The test was conducted by a set of 15 students (9 men and 6 women) with an average age of 19.867 years with a standard deviation of 1.727.

In this pretest the collected videos were presented to the participants. The participants rated their trust ratings in 21 persons based on their profile video using a 7 point scale, where 1 represented high distrust, 7 high trust, with 4 representing the neutral scale mean.

Trustworthy videos

The three selected trustworthy videos scored an average trust rating of:

- $M = 5.467$ (SD = 0.916)
- $M = 5.333$ (SD = 0.976)
- $M = 5.200$ (SD = 0.941)

There was no statistically significant difference among the three trustworthy videos, $\chi^2 (2) = 0.500$, $p = 0.779$.

The set of the three selected untrustworthy videos includes two women and one man.

Untrustworthy videos

The three selected untrustworthy videos scored an average trust rating of:

- $M = 2.600$ (SD = 0.986)
- $M = 2.867$ (SD = 1.060)
- $M = 2.800$ (SD = 1.014)

There was no statistically significant difference among the three untrustworthy videos. We conducted a Friedman test, which reported $\chi^2 (2) = 1.027$, $p = 0.598$.

The three selected untrustworthy videos were men.
Neutral videos

The neutral videos for the filler trials achieved the following values:

- $M = 4.400$ (SD = 1.454)
- $M = 3.867$ (SD = 1.356)
- $M = 4.400$ (SD = 1.765)
- $M = 4.267$ (SD = 1.280)
- $M = 4.267$ (SD = 1.534)
- $M = 3.933$ (SD = 1.580)
- $M = 4.533$ (SD = 1.552)

There was no statistically significant difference among the filler videos, $\chi^2 (6) = 5.014$, $p = 0.542$. Of the remaining videos rated by the participants, none of them obtained a neutral value. As we needed 9 videos for the filler trials and we only had 7 videos with a neutral value, we choose two random videos to be used in the last two trials. As these videos were used at the end of the test to discard drops in cooperativeness, the average trust values obtained are irrelevant, since those trials do not influence the results of the previous trials.

All the selected neutral videos for the filler trials were made by men.

There was a statistically significant difference among the trust ratings across the three categories (averaged for all videos in each category), $\chi^2 (2) = 26.533$, $p < .0001$.

A Wilcoxon Signed-Rank test indicated that the trust ratings of the untrustworthy videos were statistically significantly different than the trustworthy videos, $z=-3.423$, $p < .001$. There were also observed significant differences between the neutral and trustworthy videos, $z=-3.125$, $p < .002$, as well as the negative and neutral videos, $z=-3.408$, $p < .001$.

3.3 Dependent variables

The goal of our study is to understand the differential impact and correlation of the reputation and videos of the seller (independent variables) on the behavior of a person playing the role of buyer in a standard trust game. To understand this impact, we measured separately trust and purchase decisions (dependent variables) of the buyer regarding each seller:

- Purchase decisions: Buyer will decide whether to buy or not an item from the seller, by clicking the Buy/Not buy button respectively.

- Trust ratings: After the purchase decision the buyer will indicate how much they trusted the seller, through a 7 point likert scale, ranging from 1 (high distrust) to 7 (high trust).
3.4 Participants

The main test was conducted by a set of 40 students (16 men, 24 Women) with an average age of 20.15 years with a standard deviation of 1.861.

The participants described their online shopping experience as:

- 0 purchases per year: 15% (6 participants)
- 1 - 3 purchases per year: 45% (18 participants)
- 4 - 6 purchases per year: 15% (6 participants)
- 7 - 9 purchases per year: 20% (8 participants)
- 10+ purchases per year: 5% (2 participants)

3.5 Procedures

The experiment took place at Instituto Superior Técnico. This was the same location of the pretests. We choose the same location to assure that the participants of both tests had similar profiles.

Each participant conducted the test individually. Each test had the duration of approximately 10 minutes, so the tests were not all done on the same day. It took two days to complete all 40 tests.

The participants were recruited personally, where they were invited to participate in an experiment in which they could earn prizes (candies).

Each participant played the standard trust game. The first step of the test was to introduce the participants to the standard trust game, explaining the rules of the game and the payoff matrix. The application developed for the test contained a tutorial explaining the game, that was presented to the participants in the beginning of the experiment.

The participants were told that they were going to assume the role of buyer, and that they were going to play against other 18 participants (sellers), whose actions in the game were previously collected. It was also explained that the sellers had the choice to record or not a profile video of themselves. These sellers in fact did not exist, the participants played the game against a simulation made by the computer.

The results of each transaction were not presented immediately to the participants (as there was no one playing against them). The participants were told that the money earned based on the sellers decisions would be added up and presented at the end of the experiment.

The participants were presented with all nine combinations of the payoff matrix (trustworthy video, untrustworthy video, missing video) * (positive reputation, negative reputation, missing reputation). The participants were able to see the reputation score and the profile video of each seller (in the cases that a seller had a profile video). The participants decided whether to buy or not from that particular seller, based on the information of that seller. After the purchase decision, the participants were also prompted for their trust rating regarding the seller on a 7-point-scale.
The sellers had a three star reputation (representing moderate distrust), a four star reputation (representing moderate trust) or missing reputation. The videos selected in the pretest were used as the profile videos of the sellers.

Additionally to the 9 trades from the matrix, we used other nine filler trades. The sellers of these trades had a reputation of one, two or five stars, in order avoid the repetition of the reputation scores of the real trades. The videos of the sellers were selected in the pretest, in which they were rated as neutral. Some of these filler trades were placed in the beginning of the experiment, in order to participants familiarize with the procedures. Some filler trades were also placed in the end of the game to discard drops in cooperativeness.

The participants were presented to eighteen sellers, 9 from the payoff matrix and 9 filler trades.

**Rewards**

One issue of conducting this kind of experiments is how to make the participants feel that they are actually in an environment of risk. The trust game tries to simulate this risky environment, however there are not real potential losses to the participants.

In the experiment conducted by Bente et al.[2] the participants were rewarded after the experiment regardless of their decisions. Before the experiment the participants were promised to have the possibility to earn up to 11 euros. At the end of the experiment the payments to the participants ranged between 9.2 and 11 euros.

In our experiment, the participants were told in the beginning of the experiment that they could win up to 5 candies, depending on their performance on the game.

### 3.6 Results

In this section we present and discuss the results of the experiment that we conducted to help us understand the impacts of videos and reputation scores in online transactions.

#### 3.6.1 Effects of reputation scores and seller videos on purchase decisions

The participants decided whether to buy or not an item from each seller of the 3*3 combination matrix. Those purchase decisions are presented in detail in this section.

Table 3.1 summarizes the effects of reputation scores and seller videos on purchase decisions. This table is presented as a line chart in figure 3.3.

**Effects of reputation scores on purchase decisions**

A Friedman test was applied to the marginal distributions of purchases in order to understand the influence of reputation scores. The test revealed a statistically significant effect found for reputation, $\chi^2 (2) = 29.485, p < .0001$. 

