Tablet application GUI usability checklist

– Creation of a user interface usability checklist for tablet applications.

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GUI-användbarhets-checklista för applikationer på surfplattor

– Användbarhetschecklista för utvärdering av surfplatts-applikationsgränsnitt.

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Abstract

Since the beginning of the 21st century, the world has seen a changing trend in computing power thanks to advancements in technology. One peculiar platform in the field of usability is the tablet. Due to its recent introduction, it has had a relatively short life span with few established methodologies. The tablet is gaining market share at a tremendous speed and thus there has been a big demand of the appropriate evaluation methods. This comprehensive study intention is to; through a literature survey and transformation of collected material identify what usability requisites there are when developing a user interface for a tablet application. Existing user interface guidelines from various companies involving the development of tablet software are examined and paired up with usability principles in the creation of the usability checklist. The usability checklist practical effectiveness is tested on various tablet applications and the results are compared to the results of a usability user test evaluation. Majority of the usability problems found by the user test evaluation are codiscovered, in addition, there were a greater number of undiscovered usability problems that was identified with the checklist evaluation.
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1
1 Introduction
1.1 Background

Since the breakthrough of the desktop computer, there has been a demand of portable solutions. One of the reactions to the demands was the laptop computer, which has gained popularity due to its nature of being a portable version of the desktop computer but with similar functionality. Although in the early days, laptops who shared functionality as the desktop computer would cost almost three times as much but since advances in research such as hard drives, processors, wireless fidelity networks and liquid crystal display (LCD) technology has made laptops affordable but yet able to deliver advanced mobile computing powers in the suitcase or the backpack. May 2005, for the first time in history, laptops outsold the desktop computer, which further demonstrates the changing trends in preferences of computing power (Sandoval, 2005).

Despite the popularity shift and the laptops praise of introduction to portable computing, its portability functions are still considered incomplete (Ozok et al. 2008). One particular characteristic and common complaint is that the user is still constrained to the use of “computer peripherals, such as keyboards and a pointing device (External mouse, touch pad etc.). The consequences of the required peripherals and a large battery to sustain the laptops energy use has given the laptop the characteristic of being a portable device with a hefty weight to itself. One earlier 21st century technology invention in order to combat bulky portable devices and overthrow these hindrances was the Tablet PC which was seen as a complete functional personal computer geared for pen and handwriting usage with a optional option to install a keyboard attachment (Ozok et al. 2008).

Thereafter the massive success of the laptop; the mobile computing format, such as laptops and mobile phones, has been reinvented thanks to further advances in mobile computing. Apples introduction of the original iPhone with a touch screen, the world, as we knew it five years ago has evolved and rapidly changed our view on mobile phones as new smartphone platforms emerges. These emerging software solutions in conjunction with new platforms and better processing power in hardware have culminated powerful portable computers and itself has given the regular user advanced computing power of pocket size. These are the smartphones. On account of better processing power and display technology, engineers and
user interface designers are able to produce software with graphical user interfaces with pixel-perfect graphics with fluid and appealing animations that acts as contemporaries to real world objects, thus our interaction with the virtual environment has become a metaphor of real interaction with real objects (Gaver, 2002). When this recreated virtual environment is supplemented with the option to control it with finger gestures allows the user to see beyond what once was a mere display. These recreations are often seen in the smartphone atmosphere as applications.

Since Apple introduced the original iPad, tablet ownership and reinvented the tablet device format, tablet ownership has rapidly grown and has allowed users to enjoy a new digital experience. Research show that tablet ownership amongst adults in the United States nearly doubled from 10 % to 19 % between December 2011 and January 2012 (PewInternet, 2012). As of August 2012, 25% of American adults own tablet computers. (PewInternet, 2012).

According to Forrester Research, Tablet sales are predicted to hit 375 million by 2016 and ownership five folded to 760 million globally and eventually cannibalize the laptop market (Frank Gillet, Forrester, 2012).

Despite its huge success and constant growth, its short existence since the introduction of the Tablet PC in 2001 and the original iPad in 2010 has given little space to related research. Thus, there is little other published research on tablet usage and usability at this time of conducting the research.

Given to the insufficient information about tablets, this research hope to provide a new and the first usability checklist for tablets when designing a graphical user interface design for a tablet application to ensure a user-friendly experience. This research utilizes various methods, such as content survey of Graphical User Interface (GUI) guidelines from various companies, transformation of content and observational methods that took place in December 2012 in Sweden, Stockholm.

1.2 Purpose & Research Question

(sv: Syfte & Frågeställning)

The purpose of this research paper is to find out what requisites there are when designing a user-friendly interface for tablet applications. The intention of the research is to create a checklist with the purpose of identifying usability issues of a graphical user interface so that developers can ensure a compelling user-friendly application to interact with. By conducting a content survey of existing guidelines of most important platforms that resembles a tablet.
These are guidelines from various companies involving in software development of regular desktop computers, smartphones and tablets. The collected material is transformed into set of rules and composed to a checklist which is later validated through expert opinions and user test evaluation in hope to answer the one following question:

- **What usability factors are most important when developing a tablet application GUI?**

In order to answer the study’s primary research question, three sub-questions was identified. These three sub-questions had to be fulfilled with proper methods for each question.

1. Content survey: *What makes a tablet user interface?*
2. Transformation: *How can the existing material be converted to a checklist?*
3. Implementation & Validation: *Finally, does the checklist work and can it be improved?*

### 1.1.3 Limitations

For this study only tablet applications are examined since the studies focal point is usability of tablet applications and not web design interfaces, nor smartphone applications. The guidelines provided by manufactures are likely differentiated from each other with different rules on e.g. button layout and look-and-feel. This checklist aims and benefits more from focusing on the specific user Interface functions and components and how they correlate with each other in order to commit tasks rather than solely just focusing on the appearance built by user interface components.

For this research, two tablets with different operating systems was chosen; Android and iOS. The chosen tablets were Nexus 7 and iPad 2. The apps to be examined are the TED for android¹, eBay for iPad and USA Today for iPad. The application selection is further explained in 4.5 *Applications.*

### 1.2 Definition of Terms

The past few years, there has been a massive growth in sales and ownership globally of touch-capacitive devices with larger screens that those of older mobile phones. The new tablet format has introduced the world a new way to media consumption and the adaptation rates of these devices are continuously growing. This part of the paper presents important terms that are related to this research focal point.

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¹ TED For Android is an application to the contents of [http://ted.com/](http://ted.com/)
1.2.1 Multi-Touch Devices

A common trait amongst tablets and smartphones is the multi touch technology that is present in every modern device with a touch-screen. Multi-touch allows the system to simultaneously detect a minimum of three touch points. Due to this technology, touch experience has improved dramatically. It is now considered amongst experts to become a widely used input method in interfaces thanks to its speed and efficiency, as well its immersive experience. Devices capable of multi-touch are for example: Apple’s iPad, HP’s Touchpad, Microsoft Surface and Apple’s iPhone.

1.2.2 Tablet computer

A tablet computer is often seen as a portable version of a personal computer and a companion to the smartphone in the sense that at most times they share operating system and input method, thus there is also a consent amongst many that a tablet is a synergy of the latter and the former, mostly because of how it is identified as a device that does same tasks as their personal computers and mobile phones. A tablet’s primary user input method is operated through its touchscreen, which creates an environment where the users fingers are given the same function as mouse cursors. This new input method removed the need of using physical accessories, such as keyboards or a mouse. Tablet computers operate various operating systems and are manufactured and sold in various sizes, still the smallest tablets are much larger than smartphones and Personal Digital Assistants (PDAs). Tablets also possess the functionality to wirelessly connect computer accessories, such as keyboards, web cameras etc.

A tablet can come in various formats, some as convertible notebooks with a retractable keyboard, like the ASUS Transformer Slide. When the keyboard is hidden, only the touch screen is exposed. Some tablets come with a detachable keyboard so it can operate as both a tablet and a laptop without losing weight to functionality e.g. ASUS Transformer. There are also booklet-like tablets with two touchscreens foldable like a laptop and one of the touchscreens can be used to display additional content or a virtual keyboard.

1.2.3 Graphical User Interface (GUI)

Graphical User Interfaces, also abbreviated as GUI are one of the most important components in modern computer software. In its essence, Graphical User Interfaces are hierarchal because of its function of grouping events in graphical visual components such as windows, menus etc. These visuals from the Graphical User Interface makes software easy to use than its
earlier counterpart, the text based interface, which appeared in the earlier days of computers, such as the DOS system.

The characteristics of a graphical user interface are its graphical orientation and its hierarchical structure of graphical components. According to Soffa, Memon, & Pollack, (2001) a GUI is defined as:

*Hierarchical, graphical front-end to a software that accepts as input user-generated and system-generated events from a fixed set of events and produces deterministic graphical output. A GUI contains graphical objects and each object has a fixed set of properties. At any time during the execution of the GUI, these properties have discrete values, the set of which constitutes the state of the GUI” (p. 257)*

Widgets are graphical objects and one widget is one single graphical component such as icons, progress bar or menus. Together, multiple widgets form what we call a Graphical User Interface for applications.

**1.2.4 Application Software**

Application software or just application, often abbreviated as app, is a form of computer software, which the user operates to execute tasks. Such applications include media players, IM clients etc. Unlike operating systems, applications are a computer program that is either bundled with an operating system or is separately installed. Recently, the term “app” has seen an exclusive usage amongst applications for mobile devices, like smartphones or tablets. Examples of mobile applications are: Spotify for iOS, YouTube for iOS etc.

**2 Related Work**

Although there is very little published work about tablet usage and usability in tablet interfaces but considering the substantial and massive success of the smartphone, there is a extensive amount of related research how consumers interact with smartphones and usability, as well the longer history of the personal computer has provided a large research resources in the field of desktop computing and HCI.

Amidst all mobile phone UI and computer developers, there is a consistency that usability is a crucial attribute in software systems (Jokela et al. 2003). Different and many usability evaluation methods are created to improve usability of interactive systems to ensure optimal
user satisfaction. The development of an interactive system is usually conducted through iterative processes that involve design, evaluation and redesign (Kies et al. 1998). This method is explained later in the theory part of this paper. User evaluation methods are often employed during the design phase of a prototype. These UEMs are seen as effective and efficient methods to predict potential usability problems to be corrected in the redesign of a prototype (Scholtz, 2004).

