Making use of automation: Designing a performance driven marketing tool for Smart video

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Abstract

Online advertising is a multi billion dollar industry used by marketers all over the world. Online advertising methods enable merchants a way to deliver information that is targeted to those consumers who potentially would value the information the most and are most likely to act on it. This can be done by using data collected from people through search history, social media profiles and other services when distributing personalized ads that fit peoples corresponding profiles. With a greater amount of options available for ad targeting and more detailed statistics about online ad performance than ever before, the workload for marketers is constantly increasing. This is where automation can be of major assistance.

This thesis explores how different Levels Of Automation can be used in online marketing to assist marketers in the process of creating and following up on ad campaigns. The iterative *user experience design process* have been used to develop a design proposal of a performance driven marketing tool for the Smart video platform. First a research study was conducted in order to gather information about online advertising and automation in interface design. The result from the research was then analyzed and a lo-fi prototype was constructed. The prototype was continuously tested and evaluated in order to improve the design. Finally a hi-fi prototype of the marketing tool was implemented and usability tested. The design proposal illustrates how automation can be used to propose or automatically select a market strategy (that is based on previous ad performance data) for online advertisements. The design proposal uses colors to indicate what level of automation the system is working on. The results from the usability testing, with support from previous studies indicates that information and feedback are two of the most important aspects to consider when designing for automation.

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Chapter 1

Introduction

Online advertising is a multi billion dollar industry used by marketers all across the world [44]. This type of advertising is available, not only to large companies, but for basically anyone who wants to advertise [51].

When advertising in television, newspaper or radio, the information that reaches out to people do so more or less regardless of their interests and how relevant they might be as a target audience. It can also be difficult for the marketers to know who have actually seen their ads [24]. Online advertising methods on the other hand enable merchants a way to deliver information that is targeted to those consumers who potentially would value the information the most and are most likely to act on it [15]. This can be done by analyzing data collected from people through search history, social media profiles and other services, and then use this information when distributing personalized ads that fit peoples corresponding profiles [51].

With greater amount of options for ad targeting and more detailed statistics about online ad performance than ever before, the workload for marketers is constantly increasing. The best advertisers in the world might spend several hours a day analyzing spreadsheets of data to determine what ads are performing best. It can be a time consuming job, but the time and effort invested into strategy, creation and optimization can be very profitable.

Unfortunately for many companies they do not have the time and resources required for this level of analysis. Because of this, the way many companies end up advertising online becomes somewhat of a guessing game that is based on human intuition, rather than statistically significant facts.

Whether the goal is to increase product sales or enhance brand awareness, every dollar spent on advertisement that is not reaching the specified goal can be seen as a bad investment. John Wanamaker, a United States merchant once said *"Half the money I spend on advertising is wasted; the trouble is I do not know which half"* [26]. Not having a clear advertisement strategy can be very costly, and if not done right a lot more than half of the money spent on marketing might go to waste. Creating ad targeting online ads as well as optimizing ads over the time of a campaign can be a very time consuming job,

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and even the most experienced digital advertisers can miss key insights in data when performance analysis and optimization is done manually.

Spending money on ads that are being shown to people not interested in the content can be seen as waste. Not only is it bad for the sake of the advertisers, it's bad for everyone who is being targeted with irrelevant ads [37].

An increased usage of ad-blocking software [4] indicates that more and more people are fed up with the way online advertising works today. This together with findings that people in general have a negative attitude towards personalized ads [46], offers opportunities for developers to create better solutions for the online ad experience. Solutions that can enhance the user experience and target the correct audience.

1.1 The Client

This master thesis was written at Codemill AB. Codemill is a software development company based in Umeå, Sweden. The company was founded in 2007 and today they employ approximately 45 people [1]. Codemill is working with many major international clients, and many of their projects revolves around media and different video solutions. Codemill has their own product called Smart video[2], which is a tool for creating and showing shoppable videos online. This product has only been developed for a few years and its possibilities and areas of usage are still being explored. One of the current visions pronounced for the Smart video platform is "making it smarter". The results from this master thesis hope to contribute to the pursuit of reaching this goal.

1.2 The Smart video Platform

Video advertising is a phenomenon that have been around for more than 75 years [35]. However, findings have shown that promoting video content that contains only advertising can make it hard for companies to drive increased viewer engagement with their brand [1].

Smart video is taking a swing towards better user experience when it comes to video advertising and promoting products for sale. The way that the Smart video player works is that it primarily focus on the video content and secondarily provides a way of promoting products to the viewers. Creators or companies can make videos that people find interesting and actually want to watch, and the Smart video player then offers a way of turning these videos into a shoppable experience by making products available for purchase as they appear in the video, as seen in Figure 1.1. The video content is playing in the upper part of the Smart video player and products appear in a product bar in the lower section of the player. If a product image is clicked, the user will be redirected to a website where, in most cases, the product is available for purchase.

