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Analysing User Engagement Methods in Microblogging Platforms

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This master thesis document has been supervised by PhD David Lamas (Tallinn University, Estonia) and Mati Mõttus (Tallinn University, Estonia).

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Abstract

The research goal of this thesis is to identify the most successful User Engagement methods in microblogging platforms with the case of the Tumblr website. Initially, a literature review was conducted to assess and select the best research method that would allow a proper comparison between the different attributes. The User Engagement Scale (UES) was chosen as the main research method, as it would result in a set of subscales that can be compared between each other. The UES was implemented in two different studies: a small scale laboratory study and a large scale online study.

After the completion of the studies, a factor analysis was implemented, along tables of frequencies, comparisons of the means, scree plots, and Cronbach's alpha (to evaluate reliability).

From six of the attributes examined with the UES, Perceived Usability, Aesthetic Appeal and Felt Involvement computed the highest scores on both studies.

As a conclusion, certain features of the website were selected as not appropriate for User Engagement, and design recommendations based on design principles are suggested.

It is expected that this thesis will advance the field of User Engagement by offering a thorough description of the design, implementation and evaluation of the UES in the context of microblogging platforms.

Keywords: User engagement, microblogging platforms, UES.

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List of abbreviations

AE: Aesthetic Appeal

DA: Discriminant Analysis

EFA: Exploratory Factor Analysis

EN: Endurability

FA: Focused Attention

FI: Felt Involvement

IRR: Interactive Information Retrieval

NO: Novelty

PU: Perceived Usability

UE: User Engagement

UES: User Engagement Scale

Chapter 1: Introduction

Microblogging has become one of the most popular mediums for users to create and share information online (Jiejun X., 2014). In a microblog, content is typically smaller, and microblogging platforms allow users to exchange small elements of content such as short sentences, images, or video (Kaplan, M., Haenlein M., 2011).

The biggest microblogging platform is Twitter, followed by Tumblr, with "over 166.4 million users and 73.4 billion posts by January 2014" (Chang Y., Tang L., Yoshiyuki I., and Yan., 2014). Albeit the title of this thesis refers to all microblogging platforms, only the Tumblr website was evaluated in a laboratory study, and a large scale study in this thesis.

The reason for choosing Tumblr is that it provides more features than its competitors (e.g. Twitter, Pinterest), such as changing the appearance of the blogs (including themes and HTML editing), adding large amounts of text, chat, messaging, setting a password to protect the privacy of a blog, the compass feature (that allows to see recommended blogs and posts, taking a look at topics are trending and separate them by post type), and having multiple blogs within the same account. Moreover, Tumblr has richer content than other microblogging platforms, and it contains hybrid characteristics of social networking, traditional blogosphere, and social media (Chang Y., Tang L., Yoshiyuki I., and Yan., 2014).

The Tumblr website was created in 2007, and, as any other typical microblogging platform, aims to provide a simple system for social interaction and self-expression that allows to post, share and find information online on a blog, and have access to the information from other users on the main page (also known as *Dashboard*). The website was later bought by Yahoo! Inc. in 2013, with the intention to attract young users into other Yahoo products and generate revenue from sponsored advertisements.

Soon before the sale was announced, the Tumblr Staff broadcasted that sponsored *posts* would appear on users' *Dashboards*, so users could easily buy the product displayed on the *post* (Tumblr Staff, 2013).

Several other changes to the interface of the *Dashboard* followed:

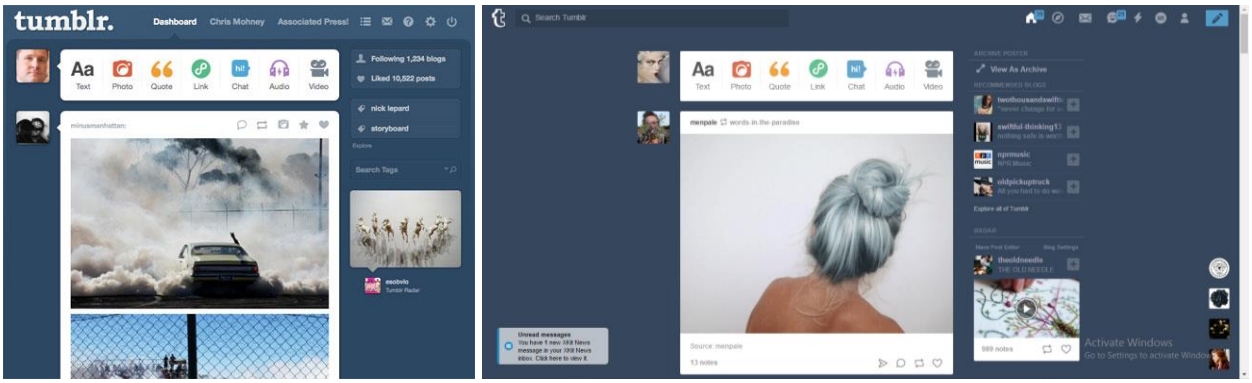

Figure 1 (left) Previous user interface of Tumblr Source: http://storyboard.tumblr.com/post/22380369570/peter-vidani-on-the-evolution-of-the-tumblr. Figure 2 (right) The Tumblr Dashboard, 2016 Source: The Tumblr Dashboard.

- The rounded corners of the *posts* were sharpened.
- The colour of the background in the *Dashboard* changed "from dark blue to a slightly different shade of dark blue".
- The *Inbox* notification icon changed from red to almost grey.
- *Posts* are no longer centred on the page.
- The space between *posts* was reduced.
- The size of the image box was expanded from 500 pixels to 540 pixels.
- Photos are automatically displayed at full-size, which is inconvenient for users with a slow speed internet connection.

(Romano, 2015)

For long time users, it was quite a shock to find so many changes that, although simple, influenced negatively on their perception of the website. Figure 3 is only one of the many manifestations of frustration from users (notice that the *post* has almost 1 million *notes*).

Figure 3 A complaint from a user about the changes made to the Dashboard Source: The Tumblr Dashboard.

The reasons for the changes remain unjustified e.g. on the *blog* of the Tumblr Staff, they commented, about changing the width of the posts: “We went ahead and did it. There was no reason not to.” (Tumblr Staff, 2014).

Most recently, the feature of *replies* to pieces of text was temporally unavailable, and while users were desperate to continue to use it, their request was ignored for months (see Figure 4).

Figure 4 Instead of providing replies, the Tumblr Staff changed the appearance of the icons Source: The Tumblr Dashboard.

The inability to engage users by creating a better design for the Dashboard and the lack of a strategy for generating revenue has resulted in a financial loss on Yahoo’s side, more specifically, “Yahoo took a $230 million write down on Tumblr and said that the site hadn't met its revenue targets” (Oreskovic, 2016).

It is expected that Yahoo Inc. “will fire employees, shutter more offices and devote more resources to increasing engagement with users” (Womack, 2016).

The Tumblr website, with over 130 billion posts and almost 300 million blogs, offers a large dataset, which is representative enough for retrieving meaningful and valuable knowledge, but is still relatively unknown how high is the level of engagement on the Tumblr website.

This website has been gaining popularity over the past few years, but, despite its success, little has been studied on the human behaviour and interaction on this platform. This is important as it sheds light on the driving force behind Tumblr’s growth (Jiejun X., Compton R., Tsai-Ching L., and Allen D., 2014).

Therefore, the goal of this research is to identify the most successful user engagement attributes in the Tumblr microblogging platform to advise the design of a more engaging user interface. To achieve this goal, relevant previous findings in the field of user engagement were compiled to determine the suitable procedure to measure User Engagement (UE) for this specific case: The User Engagement Scale (UES) and an Eye Tracking based Laboratory study.

The research questions this thesis answers are: What are the most successful user engagement methods in microblogging platforms? And, what design principles can be applied to the current user interfaces of microblogging platforms for obtaining better user engagement?

It is hoped that the answers to this questions will inspire the designers and developers working at Tumblr for creating a more engaging website.

The results of this thesis are important because designing for engagement is the ultimate goal, but it cannot be realized without a common understanding of what user engagement is and how to measure it (Lalmas, 2014).

Facilitating engaging user experiences is essential in the design of interactive systems, consequentially, it is necessary to understand the composition of this construct and how to evaluate it (O'Brien 2010), because the more engaged a user is, the more time (he or she) will spend on the website, providing a website with a higher opportunity of producing revenue.

The results of this thesis are also expected to be generalizable to be applied to other microblogging platforms.

1.1 Contribution

In the early days of social media, PR agencies would monitor customers' posts to try to identify and manage unhappy customers, however, with the current number of social media sites and the great volume of users on them, tracking the behaviour of the users alone is not enough (Weiguo, 2014) to understand the value of the company in every user's mind.

This document is relevant to the HCI community because it refers to the attributes of user engagement as a way to measure user engagement in the perspective of the Tumblr microblogging platform.

As a theoretical contribution, this thesis compiles and compares previous academic and business related studies that utilized various versions of the User Engagement Scale (UES) and it defines a

relation between the Tumblr microblogging platform and the eight attributes of user engagement. It is not the first attempt to conduct research in microblogging platforms, but in the hope to advance knowledge in the field, it is an attempt in the area of measuring User Engagement in microblogging. This thesis also contributes to academic research by presenting a methodological process that outlines how to develop, design and implement a UE study and analyse its results.

1.2 Delimitations

This thesis is not exploring issues related to recommender systems, nor multitasking, nor customer engagement, nor the Tumblr mobile application. It is not a how-to tool that compiles strict steps to follow to obtain a more engaging website. It is also worth noting that the geographic scope of the laboratory study is limited to the area of Estonia.

1.3 Definitions

User Engagement (UE) is a quality of user experience that emphasizes the positive aspects of interaction – in particular the fact of being captivated by the technology. (Lalmas, 2013).

Micro-blogs are software or applications that allow users to exchange small elements of content such as short sentences, individual images, or video links (Kaplan & Haenlein 2011).

The Tumblr website is a global platform for creativity and self-expression created by David Karp in 2007 and bought by Yahoo! Inc. in 2013 with more than 130 billion posts had been shared within the site (Tumblr, Inc. 2016).

1.4. Clarification

The title and research questions refer to methods, that, in the case of this thesis, represent the characteristics (attributes) of user engagement. In the initial process of defining the research goal and research questions, it was assumed by the researcher that microblogging platforms implemented specific methods to nourish UE, however, after the literature review, it was clarified that user engagement operates instead in terms of characteristics or attributes.

1.5 Summary

The objective of this document is to describe and rationalise the design, implementation and evaluation of two user engagement studies in the Tumblr microblogging platform and to present the compilation of six previous works of research about online UE.

In terms of applicability, the results of this thesis will present how to apply the User Engagement Scale (UES) in the context of an image oriented content microblogging platform, and hopefully influence the design goals of the layout of the Tumblr website. The results will also provide certainty over which attributes of user engagement are the most successful Tumblr website and which are not.

Chapter 2: Research strategy

The purpose of this section is to explain briefly the methodology and research methods selected to achieve the research goal, as well as the research questions, and the research problem.

2.1 Research problem

Tumblr, as any other microblogging platform, aims to provide a simple system for social interaction and self-expression that allows to post, share and find information online. However, the details of UE on the Tumblr website are still relatively unknown.

Evaluating web analytics exclusively doesn't provide the necessary amount (nor type) of data needed to obtain significant results that can demonstrate how engaged users are with the website, which is why, with almost 300 million blogs, the Tumblr website offers an immense opportunity for research in the area of measuring UE.

2.2 Research goal

The research goal of this thesis is to identify the most successful User Engagement methods in microblogging platforms.

2.3 Research questions

1. What are the most successful User Engagement methods in microblogging platforms?
2. What design principles can be applied to the current user interfaces of microblogging platforms for obtaining better User Engagement?

2.4 Hypothesis

- The Aesthetic Appeal is the most successful user engagement attribute on the Tumblr website.

There have been "usability issues within the site or its mobile app" (Hillman, Procyk, and Neustaedte, 2014), but Yahoo Inc. has been dedicating a lot of effort to change the appearance of the Dashboard, therefore, it's possible to plan the hypothesis that the Aesthetic Appeal is the most successful user engagement attribute, for all the struggle that has been put into arranging the user interface.

2.5 Assumption

- The Tumblr website is engaging.

Interestingly, the number of blogs and users in Tumblr continue to grow. It is possible to see from the website that the amount continues to be positive, which could be a sign that the website is indeed engaging for first time users.

2.6 Research methodology

The objective of this thesis is to discover which of the attributes of UE are the most successful in the Tumblr website.

To achieve this goal, quantitative methods were applied, combining a conceptual method (literature review) and empirical methods (laboratory study and field study).

Quantitative methods were selected for the ability of providing numerical data that could be comparable in terms of higher and lower to solve the first research question: What are the most successful User Engagement methods in microblogging platforms?

The User Engagement Scale (UES) was selected as the most suitable scale for measuring User Engagement (UE), as it was constantly praised from the selected literature for this thesis, presented in section 3.3 Related work.

The UES presents a considerable amount of advantages:

- Its international (and large scale) reach
- Low cost
- Flexibility e.g. Questions containing a typo could be changed in a matter of seconds.
- High internal consistency
- Enables statistical analysis and standardization
- Allows participants' anonymity
- Easy to administer to individuals
- Web based measures function well in large sample research studies

(Fulmer, S. M., & Frijters, J. C., 2009)

Six relevant documents were selected as a reference to design the studies in this thesis. Such documents were selected based on the keywords in their titles, the authors (one of the main researchers, Mounia Lalmas, works for Yahoo Inc., a company coincident to be the owner of

Tumblr.), how many times they had been referenced, and the accuracy of their results. Based on previous studies, the User Engagement Scale (UES) was selected to evaluate UE on the Tumblr website.

The hypothesis that the Aesthetic Appeal is the most successful of the characteristics was formulated based on the experience of the author of this thesis with the Tumblr website. Although various complaints have raised based on the considerable number of times the website has modified features and elements of appearance, the minimal style and the calm colour palette support a decent interaction, nevertheless, in the occasion this hypothesis is proven wrong, it would not be considered as a failure, on the contrary, a step forward the discovery of what other characteristic contributes the most for user engagement on the Tumblr website.

Designing the sample of the studies was conducted after the literature review of previous studies related to UE in different contexts.

The practical laboratory part of the study addresses subjective and physiological metrics; this is accomplished by using the biometric technology metric Mirametrix eye-tracking system.

Arriving at conclusions was made possible through statistical analysis described more extensively in Chapter 5.

2.7 Research methods

Based on the conclusions of the studies evaluated in the literature review, the UES was selected as the main data collection tool for receiving insight from users about how engaging their experiences are on the Tumblr website.

Due to the different dimensions of UE (emotional, behavioural, cognitive), it was necessary to implement a laboratory user study to collect objective data that could validate the results of the subjective study.

Research methods of this thesis:

- Online User Engagement Scale (UES) (Data collection tool)
- Laboratory study (Eye tracking data, secondary version of the UES, interview).

A more extensive and detailed explanation of the research methods and their application is presented in Chapter 4.

2.8 Summary

The research goal of this thesis is to discover the most succesful characteristic of UE on the Tumblr website, to achieve it, two studies are taken into account: A laboratory study and an online UES, based on a literature review about similar studies.

This concludes the theoretical aspect of the methodology. The following chapter will elaborate on the literature review.

Chapter 3: Literature review

The purpose of this section is to clarify the most important concepts mentioned in the document and to display an overview of the existing knowledge in the area of UE in online services. The first subchapter focuses on UE and its attributes, the second, on the Tumblr microblogging platform, and the third, on previous research using different versions of the User Engagement Scale (UES).

3.1 User engagement

"User engagement is the emotional, cognitive and behavioural connection that exists, at any point in time and possibly over time, between a user and a technological resource" (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011). This definition is deliberately extensive to allow the holistic character of UE, and, at the same time, to suggest aspects open to measurement.

It could refer to one single session or "a more long-term relationship across multiple sessions"; a single interaction, or about "how and why people develop a relationship with technology and integrate it into their lives" (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011).

UE has been recognized as a prerequisite for the success of virtual environments including social media (Verhagen, Swen, Feldberg, & Merikivi, 2015), which places the area of study in a relevant position of web design. In conclusion, UE is the result of the combination of diverse emotional, cognitive and behavioural components, and measuring it is an intricate task which preferably blends different approaches that quantify the reach of every one of its attributes.

3.1.1 Attributes of User Engagement

UE is measured through its attributes. An attribute is defined as a characteristic of the user-computer interaction that influences or is a component of UE (O'brien, Elaine G. Toms, 2008). The attributes of UE in online environments are: Aesthetic Appeal, Novelty, Focused Attention, Positive Aspect, Endurability, Richness and control; Reputation, trust and expectation; and User context, motivation, incentives, and benefits (Lalmas, M., O'Brien, H., & Yom-Tov, E, 2014).

These attributes are not independent from each other, and elaborate on the notion of user engagement over the three broad aspects: emotional, cognitive and behavioural. While some of the characteristics have stronger ties with one of the personal areas, most are a combination of the three (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011).

The following sections describe each of the attributes of UE.

3.1.1.1 Aesthetic Appeal

The Aesthetic Appeal concerns users' perception of beauty (or ugliness), taste and style, being experienced during the interaction, and it is seen as an important factor for engagement (Heather L. O'Brien and Elaine G. Toms, 2010) because web interfaces that are boring, or that fail to engender a sense of community are quickly dismissed with a simple mouse click (O'Brian and Toms, 2008). The Aesthetic Appeal may be an important factor for engagement with a films website, whilst trust has been found to be a key factor in engagement with health websites (Eickhoff, C., Harris, C. G., Vries, A. P., & Srinivasan, P., 2012).

3.1.1.2 Novelty

Novelty appeals to the sense of curiosity, encourages inquisitive behaviour, and it can also promote re-engagement (O'Brian and Toms, 2008).

Websites may be engaging when they present users with the novel, surprising, unfamiliar, or unexpected (Lalmas, M., O'Brien, H., & Yom-Tov, E., 2014).

This characteristic is versatile, because the novelty of an interaction may vary in terms of presentation, it may arise through the freshness of content in an online news site, or the innovativeness of the technology itself (Eric T., 2008).

3.1.1.3 Focused attention

This phenomenon relates to distortions in the subjective perception of the passage of time during an interaction (O'Brian and Toms, 2008).

It is important when measuring focused attention to consider the type of engagement being assessed (e.g., playing a game versus reading a news article) and the expected conclusions (e.g., total immersion or flow versus loyalty) (Lalmas, M., O'Brien, H., & Yom-Tov, E, 2014).

3.1.1.4 Positive Affect

This attribute refers to the "emotional investment that helps create a personal link to an experience or activity", which induces a desire for exploration and discovery (Morgan Jennings., 2000). Positive emotions, such as enjoyment and fun may cause engagement ("engaged users are affectively involved"); while negative emotions, such as frustration, may cause disengagement (Heather L. O'Brien and Elaine G. Toms. 2008).

“In addition to utilitarian factors, such as usability, designers must consider the hedonic and experiential factors of interacting with technology, such as fun, fulfilment, play and user engagement” (O’Brien, Lalmas & Yom-Tov, 2014).

The amount of success of this attribute, (and other attributes) depends to some extent on the type of users, e.g. whereas fun may be an important characteristic for engaging children, ease of navigation may be a higher priority for adults (Chapman, P., Selvarajah, S., & Webster, J., 1997).

3.1.1.5 Endurability

Having fun, being rewarded with incentives, and discovering new content (e.g. in a social media forum) have been shown to promote Endurability, which “has been operationalized as users’ perceptions of whether the experience met their expectations of being successful, rewarding, or worthwhile and their willingness to recommend it to others” (Heather L. O'Brien and Elaine G. Toms. 2008). Accessing a website more than once a day or/and using it for several years is also an evidence of Endurability.