28
Table 3.1: Number of purchases and expected frequencies (in parentheses).

<table>
<thead>
<tr>
<th>Purchase decisions</th>
<th>Reputation (1st factor)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Negative</td>
</tr>
<tr>
<td>Video (2nd Factor)</td>
<td>None</td>
<td>2 (7.34)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>4 (6.50)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>29 (21.17)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>35</td>
</tr>
</tbody>
</table>

Figure 3.3: Effects of reputation and videos on purchase decisions (0-40)

Positive reputation contributed towards more purchases than missing and negative reputation. Sellers with positive reputation led to 78 purchases in 120 possible (65%). A Wilcoxon Signed-Rank test indicated that the purchases of positive reputation were statistically significantly different than negative reputation ($z=-3.408, p < .001$) and missing reputation ($z=-4.466, p < .0001$).

There was also a significant difference between negative and missing reputation. A Wilcoxon Signed-Rank test indicated that the purchases of negative reputation were statistically significantly different than missing reputation ($z=-2.842, p < .004$). The absence of reputation led to significantly less purchases than negative reputation. This reveals that the participants had more difficulties trusting in a seller that has no transactions record. Sellers with negative reputation led to 54 purchases (45%), as sellers with no reputation led to 35 purchases (29.167%).

Effects of videos on purchase decisions

A Friedman test was applied to the marginal distributions of purchases in order to understand the influence of videos. The test revealed a statistically significant effect found for videos, $\chi^2 (2) = 54.250, p < .0001$.

Trustworthy videos contributed towards more purchases than missing and untrustworthy videos, regardless the type of reputation of the seller. A Wilcoxon Signed-Rank test indicated that the purchases of trustworthy videos were statistically significantly different than untrustworthy ($z=-5.097, p < .0001$) and missing videos ($z=-5.277, p < .0001$). Sellers with trustworthy videos led to 101 purchases in 120 pos-
sible (84.167%). The number of purchases were even greater than the number of purchases of positive reputation. Trustworthy videos led to more purchases than positive reputation. A Wilcoxon Signed-Rank test revealed that the purchases of trustworthy videos was statistically significantly different than positive reputation ($z=-3.147$, $p < .002$).

There was not a significant difference between untrustworthy and missing videos. A Wilcoxon Signed-Rank test indicated that the purchases of untrustworthy videos were not statistically significantly different than missing videos ($z=-0.645$, $p < .519$). This reveals that exposing through video in online transactions does not have many potential to sellers if the video is considered untrustworthy. Sellers with untrustworthy videos led to 31 purchases (25.833%), as sellers with no video led to 35 purchases (29.167%). Untrustworthy videos even led to less purchases than negative reputation.

It is noteworthy the increase of purchases in the cases where the seller had trustworthy videos comparing to the cases where the seller had untrustworthy or missing videos.

**Effects of videos * reputations combinations on purchase decisions**

Cochran’s Q test determined that there was a statistically significant difference in the purchase decisions for each treatment condition, $\chi^2(8, N = 40) = 144.231$, $p < .0001$, indicating that the treatment condition influenced the purchase decisions of the participants.

As expected, the combination where the seller had positive reputation and trustworthy videos were the one that achieved more purchases, leading to 37 purchases in 40 possible (92.5%).

The three combinations where the seller had a trustworthy video were the combinations that obtained more purchases: trustworthy video with positive reputation (37 purchases - 92.5%), negative reputation (35 purchases - 87.5%) and missing reputation (29 purchases - 72.5%). The combination with trustworthy video that obtained less purchases, trustworthy video and missing reputation, still managed to obtained more purchases than any other combination that did not have trustworthy videos, including positive reputation with missing video (23 purchases - 57.5%) and untrustworthy video (18 purchases - 45%). This means that sellers that had trustworthy videos obtained higher purchase rates than sellers that did not have a trustworthy video even if they had a better reputation score.

Comparing the two extreme conditions, completely negative information, negative reputation and untrustworthy video, resulted in more purchases (9 purchases - 22.5%) than completely missing information, missing reputation and video (2 purchases - 5%).

Missing reputation led to the worse two purchase rates, when the seller did not have a video (2 purchases - 5%) and when the video was untrustworthy (4 purchases - 10%).

The combination where the seller had negative reputation and missing video led to 10 purchases (25%), similarly to the case where the seller had untrustworthy video and negative reputation (9 purchases - 22.5%).

When the seller has missing reputation, using a trustworthy video results in a substantial increase in the number of purchases, obtaining even more purchases than a seller that already has a positive reputation record but does not use video. This reveals that a seller that has no transactions records by using trustworthy videos can reach a status similar or even superior than sellers that already has
3.6.2 Effects of reputation scores and seller videos on trust ratings

After participants decided whether to buy or not an item from each seller of the 3*3 combination matrix, they were asked to rate how much they trusted the seller in a 7 point Likert scale, ranging from 1 (high distrust) to 7 (high trust). Those trust ratings are presented in detail in this section.

Table 3.2 summarizes the effects of reputation scores and seller videos on trust ratings. This table is presented as a line chart in figure 3.4.

<table>
<thead>
<tr>
<th>Video (2nd Factor)</th>
<th>Reputation (1st factor)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1.50 (1.06)</td>
<td>2.55 (1.48)</td>
</tr>
<tr>
<td>Negative</td>
<td>2.45 (1.11)</td>
<td>3.12 (1.27)</td>
</tr>
<tr>
<td>Positive</td>
<td>4.20 (1.40)</td>
<td>4.77 (1.22)</td>
</tr>
<tr>
<td>Total</td>
<td>2.72 (1.64)</td>
<td>4.24 (1.48)</td>
</tr>
</tbody>
</table>

Figure 3.4: Effects of reputation and videos on trust ratings (1-7)

Effects of reputation scores on trust ratings

A two way (factorial) ANOVA with repeated measures was applied to analyze the effects of profile videos and reputation scores on trust ratings. There was a statistically significant main effect found for reputation, $F(2, 78) = 47.453, p < .0001$, partial $\eta^2 = 0.549$.

Post hoc tests using the Bonferroni correction revealed a statistically significant difference between the three levels of reputation (positive, negative and missing) on trust ratings. The results of the test are presented in table 3.3.

Positive reputation had a greater positive contribution towards buyers’ trust than missing and negative reputation. Sellers with positive reputation averaged a trust rating of 4.24 with a standard deviation of
Table 3.3: Bonferroni post hoc pairwise comparison test for trust ratings across the levels of the reputation scores factor

<table>
<thead>
<tr>
<th>(I) Reputation</th>
<th>(J) Reputation</th>
<th>Mean Difference (I - J)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
<td>0.758</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1.525</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Negative</td>
<td>Positive</td>
<td>-0.758</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0.767</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>Positive</td>
<td>-1.525</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>-0.767</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

1.48.

There was also significant difference between negative and missing reputation. The absence of reputation led to significantly lower trust ratings than negative reputation, corroborating that the participants had more difficulties trusting in a seller that has no transactions record. Sellers with negative reputation averaged a trust rating of 3.48 with a standard deviation of 1.40, as sellers with no reputation averaged a trust rating of 2.72 with a standard deviation of 1.64.

Effects of videos on trust ratings

A two way (factorial) ANOVA with repeated measures was applied to analyze the effects of profile videos and reputation scores on trust ratings. There was a statistically significant main effect found for videos, $F(2,78) = 86.893$, $p <.0001$, partial $\eta^2 = 0.690$.