![Iterative Design Process (Kies, Williges and Rosson 1998)](image)

As of right now, there is yet no consensus whether usability of mobile devices should be evaluated with heuristic evaluations or user testing (UT) since both methods has their own assets (Ji, Park, Lee, & Yun, 2006).

The iPad and Tablet Computers are often identified as a device that fulfills the functionality of both personal computers and mobile phones (Flew, 2010). Microsoft officially announced Windows 8 at CES 2011 and soon started to air commercials that involved their new highly anticipated operating system operating on personal computers and tablets from various manufacturers, such as Sony, Acer and Lenovo. This new sporting iteration of windows and marketing strategy of Microsoft is clearly highlighting their entry into the tablet market and thus further proving that tablets are a force to be reckoned with (AllthingsDigital, 2012). From this perspective, this study method aims to examine current rules and guidelines from various PC, smartphone and tablet manufacturers or/and software companies to transform the
collected material into a comprehensive checklist to determine potential UI issues affecting user dissatisfaction.

2.1 OS UI/UX Guidelines

Due to the nature of competition, each company that respectively develops operating systems has their own style and rules how their operating system should operate and its feel-and-look feeling. As a result, companies responsible for these operating systems have developed and published user interface guidelines according to their own terms. The purposes of these guidelines are to encourage developers with their applications to follow the same design patterns as the platform they are being run on. This is to make sure the application stays coherent with the operating systems visual aesthetics and other applications to provide the user a consistent look and satisfying user experience. The differentiating factor of these companies is to provide the user unique user expectation to each platform. Amongst these companies, Apple is the one with most exposure to the tablet market with their iPad tablets. Apple currently redirects developers to their iOS Human interface guidelines, Google redirects developers to Android Design Principles, RIM directs them to the playbook OS guidelines. Below is a short summary of the guidelines belonging to the more accepted and leading platforms.

**iOS Human Interface Guidelines:** These guidelines were created by Apple to describe principles and common usage of UI elements to assist developers in designing a user interface and ensure a satisfying user experience for their applications on their iOS platform. iPad is currently used by millions of consumers but also by business users as well used in the classroom. It is the bestselling and has the most users globally with hundreds of thousands of applications

**Design Guidance for Windows Store apps:** Microsoft created a new set of guidelines for their new operating system: Windows 8, which differs from its predecessor windows 7 by quite a margin. Windows 8 heavily emphasizes touch interaction by introducing touch friendly tiles instead of smaller icons that are mostly accessible through a mouse cursor. The windows 8 guidelines highlights Microsoft shift of focus to touch screens and tablet user experiences. The windows 8 guidelines were created for accessible touch user interfaces that resembles it Windows Phone smartphone operating system.

**Windows Application UI Development (Windows 7):** Although this research uses its successors guidelines Windows 8, both of them still differ significantly. While Windows 8
focuses on tablet friendly interfaces, windows 7 still highlights the core of the still modern
desktop computers.

**BlackBerry PlayBook tablets UI Guidelines:** Research In Motion (RIM) created their own
set of guidelines for their own tablet known as the PlayBook. Unlike other guidelines where
tablets and smartphones share guidelines, RIM created specific guidelines for applications to
be developed for one specific tablet.

**Android Design Principles:** Google created Android Design Principles. Android currently
has a smartphone market share of 75% with millions of activations per day. As of October
2012, Android tablet is responsible for 41% of tablets shipped worldwide.

The given guidelines are relevant to the selection of method in this study.

**3 Theory**
In this theoretical chapter; the chosen methods and theories that are important to this research
purpose and proposed checklist are mentioned and described. I aim to explain the differences
of interaction design, user experience and usability.

**3.1 Interaction Design**
Interaction design, also abbreviated, as iDX is the profession when one is designing an
interactive product, service systems or environment. The phenomena “interaction” that occurs
when the user interacts with a product is what the discipline interaction design attends to
inspect and shape. Like many designs, interaction design also affects human behavior but
with a slight convolution, due to the ubiquity of many software systems, such as cars, phones
and computers, using them is exhibiting complex behaviors which gave birth to the discipline
as we know it today, interaction design. (Cooper, 2007). This study is in principle based on
interaction design as it intends to improve the interaction design for tablet application user
interfaces by its proposed usability checklist. As mentioned in *Alan Cooper's Book Face 3
Essentials in interaction design*, humanistic enterprises is to a great extent dependent on
interaction design as it is very important to satisfy the needs and desires when a users are
interacting with ones’ product or service.

**3.1.1 User Experience**
User experience, abbreviated as UX, is a widely used term to describe the aspects of a user’s
experience when interacting with a software system that includes various variables such as an
interface, graphics and physical interaction etc. The term User Experience has seen an increasing use in the past 15 years. In most cases, user experience is dependent and changes according to usability with the reason that UX focuses on the general feeling and aspects of a product, as the users understand it. How the user understands a product is determined by the products presentation and usability. Nowadays, today’s industry has shifted to a new paradigm where user experience is becoming more recognized amongst developers and companies because of its importance in delivering a popular selling product. Various researches by scientists have additionally contributed to the importance of User experience such contributions from Donald A. Norman and Noam Tractinsky.

User Experience is often used as an umbrella where beneath, many various designs and usability principles join together to create products.

3.1.2 Usability

Usability is an attribute to determine the ease of use of human-made products such as application software, websites, or tools. Today, usability is if a fundamental attribute to judge quality of software systems (Hartson, Andre, & Williges, 2001).

According to Nielsen, Usability is:

“A quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process.”

And according to the international standard of usability, ISO 9241-11 (1998):

“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.”

Short summarized, Usability is an important attribute that assists the developers in the design process to develop a software with a compelling user interface that is easy to use and thus allowing for users to achieve specifics task oriented goals with effectiveness, efficiency and satisfaction.

Due to the competitive nature of companies trying to sell their products, there is a rapid change constantly in mobile technology and thus the development stage of a mobile phone is not quite at the same phase with consumer appliances. Consequently, there has been a demand
amongst companies and developers to develop more approaches on how to design software or evaluate software that require less time and effort. (Kallio & Kekalainen, 2004). One of the outcomes is the well-established heuristic evaluation technique originally proposed by Nielsen (1994) which was at the time and still, a cost-effective usability evaluation technique. The heuristic evaluation technique is a method for a selected experts that formally inspect an interface design with a set of predetermined rules (Nielsen, 1994). A heuristic evaluations primary advantage is its speed and affordability (Jeffries & Desurvire 1992).

In its core, usability testings’ intention is to measure how well and fast users can achieve specific standardized tasks and what problems they may encounter during the usage. To conduct a usability test, the products design requires being relatively complete and coherent. It may be a final version of software, clickable prototype or even a low-fi prototype; all that matters is that the usability testing can validate the products usability. With this in mind, usability testing is often conducted in later stages of the design phase when there is a consistent design concept in the development. (Cooper, 2007).

According to Alan Coopers book Face 3, the essentials of interaction design (2007). Usability testing is most effective at determining the following five attributes:

**Naming** – Are buttons or section labels understandable? Could there be alternative words than others that might make labeling more understandable?

**Organization** – Is information categorized into meaningful groups? Is content properly placed in places where users might expect them to be in?

**First-time use and discoverability** – Is it easy for new users to find common items without much effort? Are there clear instructions and are they necessary?

**Effectiveness** – Is it easy & fast to complete specific tasks? Are there mistakes? Where & when? How often?

Also, usability testing is usually done on assessing the usability only the first time it is being tested. It is often difficult to measure the usability after it’s been used fifty times already. In addition, it is also important to know what you are conducting the usability test on if it’s measureable or not. (Cooper, 2007).

The attribute Usability and existing usability principles is essential to this papers study goal to propose a usability checklist for tablet applications.
3.1.3 Iterative Design and Evaluation

Typically, Interactive systems are designed through iterative processes involving design, evaluation, and redesign as earlier mentioned. According to Kies, Williges, and Rosson (1998), the design process of a product can be split into three larger divisions: Initial Design, Prototype Design and Final Design.

Initial Design

In this facet, the final design specifications are created through iterations of goals and guidelines. This leads to the next phase of the design process: Prototype design.

Prototype Design

At the prototype design phase you can create the final design by conducting a formative evaluation of the prototype interface. The formative evaluation inspects so usability problems can be found and corrected before the final stage can come into place (final design).

Final Design

Finally, in the final design stage an operational interface is created and a summative evaluation done to validate the efficacy of the final design.

3.1.3.1 End-User review and Judgment

Ultimately in the end, usability is not verified by experts but the end-users, who are not expert evaluators. The user can only establish the severity and realness of problems. As a result, new criteria to UEMs have been endorsed to amplify the realness of usability problems. (Hartson, Andre, & Williges, 2001).

3.1.3.2 Severity Rating

The endeavor to determine the realness of a usability problem can be seen as an approach to identify what are trivial usability problems and what are actually important ones in Usability evaluation method studies. Despite its importance, it is unfortunately not sufficient enough, since a usability problem that is seen to yield high realness still only may just impact slight and little on user satisfaction or it have stopping impact on performance. As a result, there has been a need of a method to distinguish degrees of impacts; this concept of realness is called Severity levels. In other words, severity levels has become a measurement tool to evaluate the severity of a usability problem and thus assists in deciding which usability problems are the most important ones. High levels of severity are more important to find and also yields higher priority to be fixed than lower levels. From this perspective, UEMs that catches a high
percentage of high severity problems is likely to be more efficient than UEMs that find an amount of usability problems with low severity ratings. (Hartson, Andre, & Williges, 2001)

3.1.3.3 QUIS
The Questionnaire for User interaction Satisfaction (QUIS) was developed by Chin, Diehl, & Norman in 1998 in UMPC. QUIS is usability tool created to evaluate a user’s subjective satisfaction when one is interacting with a computer interface. The QUIS finishing intention is to thoroughly measure and describe the overall satisfaction of specific interface factors such as screen, learning and terminology factors. The factors that confide in the interface and the satisfaction are rated on a 9-point scale. (Chin, Diehl, & Norman, 1988).

