# Interface and Interaction Design Patterns for E-commerce Checkouts

Master Thesis – Maarten van Kalsbeek Human Media Interaction – 2012 (final version)

Graduation committee: Dr. E.M.A.G. van Dijk (1st supervisor) Ir. H. Koppelman

UNIVERSITY OF TWENTE.

Ir. M. Besseling



# **Management Summary**

Checkout processes are an important aspect of e-commerce websites. The performance of these checkout processes relates directly to the revenues for such websites. The better they perform, the more visitors will manage to complete the checkout from start till end. Or more concretely: from clicking Add to cart to having ordered the product. The percentage of people reaching the goal, relative to the number of people that started the checkout, is called the checkout conversion percentage. Enhancing usability can greatly increase this percentage, as well as user satisfaction and subsequently brand loyalty.

Therefore this research aims to discern promising interface and interaction design patterns that allow the usability of online checkout processes to be increased.

# **Research Objective**

The goal of this master thesis project is to determine interface and interaction design patterns that can enhance the usability of e-commerce checkouts for new customers. Such interface and interaction design patterns are similar to software design patterns, although the focus is different. Software patterns describe solutions for repeating design challenges in a given context. The same goes for these interface and interaction design patterns. These patterns are like building blocks for user experiences. They deal with aspects such as, but not limited to, interaction structures (e.g. sections on one page versus spread across different pages), element positioning and text style. These patterns allow the user experience to be enhanced in a proven approach. As stated, this in turn allows both short term and long term e-commerce profits to increase, making it beneficial for e-commerce companies as well their (potential) customers.

# Methodology

In order to achieve this goal, a number of interesting patterns are gathered from literature and practice. Following this, two prototypes are designed and developed, allowing these patterns to be evaluated. In addition, the prototypes will be compared with the current bol.com checkout, allowing a more complete evaluation. The research also takes place at bol.com, one of the two major Dutch e-commerce companies. The evaluations take place in the form of user studies where participants are asked to complete a number of tasks using both prototypes and the bol.com checkout. Feedback is obtained both in the form of user comments, using the think aloud protocol, as well as by means of observations. To allow this feedback to be processed, all evaluation sessions are recorded on video.

# **Key Findings**

Based on this research, e-commerce sites would be advised to incorporate the following design patterns in their checkout processes:

- Use as few pages as possible and preferably a one-page checkout.
- Display the cart contents visually (i.e. the product images) on the right or left of all pages of the checkout process, or in a box that stays in place (fixed at a certain location) when scrolling.
- Display delivery time when ordered within x hours, e.g. "Delivered tomorrow when ordered within 2 hours" (where "tomorrow" and "2" are updated and determined by the system).
- Try and provide an experience more similar to brick-and-mortar stores. Do this by phrasing headings as questions, e.g. "Contact information" becomes "How may we contact you?" but take extreme care to use correct wording and matching of the question with the answer that follows. When offering a gift service, also make this the first question. Also try to evaluate the impact of reordering the questions.
- When offering a gift service, present wrapping paper choices in a lightbox overlay at the moment the user clicks on the interface element to indicate that the item in the cart is a gift.
- Ask billing details before shipping details (at least for Dutch customers).

# **Contents**

Manage	ement Summary	ii
List	of Figures	V1
1. In	troduction	1
1.1.	Research objective	1
1.2.	Motivation	2
1.3.	Context	3
1.4.	Research Questions	3
1.5.	Research Method	4
1.6.	Structure of the Thesis	7
2. Re	elated Work	8
2.1.	Literature	8
2.2.	Practice	14
2.3.	Literature and Practice	24
3. In	terface & Interaction Design Patterns to be Evaluated	25
3.1.	List of Patterns	26
3.2.	Two Prototypes Provide a Means for Evaluating the Patterns	41
4. Re	equirements for the Checkout Prototypes	43
4.1.	Functional Requirements	43
4.2.	Technical Constraints	46
5. In	terface and Interaction Design	47
5.1.	Patterns per Prototype	47
5.2.	Design Method and Tools	50
6. Fi	nal Evaluation Prototypes	51
6.1.	Development	51
6.2.	Checkout Prototype A	52
6.3.	Checkout Prototype B	54
6.4.	Order Summary	56
6.5.	Bol.com Checkout Process	57
7. Us	ser Evaluation	61
7.1.	Script	61

7.2.	Setup	62
7.3.	Participants	65
7.4.	Processing the Results	65
8. Res	sults & Discussion	66
8.1.	Design Patterns	66
8.2.	Other Observations	81
8.3.	General Discussion	83
9. Fut	ture Research	84
10. I	Recommendations	86
10.1.	Do not use the anti-patterns	86
10.2.	Use as few pages as possible and preferably a one-page checkout	86
10.3.	Use a (floating) mini-cart sidebar with product images in the checkout	86
10.4.	Display delivery time when ordered within x hours	86
10.5.	Use question headings and assess the impact of rearranging questions	86
10.6.	Present wrapping paper choices in an overlay (instead of as an inlay)	86
10.7.	Ask billing details before shipping details (for Dutch customers)	87
Bibliogr	aphy	88
Append	ix A: User Evaluation Outline (Original Version; in Dutch)	92
Append	ix B: Checklist of usability guidelines	97

# **List of Figures**

Figure 1. Wehkamp.nl - cart page	14
Figure 2. Coolblue.nl - billing and shipping details page	
Figure 3. BCC.nl - optional account creation	
Figure 4. Toys"R"us - shipping method and gift option	
Figure 5. Booking.com - personal details	
Figure 6. Amazon.com - payment page	
Figure 7. Ebay.com - registration page	
Figure 8. Kmart - gift wrap overlay	
Figure 9. Nike - first step of the one-page checkout	
Figure 10. H&M - payment options (left) and payment details (right)	
Figure 11. Nordstrom - cart page	
Figure 12. Zappos.com - cart page	
Figure 13. Gift wrap question (left) and overlay with options (right)	
Figure 14. Lowe's - cart page	
Figure 15. Sears - one-page checkout	
Figure 16. Target - shipping page with gift question	
Figure 17. Gift question	
Figure 18. Gift overlay lightbox	
Figure 19. Gift wrap with normal radio buttons with one option selected as default	
Figure 20. Gift wrapping button-like radio buttons	
Figure 21. Coupon field hidden behind link (left) and input field after clicking link (right)	
Figure 22. Returning and new customers can choose by means of radio buttons	
Figure 23. Returning and new customers can choose by means of normal buttons	
Figure 24. Checking delivery-at-work checkbox displays text field	
Figure 25. Primary button with balloon (left) and enabled button after validated form (right)	
Figure 26. Sketch for cart page of prototype A	
Figure 27. Wireframe for initial display of prototype B	
Figure 28. Prototype A overview	
Figure 29. Page 1 – Cart (prototype A)	
Figure 30. Page 2 – Shipping and customer details (prototype A)	
Figure 31. Page 3 – Payment details (prototype A)	
Figure 32. Prototype B overview	
Figure 33. Entering details for a new account (prototype B)	
Figure 34. Order summary – initial display (prototype B)	
Figure 35. Order summary – the view after entering account details (prototype B)	
Figure 36. Payment details (prototype B)	
Figure 37. Order confirmation with highlighted email address (the same for both prototypes)	
Figure 38. Bol.com - cart page	
Figure 39. Bol.com - log in or new customer	
Figure 40. Bol.com - new customer address and contact details	
Figure 41. Bol.com Shipping method (without options) and gift service with preview on hover	
Figure 42. Bol.com - create an account and newsletter	
Figure 43. Bol.com - order review	
Figure 44. Bol.com - payment page	
Figure 45. Position of the user and moderator with laptops during the user study	
Figure 46. The actual setup with a user behind the laptop	
1 igute 70. The actual octup with a user belind the taptop	04

#### 1. Introduction

This chapter provides an overview of the focus of this research by outlining the objective, the motivation and context, the research questions and how the latter will be answered. This first chapter concludes with outlining the structure of this thesis.

# 1.1. Research objective

The objective of this research is to increase the user experience of e-commerce checkout processes by providing an overview of relevant interface & interaction design patterns and their performance. This is not only my personal objective, but also the objective of bol.com, a Dutch e-commerce company making the research possible.

Looking at the objective more closely, these key aspects of the objective can be discerned: user experience, e-commerce checkout processes and interface & interaction design patterns. Below I will first briefly introduce each of these three aspects.

# 1.1.1. Usability and User Experience

User experience in essence deals with enhancing the ease of use and the experience of a certain product. The same holds true for usability, however, user experience is also more about providing the user with an enjoyable experience. In practice, usability has a large number of definitions (e.g. [1], [2] and [3] all use different definitions). However, most of them are related to each other and contain largely the same aspects. In ISO 9241-11 (2008) [1], the ISO defines usability as follows:

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."

Other usability definitions state that the product "should be easy to learn (and remember)" (cited from [2], but also stressed by e.g. [3] and [4]). This can be related to the effectiveness and efficiency of achieving the specified goals. Others mention effectiveness and efficiency themselves [4]. It is also commonly stated that the product should be engaging [4], pleasant to use [2] or elicit positive user emotions [3]. The ISO definition of usability quoted above provides a good summary of all these aspects.

Although the usability definition given above also mentions satisfaction (just as the similar definitions mentioned above), the definition of user experience shifts the focus more to this aspect. The newer ISO 9241-210 (2010) [5] defines user experience as:

"A person's perceptions and responses that result from the use or anticipated use of a product, system or service."

This research tries to take both usability and user experience into account.

#### 1.1.2. E-commerce Checkout Processes

Checkout processes are an important aspect of e-commerce websites. Their task is to allow customers to actually order the products they have picked. The performance of these checkout processes relates directly to the revenues for such websites. The better they perform, the more visitors will manage to complete the checkout process from start till end. This process encompasses all steps from the customer clicking on "Add to cart" to the customer having ordered the products. The percentage of people reaching this goal, relative to the number of people that started the checkout, is called the checkout conversion percentage. Enhancing usability makes the process easier and thus can greatly increase this percentage, as well as the user satisfaction and subsequently brand loyalty. It should also be noted that persuasion can positively influence these aspects.

# 1.1.3. Research Goal: Recommending Interface & Interaction Design Patterns

The goal of this research is to determine interface and interaction design patterns that can enhance the usability of new customer e-commerce checkouts. Such design patterns are similar to software design patterns, although the focus is different. Software patterns describe solutions for repeating design challenges in a given context. The same goes for these interface and interaction design patterns. These patterns are like building blocks for user interfaces. They deal with aspects such as, but not limited to, interaction structures (e.g. one section, such as delivery address or payment, per page vs. a single page with multiple sections), element positioning and text style. This includes both interface patterns, focusing on more static elements, and interaction patterns focusing more on the interaction (both are named as part of this research, but they are not separated later on). Literature such as [6] and [7] explains that guidelines are usually more prescriptive and short (e.g. "disable the paste-function in the email confirmation field"), whereas patterns may be related to each other and include examples, a motivation and confidence (e.g. by means of argumentation and/or evaluation results). They may also leave more room for other solutions. It should be noted that a pragmatic and broader view on patterns is taken here regarding the partial overlap between design patterns and more specific guidelines on the one hand and design patterns and abstract design principles on the other hand (similar to Van Welie and Scott in [8]), leaning towards guidelines.

Collections of interface & interaction design patterns are also abundant (e.g. [9], [10], [11], [12] and [13]), although relatively few deal with checkouts specifically. Therefore, the goal of this research is to:

Discern new patterns tailored for enhancing the user experience of checkout processes.

#### 1.2. Motivation

Interface & interaction design patterns, as presented in the previous chapter, can increase the usability. They serve as well-tested building blocks that can be used for specific scenarios. Thereby they are not only able to directly increase usability, but they are also able to increase both internal and external consistency when they start to become adopted in other places.

Usability in itself is also very important for e-commerce checkouts. This is demonstrated by for instance the research that Jakob Nielsen, an important researcher in the field of usability, has done on this topic ([14]). In this research Nielsen evaluated a number of e-commerce sites by scoring each against his usability guidelines. He found that (at that time) Amazon.com scored 72% on his guidelines; 9 other high-revenue e-commerce sites scored 51%; 10 medium-revenue sites scored 37%, indicating a positive correlation between success (based on revenue) and usability. A quote from him even states "improving usability by 50% often increases sales by 400%". Other sources also prove that usability can have a strong effect on conversion and purchase intention, see e.g. [15].

Achieving the aforementioned research goal allows customers to better enjoy their shopping experiences and to achieve their personal goal of ordering one or more products to be purchased in an effective, efficient and satisfying way. This also aligns with the business goal of increasing the conversion percentage, thereby increasing the amount of orders as it both enables and persuades users to more successfully place their orders. By better enabling the customers to place the desired orders themselves it can even decrease customer support calls. The positive customer experience can also positively influence repeat purchases. In all these ways it has a direct impact on revenues and profits, a direct common business goal for e-commerce companies. Therefore both customers and the e-commerce companies can directly benefit from these patterns.

Finally, the motivation for bol.com as an e-commerce company should be clear. This research will allow them to increase their user experience and conversion by incorporating the successful patterns into their checkout process. Do note that this however does not mean that this biases this research in any way, all results are still shared openly with the scientific community by means of this document.

#### 1.3. Context

Conversion percentages for new customer are generally lower than for existing customers (see e.g. [16]). This is likely due to new customers not yet being assured by a positive history, nor having made an investment already by having provided personal details. Therefore, this study will focus on new user checkouts. Furthermore, it takes my earlier work [17] into account, namely the checklist with checkout usability guidelines.

#### 1.4. Research Questions

The previous sub chapters presented the research objective and why this objective was important. In order to achieve this objective of identifying interaction design patterns that can enhance checkout usability, I have defined a number of research questions. The main research question of this thesis is:

Which design patterns provide good user experience for e-commerce checkouts?

In order to answer this research question we first need to know:

RQ 1. Which potentially promising interaction design patterns (elements & structures) can be discerned from literature and practice for enhancing checkout usability?

This first question forms the preparation required to answer the following question that focuses directly on answering the main research objective:

RQ 2. Is the effect on the usability of e-commerce checkout processes of these interaction design pattern positive, negative or neutral?

# 1.5. Research Method

In order to achieve this research objective, a number of interesting patterns are gathered from literature and practice. Following this, two prototypes are designed and developed, allowing these patterns to be evaluated. These evaluations take place in the form of user studies where participants are asked to complete a number of tasks using both prototypes. Feedback is obtained both in the form of user comments, using the think aloud protocol, as well as by means of observations. To allow this feedback to be processed, all evaluation sessions are recorded on video.

More concretely, the research questions can be answered as follows.

#### 1.5.1. First Research Question

The first research question as presented above is:

RQ 1. Which potentially promising interaction design patterns (elements & structures) can be discerned from literature and practice for enhancing checkout usability?

This first research question is answered by looking at both literature and practice.

The literature aspect is taken into account by looking at relevant e-commerce usability literature, design patterns and the guidelines for my earlier work [17]. A combination of these sources should allow for a quite encompassing view of the potentially promising patterns that can be found in literature. However, given that a portion of these patterns may already have been extensively researched and are therefore less interesting for this research (they do not fit the condition of "potentially promising"), promising patterns formed by insights inspired by this literature are also taken into account.

As not all research on this topic is made public because of the high commercial value of such research, it is also very relevant to look at design patterns that can be discerned from practice. Given the positive correlation between successful e-commerce sites and usability (as stated in the research mentioned earlier in this chapter [14]), it should make sense to look at successful e-commerce sites. Therefore, the practice aspect of this research question is handled by looking at the e-commerce sites that are present in the list of the top 1000 most-visited sites on the web (according to the Google DoubleClick Ad planner [18]). The sites from this list that actually provided interesting design patterns or insights are listed in the next chapter. Similar as for the literature, potentially promising design patterns can also be formed here based on insights triggered by examining actual checkout processes.

# 1.5.2. Second Research Question

The second research question as formulated above:

RQ 2. Is the effect on the usability of e-commerce checkout processes of these interaction design pattern positive, negative or neutral?

This research is done is by means of a user evaluation.

The two basic options for user evaluations are quantitative evaluations and qualitative evaluations. Both methods have a different focus. Quantitative evaluations allow more data to be collected, but this data will also be shallower. This means it is more difficult to gain real understanding as to *why* certain patterns affect the usability either positively or negatively. It is also more difficult to assess how the patterns were *experienced*: even asking this in a survey afterwards is not likely to yield as much results as in a qualitative evaluation. Furthermore, minor issues that the users can overcome themselves are less likely to be discovered, even though their accumulated effect can have a strong impact on the overall experience. A qualitative evaluation scores better at these aspects, at the cost of having a fewer number of users that can take place in the evaluation (given time limits). [19] However, by using enough participants for the experiment this drawback can be largely mitigated. In this case 14 persons participated in a qualitative research.

Another aspect in favor of qualitative evaluation for this specific research at bol.com is that it is not possible to use a modified real-world checkout process. It would require building the complete checkout processes instead of mere prototypes. Furthermore a user pool for qualitative evaluations is already present, whereas a user pool for quantitatively evaluating prototypes is not. Furthermore this would require the prototypes to be extremely well tested because, unlike with qualitative research, there are less possibilities to help out users if a prototype error would occur. This is all in addition to the earlier mentioned aspect that the *why* is very important for this research. Therefore this research will take place in the form of a qualitative evaluation.

A qualitative user evaluation can take multiple forms. Thinking aloud is a very popular method that allows gaining deeper insights into the user experiences: when, how and why the experience is influenced. This matches the reasoning for choosing a qualitative evaluation over a quantitative evaluation.

This still leaves two methods for performing a thinking aloud user evaluation: concurrent thinking aloud (CTA) and retrospective thinking aloud (RTA). CTA requires the participant to express his or her thoughts during the execution of the task, whereas RTA simply records the task, after which the recordings are discussed with the participant who then needs to recall his or her thoughts afterwards. Thorough comparisons between these two methods (such as [20]) have revealed that both methods produce similar results, but RTA requires at least twice as much time. Therefore CTA is recommended. Furthermore, I have more personal experience with CTA, increasing this preference. It should be noted that CTA does increase the mental load during the sessions. However, this might also be beneficial as in a regular home/work setting distractions may also occur. In addition, the increased mental load might expose more user experience problems during

the test. Finally, given the amount of participants (14) and the expected task duration (1 hour), RTA is not even a viable option in this case as it would take too much time.

In order for the research question to be actually answered by the qualitative concurrent thinking-aloud user study, participants will need a way to try out the design patterns in a realistic setting. This is facilitated by placing the patterns in prototypes that represent a complete checkout process. Given my extensive personal experience with creating front-end web development and high-fidelity mockups, the quickest way to build these realistic prototypes is to hand-craft them by means of HTML and CSS. As this also provides the most realistic experience for the user study participant it makes sense to opt for this testing method.

#### 1.6. Structure of the Thesis

After having provided a comprehensive introduction into the topic and the research in the current chapter, the next chapter presents the related work. This includes a presentation of the already mentioned general literature, design pattern literature and guidelines. This second chapter also presents the sites used to discern patterns from practice. In chapter 3 the final list of potentially promising patterns is outlined, including their origin. It also provides a brief introduction into how they can be incorporated in the two prototypes used for the evaluation. The patterns themselves, together with the requirements presented in chapter 4, form the basis of chapter 5 in which the interface and interaction design of these prototypes is explained. The final prototypes based on this design can be found in chapter 6, which also briefly outlines the development of these prototypes. Following this, chapter 7 explains the details of how the evaluations took place. This is followed in chapter 8 by a presentation of the results and discussion. Finally, the research concludes with an overview of potential future work in chapter 9 and a summary of the conclusions and recommendations in chapter 10.

# 2. Related Work

As outlined in the previous chapter, the interface and interaction design patterns that are evaluated originate from literature and practice, as well as inspiration based on both these sources. The first sub chapter here presents the related literature. The second part of this chapter presents the related checkout processes that can be found in practice.

# 2.1. Literature

This sub chapter presents the related literature. First existing design patterns are described to provide context for this research. It is followed by a brief discussion about relevant usability guidelines. The sub chapter concludes with an overview of other relevant literature.

# 2.1.1. Existing Design Patterns

Design patterns have an abundant presence in literature. Software design patterns can be found commonly, but also interface and interaction design patterns are explained in various sources such as Van Welie's Interaction Design Pattern Library [9], ui-patterns.com [10], Quince [11], the Yahoo! Design Pattern Library [12], the library from Patternry [13] and books like Designing Interfaces [21], Designing Web Interfaces [22], Web Application Design Patterns [23] and Design of Sites [24].

Although most of the aforementioned libraries focus on more generic patterns, some of the libraries include a few patterns more specifically relevant for designing checkout processes. Examples of the more generic patterns from these libraries are: accordion, auto complete, breadcrumb, carrousel, faceted navigation, hover invitation, list builder, overlay, progress bar, registration, tag cloud and thumbnail.

As stated, these libraries do list some patterns that are more tailored for checkout processes than just being generally applicable. Some examples are:

- login and account registration, allowing users to sign up and log in (e.g. with an email address and password) to allow protected access to the user's information;
- purchase process, essentially a pattern for using a checkout process;
- responsive disclosure and responsive enabling, relevant as checkouts should be focused and not be overwhelming;
- shopping cart, very generic;
- talk like a person, making users more engaged and feel more human;
- terms of service, accept them implicitly and not by means of a checkbox;
- wizard (both one page and multiple pages), guiding users towards completing a single goal consisting of multiple sub-tasks.

Patterns for forms are also somewhat relevant as, in essence, a checkout can be viewed as a complex form. They include patterns such as constrained input, forgiving format, good defaults, illustrated choices, inline validation, input feedback, input hints, required form fields, right aligned labels, steps left and top aligned labels.

It should be noted that these patterns provide context to this research. The aim of this research is to discern new patterns based on or inspired by these existing patterns, guidelines, other literature and checkout processes that can be found online. Furthermore, they can be used in the designs that allow the actual checkout patterns to be tested, similar to how the guidelines and other literature can be used for this.

# 2.1.2. One More Pattern: Single-page or Multi-page Checkout

An interesting existing pattern that is relevant for this research is the use of a single-page checkout (versus more commonly used multi-page checkout processes). Most other patterns have already achieved their status among other patterns, however the actual usability and conversion potential of the single-page pattern is often debated (see e.g. [25], [26], [27], [28], [29], [30] and [31]), providing a multitude of arguments and opinions for either side. This warrants a more detailed presentation of this pattern to be present in this thesis; therefore this sub section presents a summary of the relevant literature on the debate for this pattern.