Post hoc tests using the Bonferroni correction revealed a statistically significant difference between the three levels of video (trustworthy, untrustworthy and missing) on trust ratings. The results of the test are presented in table 3.4.

Table 3.4: Bonferroni post hoc pairwise comparison test for trust ratings across the levels of the video factor

<table>
<thead>
<tr>
<th>(I) Video</th>
<th>(J) Video</th>
<th>Mean Difference (I - J)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
<td>1.658</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2.225</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Negative</td>
<td>Positive</td>
<td>-1.658</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0.567</td>
<td>0.006</td>
</tr>
<tr>
<td>No</td>
<td>Positive</td>
<td>-2.225</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>-0.567</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Trustworthy videos had a greater positive contribution towards buyers’ trust than missing and untrustworthy videos, regardless the type of reputation of the seller. Sellers with trustworthy videos averaged a trust rating of 4.77 with a standard deviation of 1.22.

There was a significant difference between untrustworthy and missing videos on trust ratings, although this was not reflected on purchase rates. Untrustworthy videos had a greater positive contribution towards buyers’ trust than untrustworthy videos. Sellers with untrustworthy videos averaged a trust rating of 3.12 with a standard deviation of 1.27, as sellers with missing video averaged a trust rating of 2.55 with a standard deviation of 1.48.
Effects of videos * reputations combinations on trust ratings

As expected, the combination where the seller had positive reputation and trustworthy videos were the one that had a greater positive contribution towards buyers’ trust, averaging 5.4 with a standard deviation of 0.9.

The three combinations where the seller had a trustworthy video were the combinations that had the greatest mean trust ratings - trustworthy video with positive reputation (5.4 with a standard deviation of 0.9), negative reputation (4.73 with a standard deviation of 1.01) and missing reputation (4.2 with a standard deviation of 1.4). All the combinations with a trustworthy video managed to obtained greatest mean trust ratings than any other combination that did not have trustworthy videos, including positive reputation with missing video (3.53 with a standard deviation of 1.45) and untrustworthy video (3.8 with a standard deviation of 1.29). This means that trustworthy videos had a greater positive contribution towards buyers’ than untrustworthy and missing videos even if the sellers had a better reputation score.

Comparing the two extreme conditions, completely negative information, negative reputation and untrustworthy video, resulted in a greatest mean trust rating (3.1 with a standard deviation of 1.03) than completely missing information, missing reputation and video (1.5 with a standard deviation of 1.06).

Missing reputation led to the worse two trust ratings, when the seller did not have a video (1.5 with a standard deviation of 1.06) and when the video was untrustworthy (2.45 with a standard deviation of 1.11).

When the seller has missing reputation, using a trustworthy video results in a substantial increase in the trust ratings, obtaining even higher trust ratings than a seller that already has a positive reputation record but does not use video.

3.6.3 Discussion

Positive reputation contributed towards buyers’ trust and higher purchase ratings when comparing to missing and negative reputation.

There was a significant difference between negative and missing reputation. The absence of reputation led to significantly lower trust ratings and purchase rates than negative reputation. This reveals that the participants had more difficulties trusting in a seller that has no transactions record, however, having a positive video can ameliorate this effect.

Trustworthy videos also had a major influence on buyers’ trust and higher purchase ratings, revealing the potential that exposing through a video has in online transactions. Sellers that have a trustworthy video obtained higher trust ratings and purchase rates than sellers that have untrustworthy or missing videos even if they had a better reputation score. Trustworthy videos led to more purchases and higher trust ratings than positive reputation. This suggests that emotional trust plays a bigger role than cognitive trust when performing online transactions. There was a significant increase of trust ratings and purchase decisions when the seller had trustworthy videos when comparing with the cases that the seller had untrustworthy or missing video. The three combinations where the seller had a trustworthy video were the combinations that had the greatest mean trust ratings and higher purchase rates.
Completely negative information (low reputation, untrustworthy video) resulted in better trust ratings and purchase rates than completely missing information (no reputation, no photo).

There was a significant difference between untrustworthy and missing videos on trust ratings, although this was not reflected on purchase rates. Untrustworthy videos led to higher trust ratings than missing videos, although these trust ratings were not converted into more purchase decisions.

When the seller has missing reputation, using a trustworthy video results in a substantial increase in the number of purchases and trust ratings, obtaining even more purchases and higher trust ratings than a seller that already has a positive reputation record but does not use video.

**Photo vs Video**

Bente et al.[2] conducted a study where they intended to understand the effects of photos and reputations scores of a seller, when these two trust building mechanisms co-occur in an online transaction (described in detail in section 2.3.4). We proposed to extend this study, by using a richer media source, using a profile video of the seller instead of a profile photo. In this section we compare and discuss the results that we have obtained with the results of Bente et al.[2] experiment.

In figure 3.5 it is presented a line chart comparing the purchase decisions of the two experiments. The values of the graph are presented on percentages since there was a different number of participants (36 on Bente et al.[2] experiment, 40 on our experiment). In figure 3.6 it is presented a line chart comparing the mean trust ratings of the two experiments.

Figure 3.5: Comparison of the effects of reputation and photo(left) / video(right) on purchase decisions (0-100%)

In both experiments it is possible to identify some similarities in the results. In both cases positive reputation of the seller significantly influenced the purchase decisions as well as the trust ratings compared to negative or missing reputation.

Missing reputation contributed to lower purchase rates than negative reputation in both experiments. This difference in purchases was reflected in our trust ratings, where there was a significant difference between missing and negative reputation, having missing reputation lower mean trust ratings than negative reputation. In Bente et al.[2] experiment this difference on trust ratings was not significant.

Trustworthy videos/photos also contributed to higher purchase rates and trust ratings than missing
Figure 3.6: Comparison of the effects of reputation and photo (left) / video (right) on trust ratings (0-7)

and untrustworthy videos/photos. However the increase registered when there was trustworthy videos in relation to the other video conditions was significantly higher than the increase of the using trustworthy photos in relation to the other photo conditions. The use of trustworthy videos had a greater impact than the use of positive photos.

The sellers that had missing and untrustworthy videos/photos obtained similar purchase rates on both experiments. However, in our experiment there was a significant difference on trust ratings between missing and untrustworthy videos. Untrustworthy video had a higher trust ratings than missing videos. In Bente et al.[2] experiment this difference was not significant.

Untrustworthy videos obtained significant lower trust ratings and purchase rates than negative photos. This means that the use of untrustworthy video generated more reasons not to trust in the seller than the use of negative photos, sustained by the fact that videos are a richer media source.

Missing videos/photos generate similar conditions for both experiments - missing video/photo * positive/negative/missing reputation. In both cases seller had an default avatar and the variable reputation score. The trust ratings and purchase decisions of our experiment are lower than Bente et al.[2] experiment. In the beginning of the study we expected that these values were closer. This lower values can be explained by the fact that different people from different cultures participated in the experiments. Another explanation might be that the initial filler trades with neutral videos had a greater impact than the filler trades with neutral photos from Bente et al.[2] experiment, causing the following sellers who did not have video to have worse results.
Chapter 4

Tipsters platform

We built a platform, named Tipsters, to help gamblers decide where they should place their bets. Users can share and view tips on sports events, and the best tipsters could even earn money by selling their tips.