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[1]`https://codemill.se/team/` Codemill AB, accessed on: 2017-10-12
[2]`https://smartvideo.io` Smart video, accessed on: 2017-10-12

This approach of placing video content first and products second offers companies or creators a way to build a relation with their audience based on the video experience rather than the products themselves.
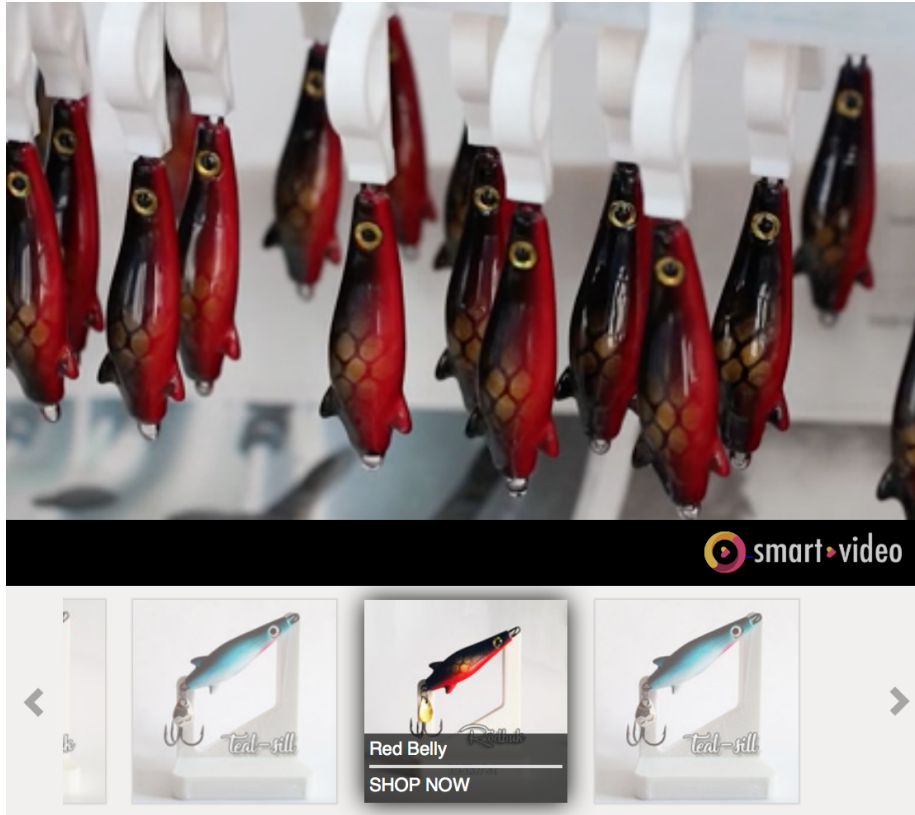
Figure 1.1: Print-screen from the Smart video player, Showing the video content in the top section and the products that are linked to the video in a product bar at the bottom section of the player.

1.3 Objective

This master thesis is about researching how online advertising works today and how automation can be used in online marketing to assist marketers in the process of creating and following up on ad campaigns. The information gathered in the research phase was analyzed and design opportunities illustrated as a design proposal of a performance driven marketing tool for the Smart video platform. Questions around which the design was developed were:

- How can automation be used in a marketing tool to help marketer when creating ad campaigns?

- How can the current Level of Automation be displayed to the user in the interface?

- How do you prevent confusion regarding the level of automation (Mode confusion)?

- How could feedback from automated processes be displayed to a user, so that it is understandable?

1.4   Goal

The design proposal of the marketing tool should show how automation can potentially be used in online marketing to help marketers when creating and following up on ads. The design proposal aims to "keep the human in the loop" by designing the interface around the principal of *Human-centered automation* [6]. One desired effect of the design is to show how automation can be used to streamline and simplify ad creation and ad management.

1.5   Requirements

The design should

- Show how automation could be used to ease the process of creating online advertisements.

- Display which level of automation (LOA) the system is currently working in.

- Marketing strategies suggested by the system should be presented in a human understandable format.

- Allow the users to select different LOA when creating and optimizing ads.

- Match the user's mental model of what the system can do.

1.6   Thesis outline

The following chapters are organized as follows:

Chapter 2: Method   Presents how the work was carried out and the methodology used, the design process, the development of prototypes and usability testing.

Chapter 3: Research   An insight into different fields relating to the thesis. Gathering of background information regarding online advertising, including related work and research about automation in interface design.

