

# Social Commerce

A user-centered design approach

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2019

MASTER THESIS



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November 10, 2019



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# Social Commerce

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## Abstract

Social commerce (s-commerce) is a new paradigm for electronic commerce (e-commerce) where sociability, such as reviews and forums, is introduced into the e-commerce context. Previous research point to s-commerce design as a topic that needs more research, and that creating user-centered s-commerce websites is cumbersome and a hindrance for s-commerce adoption. The main research objective of this thesis was to investigate the result of applying a user-centered design process to incorporate sociability into an e-commerce website. How product characteristics influence s-commerce design was also investigated.

Initially, a review of some of Sweden's largest online stores was conducted. Drawing on the conceptual model found in the reviewed stores, a low-fidelity (Lo-Fi) prototype of a fictional e-commerce platform was created. Using a user-centered design process, sociability was integrated into the fictional e-commerce platform. In order to integrate sociability, comprehensive s-commerce design requirements were formulated and a participatory design session held. Thereafter, two design iterations were performed - each iteration concluded with a test. The final test of the prototype evaluated usability, as well as other important s-commerce aspects, such as trust.

The final test revealed that a user-centered design process could be suitable for s-commerce design, as the prototype fulfilled many criteria important within the s-commerce context. Furthermore, the result from the participatory design session indicates that product characteristics influence s-commerce design. However, the prototype was not tested in production, none of the evaluations have statistical significance and some s-commerce aspects were not evaluated.

**Keywords:** user-centered design, social commerce, social commerce design, e-commerce, social media



# Sammanfattning

Social commerce (s-commerce) är ett nytt paradigm för elektronisk handel (e-handel) där sociala aspekter, såsom recensioner och forum, blivit inkorporerade i e-handelskontexten. Tidigare forskning konstaterar att det behövs mer forskning inom design av s-commerce-webbsidor. Tidigare forskning konstaterar också att det är problematiskt att skapa användarcentrerade s-commerce-webbsidor, vilket kan vara ett hinder för s-commerce fortsatta implementeringen. Det huvudsakliga målet med denna uppsats var att undersöka med vilket resultat en användarcentrerad designprocess kan användas för att inkorporerade sociala element i e-handelswebbsidor. Hur produkttegenskaper influerar designaspekter inom s-commerce undersöktes också.

Initialt genomfördes en genomgång av ett urval av Sveriges största e-handelswebbsidor. Baserat på den konceptuella modellen som hittades under genomgången skapades en low fidelity (Lo-Fi) prototyp av en e-handelswebbsida. Genom att använda en användarcentrerad designprocess integrerades sociala element i den fiktiva e-handelswebbsidan. Först skapades omfattande krav för s-commerce-design och en participativ design-session genomfördes. Därefter gjordes två iterationer av webbsidedesignen och i slutet av varje iteration hölls ett test. Det sista testet utvärderade inte enbart användbarhetsaspekter utan också andra viktiga aspekter inom s-commerce-design, såsom tillit.

Resultatet från det sista testet visade att en användarcentrerad designprocess är lämpad för design av s-commerce-webbsidor då prototypen uppfyllde många viktiga aspekter av s-commerce-design. Den participativa design-sessionen indikerade också att produkttegenskaper influerar s-commerce-design. Dock så testades prototypen aldrig i en produktionsmiljö, ingen av utvärderingarna var statistiskt signifikanta och vissa s-commerce-kriterier utvärderades inte.

**Nyckelord: användarcentrerad design, social commerce, social commerce design, e-handel, sociala medier**

## Acknowledgements

First and foremost, I would like to thank my supervisor Joakim Eriksson at the department of Design Sciences for his frequent feedback and help. I would also like to thank all test participants and co-designers whose participation been essential for this project. Finally, I would like to thank August for proofreading and looking at this report with a fresh pair of eyes.

*Lund, Oktober 2019*  
*Hampus Johansson*

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## List of Acronyms and Abbreviations

<b>Ajax</b>	Asynchronous JavaScript and XML
<b>AR</b>	Augmented Reality
<b>B2C</b>	Business to consumer
<b>CMC</b>	Computer-mediated communication
<b>C2C</b>	Consumer to consumer
<b>CBF</b>	Consumer-behaviour framework
<b>DR</b>	Design requirement
<b>E-commerce</b>	Electronic commerce
<b>eWOM</b>	Electronic Word of Mouth
<b>HCD</b>	Human-centered design
<b>Hi-Fi</b>	High fidelity
<b>Lo-Fi</b>	Low fidelity
<b>PD</b>	Participatory designer
<b>RDF</b>	Resource Description Framework
<b>RSS</b>	RDF Site Summary
<b>S-commerce</b>	Social commerce
<b>SOR</b>	Stimulus-organism-response
<b>SP</b>	Social presence
<b>SR</b>	Stimulus-response
<b>SUS</b>	System usability scale
<b>TP</b>	Test person
<b>UCD</b>	User-centered design
<b>UGC</b>	User-generated content
<b>WOM</b>	Word of Mouth
<b>VR</b>	Virtual reality

# 1 Introduction

Since the emergence of Web 2.0, a term generally used to describe users collaboration on the internet and the technologies facilitating this, *the internet has increasingly evolved into a communicative, collaborative environment with the user in focus* (L. Lai and Turban, 2008) . With Web 2.0 concepts and technology as a basis, new applications such as LinkedIn (2002), MySpace (2003), Facebook (2004) and Youtube (2005) emerged at the beginning of the 21st century. These platforms are commonly referred to as social media platforms and have steadily increased their popularity over the years since their respective launches. Formally, a social media platform could be described as a platform that utilizes Web 2.0 technologies to help users create and exchange content (Kaplan and Haenlein, 2010).

The increased adoption of Web 2.0 and social media has created a new paradigm for e-commerce, *social commerce (s-commerce)* (Busalim and Hussin, 2016; Zhao and Benyoucef, 2013b). Hajli and Sims (2015) describe s-commerce as a: *"...new stream in e-commerce, where social factors are the determinant of this phenomenon and consumers are empowered to generate content using social media through online communities, forums, ratings, reviews and recommendations"*.

According to Curty and P. Zhang (2011), both businesses and consumers benefit from this new stream in social media mediated commerce. Among others, Y. Kim and Srivastava (2007) highlight that social influence (e.g. ratings and reviews) aid consumers decision making process, which provides value for consumers. E-commerce businesses may also profit from increasing sociability in their platforms. S-commerce constructs (SCCs) such as ratings and reviews correlate with higher trust in e-commerce websites and affects the intention to buy positively (Hajli, 2015).

Additionally, Lam et al. (2019) studied 275 s-commerce initiatives among businesses between 2006 and 2011, the conclusion being that businesses gain in terms of stock return by investing in s-commerce. The potential gain from adapting s-commerce has not gone unnoticed by businesses though. Zhao and Benyoucef (2013a) present data indicating that nearly 88% of businesses plan to invest more in social media in the future and many online retailers, such as Amazon and Zalando, already let consumers contribute product reviews.

As s-commerce adoption progressed among online retailers, a trend of adding more sociability to existing e-commerce websites became evident among online retailers (Liang and Turban, 2011; Zhao and Benyoucef, 2013a). However, online retailers trying to integrate sociability into their platforms could face design-related difficulties. Chrimes, Boardman, and Henninger (2019) list design and usability as one of the main future challenges for s-commerce adoption.

Busalim and Hussin (2016) expressed that s-commerce website design is a topic that needs more research and Zhao and Benyoucef (2013b) formulated that - a challenge in s-commerce design is to create user-centered s-commerce websites.

Moreover, Hao et al. (2010) present data indicating that product category has a moderating role within online retailing. However, little to none research on how the characteristics of the product sold will influence s-commerce design has been done. Finally, Busalim and Hussin (2016) show that previous research into s-commerce is mostly quantitative. For instance, when K. Zhang and Benyoucef (2016) investigated previous s-commerce research, the used research methodology was in 70% (n=54) surveys. Qualitative methods could uncover aspects of s-commerce design not captured in quantitative research.

## 1.1 Purpose and goals

The main purpose of this thesis was to *investigate how and with what result a user-centered design process could be used to redesign an e-commerce website into a s-commerce website*. The motive behind the research objective being that a user-centered design process, potentially, could serve as a way of achieving good quality s-commerce design and to overcome design problems related to integrating sociability into the e-commerce context.

By using qualitative design and evaluation methods, often associated with user-centered design, throughout the iterative design process - a further understanding of the user in the s-commerce context as well as further understanding of s-commerce design could be achieved. Finally, by taking several categories of products into consideration during the design process, data regarding how product characteristics might influence s-commerce design could be uncovered.

Conclusively, the main research questions the thesis sets out to answer are:

- How and with what result could a user-centered design process be used to redesign an e-commerce website into a s-commerce website?
- Will product characteristics affect the design of s-commerce websites?

## 1.2 Related work

Although research into social commerce could be found in the late 1990s, it was in 2004, closely linked to the popularization of social media that s-commerce emerged as an increasingly popular research topic (Lin, Li, and Xuequn, 2017). Busalim and Hussin (2016) show that a majority of s-commerce research concern user behaviour within the s-commerce context. Using a different research framework, Lin, Li, and Xuequn (2017) identified innovation, corporate reputation and user-generated content (UGC) as the three most popular research trends. Research into s-commerce design has been conducted though.

Zhao and Benyoucef (2013a) and Z. Huang and Benyoucef (2017) provide valuable design principles and features to consider when designing s-commerce websites. Additionally, Baghdadi (2016) proposes a framework, which not only incorporates design but also, for example, business aspects and technical features. Zhao and Benyoucef (2013b), Z. Huang and Benyoucef (2015) and Z. Huang and Benyoucef (2017) present research into - which social design features



users perceive as important. In all three of the studies, the researchers used a user-centered approach with surveys as the primary research methodology. The presented studies give valuable insights into user's preferences of s-commerce design features. However, by using qualitative design and evaluations methods, additional important features could be uncovered.

No research specifically addressing the impact of product category on s-commerce design has been discovered. Though, Hao et al. (2010) have made research into how electronic word of mouth (eWOM), in the form of reviews, affect purchase intention of experience and search goods (two common ways of categorizing products). Liu, S. Huang, and L. Zhang (2016) on the other hand, investigated informational cascades in relation to product category. The results from both studies showed that product category has a moderating role.

### 1.3 Scope

The focus of the thesis was the commerce of physical goods, not services or virtual products. This was motivated by the need to limit the scope of the thesis. Also, within the European Union (EU) the most commonly bought products online are physical goods by a large (44%) margin (Eurostat, 2018).

Moreover, the focus of the thesis was business to consumer (B2C) stores, therefore, consumer to consumer (C2C) selling was disregarded. Domestic commerce was the focused, in this case commerce within *Sweden*. This was motivated by a need to limit the scope. Additionally, data from Eurostat (ibid.) show that almost 90% of the respondents have bought products from a national seller, while only 36% have bought items from sellers within the EU. Thus, domestic selling is a more common use case. It is worth to note that although domestic selling was the focus, other e-commerce stores specifically targeting the Swedish market, e.g. through a Swedish language website and domain, were considered.

Albeit the fact that culture have a moderating role within s-commerce (Ng, 2013a), cultural aspects was not taken into consideration in the thesis. This was motivated by a need to limit the scope. Finally, The adoption of virtual reality (VR) and augmented reality (AR) is still low, especially within social media. Therefore, AR and VR were not considered, although they are discussed in section 9.4 *Further research*.

## 2 Theory

### 2.1 User-centered design

In product development, especially within software, a concept known as user-centered design (UCD) is often utilized. An alternative term, human-centered design (HCD) is also widely used. The ISO definition ISO:9241-210 (2010), uses *human* instead of *user* as a way to encompass potential stakeholders, that might not be considered typical users (Earthy, Jones, and Bevan, 2012). Although the scope of the terms differ, the principles (listed below) for practicing UCD and HCD are the same.

What characterizes UCD is that it makes users and their needs a focal point, considering potential limitations of the underlying technology and features after first focusing on users. A key concept within UCD is that users should not adapt their work process; rather the UCD design process should revolve around supporting how users would naturally work (Rubin and Chisnell, 2008, p.12-13). ISO:9241-210 (2010), which replaces ISO:13407-1999, defines 6 principles for HCD, equally relevant for UCD:

- The design is based upon an explicit understanding of user, tasks and environment
- Users are involved throughout design and development
- The design is driven and refined by user-centered evaluation
- The process is iterative
- The design addresses the whole user experience
- The design team includes multidisciplinary skills and perspectives

Summarizing, the UCD process could be seen as a learning process in which the design team continuously learn about the user, their tasks and environment; and re-evaluates the design. To learn about the user, it is important to apply user-centered evaluation as well as involving users in the design process.

#### 2.1.1 Usability

One goal of the UCD process is to develop usable products. According to ISO:9241-11 (2010) usability is: *“the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”*. Rubin and Chisnell

(2008, p.4-6) elaborate on the terms in the ISO definition and presents additional concepts important for usability:

- **Usefulness** concerns the degree to which a product enables a user to achieve his or her goals, and is an assessment of the user's willingness to use the product at all. Usefulness could be measured in a multitude of ways, although mostly through qualitative research methods. Possible methods include e.g. interviews and forms.
- **Efficiency** is the quickness with which the user's goal can be accomplished accurately and completely and is usually a measure of time.
- **Effectiveness** refers to the extent to which the product behaves in the way that users expect it to and the ease with which users can use it to do what they intend. This is usually measured quantitatively with error rate.
- **Learnability** is a part of effectiveness and has to do with the user's ability to operate the system to some defined level of competence after some predetermined amount and period of training (which may be no time at all). It can also refer to the ability of infrequent users to relearn the system after periods of inactivity. One way of measuring learnability is to alternate the order of tasks performed during usability testing, to see how the amount of time a user spend within a system will effect task effectiveness and efficiency. Test persons could also be given different amount of training beforehand, to see if this affect efficiency and effectiveness.
- **Satisfaction** refers to the user's perceptions, feelings, and opinions of the product, usually captured through both written and oral questioning.
- **Accessibility** and usability are siblings. In the broadest sense, accessibility is about having access to the products needed to accomplish a goal. Measured through the other usability factors, but with test persons that might experience more difficulties. This could, for example, include elderly or humans with disabilities such as visual impairments.

## 2.2 Social commerce

### 2.2.1 Web 2.0, user-generated content and social media

Even though the burst of the .com bubble in 2000 left many distraught about the future of web technologies, new and interesting web applications continued to pop up in the years following the burst of the bubble. In 2004, to discuss the interesting development of the Web and how the Web could serve as a platform, Tim O'Reilly hosted the first Web 2.0 conference - thus popularizing the term Web 2.0 (O'Reilly, 2007).

The essence of Web 2.0 ideology is more formally described by Kaplan and Haenlein (2010) as: *"a platform whereby content and applications are no longer created and published by individuals, but instead are continuously modified by all users in a participatory and collaborative fashion"*. Regarding technology, Web 2.0 does not specify any particulars, but technologies such as AJAX (Asynchronous JavaScript and XML) and RSS (RDF Site Summary) are essential to

the function of Web 2.0 and are therefore often describes as Web 2.0 technologies.

Another term often used in the same context as Web 2.0 is user-generated content (UGC). OECD (2007) lists three criteria for content to be considered UGC: (i) *content made publicly available over the internet*, (ii) *which reflects a certain amount of creative effort*, and (iii) *which is created outside of professional routines and practices*. UGC is described as the sum of all the ways in which people make use of social media (Kaplan and Haenlein, 2010).

Conclusively, UGC and Web 2.0 forms the Kaplan and Haenlein (ibid.) definition of social media as: *Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content*.

### 2.2.2 Defining social commerce

Social media and Web 2.0 in combination with e-commerce formed a new phenomenon known as s-commerce, which has become an increasingly popular area of research (Lin, Li, and Xuequn, 2017). There is no standard definition of *s-commerce* though (Liang and Turban, 2011). Bürklin, Henninger, and Boardman (2019) list twenty different definitions of s-commerce used by researchers, leading them to describe the concept of s-commerce as *fuzzy*.

Liang and Turban (2011), for example, consider s-commerce a subset of e-commerce that involves using social media to assist transactions and activities. Others such as Sturiale and Scuderi (2013) considers s-commerce as an extension of Web 2.0 into the e-commerce domain, while IBM defines s-commerce as an extension of Word of Mouth (WOM) (IBM, 2009). These definitions differ in the conceptual understanding of s-commerce. However, two major s-commerce trends have been identified, which might serve as a basis for better grasping the s-commerce concept. The two major trends identified by Lin, Li, and Xuequn (2017), Bürklin, Henninger, and Boardman (2019), Zhao and Benyoucef (2013a), and Liang and Turban (2011) are:

- Social media platforms such as Facebook and Snapchat incorporating commercial tools.
- E-commerce platforms such as Amazon and Asos integrating social media features and content

To incorporate these trends other definitions of s-commerce is more suitable than those suggested above. Lin, Li, and Xuequn (2017), for example, defines s-commerce as *“any commercial activities facilitated by or conducted through the broad social media and Web 2.0 tools in consumers’ online shopping process or business’ interactions with their customers”*.

The definition used in this thesis will be one proposed by Yadav et al. (2013), who defines social commerce as: *“exchange-related activities that occur in, or are influenced by, an individual’s social network in computer-mediated social environments, where the activities correspond to the need recognition, pre-purchase, purchase, and post-purchase stages of a focal exchange”*. This definition is also highlighted as suitable for s-commerce by K. Zhang and Benyoucef (2016) and Busalim and Hussin (2016) in comprehensive literature reviews.

## 2.3 Consumer behaviour in social commerce

To understand how s-commerce could be designed, one key factor is comprehending how consumers (users) behave within the s-commerce context, which is also underscored in UCD. This section will present two theories, one regarding human behaviour and one regarding consumers behaviour, and an integrative framework for understanding consumer's behaviour in the s-commerce context based on the two theories.

### 2.3.1 Stimulus-Organism-Response Model

The stimulus-organism-response (SOR) models was proposed by Mehrabian and Russell (1974) as an extension to the previously existing stimulus-response (SR) model. The original SR model is described as "... *any form of conditioning in which a specific stimulus comes to be paired with a particular response in the mind of the subject*" (ENOTES, 2016). One example of the SR model in practice is the now famous and pioneering experiment conducted by Ivan Pavlov. In the experiment, Pavlov conditioned dogs to salivate (respond) to the ringing of a bell (stimulus).

However, the original SR model was criticized for being too simplistic, hence a mediator between the stimulus and response was introduced - *organism*. In the SOR model, the stimulus affects the internal emotions of the subject (organism). A behavioural response then forms as a result of the stimulus and internal emotions of the subject.

### 2.3.2 Consumer decision-making process

Liang and H.-J. Lai (2002) proposed a five-stage process to explain consumers decision-making process (Z. Huang and Benyoucef, 2017). The five stages are: (i) *need recognition*; (ii) *searching for information*; (iii) *the evaluation of alternatives*; (iv) *purchasing*; and (v) *post-purchasing*. Yadav et al. (2013) definition of s-commerce was partly conceived to cover this holistic perspective of the consumer decision-making process.

The consumer enters the *need recognition* stage when he or she feels the need for a product. In the *search for information* stage, the consumer looks for relevant information and in the *evaluation of alternatives* stage, the consumer evaluates the alternatives. At the fourth stage in the process, a *purchase* is made, followed by *post-purchase* activities such as order tracking or rating of products. It is worth to point out that this process is non-linear, e.g. the evaluation stage is not always followed by a purchase, instead the evaluation could lead back to the search stage.

### 2.3.3 An integrative framework for consumer behaviour in social commerce

To explain consumer behaviour within the s-commerce context, K. Zhang and Benyoucef (2016) proposed an integrative framework comprising the SOR model and the five-stage consumer decision-making process. The integrative framework will hereafter be referred to as the consumer-behaviour framework (CBF). In the CBF the response from the SOR model are correlated with actions in

the consumer decision-making process, e.g. a response within post-purchase activities would be *information sharing*.