3.1.1.6 Richness and control

Richness refers to the diversity of “actions, aesthetic value, and useful information that a user can interact with, as well as conveying multiple verbal and nonverbal cues, allowing for immediate feedback, using natural language, and a personal focus” (Chapman, P., Selvarajah, S., & Webster, J., 1997).

Control can be defined as “the sense of learning through different levels until achieving user’s expertise” (Morgan Jennings., 2000), which in this case refers to richness by being able to use all the (rich) features of a website as an expert.

Another definition of control is “the extent to which a person is able to achieve this growth potential by assessing the effort in the selection and attainment of goals” (with a relation to clarity, ease, self-confidence, and freedom) (Lalmas, M., O'Brien, H., & Yom-Tov, E, 2014).

Ideally, an interactive platform should offer diverse opportunities to give control to the user, e.g. On the Tumblr website a user can easily change the appearance of a blog and edit the preinstalled HTML content as they please.

3.1.1.7 Reputation, trust and expectation

Reputation has an effect on whether users wish to engage with a technological resource over a long period of time, and the level to which engage (Lalmas, M., O'Brien, H., & Yom-Tov, E., 2014). Trust can be understood as an assessment of the information quality (or/and other features of a website) that guides the decision whether to use the website or not (Lucassen T., Schraagen J. M., 2010) because it will provide a benefit to the user.

This attribute also supports better judgement from the users to choose between different websites in the absence of better information (Farmer, F. R., & Glass, B., 2010).

Expectation derives from the previous performance with the website or a similar application, which grants the user a preconceived imaginary picture of how a service should appear and function on the web e.g. an avid Facebook user may assume that all social networks request a profile picture. Taking into account the large number of websites, there is now more competition to achieve UE, which is why is relevant to induce it even before a user has access to a website.

Similarly, to other attributes, users may have different expectations depending on the type of website is visited (e.g. social networks vs search engines) relying on functionality, credibility, and authority of content (Lalmas, M., O'Brien, H., & Yom-Tov, E., 2014).

3.1.1.8 User context, motivation, incentives, and benefits

Engagement is not only heavily influenced by the user interface, but also affected by its associated process flow, the user's context, value system and incentives (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011), in other words, user's personal preferences and priorities.

But even if all of a user's values and previous experience matched with those required by a website, engagement wouldn't be complete without motivation, which works as a "precondition for action" (Yang, J., Bozzon, A., & Houben, G., 2015). A microblogging platform (or any website in general) that does not provide users with any satisfactory reason or reward, is not making sufficient effort to engage users.

3.1.2 Persuasive technologies

Computers and websites not only assist humans to achieve a certain goal, but they can also be persuasive.

Captology is “the study of computers as persuasive technologies” (Fogg, 1997), referring to the use of machines and technologies to persuade users to conduct a specific behaviour, in other words, “similar to human persuaders in our society, persuasive computing technologies can influence people’s attitudes” (Cheng, 2003).

The Tumblr website displays characteristics of persuasive technologies. It was possible to identify this from the early eight-step process of designing persuasive technologies (Fogg, 2009), when a simple target behaviour (users sharing information online), and a receptive audience (creative artists and enthusiasts) are chosen.

3.1.3 Summary

UE is the result of the collective success of each of its attributes, which are, to some extent, dependent from each other. Each attribute is related to the behavioural, cognitive or emotional dimension, or may be found in at least two, or, all of them.

The attributes suggest that UE doesn’t depend entirely on the performance of a technological resource, but relies on users’ values, priorities and previous experiences with similar types of websites.

This concludes the theoretical part regarding the attributes of UE. The purpose of the next section is to introduce the concept of microblogging platforms, the Tumblr website and its users.

3.2. The Tumblr microblogging platform

Social media compels a collection of Internet-based applications built on the ideological and technological foundations of Web 2.0, which allow the creation and exchange of user-generated content (Kaplan and Haenlein 2011).

Microblogging platforms have risen as leading content sharing and communication platforms combining blogging and social networking characteristics. These platforms allow users to generate short-form, mixed-media (e.g., text, image) posts on topics that are of interest to the users, and these posts are then exchanged and propagated either through public broadcast or within a social network based on the connected users (Jiejun X., 2014).

Tumblr is a standout amongst the most prominent microblogging services with more than 230 million users (Donghyuk Shin, 2015). It promotes and celebrates creativity, with the purpose of

letting users express freely and use the Tumblr blogs to reflect who they are, what they love, think, and stand for.

Every Tumblr user owns a blog, which contains all the posts from each user, and serves as the gateway to follow other blogs. Tumblr users can follow another user without following back, which forms a nonreciprocal social network (Jiejun X., 2014). The Tumblr website displays a home page (*Dashboard*) that can be seen using endless scrolling or up to 10 posts per page. The *follow* functionality in Tumblr provides a convenient way for users to have access to updates (e.g., new posts) from other users directly into the *Dashboard*.

On the *Dashboard* there are also the main options for customizing the blog, the activity, the number of followers, posts, likes and blogs that are being followed. In order to amuse the users constantly, the Tumblr website has relied on providing new, personalized recommendations of posts on the *Dashboard*.

The dominant element in the colour palette of the layout is blue and the overall style is minimalist, with the purpose of providing a seamless browsing experience. This has remained almost the same over the years, with the exception of the icons, that have been altered slightly.

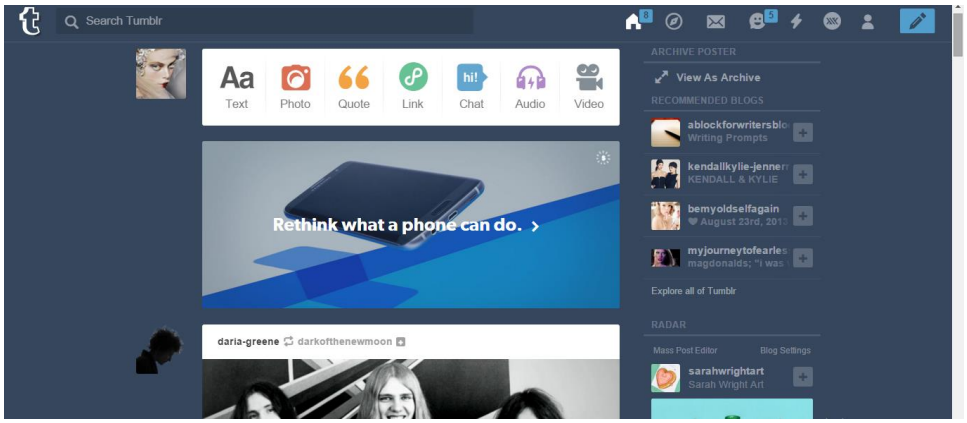

Figure 5 The Tumblr Dashboard. March, 2016 Source: Developed for this research.

Tumblr defines 8 types of posts: photo, text, quote, audio, video, chat, link, that can be posted from the *Dashboard*. It is possible to post text, image (only *.png, .jpg, .jpeg, .gif, .bmp* files accepted), audio and video. Any other type of file can be redirected by *Posting* a link to it. *Posting* can also be done within the *Dashboard* or by email, using a provided *@tumblr.com* address.

There are two main actions which can be applied to a post, the first, *Reblogging*, is the key activity on the Tumblr website that allows the users to share and save posts from other users within their

blogs. It is performed on the *Dashboard*, the page of the post or by using widgets such as *Post to Tumblr* (that can be acquired as a Google Chrome extension).

The second, *Liking* (expressing empathy for a post by marking it with a red heart) can be performed either on the on the bottom right corner of a post in the *Dashboard* or at the upper right corner of the source blog. Whenever a post is *Liked* it becomes part of its history and the total number of *Likes* appear as *Notes* on every post.

Tags can also be assigned to posts with the purpose of making it easier for users to find posts about a specific topic. "In fact, the original search mechanism on Tumblr only applies to tags, which means there is no way to retrieve a post from the Tumblr search engine if it is not tagged" (Jiejun X., Compton R., Tsai-Ching L., and Allen D., 2014).

3.2.1 Tumblr users

The most popular age group of Tumblr users involves young adults and college students between 16 to 24 years old (Cozuela, Fernando., 2014). The percentage of female users (49%) is very similar to the male users (51%) with an average of 14 minutes on the site per day (Ahmad, I., 2014).

In Tumblr, *Addicts* represent 2% of the total Tumblr users and 43% of the total visits (more than 30 visits per month), regular users correspond to 40% of the total users and take 44% of the visits (1 to 30 visits per month), and *passers-by* are 58% of the users but only represent 13% of the visits (1 visit per month) (Cooper, B. B., 2014).

Currently, the website hosts almost 300 million blogs, and, as it can be seen from the image below, it is expected this number will keep on growing.

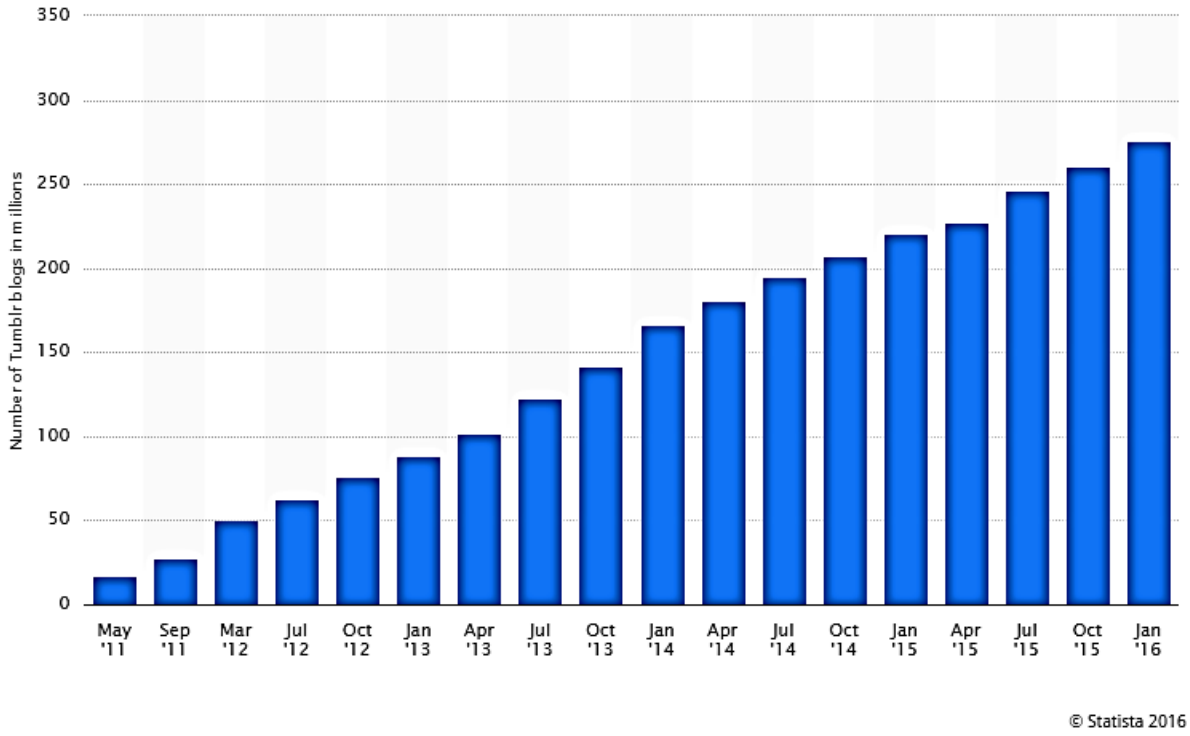

Figure 6 Amount of Tumblr blogs
Source: http://www.statista.com/statistics/256235/total-cumulative-number-of-tumblr-blogs/ Statista.2016.

Although the number of blogs may not be equal to the number of users, it can be considered as a significant form of evidence that the microblogging platform is indeed engaging, both in terms of growth and user involvement (users creating more than one blog trust the website and may be looking for a more fulfilling experience).

3.2.2 Summary

The Tumblr microblogging platform was founded in 2007 with the purpose of providing users with an opportunity to create a blog to post and share content of their interest.

The main actions to be performed on the website are *Posting* (uploading or placing content from another website), *Liking* (as a consequence of appreciating a post, a user can press a heart button attached to every post), and *Reblogging* (sharing a post). The number of times a post is *Liked* and *Reblogged* appear as *Notes*, which are displayed on the Dashboard.

Tumblr users are relatively young and the amount of user engagement is dependent to a certain point on their interaction with the website. Why is user engagement relevant to Tumblr? Because user engagement is "how we nurture and create a community" (Byrne J., 2009).

It is also important to take into account that "different forms of engagement are likely to suit different types of personalities (e.g., couch potatoes, critics, or creators)" (O'Brien, Lalmas & Yom-Tov, 2014). This concludes the theoretical review of the Tumblr microblogging platform.

3.3 Related work

This section will provide a brief explanation in ascending chronological order of six studies about User Engagement (UE) in online services, with the hope of explaining the purpose of the methodology applied to analyse the characteristics of UE on the Tumblr microblogging platform.

UE operates in the emotional, behavioural and cognitive dimensions, as a result, it is complicated to capture it entirely. It may also differ from one user to the other depending on their motivations and interests.

Previous work may describe different types of engagements or rely on engagement augmenting or decreasing over time, but the following previous studies rely on the UES (User Engagement Scale), which provides a certain format to assess the attributes of user engagement.

3.3.1. The development and evaluation of a survey to measure user engagement (O'Brien, H.L. & Toms, E.G., 2010).

Based on previous work that set a theory of engagement and identified a core set of attributes of UE, a multidimensional scale was developed and evaluated to measure user engagement, with two large-scale studies (N=440 and N=802) that were performed to assess its reliability and validity in online shopping environments.

In the first study, a Reliability Analysis (RA) and an Exploratory Factor Analysis (EFA) were applied to identify six attributes of user engagement:

- Perceived Usability (PU)
- Aesthetic Appeal (AE)
- Focused Attention (FA)
- Felt Involvement (FI)
- Novelty (NO)
- Endurability (EN)

PU refers to "users' perceived effort in using the Website, their ability to accomplish their shopping tasks, the navigation and organization of the Website, and the emotions evoked by using the Website". In the second study, the validity of those attributes and the relationships among them were tested using Structural Equation Modelling (SEM). The result was a reliable and valid 5 point Likert scale comprised of six distinct factors that can be used to test the amount of UE in software applications.

Findings also indicate that the attributes are "highly intertwined", and that they represent "a complex interplay of user-system interaction variables", in other words, they don't operate independently from the others, a statement that should be considered in the website design process.

This holistic instrument for assessing user experience includes items that relate to:

- How users perceive a system, e.g. PUs and AE subscales.
- Their state of mind during the system use, e.g. FA sub-scale.
- Their overall evaluation of the experience, e.g. EN sub-scale.
- The task that is being accomplished as part of the interaction e.g. "I felt involved in the search tasks."

In addition, the items are a blend of the pragmatic aspect, e.g., "I found this system confusing to use" (PU), and the hedonic aspect, e.g. This experience was fun (FI).

(Lalmas, M., O'Brien, H., & Yom-Tov, E., 2014)

3.3.2. Is there a Universal Instrument for Measuring Interactive Information Retrieval? The Case of the User Engagement Scale (O'Brien, H.L. & Toms, E.G., 2010).

This study focuses on the reliability and validity of the UES to make it appropriate to evaluate other context apart from online shopping, for this instance, Interactive Information Retrieval (IIR). The experiment took place with a webcast system, and by measuring the participants' interaction, instead of applying an online survey.

The findings were not consistent with the previous study: After a Maximum Likelihood Factor Analysis with oblique rotation, the Felt Involvement (FI) sub-scale was eliminated and Perceived Usability (PU) items were separated across two factors, and most of the other factors varied only in terms of numbers of items.

The Aesthetic Appeal (AE) was not found to be correlated to FA or PU, as it had been in the previous study, which indicates "that components of engagement are consistent across systems, but the manifestation and salience of these elements is what varies", and contextual differences between the current and original studies were identified.

The differences with the previous study might have aroused due to the lack of familiarity of the participants with the system, e.g. FI, immersing in the online environment could have not been possible because the system was too challenging.

While the findings were dissimilar, the authors encourage future researchers to continue using the UES as an instrument to measure engagement, in the hope of achieving a better understanding of its characteristics.

3.3.3. Proposal of a web site engagement scale and research model. Analysis of the influence of intra web site comparative behaviour (Hyder, 2010)

The aim of the study by Hyder was "to propose a new web site engagement scale, valid within the framework of e-commerce web sites, and to identify its dimensions", with a customer approach, instead of a users', with a sense of overlapping. This scale was by far the most condensed of the scales adding attributes such as curiosity and transformation of time separated from Focused Attention.

The study took place online, and the participants were invited via email to respond a 7 point Likert scale UES about a fictional website about tourism. The scale was created with a software designed specifically for this survey, that helped organize the data accurately, which was analysed using a factor analysis.

3.3.4. User Engagement attributes and levels in Facebook (Firdaus, B., Nazlena, M. A., Hairuliza, M., J., 2012)

This study took place over a two-week period with 103 Facebook users, it applies factor analysis to measure UE attributes and a Discriminant Analysis (DA) to "determine the relationship between engagement levels and Facebook activities" and a 5 point Likert scale.

The UES from previous works that were performed in an online shopping environment was adapted to fit the research goal (to test this instrument's reliability and validity) and the context of Facebook (social media). The results show different levels of engagement related to specific Facebook

activities (with the exception of Felt Involvement, the attributes evaluated in the UES were the equal to the items in the next study).

From the findings, it was identified that "the engagement attributes in social networking are slightly different to the attributes of engagement that have been found in previous work", proving that the format can influence engagement.

UE attributes in online shopping may be driven by particular reasons, such as money, privacy, transactions, exchange, fulfilment and natural satisfaction; while in social media websites, such as Facebook, they are driven by the needs of socializing e.g. FA, the attribute that refers to "getting absorbed in an activity or application", has different levels of importance and correlation with other attributes depending of the type of website.

3.3.5 Examining the Generalizability of the User Engagement Scale (UES) in Exploratory Search (O'Brien, 2013)

During a laboratory-style study, 381 participants performed (relatively) complex search tasks using a novel search interface in an online search system, and responded to the UES (using a 7 point Likert scale) immediately after completing the tasks.

In this study, the wording of the original UES was changed to fit the type and context of the website, along with the removal of some of the items e.g. "I continued to use WikiSearch out of curiosity" (NO) was deleted during the reliability analysis. For this situation, the participants might have kept on utilizing the search system since they had no option for completing the assignment.

There have been differences in the number of items retained across the factor structure, however, three sub-scales (Perceived Usability, Focused Attention, and Aesthetic Appeal) have demonstrated stability across several studies.

It is "impossible to find measures that do not vary over time and across contexts" (Serenko and Turel, 2007), during the process of scale development and analysis, some of these items became integrated into other sub-scales. Regardless, it was still recommended to continue to use all items and statistical techniques to determine and analyse the items that are "most salient to user engagement in each circumstance".

3.3.6. Examining User Engagement attributes in visual information search (Qiong, 2015)

This study examines the attributes of UE in "daily life visual information search i.e. searching images and/or videos using Web-based information systems", using a 7-point Likert scale version of the UES. Some of the items were not included in previous work, and some were reverse-coded. Regarding the amount of participants, a total of 519 college student users filled an online survey during two months.

The outcomes lead to the determination that there is a need to build up a suitable component model in the visual context, portraying the association and contrast in UES between various settings.

3.4 Conclusion of the UES theory

Every UES was adapted depending on the goal of the study and the type of website evaluated. Due to contextual differences between the current and the original studies, the findings of this thesis do not expect to match the conclusions of the previous work.

Discrepancies between studies have appeared previously and are almost expected, as it can be interpreted, e.g. from the final number of questions in every UES (see Table 1).