3.2 Usability Principles
Usability principles are existing rules of thumbs that have been developed to assist in the development phase of a product and to validate its usability.

Ji, Park, lee & Yun (2006) examined existing usability principles and selected those who fulfilled the following three criteria.

1. **Selection:** Is there a practical impact on performance?
2. **Integration:** Is there any redundancy or similarity relevant to other principles?
3. **Deletion:** Are users’ subjective feelings included (or have the mobile phone UI considerations been considered?)

The result was a list of usability principles collected by Ji, Park, Lee, & Yun (2006) by examining current existing usability principles through a screening process by a panel of experts. The selected principles were used as a data input in a Principal component analysis (PCA) with Varimax rotation.

As a result, five groups were created to classify each usability principle:

1. **Cognition Support** relates to cognitive aspects of user.
2. **Information Support** relates to characteristics of mobile phone display and information.
3. **Interaction Support** relates to the interaction between user and mobile phone.
4. **Performance Support** relates to performance of the intended task of the user/mobile phone system.
5. **User Support** relates to the degree of intervention of user.
The selected usability principles by Ji, Park, Lee, & Yun (2006) will be used in this paper's method as explained in 7.3 Workshop.

The complete list of usability principles can be seen in the attachment section 12.3.

4 Method

This chapter explains the procedure of creation and validation of the checklist for tablet user interfaces of this study. Here the chosen methods, applications, test-subject selection and validation will be explained in detail.

For this study, I chose to focus on a quantitative content survey in order to identify key-factors, quality transformation with the purpose of creating a checklist and a quality empirical study to validate the checklist.

The studies intention was to determine what user interface functions or components are common in a tablet user interface and a checklist to evaluate the usability of a tablet applications user interface was proposed. In other words, the study was focusing on transforming current available existing literature into a set of questions to assure the usability of a tablet user interface. It is important to take into account that a tablet is often seen as a hybrid of a desktop computer/laptop and a smartphone. It yields the basic interaction principles of a smartphone such as touch input and share similar operating systems but also carries the screen size of a laptop screen as well connectivity options such as keyboards etc., with this in mind, it is thus important to conduct a content survey on available guidelines for both platforms in order to collect the best material from both sides.

The method chosen was deemed most suitable was the content survey and observational methods.

The content survey was conducted with the motive to collect as much material and data as possible (Content survey) and then later through a screening process be carefully selected and deleted to further define words into refined data to be transformed to set of rules (Transformation).

The observations were a structured observation where I accompany the participants. My involvement and participation of the observation was of the reason that the test-subjects had to conduct specific tasks with written instructions. If instructions are found too confusing for
any user, they were allowed to ask questions to me to clear any possible misunderstanding to avoid any redundant actions that might skew the results.

The studies procedure can be broken down to the three following stages: (a) content survey, (b) transformation and (c) Validation.

Firstly, (a) content survey; existing materials (Guidelines) will be collected from various companies responsible for various operating systems. These guidelines are analyzed to identify keywords and key-meanings (Key-factors) that appear during the content survey and experts believe are essential and common in user interfaces and satisfactory experience. The key-factors are classified and will act as the basis, the core and raw material to be further defined and transformed.

Secondly, (b) transformation, collected materials (Key-factors.) are analyzed and arranged to select and delete key-factors to further refine the classification and basis. The basis will then be paired with usability principles from an external source in order to create an initial checklist.

Finally, (c) validation, the checklist practical effectiveness is tested by comparing the usability issues discovered against the usability issues appearing during the user evaluation testing. A Questionnaire (QUIS) is handed out after the user testing evaluation to measure satisfaction ratings.

4.1 Workshop

A workshop was organized to conduct the first development phases of this study: (a) content evaluation of the collected guidelines and (b) transformation of the collected material. The workshop lasted for six hours. Participants were experts in their respective own field and have worked with numerous big brands in developing applications and user interfaces for tablet and mobile applications and websites. The workshop was conducted in Sweden, Stockholm December 12th. The team consisted of two experts in the field of interaction design and two experts in graphical user interface design and lastly, me. The ideal of the workshop is to assemble a panel of experts to (a) examine and analyze the collected material and later (b) creating a consensus of an initial checklist through the transformation phase.

4.2 Study Subjects and experts

Participants to the user test evaluation that was selected, 1 female and 3 males, average age 22 years old, were owners and frequent users of both tablet and a smartphone device with a touch
enabled screen with minimum of WVGA resolution (800 x 480). In addition, only participants having prior experience with both iOS and android devices for one year or longer with no prior experience with the applications to be used in the study was recruited. At the beginning of each user test session, they were handed out a consent form with a description of the research purpose and procedures.

The selection of all experts that attended the panel and workshop to examine keywords and key-meanings, had prior professional experience within interaction design or user interface design and came from the same company that specializes in the field of mobile advertisement and development.

4.3 Content Evaluation

To elicit common UI components and functions related to a tablet user interface, various guidelines from various companies that develops their own tablet operating systems and-or manufactures tablets was collected. The selected guidelines to be evaluated in the upcoming workshop were selected by me. To be selected the guidelines should encompass following two criteria: (a) are they from a credible source? And (b) must currently hold a relatively sufficient market share in the tablet, smartphone or desktop/laptop market to act competitive. The guidelines to be examined are ones aforementioned in the related work section. For example: RIMs playbook tablet currently accounts approximately 20% of the tablet market in their home country, Canada (SRG, 2012) and 3.3% of the global market share of tablet ownership (The Globe and Mail, 2012)

The aforementioned workshop first task was analyzing the collected guidelines. One copy of each guideline was distributed to every attendant in the panel and they were given a small short summative brief of every guideline and survey instructions to read carefully and take notes of keywords and key-meanings that they believe are essential to a user interface and usability for tablet applications and will be together referred as key-factors in this study. The collected material was further defined through a consensus amongst the panel members by pairing up key-factors that deemed similar and removing ones that deemed not essential. Key-factors were classified and grouped through a analysis to determine each factors relationship to each other. Key-factors were compared one by one and groups that indicated the key-factors representative characteristic were created to categorize the key-factors. For example; In a user interface, graphical interactive objects such as button of different functions may be reoccurring and commonly mentioned in guidelines, these interactive buttons would be
categorized in a group that represents UI interactive components with a specific function; UI Components and Actions.

4.4 Transformation of checklist

The user interface key-factors that were elicited consist of components and elements such as back button and scroll indicator. Aside from typical interactive objects in a user interface, common reappearing thumb rules identified during the survey also were included in the list of elicited key-factors. These key-factors, such as interactive components and thumb rules were further defined during in the screening process by arranging them with the 21 usability principles of Ji, Park, Lee, & Yun (2006). For the complete list of the 21 usability principles, please see the attachment section. When a key-factor (UI component in table 1) was paired with a usability principle, the panel of experts discussed to determine if the usability principle affects and is related to the current key-factor. As a result of the screening process, every key-factor was accompanied by usability principles and rules could be defined by analyzing the correlation of the key-factor and usability principle. These rules were later to become the proposed checklist. See table 1 for an example of the pairing methods of UI components with Usability Principles.

<table>
<thead>
<tr>
<th>Table 1. Pairing of Usability Principles with UI components/functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usability Principles (Classifications)</strong></td>
</tr>
<tr>
<td><strong>Components</strong></td>
</tr>
<tr>
<td>UI component 1</td>
</tr>
<tr>
<td>UI component 2</td>
</tr>
<tr>
<td>UI component 3</td>
</tr>
</tbody>
</table>

4.4.1 The proposed checklist

The proposed checklist was intended to be structured in a hierarchal order so it was categorized into multiple sections with each section representative of the key-factors characteristics. Each key-factor is mentioned and with its own set of rules and every rule is accompanied by a 10-point rating scale (0-9) to determine the severity rating to include
realness and importance of usability problems. Below are an extract of the proposed checklist with a key-factor (activity) and two rules accompanied by each own severity scale. The transformation of each key-factor is described later in this paper in the result section.

**Activity**

- Is the activity UI component visible and recognizable? 0-1-2-3-4-5-6-7-8-9
- Is the activity UI component properly displaying signs of loading/activity in the background? 0-1-2-3-4-5-6-7-8-9

### 4.5 Validation

In this final stage, the proposed checklist was implemented in a testing scenario to measure its practical effectiveness by comparing the results of the usability checklist implementation against user test evaluation with task based scenarios in a controlled test environment. The validation stage was not conducted in the aforementioned workshop. In this section, the procedures on how the checklist is validated is explained. The chosen applications to be used, evaluation of the applications using the usability checklist and user testing, and finally, the validity through a comparison study.

#### 4.5.1 Applications

The applications chosen for this study went through a screening process in order meet a certain amount of credibility. During the screening process, three factors determined whether a application was deemed suitable for this study, the three factors were; popularity, provider and the amount of UI complexity. The final three applications were chosen for the reason that they are popular in the field they represent, their provider is reliable and revered in their fields and their application yields plenty of functionality to include many common user interface elements. For testing purposes, only applications that test subjective had no prior experience with was chosen in order to minimize skewed and biased result. Three applications were chosen, one for Android and two for iOS. Applications were tested on a Nexus 7 device and iPad 2. All chosen applications were tablet optimized and not a scaled up version of its smartphone equivalent.
4.5.2 Application TED for Android

TED (Technology, Entertainment and Design) is a conference that addresses various amounts of research topics in science and culture.

TEDs application for Android Tablet follows the android guidelines closely and has plenty of UI Components to be examined and tested and it is also dependent on gestural navigation and menu navigation.

4.5.3 Application USA Today for iPad

USA Today iOS iPad Application
USA Today is a daily newspaper distributed in America. Like many more newspaper, they have an iPad-optimized application, which will be used to observe when users interact with it and examined with the proposed checklist. USA Today for iPad was chosen because it has been used previously in other similar fields of usability research. According to Nielsen, Budiu (2011) previous iterations of USA Today application had low usability. As of today, USA Today has taken into account of the third party help and further improved the usability of their application.