The actions defined (with correlating decision process stage within parenthesis) are: (i) *attention attraction* (need recognition), (ii) *information seeking and browsing* (search), (iii) *attitude* (evaluation); (iv) *purchase intention, information disclosure and social commerce intention* (purchase) and (v) *website usage, participation, information sharing and brand loyalty* (post-purchase).

The literature review also revealed a multitude of factors concerning stimulus and organism (K. Zhang and Benyoucef, 2016). The CBF is presented in Figure 2.1.

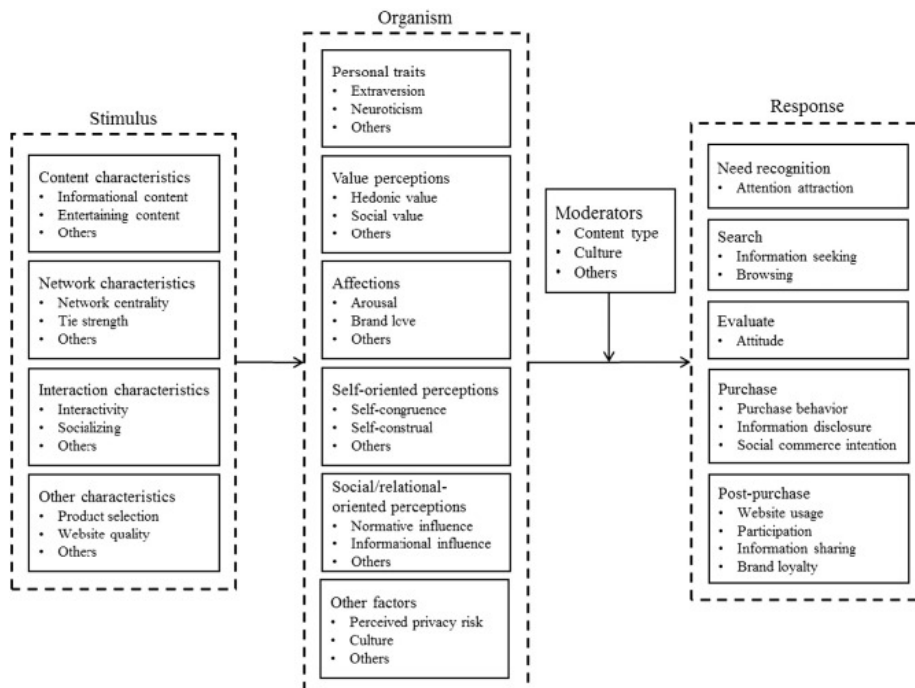


Figure 2.1: Complete theoretical framework for consumer behaviour in social commerce, as presented by K. Zhang and Benyoucef (2016)

### 2.3.4 Selected Antecedents

A selected number of antecedents for the five stages of the consumer decision-making process, presented by K. Zhang and Benyoucef (ibid.) in the CBF, will be further explained. The selections of antecedents was based on how well-referenced they were in the CBF. The antecedents are presented in conjunction with the layer in the SOR model, to which they belong. S denotes stimulus, O denotes organism and R denotes response.

#### Trust (O)

Jarvenpaa, Tractinsky, and Vitale (2000) note that trust is: "a critical factor in any relationship in which the trustor (e.g. consumer) does not have direct control

over the actions of a trustee (e.g. merchant or store), the decision is important, and the environment is uncertain". That trust is an important antecedent for purchase intention also apply to e-commerce (Hoffman, Novak, and Peralta, 1999; Gefen, 2000; Corbitt, Thanasankit, and Yi, 2003; Salam et al., 2005). Perceived trust could even be more important than perceived price (H.-W. Kim, Xu, and Gupta, 2012).

Additionally, Ng (2013b) emphasize the importance of trust transference theory, i.e. that trust may be transferred between sources. For example, trust in a product or business by an online community, an influencer on social media or a trusted member of an individual's social network could be transferred. This indicates that trust can be transferred between parties within a s-commerce domain through social connections. Furthermore, trust in the general community within an s-commerce site increase both trust for the website itself as well as purchase intentions.

The view of trust as a *key antecedent* for purchase and post-purchase activities has been adopted by many s-commerce researchers. As presented in the CBF there are 10 research articles at the purchase stage and 6 articles at the post-purchase stage that call attention to the importance of trust (K. Zhang and Benyoucef, 2016).

### **Social presence (O)**

The social presence of a medium is described as its ability to enable a communicator to experience his/hers communication partner as psychologically present (Short, Williams, and Christie, 1976). Typically, a face-to-face communication has a high level of social presence whereas email communication has a low level of social presence. Social presence theory generally describes how the *social context* affects users of a medium. Luhmann (2018, p.41) emphasize that *social context* is an important aspect of trust, as trust often forms through social interactions with other people or an organization. Gefen and Straub (2004) note that there is a lack of social context within traditional e-commerce, which could influence social presence and trust negatively.

Lu, Fan, and Zhou (2016) highlights that SCCs have a positive influence on social presence, but also points out that not only SCCs affect social presence. Social presence could for example also be conveyed by displaying socially enriched text, pictures portraying humans or by using virtual agents (Lu, Fan, and Zhou, 2016; Hassanein, Head, and Ju, 2009). Additionally, Aragon (2003) presents welcome screens and user profile pictures as two ways of increasing social presence.

### **Social support (O)**

One way to define *social support* is as the perceived care, love and support of members of a group (Cobb, 1976). The support aspect is not one-dimensional and does not only involve informational support within the s-commerce context. Other forms of support, such as emotional support or companionship (i.e. a sense of belonging), are also important since they will further increase users willingness to interact with the community. If the general social support is high within a community, users inclination to ask for informational support from the community increase (Liang, Ho, et al., 2011). In the CBF, social support

is presented as an antecedent for purchase and post-purchase activities. Social support in an interactive community also correlate with an increased social presence (H. Zhang et al., 2014) and will contribute to higher relationship quality, which comprises trust, relationship satisfaction and relationship commitment (Hajli, 2014; Liang, Ho, et al., 2011).

### Website quality (S)

Website quality is presented as a stimulus for the purchase and post-purchase stage in the CBF. Furthermore, Hsin Chang and Wen Chen (2008) confirm that website quality and website brand affect trust. For example, poor website quality will affect trust negatively. Hasan and Abuelrub (2011) propose a framework for evaluating website quality consisting of *content*, *design*, *organization* and *user-friendliness* (Figure 2.2):



Figure 2.2: A framework for assessing website quality as proposed by Hasan and Abuelrub (2011)

The website quality framework presents valuable factors to take into consideration when building s-commerce websites and evaluating website quality. Furthermore, it highlights that not only usability is important for reaching a high-quality website and consequently earning users trust.

### Value perceptions (O)

The CBF presents three dimensions of value perception proven relevant for all five stages of the consumer decision-making process. The three value perceptions are:

- **Utilitarian value** - The means to an end, goal-oriented, functional and rational (Babin, Darden, and Griffin, 1994).
- **Hedonic value** - Entertainment and worth, experiential and affective (ibid.).
- **Social value** - Social value is realized through the enhancement of status and self-esteem (Sweeney and Soutar, 2001). Social approval and feeling accepted.



For example, hedonic value underscores the importance of creating an *enjoyable* and *fun* experience, while utilitarian value highlights the *functional aspects*, such as usability.

### **Information disclosure (O)**

The CBF presents a series of situational factors relevant to consumers information disclosure. Information disclosure could be seen as a key factor in both consumer authentication and participation in social commerce, since they both usually rely on the consumer to disclose some information. The factors presented by Sharma and Crossler (2014) in the original article are:

- **Perceived apathy** - Privacy apathy implies indifference towards privacy concerns due to the belief that there is no such thing as privacy in the age of Web 2.0 technologies
- **Perceived usefulness** - In an online purchase environment, perceived usefulness can be defined as the degree to which a person believes that making online purchases will enhance the consumer's performance.
- **Perceived enjoyment** - The extent to which the activity of using the system is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated
- **Perceived privacy risk** - In a social network environment, information privacy refers to the level of identifiable information used by the vendor and the possible unauthorized uses of that information.
  - **Perceived linkage** - Linkage is established when data access is granted to another entity such as a social network to become a co-owner of private information.
  - **Perceived relevance** - When data requested by the social network or the internet vendor appears to have a bearing on the purpose of the issue, people perceive it as relevant information. Users see more privacy risk when they have to provide information that is irrelevant during social commerce transactions
  - **Perceived surveillance** Web 2.0 has introduced us to the issues of data surveillance as online vendors often watch, listen or record individual's online activities

It is empirically proven that perceived privacy risks affect user's intention to disclose information negatively. Perceived apathy, perceived usefulness and perceived enjoyment positively influence users to disclose information (ibid.). Z. Huang and Benyoucef (2015) also notes that users mainly visits social media websites to socialize and e-commerce websites mainly to shop. This is important to note with regards to perceived relevance.

### **Other factors**

A subset of other antecedents in the CBF will be mentioned to provide a more holistic view of the research area. For the complete framework, see the original research by K. Zhang and Benyoucef (2016)

- **Normative influence (O)** - Perceived norms will influence purchase and post-purchase behaviour, e.g. if it is the norm to leave a review, users will more likely do so.
- **Familiarity (O)** - How familiar the user is with the website and brand. Familiarity will affect trust.
- **Identification (O)** - How much a user identifies with his / her peer group or the website will affect evaluation, purchase and post-purchase behaviour.
- **Content characteristics (S)** - The characteristics of the content itself will affect users to participate in the need recognition, search, purchase and post-purchase stages. Such characteristics include pictures, videos, consumer-focused content, personalization, informational content, posts popularity and entertaining content.

## 2.4 Social commerce design models

### 2.4.1 Model 1

Zhao and Benyoucef (2013a) present a conceptual model for designing s-commerce websites. The model consists of four layers (see Figure 2.3):

- **Individual** - The first layer reflects an individuals "self", which is something that could be recognized by others
- **Conversation** - In the second layer, the individual interacts with others and express themselves.
- **Community** - A community is formed as conversations consolidate.
- **Commerce** - The last layer, commerce creates the possibility of making commercial transactions through an established community.

Traditional e-commerce could be explained by the same model without the community and conversation layer, only individual and commerce. It is the community and conversation layer that introduces sociability. By considering previous research made into e-commerce and Web 2.0 design, Zhao and Benyoucef (ibid.) develops design principles for each of the layers in the model as well as some design principles that span all layers, as seen in Figure 2.3

### 2.4.2 Model 2

Later on Z. Huang and Benyoucef (2017) approached s-commerce design differently, by focusing more on present research within s-commerce. They identified three relevant design principles: *usability, functionality and sociability*. *Functionality* refers to a set of functions and properties that satisfy consumers' requirements in the completion of their tasks. *Sociability* is to what degree a rich social experience, which for example enables consumers to connect with others or to share product information, is provided.

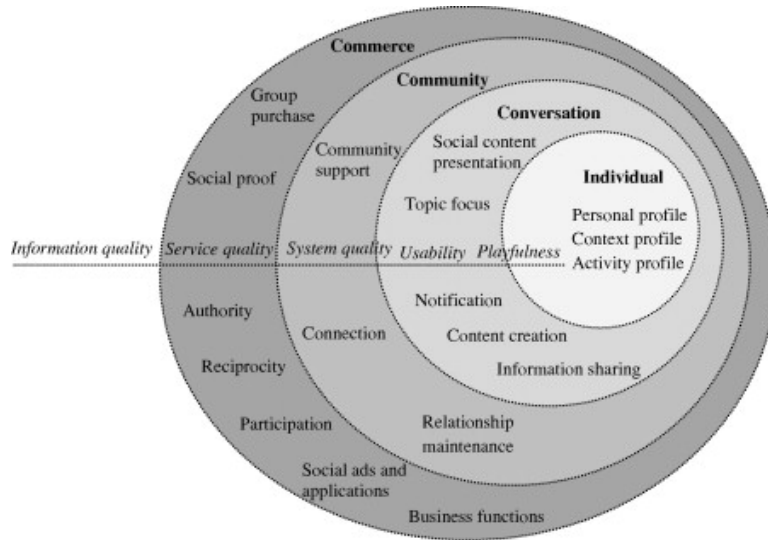


Figure 2.3: A conceptual model for s-commerce as presented by Zhao and Benyoucef (2013a)

Based on previous s-commerce research, important design features were found for the three design principles (see Table 2.1). Using the same methodology, relevant design features for each stage of the decision making process were also found, as presented in Table 2.2.

Table 2.1: Design principles with relevant design features, as presented by Z. Huang and Benyoucef (2017)

Design Principle	Design features
Usability	Ease of use, learnability, information quality, accessibility, content organization, simplicity, navigation, content design, aesthetics, personalization, usefulness, consistency
Functionality	System availability, response time, accessibility, navigability, security, privacy, search functions, processing speed, transaction capability, communication, quality of information
Sociability	Social communities, sharing, social communication, social proof, social presence, participation, user generated content, word-of-mouth referrals

Moreover, Z. Huang and Benyoucef (2017) further investigated how the three design principles and design features within the design principles, affect the five-stage consumer decision-making process. The result showed that better designed sociability, functionality and usability will influence all stages of the consumer decision-making process positively.

The result from the study also shows that different design principles and design features are important at different parts of the consumers decision-making

Table 2.2: Design features influencing the consumer decision process

Decision-making stages	Design features
Product awareness	Social communities, reviews and rating, visual aesthetics, ease of initiation, navigation, social recommendation
Information search	Complete information, social support, ease of use, utility, navigation, information content, efficient search capability, customized information provisions, accessibility
Evaluation	Social support, social communities, price and trust, recommendations, product evaluation, contact information provisions
Purchase	Visual aspects, ease of use, content organization, accessibility, navigation, customer service, credibility, interactivity, content relevance, search functions, social support, utility, buying functions, online salesperson availability
Post-purchase	Consumer discussion forums, social communities, order status tracking, allowing for product returns, flexible delivery service

process, which is important to consider when designing for social commerce.

## 2.5 Product characteristics

One common way of categorizing products is by dividing them into *experience goods* and *search goods*. Experience goods are goods that possess qualities that cannot be evaluated before experiencing them, such as movies. On the other hand, the main features of search goods could be evaluated by already available information (Nelson, 1970). These concepts should be considered extremes as many products possess features that may be evaluated before experience and features that only may be evaluated through experience.

Empirical tests have shown that eWOM, such as reviews, affect experience and search goods differently (Hao et al., 2010). P. Huang, Lurie, and Mitra (2009), for example, showed that the presence of reviews and multimedia had more effect on purchase intention for experience goods than on search goods. Furthermore, Liu, S. Huang, and L. Zhang (2016) found a difference in informational cascades between search and experience goods, where informational cascades were more common for experience goods. *Informational cascaded* being the willingness to make decisions by observing others, thus disregarding personal knowledge, taste and further investigations.

Price is also a key product characteristic that affects social aspects. Price will affect what type of social connections are perceived to have diagnosticity when purchasing products (Wang and Chang, 2013). When purchasing high-risk products (e.g. expensive ones), strong-tie contacts such as close friends have more diagnosticity than low-tie contacts. However, this effect was not seen

for low-risk products.

## 2.6 Complementary design theories

### 2.6.1 Good design according to Norman

Norman (2013, p.3) presents two cornerstones of good design: *discoverability* and *understanding*. Discoverability describes the degree to which users understand which actions that could be performed and where to perform them. For example, hiding an action deep within a navigational structure will lessen the discoverability. The second cornerstone of good design is understanding, which describes the degree to which users understand *how* features should or could be used.

### 2.6.2 Emoticons

*Emoticons* are the expression of facial expressions using keyboard characters. Emoticons are an important factor to take into consideration when building computer-mediated communication (CMC) as they are used to express nonverbal cues (Derks, Bos, and Grumbkow, 2008). Therefore, emoticons could be used to strengthen feelings expressed in messages, as well as to facilitate the expressions of sarcasm and ambiguity. It is worth to note that emoticons are used to express socio-cultural norms (Park et al., 2013), although cultural aspects were not considered in this thesis (as specified in the scope).

Moreover, Aragon (2003) mentions emoticons as a way of increasing social presence in an online learning environment. A. Huang, Yen, and X. Zhang (2008) present data indicating that emoticons influence enjoyment as well as e.g. perceived usefulness positively. Finally, data presented by Hill (2016) show that emoticons used in a review influence purchase intention positively, although not adding any value when used in negative reviews.

## 2.7 Summary of theory

So far the concept of UCD as a mean for creating usable products has been introduced. UCD highlight the importance of understanding users, their environment and tasks. To further understand consumers and the environment in which they operate, an integrative framework for consumer behaviour in s-commerce was introduced. The CBF outlines antecedents for actions at different stages of the consumer decision-making process. For example, trust is an antecedent of purchases behaviour. This shows that not only usability should be taken into consideration when designing for s-commerce. Rather, good usability could be seen a one way to achieve better website quality and trust, two antecedents in the CBF.

Additionally, two different models for designing s-commerce websites have been presented. The CBF serves as a basis for understanding many of the design principles presented in the two designs models. Moreover, by focusing on the CBF, *good s-commerce design* could be achieved. Good quality s-commerce design is, in this case, defined as the degree to which the system satisfies the antecedents presented in the CBF. The design principles and features introduced

in the design models could be seen as a way of satisfying many of the antecedents in the CBF, thus creating a good s-commerce user experience.

It is worth noticing that there is an overlap between the design models. For example, the community and conversation layers in the first model is very similar to sociability in the second, which is also pointed out by the researchers. Furthermore, the *community and conversation layer* in model 1 as well as the *sociability design principle* in model 2, could be seen as the factor differentiating e-commerce from s-commerce. To put words on this differentiation between s-commerce and e-commerce, the term *sociability* will be used. Finally, different methods to categorize products were presented. As a whole, this creates a comprehensive theoretical ground on which to base further research.

### 3 Method

As the main objective of the thesis was to find out how and with what result an UCD process could be used to integrate sociability into an e-commerce platform, the main research method used was the *user-centered design process*. A UCD process is a process that incorporates UCD principles, e.g. it is *iterative, involve users, is driven and refined by user-centered evaluation, address the whole user experience and is based on understanding users and their tasks*.

However, to start the UCD process, an e-commerce platform to be redesigned into a s-commerce platform had to be built. A fictive e-commerce platform was therefore created. The fictive e-commerce platform was based upon the conceptual model of some of Sweden's most popular online stores, mimicking their functionality. During the review of the existing online stores, all sociability was disregarded.

At the point of its creation, the fictive e-commerce platform was in a low-fidelity (Lo-Fi) stage in order to facilitate easy integration of social features. To provide an opportunity to answer how product category might influence s-commerce design aspect, four categories of products to be sold on the fictive e-commerce platform was chosen. The product categories of choice were: *jeans, headphones, gaming laptop and books*.

Apart from reviewing existing e-commerce platforms, the *investigative and conceptual phase* of the UCD process, revolved around establishing s-commerce design requirements and understanding users. During the lo-fi prototyping phase, requirements associated with sociability and social media were integrated into the fictive e-commerce platform and evaluated. This is described in chapter 7. Finally, a high-fidelity (hi-fi) prototype, with a more holistic focus on the requirements, was created and evaluated, which is detailed in chapter 8. The result from the hi-fi prototype evaluation and the participatory design session is used to answer the research questions.

An illustration of the user-centered design process applied is portrayed in Figure 3.1.