As stated, the amount of pages in a checkout process is an interesting aspect: there are arguments for either side of this subject. Arguments given by e.g. Roggio [25] for using a single-page checkout include that it might make the checkout process faster to fill out, faster in total page load times (at least the total overhead added by each extra page is reduced), easier, with fewer barriers (each new page a customer needs to visit may result in exiting the site) and thereby converting better. On the other hand, it does increase the need for well-functioning inline validation and client-side (Javascript) logic. Without these two components questions that are irrelevant (or relevant) based on earlier answers cannot be hidden (or displayed).

When using a multi-page process on the other hand, the answers on earlier pages can always be taken into account to determine which fields to display on a latter page. Also, without inline validation, a user could end up with a much larger amount of errors at once which may lead to frustration and the user exiting the site. In addition, using multiple pages might create a better focus on a single aspect of the checkout task, without other sections attracting attention (simply because they are not on the same page).

Furthermore, a bol.com business question was to compare a one-page checkout against a multi-page checkout. Given the aforementioned debate about whether a one-page checkout works better than a multi-page checkout or not, it will be very interesting to test this pattern. Especially since literature suggests that the effectiveness of this pattern is influenced by a lot of factors like the type of customers (e.g. new vs. returning or technical experience), the type of products (e.g. high involvement vs. low involvement) and the e-tailer (e.g. brand image or trust).

Most results in this area have not been presented as scientific research. However, information about this topic can be found on e-commerce (blog) sites. Examples include Get Elastic's [25] stating "single-page checkouts may significantly improve sales conversions" and [26] which presents a 21.8% conversion increase but states that this "should not be used as an indicator for how every single-page checkout will perform [..] results will vary". There are also blogs with posts titled "One

page ajax checkout – 5 reasons why not" [27] whilst other posts from the same author states that a different one-page checkout "improved conversion by 13.39%". [28]

Unfortunately, in addition to the varying results according to the e-commerce (blog) sites, when the subject is mentioned in scientific research, it is usually merely a reference. E.g. [29] states "Some websites have a one-page checkout process: shipping, billing, review and submit. Other websites have it on four pages. From our experience, both can work; it really depends on the population visiting the website." Books discussing this subject, such as [30] state "Using a 1-page checkout is definitely not mandatory, but testing is."

The aforementioned research suggests a reason for more concrete data being absent: the data is not consistent across all sites. However, the absence of concrete data might also lie in the usually confidential nature of such research. Finally, [31] points out that users may not necessarily have problems with multi-page checkout processes, but rather that research about the effectiveness of one-page checkouts sometimes compares non-optimized multi-page checkouts with optimized single-page checkouts. Therefore, not all previous findings on this subject may be completely valid. By taking this into account in the current research it could be possible to attain a better-founded conclusion on this subject and I find the aforementioned reasons to be a good motivation as to why this is an interesting pattern to evaluate here.

# 2.1.3. Checkout Usability Guidelines

In a previous study I have created a comprehensive list of usability guidelines for e-commerce checkouts based on literature [17]. The list was constructed by researching usability guidelines found in literature, related to four themes:

- general usability
  - e.g. "remind users what they should do next";
- form usability
  - e.g. "explain all errors politely and completely";
- usability of specific elements like buttons, links and overlays
  - e.g. "links look like links";
- e-commerce checkout usability
  - e.g. "highlight delivery costs at the start".

The guidelines that were found in literature were then validated by evaluating if they were adhered to in practice, by checking there usage in three major Dutch, European and worldwide e-commerce websites.

This previous research has resulted in a total of 292 validated guidelines, based on over 40 sources related to (checkout) usability such as the Nielsen Norman Group in [14], the International Standards Organization in [1] and [32], Gould & Lewis in [2], Stone et al. in [33], Smith & Mosier in [34], Dix et al. in [35] and Krug in [36]. The rationale for such guidelines lies in the fact that they are founded by literature and usually have been extensively validated by practice. These guidelines are

more specific and concrete than design patterns, but helped identifying promising patterns as well as guided the implementation of the patterns in the two prototypes used for the evaluation of the patterns.

It should be noted that such guidelines can also contradict each other in practice or that they still leave room for multiple implementations. Therefore, it is also interesting to test (some of) these guidelines in practice. The guideline topics that were relevant for the promising patterns that are listed in the next chapter are briefly presented below, focusing on their aspects that are relevant for the design patterns. The complete original list of guidelines from this previous research can be found in appendix B. Each guideline topic presented below includes the number from the appendix between parentheses.

#### Concision (3)

Everything should be as concise as possible and noise should be minimized.

# Consistency (4)

Internal consistency is about consistency within the application, but when identifying patterns external consistency plays a more important role. It is about using conventions when they exist. These conventions may stem from other sites and online shops, but it may also increase the resemblance to the real world.

# Discoverability and visibility (5)

Making aspects of the interface discoverable and visible means that features need to be appropriately advertised. They need to be visually visible, but also need to be clear about what they are meant to do. It also means that users should not have to remember information, but it should simply be displayed whenever relevant. This means that relevant instructions and information should not be hidden. Appropriately displaying prices is an important aspect of this.

# Learnability (6)

Incorporating learnability means that controls work predictable and recognizable cues are used wherever possible (which also relates to consistency). Questions a user can have should also be answered, that way a user can improve his/her effectiveness and efficiency at a website.

#### Robustness (7)

Robustness is all about preventing and solving unintended system states. In order to realize this, the user needs to be able to correctly evaluate the internal state of the system and reverse unintended actions. Highlighting errors in a helpful manner and allowing easy recovery help in this regard.

# Guidance (12)

Providing guidance is about assisting and guiding users into completing their task. Reminding users about what they should do next, as well as indicating the important and the currently active aspects can help improve the usability and user experience.

#### Overall structure and flow (14)

Guidelines about overall structure and flow focus on aspects like natural organization (in part related to the previously discussed consistency). It is also related to the previous topic about guidance: making it clear to users which steps there are and which step they are currently at.

# Form organization (18)

There are also more specific guidelines such as about how to organize forms. They should "speak with one voice" and have a logical order and grouping with natural breaks. Furthermore it includes guidelines such as not making users enter the same information more than once.

#### Input fields (21)

Relevant for input fields is that it is important to make the requested data format for such fields explicit.

# Default answers (23)

Usability can also be increased by providing good default values where applicable (e.g. for radio buttons).

# Help text (25)

Amongst other aspects, help text guidelines explain that help texts should be used for explaining why e.g. unfamiliar or privacy sensitive questions are being asked. They can take away doubt, thereby increasing the user experience as well as the conversion. Help texts should also be used suggest recommended ways of providing answers. These guidelines also explain that help texts should be as specific as possible and be visually placed at the exact space where they are relevant.

#### Errors and successes (26)

Guidelines for errors and successes detail about making sure to extremely clearly communicate when an error is blocking the task. They also state that actionable remedies should be provided and that in case an input field is responsible for the error, it should be clearly marked with a double visual emphasis.

# Inline validation and suggestions (27)

Inline answer validation should only be done after people have finished providing an answer, not during the process.

#### Checkout in general (41)

Other customers' special discounts (e.g. coupon fields) should be hidden as much as possible according to the guidelines in the general topic for the checkout.

#### **Costs (42)**

Checkout costs guidelines state that it should be clearly shown if and when extra costs are being added to the order.

# Progress (40 and 43)

A highly visible progress indicator should be provided during checkout that is simple and that is used to improve perceived performance. It should also show all steps of the process and make clear that a user can not click on a later step in the process.

#### Registration and log in (45)

Guidelines about registration and log in state that the same form should be used for both logging in and registering. They also state that both actions should be optional, i.e. a guest checkout should also be offered. Furthermore they highlight that making users choose between logging in and registering can create problems such as users using the wrong form so that it is important to tackle this sufficiently (e.g. by using two buttons, allowing users using the wrong form to switch easily or using a distinct unified form).

#### Data fields (46)

The checkout guidelines for data fields focus on different areas related to such fields. They state that newsletters should be opt-in, shipping address should be used as billing address by default and inlays with new fields should be added below the trigger-field (e.g. a checkbox). In relation to credit cards they state that the expiration date should be formatted exactly as on the credit card itself and that the type/issuer (e.g. Visa or Mastercard) should be determined automatically based on the number.

# Order of steps (48)

The shipping address is asked before asking the billing address. Furthermore a summary should be presented before the order is placed.

# Order summary (49)

The order summary guidelines state that all relevant information should be present in the summary that is displayed before the order is finalized.

#### Navigation (54)

Guidelines about checkout navigation deal mainly with the main navigation button (i.e. the primary action button or call-to-action, the one that moves you to the next page). It is stated that such a button should be located above the page fold, it should be present at both the top and the bottom of the form and it should be prominent and visually distinct from other elements.

#### 2.2. Practice

Not all findings done by e-commerce companies are published in literature, which is of course somewhat understandable given the fact that it can provide them with a commercial edge. This makes it worthwhile to not only look at literature but also take a look at checkout processes that can be found "in the wild". In this regard, I have looked at successful e-commerce sites. This should prove effective as it can be expected that most of these sites are so effective by at least providing some usability best practices. In order to discern promising patterns from such sites I have examined all e-commerce related sites from the Google DoubleClick Ad Planner top 1000 [18].

Although all e-commerce sites from the aforementioned Google top 1000 have been examined in addition to a number of Dutch sites, not all sites yielded interesting results for defining the list of promising design patterns because the only patterns they included are already well-known (such as using a shopping cart or allowing for account registration). However, there is still a large selection of sites that did. In addition and given the Dutch orientation of this research, I have also taken a look at the major Dutch e-tailers. The sites from the top 1000 and major Dutch e-tailers that influenced this research are listed below. It includes some examples of the interesting patterns and pattern-eliciting aspects that could be discerned from these sites.

# 2.2.1. Wehkamp.nl

Wehkamp.nl [37] is one of the two leading Dutch e-tailers together with bol.com (based on revenue). Their shopping cart page shows some interesting aspects such as a *progress bar* and *primary* action buttons at the top and bottom:

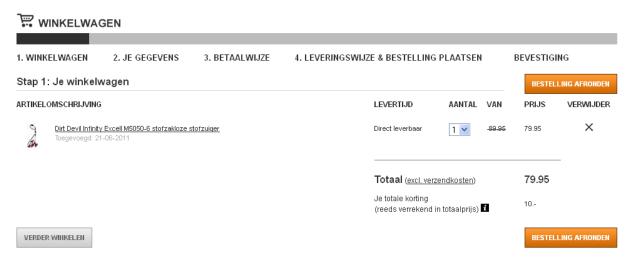


Figure 1. Wehkamp.nl - cart page

#### 2.2.2. Coolblue.nl

Coolblue.nl [38] is another large Dutch e-commerce player. The first page after their cart page shows a number of interesting features: progress bar, persistent mini-cart with product images, unique selling points, delivery time when ordered within x hours, explanations for requesting sensitive data, single group of address fields and inline validation.

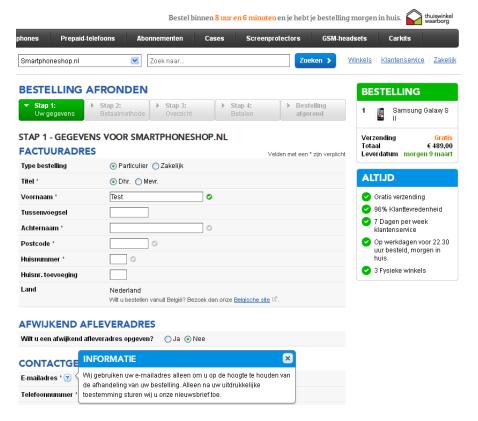


Figure 2. Coolblue.nl - billing and shipping details page

#### 2.2.3. BCC.nl

Bcc.nl [39] is the e-commerce site of a large Dutch/European retailer. Their checkout process creates a more *personal & brick-and-mortar-like experience* (by using question headings) and their *account creation* is optional:



Figure 3. BCC.nl - optional account creation

# 2.2.4. Toys"R"us

Toysrus.nl [40] is the Dutch version of a major worldwide retailer focusing on selling toys. They utilize a progress bar, data review, personal & brick-and-mortar-like experience (by using question headings), multiple and hidden wrapping paper choices on e.g. their shipping page:



Figure 4. Toys"R"us - shipping method and gift option

# 2.2.5. Booking.com

According to the Google top 1000 [18] the hotel site booking.com [41] is the most-visited hotel site online. They are well-known for their persuasive design (see e.g. [42]). With their two page checkout process these interesting aspects can be noted: *limited pages*, *persistent mini-cart with product images*, *unique selling points* (e.g. lowest price guarantee and no booking costs), *explanations for requesting sensitive data*, optional *account creation* (or login), *subtle order costs* and *newsletter opt-in*. Almost all of these aspects can already be discovered on the page you see after selecting the desired room:



Figure 5. Booking.com - personal details

#### 2.2.6. Amazon.com

The world's (and Europe's) largest e-commerce company Amazon.com [43] also utilizes some promising ideas on their payment page, such as progress bar, personal & brick-and-mortar-like experience (question headings), primary action buttons at the top and bottom and automatic credit card company:

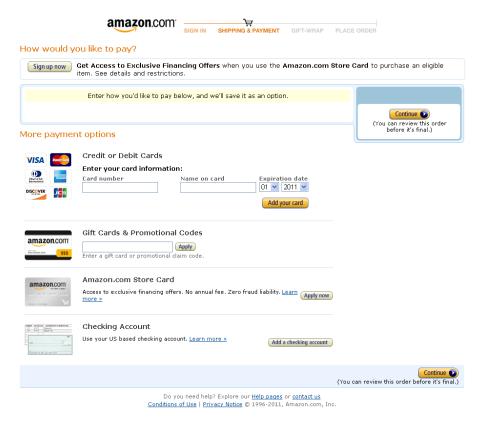


Figure 6. Amazon.com - payment page

# 2.2.7. Ebay.com

Ebay.com [44] is not a regular e-commerce web shop, however it is the top online auction site according to the Google Top 1000 [18]. Their registration form presents some interesting insights such as *limited pages* (just one page), *unique selling points*, *personal & brick-and-mortar-like experience* (the way headings and fields are labeled), *explanations for requesting sensitive data*. Part of their single page registration form can be seen below:

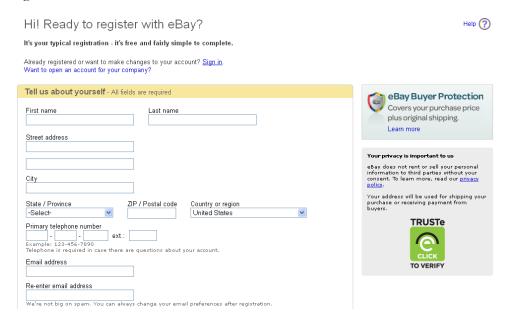


Figure 7. Ebay.com - registration page

# 2.2.8. Kmart

Kmart [45] is a Sears company and a large US retailer, also focusing on e-commerce. Their site is also part of the Google Top 1000. The most relevant insights to be found on their shopping cart page are related to the gift options and include hidden wrapping paper choices, multiple wrapping paper choices and immediate wrapping paper previews:



Figure 8. Kmart - gift wrap overlay

#### 2.2.9. Nike

The e-commerce shop of Nike [46], one of the major worldwide sport brands, utilizes *limited pages* (cart, register/login and order details), *data review*, a persistent mini-cart with product images, unique selling points (such as free returns within 30 days), a personal & brick-and-mortar-like experience (by phrasing their section headings as questions), shipping details before billing details and account creation:

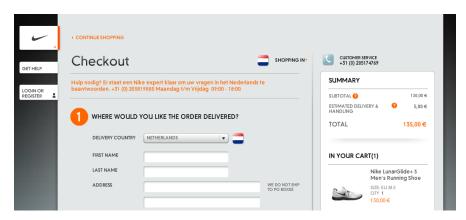


Figure 9. Nike - first step of the one-page checkout

#### 2.2.10. H&M

H&M is a major worldwide fashion retailer. Their website HM.com [47] is also part of the Google Top 1000. Remarkable aspects to note on their payment page as displayed below include a progress bar, persistent mini-cart with product images, automatic credit card company, expiration date as on credit card and subtle total order costs:



Figure 10. H&M - payment options (left) and payment details (right)

#### 2.2.11. Nordstrom

Nordstrom is another major US fashion retailer. The cart page of their online shop Nordstrom.com [48] displays interesting aspects such as *unique selling points*, *primary action buttons at the top and bottom* and *large product images in cart*:

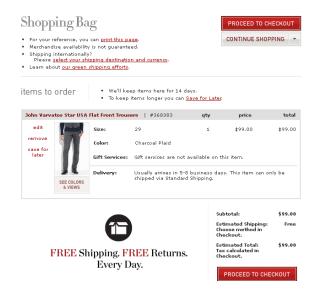


Figure 11. Nordstrom - cart page

# 2.2.12. Zappos.com

Zappos.com [49] is an Amazon.com-owned US online shoe store known for its unique 365 day return policy. Their cart page presents this and other *unique selling points*, *primary action buttons at the top and bottom* and *large product images in the cart*:

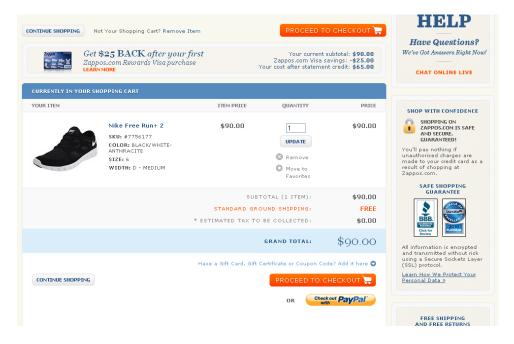


Figure 12. Zappos.com - cart page

# 2.2.13. Gap

The worldwide fashion retailer Gap is also present online with their web shop at Gap.com [50]. All their checkout sections include a persistent mini-cart with product images, unique selling points (free shipping), hidden wrapping paper choices, multiple wrapping paper choices and immediate wrapping paper previews:

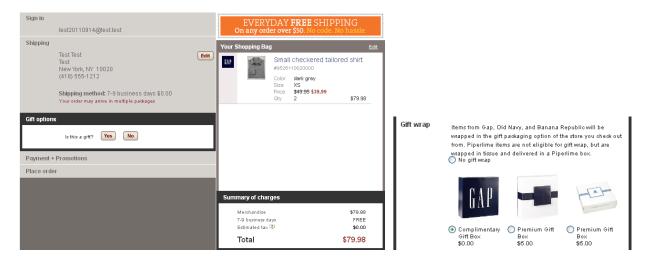


Figure 13. Gift wrap question (left) and overlay with options (right)

#### 2.2.14. Lowe's

Lowe's is a US based home improvement store. The cart page of their online version Lowes.com [51] displays two interesting aspects: some form of delivery time when ordered within x hours and primary action buttons at the top and bottom:

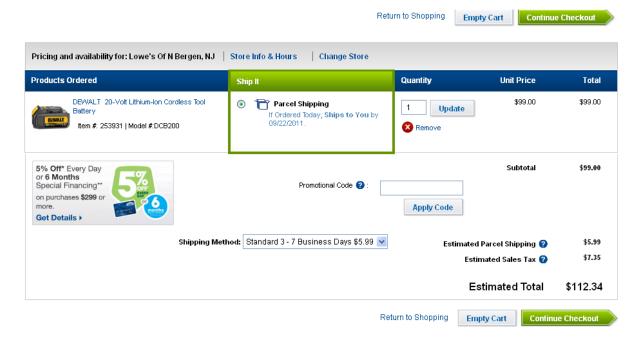


Figure 14. Lowe's - cart page

# 2.2.15. Sears

Sears is a major US based department store. It also owns the aforementioned Kmart. Interesting to note on their one page checkout process at Sears.com [52] are (besides the *limited pages*) shipping details before billing details, single group of address fields, marking optional fields, automatic credit card company, subtle total order costs and repeat email address and password:

1. Shipping Address			English	Español   Fr	ançais   Deutsch
	First Name	Last Name			
Name:					
	Address Line 1	Address Line 2 (Optional)			
Address:					
	Address Line 3 / Company (Opt	ional)			
	City	Davis Continues			
	City	Region (Optional)			
	Postal Code Co	untry			
	NE	ETHERLANDS If you	u are shipping to the U.S.	click here	
	Primary Phone Number	Alt. Phone Number (Optiona	n		
Phone:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Including Count	ry Code	
Email:		We value your privacy			
3. Order Review					
Product		Estimated Shipping	<u>Price</u>	Quantity	Item Total
1.0000.					
	14k White Gold Diamond Accent Oval	6-10 business days	EUR 165.95	1	EUR 165.95
	Hoop Earrings				
0 0					
Shipping Method:	: DHL Express (6-10 busine	ess days)			
	, ,				
Customs and Double upon delivery.	uties Prepaid. Prepay EUR 28	3.26 and be 100% guaranteed	d that there will be no a	idditional cha	rges due
		s charges and brokerage fee:			
note that your co	untry may charge different im	port duties, VAT and fees whi	ch may be collected ei	ther at or bef	ore delivery.
4. Payment Information					
	The ea	-f			
VISA MERICAN     AMEX	PayPal to pay	afer, easier way			
			Item Subtotal:		EUR 165.95
Card Number:			Shipping: Order Total:		EUR 21.24 EUR 187.19
Expiration Date:	09 🔻 2011	▼	Order rotal.		LOIN 107.13
Security Code:	What's This?				
	Use Promotion Code				
_			McAfee SECURE	BUY	MOM
TRUSTE' EU SAFE HARBOR			TESTED 15-SEPT	B011	TOW

Figure 15. Sears - one-page checkout

# 2.2.16. Target

Target is another major US department store. The shipping page of their online shop at Target.com [53] displays a number of interesting aspects such as *limited pages*, *progress bar*, *personal & brick-and-mortar-like experience* (the gift question at the bottom), *hidden wrapping paper choices*, *explanations for requesting sensitive data*, *shipping details before billing details*:

required	you would like to ship all of y		order summary (1 iten item subtotal: \$69.9
first name:	m.i.:	* last name:	
address 1:			your price*: \$69.9
ddress 2:			* You'll see any tax or additional shipping costs, and can apply discounts or GiftCards, during Checkout.
city:	* state:	² zip code:	shop safe & secure. At Target, we value your trust. We want you to know how we collect, use, share and protect information about you. learn more
	r shipping-related questions):		
nome 💌			
_	r shipping me		
Ve ve set all your items to au e able to upgrade the shipp	tomatically ship at the lowest	ethod. t cost to you.If you'd like to get some items faster, you may	
_	tomatically ship at the lowest		
Ve Ve set all your items to au e able to upgrade the shipp required sale	tomatically ship at the lowest ng method. <mark>learn more</mark>	t cost to you.If you'd like to get some items faster, you may  'estimated arrival date:	
Ve ve set all your items to au e able to upgrade the shipp required sale	tomatically ship at the lowest	t cost to you.If you'd like to get some items faster, you may	

Figure 16. Target - shipping page with gift question

# 2.3. Literature and Practice

The previous sub sections presented the related literature (mainly in the form of guidelines) and practice (in the form of successful e-commerce sites). Based on this related work, a number of interesting (i.e. not yet well-known or well-defined) patterns can be identified, a lot of which have already been indicated above. The next chapter presents the actual list of patterns based on this literature and mainly on this practice. In this next chapter, the work from the current chapter is referenced for a more complete overview.