Final structure of every UES and number of questions for each attribute						
Questionnaires /Number of questions	Examining UE attributes in visual information search 2015	Examining the Generalizability of the (UES) in Exploratory Search 2013	UE attributes and levels in Facebook 2012	Is there a Universal Instrument for Measuring Interactive Information Retrieval? The UES 2010	Proposal of a web site engagement scale and research model. 2010	The development and evaluation of a survey to measure UE 2010
Aesthetic Appeal	6	5	5	5	3***	5
Novelty	2	2*	3	2	4**	3
Endurability	5*	5*	4	2	3**	5
Focused Attention	7*	5	9***	5	6**	9
Perceived Usability	8*,**	8**	4	5***	1**	8**
Felt Involvement	3	3*	1	0	2**	3

Table 1 Six user engagement questionnaires and their common questions and attributes
Source: developed for this research

*Not all of the questions were clustered in the tables.

**At least one of the questions belonged to a different UE attributes.

***Al least one of the questions was not common with other questionnaires.

Every scale was modified considering the goal of the study, as well as the context, keeping in common with the 6 subscales, and seemly ignoring other characteristics of UE for the sake of obtaining only relevant data.

In conclusion, this Master's thesis (along with the previous works) supports the achievement of applying the UES to different online environments to test its generalizability and to gain more knowledge about the area of EU in microblogging platforms, keeping in mind that "online sites differ concerning their engagement, however, there are common patters of user engagement, such as social media, when users come frequently and stay long" (Lehmann et al. 2012). This concludes the theoretical section regarding the development of the UES.

3.5 Metrics of User Engagement outside the UES

There are two ways of measuring UE apart from self-report methods: physiological methods and web analytics (Lalmas et al., 2014).

In the case of the research goal of this thesis, with the usage of web analytics, it is more complicated to determine the extent of the characteristics of UE e.g. the fact that a user spends a lot of time on a website doesn't necessarily mean he or she is engaged, perhaps it is taking a lot of time to execute the desired tasks because the site is confusing.

Physiological approaches are the other remaining alternative, which include observational methods, such as facial expression analysis, speech analysis, and desktop actions; and neuro-physiological signal processing methods (Lalmas et al., 2014).

From these approaches, the neuro-physiological signal processing methods were discarded for the disadvantage of possibly providing misleading or insignificant data for the particular context of the Tumblr website; questions such as: Does an augmentation of pressure whenever a user looks at a specific set of images mean that the user is excited, happy or scared? and, which of this feelings contribute to which of characteristics of User Engagement?, are not coincident to the goal of the research and would not be helpful to the experiment.

Therefore, it was Eye tracking that proved to be the most suitable to determine the level of success of each characteristic of user engagement, for it allows a great way to observe the users as they interact with the Tumblr website, to capture facial expressions, and to follow eye and mouse movement on the screen.

By conducting a laboratory study, other measurements would also be possible, such as the laboratory implementation of the UES, interviews and audio recordings. Each of the works below provide different metrics to measure UE apart from questionnaires.

3.5.1. A Field Study Characterizing Web-based Information Seeking Tasks (Kellar, M., Watters C., and Shepherd, M., 2007)

A field study with 21 participants was implemented, where they were asked to utilize a custom built web browser and an electronic task diary, for the researchers to collect the participants' detailed logged web usage data. Then, the data was analysed to categorize web-based Information Seeking tasks.

Initially, the participants were asked to categorize their online interactions into 6 categories: Looking for specific information, Passing Time & Entertainment, Transactions, Information Gathering, Routine & Hobby and Monitoring.

Examples of the categories are displayed in the table below:

Task	Examples
Looking for Specific Information	Location of a conference workshop Finding percentage of the population that is left handed
Passing Time/ Entertainment	Random Surfing Just browsing EBay
Transactions/ Communication	Checking my email Online banking
Information Gathering	Trying to find a reviewer to review a conference paper Looking for references on a topic
Routine/Hobby	Reading my favourite comic Reading blogs
Monitoring	Checking to see if a project page is up to date so I can send the URL to a colleague Looking up the prices of my stocks

Table 2 Initial task categories
Source: A Field Study Characterizing Web-based Information Seeking Tasks p. 9

The category of monitoring is an activity within information seeking, and so it was merged to the former category. Passing Time & Entertainment, and Routine & Hobby also merged into a single category (Browsing). The final remaining categories are: Fact Finding, Information Gathering, Browsing, and Transactions.

Fact Finding is a task in which the user looks for specific piece of information. Typically, it takes a short amount of time, and completed over a single session, because either the user finds the fact or not, e.g. Looking for an apple cake recipe.

Information Gathering involves the collection of information, (often from multiple sources). Unlike Fact Finding, it is unknown when the task is completed because there is not one specific answer, e.g. planning an upcoming holiday abroad.

Browsing is defined as the "serendipitous task" where users may be visiting web pages with no specific goal in mind, entertainment aims or just to check what's new (in the case of Tumblr, addict users perform this type of task as a daily routine) e.g. reading a blog.

Transactions are tasks in which users perform an online action, e.g. Inputting username/password to log in to a website

In Table 3, the particulars of the online interactions of each task are compiled:

Fact Finding	Information Gathering
• Shorter duration • Small number of pages viewed • Large search component • Relatively longer queries • Little use of browser functions • Typed in URLs, Google Toolbar, Bookmarks	• Longer duration • Larger number of pages viewed • Large search component • Relatively shorter queries • Greatest use of browser functions • Typed-in URLs, Google Toolbar, Auto-Complete
Browsing	**Transactions**
• Shorter duration • Small number of pages viewed • Often repeated • Little use of browser functions • Typed-in URLs, Bookmarks, Select-URL	• Shorter duration • Number of pages and windows influenced by type email • Most often repeated • Little use of browser functions • Bookmarks, Typed-in URLs

Table 3 Four final Task categories
Source: A Field Study Characterizing Web-based Information Seeking Tasks p. 25

Each task can also be divided in terms of high and low use of browser functions, and search or revisitation: Fact finding and information Gathering are both tasks that users execute in the category of search, but fact finding takes a short time and there is a low use of browser functions, in contrast with information Gathering, when there is a higher amount of use of the browser functions. Similarly, transactions and browsing both take place in terms of revisitation, but, in contrast with the previous example, both of them are typically completed in a short amount of time and are revisitation-based.

The conclusions of this study imply that Information Gathering tasks were the most complex (participants spent more completion time, viewed more pages, and used the Web browser functions most heavily), and when users became more experienced, they "began to visit a more distinct set of web pages, accessed the web less frequently, and exhibited a lower rate of search queries".

During Fact Finding task sessions, participants engaged in repeated tasks to monitor new information, re-find (previously found) information, and take part in variations of a previous task.

3.5.2. Towards a science of User Engagement (Position paper) (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011).

This paper is quoted significantly in this thesis for its contribution to defining the fundamentals of user engagement, comprising the definition of each attribute of user engagement, and various types of measurements.

The most substantial influence from this piece of work, in terms of laboratory studies in the case of User Engagement (UE), is a table that displays different metrics for measuring each of the attributes of UE "beyond questionnaires", including references to previous works and examples.

Characteristic	Definition	Measures	Ref.
Focused Attention	Focusing attention to the exclusion of other things	Distorted perception of time, follow-on task performance, eye tracking	[28, 29, 2, 18, 9, 15]
Positive Affect	Emotions experienced during interaction	Physiological sensors (e.g. face detection)	[28, 19, 15]
Aesthetics	Sensory and visual appeal of an interface	Online activity (curiosity-driven behaviour), Physiological sensors (e.g., eye tracking), perceived utility	[29, 28, 19, 45, 15]
Endurability	Likelihood of remembering an experience and the willingness to repeat or recommend it	Online activity (e.g. bookmarking, sending emails)	[35, 29, 28, 32, 34, 49]
Novelty	Novel, surprising, unfamiliar or unexpected experiences	Physiological sensors (e.g., blood pressure)	[29, 13, 28, 48, 39, 43]
Richness and Control	Levels of richness and control	Online activity (e.g., interaction with the site, time spent), Physiological sensors (e.g. mouse pressure)	[37, 32, 46]
Reputation, trust and expectation	Global trust users have on a given entity	Online activity (returning user, recommendation)	[22, 27, 44, 10, 20, 41]
User Context	User's motivation, incentives, and benefits	Online activity (location, time, past history)	[26, 25, 30, 11]

Table 4 Possible ways to measure each UE attribute beyond questionnaires.
Source: Towards a science of user engagement (Position paper) p. 3.

The metrics displayed above were taken into consideration in the design process of the laboratory study; they influenced the set of tasks and helped define the structure of the study e.g. questions in the interviews, and script elaboration.

More details about each attribute and each metric are described in Chapter 5.

3.5.3. An Exploration of Cursor tracking Data (Warnock D., & Lalmas, M., 2015).

This paper describes the particulars of an Amazon Mechanical Turk study, where participants' cursor movements were tracked as they used two variants of the Wikipedia and BBC News

websites. Participants had to complete tasks (searching and reading) on the live websites using their own hardware “in the wild”. The independent variables of the experiment were the websites, their Aesthetic Appeal, the predicted interest in the tasks, and the type of task, while the dependent variables of the experiment were “the cursor tracking data (gathered automatically) and engagement data (gathered by survey)”.

To analyse the patterns of users when they were “reading, hesitating, highlighting, marking, and actions such as scrolling and clicking”, the following cursor tracking metrics were implemented:

- Movement Speed (MS): Average speed over all movements in pixels every second.
- Movement Rate (MR): Number of particular movements made every second.
- Click Rate (CR): Total number of mouse clicks that were made per second.
- Pause Length (PL): Average span of a pause in seconds.
- Percentage of Time Still (PTS): Percentage of time where the cursor displayed no movement.

The movements were branded as either: pauses, movements or scrolls; a pause occurred when the cursor stayed still, a movement, when the cursor moved, and if 99% or more of the movement was vertical, then it was a scroll. The results suggested that:

- It was possible to separate the behaviours of users reading content, and users looking for information, based exclusively on cursor data.
- The two different interfaces had little effect on the cursor movements.
- The choice of input hardware has a strong effect on the behaviour of the cursor.
- No relationship was found between cursor data and engagement.
- There were no significant correlations between the UE data from the surveys and any of the cursor metrics.
- The cursor metrics were not appropriate to categorize the levels of user engagement.

3.6. Conclusion of the studies

The studies present a compendium of different metrics to evaluate UE apart from questionnaires. From these metrics, those selected for this study were those that facilitated the achievement of the research goal of this thesis, e.g. analysing the dwell time was initially considered as one of the

measurements to apply, but it was soon discovered that it would not support the identification of the most successful UE attributes.

To follow the course of previous works mentioned in the literature review, only the results of the UES will be considered as the validated values to compare attributes of UE with each other, and secondary metrics, such as interviews and Eye tracking, would help to inform the reliability of the UES and design elaborations.

Observations regarding users' reactions, comments and suggestions were also noted. This concludes the theory regarding how to evaluate the attributes of UE with different metrics apart from the UES, and the theoretical part of this thesis in general. Further sections are dedicated to the implementation of the online UES and the laboratory study.

Chapter 4: Research Methodology

The purpose of the following subchapters is to describe the design and implementation of the large scale UES in the context of the Tumblr microblogging platform, and the laboratory study. Further analysis on the results will be presented in Chapter 5.

4.1 Research methods

There were two research methods applied to this research: A laboratory study and a large scale online UES.

Table 5 is a summary of the characteristics of both studies.

Research method	Online UES	Laboratory study
Scale	Large	Small
Setting	Field study	Laboratory
Platform	Desktop	Desktop
Temporality	Short term and Longitudinal	Short term
Objectivity	Subjective	Objective and subjective

Table 5 Research methods of this thesis Source: Developed for this research

Regarding the ethical considerations of both studies, actions such as the private confining of the results, and avoiding the spread of personal information were taken to protect the participants' anonymity and confidentiality.

The databases containing the response data were only accessible by the researcher, who accessed them exclusively from a password protected computer, and only to apply further examination of the results, by the supervisor.

All respondents were also informed about the purpose of the research. It was assured at the launch of all the studies that the online instruments were working appropriately and that the data entered was gathered and stored satisfactorily.

4.1.1 Online UES

This self-report method was adapted to the fit the focus and context of the study, and it took place using the Google Form application with a 7 point Likert scale. It is expected (based on previous work) that the UES will provide a condensed set of data analysable in terms of means and factor analysis.

Although this method has been used previously, resulting in optimistic conclusions, it was necessary as well to implement a laboratory study to obtain objective data that could support its results.

4.1.2 Development of the UES

Two pilot studies with two different versions of the UES were implemented before reaching the conclusion that a 32 item UES would be the most suitable to use.

Initially, a rough sketch of a new scale was constructed from the results of the previous scales explained in the literature review. Details of this sketch have been omitted due to its irrelevance and minimal number of participants, nevertheless, it was useful for providing a first opportunity to experiment with the results.

A second version of the scale was designed, once more, based on the final results from the other six previous versions from the literature review, with more care about the relations that would arise between the questions of each subscale.

It was expected that a modified version of the UES scale would be used for the laboratory study, however, a concern aroused during the pilot laboratory study, when the supervisor questioned the validity of the scale. After a deeper examination of the previous studies, it was decided to shift to the original UES, instead of attempting to provide a new version.

The only modifications to this scale were changing the words “shopping website” to “Tumblr”, or “Tumblr website”, and the elimination of one item from the attribute of Focused Attention (“I blocked out things around me when I was shopping on this website”). The wording of this item is confusing and vague, and it was also removed by the user engagement study in Facebook (Firdaus, B., Nazlena, M. A., and Hairuliza, M. J., 2012).

Online UES (Attributes and questions)	
Focused Attention (FA)	1. I forget about my immediate surroundings while blogging on the Tumblr website.
	2. I am so involved in my tasks in Tumblr that I ignore everything around me.
	3. I lose myself in my blogging experience in Tumblr
	4. I am so involved in my tasks on Tumblr that I lose track of time.
	5. When I use Tumblr, I lose track of the world around me
	6. The time I spend on Tumblr just slips away.
	7. I am absorbed in my tasks on Tumblr.
	8. During my experience in Tumblr I let myself go.
Perceived usability (PU)	*9. I feel frustrated while visiting the Tumblr website.
	*10. I find the Tumblr website confusing to use.
	*11. I feel annoyed while visiting the Tumblr website.
	*12. I feel discouraged while using the Tumblr website.
	*13. Using Tumblr is mentally taxing
	*14. My experience in Tumblr is demanding.
	15. I feel in control of my experience with the Tumblr website.
	*16. I cannot do some of the things I need to do on Tumblr.
Aesthetic Appeal (AE)	17. The Tumblr website is attractive.
	18. The Tumblr website is aesthetically appealing
	19. I like the graphics and images used on Tumblr.
	20. The Tumblr website appeals to my visual senses.
	21. The screen layout of Tumblr is visually pleasing
Endurability (EN)	22. My experience in Tumblr is worthwhile.
	23. I consider my experience in Tumblr a success
	*24. My experience with Tumblr does not work the way I plan
	25. My experience in Tumblr is rewarding.
	26. I would recommend blogging on this website to my friends and family.
Novelty (NO)	27. I continue to use the Tumblr website out of curiosity.
	28. The content of the Tumblr website incited my curiosity.
	29. I feel interested in my tasks on Tumblr.
Felt Involvement (FI)	30. I am really drawn into my tasks on Tumblr.
	**31. I feel involved in my tasks in Tumblr.
	32. My experience in the Tumblr is fun.

Table 6 UES of the large scale study Source: developed for this research

*The values of these questions were inverted in the statistical analysis.

**The wording was changed from “this” to “my”.

Regarding the pilot studies, in every of the versions of the UES, a first round was implemented to channel any misunderstandings on the questions. The evaluators checked the clarity of wordings in the scales (the first and second versions, adjusted from validated instruments already used in different studies, the third, almost unvaried from the original UES).

The concerns of the participants in the pilot studies (who acted as evaluators) about the organization of the questions (items) and their wording were noted, and questions that were not clear were properly changed on the first two scales. Their reactions, suggestions, and questions, were noted and taken into consideration.

All of the evaluators filled the survey while they were interacting with the researcher, with the exception of one of the participants of the final UES, to test whether the questions could be successfully completed in the absence of the researcher. In the case of the third and final scale, one participant had a complaint about the repetitiveness of some questions, and the other spotted a typo, that was immediately changed.

Apart from that, the evaluators confirmed that the UES could be completed without difficulty, fatigue or lack of motivation. Participants in total in the final UES were 123, a number selected from the advice of the supervisor, who suggested a population between 100 and 200.

Studies	Number of evaluators	Number of participants	Statistical method applied
First pilot study	3	10	Correlation, Frequency tables
Second study	4	124	Correlation, Factor analysis, Frequency tables
Final UES	2	123	Factor Analysis, Mean, Scree plot, Cronbach's alpha

Table 7 Number of participants and statistical methods applied Source: developed for this research

The final web based UES consisted of 6 pages (Figure 7). A pleasant, minimalist layout, and previous experience with the instrument, were the reasons Google Forms was the software used to convey the scale. All pages displayed an icon that showed the participants how far they are into the survey. A complete set of screenshots of the UES for the large scale study is presented in Appendix A.

The first page contains a greeting, a brief introductory paragraph informing about consent and the context of the research, what 1 and 7 in the Likert scale mean (1 for "Strongly disagree" and 7 for "Strongly agree"), the anonymity of the participant and a request to leave a question blank if it wasn't understood or if it didn't apply, and 8 questions regarding Focussed Attention. This first page amounts to 16% of the questionnaire.

The second page displayed 8 questions about Perceived Usability (33% of the questionnaire).

The third page presented 5 questions regarding Aesthetic Appeal (50% of the questionnaire), the fourth page displayed 5 questions about the attribute of Endurability (66% of the questionnaire), and the fifth page presented 3 questions about Novelty and 3 about Felt Involvement (83% of the questionnaire).

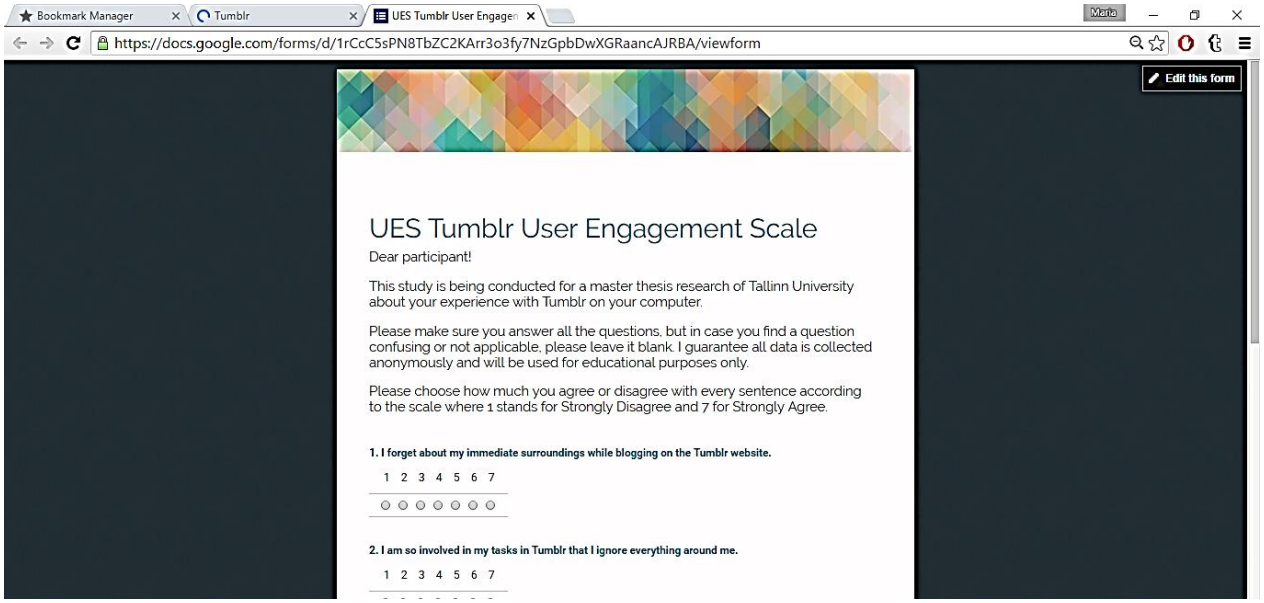

Figure 7 Screenshot of the UES Source: Developed for this research

The sixth and last page (100% of the questionnaire) displayed questions about demographic data (age, gender, education, nationality and occupation), questions regarding users' activity information (years of usage and) and the statement "My experience on Tumblr is engaging", to be agreed within the scale from 1 to 7.