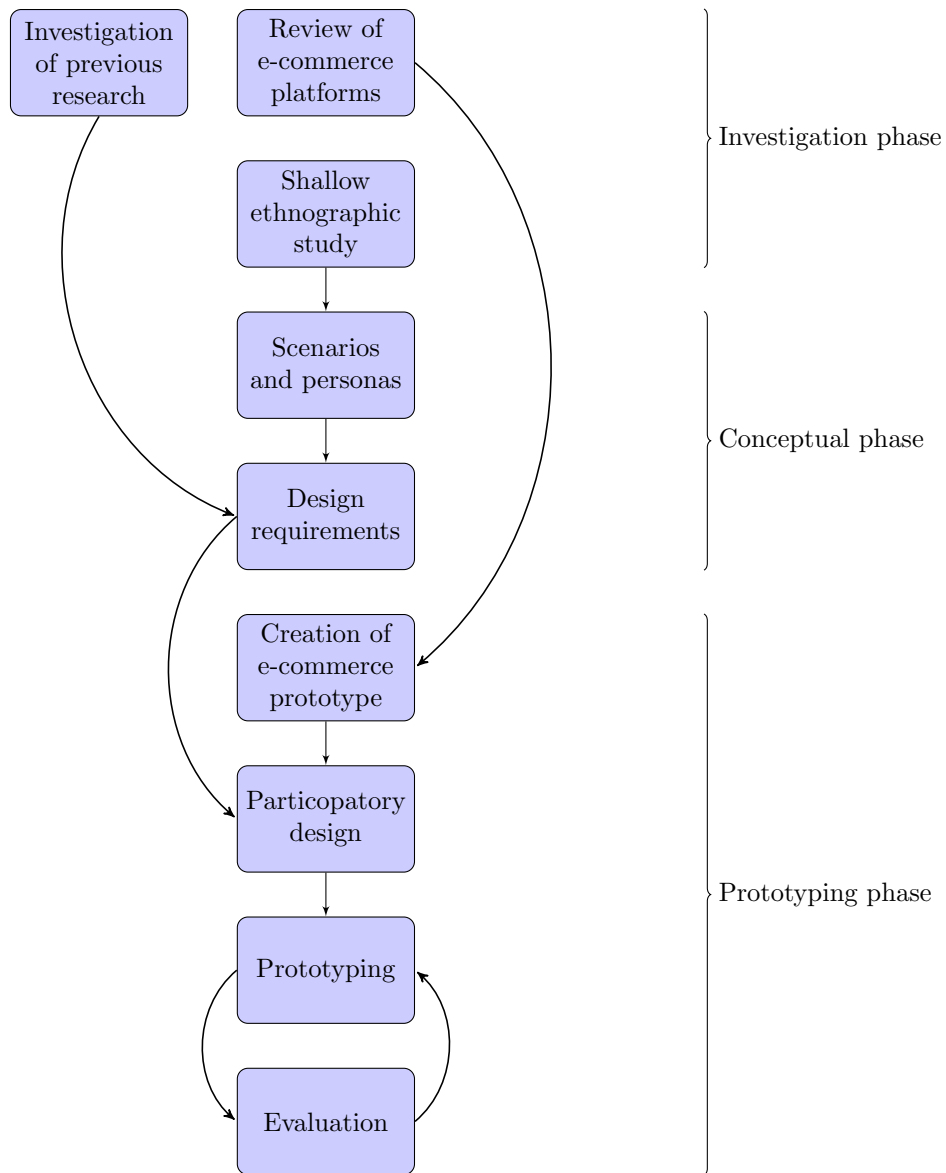


Figure 3.1: The user-centered design process applied as a method



## 4 Investigation phase

### 4.1 Investigation of previous research

First, to find design features relevant for s-commerce, *previous research* into s-commerce design was evaluated. Z. Huang and Benyoucef (2015) researched user's preferences of social features in s-commerce websites. The research was based upon the *conversation, community and commerce* layers of *model 1* and was conducted on the e-commerce platforms: Amazon, Best Buy and Groupon.

Each of the websites was evaluated by about 70 distinct students at the University of Ottawa in Canada. Some s-commerce design features bearing more significance to e-commerce websites, than to other social media websites also included in the study, were found. For example, in the conversation layer, it was important to allow people to provide product reviews.

Later in 2017, Z. Huang and Benyoucef (2017) performed a similar study but with *model 2* as a basis instead; thus considering the five-stage consumer decision process and *functionality, usability and sociability*. 262 students at a university in Shaanxi, China were given a survey where they were able to rate the importance of difference s-commerce design features on a Likert scale.

As the studies collectively have a sample size of 472 participants and present different perspectives for evaluating relevant s-commerce design features, they are both taken into account. A list of the most important design features found in each of the studies has been summarized in Table 4.1. In the features found for model 2, S denotes sociability, U - usability and F - functionality.

Table 4.1: Important s-commerce design features found by Z. Huang and Benyoucef (2015) and Z. Huang and Benyoucef (2017)

Model 1 (features)	Layer
1. Providing "Comment" button, allowing to give feedback	Conversation
2. Allowing users to provide product reviews	Conversation
3. Allowing users to rate other people's reviews	Conversation
4. Allowing users to respond to comments made by others	Conversation
5. Providing "Like" button, expressing what user like	Conversation
6. Offering "Send" button, forwarding information	Conversation
7. Providing online communities to interact with users	Community

8. Allows users to create “Wish-Lists”	Commerce
9. Providing product recommendations to users	Commerce
10. Allowing experts to give advice on what to buy	Commerce
11. Offering rewards to users	Commerce
<hr/>	
Model 2 features	Decision stage
<hr/>	
12. To provide quality information on websites (U)	Overall, Evaluation
13. To provide clear headings, titles, labels on each page (U)	Overall
14. To provide navigational support on websites (U)	Overall
15. To make content well organized on websites (U)	Overall
16. To protect consumers’ personal information (F)	Overall, Purchase
17. To support secure and easy payment methods (F)	Overall
18. To allow customers to track order statuses online (F)	Overall
19. To respond quickly to customers’ needs (F)	Overall
20. To provide useful information on websites (F)	Overall
21. To provide search functions on websites (F)	Overall
22. To offer flexible delivery services (F)	Overall
23. To share experiences and knowledge on websites (S)	Overall
24. To create an online community (S)	Awareness
25. To provide consumer feedback (S)	Awareness, Post-purchase
26. To render a social commerce site easy to use (U)	Awareness, Search
27. To provide complete information on sites (F)	Search
28. To deliver efficient search capabilities (F)	Search
29. To offer useful information on websites (F)	Search, Purchase
30. To present consumer feedback (S)	Evaluation, Purchase
31. To offer flexible payment methods (F)	Purchase
32. To ensure services in a secure manner (F)	Purchase
33. To deliver an interactive experience (U)	Purchase
34. To maintain online forums (S)	Post-purchase
35. To share product/service information (F)	Post-purchase
36. To make social recommendations (S)	Post-purchase

## 4.2 Review of online stores

To gain more knowledge into how e-commerce platforms presently function, an evaluation of already present online stores was conducted. The online stores evaluated were concatenated from Ehandel.se (2019) and ecommerceDB.com

(2019), listing the most popular web shops and the web shops with the highest revenue in Sweden 2018. Only non-social design features were considered when evaluating the online stores, since the purpose of the thesis was to investigate how to integrate sociability. The online stores evaluated and their market segment is presented in Table 4.2:

Table 4.2: Online stores selected for evaluation

Website	Segment
Apotea.se	Food and personal care
Apoteket.se	Food and personal care
Adlibris.se	Books
Boozt.com	Fashion
Bygghemma.se	Building materials
Cdon.com	Electronics and media, Furniture and appliances
Dustin.se	Electronics and media
Ellos.se	Furniture and appliances, Fashion, Electronics and media
Elgiganten.se	Furniture and appliances, Electronics and media
Hm.com	Fashion
Komplett.se	Electronics and media
Mathem.se	Food and personal care
Nelly.com	Fashion
Netonnet.com	Electronics and media
Zalando.se	Fashion

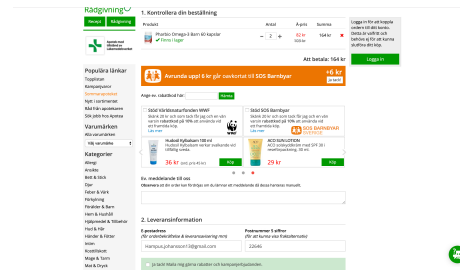
A shallow preliminary evaluation revealed that all reviewed online stores followed a very similar conceptual model. Fundamentally, the online stores consisted of products, each with its own *product page*. The products could be put in a shopping basket, which was visible on all pages. When the consumer was ready to pay, there was a checkout page with payment and delivery alternatives. In all reviewed cases, the products were part of one or more categories, each with its own *category page*. Categories were hierarchical, i.e. a category could be a subcategory of another category.

Following the preliminary review, a more thorough evaluation was conducted with the found conceptual model as a basis (for full result see Appendix A):

- **Menu bar** - All menu bars in the reviewed stores displayed some kind of logotype, a search bar and a shopping cart. A link to a login page was present on all but one of the reviewed stores. 11 of the menu bars had some kind of drop-down menus to display categories or subcategories.
- **Index page** - The index page on all stores displayed campaign images as well as some selected products. Some type of link, usually graphical (e.g. icon or image), leading to category pages was present on all but one store. An index page is displayed in Figure 4.1a



(a) An index page, from Cdon.se



(b) Part of checkout page from Apotea.se

Figure 4.1: Common page layouts in an online store.

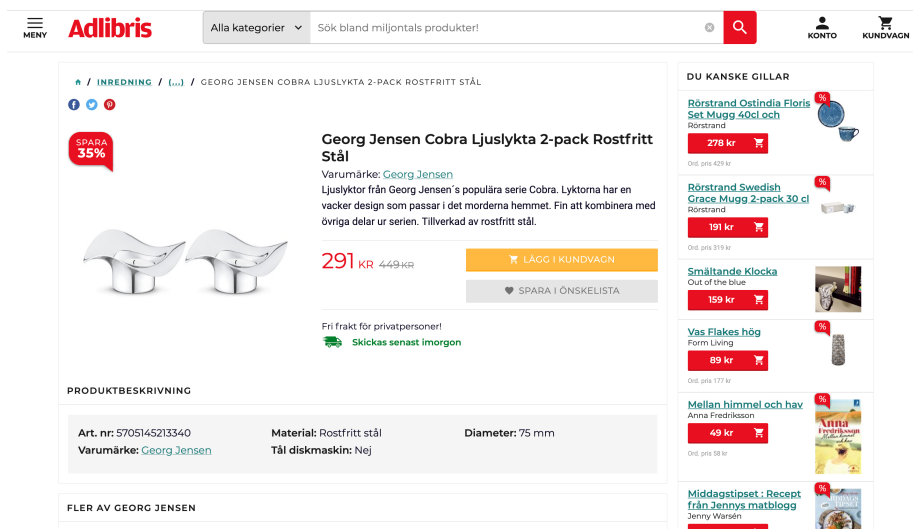


Figure 4.2: A product page from Adlibris.se

- **Category page** - In 12 out of 15 cases, the category page contained products belonging to the category. The products were presented as items in a grid, 3x3, 4x4 or 5x5. In all evaluated stores, sorting functionality was present above the product grid. All category pages which displayed products also had filter functionality at the top or to the left of the product grid. In some of the stores the hierarchy of categories was present to the left of the product grid.

The category pages of some of the stores did not display products if the category was high up in the hierarchy, i.e. it had one or many subcategories. In these cases, the category page displayed subcategories instead. An example of a category page from Zalando.se is displayed in Figure 4.3.

- **Category page product** - The product items within the category grid or list consisted of a product image, price and title. However, only 8 stores had an add to cart button and only 5 displayed a general description of the item.
- **Product page** - In all reviewed stores, the product page presented an im-

age of the product, the product title, price and an add to cart button. The product pages within the fashion segment also contained alternatives, such as the size and/or colour of the product. All product pages also presented detailed information about the product. For example, in the electronics and media segment the typical detailed information was technical specifications, while within fashion, the detailed information consisted of information regarding e.g. fabrics used. Figure 4.2 display a typical example of a product page layout.

- **Checkout** - 13 of the stores had a single checkout page, which displayed the product basket and total price followed by input forms for address and delivery options, and finally payment. Figure 4.1b show a checkout page from Apotea.se.
- **Mobile screen** - Most design features were the same or very similar between mobile and desktop screens. The most noticeable difference was changes in the menu bar and that products was shown in a list (i.e. a 1x1 grid). The mobile menu bar still consisted of a brand logotype, search bar and shopping cart. 12 of the stores opted for a hamburger menu to support navigation to for example category pages. 9 of the mobile menu bars had a link to login and 8 had some kind of profile icon.

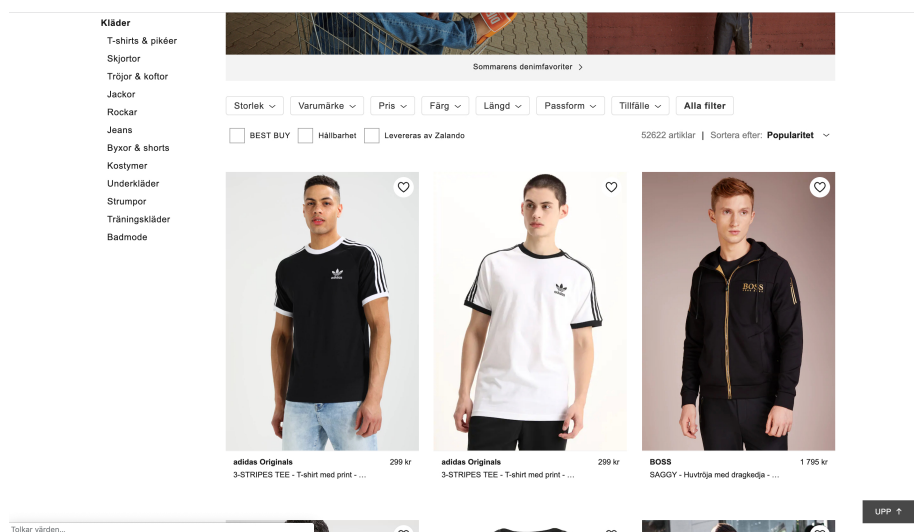


Figure 4.3: A category page from Zalando.se

### 4.3 Defining the users

Understanding the users is essential when applying user-centered design. In this section demographic factors regarding e-commerce consumers will be the focus. A lack of Swedish statistics regarding *e-commerce*, is what motivated choosing European statistics. Firstly, regarding age; a study by Eurostat (2018) show

that approximately 73% of the respondents within the age spans 16-25 and 25-54 years bought goods or services online for private use the previous year. The same figure for the 55-74 age span was 55%.

Regarding the frequency of online purchases within a three month period, it was quite evenly distributed between the age groups, 16-25, 25-54 and 55-74. However, the 25-54 group stood out with a larger portion of people who shopped online more than ten times within three months. Conclusively, the statistics indicate that a larger portion of the 16-25 and 25-54 year old's shop online, and that the 25-54 age group shop online with the highest frequency.

The online shoppers in the study were evenly distributed between the measured genders, male and female. Data concerning occupation showed that 75% of the employed and 70% of the studying respondents bought goods or services online the previous twelve months. Among retirees and unemployed the same figure was 55%. Regarding the education level of the shoppers, the largest gap was found between highly educated and lowly educated. 84% of the highly educated, but only 48% of the lowly educated, bought services or goods online within the last twelve-month period (Eurostat, 2018).

Finally, social media usage in Sweden is highest among the age groups 16-25 years and 26-35 years, at 61% and 67%. The age groups 36-45 years and 46-55 years have a slightly lower social media usage at 58% and 59%. The 56-75 year age group has a significantly lower social media usage at only 39%. Summarizing, this means that the social media usage and e-commerce usage is very similar within the age groups presented in this section (Tankovska, 2019).

## 5 Conceptual phase

### 5.1 Choice of products

To investigate the influence of product characteristics on s-commerce design, four different product categories were selected for inclusion in the thesis. The products selected were: *jeans*, *headphones*, *gaming laptop* and *books*. The motivation behind the choice of products was to represent different product characteristics. The gaming laptop is an example of a typical search product, since it is possible to evaluate most key aspects of the laptop such as the processor, graphics card and memory before experience. The operating system was not considered, but it should be noted that most computers used for gaming have Windows installed. A book on the other hand, is an archetypal example of an experience product.

Jeans possess some features that could be evaluated before experiencing them, such as size and colour. However, as with many clothing items, users prefer to try them on before buying them. This indicates that jeans possess both search and experience features. Headphones also possess both search and experience qualities. The perception of the headphones sound and sound quality is individual, but the look of the headphones or if they have certain features such as Bluetooth could be evaluated before experience. Regarding product price, books are a relatively low-cost product and gaming laptops a relatively high-cost product. Jeans and headphones exist in the mid-price-range relative to the gaming laptops and books.

### 5.2 Scenarios and personas

*Scenarios* are informal narrative descriptions of activities or tasks often presented in a story format. Scenarios are useful since they facilitate investigating users context and activities (Preece, Sharp, and Rogers, 2015, p.223-226). *Personas* are evidence-based character sketches of archetypal users. They represent typical behaviour patterns and goals of larger groups of users as they relate to your product (Rubin and Chisnell, 2008, p.331-332). Scenarios and personas complement each other since it is possible to formulate scenarios revolving around a persona's tasks and context. To further identify stakeholders and use cases, scenarios and personas were created. The personas were based on the statistics presented in *defining the users*. The scenarios were partly based on the conceptual model presented in *review of online stores*. The scenarios were created by elaborating on what a s-commerce experience could look like for a particular persona.

### 5.2.1 Scenario 1

**Persona** - Monica is 36 years old, married and has a four-year-old child. Monica is a Master of Science in business management and works as an account manager at a management consultant bureau in a larger city. Monica lives in a villa in the suburbs and since she is environmentally conscious, she has decided to commute to work by train, which in total take 60 minutes per day. During the commute she has access to a smartphone and a decent internet connection. Monica's interest include travelling, Instagram, food and fashion

**Scenario** - On her way home from work, Monica decide to buy a new pair of jeans. Using her smartphone, she browses to an online fashion store and navigates to the category female-jeans. By applying filters, she narrows down the search area to jeans in her size, with a dark-blue colour, a slim fit and made from sustainable materials; then she sorts them by price, low to high. As she scrolls through the jeans she opens the ones that look good.

Whilst a product is open, she looks at tags made by other users regarding the fit of the jeans as she worries the jeans will be too tight over her thighs. Some people have posted Instagram posts of themselves wearing the jeans, which she considers helpful. She adds the jeans that fulfil her criteria to the shopping bag, by clicking on the add to bag button. At checkout, Monica ends up with 4 pairs of jeans in her basket. She evaluates them again and dismisses two pairs since they are too similar to the other two. Finally, Monica enters her delivery address and pays using invoice. 2 days later, she receives the jeans and she tries them on. One pair of jeans fit good, but the other pair was too tight. She decides to return the pair that was too tight and visits the website again to tag the jeans with the 'tight fit' tag.

### 5.2.2 Scenario 2

**Persona** - Amir is 20 years old and studies electrical engineering at a university. He lives in a student communal living and is interested in technology, gaming and music. In summers, Amir work at a technical support hot-line for a larger company.

**Scenario** - As Amir's old headphones broke, he wants to buy new ones. As he likes listening to music, the headphones must have good sound quality. He has read about some good headphones on forums and looked at a couple of video reviews of headphones - thus generating a shortlist of headphones to consider. He navigates to an online electronics store. He uses the search functionality in the menu bar to search for the shortlisted headphones and adds them to his wish list as he finds them.

After more contemplation and after reading reviews about the headphones he selected, he adds a pair of headphones to the cart, navigates to checkout and pays using Swish. 3 days later the headphones is delivered and he tests them. He is very satisfied overall, but is a little bit disappointed with the base register, so Amir decides to write a review. He visits the website again, search for the product and writes a review and rates the headphones with 8 out of 10 stars.



### 5.2.3 Scenario 3

**Persona** - Göran is 48 years old, divorced and works as an accountant. He lives in a terraced house in a medium-sized Swedish city and bikes to work every day to keep in shape. He has a 14-year old daughter who is interested in gaming and a 17-year old son who play football.

**Scenario** - Göran's daughter's birthday is coming up and she wishes for a new computer as a birthday gift. Göran has decided to buy a gaming laptop as a present to his daughter, however, he is unsure regarding what gaming laptop to choose as his knowledge about computers is limited.