In this section we describe the development of Tipsters. We specify the tools and libraries used for the development of the platform, as well as an overview of the work conducted that led to the requirements and design decisions.

We also explain how the development of the platform was influenced by the experiment conducted to understand the impact of videos and reputation on building trust in online environments.

4.1 End User Profile and Market Segmentation

We decided to focus our tips sharing platform on sports market. Other potential market would be, for example, the stock market.

Inside the sports market, we choose to pursue mainly the football market with focus in the main European leagues:

- Premier League (England)
- Liga NOS (Portugal)
- La Liga (Spain)
- Ligue 1 (France)
- Seria A (Italy)
- International Competitions (Champions league and Europa League)

We defined our end user profile as someone who is experienced in online sports betting, particularly in the markets described above. The user should bet regularly and should be familiar with technology (computer or smartphone) and social networks.
4.2 User research

After we defined our target market and basic user profile, we focused on understanding users behavior, needs and expectations towards the platform.

We have conducted unstructured interviews with users that match the user profile. These set of representative users not only helped in this initial stage of the platform, but also throughout the development of the platform by providing useful feedback on each iteration of the platform. The group was of five users. They were all 22 years old male and all experienced in online sports betting. Two of the users obtain considerable profits in sports betting, having months in which they have won thousands of euros.

The unstructured interviews were useful to understand the procedures users take when deciding in what they should place their bets and how do they collect information and help regarding the sport events.

The greatest concern among the participants was on how to assess if an anonymous online person has the required skills to help them in their bets.

The two users that make profits on a regular basis mentioned that their motivation to use our platform was not only for the possibility to earn money, but also to build a large base of followers and acquire the inherent fame. They have also mentioned that their betting predictions were often requested by other persons.

4.3 Personas

Based on the user research we have identified two personas:

1. Fictional name: João Farinha
   • Occupation: Mechanical engineer
   • Age: 25
   • Goals and tasks: Find competent tipsters to help him increase profits in sports betting
   • Environment: He is comfortable using sports betting sites but does not obtain consistent profits

2. Fictional name: Tiago Gomes
   • Occupation: Economy student
   • Age: 22
   • Goals and tasks: Gain followers and possibly start selling sports tips
   • Environment: He is comfortable using sports betting sites and manages to obtain profits in a regular basis
4.4 Scenarios

Using the two personas that we have created we wrote two scenarios:

1. João Farinha is a mechanical engineer who started working less than a year ago. His incomes allow him to live a comfortable life. however, he intends to increase his incomes at the of the month with consistent profits in sports betting. He have been betting for a couple of months, and although he has come to have sporadic wins, he does not obtain consistent profits, despite many research on sport events and long discussions with his friends. He is looking for someone who can help him increase is profits and to teach him how to be a disciplined investor.

2. Tiago Gomes is in his last year of economics course. He has always been passionate by sports and from an young age decided to start betting in the outcomes of sport events. He applies some of the knowledge that he learns in the university in his bets, and is starting to consider to invest on the stock market. But for now he masters football, tennis and basketball. His successful predictions lead many of his friends to ask him for help. Despite liking to other people, he does not feel fair to give away sporting tips for free since there is not any advantage for him.

4.5 Requirements

After we fully understand the expectations of the users regarding our platform we were able to come up with an initial list of requirements, that has progressively been updated during the development of the platform. Some of the initial main functional requirements are listed below. Users should be able to:

- Share tips in sports events
- View the tips shared by other tipsters
- Follow other tipsters
- Access to relevant rankings and statistics of other tipsters
- Sell/purchase sports tips
- Exchange messages with other tipsters.

4.6 Low fidelity prototypes

After the initial set of requirements we built low fidelity prototypes. We started by making hand made designs, which evolved to prototypes built with Balsamiq \(^1\). Figures 3 and 4 present two examples of these prototypes, from the news feed page and from the share a tip page respectively. These prototypes suffered changes during the development of the project.

\(^1\)https://balsamiq.com/
4.7 Influence of the Video x Reputation Experiment

One of the main challenges that we faced when developing Tipsters was on how we could build relationships of trust between the users. Our platform provides relevant statistics of the tipsters, which allows the users to assess other tipsters’ competence. Tipsters also allows users to provide an explanation of their sports tips. Initially this explanation could only be made through text, but based on the results of the experiment that we conducted, we decided to allow the users to easily record and share a video.
explaining their tips.

The experiment that we conducted regarding the process of trust building in online transactions where videos and reputations scores of the trustee co occur revealed that the presence of positive videos can influence positively the perception of trust of the trustor.

In the domain of our platform, the definition of a positive video can be subjective, but it is recommended that the users record a video with good audio and visual quality, as well as having a fluent and rational speech that exposes their point of view.

Accordingly to the results of our experiment, users that use positive videos obtained higher trust ratings and purchase rates than users that have negative or missing videos, regardless of having positive, negative or missing reputation.

4.8 Architecture overview

The high level architecture of the Tipsters platform is presented in figure 4.3. In this section we will describe in detail these components.

The architecture of the platform has a clear separation of concerns between the presentation layer (the front end) and the data access layer (the back end). These components are described in detail in sections 4.9 and 4.10, respectively.

We developed a web application with a responsive web design that consumes the server data through a Javascript client that has access to RESTful services created by Google Cloud Endpoints.

![Figure 4.3: High level architecture of Tipsters](image)

4.9 Client front end

The front end is the interface between the user and the data access layer. As far as the user is concerned, the interface is the product, so it is crucial to have a functional, clean and attractive website to appeal to users and maintain their interest.
One of the greatest concerns that we had in the design process was to assure that the design was responsive, in order to allow the webpages to be viewed in response to the size of the screen in which they are displayed.

In order to have better usability and user experience, we decided to build our web application as a Single-page Application. A Single-page Application is a web application that fits on a single web page with dynamic actions without refreshing the page. Single-page applications use AJAX to communicate with the back-end servers without doing a full page refresh, resulting in the process of rendering pages to happen mostly on the client-side. An application that is constantly making a full reload of the page from the server on almost every user interaction contributes to a poor user experience. With single page applications the page load is only made one time. After that initial load, only data gets sent/received to the server, avoiding to fetch repeatedly the HTML from the server.

4.9.1 Technologies

The front end was developed to be used as an web application, and therefore uses technologies supported by most web browsers, namely HTML, CSS and JavaScript.

In this section we describe some of the technologies used in the development of the platform.

ReactJS

ReactJS\(^2\) is an open-source JavaScript library for data rendered as HTML. It is maintained by Facebook, Instagram and a community of individual developers and corporations. React is a declarative, efficient, and flexible JavaScript library for building user interfaces. React will efficiently update and render just the right components when the data changes.

While other modern frameworks apply the MVC (Model-View-Controller) pattern, ReactJS focus is mainly the view (V) layer. ReactJS allow to split the the interface in independent and reusable pieces through components. Because components are independent, one component can refresh without affecting other components or the UI as a whole, which allows to maximize the functionality and performance. ReactJS uses a virtual DOM to detect changes to a component and only render those changes, as opposed to re-rendering the entire component.