# 3. Interface & Interaction Design Patterns to be Evaluated

This chapter presents the interface and interaction design patterns that are assessed in this research. In the first sub chapter it provides an overview of the final list of patterns. This list is based on the promising (new) patterns identified by looking at the sources presented in the previous chapter, thereby making it based on both literature and practice. Almost all patterns either originate from or are inspired by practice. Most of them are further backed by the previously discussed checkout usability guidelines or, where applicable, the other literature presented above. Further motivation can be found below for the individual patterns. The chapter concludes in the second sub chapter by explaining how the patterns can be incorporated in the prototypes used for the evaluation.

# 3.1. List of Patterns

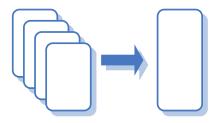
This section lists all the actual patterns that are evaluated as part of this research. It explains the relevant details of each pattern and also its origin, such as literature, practice, usability effect (e.g. efficiency or being in control) and/or its persuasiveness. In essence this origin is the rationale for each pattern. In some cases a pattern consists of two or more variations of the pattern. In such cases the variations are presented as part of the main pattern.

It is important to recognize that all patterns have a similar context. All patterns aim to improve online e-commerce checkouts for new customers, with regard to the user experience, potential for conversion, etc.

# Limited pages

- a) Single page (with obviously distinguishable sections)
- b) Three pages

Using as few pages as possible still allows for different amounts of pages to be used. As there is a lot of debate going on in literature (e.g. [29] and [30]) and online (e.g. [25], [26], [27] and [28]) about whether single page checkout processes increase usability and conversion, using one page should prove to be an interesting variation to evaluate. Given that the bol.com checkout [54] uses seven pages to allow customers order their products, using three pages is a variation fitting this pattern that might also yield interesting results. The reason for three pages is that it is somewhere in between the first alternative (one page) and the bol.com checkout process which will also be evaluated (which consists of seven pages). Furthermore, it exactly allows for a separation of the main topics of a checkout: cart, customer details and payment details.



Based on and inspired by efficiency and these sources:

Practice: [41], [44], [46], [48], [49], [50], [52], [53]

Literature: [25], [26], [27], [28], [29], [30]

# Progress bar (with indication of completed and upcoming steps)

 Step 1 ✓
 Step 2
 Step 3

A progress bar allows users to determine where they are in a process and how much still remains.

Based on being in control and these sources:

Guidelines: 12, 14, 40, 43 (appendix B)

Practice: [37], [38], [39], [40], [43], [45], [48], [51], [53]

#### Data review

- a) Sidebar
- b) Summary just before (above) the payment details

Providing a summary that allows users to review the data they have entered is encouraged by literature, guidelines and practice (see below). It is possibly even a legal requirement, at least in the Netherlands [55]. However, this does leave room for different implementations. Given that bol.com already uses the alternative of a separate page to allow users to review their order (possibly affected by the new/existing customer ratio), it makes sense to evaluate other alternatives. One alternative that lies far from this one is to continuously display an up-to-date summary on each page. In order to make this non-hindering yet nonetheless visible enough the most obvious solution would be to use a sidebar for this. This leaves room for another variation that somewhat holds the middle between two that are already mentioned: provide a summary just before the payment details (as on bol.com), but rather placed above the payment details instead of on a separate page.

Based on and inspired by being in control, effectiveness and these sources:

Guidelines: 5, 7, 12, 48, 49 (appendix B)

Practice: [38], [39], [40], [43], [45], [46], [48], [50], [53]

# Persistent mini-cart with product images

- a) In the normal sidebar
- b) In a separate floating sidebar (does not scroll together with the page, it is fixed)

Continuously displaying a product image can be a persuasive method to increase conversion. In retail literature it is suggested that allowing a person to look at and experience the product as much as possible makes the customer imagine that he/she already owns the product (see e.g. [56]). This causes the customer to feel not ordering the product as a loss and therefore makes it harder to abort the checkout process. Of course this aspect has much more to do with persuasion and conversion than it does with usability. However, luckily enough there is also a strong user experience argument for this design pattern. It can increase the positive feeling during a checkout, as it focuses on the product you will receive (instead of only on the costs and the technical data). In addition, it is also a way to summarize a key aspect of your order in a visual way, thereby potentially increasing customer confidence.

The reason for the two options (in the normal sidebar or in a separate floating sidebar) lies mainly in the fact that a one-page checkout prototype leaves room for a floating sidebar. In addition, the product image is even more continuously visible, potentially even increasing the aforementioned argumentation for displaying it at all.



Based on and inspired by being in control, effectiveness, persuasion and these sources:

Guidelines: 7, 12 (appendix B)

Literature: [56]

Practice: [38], [41], [45], [46], [47], [50]

#### Unique selling points (persuasion)

- a) Continuously visible, as two very short paragraphs in the sidebar
- b) Display as a bulleted list near the cart contents in the sidebar
- c) Display next to the primary button (call-to-action)

Displaying the site's unique selling points (USP) can be very persuasive as it provides a reason for why to order at that site instead of somewhere else. In addition, it can comfort users by providing them with reassurances during the checkout process. Finally, displaying them during the ordering of products is furthermore a very actionable moment as it is often the last chance to take away doubts.

Given that a checkout allows for multiple opportunities to display this, a number of viable options have been identified. The first two are somewhat alternatives, but they can both be present in addition to the third one. This third option is also the most actionable place to put the unique selling points. Persuasion literature (e.g. [57]) supports displaying such texts at actionable moments.

Based on and inspired by persuasion and these sources:

Literature: [57], [58]

Practice: [38], [41], [46], [48], [49]

#### Delivery time when ordered within x hours (persuasion)

Displaying the delivery time as a countdown, e.g. "Delivered tomorrow when ordered within 2 hours" can serve multiple functions. First of all, it is an informative statement that displays the delivery time as actionable as possible: the customer does not need to translate how much time there is actually left, it is already displayed this way. Furthermore, displaying the delivery time can also be a unique selling point in case the company offers a better proposition than competitors (although the same effect applies when it is not written this actionable, but simply as e.g. "Delivered tomorrow when ordered before 23:00"). Finally, it can be very persuasive as it focuses on the (time) scarcity effect, an important persuasive method (e.g. [59]).

Based on and inspired by persuasion, being in control and these sources:

Literature: [59]

Practice: [38], [51]

# Personal & brick-and-mortar-like experience

- a) Use question headings (e.g. "How can we contact you?" instead of "Contact details")
- b) Make the order of the questions match offline (brick-and-mortar) checkout experiences

The title of this pattern is a bit more abstract and broad than others because it contains multiple concepts that may work together to provide a more brick-and-mortar like experience.

The first alternative (which in this case can work together with the other one) is to phrase heading as questions instead of more brief and formal regular heading. This can both introduce a very persuasive effect and make the whole experience more life-like. People tend to answer questions when they read them, or at least start to think about them more. Furthermore it resembles the process of going to a normal store where the clerk may ask "is it a gift?" or "where would you like it delivered?" instead of "gift." And "delivery address".

This last aspect could be further strengthened (yet also function on its own) by making the chronological order in which order details are asked match that of a real store. In my experience one of the first questions is if the item you are purchasing is a gift or not (in case such a question gets asked at all). And in cases where the product might be delivered, I would get asked: if I am a new customer; where I would like it delivered; how they can reach me in case of questions; how I would like to pay. This has the added benefit of starting with more lightweight answers, increasing my commitment and (time) investment as we go along, making it seem logical that decades of perfecting offline selling resulted in this sort-of best practice.

Besides having a potential for being very persuasive (as explained above), it enhances consistency with the offline world and thereby also learnability, two important aspects of most usability literature.

Based on and inspired by external consistency, persuasion and these sources:

Guidelines: 4, 6, 14, 18 (appendix B) Practice: [39], [43], [44], [46], [53]

#### Hidden wrapping paper choices

- a) Use an overlay (e.g. a lightbox) to present the wrapping paper choices
- b) Use an inlay to present the wrapping paper choices (i.e. the choices appear in-page)

Whenever there are gift wrapping choices to choose from, sites can display them immediately, as an inlay (e.g. sliding down into view after the customer says it is a gift), or as an overlay. This overlay would be displayed when the user clicks e.g. a checkbox to mark items as a gift. Given that customers do not opt for the gift service for most bol.com orders (details being confidential), the wrapping paper choices will not be displayed immediately. That leaves the two straightforward alternatives presented above. Using an overlay is interesting because it provides some positive surprise potential without adding yet another page (which would be incompatible with the pattern of limiting the amount of pages). This positive surprise could turn the whole checkout into a pleasant user experience and thereby also be a persuasive element.

In the overlay version customers check a checkbox to indicate it is a gift:

## Is het een cadeautje?

✓ Ja, het is een cadeau ☐ Cadeaupapier: blauw (wijzigen)

Figure 17. Gift question

After which they immediately see the overlay:



Figure 18. Gift overlay lightbox

Based on and inspired by efficiency, persuasion and these sources:

Practice: [40], [45], [50], [53]

#### Multiple wrapping paper choices

This pattern is somewhat related to the previous one, however it deals with other choices for creating a checkout interface with gift wrap options.

- a) Allow them to pick no wrapping paper (even after they have indicated a gift) and use it as default (see Figure 20)
- b) Allow them to pick a wrapping paper after checking the wrapping paper option and select one as default (i.e. after clicking a checkbox two radio buttons appear, one of which is already selected):

```
☑ Ja, pak alle artikelen in (€ 0,45 per bestelling).

Gewenste verpakking:
⑤ Blauwe bollen
⑥ Rood met Billie
```

Figure 19. Gift wrap with normal radio buttons with one option selected as default

- c) Have users make the wrapping paper choice by using normal radio buttons
- d) Have users make the wrapping paper choice by using button-like radio buttons:



Figure 20. Gift wrapping button-like radio buttons

In this case the first two alternatives can be seen as opposing alternatives (either a or b) and the second two can be seen as opposing alternatives (c and d). Regarding the prototypes, this means that one of the first two can be combined with one of the second two.

The first alternative is based on usability guidelines and literature stating that extra costs should not be added without explicit consent from the user. On the other hand, the opposing alternative of selecting one wrapping choice as default does require one less user action, also increasing usability.

The last two alternatives stem from the common way of selecting an option and a method found in practice where sites use button-like radio buttons to make it more clear that a choice has to be made. This could prevent the effect that users simply overlook a radio button which can occur in practice.

Based on and inspired by these sources:

Guidelines: 5, 23, 42 (appendix B)

Practice: [40], [45], [50]

#### Immediate wrapping paper previews

Immediate previews of the wrapping paper choices means that these previews should not be hidden (e.g. hidden in a tooltip/balloon that is shown upon hovering over a choice). This could enhance usability by reducing the steps a user needs to take. In addition, it can enhance the possibility for effectively comparing the choices.

Based on and inspired by efficiency and these sources:

Guidelines: 5, 6 (appendix B)

Practice: [40], [43], [45], [50], [53]

#### Placeholder texts inside form fields

This is a space-saving and actionable place to provide hints about how to enter data like postcodes. Commonly such texts are displayed in a gray color. As modern browsers even include such a feature by default, it makes sense to use this feature (in case of using placeholder texts at all) to ensure consistency.

Based on and inspired by avoiding ambiguity and these sources:

Guidelines: 5, 6, 21, 25 (appendix B)

Literature: [60]

#### Explanations for requesting sensitive data

- a) Next to the field label
- b) Underneath the form field

People can be reluctant to provide such sensitive information, especially if it is unclear to them how it will be used. Literature suggests that providing a brief but plausible (and true) explanation can help overcome this checkout hurdle. This still leaves multiple methods for implementation. Two straightforward alternatives for this pattern will be evaluated.

Based on and inspired by effectiveness, removing barriers and these sources:

Guidelines: 25 (appendix B)

Literature: [61]

Practice: [38], [39], [40], [41], [43], [44], [45], [49]

#### Primary action buttons at the top and bottom

The primary action button is the button that allows customers to advance to the next page (effectively the call-to-action). Commonly, there only used to be one such button (at least for a specific action). Recent guidelines and literature suggest using two such buttons to make sure that such an important element is visible both above and below the fold.

Based on and inspired by efficiency and these sources:

Guidelines: 54 (appendix B)

Practice: [37], [38], [39], [43], [45], [46]

#### Hidden coupon field as cost line in the cart

Checkout literature and guidelines suggest that a coupon field should be hidden behind a link (see e.g. [62]) to make customers less likely to go searching for coupons (bad from an e-commerce perspective), but also to prevent them from worrying that they might be missing out on discounts (decreasing the user experience). It is also suggested to place it in the cart, which makes sense given the perspective that customers like to know what they will pay as soon as possible. Furthermore when you have already received a coupon as customer, the earlier on you can use it, the likelier that you will not forget.

This still leaves room for a few locations:

- a) Next to the cart's cost block
- b) As a line in the cart's cost block, so that it can become an order discount line

A common place is to display it next to the cost block. On the other hand, putting it in the cost block itself might be more logical. When placed there, it is located directly at its influence spot. This allows the feedback to be given at the place where the link was and where the coupon can be entered. Given this actionable place, I believe this to be an interesting alternative as it could potentially even further enhance usability. The current research allows both alternatives for this pattern to be evaluated. The second version looks as follows:

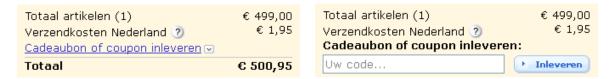


Figure 21. Coupon field hidden behind link (left) and input field after clicking link (right)

Based on and inspired by effectiveness and these sources:

Guidelines: 41 (appendix B)

Practice: [37], [45], [46], [49], [53]

#### Returning and new customers

In order to prevent repeat customers from having to enter their details over and over again, most (modern) e-commerce sites allow (or force) users to create an account. It also resembles the fact that most online orders at bol.com are placed by repeat customers. It requires customers to indicate that they already have an account and log in.

Multiple aspects and alternatives can be taken into account here:

- a) Allow them to change their initial choice without resorting to the back button
- b) Use radio buttons to allow easy switching:
  - Nee, ik ben nieuw bij bol.comJa, ik heb al een account

Figure 22. Returning and new customers can choose by means of radio buttons

c) Use normal buttons for the initial choice, with a link to switch to the other option that appears after the initial choice has been made by clicking on a button:



Figure 23. Returning and new customers can choose by means of normal buttons

The first one allows for an easier undo possibility. Providing such a possibility is founded by literature and guidelines. The latter two are the straightforward and commonly found alternatives for providing users with a way to indicate that they are returning customers.

The second and third alternative are both combinable with the first one. Given that bol.com does not comply with the first alternative, both the latter ones (b and c) will be combined with the first one (a) in the prototypes.

Based on and inspired by efficiency, ease of use and these sources:

Guidelines: 7, 45 (appendix B)

Practice: [37], [38], [39], [43], [45]

#### Shipping details before billing details

Literature and guidelines suggest that (non-business) customers have a more direct sense of a shipping address than of a billing address. Given that both addresses are usually the same, they suggest asking for the shipping address first.

Based on and inspired by ease of use and these sources:

Guidelines: 46, 48 (appendix B)

Practice: [43], [45], [46], [49], [50], [51], [52], [53]

#### Delivery-at-work checkbox

This guides users into thinking about this possibility. Bol.com [54] suggests this in both a hover balloon/tooltip and at the order review page. However, it is easy to miss, even though it could be an important consideration. It could even be perceived as genuinely trying to assist the customer, decreasing the burden of having to think if there are relevant alternatives to questions such as the delivery address. Given this fact, this pattern is based on general guidelines and aspects such as discoverability.

After clicking the checkbox a field appears to enter the company name (the address fields for an alternative delivery address should be immediately below this field so that customers can enter both the company name and address):



Figure 24. Checking delivery-at-work checkbox displays text field

Based on and inspired by ease of use (assisting the user) and these sources:

Guidelines: 5, 12 (appendix B)

### Collapsed extra address fields

- a) Allow users to indicate the addresses by making a choice using radio buttons
- b) Allow users to indicate the addresses are different by unchecking a checkbox
- c) Allow users to indicate the addresses are different by checking a checkbox

When the shipping address is displayed first, hide the billing address behind a checkbox (or the other way around when the billing address is first). This allows for a cleaner and more concise (and thereby less overwhelming) interface, supporting the fact that most customers use the same address as shipping and billing address (see also the previous pattern).

There are a number of straightforward alternatives for this pattern. Because it should be an explorable option as it might not be immediately clear what happens based on this choice, it should be easy for customers to revert their choice. Therefore the alternatives selected here use radio buttons or checkboxes instead of e.g. regular buttons.

Given that bol.com already utilizes the first alternative, it should provide most insight when both prototypes use another alternative.

Based on and inspired by (perceived) efficiency and these sources:

Guidelines: 46 (appendix B)

Practice: [38], [39], [40], [45], [51]

#### Inline validation

This is an interesting pattern for providing feedback as early as possible. Literature and guidelines suggest it to be a worthwhile pattern and the enhanced technological support (e.g. the widespread use of AJAX technology [63]), has made this pattern to be more commonly found nowadays.

Based on and inspired by efficiency, ease of use and these sources:

Guidelines: 7, 26, 27 (appendix B)

Literature: [64]

Practice: [37], [38], [39], [41], [47], [50], [53]

#### Disabled primary action button with hover balloon

In this pattern, the primary action button is disabled until the form is valid. The site should indicate what is wrong when the user is (about) to try clicking it/hovering over the primary action button by displaying a balloon that describes the error. The pattern could allow for less of a feeling that an erroneous form has been submitted (because it has not been submitted yet). This might decrease negative feelings, thereby enhancing the user experience. This is related to using inline validation (the previous pattern) and is motivated by insights based on the foundations for using inline validation.

Example of a button using this pattern (disabled with balloon on the left, enabled on the right):



Figure 25. Primary button with balloon (left) and enabled button after validated form (right)

Based on and inspired by the aforementioned reasoning and these sources:

Guidelines: 12, 26 (appendix B)

Literature: [64] Practice: [43]

#### Marking only optional fields

In this pattern only optional fields are marked as such (e.g. "(optional)" as label suffix). Required fields are not marked in any way (only implicitly by omitting the word optional).

Based on and inspired by these sources:

Guidelines: 3 (appendix B)

Literature: [65] Practice: [52]

#### Unobtrusive account creation

- a) Make it optional
- b) Do it behind the scenes by generating an activation link or password that is emailed to the user after the order has been placed

The pattern itself is supported by literature, guidelines and practice, whereas the two alternatives are inspired by practice. Some side notes can furthermore be found in chapter 4.1.

Based on and inspired by removing barriers and these sources:

Guidelines: 45 (appendix B)

Practice: [37], [38], [39], [41], [46], [48], [53]

#### Automatic credit card company

Do not ask the user to select the credit card company (such as Visa, Mastercard or American Express) but select it based on the credit card number. The required information is available at e.g. payment providers, but it can also be found online [66] [67]. A downside could be that this requires up-to-date information. However, this information is very unlikely to change often, based on this numbering structure. When taking large amounts of customers into account, it might be very worthwhile as it is one opportunity to lower the amount of information customers need to enter. It is also supported by literature, guidelines and practice.

Based on and inspired by efficiency and these sources:

Guidelines: 46 (appendix B)

Literature: [66], [67]

Practice: [43], [47], [48], [52]

### Expiration date as on credit card

Display the credit card expiration date exactly as it appears on the card (including a "/").

- a) Use two text fields to enter the month and year
- b) Use two dropdown fields to enter the month and year

This pattern increases consistency and thereby also aspects such as learnability. It is also supported by literature. However, the same literature does not agree on if text fields or dropdown fields should be used (e.g. [68]). Therefore evaluating both these alternatives might yield interesting results.

Based on and inspired by external consistency and these sources:

Guidelines: 46 (appendix B)

Literature: [68] Practice: [47]

#### Subtle total order costs

It is important to make the total cost easy to find before the order is placed, as relevant information should not be hard to find and this information is very relevant. This is supported by checkout guidelines and literature. However, this does not require the costs to be displayed too much 'in-your-face'. It might prove persuasive to not emphasize these too much and focus more on the benefits (positive emotion) than on the costs (negative emotion). Given that displaying the costs in a subtle fashion focuses more on the positive emotions, it might not only be interesting from a persuasion perspective, but it could also increase the enjoyability and thereby the overall user experience. (Do note that this pattern leaves some room for interpretation.)

Based on and inspired by persuasion and these sources:

Guidelines: 5, 42 (appendix B)

Practice: [37], [41], [46], [47], [52]

#### No repeat email address and password

The latter can always be reset. Do allow them to fix any mistakes afterwards.

Based on and inspired by efficiency and these sources:

Guidelines: 18 (appendix B)

Practice: [45], [52]

### Newsletter opt-in

Notwithstanding the value of newsletters, making a newsletter checkbox opt-out instead of opt-in might annoy customers. It would be interesting to see the effect of opt-in vs. opt-out.