He browses to an online electronics store and navigates to the gaming laptop category, although this does not make it easier as there are many laptops to choose from. He sees a chat function and asks a sales representative in the online store for good suggestions and is provided with three relevant choices. Then, he chooses the gaming laptop with the lowest price, while still having favourable reviews. He navigates to checkout, enters his delivery address in a form and pays through invoice.

### 5.2.4 Scenario 4

**Persona** - Ann-Marie is 65 years old and is newly retired from a career as an assistant nurse. She lives in a villa in a smaller city and enjoys hiking, gardening, reading and interior design. She has low experience using online stores.

**Scenario** - Ann-Marie wants to buy two new books to read during the summer. She wants a new criminal fiction book and one modern fiction book. She browses to an online store and navigates to the books category. Ann-Marie has previously read about the August prize winners in a magazine. She finds a link on the index page, linking to August Prize winning books. She finds the latest winning book and adds it to the shopping cart. Then she opens the book category from the menu bar, applies a filter for the criminal fiction category and finally sorts the books by rating.

She finds a criminal fiction novel with favorable reviews, opens the product page and read some comments. The comments are overwhelmingly positive; therefore, Ann-Marie adds the book to the shopping cart. Finally, she clicks the checkout button, enters delivery information and pays using a credit card. 7 days later she receives the books. She want to discuss the book, so she visits the online store again and discusses the book with others in a forum and write a review of the book.

## 5.3 Design requirements

Based on the CBF, additional design features were identified. There is overlap between, for instance, website quality and the s-commerce design features presented in Section 4.1. Therefore, only some website quality features were considered. Moreover, the scenarios revealed some design features not present in Table 4.1, which are presented in Table 5.1:

Table 5.1: Additional s-commerce design features

Feature	CBF
37. To make online salespersons available through a virtual agent	SP, Scenario 2
38. Socially enriched text	SP
39. Pictures portraying humans	SP
40. Displaying 'n others also view this'	SP
41. Report post button, to help moderators find abusive content	Social support
42. Welcome screens	SP
43. Profile pictures / Avatars	SP
44. Emoticons	Hedonistic value, Perceived enjoyment, SP
45. The website should be attractive (aesthetic effects and emotional appeal)	Website quality
46. Texts should be consistent, readable, have breathing space and capital letters	Website quality
47. Good contrast between background and text colour	Website quality
48. Organization's logo is clear and noticeable	Website quality
49. Short download speed	Website quality
50. Multi-browser support	Website quality
51. Working properly using different screen settings	Website quality, Scenario 1
52. Provide good organization	Website quality
53. Provide a fun content	Hedonic value, Perceived enjoyment
54. Don't ask for irrelevant information	Perceived relevance
55. To provide social tagging of content	Scenario 1
56. To show pictures or videos from social media platforms	Scenario 2

The features presented in Table 4.1 and Table 5.1 are essentially a preliminary series of requirements. Therefore, they will be referred to as the design requirements (DRs). The conclusive list of DRs is presented in Appendix B. Satisfying all or many of the requirement would likely result in a good user-centered design of an s-commerce platform.

## 6 Initial prototyping phase

### 6.1 Creating the e-commerce prototype

A lo-fi prototype of a fictive e-commerce platform was created based on the findings in *Review of online stores*. Furthermore, the e-commerce prototype was created to support shopping of the four product categories: *jeans*, *headphones*, *gaming laptop* and *books*. The prototype was created using the design software Adobe XD (Adobe, 2019). The fictional e-commerce prototype would likely satisfy many of the DRs, as it was based on a series of already established online stores, although this was not evaluated.

The e-commerce prototype consisted of an index page (Figure 6.1), category pages for jeans, gaming laptops, books (Figure 6.2) and headphones. Product pages for each of the products: jeans, gaming laptop (Figure 6.3), books and headphones were also created.

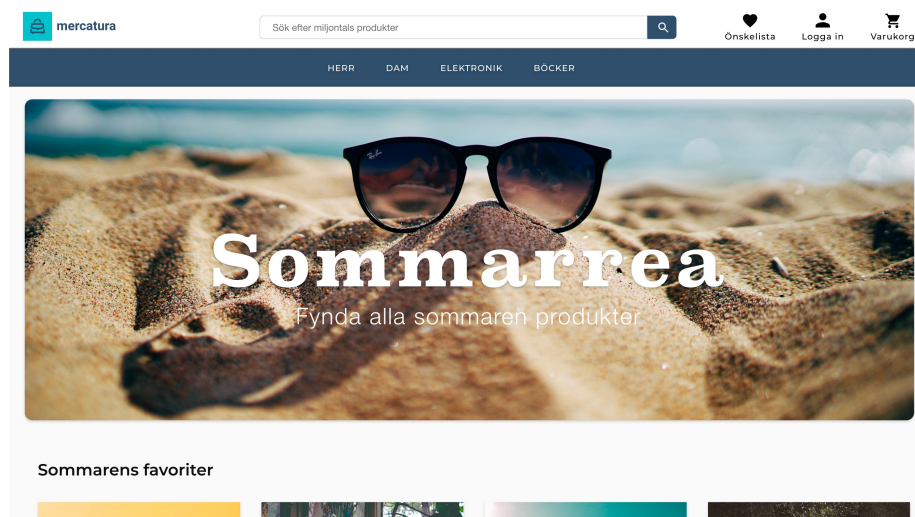


Figure 6.1: Index page of the e-commerce prototype

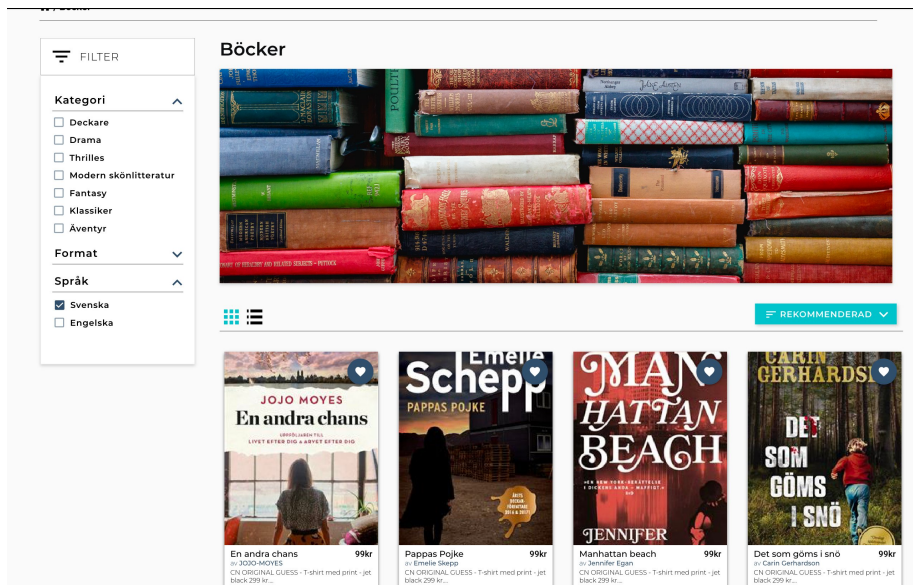


Figure 6.2: Category page for the books category

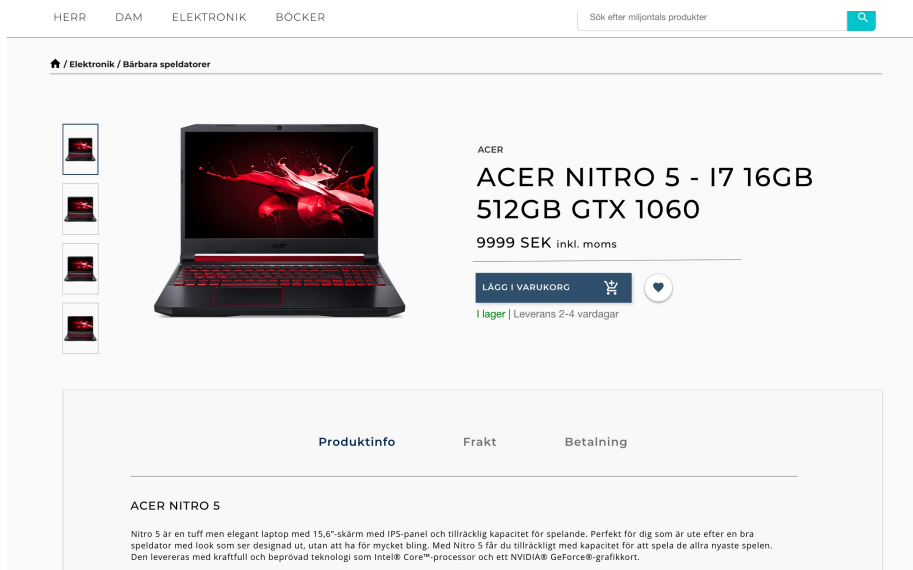


Figure 6.3: Product page for a gaming laptop

## 6.2 Participatory design workshop

In participatory design, the user becomes a part of the design team. As a result, participatory design encapsulates many key features of UCD as it provides an opportunity to directly tap into users experiences, opinions and knowledge (Rubin and Chisnell, 2008, p.17). Velden and Mörtberg (2014) present two

common methods for practising participatory design: *card methods* and *participatory prototyping*.

A participatory design workshop was conducted to gain insights into how different aspects of sociability could be integrated into the fictive e-commerce store. The main objective of the participatory design sessions was to find features and design suggestions concerning mainly what differentiates s-commerce from e-commerce, - *sociability*.

The participants in the workshop were a 23-year-old woman, a 24-year-old man, both employees at tech companies and a 24-year-old male student. The participatory design workshop was divided into two sessions, where the first session used a *card method* and the second applied *participatory prototyping*.

### 6.2.1 Card method session

Using cards to represent different features, feelings and values is common in participatory design. One common way of utilizing cards is to express importance, priorities and processes. For example, Velden and Mörtberg (2014) created inspiration cards representing important people, things, feelings, and skills for children transitioning from a children’s hospital to an adult hospital. The children were then allowed to select cards they considered important for each stage of the transition process to the new hospital.

Before the card method session, inspiration cards representing s-commerce features and content, defined in the DRs, were created (see Table 6.1). The cards were made by considering the social aspects of the DRs, mainly those correlating with the *conversation and community* layers of model 1 and *sociability* layer of model 2.

The participants, hereafter referred to as the participatory designers (PDs), were allowed to select cards they found important for each of the product categories, i.e. jeans, headphones, gaming laptop and books. The selected cards were ordered left to right based on their importance, right being the most important. All selections were discussed to gain more insight into the choice of a specific card. The PDs had access to empty cards in case they missed certain features.

Table 6.1: Cards used in card method session

Card	DR
Asking sales representative through chat function	10,23, 38
Being able to ask about a product or category in a forum	7,10,23,24
Comments made by other users	1,23,25
Likes of the product made by other users	5,23,25
Pictures portraying other users in or with the product	39
Reviews made by other users	2,23,25
Sharing the product on your own social media timeline or in a chat	6

Reading other people's discussion about the product or category in a forum	7, 10, 23, 24
Seeing if other people watch the product	40
Tags (1-2 words) made by other users	23,55
Videos about the product or category made by other users	23, 24, 56

The most important features, selected by the PDs, for each product category are presented below in descending order (1 being the most important feature):

### Jeans

1. *Pictures portraying other users in or with the product* - The PDs wanted as many pictures of other people in the jeans as possible. They wanted pictures both of studio models as well as "ordinary people" wearing the clothes. They noticed that it is common among some online stores to display Instagram pictures of non-models wearing clothes sold in the online store.
2. *Reviews made by other users* - The PDs thought that comments and reviews alike, give an indication regarding factors such as fit and colour.
3. *Comments by other users*
4. *Sharing the product on your own social media timeline or in a chat* - The PDs were divided regarding this card. They agreed on, that they would never share jeans publicly in their own social media timelines, but maybe in a chat to get opinions from someone they trust.
5. *Tags (1-2 words) made by other users* - The PDs said that they prefer comments and reviews over tags, but that tags could be good for aggregating information. They did not like the idea of free-text tags, they wanted somewhere around 5 predefined tags regarding for instance fit.
6. *Reading other people's discussion about the product or category in a forum* - They did not think forum discussions were important for a pair of jeans specifically. However, they thought discussions about the brand could be helpful, especially if the jeans were expensive.

### Headphones

1. *Videos about the product or category from social media* - The PDs mentioned that video reviews are the best kind of reviews. They perceived many reviewers on for instance Youtube as unbiased experts with high credibility. Also, the video format, in general, gave a 3D feel of the product.
2. *Pictures portraying other users in or with the product*
3. *Reviews made by other users* - The PDs stated that people who care and have knowledge usually write reviews, which makes them valuable in the decision-making process.

4. *Reading other peoples discussion about the product or category in a forum* - If they lacked information about what to look for when buying headphones, the PDs would like to read discussions in a forum.
5. *Someone else who has asked a question about the product or category in a forum* - The PDs would start by looking at more general question, such as "I got a budget of x, what headphones should I buy?". Then they would look for discussions about the specific product.
6. *Sharing the product on your own social media timeline or in a chat* - If a PD knew someone with much knowledge about technology or headphones, the PD would consider asking the friend about for example durability, support or what to look for in headphones. One PD said that sound quality is subjective and that he did not trust others regarding that aspect of the headphones.
7. *Comments by other users*
8. *Being able to ask about a product or category in a forum* - The PDs would maybe ask a question about the product, but generally not. They were more likely to do so if the price if the product was high.

### **Gaming laptop**

1. *Videos about the product or category from social media*
2. *Reviews made by other users*
3. *Asking a question about the product or category in a forum* - The PDs would like to ask specific questions, such as if they could play a specific game on a specific computer.
4. *Someone else who has asked a question about the product or category in a forum*
5. *Reading other people's discussion about the product or category in a forum*
6. *Sharing the product on your own social media timeline or in a chat* - If the PDs had limited knowledge about computers they would consider asking a friend through a chat, if they have a friend with more knowledge.
7. *Comments by other users*

### **Books**

1. *Reviews made by other users*
2. *Reading other people's discussion about the product or category in a forum*
3. *Being able to ask about a product or category in a forum* - Mostly to find new books to read and to get recommendations from others.
4. *Asking sales representative through a chat function* - The PDs would consider asking a sales representatives to suggest books based on books they previously read.
5. *Videos about the product or category from social media*

## Other observations

Generally, extensive texts written by other users, such as reviews, were perceived as more important than comments and tags. The PDs thought that tags and comments did not provide enough information about experience characteristics such as sound quality. Likes of a product were for example deemed unimportant in all cases, as the likes did provide scarce additional information about the product. If someone else looks at a product simultaneously was also considered unimportant and even stressful. They did not like the idea of rating other peoples reviews or having rated reviews either.

Some interesting discussions also arose regarding *Asking store sales representatives through the chat function*. The PDs had seen chat functionality before on e-commerce platforms, but did not use it as they did not trust the competence of anonymous store personnel. However, if they were shopping at a very niche online store, they thought the probability of chatting with high competence personnel would be higher, and that the likelihood of them using a chat would increase.

It is worth noticing, that pictures of others wearing the product was added to the DRs based on social presence theory. Although, during the session, the PDs wanted the pictures for utility reasons. Additionally, regarding their own shopping process, the PDs preferred to first create a shortlist of products within a category. They would base their shortlist on, for example, others recommendations (e.g. in forums or in videos) and recommendation engines. Finally, they would look at the products individually, considering, for instance, the price and reviews of the product.

### 6.2.2 Participatory prototyping session

In this session, the users were able to contribute to the design of the s-commerce store by using participatory prototyping. Participatory prototyping is a method to explore ‘what is’ and ‘what could be’ (Velden and Mörtberg, 2014). The participants were presented with the fictional e-commerce prototype as well as parts of the scenarios and personas. The scenarios were formulated as: *”imagine being Göran and that you want to buy a new gaming laptop to your daughter”*, thus omitting certain story parts of the scenarios allowing the PDs to form these stories themselves.

The PDs were asked to draw alternate versions of or changes in the e-commerce prototype, using markers and a whiteboard. It is important to note that the PDs were allowed to incorporate sociability aspects that could help the personas. DR51, to support different screen sizes was also considered in the case, *Monica buying jeans*.

#### Monica buying jeans

The PDs hypothesized that Monica might want to share the jeans on social media to get others approval. To facilitate this a *share button* (upwards arrow in Figure 6.4) was introduced into the design. The PDs opted for reviews to indicate the fit of the jeans, as Monica was worried the jeans might be too tight. The PDs also drew range sliders indicating various important features. Filtering by likes or *”trending”* was also proposed, as the PDs thought this was something Monica would like.



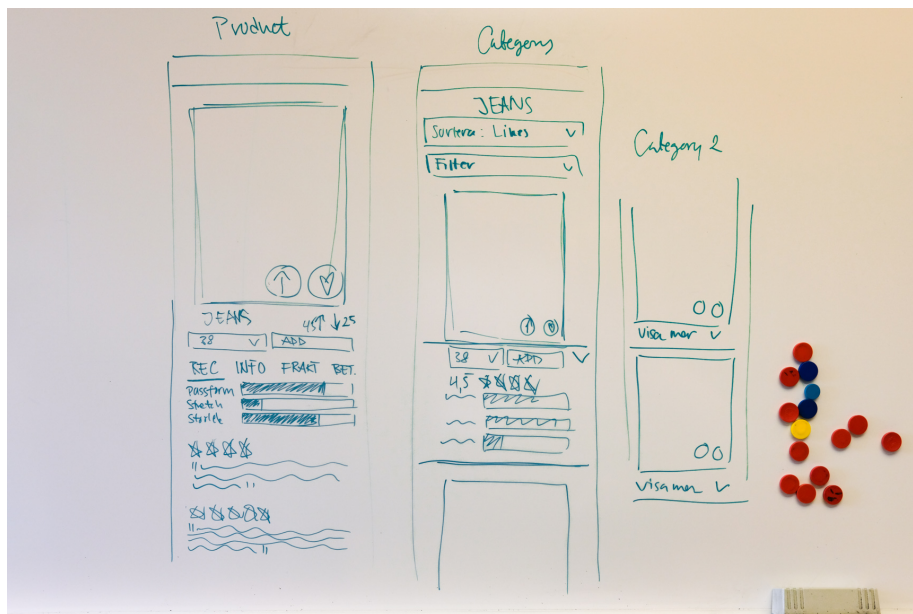


Figure 6.4: The PDs lo-fi prototype of jeans category and product pages

### Amir buying headphones

On the product cards, in the grid, the PDs drew circles indicating posts from forums or video reviews on social media. The PDs thought Amir would like to watch video reviews and read about products in forums. A share button, to, for example, send the product in a chat, was designed. Finally, the PDs thought that Amir would like to *read* reviews, thus *reviews* was added to the information tabs on the product page.

### Göran buying a gaming laptop

The PDs imagined that Göran might use the chat function, but that Göran, most likely, would call the store to ask about what gaming laptops to buy. To facilitate this, a footer with a visible phone number and a visiting address was added to the design. The PDs also thought specific and "easy" information was important for Göran, such a game x work on this computer.

### Ann-Marie buying books

The PDs thought that Ann-Marie would like to get recommendations based on what she had previously read. Thus, the category page was redesigned to be more personal. A profile page (my page) where books could be saved was also created. The PDs also imagined that Ann-Marie would like to discuss the books after reading them, thus they designed a discussion button on my page as well as integrating a *book club* that Ann-Maire could join. Reviews were also integrated into the product page.