A ReactJS component receives arbitrary inputs (props) and return ReactJS elements describing what should appear on the screen. In our component based interface, we have distinguished 'smart' and 'dumb' components. 'Smart' components were responsible to provide the application data, triggering calls to fetch the data from the server. These components send the data to a tree of 'dumb' components. These 'dumb' components receive the data through props and are responsible to map these props to React elements. In our platform, for example on the news feed page, we have a smart component and the root of the tree of components which will trigger an action to fetch the data from the server. When the data is fetched, it is passed through props to the dumb components. An example of a dumb component

\(^2\)https://reactjs.org/
in this case is a post component, which will itself render other dumb components, such as the header component that has the tipster image and name.

As ReactJS is just a view library, it does not supply all the features required to build a fully functioning app. However, there are many libraries to suppress this need. For example, as we intended to build a single-page application, we used react-router to provide a way to do client-side routing.

Flux (Redux)

Flux\(^3\) is an application architecture for building client-side web applications, used by Facebook. It complements ReactJS composable view components by utilizing a unidirectional data flow. It is more of a pattern rather than a formal framework. Redux\(^4\) was the chosen implementation of the concept of flux.

Redux architecture revolves around a strict unidirectional data flow. All the application data follows the same lifecycle pattern.

![Redux data flow](image)

In figure 4.4 it is presented the data flow of the redux pattern. Redux pattern involves three main components:

1. Actions: Actions are payloads of information that send data from the application (user interactions) to the redux store. Actions can be considered as events, which are triggered by the ui view (React components). Actions are plain JavaScript objects, that must have a type property, that indicates the type of action being performed, and payload of information being sent to the store.

\(^3\)https://facebook.github.io/flux/
\(^4\)http://redux.js.org/

43
2. Reducers: Reducers are pure functions that take the current state of the application and an action and then return a new state. Reducers perform most of the logic of the application state. Reducers specify how the application’s state changes in response to actions. The reducers of the application are combined in the app into a single index reducer. Each reducer is responsible for its own part of the application state, and the state parameter is different for every reducer.

3. Store: Store is a single immutable state tree (object) object that maintains the state of the entire application in a single immutable state tree. When a action is triggered, the store is updated with a new state via reducers. The state object is immutable, so when something changes, a new object must be created (using actions and reducers). The store provides methods to access and update the state and to register and unregister event listeners. Store is the object that holds the application state and provides a few helper methods to access the state, dispatch actions and register listeners. The entire state is represented by a single store.

Node Package Manager

Node Package Manager (NPM)\(^5\) is the package manager for JavaScript. We used NPM to install and manage the dependencies of the project. It would be possible to manually download the packages and copy them to the right folder, however, as the project grew, this task would become more time consuming.

Webpack

Webpack\(^6\) is a module bundler for JavaScript applications. Webpack processes the JavaScript files, including every module the application needs, then packages all of those modules into a a bundle, to be loaded by the browser. Webpack comes with a built in dev server which helped the development of the platform, as it provides live code updates and asset management.

ES6/ECMAScript2015

ES6 a modern version of JavaScript. ES6 provides a set of useful features, mostly syntactic sugar, such as default parameters and destructuring assignment. ES6 also makes it easy to create classes and modules. Webpack uses these modules build the dependency graph that includes every module the application needs.

We used Babel\(^7\), which is a JavaScript transpiler, to convert ES6 into plain ES5 JavaScript that is supported by any browser. It makes available all the syntactical sugar that was added to JavaScript with the new ES6 specification, including classes, fat arrows and multiline strings.

---
\(^5\)https://www.npmjs.com/
\(^6\)https://webpack.js.org/
\(^7\)https://babeljs.io/
Bootstrap

Bootstrap\(^8\) is a free and open-source front-end web framework for designing web applications. It contains HTML and CSS-based design templates as well as JavaScript extensions. Unlike many web frameworks, it concerns itself with front-end development only. The main reasons that led to the choice of Bootstrap was the speed of development, the huge support community behind Bootstrap and its responsiveness.

Bootstrap includes a powerful mobile-first flexbox grid system for building layouts of all shapes and sizes. It's based on a 12 column layout and has multiple tiers, one for each media query range.

Bootstrap primarily uses the following media query breakpoints, which we adopted in our platform:

- Min width 576 pixels - Small devices (landscape phones, 576px and up)
- Min width 768 pixels - Medium devices (tablets, 768px and up)
- Min width 992 pixels - Large devices (desktops, 992px and up)
- Min width 1200 pixels - Extra large devices (large desktops, 1200px and up)

RecordRTC

RecordRTC\(^9\) is a server-less (entire client-side) JavaScript library can be used to record WebRTC audio/video media streams. It supports cross-browser audio/video recording. It is optimized for different devices and browsers. We used the library to allow users to record and upload videos explaining their sports tips.

4.9.2 Final prototypes

The process of building the user interface was iterative and was in continuous change. The prototype covers the functionalities required for the system. These requirements were built based on the characteristics of the users, and on the expectations that they have of the platform. From the list of requirements we built a set of low fidelity prototypes that evolved to the current prototypes.

Throughout this process, a group of representative users gave constant feedback, which led to changes in the interface. The feedback was given in unstructured meetings where users could freely explore the platform.

In this section we describe the main sections and features of the Tipsters platform.

Landing page

The landing page is the entry point of our platform, hence it was extremely important to have an appealing design to catch user attention and desire to use the platform. We decided to implement an appealing vertical slider with smooth transitions between slides. The slides contained information regarding the main features of the platform. The screenshot of the landing page is displayed in figure 4.5.

\(^8\)http://getbootstrap.com/
\(^9\)http://recordrtc.org/
Login

The login/register page contains a simple form. We used a full screen video background, a design trend with growing popularity. This feature is now more used due to faster internet speeds and more advanced browsers technology, which allows to create this powerful feature. The screenshot of the login page is displayed in figure 4.6.

News feed

The news feed page works similarly to other social networks. The users receive the tips shared by the tipsters that he follows. The users are allowed to comment and like the posts. The screenshot of the news feed page is displayed in figure 4.7. Figure 4.8 presents a post that is private. The users that want to see the tips shared in this post must purchase them.

Share a tip

In the page to share a tip the users can browse through the available sport events and select their predictions, like a traditional betting site. The users sequentially choose the sport, league and sport event. We give more highlight to football and to the main football leagues. The screenshot of the page to share a tip is displayed in figure 4.9. Figure 4.10 presents the interface to upload a video explaining a tip. After a bet being added to the bet slip, the users have the option to add a video where they can talk about the reasons that took him to choose those bet.
Figure 4.6: Screenshot of Tipsters - Login

Figure 4.7: Screenshot of Tipsters - News feed
Figure 4.8: Screenshot of Tipsters - Buy tip

Figure 4.9: Screenshot of Tipsters - Share a tip
Rankings

In the rankings page the users can find the best tipsters of the platform. The ranking table contains the following information of each tipsters:

- Return on investment
- Percentage of wins
- Average winning odds
- Number of shared tips
- Number of followers
- Winning streak

The table can be sorted by each of these criteria. The default criteria is the return on investment (ROI), which is a performance measure used to evaluate the efficiency of an investment. ROI measures the amount of return on an investment relative to the investment’s cost. To calculate ROI, the benefit of an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio.

\[
ROI = \frac{(\text{GainFromInvestment} - \text{CostOfInvestment})}{\text{CostOfInvestment}}
\]

In the case of our platform, to calculate the ROI of a tipster we assume that the tipster has a fixed cost of investment, and the gains from investment are calculated based on the odds and the results of the shared tips. The screenshot of the rankings page is displayed in figure 4.11.
Profile

In the profile page it is possible to view all the information of a tipster, such as his tips record, his followers or a brief personal description. The screenshot of the profile page is displayed in figure 4.12.