### 4.5.4 Application Ebay for iPad

![Ebay iOS iPad application](image)

Ebay Inc. is a consumer-to-consumer online auction and shopping website with millions of users. Their iPad version of iOS will be used to test the practical effectiveness of the usability checklist and results of UTs. Hundreds of thousands of users rely every day on eBay as a reliable and cheap resource Internet outlet of products. The application can be used to manage and purchase content. Just like real physical stores; proper directions, labeling and friendly staff is crucial to a successful business. Websites and applications follows same principles; **good usability** which is is very important to ensure that users participating in auctions or shopping on eBay don’t get misdirected and experience an error free shopping so they can leave satisfied and potentially become a returning customer.

### 4.5.2 Checklist evaluation

To identify usability issues, every set of rules in the checklist sequentially one by one evaluated the aforementioned three applications user interfaces. The user interface components were compared to the equivalent rule in the checklist. For example, if we were
testing the set of rules concerning the back function or component in the user interface, we’d look for the back function in the current application, whether it is a button or gesture and determine its severity rating. High severity rating would indicate high usability problem and low rating indicate high usability. A severity rating of minimum 5 was required to be classified as a usability problem. As user interfaces belonging to the applications are evaluated, a small team of three user interface designers, including me, discuss and come into consensus whether something possess a usability issue or not in the UI. Identified usability issues are noted and archived to be used in the comparison against the user test evaluation.

4.5.3 User test evaluation

For the user testing evaluation method, four test subjects were chosen and with at least one year of experience with a mobile computer capable of finger gestures on a touch sensitive screen. Qualifying devices are: modern smartphones or tablets. The test was conducted in a controlled environment to document their usage with the chosen applications.

Before the test was conducted, they were given brief information regarding the applications provider, purpose and a set of predetermined instructions that were tailored for each application. The reason why they were given a brief description of the application and the provider is so that the participants become more acquainted with the application and the test situation. The applications were tested in a random order and every task was executed one by one while the cameras were recording the screen from various perspectives. After each test of the applications, they were given the QUIS questionnaire that lets them rate their experience and satisfactory levels on a 10-point scale. In addition to the questionnaire, they were also given a short interview based on their testing and performance if it felt needed.

4.5.4 Comparison of results

To validate the practical effectiveness of the checklist, the amount of usability problems spotted by both the checklist and the UT evaluation are compared to see which one of the two evaluation techniques fared better. The severity ratings of the checklist and satisfaction questionnaire were averaged.

When new usability problems appear during the user test evaluation, they are noted and the proposed checklist is adjusted to add new usability problems if seen fit. Following the adjustments, the checklist is examined once again examined for any final thoughts before it is accepted as a final design and the study is considered as finished.
4.6 Method critique

The purpose of the guidelines are to allow developers to design applications that delivers a consistent experience on the platform they are being run on, thus some UI components or functions might be more identifiable to one than others. Naturally, this will end up in a more skewed and biased result even if the test subjects don’t have any prior experience to the specific application they are testing. To prevent this phenomenon, test subjects recruited had to have prior experience in both Android and iOS.

During the UT evaluation, there is a risk of the equipment and the feeling of being observed might disrupt and interfere with the users when they are trying to execute a task. They might get confused and lost, in turn might cause the user to lose confidence in themselves and their interests might decline and thus affecting the results of the UT evaluation. In order to minimize the risks and damages, whenever a user would feel confused, he or she is asked to say so and the user evaluation session will be modified so they can be more comfortable. The method of user evaluation was conducted in a controlled environment with the options of being more flexible and adaptable to a user’s need. The only exempt would be to avoid giving hints and instructions on how to execute a task, as that would induce a very clear biased result.

There are numerous ways of identifying usability issues and in this study case; evidently there are possibly an unknown amount of usability issues that may not have been discovered by the user evaluation and the checklist. Consequently, the proposed checklist at the condition during the study might not be able to identify all usability issues. Reiterations of the checklist would have to be done and future research, including additional workshops may be required to explore the full potential of the usability checklist.

Other factor that yields an important role in the creation of the usability checklist is the application selection. Applications come in various different formats with different functions. Some are aesthetically pleasing but simple, functional but aesthetically complex and others might be very simple and reliant on gestural UI functions. There are so many ways a application user interface can be designed and operated as. For the usability checklist to be as accurate as possible, a bigger but more time consuming study including many various types of application would have to be conducted. This studies main focus were applications that yield many typical user interface components with typical functions; thus the proposed checklist might be more adaptable and useful for such applications.
5 Result & Analysis
This section of this paper is to present the results of the three development stages: content survey, transformation and validation. To grasp a better understanding of the research question at issue: “What requisites are there when designing a tablet application GUI?” The results of the content survey was transformed and combined with previously unknown usability problems occurred in the UT evaluation.

5.1 Content Survey
From the content survey of the guidelines from various companies, the workshop resulted in 187 key-factors that were of interest; these key-factors were the first result to be gone through the screening process. Thereafter the screening process through comparison and pairing of each key-factors, 110 key-factors remained with unique characteristic. Key-factors were grouped in groups that relates to their characteristics.

Since guidelines present its own set of rules on how a user interface should behave and look like, elements in a user interface like a back button might differ depending on the platform (Smith, Mosier, 1986). As a result, the group UI Components & Actions was created. The intention of this classification is that UI components perform specific actions when interacted with. For example: the back button is accompanied by the back function and the volume slider is accompanied by the increase and decrease volume function. The functions might be the same but the user interface element depending on the platform or application might be different from each other.

The final three groups were: UI Actions & Components, UI Input and UI Characteristics. These three groups will be the basis of the usability checklist. The resulting final key-factors and grouping results can be seen in table 2.

UI components & Actions: This group represents interactive UI elements such as buttons, sliders etc. and the accompanying function belonging to the UI element.

UI Input: This group holds the key-factors that were related to how a user may approach and interact with a user interface such as touch-input, physical buttons and touch gestures. All manufacturers suggested designing an application with the option to navigate with a keyboard and a mouse, although should be a secondary option to emphasize the use of the growing touch-screen technology.
**UI Characteristics:** This group intends to contain interesting and common rules on user-friendly characteristics of a user interface identified in during the content survey of the guidelines. Examples are: Precision-targeting and readable.

**Table 2. Key-factors – Grouping and classification**

<table>
<thead>
<tr>
<th>UI Actions &amp; components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command, filter, toggle, select multiple choices, page indicators, progress, browse, drop-down, menu navigation, delete, refresh, access more information, title, edit, popups, text-area, activity, search, disclosure, bookmarking.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UI Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press-and-hold, turn-to-rotate, tap-to-action, pinch-to-zoom, Keyboard-input, mouse-input, swipe-to-reveal, swipe-to-navigate, swiping, visual feedback.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UI Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision-targeting, readable, space for translations, clear and concise labels, additional options only when necessary, pixel-margin, visual cues, screen-advantage, Thumbs, right hand, avoid splash-screen, avoid wordiness, consistent, subtle controls, search, avoid all-capital words, avoid defining new gestures, save only when necessary, Be-prepared to stop, split-view, flat-structure.</td>
</tr>
</tbody>
</table>

**5.2 UI Characteristics**

Although views on user friendly characteristics seen by these companies vary a bit, they share more thoughts and practices on user friendly interfaces in common. Such as Microsoft guidelines for Windows 8 and RIMs guidelines for their playbook. Both companies mention the practice of positioning elements accessible for the hands and more importantly thumbs. Since tablets are in general too big for one hand usage and naturally, users has to rely on using both hands, in most cases leaving their right and left hand thumbs as their only tool to navigate. Microsoft heavily emphasizes the use of *right hand usage* as the majority of the
people are right handed and it is thus more natural to navigate a user interface if major UI components are accessible in a friendly manner to the user's right thumb.

A common practice that appeared in all guidelines was the practice of elevating content, in other words, only display subtle controls to make the UI more lightweight. For example, when a user wants to navigate through a gallery application, a more preferred look and a trending usability feature is to take advantage of the screen size to display the whole picture without any obtrusive controls that might decrease the aesthetics of a picture. So display options only when necessary.

In addition, a recurring practice amongst the companies is to describe interactive components with clear and concise labels. Rather than to describe a tab with ‘E-mail’, use Email. Guidelines encourage the developer to minimize the amount of characters in text areas or buttons as too much wordiness or too many characters discourages reading and might induce a usability problem in readability.

Although splash-screens are fancy but in some cases they are not a necessity. Only include splash-screens if an application needs loading time but in other cases, it only delays the launch of an application and thus affecting the effective time it takes to complete a task.

When a user interacts with a computer with its primary input method as touch-input, precision-targeting becomes very important. Unlike styluses and mouse cursors, the average human finger is bigger and requires a bigger target. Previously, in the earlier days of the touch-screen, precision-targeting only became a problem if the touchscreens hardware had a lower resolution and thus lower dpi as each pixel indicated a touchable area. (Sears & Shneiderman, 1989). Today’s modern touch screen has a bigger screen but as well a significant bigger resolution and thus a higher DPI value. Modern computers today yield a high DPI and it has no longer become a concern. What is more important is just to make the interactive area big enough for the average human finger to touch, as well the distance between interactive objects to prevent accidental actions with an adequate amount of pixel margin.

And most importantly, the importance of keeping a user interface consistent with the platform it is being run on, which is the core of a guideline. To allow for the most effective use and accomplish tasks within a fast respectable time, a user should be acquainted with it at first glance by introducing common UI components that reappears in many other applications. If
the user interface is introducing new UI components, it is important to give hints such as visual cues on how stuff may work.

5.3 Transformation

The two groups UI Actions & Components and UI Inputs were paired up with the 21 usability principles to create sets of rules.

The focus group of the workshop decided not to include the group UI Characteristic into the pairing method with the 21 usability principles. Main reason being because the groups’ key-factors was independent enough to be self-describing rules. In the end the UI characteristic group was transformed into set of rules for the usability checklist without the need of the usability principles.