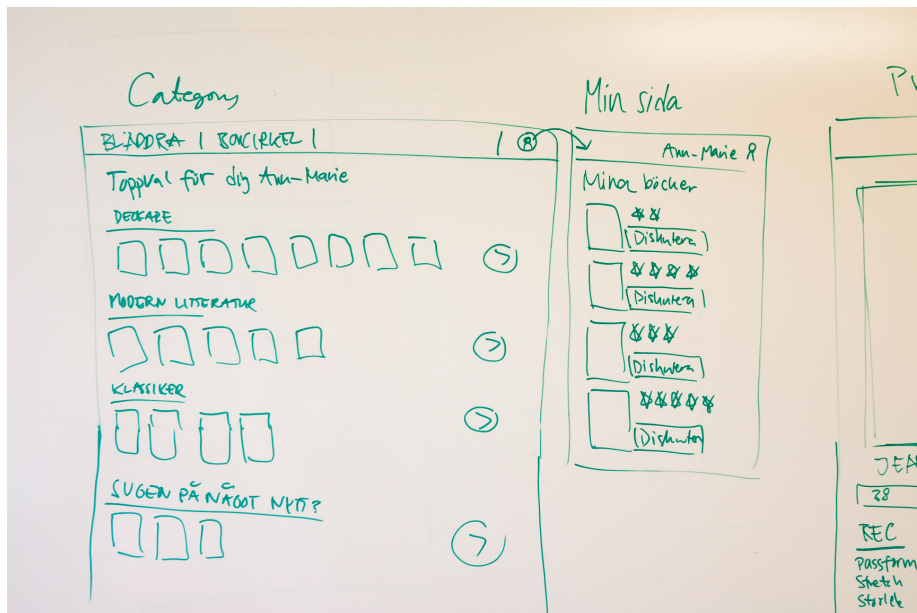


Figure 6.5: The PDs lo-fi prototype of a book category page and my page

## 7 Lo-Fi prototyping

A Lo-Fi prototype is a representation of a system, done in a quick and easy way with low fidelity. As a result, users could test a representation of the system early, facilitating faster and cheaper iterations of the design. This chapter presents how the first *social* version of the fictive e-commerce prototype was built and evaluated. The social e-commerce prototype extended upon the fictive e-commerce prototype presented in section 6.1 *creating the e-commerce prototype*.

### 7.1 First iteration

To incorporate some of the design features and concepts introduced in the participatory design session, an iteration of the fictional e-commerce platform was performed. To facilitate the introduction of new features, a sidebar was created on the category page for each product category. The sidebar was also added to facilitate *discoverability* of social features and content. The sidebar contained, at minimum, a link to my page and a link to view all products belonging to a specific category.

As the PDs indicated that *Reviews made by other users* was important for all of the product categories, a new tab containing reviews was introduced next to product info, as proposed in the participative prototyping session (see Figure 7.1). This was done for all product pages. A *create review button* was also introduced, to facilitate users creating their own reviews. Additionally, the possibility to view, edit and remove reviews was added to the user's profile page (my page).

Comments were omitted from this stage of prototyping, in favour of only reviews. The motivation for this decision was that reviews and comments are very similar and that it would be favourable to focus more on one them, before implementing the other. Moreover, a footer containing a phone number and address was added to all pages, as introduced in the participatory prototyping session. Further design changes were made and will be presented for each of the product categories respectively.

#### 7.1.1 Jeans

On each product card (when display in a grid) as well as on the product page, a *share button* was added to let users share a pair of jeans in for example a chat or in their feed. This feature was introduced in the participatory design session, as the PDs thought the persona would like to share products in social media. The

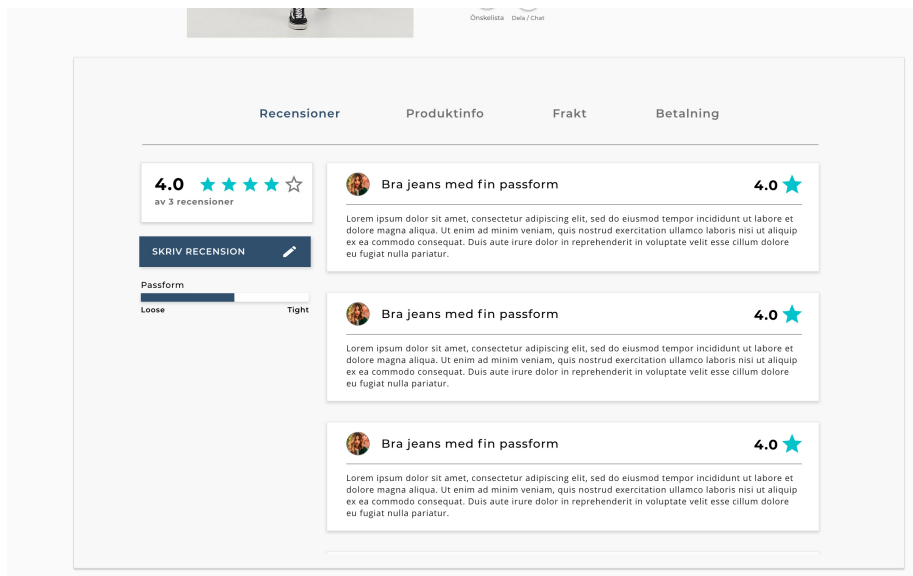


Figure 7.1: Reviews introduced into the product page design

icon chosen to represent the share feature was three connected dots, indicating some kind of forwarding of information. Finally, a form of strict tagging was also introduced, conveying the fit of a selected pair of jeans.

### 7.1.2 Headphones and Gaming laptop

*Videos about the product or category* was selected as the most important sources of information when buying or looking for headphones. Therefore, a play button was added to the product card and the product page. The thought being, that by clicking the button, the user could see embedded videos about the product. In the participatory prototyping, profile avatars (e.g. profile images from Youtube) was added to the product card. Although, to make sure additional buttons representing features could be added, they were omitted in favour of the play button. Furthermore, a link to see videos about headphones as a category, e.g. videos about "2019s best headphones" or "what to look for when buying headphones", was introduced.

A forum was also introduced to provide the opportunity for users to ask questions and have discussions, for example about a specific pair of headphones or more general discussion on what headphones to buy (see Figure 7.4). The importance of having a forum was highlighted by the PDs in the participatory design session. The forum was built around threads, each with its own topic. On the forum page, users had the opportunity to start their own thread by clicking the add thread button. A thread could be opened by clicking on it. The user's threads and the user's answers to topics in threads were also added to my page. Finally, a button was added to the products allowing the user to search the forum for mentions of that product (see Figure 7.2 and Figure 7.3)

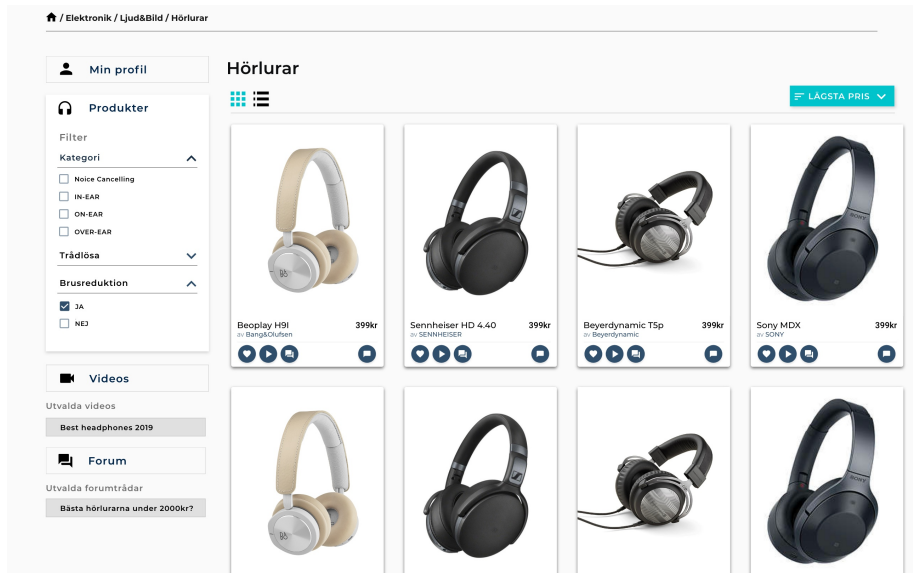


Figure 7.2: First iteration of the headphone category page

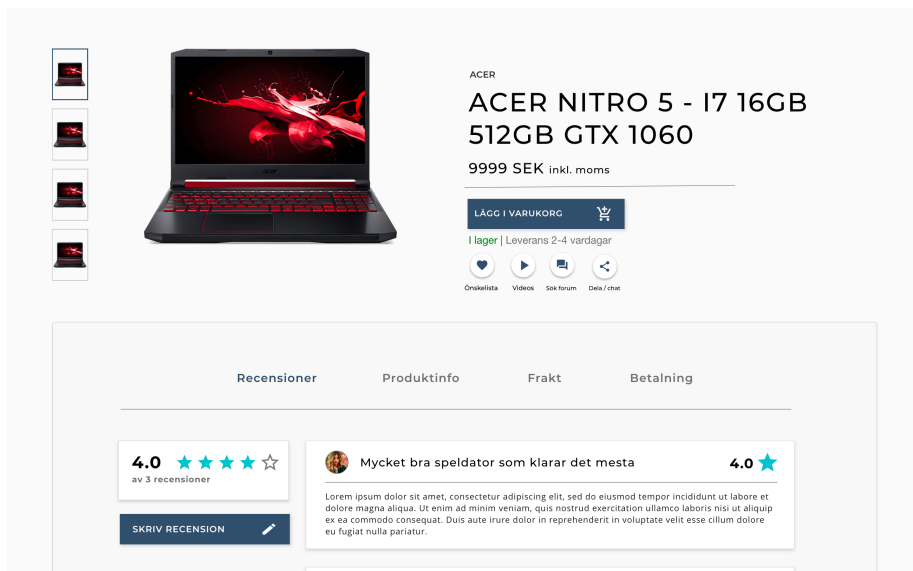


Figure 7.3: First iteration of gaming laptop product page

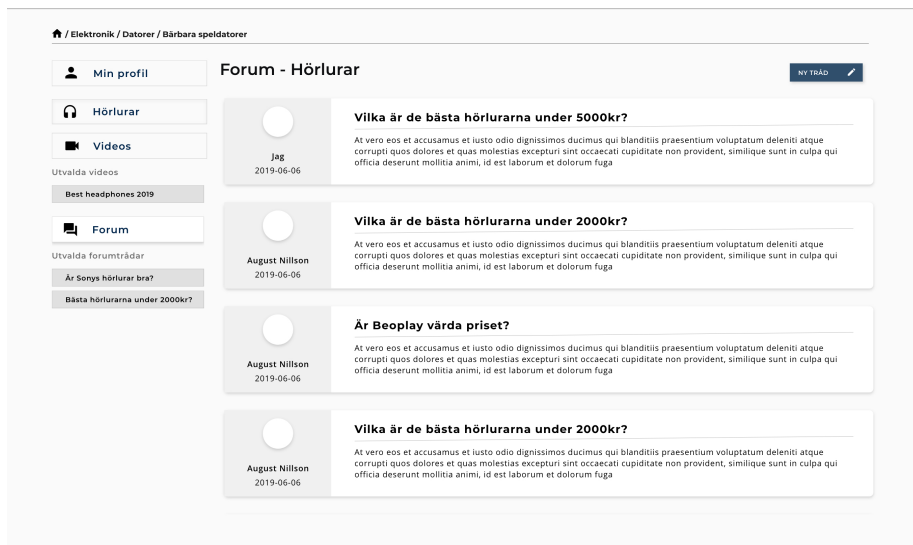


Figure 7.4: A forum page for the headphones category

### 7.1.3 Books

*Other people's discussions about the product, and the ability to ask questions about the product, were considered the second and third most important design features during the participative prototyping session. The PDs suggested having book clubs where the users could discuss books. Therefore, book clubs were introduced into the design and a link to various book clubs was added in the left menu bar. To join a book club, a join book club button was added to book clubs page. On a book club page, discussion about a book could be reached (see Figure 7.5). Discussions about a specific book could also be reached from a discuss button, visible on the book product page.*

Furthermore, the layout of the books page was altered to be more similar to the one introduced in the participative prototyping session.

## 7.2 Formative study

A formative study is common at the beginning of a UCD process - to evaluate the effectiveness of early design concepts. It is common in formative studies for users to perform representative tasks or to simply talk about prototype pages (Rubin and Chisnell, 2008, pp. 29-30).

To get early feedback about the lo-fi s-commerce prototype, a formative study was conducted. The main objective of the study was to evaluate if the new features, added in the previous iteration of the design, were *understood* and *discoverable*. The study mainly concerned how well the integration of sociability worked. It is worth pointing out that evaluating the *importance* of specific features was *not* the objective of the study. The test persons (TPs) were asked to perform tasks related to the new features. They were also asked open questions

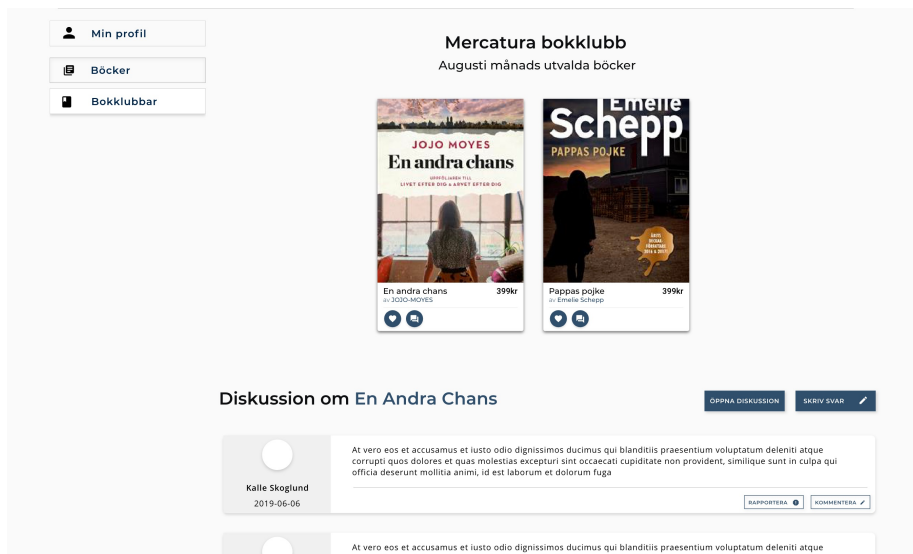


Figure 7.5: A book club page for Mercantura book club

about some of the pages they visited when performing tasks. The test/study is outlined in a test plan found in Appendix C.

The test was conducted by three participants: a 26-year-old woman (TP1), a 59-year-old man (TP2) and a 48-year-old woman (TP3). The main motivation behind selecting the participants was their availability. The two women used social media quite frequently, while the 59 year old man had scarce experience of social media usage. The test took place in a quiet household environment and all tests were recorded auditory through a microphone. The TPs interactions with the prototype was recorded with a screen-recorder and each test lasted about 30 minutes.

## 7.2.1 Results

### Reviews

None of the TPs experienced problems finding or understanding the reviews, which were located at the end of the product page. One TP noted that, often, reviews are present at the end of a product page. However, *posting a review* for a previously bought product turned out to be more difficult. All TPs reasoned that they should first find the product, in this case, the jeans. After contemplation, TP1 navigated to *my page*, and found the jeans under the header, *previously bought products*. TP2 and TP3 navigated back to the jeans category to find the jeans. A larger number of jeans to select from, than in the test, would have made this procedure much more difficult. After opening the jeans product page, the TPs scrolled down to reviews and pressed the *add review button*.

Although, the *add review* functionality was not implemented, TP1 and TP2 suggested that it would be logical if a modal appeared in which they could write about and rate the product. TP3 suggested that it would be easier if the jeans to review appeared at the top of the category page or in some way automatically

appeared when visiting the online store again after a purchase.

Regarding *removing a review*, TP1 thought that previous reviews would be located on my page and consequently navigate to my page and found *previous reviews*. The review functionality was not implemented, thus *my reviews* did not contain any reviews. However, TP1 indicated that she would have pressed a delete button to remove a review. TP3 thought the remove review functionality would be present on the product page, which was not the case, leaving her clueless. After guidance by the the test moderator, she found my reviews in my page. TP3 mentioned that it would be more logical to present the review where she wrote it, i.e. on the product page.

### Share buttons

There were two versions of share buttons present in the prototype:

- *General share button* - Used for general sharing of content and represented in the design by an icon displaying three connected dots. Without an explanatory text beneath the button, as seen from the category page, TP1 was the only one who understood the general share button. However, with an explanatory text beneath the button, TP3 understood the functionality, while TP2 missed the button entirely. When clicking on the button, TP3 suggested that alternatives would appear regarding where to share the product.
- *Chat share button* - Used for explicitly sharing content in a chat and represented by a balloon icon. When asked if they could share the computer in a chat, both TP1 and TP3 pressed the more chat share button. TP2 did not understand this functionality and said he would rather send a text-message or an email.

### Forum

When asked about what the *forum tab* in the left menu bar (on the product page) might mean, TP1 and TP3 were unsure. TP1 speculated that it might contain reviews made by others while TP3 had no idea. When asked to read about different types of headphones in a forum, TP2 and TP3 pressed the *search forum button* (while on the product page). Only TP1 pressed the forum button in the left menu bar to navigate to the forum. Whilst on the *forum page*, all participants managed to create a new *forum topic* and to open the topic to view answers. To remove a forum topic (thread) all the participants navigated to my page, found my forum topic and clicked the remove button on the topic they previously created. Without an explanatory text, none of the participants understood the search forum button.

Although not explicitly asked about them, TP1 and TP3 did not seem to notice or comment on the highlighted videos or forum posts in the left menu bar. TP2 saw them, but commented that he generally would not trust content highlighted in such a way by retailing websites.

### Videos

Although it was not implemented, the participants were asked what the *video tab* might contain. TP1 and TP3 thought it might contain videos about specific



products, but were generally unsure. The *video button* for a specific product was also not understandable when seen from the category page. TP2 thought the play icon meant you moved forward to the page while TP3 thought it might mean listening to something.

When asked if they could see a video about a specific pair of headphones, TP1 and TP3 understood correctly what the play button meant. TP2 navigated to the product page and with the explanatory text beneath the button, understood the meaning of the it. When asked to watch a video about what to look after when buying a computer, i.e. a more general video about a category of products, TP2 and TP3 used the play button. TP1 thought that the play button on the products would show a more specific video, while the video link from the category page would be more general. TP3 suggested that she would like the videos to be presented more clearly on the product page.

### **Book club**

None of the participants encountered problems finding or joining a book club. When asked to discuss the book, TP2 and TP3 navigated to the books category and found the book there, while TP1 found the book from previous purchases on my page. To discuss the book, all the participants pressed the discuss button on the book product page. All of the participants managed to find the functionality related to writing a reply in a book discussion.

### **Other observations**

Although not the purpose of the test, it is worth to note that the participants navigates to the product categories and the products with ease. TP1 and TP3 understood the wish list button, but not TP2. The filtering mechanism was not tested either, but all the participants mentioned that the filters were used to limit the search space by certain criteria. TP2 also mentioned that he preferred review aggregation websites as he perceived them as more trustworthy than "seller websites".

## **7.2.2 Summary**

It was evident from the tests that the icons used to represent the video, share and search forum features must be reevaluated. Always presenting the buttons with explanatory text could also be a possible solution. It was also apparent that the TPs experienced problems to differentiate between content and features concerning a whole category and content and features concerning only a specific product. This was most evident on the category page, where the differentiation between the actions in the side bar and the buttons on the product cards was not clear enough.

The video page as a whole also seemed confusing for the TPs. Finally, it is noticeable in the tests that the TPs would like to have content and features related to a certain product, presented on that product page.

## 8 Hi-Fi prototyping

Contrary to the lo-fi prototype, the hi-fi prototype was implemented as a real web page, constructed with web technologies such as HTML5, CSS3 and JavaScript. To increase the speed of the development process, the JavaScript library React was heavily used throughout the prototype. Since the amount of data needed to construct a realistic s-commerce store (e.g. product images, specifications, users, reviews) was high and since the data was highly connected, a graph database was used for storing all information. The graph database of choice was Neo4j. For accessing the database, a Java server was set up, built upon the Java web framework Spring MVC (Spring Boot).

### 8.1 Second iteration

After generally positive results from the formative test, a hi-fi prototype was designed. Due to the large amount of development time, content and testing efforts associated with supporting four different product categories, the choice was made to only support the book category and gaming laptop category in the hi-fi prototype. The choice of these two categories was based on their quite large difference, the books being a low-cost experience goods and the gaming laptop being a high-cost search good. The headphones and gaming laptop were also similar with regards to social features, thus motivating eliminating one of them.