Based on and inspired by these sources:

Guidelines: 46 (appendix B)

Practice: [37], [38], [39], [41], [46], [47]

### 3.2. Two Prototypes Provide a Means for Evaluating the Patterns

As stated in earlier chapters, the prototypes provide a means for evaluating the design patterns. Building them is required to allow realistic evaluations. However, given that this research project is bounded by e.g. time constraints, the number of prototypes should be as efficient as possible. The amount of prototypes not only impacts the time and effort required to build them, but it can also impact the time involved in carrying out the user evaluations and processing the results.

A lower number of prototypes affects all the aforementioned time aspects in a positive way. In that regard, building just one prototype would be as efficient as possible, as long as it allows all patterns listed above to be evaluated. However, by looking at the patterns, one can recognize that some patterns cannot be combined and especially the alternatives for some patterns cannot be combined in the same prototype. The most obvious one is the pattern of using as few pages as possible: either use one page or use just a few pages. This aspect of a one-page checkout versus a multi-page checkout can only be tested as a whole and therefore requires more than one prototype to be created. Given this fact and the fact that a lower number of prototypes is preferable, the straightforward conclusion is that two prototypes is a beneficial number for this research and each prototype will incorporate one of these two page structures.

The two prototypes built for this research allow all of the aforementioned patterns to be evaluated. Do note that not the prototypes, but rather the patterns included in them are being evaluated. This is possible by taking this into account in the evaluation setup, i.e. participants are asked to provide feedback (using concurrent thinking aloud) about each pattern used in a prototype, rather than the prototypes as a whole. See chapters 1.5.2 and 7 for details. It should furthermore be noted that these prototypes do not take an existing checkout (e.g. the bol.com checkout) into account or as a starting point, but rather start from scratch, allowing a larger number of structures and elements to be tested.

To further promote the efficient construction of the prototypes they do not necessarily have completely distinct overall visions. There will be some overlap and minor elements will mostly appear in a similar fashion in both prototypes.

Furthermore, given the fact that the one-page checkout deviates farther from the current bol.com checkout, the one-page prototype will only include the more modest deviations from the current site on other aspects. This should make the two prototypes more equal regarding how much different from the current checkout they appear and allow for better evaluations.

Do note that the evaluations do not focus merely on the *limited pages* pattern, they focus on all patterns. This pattern simply has an impact on the form of the prototypes, because it influences the structure of the pages instead of the elements on the pages, but the other patterns are equally important. This may be further clarified by the evaluation setup in chapter 7.

Both prototypes are equal in the fact that they will both incorporate the guidelines collected in my aforementioned earlier research [17]. Some guidelines may contradict each other however, so choices will need to be made. The rationale for these and other design choices can be found in chapter 5.

The patterns from this chapter form the basis for the two prototypes used in the evaluations, together with the design choices presented in chapter 5 and the functional requirements and technical constraints presented in the next chapter.

### 4. Requirements for the Checkout Prototypes

The checkout prototypes are meant to provide a means of evaluating the interface & interaction design patterns that are presented in the previous chapter. However, a checkout process is not comprised of merely these elements.

Other basic functionality needs to be present to allow the task of correctly ordering the desired product(s) to be completed successfully. This also requires taking specific details like the delivery address into account. Such functional requirements are listed in the first sub section below. It also includes two optional requirements that are included in more advances checkout processes such as the bol.com checkout process: the ability to use coupons and gift wrap options.

In addition to these functional requirements there are some technical constraints to be taken into account. They provide guidance for the technologies that can be used and the limitations that are imposed on the prototypes. These constraints are listed in the last sub section.

### 4.1. Functional Requirements

This section provides a short overview of the functional requirements for an e-commerce checkout. It is based on the requirements given by bol.com for a basic new customer checkout and thus only includes the most basic requirements.

#### The cart must present the main product details

The main product details that must be presented to the customer per product are:

- title;
- author/brand;
- specific item details depending on the category (format, specs, etc.);
- price;
- current amount;
- total price (price x current amount).

#### The cart must allow the user to edit items in the cart

In addition to displaying the product details, it must be possible for the customer to change the cart details such as:

- product amount;
- move product to wish list;
- remove from cart;
- product is a gift: yes/no (optional requirement);
- undo cart removal (optional requirement).

#### The cart must present all relevant and total costs

In addition to the item costs, shipping costs and any discounts (if applicable) must be displayed. The total costs for the order (calculated by the aforementioned costs and discounts) must also be presented as accurately as possible to the customer, on the cart page.

#### The checkout must allow (new) users to enter their billing and shipping details

Billing and shipping details are required for placing an order. New customers will always need to enter such details, existing customers might be able to log in and use existing address information or add a new address. Given that this research focuses on new customers, there must be a way for them to enter their:

- shipping address, consisting of: title, first name, *middle name (optional)*, last name, *company name (optional)*, country, postcode (for NL), house number (for NL) and *house number suffix (optional for NL)*;
- billing address (same details as shipping address);
- phone number;
- email address.

Furthermore, the customer must be able to create an account. Based on the guidelines (e.g. 45b in appendix B), making it optional to create an account is preferable over forcing the user to create one. It is believed to decrease task completion (and increase checkout abandonment) when this is forced upon users. Customers wonder e.g. "Why am I forced to register when I am merely ordering a book, a regular brick-and-mortar shop does not require this."

Making it optional prevents this problem. However, there is an alternative approach possible: have the server generate the password and email it to the customer. It has similar benefits, but it might make repeat orders more easy. On the other hand, it might also feel forced when it is created automatically, it takes away some of the user control. Given these considerations, it is listed as a pattern alternative in the previous chapter.

Furthermore, an interesting insight can be gained from [69]. By still forcing account creation, but removing the actual words "account", they were able to reduce their checkout abandonment rate by 50% (according to the article). Given the high relevance, it is mentioned here, but it should be noted that this article was not available yet at the time this research was carried out. Therefore it is not further explored here.

#### The checkout must allow registered users to order without reentering any data

The prototypes should provide at least the entrance for registered users, because this could affect the overall experience of the prototypes. Given that this research only focuses on new users an actual implementation that allows existing users to place an order is not part of the prototypes.

# The checkout must allow customers to pick a payment method and provide the relevant payment details for that method

The checkout must support the same payment methods as the current bol.com checkout provides to Dutch customers:

- iDEAL (the most popular Dutch online bank payment service);
- credit card;
- giro card (where customers receive in an invoice they can pay within 14 days).

The iDEAL option must allow customers to select their bank so that they can be transferred to the bank environment where the transaction will be presented to them. The credit card option must allow customers to enter their credit card number, expiry date (month and year) and the cards security code (CVC or CID). The final option of giro card currently requires bol.com customers to enter their bank account number.

#### Optional: The checkout should allow customers to use coupons and gift cards

Bol.com uses coupon code and gift cards as promotional tool. Although not a completely basic requirement, a good comparison should allow the coupon codes or gift card codes to be entered. This is also required for evaluating one of the patterns from chapter 3.1.

#### Optional: The checkout should allow customers to make use of the gift wrap service

Similar to the coupons requirement, this allows for a better comparison and is required for evaluating a pattern from chapter 3.1.

When it is included, three options should be provided (which apply to the whole order):

- No gift wrap for all items;
- red wrapping paper for all items (€ 0,45 per order);
- blue wrapping paper for all items (€ 0,45 per order).

#### 4.2. Technical Constraints

The common browser aspects that bol.com takes into account will also be taken into account in this research. However, it should also be noted that only prototypes will be built. These do not include the optimizations that would be present in an actual implementation, because of time constraints and different priorities. Therefore, computer and connection speeds will not be taken into account, given that no techniques will be used that have potentially high CPU utilization, etc. (e.g. Adobe Flash). The same goes for cross-browser compatibility. Functioning in at least one browser is sufficient for user testing. The aspect that should be taken into account is display resolutions. Bol.com is designed for displays with a resolution of 1024 x 600px, or a browser viewport of at least 980 x 500px.

### 5. Interface and Interaction Design

The interface and interaction design is based on the patterns listed in chapter 3.1, as it is the goal of this research to evaluate these patterns.

However, to provide a realistic evaluation, two complete new customer checkout processes are built. In order to do so, all requirements from the previous chapter are taken into account. To further make the checkout prototypes as usable as possible (to not hinder the evaluations) they take the related work found in chapter 2 into account, namely the guidelines, literature and inspiration found in practice.

This chapter explains the design process of the prototypes. It only contains a brief description because the prototypes are not the focus of this research, but rather the patterns listed in chapter 3.1 which merely use these prototypes in order to be evaluated. (The actual prototypes based on this design can be found in the next chapter.)

The first part of this chapter presents how to the patterns have been distributed across the two prototypes. It is followed by a very brief explanation of the design method and tools used. This is then outlined in somewhat more detail in the last two sub chapters.

### 5.1. Patterns per Prototype

The table below shows how the patterns were divided amongst the two prototypes. This table also includes the motivation for the specific distribution amongst the prototypes. In some cases time constraints prohibited the creation of two versions, in such cases both prototypes incorporate the same pattern and the motivation is left blank. Furthermore, in cases where I felt there was no compelling reason for placing the pattern in a specific prototype, the motivation is also left blank. It should be noted that in general most choices stem from having one page versus having multiple pages. Furthermore, because this one page pattern is already quite different from the bol.com seven page checkout process I opted to put all of the other patterns (or pattern implementations) with a possibly stronger impact in the other prototype (prototype A).

Pattern	Prototype A	Prototype B	Bol.com	Motivation for distribution
Limited pages	Three pages	One page	Seven pages	
Progress bar	Yes	No	Partial	Only relevant for multiple pages
Data review	By means of sidebar	As a section	Separate page	Prototype B has a clear path to completion (a flow down the page), presenting the data review above the payment options supports this
Persistent mini-cart with product images	In the normal sidebar	In a floating sidebar	Only amount of products & no images	With a single page the normal version would scroll out of view with prototype B

Pattern	Prototype A	Prototype B	Bol.com	Motivation for distribution
Unique selling points	Two short paragraphs + next to primary button	Bulleted list + next to primary button	No	
Delivery time when ordered within x hours	Yes	Yes	No	Given that this pattern might be a less notable to users and it is not used by bol.com I placed it in both prototypes
Personal & brick- and-mortar-like experience	Yes	No	No	This pattern could have a stronger impact and was therefore not combined with the one-page pattern
Hidden wrapping paper choices	Overlay lightbox	Inlay	Inlay	Given the potentially stronger impact of the overlay version that one was not combined with the one-page pattern
Multiple wrapping paper choices	Use no wrapping paper as default + button-like radio buttons	Selecting a wrapping paper by default + normal radio buttons	Wrapping paper by default + normal radio buttons	The overlay lightbox provides more room for the extra option (blue+red+no vs. blue+red) and for the button-like radio buttons
Immediate wrapping paper previews	Yes	Yes	No	Given that this pattern might be a less notable to users and it is not used by bol.com I placed it in both prototypes
Placeholder texts inside form fields	Yes	Yes	No	Given that this pattern might be a less notable to users and it is not used by bol.com I placed it in both prototypes
Explanations for requesting sensitive data	Next to the field label	Underneath the form field	No	
Primary action buttons at the top and bottom	Yes	No	Yes	Only relevant/useful for a multi- page checkout
Hidden coupon field as cost line in the cart	As a line in the cart's cost block	Next to the cart's cost block	Next to the cart's cost block	As a line in the cost block might be just a bit less common and is therefore not combined with the one-page pattern
Returning and new customers	Allow them to change their initial choice + radio buttons	Allow them to change their initial choice + normal buttons and link	Only normal buttons without reverting	Compared to bol.com the radio buttons were just a bit more different and therefore not combined with the one-page pattern

Pattern	Prototype A	Prototype B	Bol.com	Motivation for distribution
Shipping details before billing details	Yes	Yes	No	Bol.com already does this the other way around and the question headings might impact this pattern, therefore I opted to test it with and without the question headings
Delivery-at-work checkbox	Yes	No	No	This pattern could have a stronger impact and was therefore not combined with the one-page pattern
Collapsed extra address fields	Unchecking a checkbox	Checking a checkbox	Radio buttons	The variant of checking a checkbox to perform an action might be more common and was therefore combined with the one-page pattern
Inline validation	No	Yes	No	Even though this pattern might have some impact, it also could strengthen the speed effect of the one-page pattern and therefore was combined
Disabled primary action button with hover balloon	Yes	Yes	No	This pattern could have a different effect on the one-page prototype than on the multi-page prototype and therefore was tested with both
Marking optional fields	Yes	Yes	No	
Unobtrusive account creation	Optional	System- generated behind the scenes	Required	The optional version of this pattern could have a stronger impact and was therefore not combined with the one-page pattern
Automatic credit card company	Yes	Yes	No	Compared to bol.com
Expiration date as on credit card	Yes	Yes	No	Compared to bol.com
Subtle order costs	Yes	Yes	No	Compared to bol.com
No repeat email address and password	Yes	Yes	No	Compared to bol.com
Newsletter opt-in	Yes	Yes	No	Compared to bol.com

### 5.2. Design Method and Tools

A common two-step design method has been used: first a number of pencil and paper sketches (low-level wireframes) have been created to outline the basic concepts of the prototypes:



Figure 26. Sketch for cart page of prototype A

Based on these concepts, the actual interface and interaction design has been made in the form of wireframes. These actual complete and detailed wireframes were built using Axure RP, illustrating the designs in full detail. The reason for choosing Axure RP is the high level of familiarity with this product within the bol.com organization. In addition, it is more of a prototyping tool than a specification tool, making it well suited for this purpose. As Axure RP effectively creates interactive wireframes which can be seen as basic prototypes they were a means for creating the designs, as well as a fallback in case time constraints prevented the actual prototypes from being finalized in time. Fortunately enough this latter function did not end up being relevant. An example of the Axure RP wireframe/prototype is shown below:

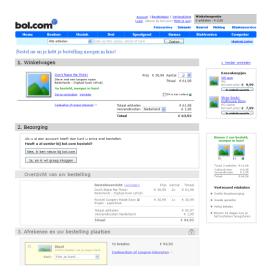


Figure 27. Wireframe for initial display of prototype B

These wireframes (or low-level prototypes) subsequently formed the basis for the final prototypes that are presented in the next chapter and were used for evaluating the patterns.

### 6. Final Evaluation Prototypes

This chapter presents the final prototypes based on the interface and interaction design process presented in the previous chapter.

It starts by briefly outlining the development process and technologies that were used and concludes by visually presenting both prototypes that were built for this research project and used in the actual user evaluations (detailed in chapters 7 and 8).

### 6.1. Development

The prototypes will be created by means of HTML, CSS, JavaScript and PHP, as I am already familiar with those languages. In addition, this allows for the most realistic user experience as it uses the same techniques as currently being used for the website front-end. This makes the user experience more realistic and familiar (as bol.com is also built using HTML and CSS), but moreover also guarantees the feasibility of potentially implementing the successful elements on the bol.com website.

The next pages briefly present the prototypes that were used for the actual evaluation of the design patterns. Given that these prototypes (and thereby the patterns) were also evaluated against the current bol.com checkout, the current checkout is also presented briefly in this chapter. All three checkouts (two prototypes and the bol.com checkout) are presented in the form of screenshots.

### 6.2. Checkout Prototype A

This sub chapter presents the first prototype, starting with an overview that explains the three main sections of the page, concluding with the checkout flow of this prototype.

#### 6.2.1. Overview

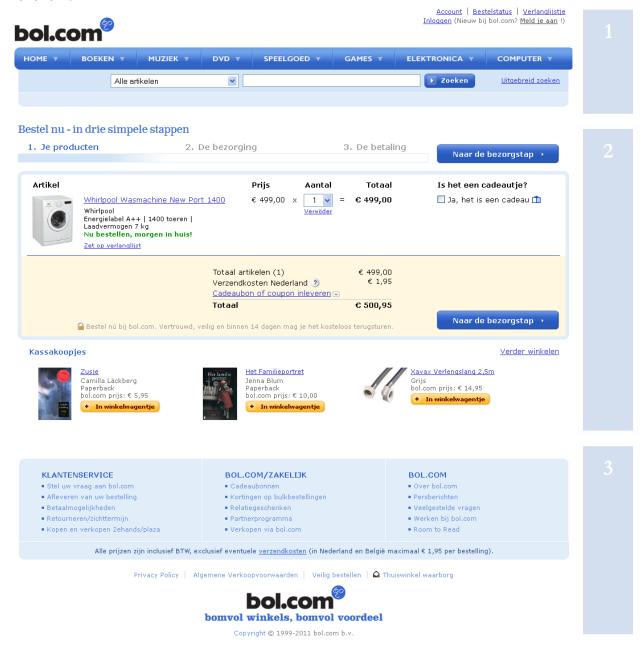


Figure 28. Prototype A overview

The overview presented above displays the complete first screen of prototype A. The header and footer (the sections labeled 1 and 3 in the figure above) are present on all pages in checkout prototype A, even though they are not printed on the next pages.

#### 6.2.2. Flow and Pages

Below the flow (cart to shipping to payment) can be found. Note: only the main block is shown.

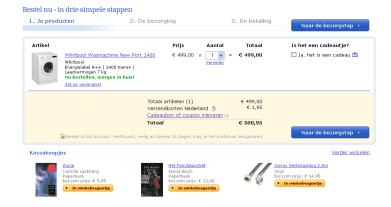


Figure 29. Page 1 – Cart (prototype A)

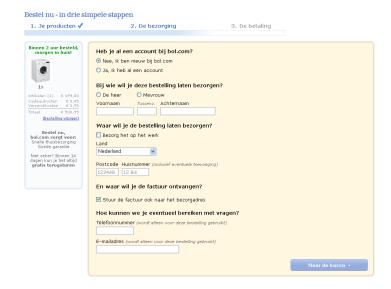


Figure 30. Page 2 – Shipping and customer details (prototype A)



Figure 31. Page 3 – Payment details (prototype A)

### 6.3. Checkout Prototype B

The second prototype consists of a single page and is presented in this sub chapter. It starts with an overview (of the initial display) of the complete page. It is followed by an outline of the four sections on this page as they are seen after the user clicks on the "new user" button.

### 6.3.1. Overview

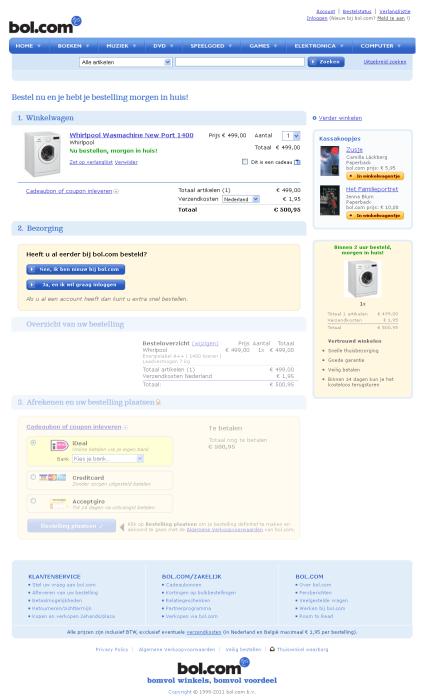


Figure 32. Prototype B overview

### 6.3.2. Creating a New Account

### 2. Bezorging

Heeft u al een bol.com-account? Klik hier

Bezorgadres
Titel:
O De heer O Mevrouw
Voornaam:
voornaam.
Tussenvoegsel (optioneel):
(van der, de)
Achternaam:
Bedrijfsnaam (optioneel):
confirmation (epitolical).
Bijvoorbeeld als u het op uw werk wilt laten bezorgen
Land:
Nederland V
Postcode:
1234AB
Huisnummer of postbus:
12 Bis
Inclusief eventuele toevoeging.
Factuuradres  De factuur op een ander adres bezorgen Standaard wordt deze naar het bezorgadres verzonden.
Inpakservice  ☐ Ja, pak alle artikelen in (€ 0,45 per bestelling).  De inpakservice kost € 0,45. Het aantal artikelen maakt niet uit. Bij grote artikelen ontvangt u het papier los.
Contactgegevens  Telefoonnummer:
Wordt alleen gebruikt voor eventuele vragen over de bestelling of bezorging.
E-mailadres:
E manage 5.
Hierop ontvangt u standaard alleen informatie over uw bestelling.
more processing a standard disentitive made ever aw postering.
Extra voordeel en acties
☐ Ja, stuur mij de bol.com-nieuwsbrief. Ik kan me altijd weer uitschrijven. (optioneel)
a sa saar mij de boneom-medwsbrier, ik kan me alaja weer dischirijven, (opaoneel)

Figure 33. Entering details for a new account (prototype B)

### 6.3.3. Order Summary

#### Overzicht van uw bestelling

Besteloverzicht (wijzigen) Whirlpool Energielabel A++   1400 toeren   Laadvermogen 7 kg	Prijs Aantal Totaal € 499,00 1x € 499,00
Totaal artikelen (1) Verzendkosten Nederland	€ 499,00 € 1,95
Totaal:	€ 500,95

Figure 34. Order summary – initial display (prototype B)

Overzicht van uw bestelling		
Bezorging & contact (wijzigen) John Doe Voorbeeldstraat 1 1234AB Voorbeelstad	Besteloverzicht (wijzigen) Whirlpool Energielabel A++   1400 toeren   Laadvermogen 7 kg	Prijs Aantal Totaal :499,00 1x €499,00
0612345678 john@doe.test	Totaal artikelen (1) Verzendkosten Nederland	€ 499,00 € 1,95
	Totaal:	€ 500.95

Figure 35. Order summary – the view after entering account details (prototype B)

#### 6.3.4. Payment Details



Figure 36. Payment details (prototype B)

### 6.4. Order Summary

This order summary after placing the order is the same for both prototypes:

#### Bestelling voltooid!



Figure 37. Order confirmation with highlighted email address (the same for both prototypes)

#### 6.5. Bol.com Checkout Process

The bol.com checkout process starts at the cart page. After continuing, the customer must choose between entering a registered email address/password combination and clicking on a button to indicate that he/she is a new customer. When indicating to be a new customer, a new page is displayed where the user can enter all shipping address details, personal details (e.g. phone number) and billing address. This is followed by a page that lists the transportation company (no choice is given) and the optional gift service. Then on the next page the user must enter his/her email address and password (both twice) in order to create an account. After continuing, the order review page is displayed with all the order details. Finally, the customer can continue to the payment page where a payment method can be chosen and the order can be submitted.

The process is displayed below and on the following pages. Note that all pages include the header and footer, even though it is excluded on all but the first screenshot.