Responsive design

As we have already mention, one of the greatest concerns that we had in the design process was to assure that the design was responsive. All the platform is mobile friendly. We adapted the layout to the viewing environment by using fluid, proportion-based grids, flexible images, and CSS3 media queries in the following ways:

- Page elements sizing to be in relative units like percentages, rather than absolute units like pixels or points.

- Media queries allow the page to use different CSS style rules based on characteristics of the device the site is being displayed on, most commonly the width of the browser.

An example of the platform responsive design is presented in figure 4.12.

Single page application

In order to have better usability and user experience, we decided to build our web application as a single-page Application. All the views are loaded inline within the same page itself. One example of of the behavior of our platform as a single-page application is presented in figure 4.14. All the transitions between the views had smooth transitions between them, which is a great factor to engage the users in a positive experience.
Figure 4.12: Screenshot of Tipsters - Profile

Aimar Bernardo

ABOUT

O seu percurso enquanto treinador profissional é o resultado de dois percursos distintos, um enquanto profissional em vários cargos na área do futebol e outro enquanto apoiador... Longos anos de experiência ligado ao mundo do futebol, passagens como Treinador por diversos clubes, entre eles a formação do Sporting CP, por diversas agências de Gestão de Carreiras de Jogadores profissionais de futebol, e na área do scouting (observação e captura de novos talentos)
When loading content inline there is a challenge to make sure the application behave in a way that is consistent with what users are used to. It is important that the URL displayed in the address bar always reflects the current view and also allow users to use back and forward button successfully. It is also possible to navigate to a particular view directly using the appropriate URL. With multi-pages applications this is not an issue, but in single-page applications as the user is not navigating to a new page it is necessary do deal with this client side routing. To handle this issue and in order to have a single-page application we used the React Router library.
4.10 Server back end

The back end is the data access layer of our application. We intended to provide a server that offered high availability, scalability and reliability.

4.10.1 Technologies

In this section we describe some of the technologies used in the development of the back end of the platform.

Google App Engine

We chose Google App Engine to be the web framework and cloud computing platform for developing and hosting the Tipsters platform, using python as the programming language.

Google App Engine is a platform as a service for developing and hosting web applications in Google-managed data centers. App Engine offers automatic scaling for web applications. As the number of requests increases for an application, App Engine automatically allocates more resources for the web application to handle the additional demand. Google App Engine’s infrastructure removes many of the system administration and development challenges of building a scalable application, allowing the developers to focus only on building the logic of the application. Google handles deploying code to a cluster, monitoring, failover, and launching application instances as necessary.

App engine provides many useful features such as Datastore, Task Queues or Cron Jobs.

Google Cloud Endpoints

Google Cloud Endpoints consists of tools, libraries and capabilities that allow to generate APIs and client libraries from an App Engine application, referred to as an API back end, to simplify client access to data from other applications.

App Engine offers globally-distributed SSL endpoints and built-in load balancing to serve your app securely, reliably, and quickly.

Google Cloud Datastore

Google Cloud Datastore is a NoSQL document database built for automatic scaling, high performance, and ease of application development. Google Cloud Datastore is designed to automatically scale to very large data sets, allowing applications to maintain high performance as they receive more traffic. Google Cloud Datastore automatically encrypts all data before it is written to disk.

Task queue

The Task Queue let an application perform tasks asynchronously outside of a user request. If an application needs to execute work in the background, it adds tasks to task queues. The tasks are executed later, by scalable App Engine worker services in the application.
One use case of using the task queue in our application is when a user perform an action that triggers a notification for all of his followers. This task can be a very time-consuming operation, so the application enqueue a task for pushing the notifications which will be delivered to a worker asynchronously. When the worker receives the task request, it can retrieve the sender's list of followers and update the DB for each one.

**Cron jobs**

The App Engine Cron Service allows to configure regularly scheduled tasks that operate at defined times or regular intervals, known as cron jobs. These cron jobs are automatically triggered by the App Engine Cron Service. A cron job invokes a URL, using an HTTP GET request, at a given time of day.

One use case of using cron jobs in our platform is to fetch the odds of sport events.

**4.10.2 Implementation details**

In this section we make an overview of the implementation of the back end of the Tipsters platform, providing the diagrams of the architecture as well as the database models.

**Architecture overview**

In figure 4.15 it is presented a diagram describing the overall system architecture that handles the implementation of the endpoints defined for the system. The class TipstersAPI is the entry point of the backend services, implementing the server side Python App Engine API, using Google Cloud Endpoints, handling the requests and forwarding them to a specific manager.

In order to have a clear specification of the API we used the framework swagger (swagger.io), that helps designing, building, documenting, and consuming a RESTful API.

In figure 4.16 it is described the overall system architecture for endpoints available for admin operations. One example of an admin operation is the validation of the match bets, based on the results of that match, determining which tips hit the predictions.

**Database domain model**

In figure 4.17 it is displayed the diagram of the domain model of the system. The design of the models were made taking into consideration the features and restrictions provided by the Google Cloud Datastore, such as the modeling entity relationships, which would optimize common queries.

**Sports events management**

One of the main requirements of the system is to allow users to share tips. The process of selecting a tip to share is very similar to the way of placing a bet in any traditional betting platform. In order to implement this feature we provide the available events and their respective odds. Currently we are retrieving the odds from a XML feed publicly available at http://xml.cdn.betclic.com/odds_en.xml.
This XML is parsed and then inserted in the datastore accordingly to the models defined. This XML is constantly being updated, since the odds are frequently changing. To fetch the updated data we use
Figure 4.17: Tipsters - Domain model

the App Engine Cron Service, that allows to configure regularly scheduled tasks that operate at defined times or regular intervals. We currently have defined 1 hour for this interval, but in production the interval should be smaller, namely for events that are starting soon.

When a sport event terminates it must be determined if the tips that have been shared in this event were won or lost. Currently the results of the events must be inserted manually, but all the validations are made automatically, and the tips status are updated. For a typical sport event it is not necessary many data to validate the bets, however it should be explored ways to fetch this data results automatically. Ideally we should rely on a paid service that manages sports events, providing all the sports events, odds and results updates. This way the sport information would be more reliable and also would avoid the need of having human input in our platform, becoming all these tasks completely automated.