#### 8.1.1 Changes to the category pages

The formative tests revealed that it was unclear what the video tab meant. In the hi-fi prototype, the video tab was removed entirely. Instead, when navigating to a category page, a *default page* showing recent videos from Youtube (only for gaming laptops) was implemented. The my page link in the side menu was also removed since the users rarely used it during the formative tests, preferring the my page link in the menu bar.

Even though the forum tab was not entirely understood either, the forum page had functionality, such as adding and removing threads, that was only relevant for the forum. Therefore, the forum tab was kept as a separate page. To make it clearer what the forum represented, recent forum threads were displayed on the default page for both the gaming laptop and the books category. Furthermore, the icon buttons on the product cards were removed. This was motivated by the limited understanding of these buttons during the formative tests. The default page for the books category is displayed in Figure 8.1.

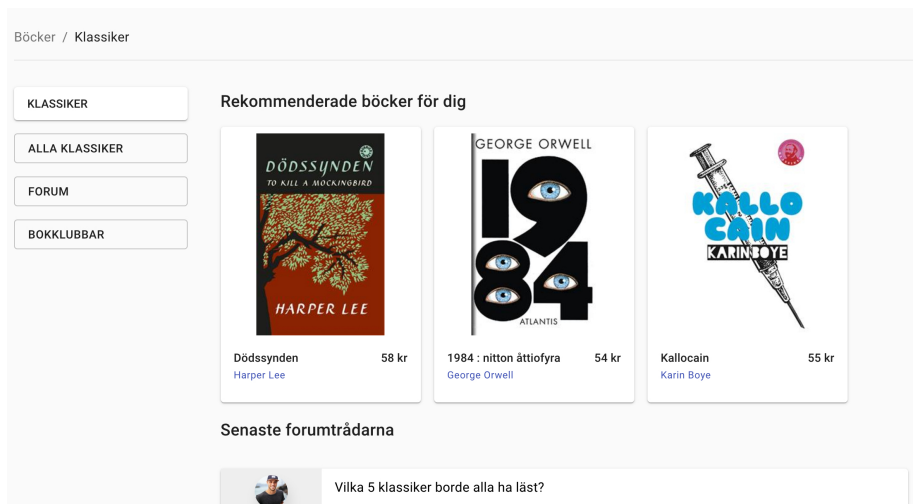


Figure 8.1: The default page for the books category

### 8.1.2 Changes to the product pages

Based on suggestions during the formative tests to make the videos more visible in the product page, the view video button was removed and replaced by video thumbnails close to the product images. Due to the limited understanding of the play icon used earlier, a video camera icon was used instead. Also, after submitting a review for a product, the user's submitted review was displayed first in the list of reviews, as this was expected by the TPs in the formative tests. Finally, for the gaming laptop, the search forum button was renamed 'discuss'. The redesigned product page for computers is displayed in Figure 8.2

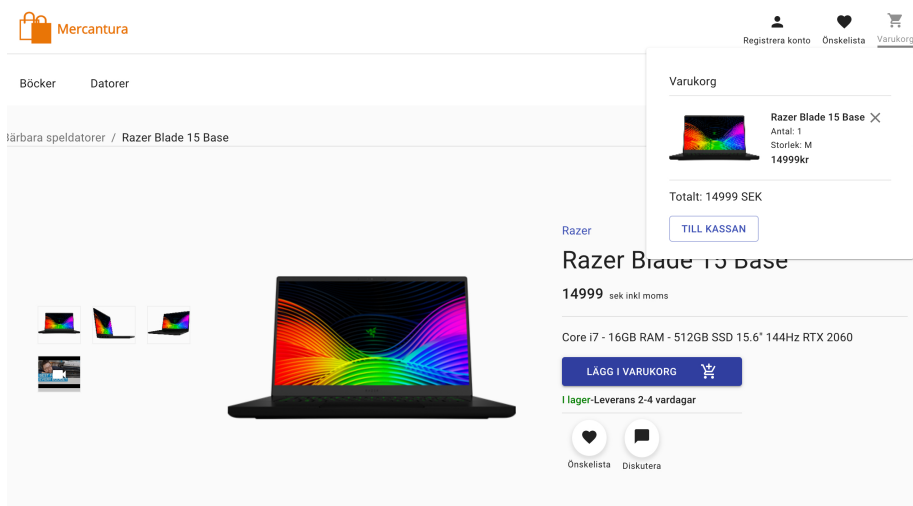


Figure 8.2: A product page for a gaming laptop

### 8.1.3 Further changes

Both the cart and wish list functionality was implemented. The posting of replies and creation of topics/threads in the forum was also implemented, as well as the ability to join a book club (see Figure 8.3). The checkout page was not implemented though. When the user pressed the checkout page in the cart, the cart items were added to previous purchases and the user redirected to the index page. The main reason behind not implementing the checkout page, was that most checkout components, such as payments, are highly dependent of third party providers (e.g. Stripe, Klarna, PayPal).

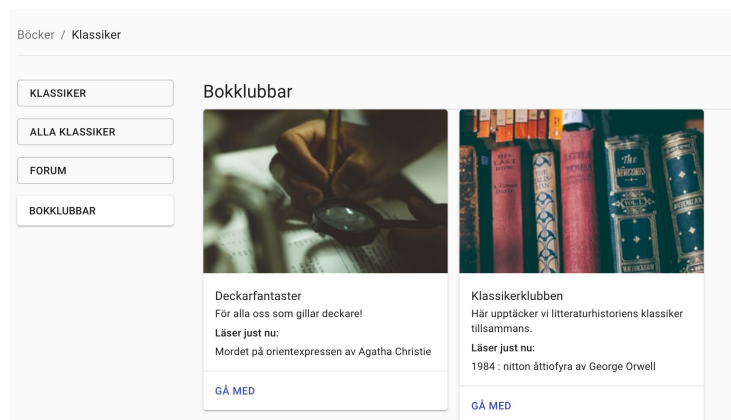


Figure 8.3: The book clubs page with book club cards

As the TPs in the formative test experienced problems related to finding where to write a review, an automated write a review popup was displayed after 'revisiting' the website after a purchase (see Figure 8.4). This way of creating a review was suggested by one of the TPs during the formative test session. The text in the popup also pointed out that the *social norm* was to leave a review.

During registration, the user was asked to type his/hers full name, email address, password, age and a short description about themselves, as seen in Figure 8.5.

The age and short description of the user was added to provide more social presence, when viewed by 'other users'. The short description was displayed when hovering over the user's profile picture. To account for the lack of *perceived relevance* this might have for e-commerce users, a short help text describing the purpose behind collecting the information was added below the input forms.

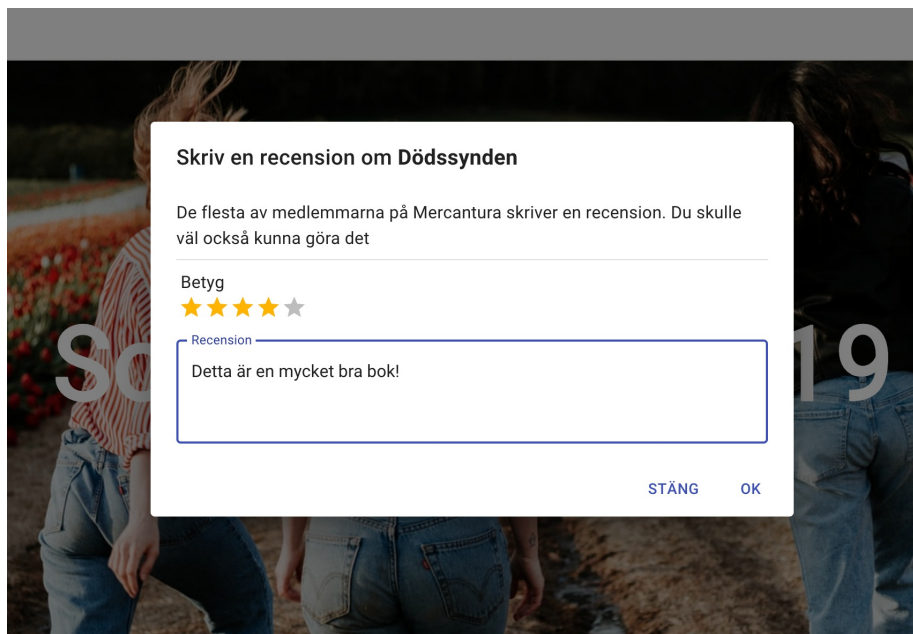


Figure 8.4: Review dialog

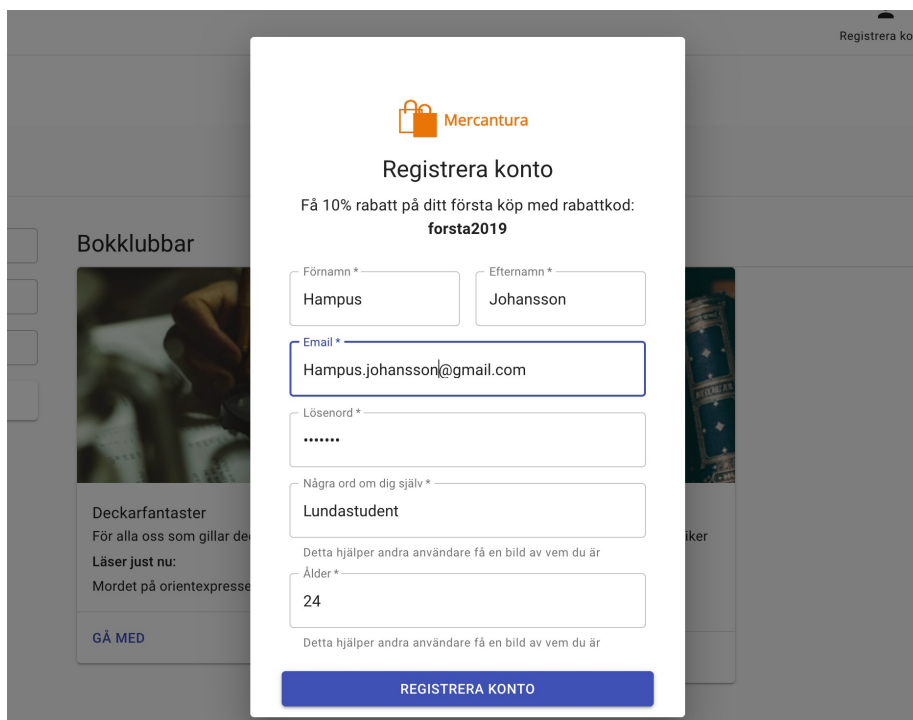


Figure 8.5: Register page

### 8.1.4 Social design changes

The lo-fi prototyping phase focused much on sociability and how to increase it. However, the CBF and the DRs present other important aspects to consider when sociability is introduced. This includes for example *social presence*, *social support* and *social norms*. Therefore, functionality related to these aspects was introduced. Based on DR43, *avatars/profile pictures* were added for each creator of reviews, threads, thread replies and discussions. As previously described, when hovering over the avatars, a tool-tip with a short text describing the person was shown.

Furthermore, *emoticon rendering* was introduced into the forum, based on DR44. When the user registered for the page, a welcome message from the "CEO" was shown, welcoming the user to the community as well as pointing out that the *social norm* is to contribute content. A welcome message from the book club moderator was also shown when joining a book-club. Welcome messages is highlighted in DR42 as a way of introducing social presence, but was in this case also used to create a social norm of contributing content.

Faked conversations between the users of the website were created within the forums and book clubs. The conversations were polite, used emoticons and if a reply answered a question, for example in a thread, the answer was to the point. As a result, the conversations were in some sense a best-case scenario from a social support perspective. An extract of such a social forum page is displayed in Figure 8.6.

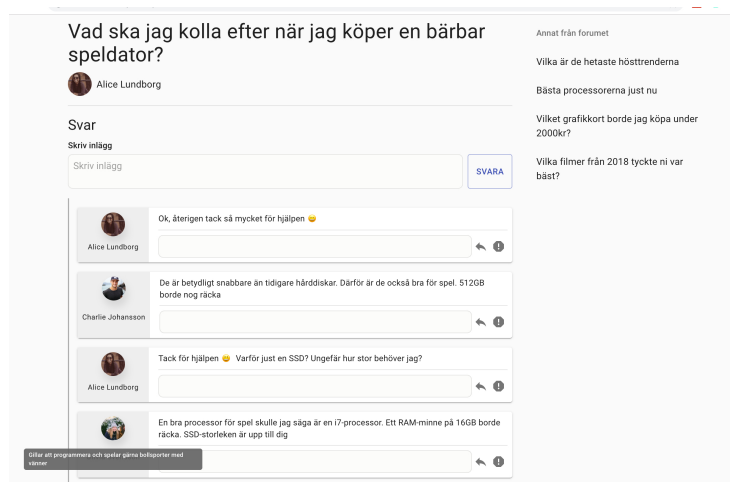


Figure 8.6: A discussion about what the look for when buying a gaming laptop

## 8.2 Hi-Fi prototype evaluation

A common way of testing prototypes in a later stage of the development cycle, for instance when 60-80% of the functionality is implemented, is by using a summative test. In summative tests, users is always given tasks to perform and a main objective is to collect quantitative data (Rubin and Chisnell, 2008,

pp. 34-35). The quantitative data includes, for instance, usability measurements such as *efficiency, usefulness and effectiveness*.

Many social features integrated into the hi-fi prototype were tested using usability measurements. However, other factors from the CBF, such as trust, strongly influence users in the s-commerce context. Therefore, factors presented in the CBF were also evaluated. One very common measurement for evaluating usability is by using a system usability scale (SUS). However, the CBF and the design models only present usability as one of many important factors in s-commerce design, therefore, more focus on CBF factors was chosen over having an additional usability measurement.

To cover both usability aspects and the antecedents presented in the CBF, research questions were formulated, presented in 8.1. To properly evaluate social support, a production website with active users would be needed. Social support was included in the evaluation to see if the users experienced social support in the next to ideal case presented in the prototype.

Table 8.1: Hi-Fi test research questions

Research question	Design factor
1. How easily and successfully does participants register for the website?	Usability
2. How easy is it for participants to create a review?	Usability
3. How easy is it for participants to join a book club?	Usability
4. How easy is it for participants to join/read a discussion?	Usability
5. How easy is it for participants to create a forum topic?	Usability
6. Do the participants trust the website?	Trust
7. Do the participants experience social presence?	Social presence
8. Do the participants experience social support?	Social support
9. What is the participant's perception of the website quality?	Website quality
10. Do the participants feel enjoyment when using the website?	Hedonistic value, Perceived enjoyment
11. Can the participants complete a purchase of a product?	Utilitarian value
12. Do the participants feel confident disclosing information to the website?	Information disclosure
13. Do the participants feel that he/she should write leave a review?	Social norms

The test sessions took place in a controlled laboratory environment. When describing the test for the participants, a script was used to make sure all participants were given the same information.

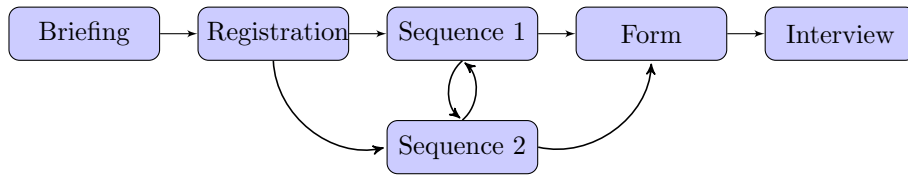


Figure 8.7: The test procedure for the summative test

The test session consisted of three parts. Initially, the TPs were allowed to test the prototype by performing a series of tasks, mainly related to the social features of the prototype. The tasks were performed in such a way that the user came into contact with other 'users' while doing the tasks. While performing tasks, the screen, as well as audio, was recorded for later analysis.

The first task for the user to solve was to *Register on the website*. To authenticate oneself is a basis for all non-anonymous communication online and was therefore tested. After the initial registration step, the TPs performed two sequences of tasks. *All participants performed both sequences*, but the first of the two sequences to be carried out was interchanged between the testing sessions. This was done to check for learnability effects. The sequences of tasks carried out were the following:

#### Sequence 1

1. Join a book club
2. Buy the book club book
3. Leave a review about the book (if not done earlier)
4. Discuss the book (leave a reply)

#### Sequence 2

1. Read about what features to look for when buying a gaming laptop
2. Look at a video about gaming laptops
3. Post a question in the forum
4. Buy a laptop
5. Leave a review about the laptop (if not done earlier)

After completing the tasks, the users filled in a form, grading different aspects such as social presence, website quality and social support on a 7-degree Likert scale. Finally, the user was asked semi-open interview questions. The full duration of the test procedure was about 30-40 minutes. For full details on the interview questions and the questionnaire, see Appendix D. For the test procedure, see Figure 8.7.



### 8.2.1 Test participants

9 participants were employed to test the prototype. The TP’s gender was almost equally distributed between male and female, with 4 males and 5 female tester. Their *average age* was about 26 years old. Regarding occupation and education, the TPs were either highly educated workers or university students. For full details, see Table 8.2.

Table 8.2: Test participants and their demography

Test ID	Gender	Age	Education (completed)	Occupation	First sequence
#1	Female	26	Baccalaureate	Student	1
#2	Female	21	Upper secondary	Student	2
#3	Male	28	Master	Employed	1
#4	Female	25	Upper secondary	Student	2
#5	Male	25	Upper secondary	Student	1
#6	Female	26	Baccalaureate	Employed	2
#7	Female	30	Master	Doctoral student	1
#8	Male	26	Baccalaureate	Student	2
#9	Male	26	Upper secondary	Student	1

### 8.2.2 Test results

#### How easily and successfully does participants register for the website?

None of the participants expressed that they experienced any usability-related problems when registering for the website. The register form was accessed through the menu bar in all cases and found almost instantly. The task completion rate and completion time, for *register for the website*, is presented in Table 8.3. The difference in time could be contributed to how much time the TPs put into writing something about themselves. How much they talked in general during the task also affected the result, especially for TP6 and TP9.

Table 8.3: Success rate for register on website

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	50	40	50	60	60	98	38	50	80

### How easy is it for participants to create a review?

None of the participants expressed that they experienced difficulties related to posting the review. All participants managed to fill out the form without problems. The task completion rate and task time is displayed in Table 8.4

Table 8.4: Success rate for posting a review

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	15	10	10	15	25	30	10	55	57

### How easy is it for participants to join a book club?

Generally, the TPs were able to join a book club within a duration of about 15 seconds. For details see Table 8.5 and Table 8.6. TP5 missed the join book club button, present on the book club card. Instead, due to non-implemented constraints/authorization, TP5 opened the book club page. However, this page did not contain a join book club button.

TP5 was given a clue to navigate back to the book clubs page, where he found the button, - commenting that this was not obvious. TP9 found the join book club button, but wanted to read more about the book club and explore more before joining, which contributed to the high task duration.

Table 8.5: Success rate for joining a book club

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	15	10	20	8	50	10	12	10	100
Clues	-	-	-	-	1	-	-	-	-

Table 8.6: Clues given for joining a book club task

Test person	Clues given	Reason
TP5	Go to book club page	Unable to find join book club button

### How easy is it for participants to join/read a discussion?

Two evident problems arose when the TPs tried to participate in a *book club discussion*. The two problems were that: *the book club page was difficult to navigate to* and that *the discussion was difficult to find*. TP1 did not find the discussion button on the book club page, despite being given a clue to navigate to the book club page. That the card was the link to navigate to the book club was not understood by TP4 and TP8, while TP6 remarked that the button was not obvious. TP1, TP4 and TP9 found the discussion through the book product

page, while TP2, TP3, TP5, TP6, TP7 and TP8 found the discussion through the book club page.