Chapter 4: Research Analysis Analyzing the results from the research phase, determining different design opportunities regarding where in the machinery of online advertising the marketing tool could fit in and how automation can be used when creating and following up on ad campaigns.

Chapter 5: Iterative design process Describes the iterative design process of developing and testing the lo-fi prototype, leading up to the final hi-fi prototype.

Chapter 6: Results presents the resulting hi-fi prototype and its associated user evaluation.

Chapter 7: Discussion The final design proposal are discussed relating back to the objective of the thesis.

Chapter 8: Conclusion Conclusions are drawn and presented.

Chapter 9: Future work Unimplemented functionality and things that should be taken into consideration when further developing the marketing tool are discussed.

Chapter 10: Acknowledgements Gratitude are expressed to those who have been involved in making this thesis possible.

Chapter 2

Method

The following section defines *The User experience design process* [19], as provided in Figure 2.1 that have been used to develop the design proposal of a performance driven marketing tool for the Smart video platform.

First a research phase consisting of literature studies was carried out in order to understand users work and needs. The results from the research was analyzed before moving on to an iterative design process. Different concepts and designs was explored along with continuous evaluation through *usability testing*, this iterative process ended with a final hi-fi prototype of a performance driven marketing tool for Smart video.
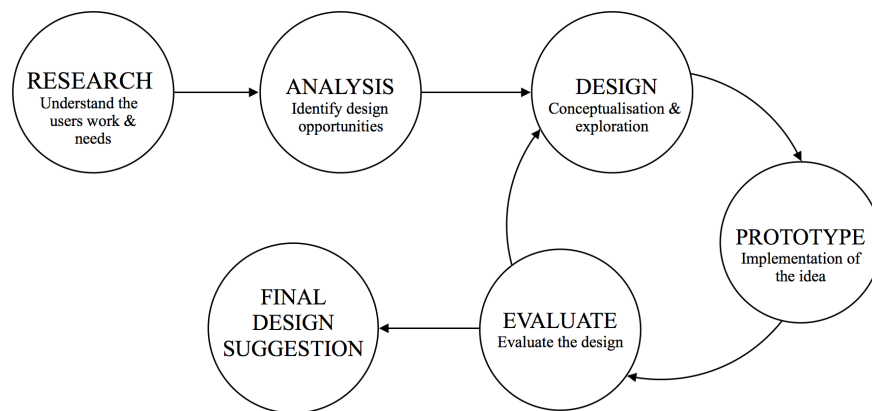
Figure 2.1: The user experience design process used in this thesis.

2.1 Research

Before developing the design proposal for the Smart video marketing tool, a research phase was carried out. This face contained a literature study which

focused on getting an overview of how online marketing works today and where a performance driven marketing tool for Smart video could best fit in. Except getting involved with the different aspects of online advertising, a background study about automation in interface design was conducted.

2.2   Analysis

The analysis of the information conducted in the research phase resulted in a set of identified design opportunities. Where in the machinery of online advertising the marketing tool for Smart video could fit in and how automation potentially can be used in the process of creating as well as managing online advertisements.

2.3   Iterative design process

An iterative design phase was carried out to develop the design proposal using the information gathered in the research phase. Then a set of user stories were written in collaboration with the smart video development team, to communicate the functionality that needed to be implemented in the design. The user stories were used when designing, user testing and evaluating the lo-fi and hi-fi prototypes.

2.3.1   User stories

User stories is a good way to communicate between stakeholders, since they can explain system requirements and functionality. User stories should be written in a language of business and they should be non-technical, meaning that developers and designers as well as the client or the end-users of the system should get the same understanding of what the final application eventually will result in [10]. To write good user stories the INVEST method [10] was used. This method propose that a good user story should be Independent, Negotiable, Valuable to both users and customers, Estimable, Small and Testable. A proposed template to use when writing user stories using the INVEST method is the following:

- As a <Role> I want to <Story> so that <Benefit> [10]

The user stories can be found in Appendix A.

2.3.2   Lo-fi prototype

To be able to test different aspects of the design a lo-fi prototype was created. A lo-fi prototype is a way to visualize design concepts, screen layout and workflows in a resource efficient way [48, 40]. Lo-fi prototypes focuses on discovering design flaws or problems in a proposed interface design, rather than design details and aesthetics. The lo-fi prototype was creates using the prototyping

tool *Balsamiq.* [1] The lo-fi prototype was continuesly evaluated and usability tested throughout the development process.

2.3.3 Hi-fi prototype

The final hi-fi prototype was based on the results from the background analysis, the design of the lo-fi prototype and the results from usability testing. The hi-fi prototype was developed using *Framer* [2] and have used color schemes and design language inspired by the current Smart video style guide [3].