Analyzing the back function with the usability principles we could suggest the following rules: The Back function must be consistent throughout the user interface to give the user the option to go back one stage whenever she or he feels need for it. The function to Back must be visible and simple to understand so it can be recognized as a back function. When it is initiated, there should be indication when the application is transitioning a stage back and it should be fast and effortless. If the back function is accidently used, there should be a possibility to recover in order to return to ones’ previous stage.

The component Refresh was paired up with the usability principle Recognition and Visibility, which are described as; Recognition: The user interface must be easy for users to recognize the status of systems or the use of tablet and visibility: The user interface should always keep users informed about what is going on, through appropriate feedback within reasonable time. This suggests that the refresh function component should be visible to the user and yield an adequate amount of visibility in order for the users to recognize the function as refresh.

See table 3 for an extract of the complete pairing of the key-factors with each of the five usability groups as described in the theory section.
### Table 3. Extract of pairing key-factors with usability principles

<table>
<thead>
<tr>
<th>Components</th>
<th>Cognition Support</th>
<th>Information Support</th>
<th>Interaction Support</th>
<th>User support</th>
<th>Performance support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>Consistency</td>
<td>Visibility, Simplicity, Recognition</td>
<td>Feedback, Responsiveness,</td>
<td>Recoverability</td>
<td>Effort</td>
</tr>
<tr>
<td>Refresh</td>
<td>Visibility, Simplicity</td>
<td>Feedback</td>
<td>Effort</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress</td>
<td>Consistency</td>
<td>Visibility, Recognition</td>
<td>Efficiency</td>
<td>Effort</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Extract from prototype checklist

#### UI ACTIONS & COMPONENTS

**Back**
- Is the Back UI component/function consistent throughout the user interface?
- Is the Back UI component/function visible?
- Is the Back UI component/function visual appearance recognizable to understand its purpose?
- Is the Back UI component/function simple enough for users to understand how it works?
- Is there sign on success or failure when the Back UI component/function is used?
- If the Back UI component/function mistakenly used, is it possible to recover from it?
- Does the Back UI component allow the user to back continuously step by step?

**Refresh**
- Is the refresh UI component/function visible?
- Is the refresh UI component/function visual appearance recognizable to understand its purpose?
- Is the refresh UI component/function simple enough for users to understand how it works?
- Is there sign on success or failure when content is refreshed?

#### UI CHARACTERISTICS

**Precision-targeting**
- Are UI components size big enough to allow users to effortlessly interact with their fingers?
- Is there adequate amount of pixel margin between UI components to allow users to avoid clicking unintentionally components?
- Is there adequate amount of pixel margin between interactive UI components on the active screen and the screen bezel?
- Do the UI take into consideration of two handed thumbs usage?
- Do the UI take into consideration of right handed usage?
In total, 32 UI components were given rules according to the usability principles and out of these components, 4 were the result of the group: UI Characteristics. This is due to the relationship between many of the chosen key-factors, words such as Right-handed and thumbs are related to the key-factors precision-targeting. As a result, a hierarchical structural was needed to assess which ones are related. In this case, these two key-factors became subsidiaries of the key-factors precision-targeting. Precision-targeting became its own component with rules that concerns right-handed and thumbs usage. See Table 4 for an extract of the checklist.

Summarized, the creation of the checklist was the outcome of the three UI groups, whereas two of them; UI Actions & Components and UI Input were paired up with the usability principles. See Figure 2.

![Diagram of UI groups and usability checklist]

Figure 2 the creation of the checklist

### 6 Implementation & Validation

Here I present the results of the usability checklists practical effectiveness. The checklist was implemented on the three earlier mentioned applications. For the purpose of keeping the research paper consistent and simple, only the most interesting usability problems discovered are mentioned.
6.1 TED for Android

Through the checklist evaluation, 18 Usability problems with a severity rating of five or higher were identified.

The Back button in the user interface is consistently placed in the same spot but when it is possible to back, a small thin light grey back arrow is placed between the edge of the screen and the TED icon on a white background. This gives off the impression that the back function inconveniently placed and colored. As a result, its visibility principle was given a severity rating of 7 highlighting its semi-high usability problem and should have been adjusted before its release. TED for Android gives the user the option to search through all articles available and gives search suggestions, but the application does not indicate if a search query was wrong and neither does it give suggestions if input was wrong. If a user were to search for the article ‘Paul Sereno digs up dinosaurs’ but misspelled the tag ‘Dinisaurs’, unaware of its mistakes, the user interface does not give suggestion on possible matches and when the search has been initiated, the results do not indicate that the user may have misspelled their search tag and neither does the application give suggestions on corrections. In these cases, a user could misinterpret and assume that the article is not available through the TED application.

TED for Android does not handle the function download very user friendly. The only indication that something is being downloaded is the operating systems own status bar but in the user interface there is no such indication nor any graphical animations or visual cues when a download is initiated. Since the status bar is small and also handles other tasks from other applications, the indication of something being downloaded is risked being passed unnoticed. In addition, the user interface does not indicate if something already has been downloaded from the articles page and it is not possible to cancel a download or delete downloaded content within articles page, the user has to navigate to the page “My Talks” to long press a video to remove it. The evaluation with the checklist of the download function identified 5 usability problems. Overall, the UI group: scored 5.6 in severity rating,

The user evaluation was observed and the participants used a nexus 7 device for the TED application and tested in portrait mode. The tasks can be seen in attachment section of this paper.

They were given a set of instructions with three different tasks to perform when operating the application. Example: Find a specific video within the application and then download it. The questions of the QUIS given to examine the satisfaction were based on the usability checklist.
If the back function was present, the user was asked to rate their experience when backing in the application. Overall, amongst all three participants their experience was rated 3, 3 and 4 in the QUIS. To produce results that were equivalent of the severity ratings, the numbers had to be reversed. In the QUIS, a higher number means higher usability whereas the higher value in severity scale would give higher usability problems. To achieve the equivalent of the severity rating, the average satisfactory score was subtracted from the number 9 (Which is the scale system). In other words, a satisfactory rating of 3.33 produced a severity rating of 5.66. \((10 - 3.33=5.66)\). The total average of the checklist evaluation resulted in a severity rating of 5.4, which only differs 0.26 points from the UT evaluation. See table 5 for a summary of the TED evaluation.

<table>
<thead>
<tr>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checklist</td>
</tr>
<tr>
<td>UI Group</td>
</tr>
<tr>
<td>UI Actions</td>
</tr>
<tr>
<td>UI Characteristics</td>
</tr>
<tr>
<td>UI Overall</td>
</tr>
</tbody>
</table>

Note: UT = User testing  
UITotal = the average of UT1, UT2 and UT3

UT1 scored the highest severity rating whereas UT3 (5.5) was not as troubled (4.1) as much. It’s worth noting that the table is not displaying the satisfactory average but the converted sum to reflect the severity rating.

Every participant succeeded in performing all tasks except Task 3 in looking for an option to refresh content. For one of the participants, she kept looking for the refresh button for 23 seconds before giving up. All three participants found the back button hard to notice and its functionality. When asked, participants in UT1 and UT3 pinpointed out that they thought it as a header button that would redirect them to the default page, just like how websites behave. Furthermore, UT1 and UT2 tried to scroll down till the point it was not possible anymore but they kept going. This is most likely due to the distinct light grey scroll bar that is apparently almost unnoticeable and the only indication that one has reached the end of the content is a very distinct small light blue glow at the bottom. The scroll bar was not enough visible and
thus doesn’t allow the user to predict the quantity of content when scrolling. The checklist did not codiscover this usability problem. See figure 3 for the aforementioned blue glow.

When questioned regarding the delete function, all three participants stated that they would rather see a clear delete button rather than a long press to reveal it. A delete button in the articles page was also suggested so one would be able to delete videos within the original article and to identify whether a video already has been downloaded or not.

During UT1 and UT2 discovered that proper text labeling would have been easier to assist first time users in exploring the content. Such as, participant in UT1 responded negatively to the labeling of “All Talks” and “My Talks” and said “Why didn’t they just use Featured, All and my content”. When told that they could navigate just swiping with their fingers, they were surprised that it was functionality. Resulting that the application had failed to give visual cues that the main pages can be navigated using gestures.

Summarized, the user test evaluation identified 8 usability problems whereas the usability checklist discovered 18. Of the 8 usability problems discovered by the UT, 6 were codiscovered by the checklist evaluation.

![FIGURE 3](image)

*Figure. 3 There is a blue light indication when a content has reached its end*

### 6.2 eBay for iPad

eBay for iPad had less usability problems than TED, but does not fall short. The checklist identified 15 usability problems with a severity rating over 5. eBay is an application that is widely used actively by a hundreds of thousands of users everyday with constant new auctions every minute resulting in a very dynamic content. Typically, for this kind of behavior, a refresh button for the user to spot new fresh content is needed. For Ebay, there is no exception. According to the checklist evaluation, a refresh function was present by sliding the content panel down to reveal a function that allows the user to refresh if he or she keeps sliding the windows down a slightly bit more, this is also more commonly referred as pull down to refresh. From my research and the panels’ earlier experience, this is a common
function amongst mobile and tablet applications that support touch functions and despite its bad visibility, it still follows the standardized method. But, many applications who rely on a this pull down to refresh gesture usually refreshes content by itself by constantly looking for new data entries, eBay for iPad does not inherit this functionality and consequently, its refresh function was given a severity rating of 6. One likely scenario could be so first time users might not be acquainted with the refresh gesture and due to this usability issues, might miss out on certain purchases.

Just like TED for Android, eBay for iPad does not detect misspellings in search queries and does not give suggestions to the misspelling in the results, however, what one wrote is still present at the search bar and thus if a user can identify whether the loss of search result was due to typos.

Buttons were identifiable by making so all buttons were of a rounded rectangle shape. Theoretically, it should easily indicate what a button is and what is not. However, it fell short when they labeled the buttons. They were of different sizes so they could fit in certain windows; this resulted as well in different font sizes and different labeled buttons that yield same functionality. This may cause a feeling of disorientation and frustration for the user when navigating and trying to distinguish buttons from each other.

Although the amount of usability problems discovered by the checklist was similar to the one of TED, most usability problems present in eBay for iPad had a lower severity rating. eBay for iPad generated a severity rating of 3.9.