After finding the discussion, all TPs managed to post a reply. How the TPs replied differed. TP2, TP3, TP5, TP6, TP7 and TP8 replied in the comment bar, i.e. more directly to the person who asked a question regarding the end of the book, while the others replied on the main thread. TP3, TP4, TP6 and TP7 commented that the chronological order of the discussion was difficult to grasp. A summary of the test can be seen in Table 8.7 and a summary of the clues given in Table 8.8

Table 8.7: Success rate for discussing a book

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	110	50	60	140	48	155	90	180	110
Clues	1	-	-	1	-	-	-	1	-

Table 8.8: Clues given during discuss a book task

Test person	Clues given	Reason
TP1	Navigate to book club page	Unable to find discussion
TP4, TP8	Navigate to book clubs page	Unable to find discussion

The task completion rate and time, for *reading about gaming laptop features*, is presented in Table 8.9. A summary of the clues given is presented in Table 8.10. Regarding observations, most TPs navigated to the forum, found the relevant thread and read it. TP6 initially missed the category: *portable gaming laptops*. After finding the correct category TP6 navigated to the correct thread, however, she did not read it and navigated away from it. TP6 possibly misinterpreted the test success criteria to *name three things to consider while purchasing a gaming laptop*, instead she named other criteria. The clue to look in the forum was given and afterwards, the task was correctly carried out. TP8 browsed through the videos, thus not regarding the 'read' part of the scenario. TP8 was given the clue to look within the forum and solved the task.

Table 8.9: Success rate for reading about gaming laptop features

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	60	60	65	64	58	240	55	140	90
Clues	-	-	-	-	-	1	-	1	-

Table 8.10: Clues given for read about laptop features task

Test person	Clues given	Reason
TP6, TP8	Look within the forums	Unable to find forum

### How easy is it for participants to create a forum topic?

None of the TPs indicated that they experienced problems creating a forum topic, and all solved the task by navigating to the forum to post a question/topic. The main reason behind the difference in task completion time was the effort they put into formulating the question. For a summary, see Table 8.11.

Table 8.11: Success rate for creating a forum topic

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	30	25	25	30	40	52	20	75	70

### Can the participants complete a purchase of a product?

None of the TPs indicated that they experienced difficulties when purchasing the gaming laptop. All found the page containing the products, navigated to the product, added it to the basket and proceeded to checkout. TP6 and TP9 paid more attention to the product information and reviews, which explains the difference in completion time. TP4 and TP9 thought that the *all gaming laptops tab* was a bit hard to understand. See Table 8.12 for details.

Table 8.12: Success rate for buying a gaming laptop

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	25	20	10	48	20	75	27	45	80

None of the TPs indicated that they experienced difficulties purchasing the book (see Table 8.13 for details). How the TPs navigated to the product page differed. TP1, TP3, TP7, TP8 and TP9 navigated to the product page through the *reading now link* on the book club card. The others missed the link, instead opting for either the default page or the all products page. TP5 and TP6 wanted to use the search function to find the book.

Table 8.13: Success rate for buying a book

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Success	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time(s)	20	15	20	20	25	30	10	18	35

### **Do the participants trust the website?**

TP1, TP2, TP6, TP7, TP8, TP9 answered explicitly yes, that they trusted the website, when asked during the interviews. TP1 and TP2 thought the website looked clean and bright and that this made the website look trustworthy. TP1, TP2 and TP9 also expressed that a lot of other users seemed involved in the website and that this influenced their trust positively. TP2 explicitly mentioned that profile pictures were important and TP9 thought that the website's "quick response time" made it more trustworthy.

However, TP5 and TP9 mentioned that the website was almost too simplistic and empty, however TP9 did not see this as something particularly negative.

TP3 would have purchased a product from the website, but was suspicious towards retrieving information from the same website as the purchase was made on. TP4 thought that the question was hard to answer, since she knew she was testing a prototype and answered: "*I don't know*". TP5 was the only one who expressed that he would not trust buying from the website. He stated that he was a habit person and would prefer shopping from a more, to him, well-known store. TP5 also said that he generally does not trust that people active in forums know what they are talking about.

TP 6 stated that, although she trusted the website, it was connected to another platform she did not trust, in this case Youtube. TP8 expressed that the welcome pop-ups made him feel at ease and that it made him trust the website more, since it was a person (Karin the CEO) welcoming him. TP4 was a bit weary towards the index page as it seemed unrelated to the products sold on the website. TP7 also expressed she did not understand the relevance of the image on the index page, but that it was very nice.

### **Do the participants experience social presence?**

When asked about their experience "interacting" with other users on the website; the TPs generally thought that it was "smooth" and that the interaction with other users worked well. TP1 thought that face-to-face conversations would be better when discussing books in a book club, but that the forum discussion was well suited for the gaming laptop category.

When asked if they would rather interact with other users in another way, the TPs generally expressed that the forum format was sufficient and that they would not like to chat with other buyers. TP2, TP4, TP5 and TP7 expressed that they would have liked to chat with representatives for the website. TP9 thought that it would be nice to have *public* profile pages for the users. Answers to form questions measuring social presence are displayed in Figure 8.8

### **Do the participants experience social support?**

All TPs answered that 'yes', the other users would be supportive if they asked a question, when asked during the interview. Their opinions were based on what they read on the website and the general feeling they got. Answers to form questions measuring social support are presented in Figure 8.9 and Figure 8.10.

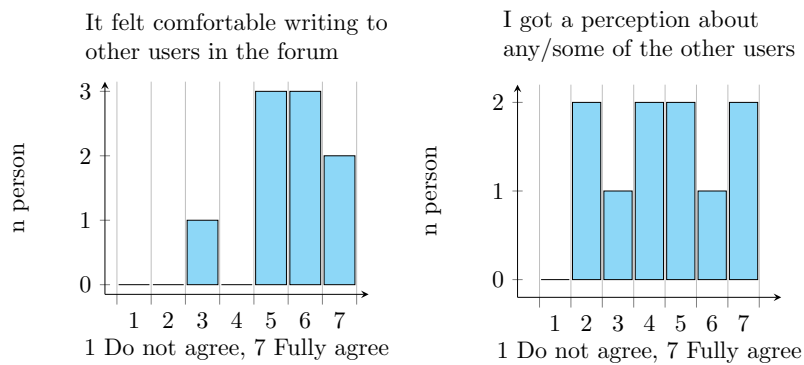


Figure 8.8: Form questions measuring social presence

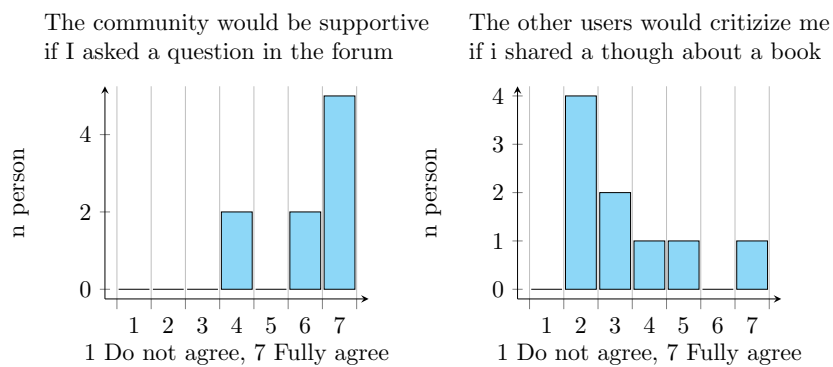


Figure 8.9: Form questions measuring social support

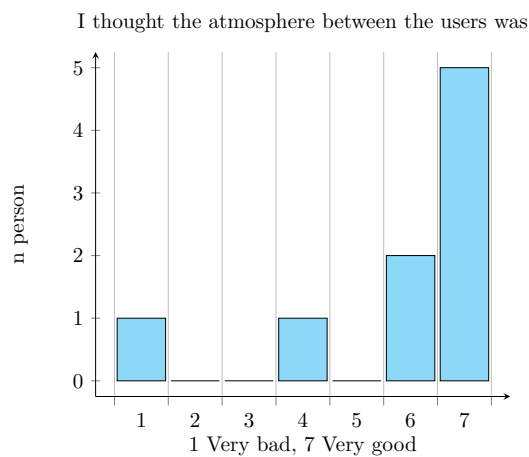


Figure 8.10: Form question regarding the store atmosphere

### What is the participants’s perception of the website quality?

All TPs, except TP5, expressed that the overall website quality was good, when asked during the interview. TP1 and TP7 thought that it was easy to navigate on the website and TP6 expressed that it was "easy to find things". TP2 and TP3 thought that the website was "easy to use", and TP3 further stated that the website felt logically structured. TP4 and TP6 thought the website looked good, while TP9 stated that it felt "clean" and not too "selly".

TP5 thought the website felt "bare-bones". TP1 would have liked to have the book clubs more separated from the category pages, TP4 thought that the book discussion was hard to find and TP6 thought the chronological order in the forum was difficult to grasp. TP7 thought it was not obvious where the videos where and finally, TP8 expressed that it was not obvious how to navigate to the book club. Answers to form questions measuring social support are presented in Figure 8.11 and 8.12.

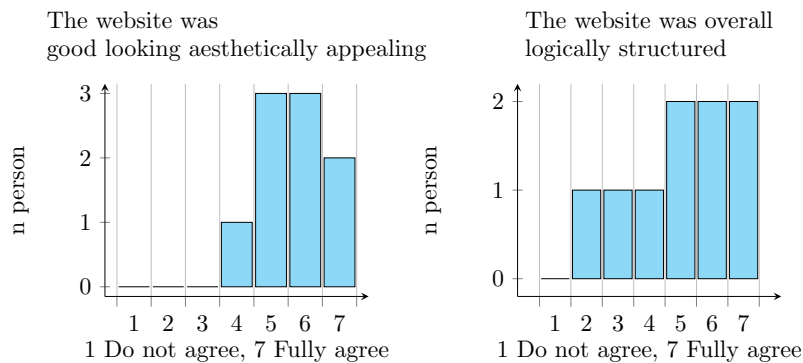


Figure 8.11: Form questions measuring website quality

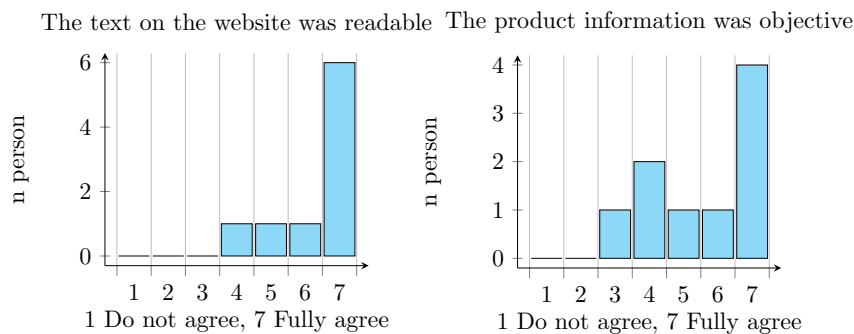


Figure 8.12: Form questions measuring website quality

### Do the participants feel enjoyment when using the website?

TP1, TP2, TP3, TP4, TP5 thought that the website was neither boring nor fun to use, when asked during the interviews. TP2 thought that the forums

were a bit fun while TP1 and TP4 thought that it, potentially, could be fun to participate in the community more.

TP6 thought the sociability aspects of the website, such as the book clubs, were fun. TP7 expressed that the website was fun to use, because it looked good, which made her happy. TP8 thought that the welcome screen, as well as the good atmosphere within the forums, made the website more fun. TP8 mentioned that it is fun to talk to others if the atmosphere is good. TP9 stated that he liked the videos and that entertaining, but still to the point, video reviewers had the potential to make the website more fun.

### **Do the participants feel confident disclosing information to the website?**

TP1, TP4, TP6, TP7 expressed that they did not see the relevance of writing something about themselves and TP7 felt that she did not get information as to how this information would be used. TP1 did not like the requirement to fill in this part of the form.

Otherwise, all TPs except TP5 and TP7 felt comfortable disclosing name, email and age. TP5 expressed that he was a bit paranoid regarding disclosing email as he felt that he would get promotional emails. TP7 expressed that she always feel a bit weary disclosing personal information. Both TP7 and TP9 though they would feel better disclosing information that would help them in the purchase process, such as interests.

### **Do the participants feel that he/she should write a review?**

The answer to the form question measuring social norms is presented in Figure 8.13.

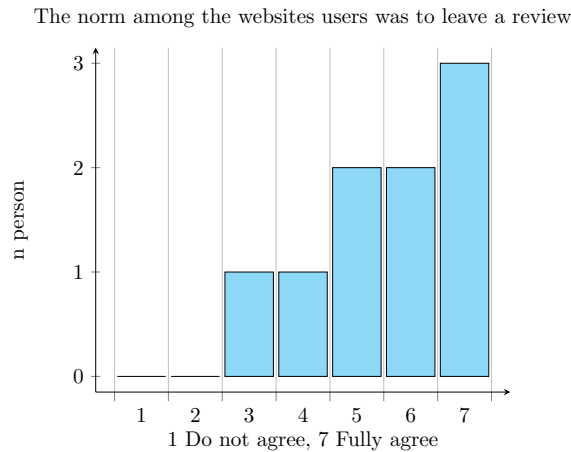


Figure 8.13: Form question regarding social norms



### 8.3 Analysis and further changes

Although usability could be seen as a part of website quality, it will be analyzed separately. *Effectiveness* was measured on the basis of task completion and number of clues. All tasks were completed by the TPs, but in some cases, clues had to be given. In the cases when clues had to be given, which also resulted in that *efficiency* was lowered. To improve the prototype the following future changes were proposed:

1. Make it more clear how to navigate to a book club, for example, by adding a button to the book club card.
2. On the book club page, make the discuss button more visible, for example by adding colour to it and move it to the left side.
3. Implement authorization. TPs should not be able to navigate to a book club without first joining it.

From a utility perspective, buying items from the website was not a problem for the TPs. The TP's perception of most aspects of the *website's quality* was also good and a vast majority of the TPs trusted the website. TP5 was the only one who did not trust the website, but he did so on the basis of not being familiar with it, which is something that is hard to amend. Furthermore, all participants experienced *social support*. The TP who gave a 'very bad' rating is considered an outlier due to the fact that she did not express this view in the interview and that the answer was so disconnected from the others.

Although leaning to the favorable side, *social presence* could be increased. Providing more *hedonistic value* could also be something to look into. However, the communities on the website could provide more hedonistic value in a real case scenario. The users generally felt comfortable disclosing information, but the "write something about yourself" input had *low perceived relevance*. Based on this result, an additional list of future changes was created:

1. Remove the "write something about yourself" input. As TP9 suggested, ask for interests instead, as this have more relevance for e-commerce. Also, make the text describing the input more visible, as it was only seen by few TPs.
2. Adding a public profile page for users to increase social presence.
3. Change the index page to something more relevant for books and gaming laptops.
4. TP6 suggested trying to create a non-abusive social environment by using social norms. Her thought was that users should agree, during registration, to be non-abusive. This could possibly increase social support and should be investigated more.

Implementing more features, such as the search function, would also be relevant for future prototypes. How well this final hi-fi prototype fulfilled the DRs is presented in Appendix E.

## 9 Discussion

### 9.1 Fulfilment of research objectives

#### **Will product characteristics affect the design of s-commerce websites?**

During the participatory design session, social features and content were evaluated for four different product categories. The PDs expressed different individual preferences of social features for each of the product categories. When thinking from the perspective of the personas, a further set of features were also generated for each of the product categories. This indicates that product category influence the social aspects of s-commerce design. The result is *not statistically significant* though.

Regarding the differences based on *experience and search characteristics*, no distinct preference of social features was revealed. However, considering books, the users put more emphasis on the post-purchase stage, that they would like to discuss the book after experiencing it. Regarding the gaming laptop, the users were more inclined to evaluate the product based on other user's opinions.

The participatory design session focused on social features, but the evaluation of the hi-fi-prototype revealed that other factors could influence design aspects differently for different product categories. Two TPs in the hi-fi-prototype evaluation noticed that the image on the index page did not seem to be related to the products sold (gaming laptop and books), for example. A majority of the DRs for s-commerce design was not selected for evaluation from a product characteristics viewpoint.

#### **How and with what result could a user-centered design process be used to redesign an e-commerce website into a s-commerce website?**

The evaluation of the hi-fi prototype revealed that it, overall, fulfilled many criteria such as trust, utilitarian value and relatively high website quality. The researcher's standpoint is that the problems related to usability found in the hi-fi prototype, could have been solved with another design iteration. Moreover, the users experienced social support and a moderate degree of social presence. The researcher's theory is that social presence could be increased through increased usage of the website, which was very limited during the evaluation and by implementing the changes suggested in the hi-fi analysis.

The result as a whole shows that by putting the users in the center, in this case by using the CBF, user-centered evaluation methods and involving users in the design process, a well designed s-commerce prototype could be created from the e-commerce prototype. The UCD-process also revealed that many different

personal preferences exist among users regarding the design of s-commerce. By using a UCD process, these preferences could be captured.

What speaks against using the UCD process, or at least the process used in this thesis, is that many products are required to properly evaluate the search stage of user's decision-making process. My experience of creating both a lo-fi and hi-fi prototype with many products, was that it was very cumbersome and time-consuming. Evaluating user-to-user interactions is also hard to integrate into the UCD process. Finally, a possibly better design could conflict with users goals, thus being disregarded. It is worth noting that users goals and priorities could change, which is not something captured in the UCD process.

### Validity of results

The hi-fi s-commerce prototype was not released to real customers. The s-commerce website was therefore not tested in production, which influenced the result. A production environment would involve many more users, resulting in a more significant and reliable result. Also, many website quality features such as response time were not tested since they depend on a production environment. Screen size was not evaluated either, which is an important factor to consider. Furthermore, due to time constraints, a more realistic number of product could not be added. This means that the search stage of the five-stage consumer decision-making process was not evaluated properly.

Many antecedents from the CBF was not selected for evaluation. This could also, potentially, have influenced the outcome of the hi-fi prototype evaluation. Although, I think the most important antecedents were selected. The CBF also presents *culture* as a mediator, which was not in the scope of the project, but could have effected the outcome.

One major flaw in the process was to not evaluate the choice of social features and content in the hi-fi prototype evaluation more thoroughly. Thus, the choice of social features heavily relied on the choices made in the participative design session. Although, during the hi-fi evaluation, none of the TPs indicated that they were missing a particular feature. This was not sufficiently tested though. Also, from a usability perspective, this means that *usefulness* was not properly tested in the hi-fi evaluation.

The selection and quantity of users involved in the design process could also have introduced potential errors. The main participants involved in the hi-fi evaluation and the participative prototyping session were between 20-30 years old, highly educated workers or students. However, data from the investigation phase shows that a lot of online shoppers are above 30 years old and have a wider range in educational background and current occupation. The number of users involved in the tests were also too few to generate any statistical significance, thus decreasing the reliability of the result.

Finally, all the users on the website were fictive. Thus, many requirements could have been omitted that would have been required in a production setting with real users. This is also one of the major difficulties concerning s-commerce design, that it is hard to anticipate how users will interact socially.

## 9.2 Design process improvements

During the design process, much focus was put on usability aspects. More attention on other factors such as trust could have been taken into account when performing, for example, the formative study. By doing this, other important aspects and effects, than usability-related ones, could have been uncovered earlier.

As discussed in *validity of results*, only the 59-year-old man and 48-year-old woman were older than 40 years of age. Furthermore, the 59 year-old-man in the formative test and one of the TPs in the summative test were the only TPs with scarce daily usage of social media. By involving a wider range of users in all aspects of the design process, would have generated a better result.

The UCD process could also have focused more on the whole user experience. For example, the checkout page was omitted in the hi-fi prototype. Additionally, many users would have liked to use another search engine to search for information, not the one present on the website. Therefore, it is questionable whether the users way of working was properly supported. Integrating another search engine into the website could have been a way to address this.

## 9.3 Implications for practitioners

This thesis shows that a user-centered design process could be a suitable way to integrate sociability or to increase sociability in already present e-commerce websites. By involving users in the design process, errors that otherwise could have made it into production, were removed early. The users also generated valuable suggestions throughout the process. Therefore, when integrating new social features and content, I suggest following a user-centered design process.