2.3.4 Usability testing

Usability testing was performed on different stages of the prototype. The usability testing method used is based on the *Do it yourself usability testing method*, established by Krug [23]. The method suggests to perform usability tests continually through out the development process. The participants does not necessarily have to be potential end-users of the system being tested. Each test should be performed in a calm environment e.g. an office or conference room, where participants will not be interrupted and the screen as well as the users voice should be recorded throughout the test for later analysis. Users should be encouraged to "think aloud" during the test [23] in order for the observers to gain insight into why some actions of the users are successful while other leads to errors. To ensure that all tests were consistent for all participants a script was used. The script was inspired by the proposed script developed by Krug to use with the "Do it yourself usability testing method" [23].

2.3.5 Heuristic evaluation

Heuristic evaluation is an inspection method for evaluation user interfaces to find their usability problems [32]. Basically it works by having a set of evaluators inspect the user interface with respect to a set of usability principles or guidelines, which are referred as Heuristics. Looking at earlier collections of usability guidelines, like those proposed by Smith and Mosier in 1986 [43], the list consists of thousands of rules to follow, and are therefore often seen as intimidating by developers. Such a large set of principles might cover a lot of the common usability problems occurring in user interfaces, but is not very well suited for a practical heuristic evaluation. A refined list of heuristics, based on a factor analysis of hundreds of usability problems, was presented by Nielsen in 1994 [31]. The list consists of 10 different heuristics with maximum explanatory power.

This list, included in Table 2.1, have been used when evaluating the final design proposal.

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[1] `https://balsamiq.com`, Balsamiq prototyping tool, Accessed on 07-10-2017

[2] `https://framer.com`, Framer - A tool for making interactive prototypes, Accessed on 13-11-2017

[3] The Smart video style guide is only available to Codemill employees and the people working on the Smart video platform.

Table 2.1: Ten Usability Heuristics

Heuristic	Description
Visibility of system status	The system should always keep users informed about what is going on through appropriate feedback within reasonable time.
Match between system and the real world	The system should speak the users language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
User control and freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Consistency and standards	Users should not have to wonder whether different words, situations, or actions,mean the same thing. Follow platform conventions.
Error prevention	Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
Recognition rather than recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Flexibility and efficiency of use	Accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
Aesthetic and minimalist design	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
Help users recognize, diagnose, and recover from errors	Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
Help and documentation	Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Chapter 3

Research

This chapter provides background information regarding different fields relating to the thesis and will explain how online advertising is working today, what information about people are being available to marketers for ad targeting, where this information comes from and what parts of the online advertising process could potentially benefit from automation. This together with an in-depth review of how automation have been and should be integrated into user interfaces and what challenges should be accounted for when designing for automation is further explained in this section.

3.1   Online Advertising

Online advertising is a form of marketing which uses the Internet to deliver promotional messages to consumers. It includes email marketing, display advertising, search engine and social media marketing etc [51]. Advertising online often involves different media publishers who integrate the online advertisements along with their content.

There are many stakeholders when it comes to online advertising including the publishers who profit from selling *ad-space* to advertising agencies who help creating the ads, ad servers which technologically distributes the ads, *data brokers* offering consumer data for ad targeting and *Real Time Bidding platforms* that automatically sells ad-space to the highest bidders, just to mention a few.

Ad Space   Ad space is a place where an ad can be shown, for example a banner on an online newspaper, a video commercial shown before a Youtube clip or a promotional message in peoples social media feed. A common way that digital ad space is being sold is through auctioning, where *Google's Adwords* program is a key player [22]. On the Adwords platform marketers can place bids to buy specific keywords or phrases (e.g "Luxury Hotels") so that if they are the highest bidder at an auction then their text based ads will appear in the Google Search results whenever a user query those keywords or search phrases [46]. Other type

of ad space available on websites can either be sold directly to an advertiser, or they can be auctioned out automatically to the highest bidder in a similar way that search based ads on Google are being sold.

Advertising Networks An *advertising network* is a network that enables advertisers to easily place their ads with many publishers, and at the same time allows the publishers to support their ad space with many different advertisers. The ad networks can offer advertisers the ability to systematically target ads to users based on demographics, location, context of the website, users online behavior etc. Advertising slots not sold through an ad-network can be sold through different kinds of advertising exchanges. Ad exchanges offers a way to fill these slots, in real time, taking bids from multiple advertisers via many advertising networks [27].