The user testing evaluation participants were given to perform a set of tasks with an iPad 2. When the testing was done, the users were given a similar questionnaire to TED one but also tailored towards what UI components and functions eBay for iPad utilizes. The user rated the overall experience as 7 – 6 – 6, which converts to 2–3 -3 on the severity scale and averages to 2.67 in severity rating. Just like the checklist evaluation, the UT returned with a lower severity rating and higher customer satisfaction than the TED application. As seen in table 6, It is apparent that eBay for iPad scored better and was more coherent in all categories than the TED application.

Figure. 3 The Refine button was mistakenly identified as a search button.
All three UT participants struggled with identifying certain buttons due to labeling, such as when they were given the task to sort the television size from default to 60 inches or bigger, two participants tried to type 60 and 60” into the search bar and then search. This resulted in displaying the wanted televisions size but also unwanted results such as television model names including the number 60 in its’ name or the sellers’ name. The user interface had failed to notify the participants of the refine button just beside the search bar. UT1 accidently stumbled upon the refine button because he mistook it for a “search button”. A button that would initiate his search query. This was partly codiscovered by the checklist and is an interesting encounter. The checklist had identified the usability problem of labeling but it is interesting because the checklist does not take into account that positioning of elements that might cause confusion and thus mislead users thinking that a button might serve another functionality. See figure 3.

One of the participants failed to discover the refresh function and tried to close the application and open it again. When approached and asked why, he said that by reopening the application, applications would by default ask for new entries of data and refresh content. Given this impression suggests that one might have to use different dubious techniques than the built in one to execute a simple task. UT2 discovered the refresh function by accidently scrolling back the content with too much force and claimed that she was not aware of this function at all, furthermore, if it had not been discovered accidently, she’d probably fail the test. A proposition from the conclusion of the evaluation by the checklist and evaluation would be that eBay simply have to add a visible refresh function such as a refresh button to accompany the refresh gesture or simply automatically refresh content.

*Figure. 4 The Pull down to refresh function on ebay application.*

Given a rundown, the UT evaluation discovered 9 usability problems and 6 were codiscovered by the checklist of its total 15.
Table 6: eBay Summary of severity ratings from Usability checklist and UT evaluation

<table>
<thead>
<tr>
<th>UI Group</th>
<th>Checklist Score</th>
<th>UTtotal Score</th>
<th>UT1 Score</th>
<th>UT2 Score</th>
<th>UT3 Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>UI Actions</td>
<td>3.6</td>
<td>4.0</td>
<td>4.3</td>
<td>3.9</td>
<td>3.8</td>
</tr>
<tr>
<td>UI Characteristic</td>
<td>4.2</td>
<td>4.5</td>
<td>4.7</td>
<td>4.3</td>
<td>4.5</td>
</tr>
<tr>
<td>UI Overall</td>
<td>3.9</td>
<td>2.67</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. UT = User testing  UITotal = the average of UT1, UT2 and UT3

6.3 USA Today for iPad

Previous versions of the iPad version of USA Today has been highly used in usability experiments and to demonstrate usability issues. For example; Nielsen Group has performed user testing on the USA today application and describes that its navigation function “lack of any perceived affordance” and highly complained amongst the participants in the user tests. USA Today has taken into account of the highlighted usability problems and thus iterated their interface with usability improvements from its release to the newest version as of 2012, December. The previous findings and reiterations spotlight these application improvements in usability and theoretically should be more users friendly than its earlier versions.

The checklist evaluation singled out 7 usability problems of the USA Today application. In contrast to the other two applications, USA today evidently retained fewer usability issues and scored a severity rating of 2.5. It is apparent that USA Today has improved its usability in its application with the assistance of third party usability researches, however it is not entirely beyond any usability issues.

One of the usability issue scenarios reproduced by the checklist is the shortcut panel that resides to the left of the user interface. The USA Today application at first time usage, hints at that swiping from the panel instead of manually pressing the arrow button can reveal the shortcut panel. However, the swipe gesture does not work when the finger is swiping from the button. This gives suspicions that a user might try to swipe from the arrow due to its highlighted visibility rather than swiping from anywhere on the panel. Still, it only concerns the arrow button and the rest of the area can still be used with a swipe gesture to reveal the shortcut panel and thus only resulting in a mild severity rating of five. Be that as it may, there is one more concerning issue raised with the positioning of the arrow button. It is positioned
just beneath the logo “USA Today” which itself is a home screen button. There seem not to be adequate amount of pixel margin between these two buttons and a user might unintentionally press the shortcut button when the user actually want to just return to the home screen or refresh content. It is also worth mentioning that the shortcut panels’ content is not consistent amongst the news categories (NEWS, SPORTS, LIFE etc.). It changes depending on what page you might be. The shortcut panel can be customized to display sports score and weather etc. These information shortcuts later disappears or remains depending on the category the user is present in. In other words, if a user were too find him or herself in the page “TECH” and would want to see for example weather and sport results, the user would have to customize the shortcut panel to display these information bits and it has to be done manually to every shortcut in every news category.

Since the application refreshes every time the user enters a new subpage (category), it might be hard to return to a previous news article or certain point the user were in an earlier different category because due to the auto refresh, the page location automatically repositions the view to the top. Furthermore, there is no search and history function to effortlessly return to previously read articles.

The outcome of the user evaluation test were in total 6 usability problems that limited effective usage in the application.

A common issue that occurred amongst all participants, also codiscovered by the usability checklist was when they tried to swipe to reveal the hidden shortcut panel. UT1 and UT3 attempted to swipe from the arrow button as predicted by the checklist and as explained earlier, this did not trigger the action to reveal the hidden panel. When asked why they were trying to swipe from the particular area both mentioned that the distinguished arrow button on the panel hinted at that the specific button had to be interacted with and thus swiped from the particular area to be revealed. They were given
the impression that the rest of the blue stripe was just decoration and further exposed the functionality of the arrow button.

A usability problem that was not codiscovered was identified during the scenario when a participant was asked to open a news article and then access the next article. USA Today treats news articles as popups, so to exit one, a user would have to locate a close button (x) instead of a back button. This close button is also placed on the right side rather than the left side which is the more standardized location for reversing actions. The user tried to locate a back button and only identified the close button approximately 4 seconds later. This discovery adds an intriguing addition to the reconstruction phase of the checklist: One might ask whether they just regularly should add a back button instead of introducing a rather new and uncommon function to reverse one actions. People read from the left to right in the most continents and in many cases, a tablet interface is should not be entirely seen as a desktop interface with moveable windows and a close button. Tablet interfaces are mostly dominated by hierarchical structures rather than flat structural interfaces. This suggests that USA Today would benefit more by introducing a back button rather than a close button.

The checklist discovered 7 usability issues and codiscovered 5 alongside with the UTs 6 usability problems.

### Table 7: USA Today Summary of Usability checklist and UT evaluation

<table>
<thead>
<tr>
<th>UI Group</th>
<th>Checklist</th>
<th>UTTotal</th>
<th>UT1</th>
<th>UT2</th>
<th>UT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>UI Actions</td>
<td>2.8</td>
<td>2.3</td>
<td>1.9</td>
<td>2.9</td>
<td>2.1</td>
</tr>
<tr>
<td>UI Characteristics</td>
<td>2.2</td>
<td>2.4</td>
<td>2.0</td>
<td>2.4</td>
<td>2.8</td>
</tr>
<tr>
<td>UI Overall</td>
<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Note. UT = User testing  
UITotal = the average of UT1, UT2 and UT3

### Table 8: UT and Checklist evaluation comparison

<table>
<thead>
<tr>
<th>Application</th>
<th>Checklist UT</th>
<th>UT Evaluation</th>
<th>Codiscovered</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>TED</td>
<td>18</td>
<td>8</td>
<td>6</td>
<td>75%</td>
</tr>
</tbody>
</table>
### 6.4 Redesign

The comparison of the user test evaluation and the checklist resulted in new additional rules to be added in the checklist. In total, 6 new sets of rules were added and can be seen in the attachment section. The new rules are marked with an (*) asterisk to the left.

As mentioned earlier, one interesting addition to the checklist is the confusion that might occur if UI elements are positioned in places that might be recognizable as a different function and thus diminishing its labeling and appearance. Another addition is the discovery of the close button in the USA Today application. The application would have gained and allowed for more effective usage if they used a back button instead of a close button. These two discoveries became additions to the checklist UI component buttons as:

**Buttons**

- Are UI Buttons positioned correctly to not be mistaken to serve another functionality (*)
- Are UI Buttons clear and concise? E.g. could another type of button be used and positioned to minimize confusion? (*)

The UT discovery of the scroll bar indication also had served as an addition to the checklist. The user was not given enough visual feedback when content had reached its end. This in turn became its own rule concerning the UI Action “Indication”:

- Is there indication when there is no further content? (*)

To see all new additions, please see the checklist in the attachment section.

### 7 Discussion and Conclusion

In this section I explain the findings of this papers research and its relevancy to the proposed research questions (sv: Frågeställning).

#### 7.1 Discussion

The core of this research was to examine existing guidelines and principles to transform the collected data to propose a checklist that will hopefully assist future development of tablet
applications. To validate the feasibility of the usability checklist, three chosen applications; eBay for iPad, TED for Android and USA Today for iPad was evaluated with the checklist. After the evaluation, usability issues are identified and compared to a user test evaluation for validation and further improvement to the checklist by including discoveries in the user test evaluation.

In order to answer the primary question, the research method was split into three development stages. After a reflection of the results, the three development stages could alternatively be seen as three sub questions to the primary question.

The research’s primary question:

- What usability factors are most important when developing a tablet application GUI?

And three development phases with their own sub question in order to answer the primary one.

4. Content survey: What makes a tablet user interface?
5. Transformation: How can the existing material be converted to a checklist?
6. Implementation & Validation: Finally, does the checklist work and can it be improved?

With the first two development stages (Survey literature and transformation) in mind, common elicited UI components and reoccurring practices in the guidelines was found with the help of experts in a quantitative literature survey and quality transformation. A preliminary checklist containing common UI components with its own set of rules were created. It is later implemented and improved from the results of the User testing evaluation.