The closing page concludes with the option to change their answers or to submit a new response, and a Thank You to the responders for their participation.

4.1.3 Recruitment

The studies took place between the months of February, March and April of 2016. The first pilot study was promoted with an invitation email, and followers from the personal account of the researcher.

Once those sources ran out, the second and third survey were posted on different Facebook groups with the Tumblr keyword in the title, and messaged to individual users with the Tumblr messaging feature from four different accounts.

The message mentioned the goal of the research, and the length of time it will take to complete the survey. The accounts those messages were sent to were selected from a set of random generated names and patterns of three and four words.

4.1.4 Participants

The target group consisted of international Tumblr users, regardless of their user profile, with as many different characteristics as possible, to obtain a diverse set of Tumblr users. All the evaluators who checked the UES were Tumblr users, and were selected based on their time availability to work with the researcher.

4.1.5 Data preparation

The data was automatically gathered and displayed in a Google Doc spreadsheet for revision and cleaning, and later exported to a .tsv file and re-exported to the statistical analysis software PSPP. The items were reverse coded where applicable.

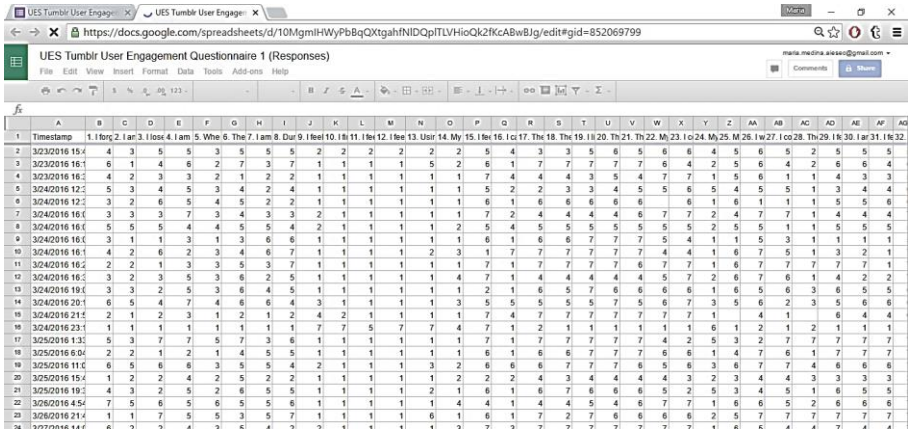

Figure 8 Data samples Source: developed for this research

Figure 8 is a screenshot of the set of data (after cleaning) and several days after it has been posted. Missing values were very scarce and dismissed from the statistical analysis. This concludes the description of the online UES for the large scale study. In the next section, the details of the laboratory study will be explained.

4.2. Laboratory study

As a result of UE being multi-faceted, there are many approaches to its measurement. Measuring the attributes in the laboratory study was possible with different metrics (Table 8).

Metrics/UE attributes	FA	PA	AE	EN	NO	PU	Richness and control	Reputation, trust and expectation	User context
UES	x		x	x	x	x			x
Interviews	x		x	x				x	x
Eye tracking	x		x				x		
Observations		x					x		
Retrospective study				x					
Web browser				x			x		

Table 8 Attributes of UE and their metrics for the laboratory study Source: developed for this research

The item of "retrospective study" refers to a question asked to the participants a week after the study had been conducted, the particulars of this question are displayed in the section of validity and reliability of this document.

The item of "web browser" is related to any type of behaviours of the participants regarding the Google Chrome browser features, e.g. Did they make any bookmarks?

The item of "observations" refers to notes taken during and after the study (looking at the videos and listening to the audio) by the author of this thesis, that contain information about the experience of the participants e.g. comments, suggestions.

Many metrics are described in the former table, but only the results of the UE scale (UES) will be utilized to compare the user engagement attributes with each other. The reason for this is that all the other measurements (such as interviews and dwell time) are not yet considered to be valid in the previous works mentioned in the literature review of this thesis. The aim of including other metrics is to provide objective insight about user engagement on the Tumblr website, and to compare with the subjective data for reliability.

In total, the laboratory study included one biometric measure, brief interviews, and a version of the online UES, for further reflection on the experience and comparison with the large scale study.

4.2.1 Setting up the study

Mirroring previous studies that applied the UES immediately after the participants performed specific tasks, the tense of the sentences was changed from present to past.

Once the scale had been modified, it was necessary to create the script for the laboratory study. Years of experience with the Tumblr website provided the author or this thesis with the necessary

knowledge about what the user could and could not do, its main features, and types of interaction. To obtain a general idea of how first time users with interact with the Tumblr website, a list of tasks was created based on different types of web behaviour (Table 9):

Types of web behaviour of each task in the laboratory study	
1 Log in	Transaction
2 Select 5 topics	Fact finding
3 Browse in the dashboard	Browsing
4 Exploring other blogs	Browsing
5 Making posts	Transaction
6 Searching for a topic	Information Gathering
7 Using the compass	Browsing
8 Changing the appearance of the blog	Transaction

Table 9 Types of web behaviour of each task in the laboratory study Source: developed for this research

The set of tasks contains types of interactions of search, browsing, fact finding and transactions, implying that the Tumblr website (in this thesis) is not studied as a social network, but as a microblogging platform.

One of the main differences from one another is that transaction prioritizes freedom of expression instead of social communication, therefore, the features that were listed in the study represent a typical set of interactions common to bloggers and users who are interested in new content.

After the list of tasks was completed, the author of this thesis wrote a draft of the script, which was revised by the supervisor, who checked for errors. The section below elaborates on the particulars of the laboratory script.

4.2.2 Laboratory study script

1. Prior to the arrival of the participant, it is necessary to turn on the computer and to set up the Mirametrix device on the top of the computer screen to test if it is functioning correctly.

A folder in the desktop (with subfolders) will be created to save the data files.

The online UES tab will be open in a different Google Chrome window.

2. Greeting the participant: The goal of the study is explained to the participant by the researcher, as well as the expected amount of time. It is also mentioned that video and audio recordings will be taken (and started) and that all the data will be used for educational purposes only.

The introduction of the experiment is followed by a brief semi structured interview about the user's previous experience with (micro)blogging platforms:

- Are you familiar with social media websites?
- Are you a user of Facebook, Pinterest, Twitter or Instagram?
- Do you spend a lot of time on (the websites above)?
- What (other) microblogging platforms do you use?
- Do you have a blog(s)?
- For how long have you had a blog(s)?
- (Roughly) How much time do you spend online?
- Are you familiar with Tumblr?

The number of questions and their order may vary.

4. Setting up the Mirametrix eye-tracking instrument.

This step involves:

- Finding comfortable sitting position, and the position of the hands on the keyboard and the mouse.
- Adjusting chair height.
- Establishing an optimal distance to the computer screen.
- Calibration of the eye-tracker instrument using the Mirametrix calibration software.
- Asking the participant to move forward, backwards and sideways while looking at the tracking on the screen to see how much he/she can move without losing connection with the device.

The participant is then asked to avoid looking away from the computer screen during the study, with the exception of using the keyboard and mouse. The participant is also advised to relax and to interact with the website freely ("there really is no wrong interaction").

5. Start recording video data with the Mirametrix Eye tracking device. Saving .csv and .avi files in a specific folder in the desktop.

6.The participant is invited to open the Tumblr website and is questioned about his/her first impressions and expectations.

7. Brief explanation of the tasks.
All actions are listed on two pieces of paper on the table next to the computer.

Tasks

First paper sheet
Tumblr Log in information
(Including an email and password created for the study by all participants).

Username:
Please choose any username you prefer
End of the first paper sheet

Second paper sheet
1. Log into Tumblr
Enter the email and password
Choose a username
Enter your age
Read and agree with the privacy settings

2. Select 5 topics of your choice (https://www.tumblr.com/getting_to_know_tumblr/)

3. From the blogs and posts on the dashboard:

- **Like** at least three posts
- **Reblog** at least three posts
- **Follow** at least three blogs

4. Visit at least one of the blogs you follow. You may visit more if desired.

5. Make at least two posts of your choice.

6. Search for a topic of your choice. You make like and reblog posts, and follow blogs if desired.

7. Use the compass. You may like and reblog posts, and follow blogs if desired.

8. Change the appearance of your blog

You may finish when you are happy with the appearance of your blog.

End of the second paper sheet

8. The participant is asked how much time does he/she think has passed since the creation of the account until this moment.

9. The screen recording software is stopped.

10. The participant completes the UE online questionnaire. They participant is instructed to focus on the whole experience rather than only one aspect, to capture a general picture of user engagement, and to answer with honesty.

11. The completion of the UES is followed by a brief semi structured interview about the participant's experience.

- Do you see yourself using this website again?
- Which tasks do you remember?
- Which tasks did you like the most?

The number of questions and their order may vary.

12. The Tumblr account is deleted so that the next participant can input new data.

13. The online UES window is refreshed for the next participant to input new data.

14. The Eye tracking device is turned off after the last participant leaves.

End of the laboratory study script

Time frame of the study:
2 minutes. Greeting and explaining to the participant the process of the experiment.
3 minutes. Preparing the participant (and calibrating) for the Eye tracking instrument.
3 minutes. Short interview with the participant about the usage of internet and blogging platforms.
1-2 minutes. Calibrating the Eye tracking device.
1 minute. Creating a new account.
2-3 minutes. Choosing 5 topics of interest.
10-15 minutes. Liking posts in the dashboard, looking at other blogs, making posts.
2-4 minutes. Searching for a topic of the participant's choice.
3-5 minutes. Using the compass.
3-4 minutes. Changing the appearance of the blog.
5 minutes. Completion of the UES.
1 minute. Post session interview.
Total time of the study: At least 36 minutes.

4.2.3 Recruitment

It took place exclusively through Facebook, with a brief message on the HCI TLU Facebook student group, the ESN Tallinn University group, Tallinn expats, and the personal page of the author of this thesis.

The reason Facebook was chosen as the medium for propagation was for its ability to reach large groups of foreigners (mirroring Tumblr's international users) and immediate communication with the volunteers.

4.2.4 Participants

A total of 12 participants (2 women and 10 men) from different nationalities participated in the study, one of them, claimed that he had created a Tumblr account months before the study, but he didn't remember much of the interactions, however, for the sake of rigor, it was asked that the participant answered the large scale online UES instead.

4.2.5 Data Preparation

A folder in the desktop (with subfolders) was created to save the video and data files from the Eye tracking software. Recordings were saved as a .wma file from a Samsung cell phone placed between the participant and the researcher using the Voice Recorded application. A copy of the online UES in the past tense was also used in this research.

Chapter 5: Results

The variables that are used in this research are the 32 items of the UES. They were measured using means, scree plots, a principal components factor analysis and a table of frequencies.

5.1 Large scale UES

The data file was downloaded from the Google spreadsheet as a .tsv file, then imported into PSPP for factor analysis.

Initially, a table of frequencies was created to find what percentage of users had completed the UES depending on how often they use the Tumblr website (see table below).

Value	*Frequency*	*Percent*	*Valid Percent*	*Cum Percent*
	1	,83	,83	,83
At least once a day	40	33,33	33,33	34,17
At least once a month	4	3,33	3,33	37,50
At least once a week	23	19,17	19,17	56,67
At least once a year	2	1,67	1,67	58,33
I don't remember the last time I used Tumblr	2	1,67	1,67	60,00
More than once everyday	48	40,00	40,00	100,00
Total	120	100,0	100,0	

Table 10 Frequencies of responses Source: developed for this research

Results (Table 10) show that most participants use Tumblr more than once a day (40%), followed by those who use it at least once a day (33,33%). This is a consequence of recruiting the users with personal messages on their Tumblr accounts and Facebook groups.

Although there were few users who either didn't remember the last time they used Tumblr, or only used it at least once a year, they were also considered since UE may happen at any given time. Subsequently, the means were retrieved to establish a comparison between the values of different attributes of UE on the Tumblr website.

Regarding the answer to the first research question:

1. What are the most successful user engagement methods in the microblogging platforms?

In the case of this large scale study (Table 11), the attribute of Perceived Usability gave the highest score (6.05), contrary to the initial hypothesis that the Aesthetic Appeal would be the most successful attribute (scoring 5.14).

Means comparison			
Attributes of UE	No. of items	Mean	Sample standard deviation
Focussed Attention	8	3.61	0.49
Perceived Usability	8	6.05	0.46
Aesthetic Appeal	5	5.14	0.22
Endurability	5	5.01	0.40
Novelty	3	4.72	0.25
Felt Involvement	3	4.99	0.71

Table 11 Means comparison Source: developed for this research

Complaints have been made in the past about some of the functionalities of the Tumblr website, such as "Tumblr users were generally not happy with the Tumblr messaging system" and "users were frustrated that they did not have better functionality for searching multiple tags and eliminating a tag from their search" (Hillman, Procyk, and Neustaedte, 2014). From these complaints is possible to deduce that users don't rely on all the functionalities of the Tumblr website, but there might be reasons PU has given a high score.

Most of the items of this subscale were reverse coded, meaning that instead of having the participants to agree with positive premises, they were asked to relate negatively to negative statements, which they might have felt reluctant to do. This was also one of the subscales with most items.

Moreover, long-time users must have discovered that there are extensions available to make the actions of *blogging* and *reblogging* easier, e.g. A Google Chrome extension called *Archive Poster* allows users to *reblog*, select, and edit dozens of posts at once. Another extension is called *XKit*, it allows users to use keyboard shortcuts to *reblog* and *tag* posts.

Consequently, a scree plot was conducted to decide on an expected number of factors, which, in this case, is 5 (Figure 9).

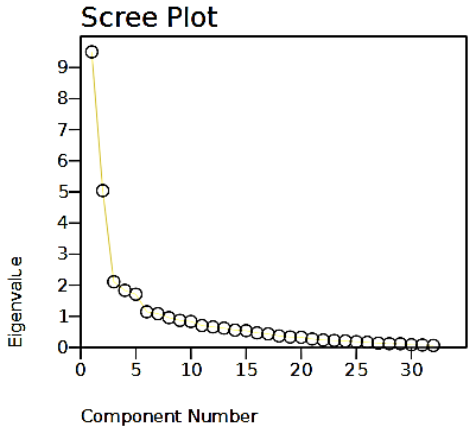

Figure 9 Scree plot of the large scale version of the UES Source: developed for this research

A Principal Components Factor Analysis with a Varimax rotation was applied to discover the exact number of the factors. After six iterations, the total number of factors with eigenvalues equal to 1.00 or higher were 7 (Table 12):

Total Variance Explained

	Initial Eigenvalues		
Component	*Total*	*% of Variance*	*Cumulative %*
1	9,50	29,69	29,69
2	5,04	15,75	45,45
3	2,11	6,59	52,04
4	1,83	5,73	57,77
5	1,71	5,34	63,11
6	1,15	3,58	66,69
7	1,08	3,39	70,08
8	,96	2,99	73,08
9	,87	2,72	75,79
10	,84	2,61	78,40

Table 12 Factor Analysis with Varimax rotation of the large scale version of the UES Source: developed for this research

There is a slight discrepancy between the number of factors expected from the scree plot (5) and the extracted number of factors from the initial eigenvalues (7), which will be clarified after the Factor Analysis, in which a value from 1 to 0 was assigned to every question (item) depending on the level of correlation with each factor, e.g. Questions from 17 to 21 (item 17 to item 21) refer to the first factor (see table below).

Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
item1	,25	,70	-,04	,03	,18	-,04	,16
item2	,01	,86	-,13	-,05	,09	-,20	,04
item3	,11	,75	-,04	,10	,22	,09	-,06
item4	-,05	,76	,10	,03	,06	,27	-,29
item5	,11	,81	-,11	,19	-,02	-,03	,10
item6	,20	,72	-,07	,03	,02	,22	-,25
item7	,12	,73	-,05	-,06	,12	,34	-,02
item8	,20	,40	-,09	,19	,01	,59	,07
item9	,25	-,14	,77	-,01	,27	,09	-,10
item10	,33	,03	,62	,03	,16	-,14	-,11
item11	,28	-,06	,75	,01	,21	,08	,11
item12	,23	,05	,78	,07	,14	,08	,26
item13	,07	,05	,70	-,16	,10	-,07	,35
item14	-,13	-,28	,65	,26	-,14	,05	-,05
item15	,16	-,18	,05	,06	,47	-,10	-,22
item16	,03	-,25	,46	,26	,01	-,40	-,16
item17	,86	,05	,14	,15	,07	,11	-,03
item18	,87	,13	,14	,08	,11	,01	,11
item19	,82	,15	,21	,08	,19	,12	-,03
item20	,82	,21	,17	,03	,20	,05	,02
item21	,82	,11	,13	,07	,30	,06	,13
item22	,28	,12	,19	-,12	,75	,01	,17
item23	,17	,17	,15	,03	,71	,08	,48
item24	,13	-,25	,23	,06	,08	,10	,66
item25	,10	,21	,09	,05	,78	,15	,17
item26	,25	,03	,16	,01	,44	,61	,04
item27	,08	,05	,20	,75	,02	,22	,05
item28	,16	,09	-,13	,80	,13	-,17	,06
item29	,26	,31	,20	,48	,57	,15	-,24
item30	,13	,41	,19	,46	,57	,09	-,19
item31	,18	,43	,12	,36	,57	,05	-,23
item32	,44	,24	,27	,18	,48	,26	-,02

Table 13 Rotated Component Matrix of the large scale version of the UES Source: developed for this research

The items on the table above were analysed with the same guidelines that were applied when the first UES by Lalmas et al. (2010) was originally created:

“Item loadings were interpreted using Comrey and Lee's (1992, as cited in Tabachnick & Fidell) criteria:

- 0.71…1.0 (50% overlapping variance between variable and factor): excellent;
- 0.63...0.70 (40% overlapping variance): very good;
- 0.55…0.62 (30% overlapping variance): good;
- 0.45…0.54 (20% overlapping variance): fair;
- 0.32…0.44 (10% overlapping variance): poor”.

According to these procedures, only the items with a score greater than or equal to 0.45 were considered, and the others, dismissed.