Demand side platform A *Demand-side Platform* (DSP) is a computer-based platform that provides technology for media buyers to purchase ad placements across multiple sources [9]. In an article from 2016 one single DSP was studied for a time period of two years. In 2014 this particular platform was integrated with 5 different third-party data brokers providing various information about Internet users. By 2016 the number had grown to about 40. This evolution shows that more and more third-party data and audiences will be accessible from a single point of entry (the DSP) to a *Real Time Bidding*-platform [46]. Meaning that an advertiser can reach out to a lot of different target audiences without the need to engage with tens or even hundreds of different ad networks.

Real Time Bidding platform RTB-platforms offers advertisers a way to bid on ad impressions individually in real time which can reduce the cost of advertising by paying only the current rate based on supply and demand rather than paying in bulk. The integration of these RTB systems with third party data providers allows digital advertisements to be displayed to specific individuals based on endless combinations of personal data [20].

Where does the data come from All personal data made available to marketers has some kind of origin. A study made in 2016 [46] listed some of the most common origins of third-party personal data to be:

- customers purchase history

- perceived interest in or intent to buy certain goods or services in the future.

- socioeconomic indicators and classifications

- technically derived information about computer networks and devices

- media consumption

- behavior on social media sites

- personal data collected from:
    - public records
- User-supplied data collected from:
    - Account profiles
    - Online and offline surveys

How can the data be used?   Past behavior is a strong indicator of future behavior [36]. Meaning that previous shopping habits can be a strong indicator of what products or services someone will be likely to purchase in the future. Therefore it does not come as a surprise that third party data providers makes this information widely available to marketers in a variety of ways. Not only is it possible to target people from what products or services they have bought, but also when and where they've made their purchases. How a marketer choses to use this information can have a great impact on how a certain advertisement campaign will perform. For example if a company want to advertise a car, targeting people whom have bought a car just recently might not be as successful as targeting people who bought a car five or more years ago [46].

Socioeconomic indicators can reveal information about peoples values, behavior and lifestyle. People who for example prefer an urban lifestyle and belong to the upper middle class might be a better target audience for some marketers while others might get better results if they advertise towards working class citizens who prefer a rural or suburban lifestyle.

Data brokers can even offer a variety of information about users online behavior as well as information about their devices, applications and networks. For example software applications can provide automated data when communicating back and forth to servers, like operating system, smart-phone model, desktop or mobile browser, Wi-Fi or mobile data etc. Even information about Apps installed on users devices are made available for targeting. This App data allows marketers to target individuals based on what categories of Apps they have installed on their devices, for example trivia game, fitness or training Apps. These are just a few examples of data that is made available to marketers for ad-targeting.

3.1.1   Attitude towards the use of personal data

A study from 2016 showed that people in general have a negative attitude towards their personal data being used for *personalized advertisement* targeting, mainly because they feel stalked [46]. Some participants even described themselves as being harassed by the personalized ads, repeatedly showing them products they had stumbled upon once, but was not interested in buying [46].

The many ways consumers seek to avoid online advertisement also indicates a displeasure towards the way advertising is being promoted and distributed over the Internet today [41]. This negative attitude towards online advertisements

have lead to an increased use of ad-blocking software. According to a report published in 2015 this trend of saying no to ads is thought to have cost American publishers around 21.8 Billion Dollars worth of revenue in 2015 alone. The global "cost" of ad blocking was at this time expected to be around 41,4 Billion Dollars by 2016 [4].

While people in general seem to dislike the fact that their user data is being used for personalized advertising, they can appreciate the fact that their shared data can lead to new products or services that make their lives easier and more entertaining, perhaps even educate them or save them money [28]. So instead of targeting people with products you want them to purchase, why not use this data available to address people with content they actually want to engage with?

3.1.2 Video advertising

Video on the Internet is increasing in popularity, both when it comes to creating content as well as showing ads on websites [11]. By knowing the content of a website or video in which an ad can be promoted, advertisers can at a greater extent place their ads in the right context. New upcoming formats for online video display opens up for advertisers to create a more immerse ad experience than just the passive video advertisements we often see on the television.

VAST and VPAID The *Video Ad-Serving Template* (VAST) [1]. is a specification produced by the *Interactive Advertising Bureau* (IAB). The specification provides an ad response format that enables video ads to be served across multiple compliant video players. VAST supports a simple in stream video ad format, but does not provide support for rich interactivity or allow advertisers to collect rich interaction details from the ads. Basically the VAST specification provides a way to distribute simple video advertisements online through different compatible ad networks.

Another IAB specification, *Video Player-Ad Interface Definition* (VPAID), on the other hand, can establish a common interface between video players and ad units, enabling a richer interactive in-stream ad experience [2]. By layering VPAID onto VAST enables executable ad formats to be displayed in-stream with publishers video content in any compliant video player. Making it possible for marketers to display rich interactive ad experiences to video consumers.