The CBF presented in the thesis is also a good framework for understanding users within the s-commerce context. It is worth noticing that the antecedents in the CBF are not isolated from one other. For example, heightened social presence influence trust positively, but could also influence social support through decreased anonymity. By seeing the CBF in this more holistic perspective, new ideas on how to design s-commerce websites could be found. For example, using social norms as a way to increase social support, as suggested by TP6.

How increased sociability might affect users, is also a key factor to take into consideration, both when designing and evaluating s-commerce websites. Reviews and forums could, for example, influence users trust in the website positively. However, TP9 in the hi-fi evaluation stated that a non-serious forum would influence his trust negatively. Therefore, when considering investing in more sociability, one must take into account the continuous costs of, for example, managing a forum.

Furthermore, both TP8 and TP9 liked the videos and the hedonistic value they provided, but TP6 thought that Youtube (the supplier of the videos in this case) was untrustworthy. This implies that a key factor when integrating more sociability would be to understand the *existing users* of an e-commerce platform and their needs.

This thesis also focused much on sociability and in some sense assumed that the fictive e-commerce website was of good quality. If building a s-commerce

website from scratch, I think that focus should be put on the non-social aspects first. Generally, many of the DRs presented in this thesis are worth considering.

## 9.4 Further research

The research method for evaluating the significance of product characteristics on s-commerce design could have been chosen differently to get a more reliable result. Doing a thorough quantitative study, using, for instance, forms handed out to a large number of respondents, would produce a more reliable result.

Performing a larger study of the s-commerce website within a more production-like context would generate more reliable results regarding the applicability of the UCD-process on s-commerce design. For example, by letting participants interact with a production-ready prototype on a daily basis from their home would generate more reliable data. Involving an existing e-commerce platform business in a research project could be a potential way to go.

New areas of technology could also be interesting to research in relation to s-commerce. VR, for example, have the potential to generate high amounts of social presence, which is an important factor in s-commerce. VR could also introduce a high amount of utility value as the virtual representation of an item could be experienced in 3 dimensions and with a realistic size. Moreover, imagine walking in to a virtual mall or shop, being able to interact with other shoppers. That would take s-commerce to a new level.

Augmented Reality (AR) could also be explored from a s-commerce viewpoint. As with VR, AR could increase utility value through realistic representations of items. Furthermore, AR could be used to, for example, overlay real world products with reviews or forum threads collected from the internet. Thus, in some cases, creating a more social real world shopping experience. Other current trends such as *gamification* have the potential to create more hedonistic value. How this influence users within the s-commerce context could also be an interesting future research topic. It should be noted that AR, VR and gamification could be applied to s-commerce in thousand of ways, creating an almost endless possibility for future research.

## 9.5 Conclusion

Conclusively, this thesis shows that a UCD process could be usable when integrating sociability in e-commerce. Although using the UCD process has its downsides within the s-commerce domain, for example, that social interactions are hard to prototype and anticipate and that prototyping a large amount items is difficult. Finally, the thesis presents data indicating that product characteristics play an important role in the design process. However, this could be explored further and more thoroughly.

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## A Review of online stores

Table A.1: Online stores design features (desktop)

Category	Design feature	Number of stores (15)
Menu bar	Brand image	15
	Search bar	15
	Dropdown category menus	11
	Hamburger category menu	2
	Login	14
	Shopping cart	15
Index page	Selected products	15
	Campaign images	15
	Category links	14
Product page	Image	15
	Title	15
	Description	14
	Detailed info	15
	Add to cart button	15
	Price	15
	Delivery information	13
	Alternatives	8
Category page	Product list	3
	Product grid	12
	Sort (top)	15
	Filters (left)	7
	Filters (top)	8
Category product page	Image	15
	Title	15
	Description	5
	Add to cart button	8
	Price	15
Checkout	See basket	13

Choose address and delivery	13 (15)
Payment	15
Debit card	7
Direct bank	6
Klarna	5

Table A.2: Online store mobile design features

Category	Design feature	Number of stores
Menu bar	Brand image	15
	Search bar	15
	Hamburger menu	12
	Login link	9
	Profile icon	8
	Shopping cart	15

## B Design requirements

Table B.1: Important s-commerce design features found by Z. Huang and Benyoucef (2015) and Z. Huang and Benyoucef (2017)

Model 1 (features)	Layer
1. Providing “Comment” button, allowing to give feedback	Conversation
2. Allowing users to provide product reviews	Conversation
3. Allowing users to rate other people’s reviews	Conversation
4. Allowing users to respond to comments made by others	Conversation
5. Providing “Like” button, expressing what user like	Conversation
6. Offering “Send” button, forwarding information	Conversation
7. Providing online communities to interact with users	Community
8. Allows users to create “Wish-Lists”	Commerce
9. Providing product recommendations to users	Commerce
10. Allowing experts to give advice on what to buy	Commerce
11. Offering rewards to users	Commerce
Model 2 features	Decision stage
12. To provide quality information on websites (U)	Overall, Evaluation
13. To provide clear headings, titles, labels on each page (U)	Overall
14. To provide navigational support on websites (U)	Overall
15. To make content well organized on websites (U)	Overall
16. To protect consumers’ personal information (F)	Overall, Purchase
17. To support secure and easy payment methods (F)	Overall
18. To allow customers to track order statuses online (F)	Overall
19. To respond quickly to customers’ needs (F)	Overall
20. To provide useful information on websites (F)	Overall
21. To provide search functions on websites (F)	Overall
22. To offer flexible delivery services (F)	Overall

23. To share experiences and knowledge on websites (S)	Overall
24. To create an online community (S)	Awareness
25. To provide consumer feedback (S)	Awareness, Post-purchase
26. To render a social commerce site easy to use (U)	Awareness, Search
27. To provide complete information on sites (F)	Search
28. To deliver efficient search capabilities (F)	Search
29. To offer useful information on websites (F)	Search, Purchase
30. To present consumer feedback (S)	Evaluation, Purchase
31. To offer flexible payment methods (F)	Purchase
32. To ensure services in a secure manner (F)	Purchase
33. To deliver an interactive experience (U)	Purchase
34. To maintain online forums (S)	Post-purchase
35. To share product/service information (F)	Post-purchase
36. To make social recommendations (S)	Post-purchase

Table B.2: Additional s-commerce design features

Feature	CBF
37. To make online salespersons available through a virtual agent	SP, Scenario 2
38. Socially enriched text	SP
39. Pictures portraying humans	SP
40. Displaying 'n others also view this'	SP
41. Report post button, to help moderators find abusive content	Social support
42. Welcome screens	SP
43. Profile pictures / Avatars	SP
44. Emoticons	Hedonistic value, Perceived enjoyment, SP
45. The website should be attractive (aesthetic effects and emotional appeal)	Website quality
46. Texts should be consistent, readable, have breathing space and capital letters	Website quality
47. Good contrast between background and text colour	Website quality
48. Organization's logo is clear and noticeable	Website quality
49. Short download speed	Website quality
50. Multi-browser support	Website quality
51. Working properly using different screen settings	Website quality, Scenario 1

52. Provide good organization	Website quality
53. Provide a fun content	Hedonic value, Perceived enjoyment
54. Don't ask for irrelevant information	Perceived relevance
55. To provide social tagging of content	Scenario 1
56. To show pictures or videos from social media platforms	Scenario 2



## C Formative test script

### C.0.1 Objective

The objective of the test is to evaluate social features introduced into an e-commerce platform and to capture user's opinions about the design.

### C.0.2 Test script

*The purpose of this test is to investigate how social elements such as forums, chats and reviews could be integrated into e-commerce. You will test a low fidelity prototype, portraying an e-commerce website. However, it is not a real website, so backwards navigation do not work. Therefore you may tell me if you want to navigate backwards*

*During the test, I will ask questions regarding what you see and how you think things should work. Please ask questions during the duration of the test if something feels unclear. The prototype is in a preliminary stage, so don't be surprised if something don't behave in the way you expected*

#### Jeans

1. We will start with a hypothetical situation. Imagine that you want to buy a pair of jeans. First you want to get an overview over jeans to choose from.  
*User navigates to jeans category page*
2. Ok, so you have found a page with jeans. Could you describe this page?  
*User discuss jeans category page*
3. You want to closer investigate a pair of jeans.  
*User navigates to jeans page*
4. Ok, so you have found the product page for jeans. Where do you find information from other users?  
*User indicate how they would proceed in finding information.*
5. You want to share the jeans with a friend through a chat. How would you proceed?  
*User indicate how they would share information*
6. Imagine that your jeans have been delivered. You are very pleased with them and want to write a review about them.  
*User tries to solve the task*

7. You are not happy with the review you wrote, so you want to remove it.  
*User tries to solve the task*

### **Headphones**

1. We will continue with the next hypothetical situation. You want to buy a pair of headphones. What headphones could you choose from.  
*User navigates to headphones category page*
2. Could you please describe this page?  
*User discuss the information of the page and what actions that could be taken.*
3. You want to see a video about one pair of the headphones  
*User indicate how they would solve the task*
4. You want to read about different types of headphones in a forum  
*User tries to solve task*
5. You want to ask a question in the forum, which headphones is best below the price 5000sek.  
*User indicate how they would solve the task*
6. You want to see if your forum post have gotten any replies  
*User tries to solve the task*
7. You want to investigate a pair of headphones closer  
*Could you describe this page?*
8. You want to investigate a pair of headphones closer  
*User discuss what actions could be taken on the page and what information is available*
9. It has been months since you ordered the headphones. Therefore you want to remove your question. How would you proceed?  
*User tries to solve the task*

### **Gaming laptop**

1. In the next hypothetical situation you are interested in buying a gaming laptop. You want to get an overview over what gaming laptops you could choose from.  
*User navigates to computer category page*
2. What is your impression of this page?  
*User discuss the computer category page*
3. Imagine having a friend that is good with computers. You want to ask him / her in a chat if a specific computer is good.  
*User indicate how they would solve the task*
4. You want to see if a specific computer is mentioned in a forum thread.  
*User tries to solve task*

5. You want to see a video about what to look for when buying a computer  
*User indicate how they would solve the task*
6. You want to find a phone number to call to ask store personnel, which computer to choose.  
*User indicate how they would proceed to find phone number*
7. You decide to read more about a specific computer  
*User attempts to solve task*
8. You decide to read more about a specific computer  
*User attempts to solve task*
9. What is your impression of this page?  
*Discussion about the product page for gaming laptop*

### **Books**

1. We will continue with the next hypothetical situation. You want to buy a new book. Find some books to choose from.  
*User tries to solve task*
2. You want to join Mercantura book club to get some suggestions regarding what books to read.  
*User tries to solve task*
3. You decide to read more about a specific book  
*User attempts to solve task*
4. What is your impression of this page?  
*Discussion about the product page for books*
5. It has been two weeks since you read the book. You want to see a discussion about the book  
*User tries to solve task*
6. You want to make a reply in the book discussion  
*User indicate how they would solve task*
7. Finally, you want to check if there is another book to read in Mercantura book club.  
*User attempts to solve task*

## **D Summative test plan**

### **D.1 Purpose**

The purpose of the test is to evaluate the hi-fi prototype presented in Chapter 8. The social features present in the hi-fi prototype will mainly be evaluated based on usability aspect. Furthermore, the overall website will be evaluated based on important factors for s-commerce, such as trust, social presence and website quality, presented in the CBF.

### **D.2 Research Questions**

1. Can the participants complete a purchase of a product?
2. How easily and successfully does participants register for the website?
3. How easy is it for participants to create a review?
4. How easy is it for participants to join a book club?
5. How easy is it for participants to join/read a discussion?
6. How easy is it for participants to create a forum topic?
7. Do the participants trust the website?
8. Do the participants experience social presence?
9. Do the participants experience social support?
10. What is the participant's perception of the website quality?
11. Do the participants feel enjoyment when using the website?
12. Do the participants feel confident disclosing information to the website?
13. Do the participants feel that he/she write leave a review?

### **D.3 Data collection**

#### **D.3.1 Equipment and test environment**

The tests will take place in a controlled laboratory environment. The laboratory environment contain cameras and a microphone that will be used during the tests. The tests of the prototype will be made on a laptop (MacBook Pro) and recorded with a screen recorder.

### D.3.2 Selection of participants

The selection of participants will be made according to the following criteria:

1. As wide variety in age as possible
2. As wide range in current occupation as possible
3. As wide range in educational background as possible
4. An even distribution between the sexes of the participants

### D.3.3 Reporting of results

The result of the tests will be summarized and presented in the master thesis under 8.2.

### D.3.4 Test coverage

Table D.1: Online store mobile design features

Question	Objective / Quantitative	Objective/ Qualitative	Subjective / Quantitative	Subjective / Qualitative
1	Successfully performed, Hints from TL	Comments by TP		
2	Successfully performed, Hints from TL	Comments by TP		
3	Successfully performed, Hints from TL	Comments by TP		
4	Successfully performed, Hints from TL	Comments by TP		
5	Successfully performed, Hints from TL	Comments by TP		
6	Successfully performed, Hints from TL	Comments by TP		
7				Post test interview

8		Post test questionnaire	Post test interview
9		Post test questionnaire	Post test interview
10		Post test questionnaire	Post test interview
11			Post test interview
12	Comments by TP		Post test interview
13		Post test questionnaire	

### D.3.5 Test tasks

Table D.2: Test tasks

Task	Sub tasks	Success criteria	Max time
Register on the website	<ol style="list-style-type: none"> <li>1. Click login-button in menubar</li> <li>2. Provide register details</li> <li>3. Click login</li> </ol>	User has logged in	4min
Purchase a new book	<ol style="list-style-type: none"> <li>1. Navigate to books category</li> <li>2. Navigate to product</li> <li>3. Click add to cart button</li> <li>4. Open cart and click at checkout button</li> </ol>	Navigated to checkout	5min

Purchase a gaming laptop	<ol style="list-style-type: none"> <li>1. Navigate to gaming laptops category</li> <li>2. Navigate to product</li> <li>3. Click add to cart button</li> <li>4. Open cart and click at checkout button</li> </ol>	Navigated to checkout	5min
Leave a review	<ol style="list-style-type: none"> <li>1. Navigate to purchased product</li> </ol>	Submitted a review	3min
Join a book club	<ol style="list-style-type: none"> <li>1. Navigate to books category</li> <li>2. Navigate to book clubs page</li> <li>3. Click join book club button</li> </ol>	Joined a book club	3min
Join a discussion about a book	<ol style="list-style-type: none"> <li>1. Navigate to a book</li> <li>2. Click discuss button</li> <li>3. Submit a reply in the discussion</li> </ol>	Submitted a reply	3min
Ask a question about a gaming laptop	<ol style="list-style-type: none"> <li>1. Navigate to forum</li> <li>2. Submit a question</li> </ol>	Submitted a question	3min
Watch a video about gaming laptops	<ol style="list-style-type: none"> <li>1. Navigate to default page</li> <li>2. Click on video</li> </ol>	Submitted a question	3min

### D.3.6 Interview questions

1. Did you trust the website in general?
2. How did you experience interacting with others on the website?
3. Do you think the community would have been supportive if you shared an

opinion our asked a question?

4. What did you think about the quality of the website?
5. Was the website enjoyable to use?
6. What did you feel about disclosing information about yourself?
7. What did you think about having access to forums, book clubs and videos through the side bar?
8. Was there any information or help you lacked, if you were to buy the products for yourself?

### **D.3.7 Post test questionnaire**

#### **Part 1 - Demographic factors**

1. Age
2. Gender (male, female, other)
3. Highest completed education (Elementary school, upper secondary school, bachelor degree, masters degree, doctor degree, others)
4. Current occupation (Student, working, self-employed, unemployed, on sick leave, retired, other)
5. Frequency of social media usage (3 or more hours each day, 2-3 hours each day, 1-2 hours each day, 0-1 hours each day, 0-1 hours multiple days in the weeks)
6. Usage of e-commerce websites (browsing) (Each day, 5-6 days per week, 2-4 days per week, Once per week, Once every other week, Once per month, never, other)

#### **Part 2**

All statements were graded on a 7-degree likert scale.

1. I felt comfortable writing to other users in the forum? (1 - do not agree, 7 - fully agree)
2. I was able to form an impressions of some forum participants. (1 - do not agree, 7 - fully agree)
3. I felt that the community on the website would be supportive if I asked a question? (1 - do not agree, 7 - fully agree)
4. I felt that the community on the website would criticize me if I shared a though on a book? (1 - do not agree, 7 - fully agree)
5. I felt that the atmosphere between the user of the website was (1 - very bad, 7 - very good)
6. The website was attractive (1 - do not agree, 7 - fully agree)



7. The content of the website was overall logically structured (1 - do not agree, 7 - fully agree)
8. The text on the website was readable (1 - do not agree, 7 - fully agree)
9. The product information was objective (1 - do not agree, 7 - fully agree)
10. The norm of the website community was to leave a review after a purchase

## E Fulfilment of requirements

The hi-fi prototype in relation to the DRs is presented in Table E.1. The following abbreviations were used:

- N.F. - Not fulfilled
- P.F - Partially fulfilled
- N.E. - Not evaluated
- N.A. - Not applicable. For example if the requirement is dependent on a production environment to be properly evaluated.
- N.I. - Not important. If the feature, during the UCD process, was deemed unimportant by the users
- O - Omitted. If the features were relevant for the hi-fi prototype, but not integrated.

Table E.1: Hi-Fi prototype's fulfilment of requirements

Design requirements	Fulfilled
1. Providing "Comment" button, allowing to give feedback	O
2. Allowing users to provide product reviews	✓
3. Allowing users to rate other people's reviews	N.I.
4. Allowing users to respond to comments made by others	✓
5. Providing "Like" button, expressing what user like	N.I.
6. Offering "Send" button, forwarding information	O
7. Providing online communities to interact with users	✓
8. Allows users to create "Wish-Lists"	✓
9. Providing product recommendations to users	✓(books)
10. Allowing experts to give advice on what to buy	O
11. Offering rewards to users	✓
12. To provide quality information on websites (U)	N.E.
13. To provide clear headings, titles, labels on each page (U)	✓

14. To provide navigational support on websites (U)	✓
15. To make content well organized on websites (U)	✓
16. To protect consumers' personal information (F)	N.A.
17. To support secure and easy payment methods (F)	N.A.
18. To allow customers to track order statuses online (F)	N.A.
19. To respond quickly to customers' needs (F)	N.A.
20. To provide useful information on websites (F)	✓
21. To provide search functions on websites (F)	O Not implemented
22. To offer flexible delivery services (F)	N.A.
23. To share experiences and knowledge on websites (S)	✓
24. To create an online community (S)	✓
25. To provide consumer feedback (S)	✓
26. To render a social commerce site easy to use (U)	✓
27. To provide complete information on sites (F)	✓
28. To deliver efficient search capabilities (F)	O
29. To offer useful information on websites (F)	✓
30. To present consumer feedback (S)	✓
31. To offer flexible payment methods (F)	N.A.
32. To ensure services in a secure manner (F)	N.A.
33. To deliver an interactive experience (U)	N.E.
34. To maintain online forums (S)	N.A.
35. To share product/service information (F)	✓
36. To make social recommendations (S)	O
<hr/>	
37. To make online salespersons available through a virtual agent	N.I. O
38. Socially enriched text	O
39. Pictures portraying humans	O
40. Displaying 'n others also view this'	N.I
41. Report post button, to help moderators find abusive content	✓
42. Welcome screens	✓
43. Profile pictures / Avatars	✓
44. Emoticons	✓
45. The website should be attractive (aesthetic effects and emotional appeal)	✓

46. Texts should be consistent, readable, have breathing space and capital letters	✓
47. Good contrast between background and text colour	✓
48. Organization's logo is clear and noticeable	✓
49. Short download speed	N.A.
50. Multi-browser support	✓
51. Working properly using different screen settings	N.E.
52. Provide good organization	✓
53. Provide fun content	P.F
54. Don't ask for irrelevant information	P.F
55. To provide social tagging of content	N.I.
56. To show pictures or videos from social media platforms	✓