Online UES of the Large scale study (Eigenvalue)	
Factor 1	Aesthetic Appeal: 17. The Tumblr website is attractive. (0.86) 18. The Tumblr website is aesthetically appealing (0.87) 19. I like the graphics and images used on Tumblr (0.82) 20. The Tumblr website appeals to my visual senses (0.82) 21. The screen layout of Tumblr is visually pleasing (0.82)
Factor 2	Focused Attention: 1. I forget about my immediate surroundings while blogging on the Tumblr website. (0.70) 2. I am so involved in my tasks in Tumblr that I ignore everything around me. (0.86) 3. I lose myself in my blogging experience in Tumblr (0.75) 4. I am so involved in my tasks on Tumblr that I lose track of time. (0.76) 5. When I use Tumblr, I lose track of the world around me (0.81) 6. The time I spend on Tumblr just slips away. (0.72) 7. I am absorbed in my tasks on Tumblr. (0.73)
Factor 3	Perceived Usability: 9. I feel frustrated while visiting the Tumblr website. (0.77) 10. I find the Tumblr website confusing to use. (0.62) 11. I feel annoyed while visiting the Tumblr website. (0.75) 12. I feel discouraged while using the Tumblr website. (0.78) 13. Using Tumblr is mentally taxing (0.70) 14. My experience in Tumblr is demanding. (0.65) 16. I cannot do some of the things I need to do on Tumblr. (0.46)
Factor 4	Novelty 27. I continue to use the Tumblr website out of curiosity. (0.75) 28. The content of the Tumblr website incited my curiosity. (0.80)
Factor 5	Perceived Usability: 15. I feel in control of my experience with the Tumblr website. (0.47) Endurability: 22. My experience in Tumblr is worthwhile (0.75) 23. I consider my experience in Tumblr a success (0.71) 25. My experience in Tumblr is rewarding. (0.78) Novelty 29. I feel interested in my tasks on Tumblr. (0.57) Felt Involvement 30. I am really drawn into my tasks on Tumblr. (0.57) 31. I feel involved in my tasks in Tumblr. (0.47) 32. My experience in the Tumblr is fun. (0.48)
Factor 6	Focussed attention: 8. During my experience in Tumblr I let myself go. (0.59) Endurability: 26. I would recommend blogging on this website to my friends and family. (0.61)
Factor 7	Endurability: 24. My experience with Tumblr does not work the way I plan (0.66)

Table 14 Principal components of the large scale study version of the UES Source: developed for this research

*The underlined items appear in two factors.

Consequently, the results of the item "My experience in Tumblr is engaging" were analysed.

Participants were asked to agree on the scale from 1 to 7 with the premise of self-report of engagement. The results are displayed on Table 15.

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	1	6	4,88	4,88	4,88
	2	5	4,07	4,07	8,94
	3	13	10,57	10,57	19,51
	4	20	16,26	16,26	35,77
	5	36	29,27	29,27	65,04
	6	26	21,14	21,14	86,18
	7	17	13,82	13,82	100,00
	Total	123	100,0	100,0	

VAR039		
N	Valid	123
	Missing	0
Mean		4,80

Table 15 Self report of engagement in the large scale UES Source: developed for this research

Most of users find the Tumblr website to be engaging, almost a third of participants marked the value of 5, which is a positive mark, and only very few diverged to the lowest values (1 and 2). The mean 4.80 is a good representative of the total of opinions, and it supports the assumption that the Tumblr website is indeed engaging.

This result is supported by "the process of engaging with Tumblr as an experience that continuously occurred" (Hillman, Procyk, and Neustaedte, 2014). The service of the Tumblr website is free and it is very easy to have always at least a tab open to continuously receive new information, which is provided instantaneously.

5.1.1 Demographic data of the Large scale UES

The demographic data of the participants of the large scale UES is displayed on Table 16.

Demographic data gathered with the large scale UES	
Age	14 to 54 years old
Geographical reach	Worldwide
Contact method	Tumblr and Facebook
Sample size	123
Gender	87 women, 31 men
Time frame of the study	23rd of March until the 14th of April

Table 16 Demographic data gathered with the large scale UES Source: developed for this research

The values in the gender part of the questionnaire do not amount to 123 because there was another option, *Other*, that was marked 2 times, and there were 3 missing values. From the 123 participants, there were 67 students; the rest of the answers about the participants' occupations varied greatly from one option to the other.

Regarding the participants' education level, 40 people responded they hold a Bachelor's degree, another 40 had graduated from high school, 31 are high school students, and 10 hold a master's degree (there were 2 missing values).

5.2. Laboratory study

The results of the laboratory study are presented in the following sections in the same order of the script.

First, the responses of the interviews, that give an estimate of users' context (are they familiar with the topic of microblogging platforms?), motivations, incentives and benefits (why do they use these platforms? What is their gain?); the reputation of the Tumblr website (Have they heard of it before?), expectations from users (what do they think they can achieve with it?), and their first impressions of the Tumblr website.

Secondly, the results from the UES, to which a factor analysis and mean comparison have been applied to identify the most successful user engagement attributes on the Tumblr website.

Finally, there is a brief section regarding one question about self-report engagement.

5.2.1 Interviews

The purpose of the initial semi structured interview was to discover the level of the participants' knowledge and internet usage. This was relevant to the study because it was necessary to confirm that the participants were familiar with the concept of blogging and online interactions, otherwise the values in the UES would have been too low.

Initially, the participants were asked simple questions such as "Do you go online every day?" and "Would you say you spend a lot of time online?", to determine their amount of internet usage. Secondly, they were asked if they have more than one account on social networks and microblogging platforms (such as Twitter).

The results of these questions will allow the researcher to identify if the participants would be interested to sign in to another website, and the amount of background experience that they have with microblogging platforms.

Finally, they were questioned about having a blog. This may have influenced their behaviour on the Tumblr website, because they would be more familiarized with the concept of blogging and they may have had a more determined goal or expectations about the website.

The questions and answers are gathered in Table 17 and Table 18:

User context, motivation, incentives, and benefits					
Questions/Users	User 1	User 2	User 3	User 4	User 5
Do you go online every day?	Yes	Yes	Yes	Yes	Yes
Would you say you spend a lot of time online?	Yes	Yes	Yes	Most of working time	Yes for work
Are you a user of Facebook, Pinterest, Twitter or Instagram?	Yes No Yes No	Yes No Yes No (Flickr)	Yes Yes Yes Yes	Yes Yes Yes No	Yes Yes No yes
Do you spend a lot of time (on the websites above)?	Yes No	Yes No	Yes, I'm a cyberloaf	Yes No N/A	Yes
For how long have you been a user (of the websites above)? (since)	N/A	N/A	10 years 3 years ago 4-3 ago 5 years ago	Over 5 years N/A Over 5 years	2009 2012 No 2012
Do you have a blog(s)?	Yes (political blog)	Yes (business related)	Yes (education related)	Not anymore	no
Platform	BlogSpot	N/A	WordPress	live journal	N/A
For how long have you had a blog(s)? (years: y, months: m)	N/A	Since 2009	Since last semester	N/A (a long time ago)	N/A

Table 17 Participants from 1 to 5 Source: developed for this research

It is important to specify that these questions were not implemented to measure user engagement directly, and were applied only to gather insight of the participants' contexts, motivation, incentives and benefits from using other microblogging platforms (Facebook is not a microblogging platform, but participants were contacted through that website).

The results indicate that all participants were indeed acquainted with internet environments (8 out of 11 participants have or have had blogs), some of those who had started a blog are not using it at the moment, but it is possible to infer that, at a certain point in time, they were motivated to find and search information online.

User context, motivation, incentives, and benefits						
Questions/Users	User 6	User 7	User 8	User 9	User 10	User 11
Do you go online every day?	yes	yes	yes	yes	yes	Not on vacation
Would you say you spend a lot of time online?	yes	yes	Yes 2-3 hrs a day	yes	yes	At work, yes
Are you a user of Facebook, Pinterest, Twitter or Instagram?	Yes Yes Yes Yes	Yes Yes No yes	Yes Yes No no	Yes No No no	Yes No Yes yes	Yes No No no
Do you spend a lot of time (on the websites above)?	Yes No Not that much yes	Yes Yes No Not that much	No no	yes	Yes No 3 times a month	no
For how long have you been a user (of the websites above)?	6 2 5 5	2011 2012-13 2015	2011 2014	At least 5 years	2003 2015	7 years ago
Do you have a blog(s)?	2 Study related and portfolio	1 education related	2 Education related 1 personal blog	1 education related	1 personal information knowledge management	no
Platform	Wix	Maybe WordPress	BlogSpot	WordPress	WordPress	N/A
For how long have you had a blog(s)? (years: y, months: m)	7 m 1,5 y	2014	8 y personal 3 y education	2 m	2 m	N/A

Table 18 Participants from 6 to 11 Source: developed for this research

The incentives to own a blog varied from business matters, to self-expression and educational motives, making the group of participants varied. Additionally, the participants were questioned if they had heard from the Tumblr website before, or if they were familiar with the concept, all answers are displayed in Table 19:

Comments about the reputation of the Tumblr website (Reputation, trust and expectation)	
User 1	Heard of it.
User 2	I know the name, but I have no idea what it is about.
User 3	I don't know much about it, I've never had an interest about it.
User 4	Heard about it.
User 5	Heard about it
User 6	Heard of it
User 7	Heard about it from a friend
User 8	Heard about it
User 9	Heard about it a long time ago
User 10	Social media research work was listed, stumbled on it, visual
User 11	His ex-girlfriend sent him links about it. Had seen other people use Tumblr.

Table 19 Comments about the reputation of the Tumblr website Source: developed for this research

Most of the participants explained that they had heard about it, very few had a clear idea of it, and no one had a clear definition of its features. They were not asked directly if they would trust the Tumblr website before they had interacted with it, as it is expected that participants would have a better idea of whether to trust the website after they had used it.

Once more, it is important to specify that these questions were not implemented to measure user engagement directly, but to gather insight about the reputation of the Tumblr website. The final question that participants were asked before they started interacting with the website was about their first impressions and expectations of the Tumblr website.

The results of this question are displayed in section 5.6. Design recommendations, considering that they provide sufficient insight to provide design advice.

5.2.2. UES in the Laboratory study

A different version from the UES used in the online large scale study was implemented for the laboratory study. The only difference between the two versions was that the verbs in present tense

were changed to past tense, to refer to the group of interactions the participants have just experienced on the Tumblr website.

Using the PSPP statistics software, the means were retrieved to establish a comparison between the values of different attributes of UE on the Tumblr website (see Table 20).

Means comparison of the UES for the Laboratory Study			
Attributes of UE	No. of items	Mean	Sample standard deviation
Focussed Attention	8	3.71	0.54
Perceived Usability	8	4.65	0.48
Aesthetic Appeal	5	4.63	0.42
Endurability	5	4.23	0.99
Novelty	3	4.06	0.44
Felt involvement	3	4.45	0.39

Table 20 Means comparison of the UES for the Laboratory Study Source: developed for this research

Regarding the answer to the first research question:

1.What are the most successful user engagement methods in microblogging platforms?

In the case of the laboratory study, the attribute of Perceived Usability gave the highest score (4.65), a result matching with the online large scale UES, not in terms of equal means, but in the resulting highest means compared to the other means.

Based on the observations noted during the laboratory study, most participants were indeed able to complete most of the tasks, but it was difficult for some to change the appearance of the blogs, which is why the value of PU may have not been as high as in the large scale UES. Subsequently, a scree plot was implemented to determine an estimated number of factors (Figure 10), which, in this case, varies from 5 to 6 (similarly to the result of the large scale UES).

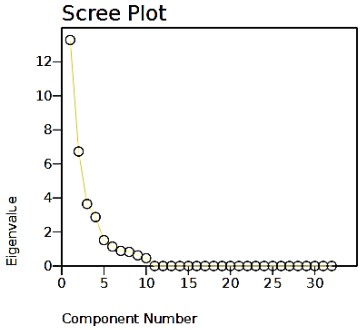

Figure 10 Scree plot of the Laboratory version of the UES Source: developed for this research

A Principal Components Factor Analysis with a Varimax rotation was implemented to simplify the factors. After six iterations, the total number of factors with eigenvalues equal to 1.00 or higher were six (higher than the online UES), as it can be seen from Table 21:

Total Variance Explained

	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	13,28	41,52	41,52
2	6,73	21,03	62,54
3	3,64	11,39	73,93
4	2,88	8,99	82,93
5	1,52	4,75	87,67
6	1,14	3,56	91,23
7	,89	2,78	94,01
8	,83	2,59	96,60
9	,63	1,96	98,56
10	,46	1,44	100,00

Table 21 Total variance of the Laboratory version of the UES Source: developed for this research

According to Table 21, the number of factors (6) is equal to the number of attributes in the UES (6), an optimistic sign that all the attributes were indeed of great influence in the questionnaire. Using the Factor Analysis, a value from 1 to 0 was assigned to every question (item) depending on the level of correlation with each factor, e.g. Questions from 1 to 8 refer to the Focused Attention attribute in the online UES, correspondingly, variables from item 1 to item 8 refer to the first factor. The items were analysed with the same guidelines that were applied with the UES of the large scale study. According to these procedures, only the items with a score higher or equal to 0.45 were considered, and the others, dismissed, resulting in a total of 5 different factors.

Rotated Component Matrix

	Component					
	1	2	3	4	5	6
item1	,91	-,21	,02	,00	-,07	-,20
item2	,85	-,34	-,05	-,13	,00	-,31
item3	,90	-,32	-,06	,01	-,16	-,06
item4	,84	-,15	-,35	,09	,07	,11
item5	,95	,03	-,13	-,09	-,21	,05
item6	,49	-,10	-,10	,80	-,03	,01
item7	,92	-,13	,03	,05	,27	,10
item8	,75	,06	,28	-,03	,45	,25
item9	,10	,48	,40	,43	,44	,30
item10	-,10	,46	,35	,76	,04	,09
item11	-,25	,84	,17	,13	,12	,03
item12	-,16	,33	,77	,21	,08	,04
item13	,02	,01	,07	,83	-,12	,05
item14	-,31	-,01	-,14	,79	,43	-,16
item15	,55	,05	-,15	-,38	,58	,05
item16	,05	,63	-,59	,37	,06	-,12
item17	-,19	,27	,92	-,05	,12	-,02
item18	-,02	-,07	,90	-,19	,01	-,05
item19	,58	-,27	,65	,14	,31	,10
item20	,38	-,10	,75	,14	,35	-,06
item21	,26	,17	,75	,36	-,09	,15
item22	,77	,25	,46	,19	,15	,18
item23	,58	,52	,30	-,17	,29	,12
item24	-,07	,95	,02	-,09	,01	,02
item25	,66	,56	,19	,08	,39	,01
item26	,47	,47	,41	,34	,18	-,03
item27	,20	,29	,47	,02	,74	,01
item28	,68	,40	,22	-,01	,50	-,16
item29	,70	,16	,08	,22	,63	,00
item30	,85	,11	,08	,10	,41	,01
item31	,82	,10	,14	,12	,43	-,01
item32	,70	,33	,38	,07	,14	,26

Table 22 Rotated Component Matrix of the Laboratory version of the UES Source: developed for this research

Online UES of the Laboratory Study (Eigenvalue)	
Factor 1	Focused Attention: 1. I forgot about my immediate surroundings while blogging on the Tumblr website. (0.91) 2. I was so involved in my tasks in Tumblr that I ignored everything around me. (0.85) 3. I lost myself in my blogging experience in Tumblr (0.90) 4. I was so involved in my tasks on Tumblr that I lost track of time. (0.84) 5. When I used Tumblr, I lost track of the world around me (0.95) 6. The time I spent on Tumblr just slipped away. (0.49) 7. I was absorbed in my tasks on Tumblr. (0.92) 8. During my experience in Tumblr I let myself go. (0.75) Endurability: 22. My experience in Tumblr was worthwhile (0.77) 23. I consider my experience in Tumblr a success (0.58) 25. My experience in Tumblr was rewarding. (0.66) 26. I would recommend blogging on this website to my friends and family. (0.47) Novelty: 28. The content of the Tumblr website incited my curiosity. (0.68) 29. I felt interested in my tasks on Tumblr. (0.70) Felt Involvement 30. I was really drawn into my tasks on Tumblr. (0.85) 31. I felt involved in my tasks in Tumblr. (0.82) 32. My experience in the Tumblr was fun. (0.70)
Factor 2	Perceived Usability: 9. I felt frustrated while visiting the Tumblr website. (0.48) 11. I felt annoyed while visiting the Tumblr website. (0.84) 16. I couldn't do some of the things I needed to do on Tumblr. (0.63) Endurability: 24. My experience with Tumblr did not work the way I plan (0.95)
Factor 3	Perceived Usability: 12. I felt discouraged while using the Tumblr website. (0.77) Aesthetic Appeal: 17. The Tumblr website was attractive. (0.92) 18. The Tumblr website was aesthetically appealing (0.90) 19. I liked the graphics and images used on Tumblr (0.65) 20. The Tumblr website appealed to my visual senses (0.75) 21. The screen layout of Tumblr was visually pleasing (0.75)
Factor 4	Perceived Usability: 10. I found the Tumblr website confusing to use. (0.76) 13. Using Tumblr was mentally taxing (0.83) 14. My experience in Tumblr was demanding. (0.79)
Factor 5	Perceived Usability: 15. I felt in control of my experience with the Tumblr website. (0.58) Novelty 27. I continued to use the Tumblr website out of curiosity. (0.74)

Table 23 Table of factors of the Laboratory version of the UES Source: developed for this research

*The underlined items appear in two factors.

Some of the items loaded on more than one factor, a sign that there is a complex factor model, in which some of the items influence more than one factor. In this case, the item would be placed corresponding to the factor in which resulted with a higher eigenvalue.

To corroborate the initial assumption that the Tumblr website is engaging, the mean of the self-report item of engagement was extracted:

My experience with Tumblr is engaging										Mean	Sample standard deviation
5	5	5	5	4	6	5	5	1	1	4.2	1.7

Table 24 Self report of engagement in the Laboratory UES Source: Laboratory Online UES data set

According to the results, the level of self-reported engagement is neutral, meaning that the site is not perceived as remarkably engaging, but it wasn't too repelling either, so that the initial assumption is not entirely wrong. These results almost match identically with those from the large scale UES, in which the mean of self-report of engagement amounted for 4.8.

5.2.3 Demographic data

Table 25 compiles the demographic data of the participants, including the age, dates of the study, the location of the laboratory, the instrument of recruitment and the sample size. Moreover, the nationality, level of education and the field of education were also retrieved (see Table 26).

Demographic data gathered with the online UES in the Laboratory study	
Age	24 to 36 years old
Geographical reach	Tallinn, Estonia
Contact method	Facebook
Sample size	11
Gender	2 women 9 men
Time frame of the study	30th of March until the 1st of April

Table 25Demographic data of the online UES in the Laboratory Study Source: developed for this research

What is your nationality?	What is the highest level of education	What is your field of occupation?
Estonian	Graduated from high school	Management
Spanish	Postdoctoral	Natural and applied sciences
Nigerian	Bachelor	Business, finance, administration
Russian	Bachelor	Social science, education, governme
Dutch	Bachelor	Sales and services
Iranian	Bachelor	Student
Iranian	Master	Student
Estonian		Student
Venezuela	Bachelor	Business, finance, administration
Nigerian	Master	Student
Estonian		Other/Not specified

Table 26 Demographic data of the laboratory version of the UES Source: Laboratory Online UES data set

The study compiled different nationalities from four different continents, although none of the participants were likely not to have English as their native language, questions about the certainty of the scale were scarce. This notion is valid in the terms of testing the reach of the UES and the Tumblr website internationally.

5.4. Validity and reliability

This study was implemented using the UES, a previously validated instrument retrieved from former work mentioned in the literature review. The reliability of the subscales of the UES were analysed using Cronbach's alpha for both the laboratory and the online study.

The results of the online study are displayed in Table 27.

Reliability analysis of the UES subscales of the Large scale UES		
Attributes	No. of items	Cronbach's alpha
Focussed Attention	8	0.90
Aesthetic Appeal	8	0.79
Endurability	5	0.93
Perceived Usability	5	0.79
Novelty	3	0.70
Felt involvement	3	0.85

Table 27 Reliability analysis of the UES subscales of the large scale UES Source: developed for this research

Table 28 presents the same values for the laboratory study.

Reliability analysis of the UES subscales for the Laboratory study		
Attributes	No. of items	Cronbach's alpha
Focussed Attention	8	0.95
Perceived Usability	8	0.71
Aesthetic Appeal	5	0.90
Endurability	5	0.88
Novelty	3	0.88
Felt involvement	3	0.94

Table 28 Reliability analysis of the UES subscales for the laboratory study Source: developed for this research

The values are considerably high (near to 1.00), a sign of good reliability.

To subjectively evaluate the reliability of the participants in the laboratory study, during the post session interview, participants were asked: (Q1) Do you see yourself using this website again? And a week later, (Q2) Have you used the website in the study?