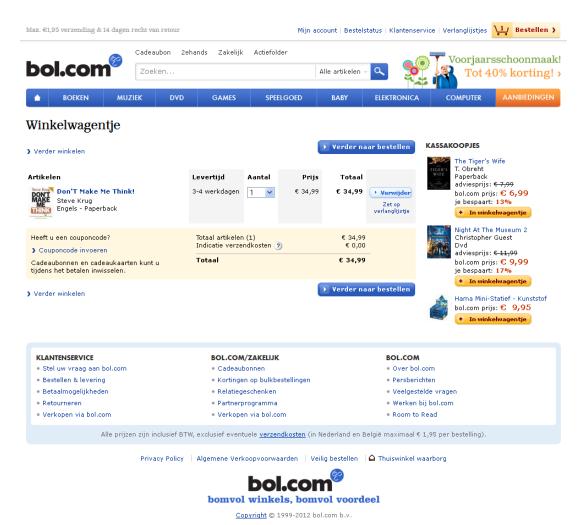


Figure 38. Bol.com - cart page

#### Bestellen



Figure 39. Bol.com - log in or new customer

#### Bestellen

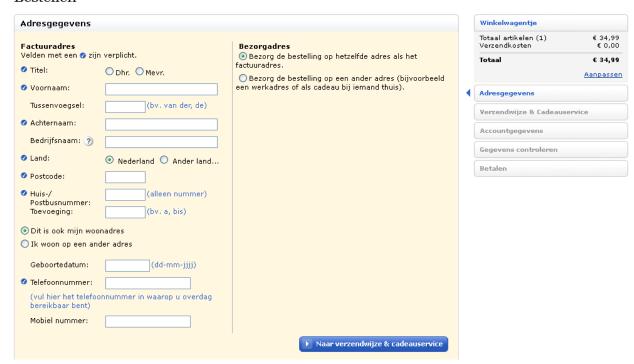


Figure 40. Bol.com - new customer address and contact details



Figure 41. Bol.com Shipping method (without options) and gift service with preview on hover

#### Bestellen

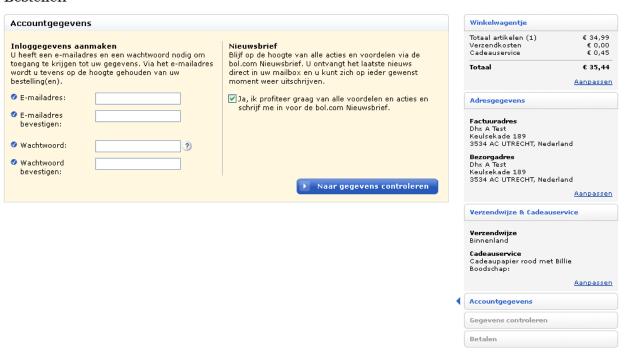


Figure 42. Bol.com - create an account and newsletter

#### Bestellen

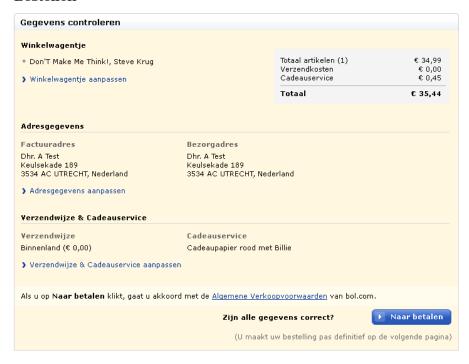


Figure 43. Bol.com - order review

#### Bestellen



Figure 44. Bol.com - payment page

#### Gegevens controleren

Hiernaast vindt u een overzicht van uw bestelgegevens. Controleer deze en pas aan indien nodig. Als alle gegevens kloppen, klikt u op Naar betalen.

In de volgende stap kiest u een betaalmethode, kunt u coupons en cadeaubonnen opvoeren en maakt u de bestelling definitief.

#### Overal bezorgen

U kunt uw bestelling overal laten bezorgen, dus ook op het werk. Klik op de link aanpassen bij Adresgegevens, maak een nieuw adres aan en selecteer dat als bezorgadres.

Bepaalde artikelen kunt u bij een Kialaafhaalpunt laten bezorgen en daar afhalen. Als uw bestelling aan de voorwaarden voldoet, klik dan op de link Bestelling laten bezorgen bij een Kialaafhaalpunt onder bij het Bezorgadres. Voer vervolgens uw postcode in om een Kiala-afhaalpunt te selecteren.

#### Is het een cadeautje?

Als uw bestelling een cadeau is, dan kunt u het laten inpakken via onze cadeauservice. Klik op de link aanpassen bij Verzendwijze & Cadeauservice, kies het inpakpapier en schrijf een persoonlijke boodschap.

**Zichttermijn** Met uitzondering van digitale boeken, fotoservice, en 2ehands artikelen, kunt u bij bol.com gekochte artikelen, zonder opgave van redenen, binnen 14 kalenderdagen na ontvangst kosteloos retourneren. 2ehands artikelen kunt u alleen aan de verkoper retourneren als u binnen 14 dagen na ontvangst een aanvraag tot retour start.



#### 7. User Evaluation

The actual user evaluation sessions play a key part in this research. They allow the main research question to be answered by providing insight into whether the promising design patterns from chapter 3.1 can actually increase usability and conversion.

This chapter describes how the evaluations have been performed by explaining the user study setup. It also provides details about the participants who have evaluated the prototypes and thus the design patterns that were incorporated into these prototypes.

### 7.1. Script

Using a test script allows for a systematic evaluation and therefore more consistent and comparable results. In order to achieve this, the test script contains all the relevant details of the evaluation from start till finish. This section explains the primary aspects of the script. The complete (unedited and Dutch) script can be found in appendix A.

#### 7.1.1. Introduction

The script starts with an introduction, introducing the evaluations and that the evaluations are intended to improve the website by having the participant test the prototypes and the bol.com checkout process. It also clearly explains that it is truly the sites that are being tested and that in no way should the participant feel that he or she is being tested (whatever action they take, it is the correct one).

The introduction also explains the thinking-aloud concept and strongly encourages participants to do this. It is also explained that if they forget to do so, it will not be a problem as the moderator (being the same person in 12 of the 14 sessions for consistency purposes) will remind them to do this. It is also explained that the moderator is there only to observe and not to help the respondents (mimicking the home situation in which you are also on your own). Some details about e.g. the recordings and confidentiality are also explained.

We furthermore explain that the participants should act as if they are new customers, as this is a constant aspect of all tasks they are about to receive. The importance of the thinking-aloud and ignoring minor issues due to prototypes being used (instead of fully developed checkouts) is stressed once more. Participants are also asked some introductory questions such as about their occupation and online shopping habits. This is also intended to increase the thinking-aloud as it aims to get them in a "talking mood".

#### 7.1.2. Tasks

Each participant was given five tasks in total:

- a) 2x Order a book as a gift (once per prototype);
- b) 2x Order a washing machine: a typical high-involvement product (once per prototype);
- c) Order a book on the normal bol.com website.

### **7.2.** Setup

For each task, the respondent was explained how to start it. Each participant started with task A (book as gift), then task B (washing machine) and finally bol.com. This could introduce learning effects, however for the tasks themselves this should not pose a problem because the comparison between the prototypes themselves was most relevant for this research (not the comparison with bol.com). In addition, trust needs to be built making it more likely a first order to be a low-involvement product (like a book), rather than a high-involvement product.

#### 7.2.1. Order Effects

Order effects, aside from the aforementioned, were counter balanced by alternating the order of the prototypes per respondent. E.g. the first respondent would start by ordering a book with the first prototype, then the second prototype, followed by a washing machine with the first prototype and ending with the washing machine in the second prototype. The order for the second participant would be alternated by having him/her start with ordering a book with the second prototype. Unfortunately, it should be noted that a mix-up ended causing one participant to start with the first prototype who should have started with the second one. Therefore eight participants started with prototype A and only six participants started with prototype B. Furthermore, due to very lengthy observations made by one participant, she was not able to carry out the fifth task of ordering a book at the bol.com site, so in that case no comparisons with this site could be made.

#### 7.2.2. Concurrent Thinking Aloud with Limited Interruptions

As explained and motivated in chapter 1.5.2 concurrent thinking aloud has been used during the evaluation in order to gather the results. Participants were asked to say exactly what they were thinking during their tasks. This included what they were doing, but more relevant for this research, they stated when things were unclear or when problems occurred. They also explained when they were positively impacted by some aspect of the interface. These aspects are in most cases the actual patterns this research aims to evaluate. Given that the basis for their feedback was that they were thinking aloud, this does mean that not every pattern resulted in feedback. This is good, because aspects which did not influence their user experience (or only very minor way) were not evaluated in a forced way. However, to ensure that relevant feedback was not withheld users were further questioned after their task and asked to tell which aspects were pleasant, which ones annoyed or positively surprised them, which ones created problems. They were also questioned about their overall experience and which aspects contributed to this experience. In essence, not the experience itself was evaluated, but the aspects (i.e. the patterns) contributing to this experience.

As stated, participants were instructed to think aloud. In cases they did not, they were reminded to do so, especially when they hinted that something might be going on and they were not thinking aloud, e.g. when they said "hmm" or "weird". However, otherwise they were never interrupted in performing their task. Even when problems were observed the moderator would not intervene. Only when such a problem was clearly caused by a glitch in a prototype the moderator would indicate this to the user. Also very occasionally, when a user would distract him- or herself by starting an internal debate (still thinking aloud) about a certain aspect, the moderator was allowed to

try and elicit a deeper understanding of this aspect by asking a follow-up question. Given that the user was already distracted somewhat from the task it can be argued that such a follow-up question would not cause further distractions than had already been caused.

#### 7.2.3. Elicited Further Feedback

After the respondent completed a task they were asked to further convey their observations. They were asked how they experienced the checkout processes (positive/negative) or if the processes had caused them any trouble or confusion. Participants were also invited to compare the prototypes and bol.com checkout, indicate which one they preferred and which specific elements (essentially the patterns) they appreciated or disliked. Furthermore they were asked about the impact of the checkout experiences on their purchase intentions, in general and for high-involvement products (tackling any fears that a one-page checkout would cause problems for such products). This provided a way to get feedback that was missed during the thinking aloud performing of the task, making sure all relevant feedback about the patterns would be elicited.

#### 7.2.4. Session Recordings

Each session was also recorded using Morae recorder. This allowed the recording of the user screen, a webcam view (allowing facial hints such as confusion to be better spotted) and the spoken feedback of the user. It also allowed others to observe the sessions and include annotations about the patterns, making the processing of results more efficient.

### 7.2.5. Room setup

A graphical overview of the room setup can be found below.

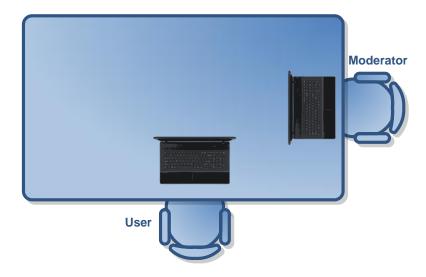


Figure 45. Position of the user and moderator with laptops during the user study

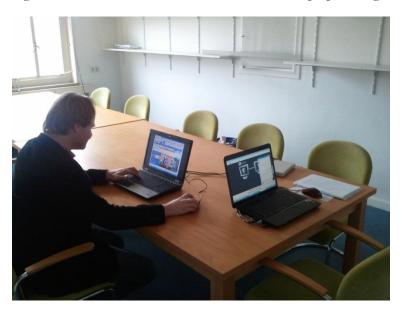


Figure 46. The actual setup with a user behind the laptop

### 7.3. Participants

In total 14 persons participated in the evaluations. All of them signed up for the research based on an invitation on the bol.com blog and social media sites. All participants had online shopping experience and had ordered at bol.com before. Ten of the 14 participants were female, four were male. They were aged between (and including) 21 and 37 with an average age of 28.

	User Study	Bol.com	Other
Male	29% (4)	48%	51%* (CBS 12 - 74) [70])
Female	71% (10)	52%	49%* (CBS 12 - 74) [70])
Total	14		
Age	21 - 37 (avg. 28)		_

### 7.4. Processing the Results

As stated above, the evaluations were recorded and annotated. These were then categorized by pattern and their impact (positive or negative). Effectively, the annotation schema used allowed annotations for each observation in the format: participant id, which pattern (alternative), negative/positive observation and an optional user quote. These annotations have allowed the results to be presented in the next chapter. It should however be noted that no exact counts or scores per pattern (alternative) have been kept. The reason for this is that it is not possible to e.g. weigh a person making a small mistake because of a pattern and saying "hm" versus someone explicitly stating "I liked the other version better regarding this aspect". The first person may have had a stronger negative experience than the second, just as well as the other way around. However, it does provide an indication of how and how many participants experienced most patterns a certain way. These results are presented in the next chapter, where they are also discussed and, where relevant, presented with an actionable conclusion.

#### 8. Results & Discussion

This chapter presents the results of the user evaluations outlined in the previous chapter. These results are based on users ordering products by using the prototypes that are presented in chapter 6. It details both the results and the discussion for the patterns listed in chapter 3.1. In order to increase the readability of this research, the results and discussion are grouped per pattern.

#### 8.1. Design Patterns

This sub chapter presents both the results and the discussion for each of the patterns listed in chapter 3.1. Each pattern also includes a conclusion, indicating the expected impact of using the pattern based on three aspects:

- effect: does it have a positive effect on user experience, potential conversion and future order intention;
- impact: does it strongly affect user experience, conversion and order intention;
- proportion: did most participants experience the effects or just a few (issues causing problems for only a few customers have a lower impact than issues causing problems for everyone).

Notable quotes and problems in the user evaluations are also listed where relevant. Also note that although proportion does provide some insight into on how many findings the results and conclusions are based, no actual numbers are provided. The reason for this is that readers should keep in mind the qualitative nature of the evaluations, whereas providing numbers could be interpreted as this being a quantitative research.

However, in order to gain a rough idea of how many participants were impacted some indications are provided in the results. This ranges from a few (1 to 3), to some (4 to 7), to most (8 to 10), to almost all (11 to 13), to all (14). The indications between parentheses should provide a rough indication, but given that user feedback is not always black or white, these numbers should not be interpreted as absolute, they merely provide an indication.

For the same reasons, the conclusions also do not contain any numbers. The impact is expressed by a value ranging from very low to very high (including also low, medium and high). The proportion is expressed in similar values as the impact to make it easier to read the conclusion by itself.

# 8.1.1. Limited pages

- a) Single page (with obviously distinguishable sections)
- b) Three pages

#### Results

Almost all participants indicated they found the seven pages of the bol.com checkout to be very lengthy, sometimes even sighing when they noticed yet another page was appearing. Especially the pages "Verzendwijze & cadeauservice" (a display of the shipping method and an option to use the gift service) and "Accountgegevens" (create an account by entering email address and password twice) caused participant to try and see if they could continue to the next page without really reading it first. In all cases the amount of pages in the prototypes (one and three) improved the user experience according to the participants.

However, results about whether a one-page checkout creates a better *user experience* than a three-page checkout were not clear (do note that all participants preferred this over a seven-page checkout). Roughly half of the participants preferred one page and the other half preferred the three pages.

Nonetheless, there was an interesting difference: some participants did indicate that they found the one-page checkout to be that fast that it would increase their *future order intentions*. For example, one participant stated "with this [one-page checkout] I would just order in between other tasks instead of waiting until I have time to do so". Furthermore, none indicated a difference between low-involvement and high-involvement products on these aspects.

## **Discussion**

Given the fact that using fewer pages improves the user experience according to this research, it should make sense for e-commerce checkouts to limit the amount of pages to roughly three (the only amount about which such a statement can be made based on this research). Given that a one-page checkout provided a similar experience, but nonetheless would be able to increase conversion, a one-page checkout would be strongly advised. Some literature suggests that the use of a one-page checkout depends on the type of products (e.g. high-involvement vs. low-involvement). This research does not support this hypothesis. Based on this research all checkout processes could benefit from a one-page checkout. I do believe that it is important to clearly indicate the separate sections on such a page, which may cause other research to yield different results.

#### Conclusion



Use as few pages as possible (to increase user experience) and preferably a one-page checkout (to increase order intention).

Impact: very high. Proportion: very high (low for one-page vs. three-page). Effect: positive.

# 8.1.2. Progress bar (with indication of completed and upcoming steps)

## Results

Most users noticed the progress bar, but sometimes only in a later task. Even though they were not hindered in their goals when they did not see it, all observations made about it were positive. Participants indicated it provided them with reassurance and indicated they were proceeding to later steps. On the bol.com checkout no progress bar is displayed. However, the sidebar could be perceived as a combination of a summary and a step overview. Participants that made observations about this were also positive, however the distinction between current and completed steps appeared to be less clear. A few participants also found it unbalanced that the summary function of the sidebar could make it taller than the actual page contents.

#### **Discussion**

Given the positive comments about this pattern and no drawbacks being apparent, it should be worthwhile to follow this pattern. It improves the experience by removing any doubts about where the user currently is and what still needs to be done.

#### Conclusion



Include a clear progress that indicates the current step and the upcoming steps. *Impact: low. Proportion: medium. Effect: positive.* 

#### 8.1.3. Data review

- a) Sidebar
- b) Summary just before the payment details

## **Results**

All participants appreciated the opportunity to review the order before submitting it. However, some users indicated that they had seen it but were not inclined to actually review it. This was not a negative observation, they simply did not care in general. There is a difference between the two alternatives: all participants noticed the summary when it was located just before the payment details, but two participants only noticed the sidebar version during a later task. On the other hand, they indicated that they did not miss it and therefore had not looked for it either. On bol.com experiences were similar to the sidebar version. Some participants did notice that the large amount of summary data caused the sidebar to become very tall in the bol.com checkout.

#### **Discussion**

Although not everyone expressed a need for the summary, for most it was able to provide more reassurance. This could be seen as allowing them to be better in control, thereby improving their experience. This final aspect is improved even further by including links that allow the data to be easily modified. Given that there were no drawbacks this pattern is advisable for checkouts. Looking at the two alternatives, one could argue that the sidebar version was less visible. On the other hand, based on this research, it is also hard to advise against it since it still was visible enough for the participants who had a stronger need for it.



Display a summary of entered data, including edit links. Displaying it just before the payment details may provide the highest confidence, yet in a sidebar can be sufficient. *Impact: low. Proportion: high. Effect: positive.* 

# 8.1.4. Persistent mini-cart with product images

- a) In the normal sidebar
- b) In a separate floating sidebar (does not scroll together with the page, it is fixed)

#### Results

Almost all participants mentioned noticing the product images in the sidebar and judged this to be very positive. Most of them indicated they were missing the images in the bol.com checkout, even though they had not realized this before participating in this evaluation. Some even explicitly indicated they liked that the product could be seen as following them throughout the checkout. This was enhanced in the one-page prototype where it even "follows you when you scroll". Furthermore it continuously provides confidence about the correct product being ordered, further enhancing the checkout user experience.

#### **Discussion**

Given the potential persuasive power and the enhanced user experience according to the overwhelmingly positive responses, this pattern is strongly recommended.

#### Conclusion



Display the product images of the cart contents in a (if possible floating) sidebar during the checkout.

Impact: high; proportion: very high; effect: positive

# 8.1.5. Unique selling points (persuasion)

- a) Continuously visible, as two very short paragraphs in the sidebar
- b) Display as a bulleted list near the cart contents in the sidebar
- c) Display next to the primary button (call-to-action)

## Results

Displaying the USPs took away doubts for some of the participants (e.g. they appreciated being able to return the product free of charge). However, sometimes further information was lacking, participants indicated that they would like to know more details in some cases. This holds true for all of the tested alternatives, no differences between these were discovered.

## **Discussion**

Because there were no negative remarks and it provided reassurance for multiple participants, it should make sense to include. The potential persuasive aspects are also important in this regard. Yet it would be wise to allow some more detailed information to be easily retrievable. In order to not

lead customers out of the checkout it might work best when such information would be provided on hover by means of a balloon tip.

#### **Conclusion**



Display the site's unique selling points (USPs) during the checkout. *Impact: medium. Proportion: low. Effect: positive.* 

# 8.1.6. Delivery time when ordered within x hours (persuasion)

#### Results

Almost all participants noticed this multiple times during the evaluations. They indicated to appreciate it as it reassured them. They did not indicate that it introduced stress.

## **Discussion**

Even though it might introduce some pressure, none of the participants experienced this negatively. Rather they indicated it as a positive pattern because it provided reassurance. Combined with the potentially persuasive effect, this pattern is strongly recommended.

## **Conclusion**



Display delivery time when ordered within x hours. *Impact: very high. Proportion: high. Effect: positive.* 

# 8.1.7. Personal & brick-and-mortar-like experience

## Results

This pattern consists of two facets: using questions as headings and making the order in which details are asked reflect the order in a brick-and-mortar shop. Both of these aspects were appreciated by at least some participants.

To start with the order facet: the most notable aspect of this facet was the first question in which users were asked if it was a gift. A few participants indicated by themselves that they found this to be a logical spot for this question. Other comments about the order of the questions were not expressed, neither positive nor negative, except possibly implicitly about the contact details (see the following paragraphs for details).

Results for the question-style headings were somewhat mixed. However, the evaluations did yield positive results for this pattern. The reason for the results being mixed was that the initial response of the first five participants was positive, however their assessments changed as soon as they were asked where the items should be delivered. This question confused almost all of them, causing most of them to dislike the question heading. Although I did not want to invalidate the results for this pattern, I did feel that the wordings used for this question in the prototype was not correct, negatively influencing the results. As I felt that this would not yield realistic results, I opted to change the wording during the evaluation sessions. But not the pattern itself! (More specifically:

from "Voor wie is deze bestelling?" to "Bij wie wil je deze bestelling laten bezorgen?", in short from for whom is this delivery to at whom would you like it delivered.) This proved fruitful: none of the participants indicated this pattern to be negative after the wording had been corrected, most of the latter participants even indicated it as a positive pattern.

And, perhaps more important, some of them even explicitly indicated that during the evaluations they realized that somehow the question headings persuaded them into more comfortable answering the questions. Especially regarding the contact details (phone number and email address, one of the latter questions) they indicated to notice that they were very willing to give these details when they were continuously answering questions even though they were reluctant to provide the system with these details in the other prototype. They did not mind this: it was experienced as a positive effect.