The VAST and VPAID specifications were developed in order to increase the common video ad supply technology so that video publishers can accept video ads from a large variety of ad servers and networks, and thus decrease the cost and need for an integration with each publisher individually.

These video advertising specifications enables the Smart video way of promoting products to be converted into different video ad formats (and still keep

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[1]`https://www.iab.com/guidelines/digital-video-ad-serving-template-vast-4-0/`, IAB - definition of VAST, accessed on: 2017-09-22

[2]`https://www.iab.com/guidelines/digital-video-player-ad-interface-definition-vpaid-2-0/`, IAB - definition of VPAID, accessed on: 2017-09-22

the interactive functionality). Interactive Smart video ads can then be distributed to different advertising slots on the Internet through compatible ad networks supporting interactive video ad formats such as VAST and VPAID.

However, not all platforms support these interactive video ad formats. And some platforms will not allow any other ad formats to be displayed other than their own custom formats. *Facebook* is such an advertising platform.

3.2   Facebook as Ad platform

With more than 2 Billion monthly users [45], Facebook ranks second place (After Google) on the list of the world largest advertising platforms, gaining US$26.9bn in ad revenue in 2016 [3].

The fact that more than one quarter of the worlds current population is using Facebook on a monthly basis, shows that the social network offers great potential for marketers to reach out to a large audience. Facebook's large user base also indicates that there is a good chance that companies might have their already existing customers present and active on the social network. The power of Facebook is that it often holds a lot more information about users than just their email addresses or names. This information about Facebook users is made available to marketers for ad targeting on the social platform[3]. Different target audiences can be created in Facebooks own marketing interface, and each audience created can then be used in Facebook advertising campaigns, whether it is for targeting a specific audience or excluded one audience from a certain marketing campaign. How the target audiences should be used all depends on what the goal or preferences marketers have for a certain campaign.

Automation on Facebook   If a company have information about their customers, like names , phone number or e-mail addresses, there is a good chance that at least some of these customers have their corresponding Facebook account linked to those very same attributes. Facebook offers advertisers a way to automatically create a target audience for marketing campaigns based on account data linked to these attributes. For example a list of company-provided Email addresses can be used to automatically create an audience consisting of Facebook accounts that are linked to those email-addresses.

If an audience has been created, whether it is from a list of a company's customer email addresses or a Facebook fan-page , that audience can be used as a basis when creating what is called a "lookalike audience"[4].

Lookalike Audience   Facebook offer tools for creating new audiences consisting of user accounts that are similar to an existing audience. So instead of guessing who might be interested in a company's brand or products, marketers can let their already existing customer data provide a lot of this information

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[3]`https://www.facebook.com/business/products/ads/ad-targeting`
[4]`https://www.facebook.com/business/help/164749007013531`, Facebook Lookalike Audience , accessed on : 2017-09-25

for them. Different sets of customer data can be used to create different sets of lookalike audiences. Companies can use the Facebook tool to create a lookalike audience based on their data of all available customers, only the highest spending customers or whatever selection data chosen as a reference. The audience creation process is done automatically by Facebook, and the criteria for it to work is that there are enough Facebook accounts linked to the provided data so that a new audience can be generated[4].

This type of automation can save marketers a lot of time when deciding to whom to target ads. But it's not always clear what the automation is doing. Lack of feedback from automated processes in user interfaces can lead to users being "left in the dark", not knowing what is going on with the automation, or completely misunderstand what the automation is actually doing. This leads up to series of challenges regarding how to make use of automation in interface design.

3.3   Automation in interface design

As artificial intelligence, the use of big data and automation is becoming more and more popular, and it seems like developers are finding new ways to use this technology every day [2]. While some tasks can be successfully automated, much like the RTB process for selling ad-space, or the algorithms that Facebook use to create lookalike audiences for advertising, some processes still need human involvement to get a satisfying result. Human centered automation, is automation designed to work cooperatively with human operators in the pursuit of stated objectives [6]. The automation in such systems can be seen as tools or resources that can help human operators to accomplish tasks that might otherwise be difficult or impossible to achieve.

But there are great challenges when it comes to designing smart user interfaces where automated processes are being integrated alongside with human controlled parameters. Exploring this area provides an opportunity to extend our understanding of the role of automated processes for enhancing the user interface and, more generally, for enhancing the overall human computer interaction experience.