The results are presented in the table below:

Participants	In the laboratory study (Q1)	A week after the laboratory study (Q2)
1	Probably not	No
2	I would definitely have a look. I am interested in the context.	Yes. But only for 5 minutes and I do not think I will do it in the near future.
3	*Yeah, actually, I do.	No.
4	I might, if it has content that is relevant, either entertaining or useful.	No.
5	Personally, no, I think.	No.
6	Well, uh, it depends, if I have time, of course, yes.	Actually, I tried to look at (it a) couple of times.
7	At the moment, no, but in general, I might. I should find out if it's different from Pinterest.	No
8	No	No
9	No	No
10	Yes	I haven't used it since then (the study)
11	No	No

Table 29 Reliability of the participants Source: developed for this research

*The participant was almost immediately asked what would be the purpose of using the website again. He responded "to check things when I'm bored". A week after the study, he added: "This has been a very busy period for me tho<sic>…I liked it but reckon it would be a distraction".

Table 29 does not measure an objective way to measure the reliability of the participants, but it does offer a way to identify if they were serious and honest about their answers.

Additionally, the participants were also asked if they had recommended the website to friends or family. Out of 11 participants, 10 said they haven't, although it can be inferred that two of them were expecting to do it.

- "I've not recommended it to anyone yet".
- "I have not recommended it to anybody. But I almost did".

The only positive answer:

- "I haven't use it since then, but recommended it to friends".

And a curious comment: "I feel I'm too old to be using Tumblr, it (is) stuff for teenagers".

5.5 Generalizability of the results

"Standardization of what user engagement is and how to measure it will benefit research, design and users" (Lalmas, 2014).

Microblogging platforms and their features vary from each other. Some specialize in videos (Vine), others, in text (Twitter), or exclusively in images (Pinterest). In other words, "user engagement almost certainly has different characteristics in different application domains and for different demographic groups. The web offers a diversity of experiences relevant to a diversity of users, and different user populations may have different priorities" (Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B., 2011).

However, it is envisioned that the results of this thesis can extend to sites like Twitter and Pinterest, where users can post images, text and video, but perhaps not where users can't change the appearance of their blogs.

5.6. Design recommendations

Regarding the answer to the second research question:

2. What design principles can be applied to the current user interfaces of microblogging platforms for obtaining better user engagement?

It still uncertain to the research area of UE how to influence and design for engagement, in terms of matching each attribute to a specific principle or feature. However, it is possible to advise the design of microblogging platforms based on the most successful attributes and observations conducted in the laboratory study with the Eye tracking device.

Principles such as colour (Krause, 2004), and contrast (Yocum, 2009) were exonerated for the relatively high score of the attribute of Aesthetic Appeal, and observations of the laboratory study, in which participants focused exclusively on the images and ignored the background space.

Those design principles that ought to be revised, concerning the layout of the website and the behaviours of the participants are contrast (Prust, 2010), compositional flow, and movement (Bradley, 2015).

There is not enough contrast between the icons on the top right corner of the *Dashboard*, it is understandable that the designers wanted to fit "different elements into a stable and coherent form", following the Gestalt laws of the perception of groups (Sternberg, & Sternberg, 2012), but for the participants it was difficult to identify were the Compass was located.

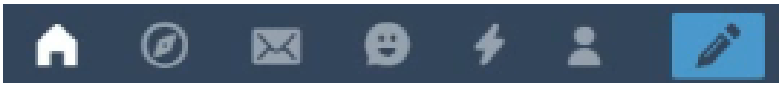

Figure 11 Icons on the top right corner of the Dashboard Source: developed for this research

The constant apparitions of pop ups with advice on how to use the Tumblr website were distracting for some of the participants, although the intention of helping them was understandable, it may have affected their attention.

Figure 12 Pop up with instructions Source: developed for this research

While participants were interacting with the *Dashboard*, it took them a lot of time to find elements not related to the *Dashboard* elements, e.g. changing the appearance of the blog and finding out later how the appearance had changed outside the *Dashboard*, and looking at the blogs they had just followed, so that the navigational flow should be reconsidered for the users to immediately identify the consequences of their interactions and how different pages relate between each other.

Another procedure to inform design was to ask users about their first impressions on the site (see Table 30). One important remark was that users were most likely to create a first impression of the images on the background of the Log in page. This image changes every time the website is refreshed, so it's not possible to create a concrete opinion of the website if there is no apparent relation between different images.

First impressions and expectations of the Tumblr website	
User 1	The background looks quite interesting. I have realized the background changes when it refreshes. It's like in a Nordic style, quite simple.
User 2	This is either for photos or for food. It looks like a blogging platform, it seems you can find topics here.
User 3	(Comments about the image on the background) It definitely looks like it's not for interacting with other people. It looks like a place where you can find stuff.
User 4	It looks kind and positive. I presume (it) is not entertaining, it looks it has a serious purpose. The motto is not very concrete.
User 5	Mysterious (Comments about the image on the background)
User 6	(Comments about the image on the background)
User 7	The first thing I saw is that I have to create an account
User 8	"I think it's nice. It looks fresh."
User 9	I like the fact that it's very simple. Cute. Teenage thing, feeling silly.
User 10	It looks cool. In the inside I think it will be educative and that I can look at pictures in it. My expectation is to see similar things to the ones I have seen on Instagram or Twitter.
User 11	Quite few buttons, it seems nice, but I don't like the background picture. I know when you hit refresh it will change.

Table 30 First impressions and expectations of the Tumblr website Source: developed for this research

Interestingly, the last day of the study was accidentally conducted on April Fool's Day holiday (a holiday celebrated by many U.S. based websites featuring pranks on their users), so five of the participants were exposed to a joke feature of the website.

Figure 13 illustrates the normal layout of the website, whereas, in Figure 14 there are four lizards running for presidency, and if the participants had clicked on the logo of the Tumblr website on the top right, a fake news channel would have appeared.

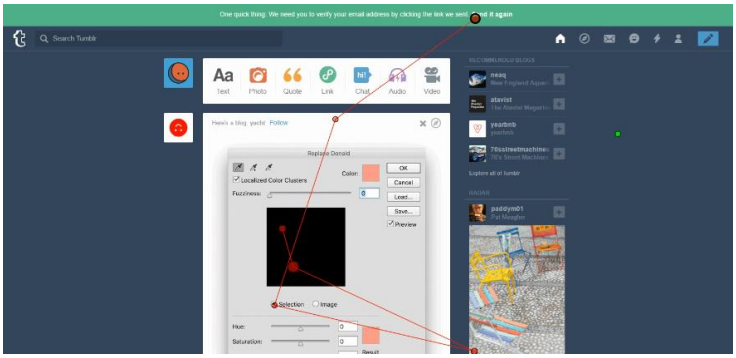

Figure 13 Normal Dashboard Source: developed for this research

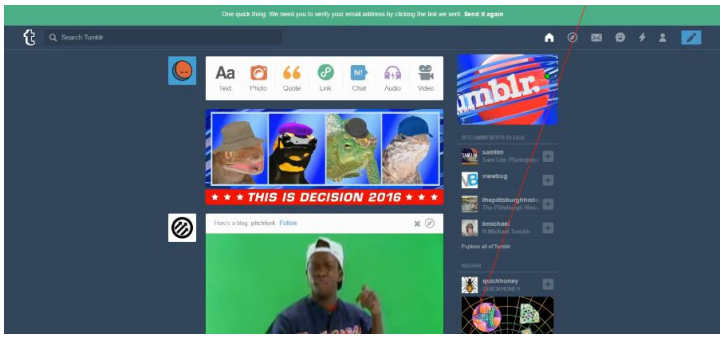

Figure 14 (right) The Dashboard on April's fools, 2016 Source: developed for this research

However, none of the participants clicked on the fake campaign features, so they were not part of the holiday celebration. Regarding the attribute of Richness and control (which was evaluated mostly from observations), the participants enjoyed the discovery of new information related to their interests, however, none of them decided to bookmark or save any of the new information they had discovered.

Chapter 6: Discussion

The issues that aroused from the video and audio recordings in the laboratory study referred to the low speed of loading of the images while using the Compass tool. There was also an inconvenience when the participants tried to log in for the first time; sometimes, the site would display an error message and ask the participants to try again. This demotivated one of the participants, who said he wouldn't use the Tumblr website "ever again" because of it.

The Tumblr website was successfully persuasive in cases when the content of the participants' interest was presented to them, they seemed to be truly involved with what was being displayed on the screen. Trust continues to be an important element not to disengage users, albeit it was not thoroughly analysed in this study.

The UES was developed exclusively in English, but some participants' first language wasn't English and they might have understood some questions incorrectly, however, this was relevant while the survey was being built and it was always kept in mind. The very few changes in the wording of the questions were due to this condition.

The participants' experiences on the day of the study might have influenced their behaviour, in other words, "the experience and, as a consequence, engagement with the same tool in different circumstances (time of the day, devices used, time availability) will often be different. This means that observing user behaviour over a single session may be limiting in terms of evaluating engagement" (Lalmas, M., O'Brien, H., & Yom-Tov, E. (2014). The same rule applied to the respondents of the online UES.

Another inconsistency appeared when participants were asked how much time they thought had passed between the moment that they created their accounts to the moment that they had finished editing the appearance of their blogs.

The answers of these questions would have been compared to the values of Focussed Attention, but soon after examining the visual data, it was clear that no correlation would be found between them. Moreover, this method has not yet been validated by any of the researchers on the literature review.

Chapter 7: Conclusion

Tumblr, as any other microblogging platform, aims to provide a simple system for social interaction and self-expression that allows to post, share and find information online. Through statistical analysis applied to the UES in Tumblr, both in a small and large scale, it was possible to extract a quantitative answer to the question: What are the most successful user engagement methods in microblogging platforms? The results are displayed in Table 31.

Means comparisons		
Attributes of UE	Large scale UES	Laboratory UES
Focussed Attention	3.61	3.71
Perceived Usability	6.05	4.65
Aesthetic Appeal	5.14	4.63
Endurability	5.01	4.23
Novelty	4.72	4.06
Felt Involvement	4.99	4.45

Table 31 Means comparison of the Field study and the Laboratory study Source: developed for this research

The main findings reveal that, in consecutive order, the most successful attributes of user engagement are:

- Perceived Usability
- Aesthetic Appeal
- Felt Involvement

These results do not match with previously reported research, which was expected, because different users engage with different websites differently. This is also the main implication of this research for people working in the field of User Engagement (UE).

The results contradict the initial hypothesis that the Aesthetic Appeal would be the most successful of the attributes of UE, which has been justified in terms of the users finding alternative ways to use the website (e.g. Google Chrome extensions).

The assumption that the Tumblr website is engaging turned in positive results of 4.8 for the large scale UES and 4.2 for the laboratory study. This result is optimistic in terms of growth for the Tumblr website, although certain reported features by the participants of the laboratory study may have affected the attributes with lower scores.

Some participants expressed that the explanatory pop ups of the website were “annoying”, which might have diverted their attention, affecting the score of the attribute of focused attention. A result of this was not being able to remember or focus on a positive experience, which is why most of the participants have not used the Tumblr website since, referring to the low score of the attribute of Endurability.

Based on these results, it was advised to revise the design principles of contrast, compositional flow and movement to create a layout that would not disturb the experience of Tumblr users. It is not necessary to be an expert of UE to successfully create a design that will engage users, but it is necessary to keep in mind all of the attributes so that the total score of engagement is high.

Further research should focus on improving the reach of already existing surveys and the creation of new ones. The UES proved to be reliable in terms of obtaining data and analysable results, but so have other questionnaires.

It is possible to continue using this generalizable instrument, but it would be interesting to continue to develop new, specialized ones, to realize studies that would compare the reliability between the two, and to include more attributes of UE.

Chapter 8: Future work

The surveys used to measure the amount of UE have been evolving constantly since their creation. Hopefully the work provided in this thesis will be used to guide the corresponding updates to further studies regarding UE. It is hoped that experts who work at Tumblr will develop an interest for it as well, which is the reason this thesis will be sent to contacts in both Tumblr and Yahoo Inc..

Only 6 of the 8 characteristics of UE were tested with the UES, but, because UE works in three different dimensions (behavioural, cognitive and emotional), the possibilities to evaluate it can be more extensive, and more enduring.

The topic of extensions in microblogging platforms and UE would be an interesting topic to investigate. Perhaps in the future, it will be pertinent to ask questions such as “Do I see myself using this website in the next five years?”, “Do I have dreams about this website?”, “Would I get a tattoo of the logo of this website?” or “Do I like sharing my experience in Tumblr with others?”, that rely on an emotional and subconscious level, and focus more on the consequences and influences of Tumblr in people’s lives.

In this case, not only could the nature of users' correspondences and experiences with computing systems be enhanced, but user's health, quality of life, well-being and personal satisfaction could be decidedly affected by modifying the topics of oriented marketing and link recommendation (Gutierrez, 2015).

The goal of this thesis is relatively humble compared to the extent of what further investigation will achieve, perceiving the affective state of users when utilizing microblogging platforms for self-expression and social interaction, so one final advice for future researchers would be to double the screens in the case of utilizing Eye tracking devices, so that in the secondary screen is possible to look at the video recordings of their eyes, to check if the users are in their right positions and the device is indeed recording.

Some of the participants did not remember to maintain a regular position and at times the visual recordings were lost.

Chapter 9: Summary

User Engagement (UE) is a quality of user experience that emphasizes the positive aspects of interaction – in particular the fact of being captivated by the technology. (Lalmas, 2013).

There are eight attributes of User Engagement:

- Focused Attention
- Aesthetic Appeal
- Endurability
- Novelty
- Positive affect
- Richness and control
- Reputation, trust and expectation
- User context, motivation, incentives, and benefits

It is possible to measure the first four of these attributes using the User Engaging Scale (UES), plus two other characteristics: Felt Involvement and Perceived Usability.

Previous studies have used this scale in websites related to information search, shopping, and social networking, but the attributes of UE in microblogging platforms were still relatively unknown until the implementations of a large scale online study and a small scale laboratory study on the Tumblr website, using the User Engagement Scale (UES).

The reason the Tumblr website was selected as a representative example of microblogging platforms, was the great amount of features, such as changing the appearance of the blogs, adding large amounts of text, chat, messaging, setting a password to protect the privacy of a blog, the compass feature and having multiple blogs within the same account.

Posterior to the completion of the two studies, statistical analysis (factor analysis, table of frequencies, means, scree plots, Cronbach's alpha) was implemented, resulting in a set of subscales whose means were compared between each other to achieve the research goal of identifying the most successful attributes of user engagement in microblogging platforms: Perceived Usability, Aesthetic Appeal, and Felt Involvement.

Based on these results, it was advised to revise the design principles of contrast, compositional flow and movement to create a layout that would not disturb the experience of Tumblr users.

9.1. Summary in Estonian: Kasutajate kaasamise meetodite analüüs mikroblogimise keskkondades

Käeosoleva uurimistöö eesmärgiks on välja selgitada kõige paremaid tulemusi andvad kasutajate kaasamise ja sidustamise meetodid mikroblogimise keskkondades. Töö esimene osa annab ülevaate erinevatest varem avalikustatud uurimustest ja tulemustest. Edasi analüüsitakse varasemaid analoogseid publikatsioone, et leida parimad parameetrid ja uurimismeetodid, mida hiljem Tumblr veebilehe näitel katsetada. Töö tulemusena valmis põhjalik ülevaade kasutajate kaasamisest mikroblogimise keskkondades Tumblr veebilehe näitel.

Kasutajate kaasamine on kasutaja kogemuse parameeter, mis rõhutab interaktsiooni positiivsetele emotsioonidele tehnoloogia ja inimese vahel (Lalmas, 2013). Levinud arusaama järgi määrab kasutate kaasatuse järgmised omadused: keskendumine; väljanägemine; talutavus; uudsus; positiivne mõju; rikkalikkus ja kontrollitavus; maine, usaldatavus ja ootused; kasutaja motivatsioon ja kasu. Esimest nelja omadust saab mõõta Kasutajate Kaasamise Skaalaga (*User Engagement Scale*) ja veel 2 täiendavat omadust tunnetuslikku seotust ja näilist kasutatavust.

Eelnevad uuringud on keskendunud erinevate veebilehtede, on-line teenuste ja sotsiaalsetele suhtluskeskkondadele. Antud uuring rakendab kasutajate kaasamise skaala meetodit Tumblr mikroblogimise keskonnal. Tulemuste paremaks usaldatavuseks viidi läbi väikesearvuline pilgujägijaga detailne laboriuuring ja laiapõhjalisem veebiküsitlus. Antud töös valiti Tumblr mikroblogimise keskkondade seast kui testplatvorm, sest on suure funktsionaalusega ja kergesti kohandatav vastavalt kasutaja soovidele. Lisaks võimaldab Tumblr keskkonnas üles laadida erineval kujul meediat lühike tekst, pikk tekst, küljendatud tekst, pildid, pidlidalbum, video, lingid, jne… mida teised populaarsed mikroblogimise keskkonnad mugavalt ei võimalda. Suur eelis on ka funktsionaalsus, et ühel kasutajal võib olla mitu erinevat blogi ja ta saab valida kohandada iga blogi seadeid erinevalt vastavalt soovidele.

Uuringu tulemustele rakendati faktor analüüsi meetodit (*factor analysis*) ja tulemuseks saadi sageduste tabel, keskmiste võrdlus, scree plot (hajususgraafik) ja Cronbach's alpha (usaldatavuse graafik). Mõlema uuringu tulemusena saadi, et kasutatavus, väljanägemine ja seotus andsid kõrgeimad tulemusi ehk mõjutavad kasutate kaasamist enim.

Uuringu tulemusena leiti, et mõned veebilehtede elemendid ei ole olulised kasutajate kaasamise suurendamiseks, ja töös toodi välja ka soovitusi kontrasti, paigutuse ja suunamise redigeerimiseks

Tumblr lehe näitel. Töö tulemusena valmis põhjalik ülevaade kasutajate kaasamisest mikroblogimise keskkondades ja saadud tulemused on rakendatavad erinevates mikroblogimise keskkondades kasutate paremaks kaasamiseks ja sidustamiseks.

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References

Adam N. Joinson. 2008. Looking at, looking up or keeping up with people? motives and use of Facebook. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '08). ACM, New York, NY, USA, 1027-1036. DOI=http://dx.doi.org/10.1145/1357054.1357213

Alejandro Jaimes, Mounia Lalmas, and Yana Volkovich. 2011. First international workshop on social media engagement (SoME 2011). *SIGIR Forum* 45, 1 (May 2011), 56-62. DOI=http://dx.doi.org/10.1145/1988852.1988863

Ahmad, Irfan (2014, April 3). How to Produce Content for Facebook, Twitter, Instagram, LinkedIn, Tumblr and Snapchat- infographic. Retrieved March 16, 2016, from http://www.digitalinformationworld.com/2014/04/how-to-produce-content-for-social-media-infographics.html

Attfield, S., Kazai G., Lalmas M., and Piwowarsk, B (2011, February 11). Towards a science of user engagement (Position paper) [Pdf]. Hong Kong: WSDM'11. ACM 978-1-4503-0493-1/11/02. Retrieved March 5, 2016.

Banhawi, F., Ali, N. M., & Judi, H. M. (2011). Measuring user engagement levels in social networking application. Proceedings of the 2011 International Conference on Electrical Engineering and Informatics. Retrieved January 21, 2016.

Bradley, S. (2015, April 29). Design Principles: Compositional Flow and Rhythm. Retrieved April 14, 2016, from https://www.smashingmagazine.com/2015/04/design-principles-compositional-flow-and-rhythm/

Chapman, P., Selvarajah, S., & Webster, J. (1997). Engagement in multimedia training systems. Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers. Retrieved March 12, 2016.