## **Discussion**

Regarding the question heading, I believe the results indicate that the correct wording of these headings is extremely critical. I think I can not stress this enough: the questions should completely match the following answer fields or choices. If not, they will only cause confusion. Yet, as the very strong persuasive effects were witnessed at work and confirmed by the participants in a positive way, it is strongly encouraged to follow this facet of this pattern.

The order of the questions only yielded explicit results for the gift question: only this aspect can be really recommended based on this research. However, as the persuasiveness of the contact details question did appear to be influenced by the order as well, it would be recommended to also keep the question order in mind when using the question headings.

## **Conclusion**



Use question headings, but take extreme care to use correct wording and matching of the question with the answer that follows. When offering a gift service, make this the first question. Also try to evaluate the impact of reordering the questions.

Impact: very high. Proportion: high (low for question order). Effect: positive.

# 8.1.8. Hidden wrapping paper choices

#### Results

Some participants indicated surprise when the choices were presented as an overlay. Most participants indicated to have enjoyed this and named it as a pleasant experience (either at the time of seeing the overlay or when listing their surprise moments during the interview afterwards). The checkbox appeared to be enough of a trigger to click on it, none indicated the somewhat lower clarity about what would happen upon clicking it as a negative aspect. Some of the participants furthermore indicated to appreciate that they could still easily cancel the gift wrap service from within the overlay and also afterwards.

## **Discussion**

The downsides of this pattern could be that it is less clear what happens when the checkbox is ticked and that the findability of the gift wrap service might be somewhat lowered. On the other hand, the gift wrap service appears to be strongly enough related to the gift wrap question. Therefore, based on the very positive emotions experienced by this method of presenting this service, it is strongly advised to present it by means of an overlay. Making a user experience truly pleasant includes surprising a user in a positive and delightful way. A checkout process allows for very few of such opportunities. As this appears to be a successful one, I would strongly advise it, despite the potential minor downsides.

#### Conclusion



Present wrapping paper choices only when the user indicates it is a gift and display them in an overlay (instead of as an inlay).

Impact: very high. Proportion: high. Effect: positive.

# 8.1.9. Multiple wrapping paper choices

- a) Allow them to pick no wrapping paper (even after they have indicated a gift) and use it as default
- b) Allow them to pick a wrapping paper after checking the wrapping paper option and select one as default
- c) Have users make the wrapping paper choice by using normal radio buttons
- d) Have users make the wrapping paper choice by using button-like radio buttons

## Results

Having two options for wrapping paper in general were expressed by some participants to be positive and none of them expressed this to be negative. Although it was experienced as positive (in the overlay alternative) that it was still possible to indicate that the customer did not want wrapping paper, the research yielded no conclusive results for the first two alternatives. Regarding the second alternatives, some indicated that they preferred the button-like radio buttons. However, it was unclear if this result stemmed from the button-like radio buttons or the fact that this alternative provided a preview of both options at the same time. In addition, a few participants thought that the alternative with the button-like radio buttons used smaller previews of the wrapping paper (which they disliked) even though the previews were exactly the same size in both prototypes.

#### **Discussion**

The results did not provide very much information, except for the fact that participants liked being able to pick between two alternative wrapping papers. However, given the advantage of more easily displaying the two previews at the same time and the fact that the button-like radio buttons appear to work well in combination with the overlay it could be worthwhile to implement this alternative in checkout processes unless conclusive evidence for another pattern becomes apparent.



Allow users to pick between multiple wrapping paper choices or to pick no paper at all. *Impact: low. Proportion: low. Effect: positive.* 

# 8.1.10. Immediate wrapping paper previews

#### Results

Most participants experienced this pattern as more convenient than the pattern used in the bol.com checkout process (hiding the previews in a balloon that only becomes visible after hovering over a link). Both prototypes were experienced as more positive in this regard. According to some of the participants, one of the prototypes had the advantage that it displayed both previews at the same time, thereby allowing them to be more easily compared.

Participants did indicate to appreciate the fact that the preview images were larger in the bol.com checkout.

## **Discussion**

The results for this pattern are rather conclusive in that the user experience is increased by following this pattern. It also appears to make sense to use somewhat larger preview images, based on the results of this research. In this regard it should also be noticed that the design of the page can also influence the perceived size (as explained in the results for the previous pattern).

#### Conclusion



Present the wrapping paper choices by immediately showing previews of both choices and not by hiding them behind some hover effect.

Impact: low. Proportion: high. Effect: positive.

#### 8.1.11. Placeholder texts inside form fields

#### Results

None of the participants were obviously assisted by the placeholder texts, none made a positive remark about this. Some participants even ignored the suggested format for entering e.g. the postcode. Furthermore the placeholder texts caused some participants to have more trouble scanning the form to find out which field they had forgotten. It should be noted that the prototype nature did not allow very specific errors to be presented to the users, making them have to look for the errors themselves. Nonetheless the placeholder texts hindered participants in finding the offending fields and in a few cases it even caused the problems themselves as the fields appeared like they did not need to be filled out. A few participants even pointed out that the placeholder text had caused their problems. In relation to this however, it should be noted that because users did not look at the expected format but simply assumed their formatting would be accepted, it can cause problems when this is not the case. E.g. in the bol.com checkout a few users experienced problems when their date of birth was not accepted.

## **Discussion**

This research does not provide evidence that placeholder texts support users as to how to fill out a field. Furthermore, it does provide some evidence that it was not used at all. On the other hand, it did cause people to miss fields: both when filling out the form and when trying to find out which field they had missed. Given that the potential positive effects were thereby not clear, whereas the negative effects are present in multiple forms, I find this pattern should not be followed.

## **Conclusion**

Do not use placeholder texts to indicate the data entry format in a form field, accept all possible data formats instead.

Impact: high. Proportion: medium. Effect: negative.

# 8.1.12. Explanations for requesting sensitive data

- a) Next to the field label
- b) Underneath the form field

#### Results

Most participants indicated that they would usually continue the purchase process when data like a phone number was required even though they did indicate that they thought it should not be required. Most of the participants that made a negative remark about these fields indicated to mind less in the cases where an explanation was given. One participant indicated to actually prefer the phone number field being required as that way it could be made sure that she would not forget to fill it out. All remarks given by participants only referred to the phone number field making it the only field with which they had such issues. Furthermore, none of the participants were negatively influenced by the short explanation texts.

#### **Discussion**

Given that most participants would be helped with the explanation texts, I believe it to be wise to include these whenever asking for sensitive information.

## **Conclusion**



Provide explanations for sensitive data requests, especially for phone numbers. *Impact: high. Proportion: medium. Effect: positive.* 

# 8.1.13. Primary action buttons at the top and bottom

### Results

None of the participants were assisted by having two buttons (although a few noticed them). Some did notice that having two buttons had caused them problems previously (e.g. on the current bol.com checkout process). Some even indicated that they thought the buttons would have a different effect. An example is a participant who thought that when using the top button, the customer would continue to the next page without the cart contents (whatever that would mean).

## **Discussion**

Given that no participants were helped by this pattern during this evaluation, but it only caused confusion, both now and previously (in other checkouts), I can only advise against this pattern. The only way it could potentially help (but which was not tested here) is when there are a lot of products in the cart, making the bottom button go below the fold. However, this would require additional testing. Given the current evaluations I can only advise to at least not show two buttons above the fold.

#### Conclusion

Make sure there are never two primary action buttons visible in a single screen (e.g. when there are only two or three products in the cart).

Impact: high. Proportion: medium. Effect: negative.

# 8.1.14. Hidden coupon field as cost line in the cart

## Results

Given the limited time available per evaluation session, this pattern was not part of the evaluation scenarios. However, one participant tested this and indicated this to be clear and placed at a sensible spot.

#### **Discussion**

Given the limited testing no conclusions can be drawn yet, but it might be worthwhile to test this pattern in future research.

## **Conclusion**

N/A

## 8.1.15. Returning and new customers

- a) Allow them to change their initial choice without resorting to the back button
- b) Use radio buttons to allow easy switching
- c) Use normal buttons for the initial choice, with a link to switch to the other option that appears after the initial choice has been made

## Results

A few participants indicated the button version to have a stronger call to action. No other remarks were made.

#### **Discussion**

The results do not provide a strong motivation for either option. Based on this research I would advise the normal buttons, however it does not appear to have a strong impact. If you wish to make a choice based on research, normal buttons could be chosen but the research here is not conclusive.

#### **Conclusion**

N/A

# 8.1.16. Shipping details before billing details

## Results

This confused some of the participants and caused them to enter the wrong details in the wrong fields. A few of them indicated not being used to this order. It should be noted however that the first scenario (ordering a gift) might have inadvertently negatively influenced this pattern. Nonetheless, none of the participants were in any way helped by this pattern, also not in the second scenario.

#### **Discussion**

This pattern might be culturally dependent. After noticing that this caused problems for users I realized that major Dutch e-commerce checkouts I have used ask for the billing details first. Thereby it might be an issue of external consistency and the pattern may score better in other cultures such as the US, where this seems more common. Nonetheless, based on this research and its Dutch nature, I can only strongly recommend not following this pattern.

#### **Conclusion**

Do not ask shipping details before billing details, it will confuse (Dutch) shoppers. *Impact: high. Proportion: high. Effect: negative.* 

# 8.1.17. Delivery-at-work checkbox

#### Results

It should be noted that this pattern caused some problems in combination with the question heading at first. This was caused by the wording of the question heading which did not completely match this pattern. As the aim of this research is to test patterns and not the specific wording, I opted to change the wordings subtly after the first five participants (from for whom the delivery was to at whom it should be delivered, see 8.1.7 for details). Therefore, less strong conclusions can be drawn, but I believe them to be still valid.

Furthermore not only the question heading may have impacted this pattern, also asking the shipping address before the billing address might have negatively impacted this pattern (although this aspect has not been altered during the evaluations).

Most of the latter participants indicated this to increase their user experience as they felt that the site was helpful and assisting them. None of the latter participants experienced problems with this pattern.

#### **Discussion**

Given the results the first thing to note is that the copy (wordings) of this pattern in relation to its heading is extremely critical to get right. However, given the positive reaction later on, I would strongly recommend this pattern.



Use a checkbox to indicate delivery at work, thereby assisting the user in making a decision about the delivery address; do test the copy of this pattern before using it though. *Impact: medium. Proportion: medium. Effect: positive.* 

# 8.1.18. Collapsed extra address fields

- a) Allow users to indicate the addresses are different by unchecking a checkbox
- b) Allow users to indicate the addresses are different by checking a checkbox

#### Results

All users were able to use both versions. Nonetheless, a few participants indicated the label to be easier to read when they needed to uncheck the checkbox (version a). The bol.com version which uses two radio buttons also worked well and was indicated to be just as pleasant (by the few people making a remark about it), but it was noted that it required some more reading.

## **Discussion**

No strong conclusions could be drawn, but when forced to choose I would pick the unchecking variant based on these results.

#### **Conclusion**



Allow users to indicate the addresses are different by unchecking a checkbox. *Impact: low. Proportion: low. Effect: positive.* 

## 8.1.19. Inline validation

#### Results

Most of the participants who noticed the inline validation at all indicated this to be pleasant for their experience. During the evaluations no fields with error messages were triggered, making that there are no results for this. In other words: placing green checkmarks was experienced as positive by most participant and there are no results for placing red error messages during inline validation. However, the field checks (without error messages, just the check) were included in the prototype, making the browser put a red glow around the field. One participant did indicate to find it somewhat childish/school-like when the checkmarks appeared, but her user experience was not negatively influenced by them. It furthermore allowed some participants to more quickly spot their errors because of the red glow around the field (created by the browser).

Another aspect of the inline validation used here was that it would immediately display the complete address details based on a lookup of house number and postcode. A few participants indicated this took away any doubts about whether their address details had been accepted and were correct.

#### **Discussion**

Given the positive reactions I would recommend this pattern.



Use inline validation and preferably also do an address lookup and present the results. *Impact: medium. Proportion: high. Effect: positive.* 

# 8.1.20. Disabled primary action button with hover balloon

## Results

Disabling the button triggered participants with form errors to mostly immediately go hunting for an error in their entered data. A few participants tried to click twice before reading the balloon, but then quickly read it. A few of them also did not read the balloon and simply went to immediately look for errors. These participants were helped by the inline validation in such cases.

No negative remarks were made about either aspect of this pattern.

## **Discussion**

Given that the results indicated both aspects of this pattern helped participants to be able to more quickly find their errors and the fact that no negative remarks were made about the workings of this pattern, I would advise to incorporate it into checkout processes.

#### Conclusion



Use a disabled primary action button as long as the form is not yet completely correctly filled out and present a small but actionable balloon upon hovering over the button that clearly and briefly explains what is wrong.

Impact: low. Proportion: low. Effect: positive.

# 8.1.21. Marking only optional fields

#### Results

Roughly half of the participants experienced some doubt because of this pattern. Some indicated being used to required fields also being marked. Most standard fields did not cause problems, but especially more sensitive fields to phone number, account creation (email and password) and bank account number did. The participants that experienced doubt indicated to simply not know if the fields were optional, causing most of these participants to simply try continuing without filling them out. This did not cause problems, but it did cause frustration, negatively influencing the user experience according to the participants.

#### **Discussion**

Even though backed by literature, the results indicate this pattern to work adversely. Therefore I would suggest marking optional fields as optional (with the text "optional") and required fields with a commonly used asterisk icon.



Mark optional fields as optional, but also mark required fields as being required. *Impact: medium. Proportion: medium. Effect: negative.* 

#### 8.1.22. Unobtrusive account creation

- a) Make it optional
- b) Do it behind the scenes by generating an activation link or password that is emailed to the user after the order has been placed

#### Results

Roughly half of the participants indicated to prefer the prototypes when they faced the account creation page at bol.com. They said it was "pushy". Some of them even tried to simply continue without filling out these fields, which did not work as they were required fields. A few of them even indicated that in case they were buying e.g. a book, this could mean they would abandon the checkout process and look for a different store. A few of the other half of the participants indicated to understand why it was required.

#### **Discussion**

Given the strong negative impact on both the user experience, as well as the potential conversion (according to a few of the participants) of having a required account creation, I would strongly advise to follow this pattern. However, I do think that not creating an account could lower long-term conversion because then customers need to enter all their details again each time they order (as their information can not be stored in their account). These effects have not been researched here. Given the strong positive impact of this pattern on the user experience and short-term conversion and the unknown effects on the long-term conversion I would advise to adhere to this pattern until there is conclusive negative evidence about the long-term effects. And in that regard the balance between new and existing customers should also be taken into account. Furthermore, creating an account behind the scenes could largely mitigate that effect. Therefore, I recommend this variant.

#### Conclusion



Create an account behind the scenes. *Impact: high. Proportion: medium. Effect: positive.* 

# 8.1.23. Automatic credit card company

#### Results

None of the participants made a remark about or experienced any issues because of this.

#### **Discussion**

Given that there were no negative effects, but that it does make the checkout process one field shorter (where each field can be a potential abandonment spot), I would advise to follow this pattern.



Do not ask customers to select the credit card company, but automatically select it. *Impact: very low. Proportion: very low. Effect: neutral / not negative.* 

# 8.1.24. Expiration date as on credit card

- a) Use two text fields to enter the month and year
- b) Use two dropdown fields to enter the month and year

#### Results

None of the participants made a remark about or experienced any issues because of this.

# **Discussion**

Given that there were no negative effects and the reasoning that persons less familiar with credit cards will have an easier time finding the right values, unless other motivations apply, I would still follow this pattern.

#### **Conclusion**

N/A

## 8.1.25. Subtle total order costs

## Results

None of the participants made a remark about or experienced any issues because of this.

#### **Discussion**

Given that there were no negative effects and the reasoning that it could increase conversion I would recommend this pattern to be A/B tested.

## **Conclusion**

N/A

# 8.1.26. No repeat email address and password

# Results

This pattern did not cause problems during the evaluation. Some participants did sigh or indicate that there was a large amount of fields to be filled out at the bol.com checkout when they arrived at the account creation page. Furthermore, almost all participants did notice the highlighted email address on the order confirmation page.

## **Discussion**

Given that almost all participants noted the highlighted email address on the confirmation page, this might post a viable option. It did not create problems during the evaluations. The results indicate this pattern could improve the user experience and conversion, however it is unknown how many

problems it would cause with mistyped email addresses in practice. Therefore it would be advisable to further investigate this, now that its positive effects are known.

## Conclusion



Test to make sure that it does not cause problems for your site with mistyped email addresses; if so, do not force users to repeat their email address or password. *Impact: medium. Proportion: high. Effect: possibly positive.* 

# 8.1.27. Newsletter opt-in

#### Results

Most of the respondents who did not want the newsletter indicated that they found the default choice at bol.com to be "very pushy". They indicated they would not abandon their order, but it did negatively influence their user experience. The participants that did wish to receive the newsletter did not experience problems or negative emotions when they had to check the checkbox themselves in the prototypes.

## **Discussion**

The evaluation results confirm this pattern. It might be feared that a newsletter checkbox that is unchecked by default might cause only a few customers to still subscribe to the newsletter. However, according to this research that is not true, customers who want it have no problem ticking the box themselves. According to this research most customers are likely to correctly indicate their newsletter preference, but given the negative experience for opt-out, I would recommend following this opt-in pattern.

#### Conclusion



When offering a newsletter, do not tick the checkbox by default. Impact: high (for user experience, low for conversion). Proportion: medium. Effect: positive.

#### 8.2. Other Observations

Asides from the patterns, a few more observations can be made based on this research. These observations are presented below.

First of all, it appears that the participants were able to truly act as if they were buying a high-involvement product (a washing machine). I believe this to be the case based on the fact that participants noticed during or after completing their order that they had not been able to indicate when they would like it to be delivered. In addition, all participants took more time finding the preferred washing machine (from the three given options) than they took for finding the preferred book (also from three given options). Although no exact timing data is available, this was observable during the evaluations and by looking at the recordings afterwards.

Secondly, it can also be noted that the participants felt at ease during the evaluations, which is likely to have a positive influence on how realistic the results are. Most participants indicated to have felt at ease afterwards and one of them even sent an email later on to emphasize this.

## 8.3. General Discussion

All patterns were well-founded and it could therefore be expected that each individual pattern would have a neutral or positive influence. Even though it may have been likely that not all patterns would score equally well, I would not have been able to point out a single anti-pattern beforehand. Therefore, it is interesting to note that most patterns did indeed increased both the user experience and/or conversion in some way. Yet it was also interesting to see that some patterns, despite being promising and used on other major e-commerce sites, did fail. I believe the most notable examples in this regard to be using primary action buttons at the top and bottom, shipping details before billing details, marking only optional fields and placeholder texts inside form fields, as these were all founded mainly by literature.

There were also some patterns that influenced each other (aside from the reasons for combining them or not as explained in chapter 5.1). The pattern "personal & brick-and-mortar-like experience" (most notably the question headings) appeared to negatively influence the "delivery-at-work checkbox" pattern and the "shipping details before billing details" pattern, or vice versa. In relation to the delivery at work, this appears to be only due to the text, making it very clear that the power of the question headings also dictates really well-formulated texts to be used (and also to test them very thoroughly). Asking for shipping details first caused problems for both patterns however and this appeared not to be due to the wording that was used.

Also patterns influencing each other positively could be found. The "disabled primary action button with hover balloon" worked very well when users were able to quickly spot which fields were preventing them from continuing, and the "inline validation" helped in this regard (on the other hand, "placeholder texts inside form fields" did the opposite as it prevented participants from quickly scanning the form).

All in all I believe this to be valuable research given the amount of discerned positive patterns in addition to determining a few anti-patterns. The next chapter shows a number of ideas about how this research could be improved even further.

## 9. Future Research

Notwithstanding the value provided by the current research, future research could focus on the aspects described below.

## Fine-tuning the current patterns

Although the current patterns already form a solid foundation based on this research, they could also be further refined in some cases. An example would be the pattern *delivery time when ordered within* x *hours*. An alternative to test here would be to only use the patterns when x < 3. E.g. "delivered tomorrow when ordered before 23.00" during the day (before 20.00) and "delivered tomorrow when ordered within 2 hours" when it is 21.00. This example would also require the pattern to be tested during the day and in the evening (which was not possible here) and an A/B test (where both options are tested simultaneously real-life) might be even more conclusive.

## Combining and evaluating the successful patterns in a single prototype

Given that a few of the patterns affected each other in some cases, results could become even more conclusive by combining the patterns in a single checkout (prototype) and evaluating this checkout.

## Quantitatively evaluating the error rate and conversion

Although this research provided valuable insights because of its qualitative nature, some patterns could benefit from quantitative evaluations providing more exact insights on aspects such as error rate and conversion. This tested by means of an A/B test, or a multi-variate test in cases where it is expected that the patterns influence each other. Examples of patterns that could benefit from quantitative evaluations are:

- newsletter opt-in vs. opt-out;
- repeat email address vs. allowing corrections on confirmation page.

## Using more evaluators

Related to the previous suggestion, using more participants in the evaluations may provide some additional insights. In addition to using e.g. A/B testing to evaluate conversion, a later quantitative evaluation might use more participants to gain more insights into the patterns with less conclusive results in this research (i.e. the patterns with a low impact or low affected proportion).

# Testing different scenarios

Similar to using more evaluators, using different scenarios might yield more conclusive results for patterns that are currently less conclusive. An example extra scenario would be ordering a non-gift low-involvement product.

## Evaluating more new customer patterns

This would allow the list of patterns and anti-patterns to be further expanded, allowing designers of a checkout process to choose from more patterns and alternatives.

## Determining the effects of the patterns on existing customers

The successful patterns of this research should allow for better checkout processes for new customers to be created. However, the effects on existing customers have not been tested. Even when it can be assumed that existing customers might also benefit from these patterns in a similar way as new customers, this positive effect needs to be weighed against existing customers having to learn a new process. Do note however that some of the patterns do not apply to existing customers (e.g. the pattern no repeat email address and password) or that their effects are different.

## Determining patterns for the existing customer checkout process

In addition to determining the effects of the patterns from this research for existing customers and evaluating more new customer patterns, also patterns specifically tailored for existing customers could be researched.

## Creating or enriching pattern libraries

Furthermore, not necessarily research, yet equally useful, it is possible to use the patterns from this research to create or enrich an online pattern library with these patterns.

## 10. Recommendations

This research yields a large number of patterns that can be applied for increasing the user experience and conversion ratio of checkout processes for new customers. Some of these patterns score better than others, i.e. their effects are more positive or their effects apply to more participants. The patterns that can be most strongly recommended based on this research are listed below. This list forms a concrete set of recommendations that are very likely to increase both the user experience and conversion of online checkout processes.