4.11 Source code

The source code of the project can be seen at https://github.com/PNBenfica/Tipsters. We used Git as the version control system of the project and it is hosted in Github, which offers all of the distributed version control and source code management functionality of Git as well provides access control and several features such as bug tracking, task management and wikis.
4.12 Conclusion

Tipsters fulfill the needs identified in the early stages of the development of the platform. The platform allows users to share and view tips on sport events and to connect users to competent tipsters through a modern and simple interface. To build the interface, we used modern technologies like ReactJS and Redux, which promotes good practices that are reflected in a good user experience. For the server we used Google App Engine, which by itself guarantees that the server has high scalability and availability, which allowed us to focus on the development of the logic of the application.
Chapter 5

Usability tests

We conducted usability tests to Tipsters with representative users. The goal of this procedure was to identify any usability problems with the interface of the platform and to determine if the platform meets users’ expectations.

The scope of the platform that was tested included only the interface. Since platform has a clear separation of concerns, it was easy to isolate and test only the interface, populating it with fake data. All user interactions were similar as if there was actually a server back end, we even simulated a delay in server calls.

5.1 Tasks

In this section we describe the tasks used in the usability tests. We have identified a set of 5 critical tasks that can be performed in the Tipsters platform:

1. Follow a tipster

Figure 5.1: Usability test task: Follow user
In this task it is required that the participants follow a specific tipster (‘Renato Sanches’).

The sequence of predicted steps that the participants should take is illustrated in figure 5.1. The predicted path involves using the search feature of the platform and type the requested tipster name, which appears on the search suggestions. The participants should click the suggestion and then click the follow button.

2. Share a tip with a video explaining the tip.

In this task it is required that the participants share a tip on the event ‘Manchester United - Arsenal’, selecting that the winner of the match is Manchester United. When sharing the tip they should add a video where they say ‘Manchester will win’.

The sequence of predicted steps that the participants should take is illustrated in figure 5.2. The predicted path involves using the share a tip link from the navbar and then browse to the specified event. The participants should not enter in the event, but rather select the winner of the match directly from the league table. After the odd is selected, the participant should click in the bet slip icon, record the video and finally click in the share a tip button.

3. See the tips shared in a sport event.
In this task it is required that the participants see the tips shared in the event 'Crystal Palace - Manchester City'.

The sequence of predicted steps that the participants should take is similar to the previous task, illustrated in figure 5.2. The difference is that after the participant browses to the specified event, they should click in the ‘view tips on this event’ icon, placed below the ‘bet slip’ icon, concluding the task.

4. Buy a tip from the number one tipster in the ranking

In this task it is required that the participants buy the most recent tip from the number one tipster in the ranking.

The sequence of predicted steps that the participants should take is illustrated in figure 5.3. The predicted path involves using the rankings link from the navbar and then select the first tipsters from the rankings table to view his profile. After entering the profile the participants should scroll down to section that presents the tips shared by the user and buy the most recent tip.

5. Like and comment a tip

In this task it is required that the participants like and add a comment with the text ‘good tip’ to the most recent tip that appears on their news feed.

The sequence of predicted steps that the participants should take is illustrated in figure 5.4. The predicted path involves using the news feed link from the navbar and then like and add comment to the first post that appears.

5.2 Metrics

We have identified the following quantitative metrics to collect during the course of testing:

- Speed: The amount of time it takes the participant to complete the task.
- Accuracy: The number of non-critical errors (errors that are recovered by the participant and do not cause the participant to fail the completion the task), namely the number of false clicks.
Overall success: The capacity of the participant to successfully complete the required task.

In order to identify realistic goals for each task in terms of these metrics, we ran the tests with 3 users.

1. Follow a tipster:
   - Speed: On average users will complete the task in under 30 seconds
   - Accuracy: On average users will complete the task with less than 2 false clicks.
   - Overall success: 100% of the participants will complete the task

2. Share a tip with a video explaining the tip:
   - Speed: On average users will complete the task in under a minute
   - Accuracy: On average users will complete the task with less than 2 false clicks.
   - Overall success: 100% of the participants will complete the task

3. See the tips shared in a sport event:
   - Speed: On average users will complete the task in under a minute
   - Accuracy: On average users will complete the task with less than 2 false clicks.
• Overall success: 100% of the participants will complete the task

4. Buy a tip from the number one tipster in the ranking:

• Speed: On average users will complete the task in under 30 seconds
• Accuracy: On average users will complete the task with less than 2 false clicks.
• Overall success: 100% of the participants will complete the task

5. Like and comment a tip:

• Speed: On average users will complete the task in under 30 seconds
• Accuracy: On average users will complete the task with less than 2 false clicks.
• Overall success: 100% of the participants will complete the task

System Usability Scale

Additionally to the quantitative metrics presented earlier in this section, we have also defined a subjective metric, namely the System Usability Scale (SUS).

The SUS is a reliable tool to measure the usability of a platform. It consists of a 10 item questionnaire with five response options from strongly agree to strongly disagree:

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

After the conversion of the scores it is obtained a value in a range of 0-100, however these are not percentages and should be considered only in terms of their percentile ranking. The average SUS score is 68. An application with 68 SUS means that it has obtained 68% of the maximum score, but it falls right at the 50th percentile.
5.3 Participants

The usability tests were conducted with 10 participants. These participants are representative users of the platform, which mean that they match the criteria of our target user. All the participants have experience in online sports betting. The participants were all male and had an average age of 23.2 years with a standard deviation of 1.989.

5.4 Location

The usability tests took place in two private houses. Although the tests were conducted in two distinct locations, in both cases it was assured that there were assembled proper and equal conditions for all the participants.

5.5 Equipment

For the realization of the pretests we used a personal computer with all the required software to support the latest version of the Tipsters platform.

The personal computer used also had installed the software Screencast-O-Matic to record the screen of the computer during the realization of the usability tests. These records were later used to measure the time and errors that each participant made in each task of the usability test.

5.6 Procedures

The usability tests were conducted individually. In the beginning of the test we explained to the participants the features of the platform and gave them 5 minutes to explore freely the interface of the Tipsters platform. After this initial contact with the platform, the participants proceed to execute the tasks defined for the usability test. The order of the tasks for each participant was randomly assigned, since participants might speed up during the course of the test. The screen of the computer used by the participants was being recorded for later analysis.

After the completion of the tasks the participants filled a questionnaire (system usability scale) regarding the usability of the platform.

5.7 Results

In this section we present and discuss the results obtained in the usability tests for each task.

1. Follow a tipster: On average participants took 16 seconds (standard deviation = 2.646) to complete the task (figure 5.5). There were not any false click and all the participants managed to complete
the task. As this is a task that participants are used to execute in other social networks they revealed no difficulty to complete it within the defined metrics.

2. Share a tip with a video explaining the tip: All participants completed the task, taking on average 40.3 seconds (standard deviation = 6.198) to complete the task (figure 5.6). There was an average of 0.3 false clicks (standard deviation = 0.458). The false clicks occurred when the participants enter in the sport event to select the required odd, instead of selecting it in the league table (which has the shortcuts to select the winner of the match).

3. See the tips shared in a sport event: On average participants took 32.5 seconds (standard deviation = 9.376) to complete the task (figure 5.7). There was an average of 0.5 false clicks (standard deviation = 0.5) and only 60% of the participants successfully completed the task. This task failed to meet the specified metrics. We had an light bulb icon in the right side of the page which not all
users were able to associate with the operation of viewing the tips of an event.