Cheng, Ran. (2003). Persuasion Strategies for Computers as Persuasive Technologies [Pdf]. Department of Computer Science, University of Saskatchewan. Retrieved the 22 of April of 2016

Christopher Peters, Ginevra Castellano, and Sara de Freitas. 2009. An exploration of user engagement in HCI. In *Proceedings of the International Workshop on Affective-Aware Virtual Agents and Social Robots* (AFFINE '09), Ginevra Castellano, Jean-Claude Martin, John Murray, Kostas Karpouzis, and Christopher Peters (Eds.). ACM, New York, NY, USA, Article 9, 3 pages. DOI=http://dx.doi.org/10.1145/1655260.1655269

Cooper, Belle Beth (2014, January 06). 10 Awesome Infographics to Guide Your Marketing Plan. Retrieved March 16, 2016, from https://blog.bufferapp.com/10-awesome-infographics-to-inform-your-marketing-plan-for-2014

Cozuela, Fernando. (2014, March 18). Where to Post your Visual Content: Pinterest vs Tumblr. Retrieved March 16, 2016, from http://everypost.me/blog/visual-content-pinterest-vs-tumblr/

D. Warnock and M. Lalmas. 2015. An Exploration of Cursor tracking Data, arXiv preprint arXiv:1502.00317.

Donghyuk Shin, Suleyman Cetintas, Kuang-Chih Lee, and Inderjit S. Dhillon. (2015). Tumblr Blog Recommendation with Boosted Inductive Matrix Completion. In *Proceedings of the 24th ACM International on Conference on Information and Knowledge Management* (CIKM '15). ACM, New York, NY, USA, 203-212. DOI=http://dx.doi.org/10.1145/2806416.2806578

Eickhoff, C., Harris, C. G., Vries, A. P., & Srinivasan, P. (2012). Quality through flow and immersion. Proceedings of the 35th International ACM SIGIR Conference on Research and Development in Information Retrieval - SIGIR '12. Retrieved March 12, 2016. ACM 978-1-4503-1472-5/12/08 DOI: 10.1145/2348283.2348400. 77

Eric T. (2008) Peterson and Joseph Carrabis. Measuring the Immeasurable: Visitor Engagement. Retrieved March 7, 2016.

Farmer, F. R., & Glass, B. (2010). Building Web reputation systems. Page 3. Retrieved March 14, 2016.

Fogg, B.J. (1997). Captology: The Study of Computers as Persuasive Technologies. Retrieved April 22, 2016, from http://www.sigchi.org/chi97/proceedings/sig/bjf.htm

Fogg, B.J. (2009). Creating Persuasive Technologies: An Eight-Step Design Process [Pdf]. Claremont, California, USA. Retrieved the 22 of April of 2016.

Francisco J. Gutierrez and Barbara Poblete. 2015. Sentiment-based User Profiles in Microblogging Platforms. In *Proceedings of the 26th ACM Conference on Hypertext & Social Media* (HT '15). ACM, New York, NY, USA, 23-32. DOI=http://dx.doi.org/10.1145/2700171.2791027

Firdaus, B., Nazlena, M. A., Hairuliza, M., J., (2012). User Engagement attributes and levels in Facebook. Journal of Theoretical and Applied Information Technology, 41(1), 11-19. Retrieved January 27, 2016, from http://www.jatit.org/volumes/Vol41No1/2Vol41No1.pdf E-ISSN: 1817-3195

Fulmer, S. M., & Frijters, J. C. (2009). A review of self-report and alternative approaches in the measurement of student motivation. Educational Psychology Review, 21, 219-246.

Heather L. O'Brien and Elaine G. Toms. 2008. What is user engagement? A conceptual framework for defining user engagement with technology. *J. Am. Soc. Inf. Sci. Technol.* 59, 6 (April 2008), 938-955. DOI=http://dx.doi.org/10.1002/asi.v59:6

Heather L. O'Brien and Elaine G. Toms. 2010. The development and evaluation of a survey to measure user engagement. *J. Am. Soc. Inf. Sci. Technol.* 61, 1 (January 2010), 50-69. DOI=http://dx.doi.org/10.1002/asi.v61:1

Janette Lehmann, Mounia Lalmas, Ricardo Baeza-Yates, and Elad Yom-Tov. (2013). Networked user engagement. In *Proceedings of the 1st workshop on User engagement optimization* (UEO '13). ACM, New York, NY, USA, 7-10. DOI=http://dx.doi.org/10.1145/2512875.2512877

Jiejun Xu, Ryan Compton, Tsai-Ching Lu, and David Allen (2014) Rolling through Tumblr: characterizing behavioural patterns of the microblogging platform. In *Proceedings of the 2014 ACM conference on Web science* (WebSci '14). ACM, New York, NY, USA, 13-22. DOI=http://dx.doi.org/10.1145/2615569.2615694

Janette Lehmann, Mounia Lalmas, Elad Yom-Tov, and Georges Dupret. (2012). Models of user engagement. In *Proceedings of the 20th international conference on User Modeling, Adaptation, and Personalization* (UMAP'12), Judith Masthoff, Bamshad Mobasher, Michel C. Desmarais, and Roger Nkambou (Eds.). Springer-Verlag, Berlin, Heidelberg, 164-175. DOI=http://dx.doi.org/10.1007/978-3-642-31454-4_14

José Antonio Hyder Espineira. Proposal of a website engagement scale and research model. Analysis of the influence of intra-website comparative behavior. University of Valencia (Spain), 2010.

Kaplan, A. M., & Haenlein, M. (2011). The early bird catches the news: Nine things you should know about micro-blogging. Business Horizons, 54(2), 105-113.

Krause, J. (2004). Design basics index. Cincinatti, OH: F W. Retrieved April 13, 2016.

Lalmas, Mounia. (2013, May 8). Measuring User Engagement. Retrieved November 07, 2015, from http://www.slideshare.net/mounialalmas/measuring-userengagement

Lalmas, M., O'Brien, H., & Yom-Tov, E. (2014). Measuring user engagement. Synthesis Lectures on information concepts, retrieval, and Services Gary Marchionini, Series Editor MORGAN&CLAYPOOL. Retrieved November 22, 2015.

Lalmas, M., & Warnock, D. (2015, February 3). An Exploration of Cursor tracking Data [Pdf]. Barcelona: Yahoo Labs.

M. (n.d.). Customer Engagement on Facebook: A Social Brand Experience? (Unpublished master's thesis). NORGES HANDELSHØYSKOLE. Retrieved November 23, 2015, from http://hdl.handle.net/11250/169935

Mauro José de Oliveira, Melby Karina Zuniga Huertas, and Zhibin Lin. 2016. Factors driving young users' engagement with Facebook. *Comput. Hum. Behav.* 54, C (January 2016), 54-61. DOI=http://dx.doi.org/10.1016/j.chb.2015.07.038

Melanie Kellar, Carolyn Watters, and Michael Shepherd. 2007. A field study characterizing Web-based information-seeking tasks. *J. Am. Soc. Inf. Sci. Technol.* 58, 7 (May 2007), 999-1018. DOI=http://dx.doi.org/10.1002/asi.v58:7 Retrieved April 4, 2016

Morgan Jennings. 2000. Theory and models for creating engaging and immersive ecommerce Websites. In *Proceedings of the 2000 ACM SIGCPR conference on Computer personnel research*(SIGCPR '00). ACM, New York, NY, USA, 77-85. DOI=http://dx.doi.org/10.1145/333334.333358

O'Brien, H.L. & McLean, K. (2009). Measuring the User Engagement Experience. Engagement by Design Pre Conference Workshop, CHI 2009 Digital Life New World, Boston, MA, April 5, 2009 [Short Paper and presentation].

O'Brien, H.L. & Toms, E.G. Examining the Generalizability of the User Engagement Scale (UES) in Exploratory Search. Information Processing and Management (In press) DOI: http://dx.doi.org/10.1016/j.ipm.2012.08.005.

O'Brien, H.L. & Toms, E.G. (2010). Is there a Universal Instrument for Measuring Interactive Information Retrieval? The Case of the User Engagement Scale. In Proceedings of Information Interaction in Context (IIiX), Rutgers, NJ, pp. 335-340, ACM Digital Library, DOI: 10.1145/1840784.1840835.

O'Brien, H.L. & Toms, E.G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. Journal of the American Society for Information Science & Technology, 59(6), 938- 955. DOI: 10.1002/asi.20801.

Oreskovic, A. (2016, February 02). Yahoo just admitted that it overpaid for Tumblr. Retrieved April 28, 2016, from http://www.businessinsider.com/yahoo-tumblr-write-down-shows-it-overpaid-2016-2

Prust, Z. (2010) Graphic Communications Chapter 5 Design and Layout [Pdf]. Goodheart-Willcox. Page 89. Retrieved April 14 of 2016.

Romano, A. (2014, October 30). Tumblr users can't handle the new Tumblr dashboard. Retrieved April 28, 2016, from http://www.dailydot.com/geek/tumblr-meltdown-over-dashboard-changes/

Saravanan Thirumuruganathan, Nan Zhang, Vagelis Hristidis, and Gautam Das. 2014. Aggregate estimation over a microblog platform. In *Proceedings of the 2014 ACM SIGMOD International Conference on Management of Data* (SIGMOD '14). ACM, New York, NY, USA, 1519-1530. DOI=http://dx.doi.org/10.1145/2588555.2610517

Serena Hillman, Jason Procyk, and Carman Neustaedter. 2014. Tumblr fandoms, community & culture. In *Proceedings of the companion publication of the 17th ACM conference on Computer supported cooperative work & social computing* (CSCW Companion '14). ACM, New York, NY, USA, 285-288. DOI=http://dx.doi.org/10.1145/2556420.2557634

Serena Hillman, Jason Procyk, and Carman Neustaedter. 2014. 'alksjdf;Lksfd': tumblr and the fandom user experience. In *Proceedings of the 2014 conference on Designing interactive systems* (DIS '14). ACM, New York, NY, USA, 775-784. DOI=http://dx.doi.org/10.1145/2598510.2600887

Serenko, A. and Turel, O. (2007) *Are MIS research instruments stable? An exploratory reconsideration of the computer playfulness scale. Information & Management*, 44 (8), pp. 657-665.

Sternberg, R., & Sternberg, K. (2012). Cognitive psychology [Pdf]. Belmont, USA: Wadsworth Cengage Learning. Page 113. Retrieved on April 14 of 2016.

Sutcliffe, A. (2010). Designing for user engagement: Aesthetic and attractive user interfaces. San Rafael, CA: Morgan & Claypool.

Teun Lucassen and Jan Maarten Schraagen. 2010. Trust in Wikipedia: how users trust information from an unknown source. In *Proceedings of the 4th workshop on Information credibility* (WICOW '10). ACM, New York, NY, USA, Page 19. DOI=http://dx.doi.org/10.1145/1772938.1772944

Tumblr. (n.d.). Retrieved March 04, 2016, from http://www.tumblr.com/

Tumbr Staff. (2014, October 30). Two-lil-changes-to-the-dashboard-rolling-out. Retrieved April 28, 2016, from https://staff.tumblr.com/post/101343889090/two-lil-changes-to-the-dashboard-rolling-out

Tumbr Staff. (2013, May 30). Tumblr Staff. Retrieved April 28, 2016, from https://staff.tumblr.com/post/51733370152/since-we-launched-our-first-sponsored-post-on

Verhagen, T., Feldberg, F., van den Hooff, B., Meents, S., & Merikivi, J. (2011). Satisfaction with virtual worlds: an integrated model of experiential value. Information & Management, 48(6), 201e207.

Vidani, P. (2012, May 4). Peter Vidani on the Evolution of the Tumblr Dashboard. Retrieved April 28, 2016, from http://storyboard.tumblr.com/post/22380369570/peter-vidani-on-the-evolution-of-the-tumblr

Warnock D., & Lalmas, M.. (2015, February 1). An Exploration of Cursor tracking Data [Pdf]. Barcelona: Yahoo Labs. Retrieved March 29, 2016.

Weiguo Fan and Michael D. Gordon. 2014. The power of social media analytics. *Commun. ACM* 57, 6 (June 2014), 74-81. DOI=http://dx.doi.org/10.1145/2602574

Womack, B. (2016, February 2). Yahoo to Pursue Asset Sales, Cut 15% of Staff. Retrieved April 28, 2016, from http://www.bloomberg.com/news/articles/2016-02-02/yahoo-exploring-options-for-some-units-cutting-15-of-staff

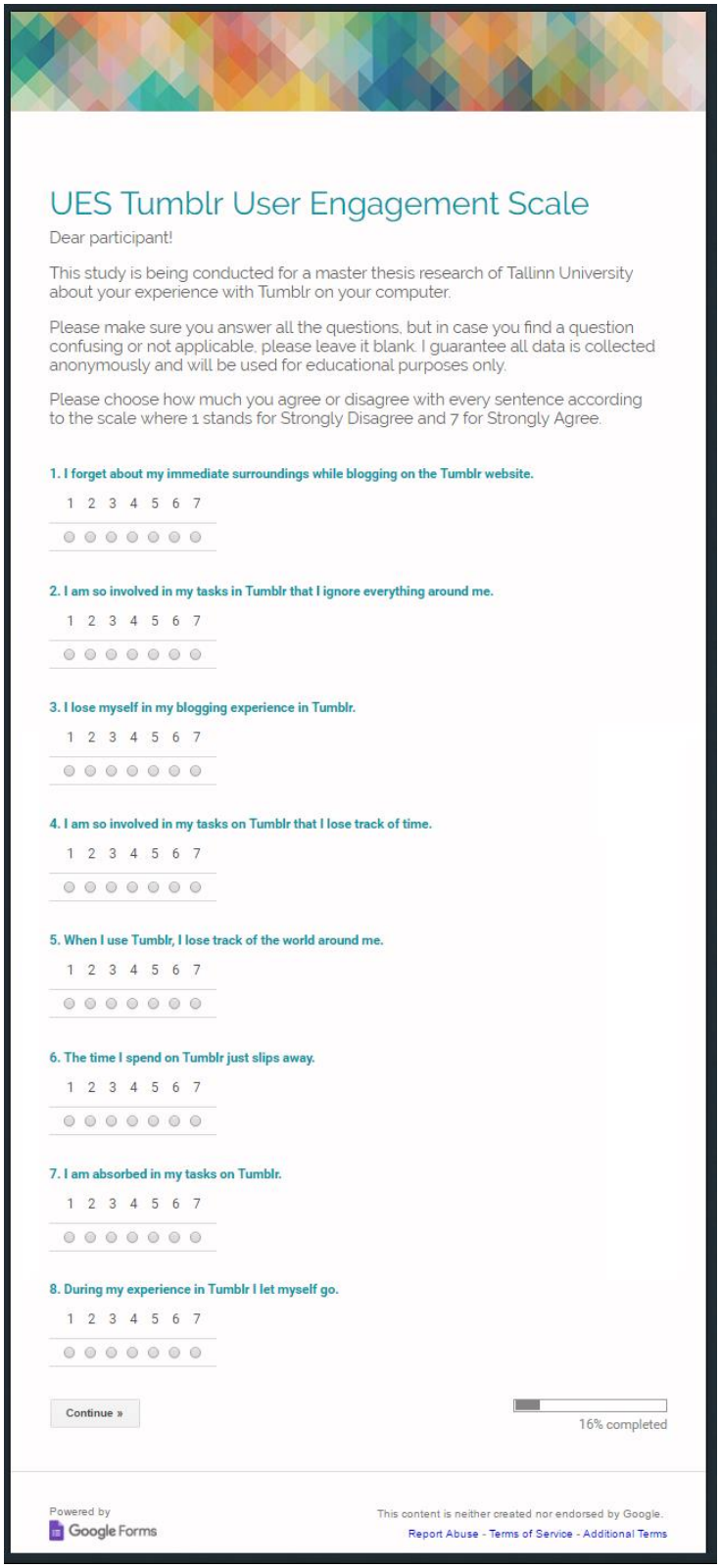
Xu, Q. (2015). Examining User Engagement Attributes in Visual Information Search. In iConference 2015 Proceedings.

Yang, J., Bozzon, A., & Houben, G. (2015). Harnessing Engagement for Knowledge Creation Acceleration in Collaborative Q&A Systems. Lecture Notes in Computer Science User Modeling, Adaptation and Personalization, 315-327. Retrieved March 15, 2016.

Yi Chang, Lei Tang, Yoshiyuki Inagaki, and Yan Liu. (2014). What is Tumblr: a statistical overview and comparison. *SIGKDD Explor. Newsl.* 16, 1 (September 2014), 21-29. DOI=http://dx.doi.org/10.1145/2674026.2674030

Yocum, M. (2009, November 30). Principles of Design. Retrieved April 13, 2016, from https://sites.google.com/site/principlesofdesignsite/

Appendix A: Tumblr User Engagement Scale



UES Tumblr User Engagement Scale

Dear participant!

This study is being conducted for a master thesis research of Tallinn University about your experience with Tumblr on your computer.

Please make sure you answer all the questions, but in case you find a question confusing or not applicable, please leave it blank. I guarantee all data is collected anonymously and will be used for educational purposes only.

Please choose how much you agree or disagree with every sentence according to the scale where 1 stands for Strongly Disagree and 7 for Strongly Agree.