3.3.1   Challenges with automation

As automation is integrated more increasingly into industries, or other fields of work, it is often blamed for causing harm and to increase the risk of human error when failure occurs [34]. However, the problem might not be the automation itself, but rather the inappropriate design of the user interface in which it's used. Donald A Norman suggest in his 1990 report [34], that one of the main problems of automation occurs when the automation process is at an intermediate level of intelligence, meaning that it is powerful enough to take over controls that used to be done by people, but not powerful enough to handle all possible abnormalities that occurs in the system.

Keeping the human in the loop   Feedback is an essential aspect of control theory, and the need for complete feedback is one of the major points of Normans 1990 report [34]. Without appropriate feedback, whether it is to signal that a request have been received, an action is being performed properly or an error has occurred, not providing this information is keeping the human out of the loop.

When people interact, whether it's with other people, the environment or artifacts of technology, they construct mental models of themselves and the things in which they are interacting [33]. The mental models are naturally evolving through interaction with a target system, but will be constrained by such things as the users technical knowledge or background, previous experience of similar systems and the structure of the information available to them from the system. This meaning that a users mental model of a system is critically depending on the information that is made available from the system when interacting with it. In cases like this the way that our mental model of such a system can be updated, is through the feedback provided to us [34].

But there are great challenges when designing interfaces that are supposed to be informative, yet non intrusive. And many attempts of doing so tend to irritate as much as they inform, either by failing to provide enough feedback and information to the user or by presenting too much information, so that the system becomes somewhat of a nagging "backseat driver" [5], much like the "helpful assistant" in Microsoft office (1997-2003) as can be seen in Figure 3.1.

Figure 3.1: Microsoft Office assistant 1997.
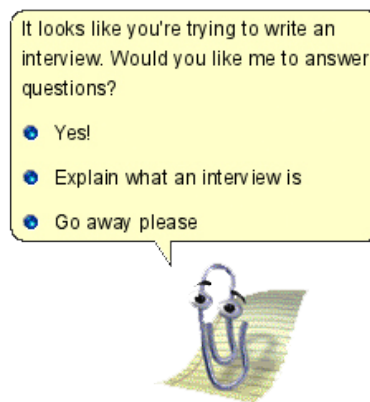
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[5]http://dictionary.cambridge.org/dictionary/english/backseat-driver,   Definition of backseat driver: "A passenger in a car who keeps giving the driver advice that he or she has not asked for", accessed on: 09-27-2017

Feedback   Part of the reason why many automated systems have such poor feedback and interaction is often to blame on the designer, but for a perfectly logical reason. The automation itself has no need for the feedback. So if a designer is asked to design an automated process to control some function, the task itself can be seen as completed when the system is functioning as requested [34]. This way of designing often leads to the fact that providing monitoring information and feedback to the human operators is of secondary importance. Primarily because if the automation works as intended, there will not be any need for it [34]. Feedback is however an essential part of any interface, and much like Murphy's law indicates[6], if something has the possibility of happening, it eventually will. So in any complex environment or system one should always expect unexpected events to occur and design accordingly.

In a perfect world where equipment never fail and is capable of handling all possible situations, then a human operator would not be necessary, essentially meaning that the feedback and interaction with the system similarly would not be necessary. But in the absence of such a perfect automated system an appropriate design, should assume that errors can and will potentially occur, meaning that the system should continuously interact with the user in an appropriate manner. It should provide feedback when warranted and should have a design that is appropriate for the worst of situations [34]. What is appropriate highly depends on the system itself, and what can be considered as appropriate for automated processes in a performance driven marketing tool might be very inappropriate for an autonomous system in self driving cars.

3.3.2   Different levels of automation

The degree to which a task is automated is referred to as *Level of Automation* (LOA). In 1978, Thomas B. Sheridan and W.L. Verplanck developed a Level of automation taxonomy for man-computer decision making [42]. The list goes from a level wherein the human controls everything to a level where the computer controls everything. The taxonomy aims to help designers or operational managers to decide what mix of man and computer automation to use in an interface. This taxonomy incorporates issues considering feedback from the system, as well as the challenges with shared option selection and task execution.

In an article from 1999, a slightly altered version of Sheridan and Verplanck's LOA-list was proposed [12] to better be applicable to systems consisting of cognitive tasks in which operators abilities to respond to, and make decisions based on the information provided by the system, is critical to the over all performance. In the article, four generic functions of such systems was identified as: (1) monitoring - scanning displays to perceive system status; (2) generating - formulating options or strategies for achieving goals; (3) selecting - deciding on a particular option or strategy, and (4) implementing - carrying out the chosen option. By assigning these four functions to a human operator or a computer or a combination of the two, a list of ten levels of automation was formulated.