The results certainly seem applicable to the initial research question. The research has through a quality screening process of quantity survey of data transformed into what is a proposed set of requisites. These requisites are combined with a severity scale to further assist the evaluation by predicting its realness and importance. These requisites with a severity scale are compiled into a checklist in order to evaluate and assist development of future user interfaces of tablet applications. From the evaluation with the checklist, there has been found numerous usability problems of high severity rating that has also been cosdiscovered during the usability testing and improvements to the usability issues present during the evaluation are also suggested to further demonstrate its practical effectiveness.
7.2 Conclusion

In the end, during the user testing evaluation, the checklist had already proven its efficiency with a high accuracy rating when comparing the severity ratings to the satisfaction rating. Furthermore, the checklist went through a round of improvement with the user test evaluation result as a basis so to in future to identify more usability issues and yield an even higher accuracy rating, although this remains to be proven.

Usability functions are dynamic and we’re currently living in an era with constant advances in the field of mobile computing power, which jeopardize the usefulness of this checklist. However, the checklist has proven useful in today’s modern user interfaces and will most likely remain useful for a few years ahead. Manufacturers are predicted to introduce the first smartphones with a flexible screen, which further improves the point that there is changes inbound. There will be new dimensions and will most likely add a great deal of new usability functions to take into account.

The proposed checklist and the comparative experiments of the UT revealed that the checklist also codiscovered 70 – 90% of the usability issues discovered by the UT. According to Law & Hvannberg, 2002, heuristic evaluations usually don’t discovered 30 – 50% of UT usability problems. The researches results suggest otherwise, but I yet believe that it is not to replace the traditional UT evaluation, since in the end; UTs are still more effective, however not as cost effective. However, rather than completely replacing the traditional User testing evaluation, I believe this checklist will be a good option to those who are looking for a more cost effective way of evaluation tablet interfaces.

The result of this research is an applicable usability checklist to systematically examine UI components one after one in hopes to assist tablet and smartphone UI designers and developers to quickly and effortlessly evaluate the usability of a UI in the middle of the development process. The research has successfully demonstrated the checklist practical usefulness in not just identifying common usability issues, but also more critical usability issues found in user testing evaluations by comparing severity ratings and customer satisfactory ratings.

7.3 Further research

There is a lot of potential to be seen in this checklist and it has only been evaluating three applications and compared once. Considering the various amount of applications that serve
different functionality and the big market, there is unmistakably room to further validate and improve the checklist.

As mentioned earlier, usability functions are rapidly changing and for the checklist to remain useful, it would have to be continuously updated as advancements are seen in the field of computing power.

8 References


9 Attachment

9.1 Checklist Rev 2.0

### TABLET USER INTERFACE USABILITY CHECKLIST 2.0

#### UI ACTIONS & COMPONENTS

**Back**
- Is the Back UI component/function consistent throughout the user interface? 0-1-2-3-4-5-6-7-8-9
- Is the Back UI component/function visible? 0-1-2-3-4-5-6-7-8-9
- Is the Back UI component/function visual appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is the Back UI component/function simple enough for users to understand how it works? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when the Back UI component/function is used? (*) 0-1-2-3-4-5-6-7-8-9
- If the Back UI component/function mistakenly used, is it possible to recover from it? 0-1-2-3-4-5-6-7-8-9
- Does the Back UI component allow the user to back continuously step by step? 0-1-2-3-4-5-6-7-8-9

**Refresh**
- Is the refresh UI component/function visible? 0-1-2-3-4-5-6-7-8-9
- Is the refresh UI component/function visual appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is the refresh UI component/function simple enough for users to understand how it works? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when content is refreshed? 0-1-2-3-4-5-6-7-8-9

**Progress**
- Is the progress UI indicator recognizable for the user to understand the current processing stage? 0-1-2-3-4-5-6-7-8-9
- Is the progress UI indicator component visible? 0-1-2-3-4-5-6-7-8-9

**Main Menu**
- Is the menu recognizable? Is the user able to recognize it as a menu? 0-1-2-3-4-5-6-7-8-9
- Is the main menu visible? 0-1-2-3-4-5-6-7-8-9
- Is the main menu simple enough for users to understand how it works and use it effortlessly? 0-1-2-3-4-5-6-7-8-9
- Is the main menu easy enough to learn to allow for recoccurring effortless usage? 0-1-2-3-4-5-6-7-8-9

**Indication**
- Is indication on page location visible? 0-1-2-3-4-5-6-7-8-9
- Does indication on page allow for prediction of quantity of pages? 0-1-2-3-4-5-6-7-8-9
- Is there indication when there is no further content? (*) 0-1-2-3-4-5-6-7-8-9

**Activity**
- Is the activity UI component visible and recognizable? 0-1-2-3-4-5-6-7-8-9
- Is the activity UI component properly displaying signs of loading/activity in the background? 0-1-2-3-4-5-6-7-8-9

**Sort content/Filter content**
- Is the sort UI component/function visible appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is the sort UI component/function simple enough to grasp for users to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Is there sign of success or failure when content is filtered? 0-1-2-3-4-5-6-7-8-9
- Is there sign of activity when content is being filtered? (*) 0-1-2-3-4-5-6-7-8-9

**Search**
- Is the search UI component/function visible appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is the search UI/component simple enough to grasp to effortlessly search items. 0-1-2-3-4-5-6-7-8-9
- Is the search UI/component providing adequate information when input is wrong? 0-1-2-3-4-5-6-7-8-9
- Is the system responding to search queries in a respectable time? (*) 0-1-2-3-4-5-6-7-8-9
- Does the search UI component/function allow for the user to reverse their search query? 0-1-2-3-4-5-6-7-8-9

**Navigation Menu**
- Is the navigation menu UI component consistent throughout the user interface? 0-1-2-3-4-5-6-7-8-9
- Is the navigation menu UI component visible and distinguishable from the rest of the user interface? 0-1-2-3-4-5-6-7-8-9
- Does navigation menu UI component response in a respectable time to user inputs? 0-1-2-3-4-5-6-7-8-9

**Disclosure**
- Is the disclosure UI component/function visible appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is there sign of activity when content is being disclosure. 0-1-2-3-4-5-6-7-8-9

**Buttons**
- Are UI Buttons visible and distinguishable from non-interactive components in the user interface? 0-1-2-3-4-5-6-7-8-9
- Are UI Buttons simple enough and recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is there sign of success or failure when a button is interacted with? 0-1-2-3-4-5-6-7-8-9
- Are UI Buttons positioned correctly to not be mistaken to serve another functionality (*) 0-1-2-3-4-5-6-7-8-9
- Are UI Buttons clear and concise? (*) 0-1-2-3-4-5-6-7-8-9

**Media Control**
- Are the media control components visible appearance recognizable to understand its purpose? 0-1-2-3-4-5-6-7-8-9
- Is there sign of when media content is being controlled? 0-1-2-3-4-5-6-7-8-9
- Does the media control component response in a respectable time to user inputs? 0-1-2-3-4-5-6-7-8-9
- Are the media controls simple enough to effortlessly allow control of media content? 0-1-2-3-4-5-6-7-8-9

**Multiple Choices**
- Are the multiple choices component visually clear and concise? 0-1-2-3-4-5-6-7-8-9
- Is the activated & current choice distinguishable from the rest of the options? 0-1-2-3-4-5-6-7-8-9

**Content**
- Is the content area distinguishable from the rest of the user interface? 0-1-2-3-4-5-6-7-8-9
- Is user interface giving visual clues about the possibility of exploring more content? 0-1-2-3-4-5-6-7-8-9

**Header**
- Does the header allow for the user to recognize the current & active page/application 0-1-2-3-4-5-6-7-8-9
- Is the header & title distinguishable from the rest of the user interface? 0-1-2-3-4-5-6-7-8-9

**Drop-down**
- Is the drop-down UI function visible appearance recognizable to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow the user to recover if mistakenly clicked on a drop-down component? 0-1-2-3-4-5-6-7-8-9

**Home screen**
- Is there any UI component/function that immediately brings back the user to the home screen? 0-1-2-3-4-5-6-7-8-9
- Is the UI component/function home screen visually clear? 0-1-2-3-4-5-6-7-8-9

**Downloading**
- Is the user interface visually displaying if a download has begun? 0-1-2-3-4-5-6-7-8-9
- Is the user interface visually displaying if something is downloading? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when something is downloading? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow the user to cancel a download? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow the user to delete something downloaded? 0-1-2-3-4-5-6-7-8-9

**Delete**

- Is the UI component/function Delete visually recognized by the user to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when something is being deleted? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow the user to recover a deletion? 0-1-2-3-4-5-6-7-8-9
- Is there reconfirmation when deleted by the user? 0-1-2-3-4-5-6-7-8-9

**Edit**

- Is the UI component/function Edit visually recognized by the user to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when edited by the user? 0-1-2-3-4-5-6-7-8-9
- Is there reconfirmation when edited by the user? 0-1-2-3-4-5-6-7-8-9

**Bookmark**

- Is the UI function bookmark visible appearance recognizable to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Is there sign on success or failure when something is bookmarked? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow the user to unbookmark something previously bookmarked? 0-1-2-3-4-5-6-7-8-9

**Text-area**

- Is the UI component text-area visually recognized by the user to understand its functionality? 0-1-2-3-4-5-6-7-8-9
- Is the UI component text-area distinguishable from the rest of the user interface? 0-1-2-3-4-5-6-7-8-9
- Do the UI component text-area respond visually if it’s active or not? 0-1-2-3-4-5-6-7-8-9

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**UI INPUT**

**Swipe-to-reveal**

- Does the user interface give visual clues if an application can be navigated by swiping with fingers? 0-1-2-3-4-5-6-7-8-9

**Swipe-to-navigate**

- Does the User interface give visual clues if something can be used with swipe-to-navigate? 0-1-2-3-4-5-6-7-8-9
- Is the user interface responding to touch-to-swipe in a respectable time? 0-1-2-3-4-5-6-7-8-9
- Does the user interface allow adequate freedom to control the user interface with swipe-to-navigate? 0-1-2-3-4-5-6-7-8-9
- Can the user interface be controlled effortlessly with swipe-to-navigate? 0-1-2-3-4-5-6-7-8-9