1. I forget about my immediate surroundings while blogging on the Tumblr website.

1 2 3 4 5 6 7

2. I am so involved in my tasks in Tumblr that I ignore everything around me.

1 2 3 4 5 6 7

3. I lose myself in my blogging experience in Tumblr.

1 2 3 4 5 6 7

4. I am so involved in my tasks on Tumblr that I lose track of time.

1 2 3 4 5 6 7

5. When I use Tumblr, I lose track of the world around me.

1 2 3 4 5 6 7

6. The time I spend on Tumblr just slips away.

1 2 3 4 5 6 7

7. I am absorbed in my tasks on Tumblr.

1 2 3 4 5 6 7

8. During my experience in Tumblr I let myself go.

1 2 3 4 5 6 7

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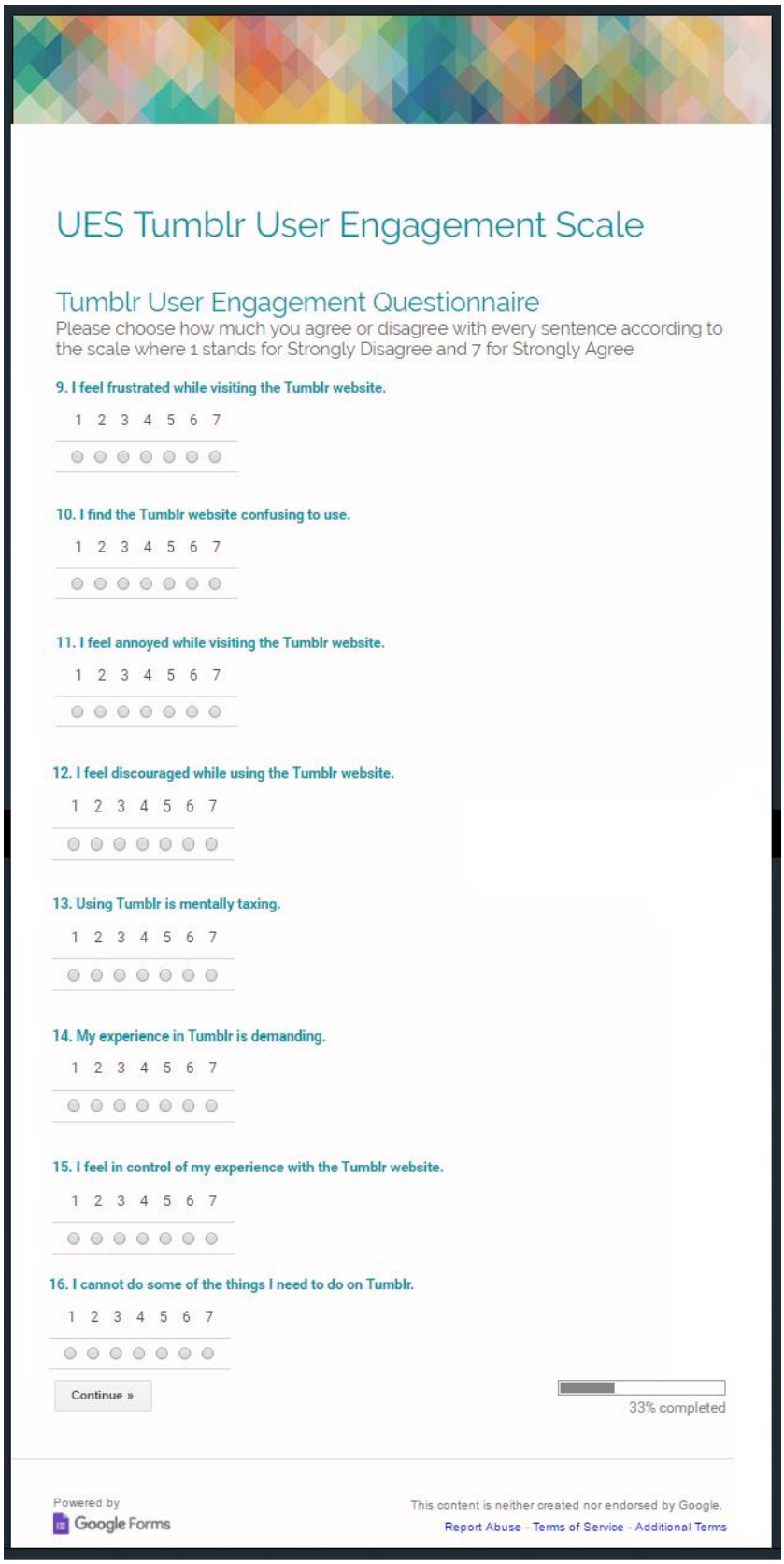
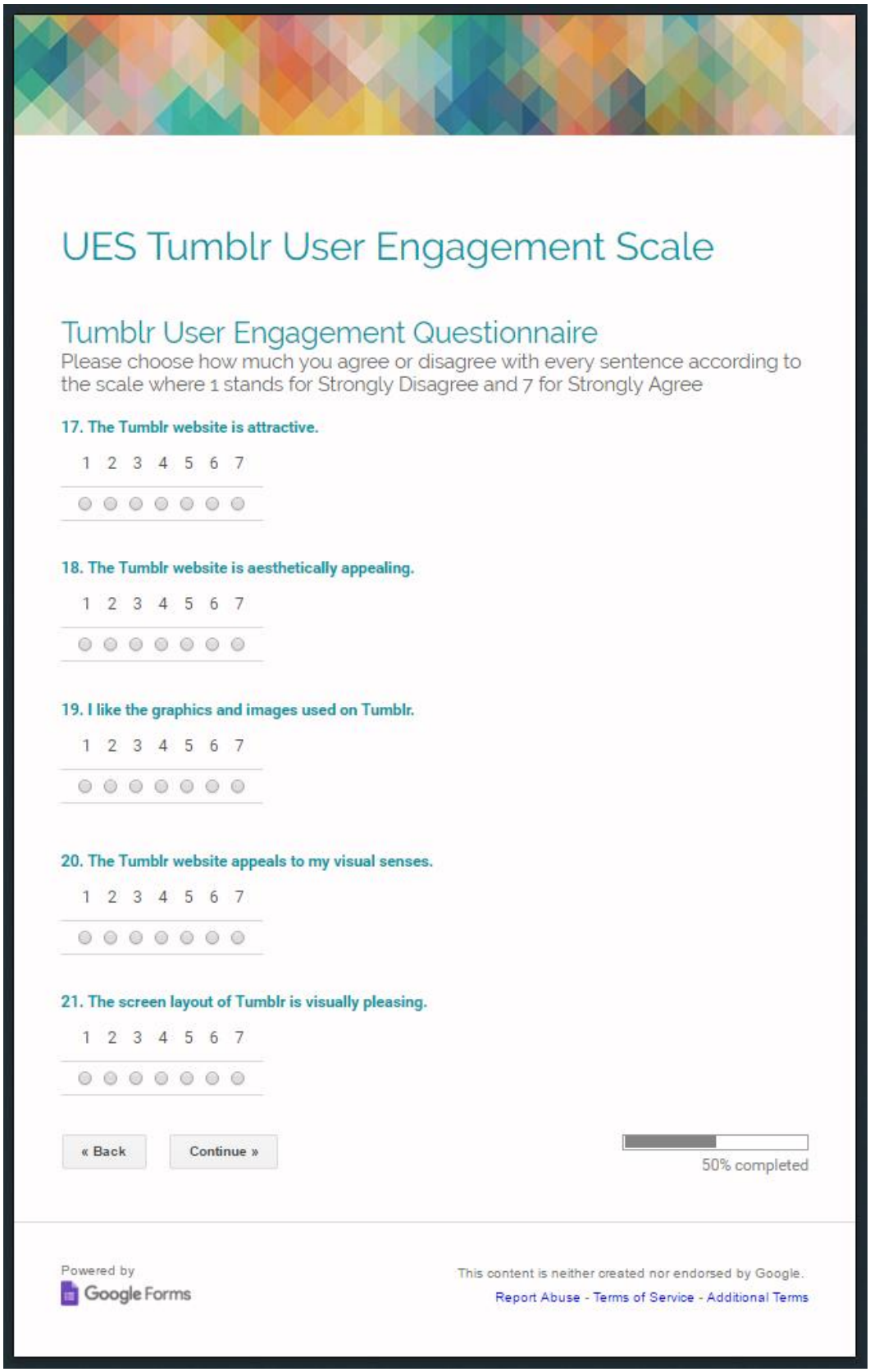
Page 1 of the online UES Subscale of Focused Attention



Page 2 of the online UES Subscale of Perceived Usability



UES Tumblr User Engagement Scale

Tumblr User Engagement Questionnaire

Please choose how much you agree or disagree with every sentence according to the scale where 1 stands for Strongly Disagree and 7 for Strongly Agree

17. The Tumblr website is attractive.

1 2 3 4 5 6 7

18. The Tumblr website is aesthetically appealing.

1 2 3 4 5 6 7

19. I like the graphics and images used on Tumblr.

1 2 3 4 5 6 7

20. The Tumblr website appeals to my visual senses.

1 2 3 4 5 6 7

21. The screen layout of Tumblr is visually pleasing.

1 2 3 4 5 6 7

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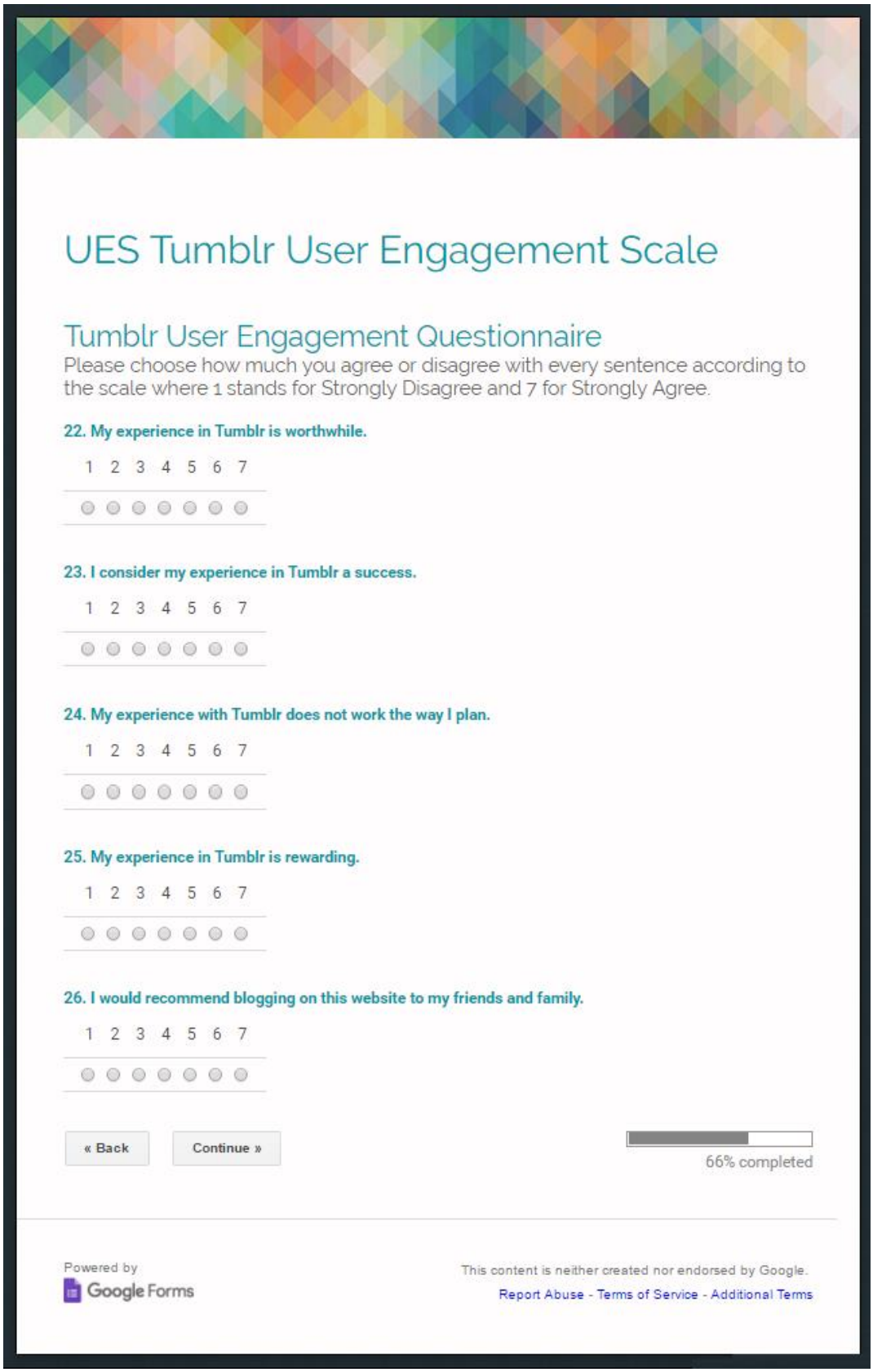
Page 3 of the online UES Subscale of Aesthetic Appeal



UES Tumblr User Engagement Scale

Tumblr User Engagement Questionnaire

Please choose how much you agree or disagree with every sentence according to the scale where 1 stands for Strongly Disagree and 7 for Strongly Agree.

22. My experience in Tumblr is worthwhile.

1 2 3 4 5 6 7

23. I consider my experience in Tumblr a success.

1 2 3 4 5 6 7

24. My experience with Tumblr does not work the way I plan.

1 2 3 4 5 6 7

25. My experience in Tumblr is rewarding.

1 2 3 4 5 6 7

26. I would recommend blogging on this website to my friends and family.

1 2 3 4 5 6 7

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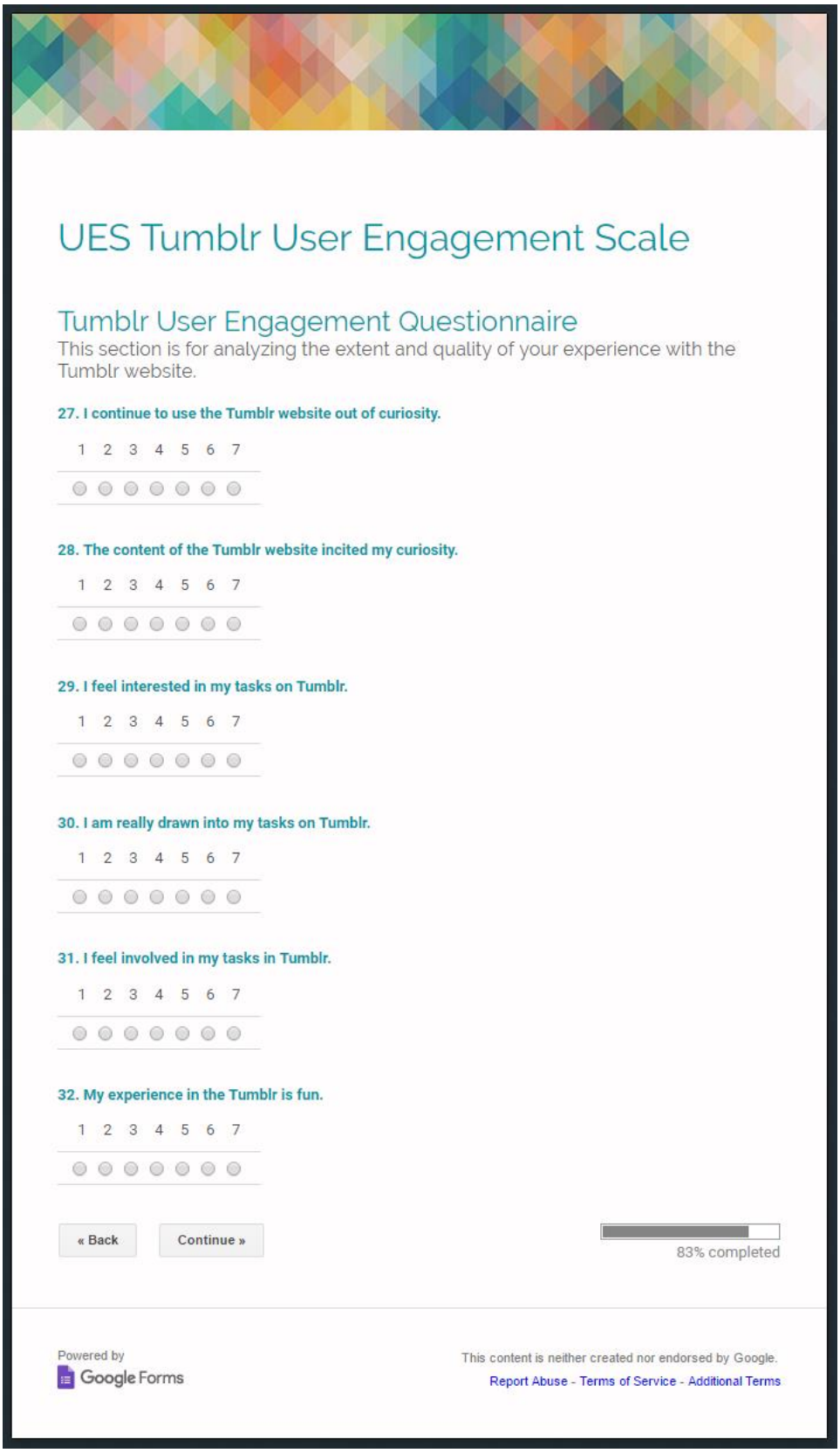
Page 4 of the online UES Subscale of Endurability



UES Tumblr User Engagement Scale

Tumblr User Engagement Questionnaire

This section is for analyzing the extent and quality of your experience with the Tumblr website.

27. I continue to use the Tumblr website out of curiosity.

1 2 3 4 5 6 7

28. The content of the Tumblr website incited my curiosity.

1 2 3 4 5 6 7

29. I feel interested in my tasks on Tumblr.

1 2 3 4 5 6 7

30. I am really drawn into my tasks on Tumblr.

1 2 3 4 5 6 7

31. I feel involved in my tasks in Tumblr.

1 2 3 4 5 6 7

32. My experience in the Tumblr is fun.

1 2 3 4 5 6 7

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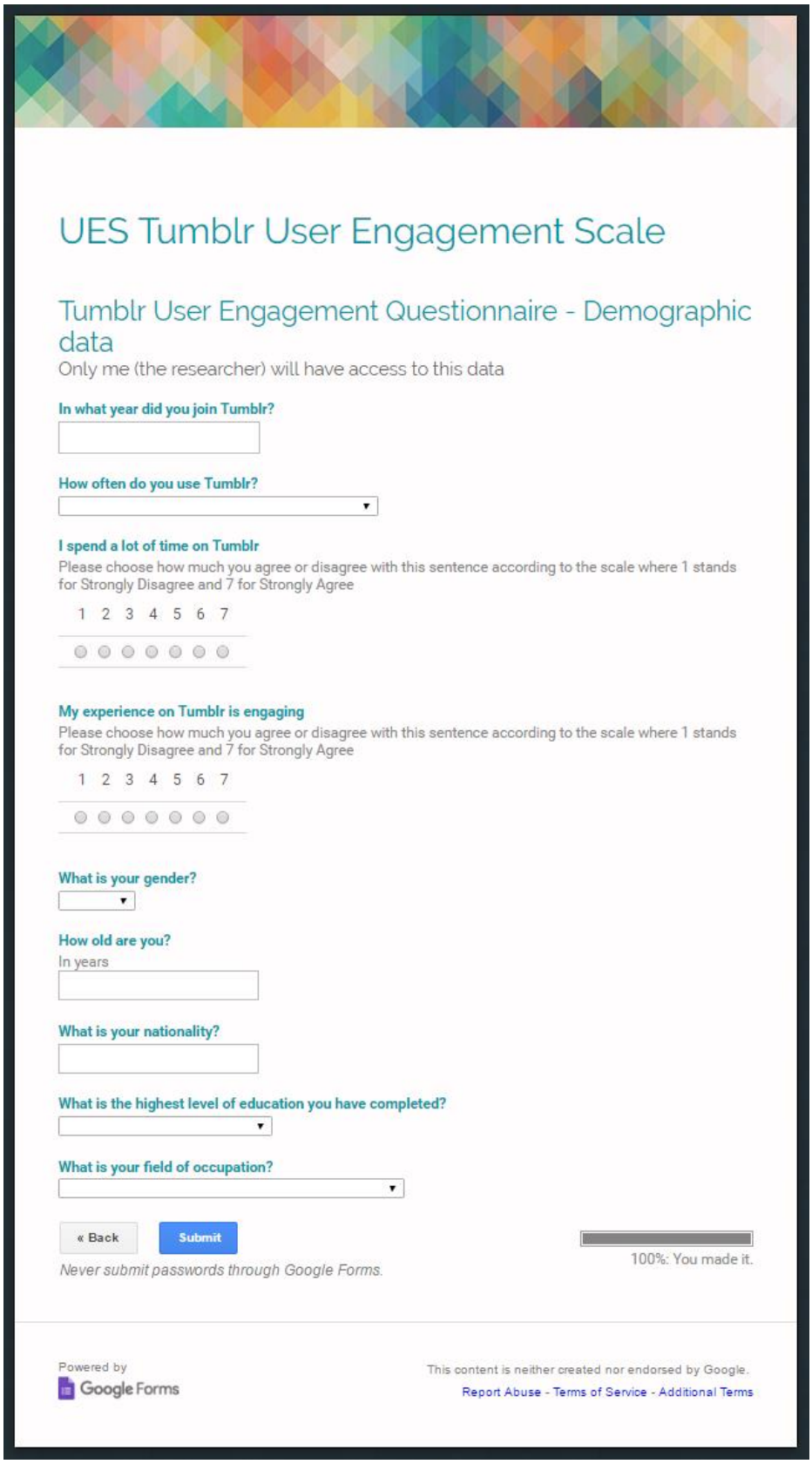
Page 5 of the online UES Subscale of Novelty and Felt Involvement



UES Tumblr User Engagement Scale

Tumblr User Engagement Questionnaire - Demographic data

Only me (the researcher) will have access to this data

In what year did you join Tumblr?

How often do you use Tumblr?

I spend a lot of time on Tumblr

Please choose how much you agree or disagree with this sentence according to the scale where 1 stands for Strongly Disagree and 7 for Strongly Agree

1 2 3 4 5 6 7

My experience on Tumblr is engaging

Please choose how much you agree or disagree with this sentence according to the scale where 1 stands for Strongly Disagree and 7 for Strongly Agree

1 2 3 4 5 6 7

What is your gender?

How old are you?

In years

What is your nationality?

What is the highest level of education you have completed?

What is your field of occupation?

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Page 6 of the online UES Demographic data