![Graph showing participant times in see tips task](image1)

**Figure 5.7: Usability test result: participants times (seconds) in see tips shared in an event task**

4. Buy a tip from the number one tipster in the ranking: On average participants took 18.4 seconds (standard deviation = 2.905) to complete the task (figure 5.8). There were not any false click and all the participants managed to complete the task. The participants revealed no difficulty to complete the task within the defined metrics.

![Graph showing participant times in buy tip task](image2)

**Figure 5.8: Usability test result: participants times (seconds) in buy tip task**

5. Like and comment a tip: On average participants took 20.1 seconds (standard deviation = 5.907) to complete the task (figure 5.9). There were not any false click and all the participants managed to complete the task. This is also a task that participants are used to execute in other social networks, so they do not revealed any difficulty to complete it within the defined metrics.
System Usability Scale results

Figure 5.10 presents the results obtained in the questions of the System Usability Scale. The participant's scores for each question were converted to a new number, added together and then multiplied by 2.5 to convert the original scores of 0-40 to 0-100. Our platform scored 84, in this 0-100 range, which is considered above average. SUS score above a 68 are considered above average and anything below 68 is below average.

5.8 Discussion

The usability tests achieved most of the proposed goals, however they helped us identified some issues in the interface of the platform.

The task of following a tipster and liking/commenting a post are very similar to many other social networks, so the users did not have problems in completing those tasks easily and within the defined metrics. However, some participants pointed out that the comment icon as not correct, since it was an envelope icon, which is associated to sending a message or an email.

Buying tips and consult rankings also revealed to be an easy task, and did not raised any difficulties to the participants.

The tasks that raised more difficulties for the participants were the one involving sharing and exploring tips of a sport event. The task of discover the tips of a specific sport event was not completed by 40% of the participants, which reveals serious usability issues. The main concern was on how to access to the section to view tips and bet slip, which was being done by clicking in the icons placed on the right of the screen. The solution is to change the access icons since they are not indicative of their function and possibly change these two sections to two different tabs in
The task of sharing a tip met the defined goals, however some participants pointed out the fact that despite the process of browsing to a sport event is pleasant and easy to use, it differs from the traditional sports betting websites, mainly in terms of navigation, since the current state (sport, league and event) is not visible. The solution is to always present the current state.
The participants also provided verbal feedback about what they liked most about the site. They particularly liked the simplicity of the design and the smooth transitions between the pages of the application, which contributed to a pleasant user experience.
Chapter 6

Conclusion

Many people make bets on the outcomes of sport events. Some of them seek for help when deciding in which bet they should invest their money. We developed a tips sharing platform to help the users placing their bets.

In many situations it is hard to build trust among users in an online environment due to all the risks associated with these environments. In websites that involve transactions between the users, it is important to build trust among the parties involved in the transaction.

We investigated the influence of seller videos and reputations scores on trust building in online transactions. We used a standard trust game with three reputation conditions (positive, negative and no seller reputation) and three seller videos conditions (trustworthy, untrustworthy, no seller video) to measure the impact of seller videos and reputations scores in promoting trust among the users.

Positive reputation contributed towards buyers’ trust and higher purchase ratings when comparing to missing and negative reputation.

Missing reputation led to significantly lower trust ratings and purchase rates than negative reputation, revealing that the participants had more difficulties trusting in a seller that has no transactions record. However, having a positive video can ameliorate this effect.

Sellers that had trustworthy videos obtained higher trust ratings and purchase rates than sellers that had negative or missing videos, even if they had a better reputation score. There was a significant increase of trust ratings and purchase decisions when the seller had trustworthy videos, revealing the potential that exposing through a video has in online transactions. Trustworthy videos led to more purchases and higher trust ratings than positive reputation, revealing that emotional trust plays a bigger role than cognitive trust when performing online transactions.

The use of trustworthy videos had greater impact than the use of trustworthy photos.

Untrustworthy videos have not contributed to higher purchases rates than missing videos, despite having led to higher trust ratings. This reveals that an untrustworthy video has the ability to reduce
the anonymity and build basis of trust comparing with the cases where there is an absence of video, although this was not immediately reflected in purchase rates.

When the seller had missing reputation, using a trustworthy video resulted in higher purchase rates and trust ratings than a seller that already had a positive reputation record but does not used video. This reveals that a seller that has no transactions records by using trustworthy videos can reach a status similar or even superior than sellers that already has transactions record.

The results obtained in this study were extrapolated into the domain of our platform. The positive impact of trustworthy videos led to changes to our requirements during the development of the platform. We decided to allow users to easily record and share videos explaining their sports tips.

Regarding the platform, Tipsters fulfill the needs identified in the early stages of the development of the platform. Tipsters allows users to share and view tips on sport events. Users can access to rankings to find the most competent tipsters.

The interface of Tipsters was built focusing on providing a good user experience. We used modern technologies, like ReactJs, that helped us providing this good experience. The server of the platform assures high availability and scalability, also contributing to a fluid navigation of the platform.

The usability tests conducted to the interface of Tipsters achieved most of the proposed goals in the beginning of the tests. The participants successfully completed most tasks within the defined metrics. However, the usability tests helped us identified some issues in the interface. Browsing to a specific sport event is being made differently from traditional sports betting websites, which our participants are already familiar with. Participants also struggled accessing to some of the sections of the website, such as the bet slip and the section to view tips on a specific sport event. Overall, participants considered the experience of the platform as pleasant, due to the simplicity of the design and smooth transitions between the pages of the application.

6.1 Future work

As future work we propose the extension of the current study in order to understand more clearly the impacts of videos in online transactions.

In our experiment we used a simplistic website where sellers appear consecutively, and the participants decided whether or not to buy an abstract item from that seller, based on the reputation and profile video. The experiment could be extended by conducting it in a less abstract scenario. The scenario could be a realistic web store, where users can buy real items.

It would also be interesting to see the results in a scenario that was not a one-time experience. For example, in our scenario sellers that had untrustworthy videos obtained significantly lower purchase rates and trust ratings that sellers that used trustworthy videos. In a scenario where participants could operate transactions over several weeks or months, it could be interesting to
find out if the sellers that used untrustworthy or missing videos were progressively excluded from the website in favor of sellers that used trustworthy videos.

It was also interesting to verify if sellers that use negative videos would overcome sellers that do not use videos. In our experience they obtained similar purchase decisions, but sellers with untrustworthy videos obtained higher trust ratings. It is possible that this trust transmitted by the untrustworthy videos to be favored by a long term experience.

Regarding the platform, we should fix the usability issues identified in the usability tests. Browsing to a specific sport event should be made like traditional sports betting websites, since the users are already familiar with this interface, always keeping visible the current state (sport, league and event) and easily allowing to return to previous states. It is also important to review the method of accessing to the bet slip and the section to view tips on a sport event. Now we simply have two icons on right of the screen, that were considered not indicative of their function. We should review these icons and possibly change these two sections to two different tabs in the page.

It would be interesting to have Tipsters in production, which could serve as a realistic environment to measure the impact of videos and reputation when co occurring online. With this scenario we would be able measure the impact of using videos to promote trust, verifying if tipsters that used videos over the months would gain more followers and obtain higher purchase rates than users that do not use videos.
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