# 10.1. Do not use the anti-patterns

This research also yielded some anti-patterns that do not enhance the checkout process. It is recommended that these patterns are <u>not</u> used a in checkout process: *primary action buttons at the top and bottom*, *shipping details before billing details*, *marking only optional fields* and *placeholder texts inside form fields*.

# 10.2. Use as few pages as possible and preferably a one-page checkout

Limiting the amount of pages enhances the user experience. Three pages provide a better experience than seven. Although using a single page does not necessarily increase the user experience further, it does not decrease it either. However, it does have the ability to increase conversion and order intent and thereby the total revenues.

# 10.3. Use a (floating) mini-cart sidebar with product images in the checkout

Displaying the product images continuously during the checkout reassures users that they are ordering the right product. It positively increases their experience and, although not yet proven, it can potentially increase conversion. A floating sidebar (one that does not scroll when the page scrolls) appears to have the strongest effects.

# 10.4. Display delivery time when ordered within x hours

An example of this pattern is "Delivered tomorrow when ordered within 2 hours". It is both persuasive and reassuring for customers to know how much time they have left to order to receive their products as soon as possible. Thereby it can increase both conversion and the user experience.

# 10.5. Use question headings and assess the impact of rearranging questions

Question headings proved to be very persuasive. Participants in this research even explicitly noticed this effect. Nonetheless, they experienced it to be positive and not annoying. Each question effectively represents a section. The order of these sections and questions can also play a role in their persuasiveness and if they make sense to customers. One aspect proven by this research is that a gift wrap question is a good first question (when applicable). It has also proven that the wording used for the questions can also introduce problems. It is therefore extremely important to make sure that correct wording is used and that the question completely matches the answers/fields that follow.

# 10.6. Present wrapping paper choices in an overlay (instead of as an inlay)

When offering a gift wrap service, the actual options can be presented in multiple ways. The overlay method where the options appear as a sort of pop-up window on the page itself proved most

successful. It was unexpected and thereby a positive surprise that consequently positively increased the user experience.

# 10.7. Ask billing details before shipping details (for Dutch customers)

At least in the Netherlands e-commerce sites should ask for the billing address details before asking for the shipping address. This appears to have become convention and breaking this convention only appears to confuse and thereby annoy (potential) customers.

# **Bibliography**

- [1] International Organization for Standardization (ISO), "ISO 9241-11 Ergonomic requirements for office work with visual display terminals (VDTs) Part 11: Guidance on usability". 2008.
- [2] J. D. Gould en C. Lewis, "Designing for usability: key principles and what designers think", *Communications of the ACM*, vol. 28, nr. 3, pp. 300–311, 1985.
- [3] J. L. Bennett, "Managing to meet usability requirements: Establishing and meeting software development goals", *Visual display terminals*, pp. 161–84, 1984.
- [4] W. Quesenbery, "What Does Usability Mean: Looking Beyond Ease of Use", in *Annual Conference-Society for Technical Communication*, 2001, vol. 48, pp. 432–436.
- [5] International Organization for Standardization (ISO), "ISO 9241-210 Ergonomics of human system interaction Part 210: Human-centred design for interactive systems". 2010.
- [6] P. Kotze, K. Renaud, K. Koukouletsos, B. Khazaei, en A. Dearden, "Patterns, anti-patterns and guidelines–Effective aids to teaching HCI principles", in *Proc. of The First Joint BCS/IFIP WG13.ICS/EU CONVIVIO HCI Educators' Workshop (2006)*, 2006.
- [7] J. M. Spool, "Design Patterns: An Evolutionary Step to Managing Complex Sites". [Online]. Available: http://www.uie.com/articles/design\_patterns/. [Accessed: 15-mrt-2012].
- [8] M. van Welie en B. Scott, "Design Patterns: Part 1". [Online]. Available: http://www.lukew.com/ff/entry.asp?348. [Accessed: 12-mrt-2012].
- [9] M. van Welie, "Interaction Design Pattern Library". [Online]. Available: http://www.welie.com/patterns/index.php. [Accessed: 23-dec-2011].
- [10] A. Toxboe, "Design patterns". [Online]. Available: http://ui-patterns.com/patterns. [Accessed: 23-dec-2011].
- [11] Quince, "All Public Patterns". [Online]. Available: http://quince.infragistics.com/html/AllPatterns.aspx. [Accessed: 23-dec-2011].
- [12] Yahoo!, "Design Pattern Library". [Online]. Available: http://developer.yahoo.com/ypatterns/. [Accessed: 23-dec-2011].
- [13] Pattern Factory, "UI Design Pattern Library | Patternry". [Online]. Available: http://patternry.com/patterns/. [Accessed: 23-dec-2011].
- [14] J. Nielsen, S. Farrell, C. Snyder, en R. Molich, *E-commerce User Experience*. Nielsen Norman Group, 2000.
- [15] H. H. Kuan, G. W. Bock, en V. Vathanophas, "Comparing the effects of usability on customer conversion and retention at e-commerce websites", in *System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on,* 2005, p. 174a–174a.
- [16] V. Agrawal, L. Arjona, en R. Lemmens, "E-performance: The path to rational exuberance", *The McKinsey Quarterly*, vol. 2001, nr. 1, pp. 30–43, 2001.
- [17] M. van Kalsbeek, "Interface Guidelines for E-commerce Checkouts".
- [18] Google, "Top 1000 sites DoubleClick Ad Planner". [Online]. Available: http://www.google.com/adplanner/static/top1000/#. [Accessed: 27-aug-2011].
- [19] J. Nielsen, "Risks of Quantitative Studies". [Online]. Available: http://www.useit.com/alertbox/20040301.html. [Accessed: 16-feb-2012].
- [20] M. J. Van den Haak, M. D. T. de Jong, en P. J. Schellens, "Employing think-aloud protocols and constructive interaction to test the usability of online library catalogues: a methodological comparison", *Interacting with computers*, vol. 16, nr. 6, pp. 1153–1170, 2004.
- [21] J. Tidwell, Designing Interfaces. O'Reilly Media, Inc., 2010.
- [22] B. Scott en T. Neil, Designing Web interfaces. O'Reilly, 2009.
- [23] P. Vora, Web application design patterns. Morgan Kaufmann, 2009.

- [24] D. K. V. Duyne, J. A. Landay, en J. I. Hong, *The design of sites: patterns for creating winning web sites*. Prentice Hall Professional, 2007.
- [25] A. Roggio, "The Pros and Cons of One-Page Checkout | Get Elastic Ecommerce Blog". [Online]. Available: http://www.getelastic.com/single-page-checkout/. [Accessed: 11-mrt-2012].
- [26] J. Lanka, "A/B Test Case Study: Single Page vs. Multi-Step Checkout | Get Elastic Ecommerce Blog". [Online]. Available: http://www.getelastic.com/single-vs-two-page-checkout/. [Accessed: 11-mrt-2012].
- [27] J. Petrovic, "One Page Ajax Checkout 5 Reasons Why Not | Proimpact7.com E-commerce Blog". [Online]. Available: http://www.proimpact7.com/ecommerce-blog/one-page-checkout-5-reasons-why-not/. [Accessed: 11-mrt-2012].
- [28] J. Petrovic, "Checkout A/B Test: Checkout Test Which Increased Conversion By 13.39% | Proimpact7.com E-commerce Blog". [Online]. Available: http://www.proimpact7.com/ecommerce-blog/checkout-ab-test-checkout-test-which-increased-conversion-by-13-39/. [Accessed: 11-mrt-2012].
- [29] D. Waisberg en A. Kaushik, "Web Analytics 2.0 Empowering Customer Centricity, Part II", SEMJ. org, vol. 2, nr. 2, 2009.
- [30] I. Daniel, E-Commerce Get It Right! Ian Daniel, 2011.
- [31] C. Holst, "One Page Checkouts the Holy Grail of Checkout Usability?" [Online]. Available: http://baymard.com/blog/one-page-checkout. [Accessed: 27-apr-2011].
- [32] International Organization for Standardization (ISO), "ISO 9241-151 Ergonomics of human-system interaction Part 151: Guidance on World Wide Web user interfaces". 2008.
- [33] D. Stone, C. Jarrett, M. Woodroffe, en S. Minocha, User Interface Design and Evaluation. 2005.
- [34] S. L. Smith, J. N. Mosier, M. Corporation, en U. S. A. F. S. C. E. S. Division, *Guidelines for designing user interface software*. Citeseer, 1986.
- [35] A. Dix, J. E. Finlay, G. D. Abowd, en R. Beale, Human-Computer Interaction, Third edition. 2004.
- [36] S. Krug, Don't make me think!: a common sense approach to web usability. New Riders, 2006.
- [37] Wehkamp.nl, "Hét online warenhuis van Nederland". [Online]. Available: http://www.wehkamp.nl/. [Accessed: 07-sep-2011].
- [38] Coolblue, [Online]. Available: http://www.coolblue.nl/. [Accessed: 07-sep-2011].
- [39] BCC, "Everyday Low Pricing, High Service". [Online]. Available: http://www.bcc.nl/. [Accessed: 07-sep-2011].
- [40] Toys'R'Us, "Speelgoed, spellen & meer". [Online]. Available: http://www.toysrus.nl/. [Accessed: 07-sep-2011].
- [41] Booking.com, "183.964 hotels wereldwijd. Reserveer nu uw hotel!" [Online]. Available: http://www.booking.com/. [Accessed: 07-sep-2011].
- [42] P. Rouke, "Booking.com: improving conversion with best practice persuasive design". [Online]. Available: http://econsultancy.com/uk/blog/8151-booking-com-improving-conversion-with-best-practice-persuasive-design. [Accessed: 08-mrt-2012].
- [43] Amazon.com, "Electronics, Apparel, Computers, Books, DVDs & more". [Online]. Available: http://www.amazon.com/. [Accessed: 07-sep-2011].
- [44] eBay, "Register with eBay". [Online]. Available: https://scgi.ebay.com/ws/eBayISAPI.dll?RegisterEnterInfo. [Accessed: 07-sep-2011].
- [45] Kmart, "Clothing, Toys, Electronics, Jewelry, Jaclyn Smith". [Online]. Available: http://www.kmart.com/. [Accessed: 07-sep-2011].
- [46] Nike, [Online]. Available: http://www.nike.com/. [Accessed: 07-sep-2011].
- [47] H&M NL, "Fashion en kwaliteit voor de beste prijs". [Online]. Available: http://www.hm.com/nl/. [Accessed: 07-sep-2011].

- [48] Nordstrom, "Free Shipping. Free Returns. All the Time." [Online]. Available: http://shop.nordstrom.com/. [Accessed: 07-sep-2011].
- [49] Zappos.com, "Shoes, Clothing, and More". [Online]. Available: http://www.zappos.com/. [Accessed: 07-sep-2011].
- [50] Gap, "Shop clothes for women, men, maternity, baby, and kids". [Online]. Available: http://www.gap.com/. [Accessed: 07-sep-2011].
- [51] Lowe's Home Improvement, "Appliances, Tools, Hardware, Paint, Flooring". [Online]. Available: http://www.lowes.com/. [Accessed: 07-sep-2011].
- [52] Sears International, "Shop online, send worldwide with great shipping rates". [Online]. Available: http://www.sears.com/. [Accessed: 07-sep-2011].
- [53] Target, "Furniture, Baby, Electronics, Toys,..." [Online]. Available: http://www.target.com/. [Accessed: 07-sep-2011].
- [54] bol.com, "bomvol winkels, bomvol voordeel". [Online]. Available: http://www.bol.com/nl/index.html. [Accessed: 27-jan-2012].
- [55] S. Biersteker, "One step checkout: een stap te weinig". [Online]. Available: http://twinklemagazine.nl/weblog/2010/10/one-step-checkout-een-stap-te-weinig/. [Accessed: 11-mrt-2012].
- [56] J. Peck en S. B. Shu, "The Effect of Mere Touch on Perceived Ownership", *Journal of Consumer Research*, vol. 36, nr. 3, pp. 434–447, okt. 2009.
- [57] W. IJsselsteijn, Y. de Kort, C. Midden, B. Eggen, en E. van den Hoven, "Persuasive technology for human well-being: setting the scene", *Persuasive technology*, pp. 1–5, 2006.
- [58] A. Brown, "What is marketing? A brief introduction to marketing for participants in the MAP industry", *Frontis*, vol. 17, pp. 213–221, nov. 2006.
- [59] R. B. Cialdini, *Influence: Science and practice*, vol. 4. Allyn and Bacon Boston, MA, 2001.
- [60] L. Wroblewski, "The Apple Store's Checkout Form Redesign". [Online]. Available: http://www.lukew.com/ff/entry.asp?968. [Accessed: 11-mrt-2012].
- [61] L. Wroblewski, "What Impacts Web Form Conversion?" [Online]. Available: http://www.lukew.com/ff/entry.asp?1416. [Accessed: 11-mrt-2012].
- [62] B. Eisenberg, "How to Increase Conversion Rate 1,000 Percent". [Online]. Available: http://www.clickz.com/clickz/column/1692957/how-increase-conversion-rate-percent. [Accessed: 19-mrt-2012].
- [63] L. D. Paulson, "Building rich web applications with Ajax", *Computer*, vol. 38, nr. 10, pp. 14–17, 2005.
- [64] L. Wroblewski, "Inline Validation in Web Forms". [Online]. Available: http://www.alistapart.com/articles/inline-validation-in-web-forms. [Accessed: 11-mrt-2012].
- [65] L. Wroblewski, Web form design: filling in the blanks. Brooklyn NY: Rosenfeld Media, 2008.
- [66] "Anatomy of Credit Card Numbers". [Online]. Available: http://www.merriampark.com/anatomycc.htm. [Accessed: 11-mrt-2012].
- [67] "Bank card number Wikipedia, the free encyclopedia". [Online]. Available: http://en.wikipedia.org/wiki/Credit\_card\_number. [Accessed: 11-mrt-2012].
- [68] J. Appleseed en C. Holst, E-Commerce Checkout Usability Exploring the customer's checkout experience, 1.0.1 ed. Baymard Institute, 2011.
- [69] P. Rouke, "Persuasive checkout best practice from Asos". [Online]. Available: http://econsultancy.com/uk/blog/8391-persuasive-checkout-best-practice-from-asos. [Accessed: 11-jan-2012].

[70] Centaal Bureau voor de Statistiek, "Statline - Internetaankopen van personen naar persoonskenmerken". [Online]. Available: http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=71098ned&D1=33-40,114&D2=0-2&D3=a&HDR=G1&STB=T,G2&VW=T. [Accessed: 04-jan-2012].

# Appendix A: User Evaluation Outline (Original Version; in Dutch)

#### **GEBRUIKSONDERZOEK**

#### Checkout

Welkom bij dit gebruiksonderzoek voor bol.com. Mijn naam is [.....] en ik zal u begeleiden tijdens dit onderzoek. Voordat we beginnen met het onderzoek heb ik nog algemene informatie over het gebruiksonderzoek. Ik zal dit voorlezen, zodat ik niets kan vergeten.

De gebruiksonderzoeken worden uitgevoerd om te kijken of de website werkt zoals wij denken en om de website te verbeteren. Een belangrijk punt voor dit onderzoek is dat we de website aan het testen zijn, niet u. Dit betekent dat u niets verkeerd kan doen.

Tijdens dit onderzoek gaan we kijken naar een aantal pagina's van bol.com. Hierbij wil ik u vragen om tijdens deze opdracht hardop te denken, oftewel alles wat u ziet en wat u denkt mag u zeggen. Hierbij maakt het niet uit of het een positieve of negatieve reactie is. We willen graag uw mening horen.

Mocht u tijdens het onderzoek vragen hebben dan kunt u deze stellen. Er is een kans dat ik op een vraag niet meteen antwoord kan geven omdat we juist willen weten wat u zou doen wanneer er niemand naast u zit om te helpen. Uiteraard mag u de vragen altijd stellen. Als u even een moment wilt stoppen (om iets te drinken of om naar de wc te gaan) mag u dat aangeven.

Het onderzoek wordt opgenomen, zodat wij het nog terug kunnen kijken. De opname zal alleen gebruikt worden om de website te verbeteren en het wordt alleen bekeken/beluisterd door de personen die aan dit project werken.

De getoonde pagina's staan op een testomgeving van bol.com. Dit houdt in dat bepaalde onderdelen zoals links mogelijk niet werken of dat er incorrecte informatie getoond wordt. Ik wil u vragen om te proberen u in te beelden dat deze problemen er niet zijn. Wel wil ik u vragen om ook de gedachtes die u over deze onderdelen heeft hardop te zeggen.

Omdat het om nieuwe pagina's van bol.com gaat en dus om vertrouwelijke informatie, willen we u verder vragen om een geheimhoudingverklaring te ondertekenen.

De verklaring rustig door laten lezen en dan laten ondertekenen

Controleer of de Communicator op de recorder uit staat: klik op Sign Out

#### **BASISVRAGEN**

Voordat we naar de opdrachten gaan wil ik eerst een aantal algemene vragen aan u stellen.

- 1. Wat doet u in het dagelijks leven?
- 2. Wat zijn uw favoriete websites?
- 3. Koopt u regelmatig op internet?
- 4. Wat voor producten koopt u voornamelijk en op welke website(s)?
- 5. Koopt u ook wel eens grotere apparaten op internet, zoals wasmachines of koelkasten? Zou u zich voor kunnen stellen dit te doen?

Heeft u nog vragen voordat we starten met het onderzoek?

#### **ONDERZOEK**

Voor dit gehele onderzoek wil ik u vragen om u in te beelden dat u nog niet eerder bij bol.com heeft gekocht. U heeft er uiteraard wel van gehoord van tv en vrienden, maar u heeft hier nog niet eerder iets besteld.

Tot slot gaan we zoals gezegd een aantal pagina's van bol.com bekijken op de testomgeving. Ik zal u vragen om een aantal opdrachten uit te voeren. Als u de opdracht uitvoert moet u proberen zoveel mogelijk hardop na te denken, zodat het voor ons duidelijk is waarom u iets doet zoals u het doet. Omdat het een testomgeving is werken sommige zaken niet. Zo kunt u bijvoorbeeld geen productgegevens bekijken. Wanneer iets niet werkt vanwege de testomgeving wil ik u wel vragen om hardop aan te blijven geven wat u denkt.

Bent u klaar om te beginnen?

[Je / u gebruik afstemmen op respondent. Verder in testscript wordt steeds u gebruikt]

#### OPDRACHT 1 - Boek als cadeau

Welke onderdelen werken intuïtief in beide prototypes? Welke onderdelen zijn veelbelovend maar moeten beter uitgewerkt worden? Welke onderdelen hinderen de gebruiker in het behalen van de doelen of verminderen de positieve ervaring?

Stel, uw neef(je) wordt morgen 19. Hij houdt enorm van boeken lezen en voor zijn verjaardag vraagt hij dus ook boeken. Omdat hij er ook al heel veel heeft, bent u blij dat hij al een kleine selectie heeft gemaakt. Hij heeft u een link gestuurd naar een webwinkel waarbij zijn selectie direct tevoorschijn komt. Probeert u zich in te leven dat u de winkel (bol.com) wel kent, maar dat u er nog niet eerder heeft besteld.

- ⇒ Start Firefox, klik bovenaan in de browser op '1[A/B]. Boek' en bestel vervolgens op deze site het boek voor uw neef(je).
- @ Hoe vond u het gaan? (Gemakkelijk? Moeilijk?)
- (@ Waren er momenten dat u in verwarring was?)
- @ Waren er zaken waardoor u verrast werd? Positief of negatief.

Ik wil u graag een alternatief laten zien. Stel, uw neef(je) had u een andere link had gestuurd om het boek te kopen.

- ⇒ Klik bovenaan in de browser op '4.'. Klik nu bovenaan op '1[B/A]. Boek'. U ziet nu dezelfde pagina, maar de schermen hierna zijn anders. Bestel nu op deze site het boek voor uw neef(je).
- (a) Hoe vond u het gaan? (Gemakkelijk? Moeilijk?)
- (@ Waren er momenten dat u in verwarring was?)
- @ Waren er zaken waardoor u verrast werd? Positief of negatief.
- @ Wat vond u deze andere variant?
- @ Aan welke variant geeft u de voorkeur?
- @ Welke elementen van beide varianten vond u prettig?

#### **OPDRACHT 2 - Wasmachine**

# Verandert de voorgaande ervaring in het geval van een high-involvement product?

Stel, het is dinsdag, vijf uur 's middags. U heeft een middagje vrij. Omdat u er eerder nog niet aan toegekomen bent om de was te doen besluit u het maar meteen te doen. Zodra u de wasmachine aanzet hoort u echter een vreemd, hard, tikkend geluid. U schrikt. Na het bekomen van de schrik haalt u direct de stekker eruit. U probeert het nogmaals, maar het is duidelijk: hij is stuk. U realiseert zich dat de wasmachine al 10 jaar oud is en u besluit dus om maar direct een nieuwe wasmachine op internet te kopen. U belt een vriend die er verstand van heeft en toevallig ook net een nieuwe wasmachine heeft gekocht. Hij stuurt u een link naar bol.com met een kleine selectie. U besluit om op aanraden van de vriend een van deze drie modellen te kiezen en deze te bestellen.

Ook in dit geval wil ik u vragen om u voor te stellen dat u nog niet eerder bij bol.com heeft besteld.

- ⇒ Klik bovenaan in de browser weer op '4.'. Klik nu op '2[A/B]. Wasmachine' en bestel vervolgens een nieuwe wasmachine zodat u deze morgen direct kunt gebruiken.
- @ Hoe vond u het gaan? (Gemakkelijk? Moeilijk?)
- @ Waren er momenten dat u in verwarring was?
- @ Waren er zaken waardoor u verrast werd? Positief of negatief.

Ook hiervoor wil ik u graag een alternatief laten zien. Stel, uw vriend had een andere link gestuurd.

- ⇒ Klik hiervoor bovenaan in de browser eerst weer op '4.' en daarna op '2[B/A]. Wasmachine'. Net zoals bij de vorige opdracht ziet u nu eerst dezelfde pagina, maar zijn de schermen hierna anders. Bestel nu op deze site de nieuwe wasmachine.
- @ Hoe vond u het gaan? (Gemakkelijk? Moeilijk?)
- @ Waren er momenten dat u in verwarring was?
- @ Waren er zaken waardoor u verrast werd? Positief of negatief.
- @ U gaf aan wel/geen apparaten zoals wasmachines op internet te bestellen. Heeft u hier nu een andere mening over? Verschilt dit nog voor een van de twee varianten?