**Pinch-to-zoom**

- Does the user interface give visual clues if something can be used with Pinch-To-Zoom gesture? 0-1-2-3-4-5-6-7-8-9
- Is the user interface responding with delay free to pinch-to-zoom? (*) 0-1-2-3-4-5-6-7-8-9
- Can the UI component be controlled effortlessly with touch-to-swipe? 0-1-2-3-4-5-6-7-8-9

**Keyboard input**

- Does the user interface allow for navigation with a keyboards arrow keys? 0-1-2-3-4-5-6-7-8-9
- Does the user interface respond visually to indicate movement? 0-1-2-3-4-5-6-7-8-9
- Does the user interface sign when a keystroke is successful or failure? 0-1-2-3-4-5-6-7-8-9

**Mouse-input**

- Does the user interface allow for navigation with a computer mouse? 0-1-2-3-4-5-6-7-8-9
- Does the user interface respond visually when mouse is hovering a clickable UI component? 0-1-2-3-4-5-6-7-8-9
- Does the user interface sign when a mouse click is successful or failure? 0-1-2-3-4-5-6-7-8-9
UI CHARACTERISTICS

Precision-targeting

- Are the UI components size big enough to allow users to effortlessly interact with their fingers? 0-1-2-3-4-5-6-7-8-9
- Is there adequate amount of pixel margin between UI components to avoid miss clicking? 0-1-2-3-4-5-6-7-8-9
- Is there adequate amount of pixel margin between UI components and the screen bezel? 0-1-2-3-4-5-6-7-8-9
- Do the UI take into consideration of two handed thumbs usage? 0-1-2-3-4-5-6-7-8-9
- Do the UI take into consideration of right handed usage? 0-1-2-3-4-5-6-7-8-9

Labelling

- Is labelling of UI components clear and concise? 0-1-2-3-4-5-6-7-8-9
- Are there parts in the UI where an icon can be used instead of text? 0-1-2-3-4-5-6-7-8-9
- Are there too unnecessary explanation that might discourage reading? 0-1-2-3-4-5-6-7-8-9
- Is the text in the User Interface at a readable font size, color or/and font? 0-1-2-3-4-5-6-7-8-9

Gestures

- Are there any new, redefining gestures that might cause confusion? 0-1-2-3-4-5-6-7-8-9
- Is the area that is intractable with specific gestures of adequate size? (*) 0-1-2-3-4-5-6-7-8-9

9.2 Tasks

UT TASK SCENARIO

Scenario descriptions is in a slanted orientation. The task the user is asked to perform is in BOLD.

Application: TED for android

Task #1 Starting point: Default home screen

- You want to browse through all available videos showcasing TED Talks.
  1. Access the entire catalogue of TED talks.
- You’re interested in TED Talks concerning the world part Asia.
  2. Enter the category that is labeled “asia”
- Articles regarding powerhouse China and workers situation sounds interesting.
  3. Find and enter the article “Leslie T. Chang: The voice of Chinas workers”
- You’re interested in watching this TED Talk later.
  4. Download the video and bookmark it.
- Onto the next task.
  5. Return to the default home screen page.

Task #2 Starting point: Default home screen

- You’re interested in TED Talks concerning the ancient reptiles: Dinosaurs.
  1. Use the search function to search with the keyword “Dinosaur” and look for the article when Paul Sereno digs up dinosaurs.
- This TED Talk immediately catches your attention.
  2. Play the TED Talk (Video)
- Introductions are usually boring and in this case, there is no exception.
  3. Fast forward a few minutes and pause the video.
- Now you’re somewhere in the video and the audio is a slightly bit too loud.
4. Play it and decrease the volume using only the interface (No physical buttons)
   • Onto the next task.
5. Return to the default home screen page.

Task #3 Starting point: Default home screen

• There might have been a new TED Talk available while we were doing our tasks.
  1. Refresh the content to see what’s new.
• Nothing new; access your personal page to see your bookmarks.
• Leslie T. Chang’s TED Talk doesn’t interest you anymore.
  3. Unbookmark the TED Talk and delete it.

Application: Ebay for iPad

Task #1 Starting point: Default home screen

• You’re interested in looking for an iPhone 5.
  1. Swipe from the left to reveal the navigation menu, use the search function to find an iPhone 5.
• You’re now at the search results.
  2. Enter the advertisement that catches your attention and is selling an iPhone 5.
• Not interested in buying an iPhone but your interested in what other things the seller might have in store.
  3. Access the seller’s custom eBay page.
• Onto the next task.
  4. Return to the default homepage.

Task #2 Starting point: Default home screen

• You’re looking for clothing for men.
  1. Access the category for men’s clothing.
• A football t-shirt sounds neat.
  2. Find the black Nike men’s football t-shirt.
• You want to know the description of the item.
  3. Find the item description and enlarge it, then return to the item.
• You want to return to the t-shirt later, so you’ll have to save the item.
  4. Save this item to your eBay account so you can easily return to it.
• You want to keep shopping so you want to return back to the category.
  5. Return to the category and refresh the content.
• Nothing else interests you. Onto the next task.
  6. Return to the home screen.

Task #3 Starting point: Default home screen

• You’re interested in buying a new television.
  1. Find the category to browse televisions.
• You want the big televisions!
  2. Refine (Sort) the category so it will only display 60” or bigger.
• 60” televisions are quite expensive and you’re looking for cheaper alternatives.
  3. Sort the pricing so it will show from cheapest to expensive.
• Pointless, too expensive and shipping is way too much.
  4. Return to the home screen.

Task #3 Starting point: Default home screen

• You’re interested in buying a new television.
  1. Find the category to browse televisions.
- You want the big televisions!
  2. Refine (Sort) the category so it will only display 60” or bigger.
- 60” televisions are quite expensive and you’re looking for cheaper alternatives.
  3. Sort the pricing so it will show from cheapest to expensive.
- Pointless, too expensive and shipping is way too much.
  4. Return to the home screen.

Task #4 Starting point: Default home screen

- You’re interested in cameras and want a fast way to access the category “compact digital cameras” from your home screen.
  1. Add a shortcut to compact digital cameras to your home screen.
- You want to read your messages.
  2. Read your messages and delete the one about invoice of October 2012.
- You realize that you want to return to the same iPhone advertisement.
  3. Return to the exact same iPhone advertisement using a faster way than the previous method

Application: USA Today for iPad

Task #1 Starting point: Default screen

- You’re interested in the current weather and temperature.
  1. Swipe from the left to reveal shortcut panel to see the current weather status.
  - Close the shortcut panel.
- You’re now interested in reading some news regarding technology.
  2. Enter USA Today’s news category “TECH”.
- You see many articles regarding technology.
  3. Favorite this article using the favorite function.
- This article surely seems interesting.
  4. Enlarge the text size for easier reading.
- On to the next article.
  5. Access the next or previous article.
- Onto the next task.
  6. Return back to the “NEWS” section.

Task #2 Starting point: Default home screen

- You’re at the section “NEWS”.
  1. Refresh the content.
- You want to see videos and pictures.
  2. Access the page with videos & pictures.
- You’re interested in watching something.
  3. Play a video that catches your attention.
- You want to see pictures.
  4. Return back to the page with videos and toggle so you’ll see pictures instead.
  - What are galleries without slideshows?
  5. Start a slideshow of the current gallery you are in.
- Nothing else interests you. Onto the next task.
  6. Return to the “NEWS” section.

Task #2 Starting point: Default home screen

- You’re at the section “NEWS”.

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1. Enter settings for this application (Within the application).
   - You want to return to the exact same article you favorite earlier.
2. Find the same article you saved earlier.
   - The article does not interest you anymore.
3. Delete the saved article.
   - You're soon done!
4. Go to the “SPORTS” section and reveal the shortcut panel.
   - You’re interested in upcoming matches in the NBA League.
5. Sort the score section in the shortcut panel to display scores from NBA.
   - This score section lets you see upcoming matches and the scores. You’re interested in when Phoenix’s next match is.
6. Identify when Phoenix’s next match is and against whom.

9.3 Usability Principles

Usability Principles with definition

Group

- **Usability Principle** – Definition.

Cognition support

- **Predictability** - The user interface must produce results that are in accord with previous commands and states.
- **Learnability** – The user interface must be designed for user to learn easily the use of tablet.
- **Structure Principle** - The user interface must be organized purposefully, in meaningful and useful ways that put related things together and separate unrelated things based on clear, consistent models that are apparent and recognizable to others.
- **Consistency** - The user interface must be designed consistently.
- **Memorability** - The user interface must be easy for users to remember how to use the mobile phone.
- **Familiarity** - The user interface must be familiar to users.

Information Support

- **Recognition** - The user interface must be easy for users to recognize the status of systems or the use of tablet.
- **Visibility** – The user interface should always keep users informed about what is going on, through appropriate feedback within reasonable time.
- **Simplicity** - Make simple, common tasks simple to do, communicate simply in the user’s own language and provide good shortcuts that are meaningfully related to longer procedures.
- **Substitutivity** - The information about numerical values must be easily understood by user.

Interaction Support

- **Feedback** – The user interface must keep users informed of actions or interpretations, changes of state or condition using clear, concise, and unambiguous language familiar to users.
- **Error indication** – The representation of errors must be clear to users.
- **Synthesizability** - The user must be able to construct the proper model of the system. The system must display the correct clues to construct a proper model.
- **Responsiveness** - The system must respond in an appropriate time.

User support

- **Recoverability** – If the user makes a mistake or the application fails, the user must be able to recover the work.
- **Flexibility** – The user interface must be flexible so that adapts to various environments and users.
- **User control** - The users must be able to control the system by their own decisions.
- **Customizability** - The user must be able to modify the interface in order to improve efficiency. The customizing features must be easily accessible.

Performance support

- **Effectiveness** – The required range of tasks must be accomplished at better than some required level of performance by some required percentage of the specified target range of users within some required proportion of the range of usage environment.
- **Efficiency** – The system should be efficient to use so that once the user has learned the system, a high level of productivity is possible.
- **Effort** - The user interface should be designed to minimize the user’s effort for using the system.