#### **INTERVIEW**

## Iets dieper op de verschillen ingaand.

U heeft nu vier keer een product besteld met deze twee bestelvarianten.

- @ Kunt u van elke van de twee varianten aangeven wat u er het prettigst aan vond?
- @ Welke variant vond u in het algemeen het prettigst werken?
- @ Zou u bij een van beide varianten eerder een product bestellen dan bij de andere?
- @ In de ene variant stond alles op één pagina, terwijl het bij de andere over meerdere pagina's verspreid was. Vond u een van deze manieren prettiger?
- ⇒ (Zullen we samen nog even een keer de schermen doorgaan en kijken of u nog verdere opmerkingen heeft?)

## OPDRACHT 3 - Vergelijking met huidige bol.com-website

Voor de laatste opdracht wil ik vragen om op de gewone website van bol.com een van de eerder getoonde boeken te bestellen.

- ⇒ Klik bovenaan in de browser op '4.' en bestel dit product tot aan de betaalpagina.
- @ Wat vindt u van dit bestelproces in vergelijking met de voorgaande twee varianten?
- @ Welke elementen vond u hier beter of prettiger?
- @ Welke elementen uit de voorgaande twee varianten vond u prettiger?

#### **AFSLUITING**

Bedankt voor het meedoen. Hoe vond u het om mee te werken aan het gebruiksonderzoek? Doorvragen waarom

Heeft u nog vragen over het onderzoek?

Bedankt dat u mee wilde werken aan het onderzoek.

## Als het onderzoek klaar is

- 1. Sluit de opname en klik op OK.
- 2. Typ het volgnummer van de respondent in bij Save recording as.
- 3. Sla het bestand op in [path removed from this document]
- 4. Run het programma "Clear history" om de browser met een schone lei te laten beginnen bij het volgende gebruiksonderzoek.

# Appendix B: Checklist of usability guidelines

Below, a complete overview of all the validated guidelines from [17] is included. These are referenced in chapter in chapter 2.1.3. A large portion of these guidelines have been used for determining the potentially promising interface & interaction design patterns outlined in chapter 3.1.

#### **General**

## 1. Affordance

- a. Elements on the page provide affordance
- b. Invitations are placed in context, in proximity to the interaction

## 2. Clarity/guessability

- a. The interface avoids ambiguity by making everything clear through language, flow, hierarchy and metaphors for visual elements
- b. Information is always displayed in a directly usable format (e.g. no need to convert values yourself)

#### 3. Concision

- a. Everything is as concise as possible, noise is minimized
- b. Dialogs do not contain information which is irrelevant or rarely needed
- c. Objects have an appropriate level of granularity

## 4. Consistency

- a. Whenever accepted conventions exist, they are used
- b. Action sequences, layout, terminology, command use, abbreviations, etc. within the site and within a page is consistent (common items are formatted consistent visually and also behave consistently)
- c. The company name and logo appear on every page and there is a consistent visual appearance between pages
- d. Appropriate interaction objects are used (e.g. radio buttons for mutually exclusive options)

## 5. Discoverability/visibility

- a. The function of all controls is obvious
- b. Functional features buttons, scroll bars, navigational bars are identified by users as being working functions rather than images
- c. Features are appropriately advertised
- d. Users do not have to remember information from one part of the dialog to another
- e. Instructions for using the system are visible or easily retrievable when appropriate
- f. Important information is not hidden (e.g. prices and shipping rates)
- g. The main goals a user can have for a page have obvious call-to-action elements

## 6. Learnability

- a. Recognizable cues are incorporated wherever possible (recognition over recall)
- b. Controls work predictable
- c. Potential questions a user can have are answered appropriately
- d. Links to supportive information are provided

#### 7. Robustness

- a. The user is able to correctly evaluate the internal state of the system
- b. Easy reversal of actions is possible (undo and redo)
- c. Error messages are helpful by explaining why the error occurred, how it can be corrected and by providing additional explanation upon request (if needed)
- d. The system never blames the user for errors (but rather takes the blame itself)
- e. During error situations, the state is maintained (no need to start all over again)
- f. Potential user errors as well as the effort needed to recover are minimized
- g. If the content of a page is (or actions are) only valid for a certain period of time, the period of validity is indicated by appropriate means

#### 8. Aesthetics

a. The site looks professional and aesthetically appealing

## 9. Text labels and language

- a. Language is simple, uses familiar words and no jargon
- b. Texts are positive and non-threatening
- c. Terms are specific and constructive
- d. Text is concise and factual (kept to a minimum)
- e. No (obvious) faux sincerity is displayed
- f. Acronyms and abbreviations are used sparingly, and if used, are always defined
- g. Active voice is used
- h. Instructions are written in the affirmative
- i. There are no spelling and grammar errors present
- j. Mixed casing is used for prose text (e.g. sentences start with a capital character)
- k. Labels and titles are unambiguous
- 1. Headings are unique and descriptive
- m. Descriptive row and column headings are used
- n. Button labels use verbs

#### 10. Text style and structure

- a. Information is easy to skim
- b. Headings and subheadings are used, and in a meaningful way and in a relative size
- c. Long blocks of text are divided into separate sections
- d. Bulleted and numbered lists are used where appropriate
- e. Underlined text is only used for links
- f. Text has a 11- to 14-point type and headings are 3 to 5 point sizes larger (only episodical items such as menu bars or captions for icons may be smaller)
- g. Blocks of text are left-justified
- h. Short texts are aligned in relation to the item they belong to (e.g. center align for buttons)
- i. Familiar fonts are used
- j. Units of measurement are always labeled (e.g. "length: 1.0m" instead of "length: 1.0")

#### 11. Validation and feedback

- a. Informative feedback is given for every user action, at a level appropriate to the magnitude of the action
- b. Buttons, links and similar elements use a recognizable hover state, including a cursor change, color change and tool tips when a user hovers over the element (or over an attached element)
- c. Buttons, links and similar elements use a visual active state when pressed

#### 12. Guidance

- a. Flow is not interrupted by irrelevant elements (like long flash intros)
- b. Users are reminded what they should do next
- c. Indicate or separate the currently active components to assist the user in focusing
- d. Important issues, topics and critical data are highlighted and emphasized
- e. There is an apparent flow in the page (e.g. through directing attention visually, conforming to the Gutenberg diagram for blocks or the F-pattern for text blocks)
- f. Blank states provide helpful information to get started (e.g. empty lists invite adding items)

## 13. Page structure

- a. Related items appear together or are clearly and closely associated (e.g. by proximity, similarity, closure, symmetry, white space or rounded corners) and non-related items do not
- b. There is a clear visual hierarchy on every page: important elements are more prominent, logically related elements are visually related and visual "nesting" is used to show what is part of what
- c. Pages are broken up into clearly defined areas
- d. The single call-to-action for every page is displayed in a visually prominent way
- e. Navigation components are placed consistently on the pages of a website
- f. If pages are long, they are subdivided into meaningful sections (either on a single page with headers or on multiple pages)
- g. Every page displays a descriptive title that is placed consistently
- h. Page layout is consistent
- i. Pages do not appear cluttered
- j. Important items are positioned consistently
- k. The structure allows for easy comparison
- l. Items on a page are aligned
- m. Scanning of content is facilitated
- n. No unsolicited windows or graphics are displayed

#### 14. Overall structure and flow

- a. Information follows a natural organization and reflects the structure of the tasks the users want to carry out
- b. Navigation is self-descriptive and helps users understand where they are, where they have been and where they can go next

- c. For well-defined user tasks such as purchasing a product, the navigation structure guides users through that task and gives users a clear indication of their current position within the task (except possibly on the shopping cart page)
- d. If users navigate between different pages belonging to the same multi-step task, they are supported by step-by-step instructions, clear indications of the user's position in the task at all times and feedback on the status of the data processing
- e. If users navigate between different pages belonging to the same multi-step task, they are allowed to move to previous steps and correct their entries
- f. In a process requiring a sequence of steps, e.g. buying a product on an e-commerce website, the overview shows the steps needed to complete the transaction
- g. The current position within the navigation is highlighted (if possible)
- h. If a task requires a sequence of steps, a meaningful "step back" function is provided on the page that saves the data that has been entered (as the browser causes data to be lost)

# 15. Scrolling

- a. The most important content is visible without scrolling (@1024x768+)
- b. There are no scroll stoppers
- c. All important links are visible without scrolling (above the fold)
- d. Horizontal scrolling is not needed (@1024x768+)

#### 16. Color

- a. Elements do not rely on color alone to convey information (e.g. errors are also bold)
- b. There is sufficient contrast between the brightness of the background and foreground colors, but it should not be too extreme (e.g. not pure black and white)
- c. No more than six colors are used to organize a screen (in addition to black and white)

#### 17. Graphics

- a. The site is visually identifiable by a logo
- b. Graphics do not look like banner ads
- c. Large images above the fold are limited
- d. Use of images in general is limited
- e. Thumbnail images are used to preview larger images

## **Forms**

#### 18. Form organization

- a. Forms speak with "one voice" (different people/departments are not noticeable)
- b. Logical grouping and sequencing of the fields is used with natural breaks between topics, aiding scanning and completion
- c. The form is presented in a visually appealing layout
- d. White space and boundaries are used effectively
- e. Users can stay with one entry method as long as possible (e.g. drop-downs followed by drop-downs and then text fields instead of 'random')
- f. Sign-up forms are as simple as possible
- g. Users do not have to enter the same information more than once

## 19. Path to completion

- a. Form titles match people's expectations and succinctly explain what the form is for
- b. Forms contain a path to completion by using clear scan lines and effective visual pacing that comfortably takes people from start to finish
- c. For mission-critical forms like checkout or registration, distractions and any links or content that may lead to form abandonment are absent
- d. Forms with a known sequence of pages, include progress indicators that communicate scope, status, and position (except on the cart page)
- e. Forms without a clear sequence of pages, do not include progress indicators or use more general progress indicators instead of those that set incorrect expectations
- f. "Tabbing" through a form works as one would expect based on the visual layout

#### 20. Labels

- a. All labels are clear and concise (or use natural language for clarification)
- b. Labels use succinct, natural language and consistent capitalization
- c. There is a clear distinction between labels and data, especially when using labels within input fields
- d. All fields have meaningful and familiar titles or labels (using the users' language)
- e. Data entry fields are labeled consistently

## 21. Input fields

- a. The correct control is used for questions (e.g. radio buttons for mutually exclusive options)
- b. Field lengths provide meaningful affordances for effectively answering questions
- c. Otherwise, a consistent length is used providing enough room for correct answers
- d. Natural structure among input fields providing a valuable clue on how to answer a question is used to group these inputs visually when possible
- e. All answer formats are accepted for fields with clearly multiple correct formats (e.g. spaces in credit card numbers)
- f. Impossible actions are constrained by disabling or hiding the controls
- g. Any user-entered codes are not case sensitive
- h. Data can be entered in a form convenient for users, no need for tabbing (e.g. single fields for phone numbers) and there is enough room for info
- i. The requested data format for input fields is made explicit
- j. Data is always retained in case of e.g. input errors (no need to start over)

## 22. Required and optional fields

- a. Optional input fields are limited in count as much as possible
- b. If required fields are not indicated textually, a \* symbol and a legend is used

## 23. Default answers

a. Default values are provided where applicable (e.g. for radio buttons)

# 24. Form actions

a. Secondary actions in forms are avoided and otherwise made visually distinct and considerably less prominent compared to primary actions

- b. When there are multiple pages, primary actions move people closer to completion and secondary actions allow them to go back
- c. Terms of service agreements are combined with primary actions (no checkbox)

## 25. Help text

- a. Help texts are minimized
- b. Help text is used for explaining unfamiliar data requests, such as why certain questions are being asked, security and privacy concerns, recommended ways of providing answers, and indicating optional answers
- c. Help text is concise and visible and adjacent to the question being asked
- d. An inline system is used for help texts to avoid page-jumping and rollover problems
- e. If there is a lot of help content, a consistent help section is used instead
- f. Help text is always as specific as possible, also location-wise
- g. When asking for sensitive information, there is actionable help text that allows people to confirm that their information is safe

## 26. Errors and successes

- a. It is extremely clearly communicated when an error is blocking completing a form
- b. Actionable remedies are provided enabling people to solve errors easily
- c. Top-level error messages indicate an error has occurred and how it can be resolved
- d. If multiple errors exist, they are listed in the top-level message
- e. If any input fields are responsible for an error, they are clearly marked with a double visual emphasis
- f. Red text and warning icons are reserved for error messages
- g. Error messages are not expressed in codes
- h. Any errors are explained politely and completely

## 27. Inline validation and suggestions

a. Inline answer validation is only done after people have finished providing an answer, not during the process

#### **Elements**

### 28. Links

- a. Appearance
  - i. Links look like links
  - ii. It is obvious what is clickable
  - iii. Text is used for links (no image-only links)
  - iv. There are no visual elements that could be mistaken for, but are not links
  - v. Clickability cues are consistent
  - vi. If images are used in links, their clickable regions are clear

#### b. Text

- i. Text links are worded to reflect the users' goals
- ii. Any link cues (e.g. link labels, icons or tool-tips) presented to the user are selfexplanatory and give a clear indication of the target to which the link leads
- iii. Link names match with their destination pages

- iv. The target or purpose of a link is directly indicated by its label (there are no generic labels such as "go" or "click here")
- v. Textual link names are understandable but short enough to avoid wrapping

#### c. Other

- i. Links open in the same window
- ii. Adjacent links are visually distinct from each other (it is clear where the next one starts)
- iii. Text links are used for navigating, buttons are used for transactions that manipulate data
- iv. Navigation links are clearly distinct from controls

#### 29. Lists

- a. Elements are sorted to maximize user performance, important items are at the top
- b. Lists are formatted to ease scanning
- c. Related items are displayed in lists
- d. Each list is introduced (e.g. by a heading or introduction text)
- e. Numbered items start at one
- f. An appropriate list style is used
- g. First letters of first words in lists are capitalized

#### 30. Icons

- a. Icon designs allow users to easily recognize and understand them
- b. Icons are visually simple, informative, distinct, easy to perceive and represent concrete objects
- c. When possible and useful, text is used instead of icons

#### 31. Command buttons

- a. Button labels clearly state what they do, not what the user did
- b. Buttons are placed along the bottom of dialog boxes or up the right-hand side
- c. Buttons are large
- d. Buttons are not over-designed (so they cannot be mistaken for e.g. banners)

## 32. Radio buttons and checkboxes

- a. Radio buttons are used when the user needs to choose one option from a selection
- b. Check boxes are used when the user needs to choose more than one option from a selection
- c. When there is a radio button, there are always at least two

## 33. List boxes and drop-downs

- a. List boxes are used when there are a large number of options
- b. A drop-down list is only used when there is too limited space
- c. Default selections for list boxes are used when they align with the interests/goals of most people

## 34. Text boxes

- a. A text box is used if it is not possible to anticipate the user input and no standardized information is required
- b. Text box sizes indicate how much information is required
- c. Text boxes are scrollable if it is not possible to anticipate the quantity of user input

- d. Scrollable text boxes have enough visible lines to give sufficient context for the person entering the text
- e. If text cannot be changed in a particular context, the text box is grayed out

#### 35. Hover-reveal tools

- a. Overlays are not used to reveal additional tools, the Hover and Cover anti-pattern is avoided (i.e. the overlay hides important information)
- b. When overlays are revealed, all parts of the page remain stable
- c. Elements do not shift by a few pixels or start moving around when the mouse moves

## 36. Dialog overlays

- a. Dialog overlays are used instead of browser pop ups
- b. There are no unnecessary dialog overlays interrupting the user's flow
- c. No overlays are used when a simpler, in-page interaction would suffice
- d. No JavaScript alert boxes are used

## 37. Detail overlays

- a. Hover-activated detail overlays use a simple deactivation (e.g. a simple mouse out)
- b. Detail overlays have a symmetrical activation and deactivation (e.g. hover & unhover)
- c. There are no lengthy animations or effects that delay showing a detail overlay
- d. Hover is used when it is not obvious how to get more information
- e. Click is used to (de)activate the overlay if there are additional links inside it

## 38. Inlays

- a. Dialog inlays are used for secondary tools that are not primary to the main flow of the page
- b. Detail inlays are used to provide additional information in context without hiding other information (avoiding the anti-pattern Hover and Cover)

## 39. Static single-page process

- a. A multi-page process is used when the process is complex and the previous context (and the next) should be hidden, bringing the focus to a single task in the steps
- b. Visual treatments are used to make the number of steps seem fewer (e.g. by using the same color or section for two related steps)
- c. Clues are present as to where the user is and how much is left in a multi-step operation
- d. In a multi-step operation the first steps are the lightweight ones (as far as possible)

## 40. Progress indicators

- a. Progress indicators are used to improve perceived performance
- b. Progress indicators are simple

#### Checkout

#### 41. General

- a. During the checkout, customers are not threatened with legal actions or other fears
- b. Other customers' special discounts are hidden as much as possible (e.g. coupon fields)
- c. Shipping address is differentiated from billing address
- d. The privacy policy is clearly explained and easy to find

#### 42. Costs

a. Delivery costs are highlighted at the very beginning of the process

- b. The price is always clearly displayed next to any product
- c. Shipping charges are revealed before asking for personal information
- d. Shipping charges are provided exactly, not by means of formulas
- e. It is clearly shown if and when extra costs are being added to the order
- f. Full (or estimated) prices are displayed as early as possible

## 43. Progress

- a. A highly visible progress indicator is provided during checkout
- b. The steps of the process are shown, it is made clear enough that a user can not click on a later step in the process

## 44. Help

- a. Users are provided with sufficient help when an error is made
- b. There are explanatory links next to information customers are likely to have questions about

## 45. Registration and log in

- a. The same form is used for both logging in and registering
- b. Signing-up or signing in to order is not required, instead registration info is inferred, allowing the user to just enter a username and password to register (but optional)
- c. It is explained how to select a user name and password and why
- d. There are no secret questions and hints for password recovery
- e. When Marketing wants to collect customer demographics, there is a separate form for that information and customers are invited to complete that form after their purchase, ideally by offering them a reasonable incentive to do so
- f. The log in vs. register option problem is tackled sufficiently (e.g. by using two buttons, allowing users using the wrong form to switch easily or using a distinct unified form)

## 46. Data fields

- a. Newsletter sign-up is opt-in instead of opt-out, etc. remains turned off after any errors
- b. Forms are pre-filled when required information has been entered before
- c. Hitting the enter or return key by mistake is handled gracefully
- d. There are tools for forms (e.g. address books, zip/postal lookups, area code lookups)
- e. Multiple shipping addresses are not allowed for one order
- f. Shipping address is used as billing address by default
- g. All customer input is preserved despite errors in the form
- h. There is only a single 'Name' field
- i. The paste-function in the 'e-mail confirmation' field is disabled
- j. Labels are visible at all times
- k. Any new input fields are added below the trigger-field
- l. Only options are shown that are meaningful to the current customer and context
- m. The customer's credit card type is automatically detected and selected
- n. 'Expiration date' fields are formatted exactly as they appear on the credit card

## 47. Shopping cart

a. From the shopping cart it is easy to modify quantities, remove items, convert items to wish list, continue shopping and complete the checkout

- b. There is information about or links to the return policy and any guarantees
- c. Accessories are not added automatically, but they are offered as a suggestion
- d. There are shopping instructions in the empty shopping cart
- e. The shopping cart displays each clickable line item, all additional charges, and the total based on the cheapest shipping method
- f. Every time the user clicks any button or link in the shopping cart even if it is the help button the cart updates any changed quantities automatically

# 48. Order of steps

- a. The checkout starts at the shopping cart
- b. Then the customer chooses either gift options (if any) or the shipping method (if any)
- c. Then the customer enters the shipping address, then billing address
- d. After that the customer reviews the entire order and provides payment information
- e. Then the site displays a confirmation page and gives customers the option to register
- f. The checkout process is linear
- 49. The order summary shows all information about the transaction:
  - a. Items to be shipped, including gift messages and wrapping options
  - b. Total charge including price for each item, shipping, tax, and other additional costs
  - c. Shipping and billing addresses
  - d. Shipping method
  - e. State of the transaction (e.g. "The order is not placed until after you provide payment information on the next screen and press the Confirm Order button.")
  - f. Links to information the customer might want, such as privacy, security, customer service, returns, guarantees, and customer profile
  - g. Method for making changes to the order
- 50. The order confirmation page shows:
  - a. Items to be shipped, including gift messages and wrapping options
  - b. Total charge including price for each item, shipping, tax, and other additional costs
  - c. Shipping and billing addresses
  - d. Shipping method
  - e. State of the transaction (e.g. "The order is not placed until after you provide payment information on the next screen and press the Confirm Order button.")
  - f. Links to information the customer might want, such as privacy, security, customer service, returns, guarantees, and customer profile
  - g. Method for making changes to the order
  - h. A thank-you message
  - i. The order confirmation or reference number
  - j. The shipping method and estimated delivery date
  - k. Customer service contact information
  - l. A reminder to print or save the page for future reference
  - m. Which e-mail address the confirmation e-mail has been sent to
  - n. How to get back to the store and order more items without having to log in again

o. Site navigation links

#### 51. Page structure

- a. If users might have to scroll to see the action buttons or navigation in the shopping cart, those items are repeated so they are always visible
- b. There is less site navigation in the checkout than on other pages
- c. All criteria that need to be compared are shown

#### 52. Text

- a. Buttons are never labeled "apply"
- b. Clear and meaningful shipping names are used

## 53. Layout

- a. A primary button is used for the primary action
- b. There are no animated graphics
- c. Navigation is hidden during checkout
- d. Radio buttons are always placed in close proximity to one another

## 54. Navigation

- a. Users can force-proceed through potentially wrong validators
- b. The different process steps during checkout are clearly shown and are links
- c. The primary action / input is located above the fold
- d. Images are clickable
- e. The basket has a highly visible 'Proceed to checkout' button at the top and bottom
- f. The next-step button is prominent and visually distinct from the site navigation and other page elements
- g. Navigation buttons are clearly named, indicating where they will take you