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[6]`http://www.murphys-laws.com`, Murphy's law, Accessed on : 27-09-2017

(1) Manual Control (MC) the human performs all tasks including monitoring the state of the system, generating performance options, selecting the option to perform (decision making) and physically implementing it.

(2) Action Support (AS) at this level, the system assists the operator with performance of the selected action, although some human control actions are required.

(3) Batch Processing (BP) although the human generates and selects the options to be performed, they then are turned over to the system to be carried out automatically. The automation is, therefore, primarily in terms of physical implementation of tasks. Many systems that operate at this fairly low level of automation exist, such as batch processing systems in manufacturing operations or cruise control on a car.

(4) Shared Control (SHC) both the human and the computer generate possible decision options. The human still retains full control over the selection of which option to implement; however, carrying out the actions is shared between the human and the system.

(5) Decision Support (DS) the computer generates a list of decision options that the human can select from or the operator may generate his or her own options. Once the human has selected an option, it is turned over to the computer to implement.

(6) Blended Decision Making (BDM) at this level, the computer generates a list of decision options that it selects from and carries out if the human consents. The human may approve of the computers selected option or select one from among those generated by the computer or the operator. The computer will then carry out the selected action. This level represents a higher level decision support system that is capable of selecting among alternatives as well as implementing the second option.

(7) Rigid System (RS) this level is representative of a system that presents only a limited set of actions to the operator. The operators role is to select from among this set. He or she may not generate any other options. This system is, therefore, fairly rigid in allowing the operator little discretion over options. It will fully implement the selected actions, however.

(8) Automated Decision Making (ADM) at this level, the system selects the best option to implement and carry out that action, based upon a list of alternatives it generates (augmented by alternatives suggested by the human operator). This system, therefore, automates decision making in addition to the generation of options (as with decision support systems).

(9) Supervisory Control (SC) at this level the system generates options, selects the option to implement and carries out that action. The human mainly monitors the system and intervenes if necessary. Intervention places the human in the role of making a different option selection (from

those generated by the computer or one generated by the operator), thus, effectively shifting to the decision support LOA. This level is representative of a typical supervisory control system in which human monitoring and intervention, when needed, is expected in conjunction with a highly automated system.

(10) Full Automation (FA) at this level, the system carries out all actions. The human is completely out of the control loop and cannot intervene. This level is representative of a fully automated system where human processing is not deemed to be necessary.

This LOA taxonomy considers a wide range of options describing the way in which functions can be divided between a human operator and a computer to achieve task performance.

Modes   Highly automated systems, for example airplanes, can operate in various modes. These modes incorporates different levels of automation and can often be changed either automatically by the system itself or directly by the pilots interacting with the system. However a system can fail to provide sufficient feedback on the state of the current automation mode, leading to something referred as mode confusion [13]. There has been substantial research on mode confusion in highly automated systems [21, 39, 8], and the concept of Mode confusion is traced to at least three fundamental sources [8]: (1) Opacity (Poor display of the state of automation), (2) Level of complexity (unnecessary complex automation), (3) incorrect mental model (misunderstanding in the behavior of the automation). Mode confusion is often associated with what is referred as mode error, a type of mistake in which the operator acts based on the assumption that the system is in a particular mode of operation, when it in fact is in a different mode [38]. It is therefor essential that designers work together with the users of automated systems, to ensure that the users are informed properly about what the automation is doing and the basis for why it is doing so.

Chapter 4

Research Analysis

When looking into how online advertising works today and the way people are being targeted with ads, the research conducted indicates that people in general are negative towards their data being used for personalized ad targeting [28], but that they can appreciate when the data is being used in ways that educates them, make their lives more entertaining or saves them money.

Making video content that people actually want to watch, enables creators to build a good relation with their audience. But it's not always easy to organically [1] reach out to people potentially interested in the content. So in order to reach further out companies can pay for the distribution of their content.

By looking at the machinery of online advertising and the parts connected, a performance driven marketing tool for Smart video would probably serve well as an integration with other third party web services, like Facebook or Google. The advertisements can then be budgeted, targeted and followed up in the Smart video interface, but are then hosted and distributed by the third party ad service.

Knowing how to advertise and to which audience can be a hassle, especially for people without great experience in marketing. Companies, big or small, may not have the time or resources to engage in complex marketing systems or time consuming campaign administration. Having a performance driven marketing tool to assist marketers could potentially relieve the workload and help companies spend their marketing budget more efficient. The tool could potentially even decrease the amount of ads that are being displayed to the "wrong people" - not interested in the content. Meaning that companies as well as consumers can benefit from such a service.

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[1] `https://www.facebook.com/help/285625061456389?helpref=uf_permalink`,"Organic reach is the total number of unique people who were shown your post through unpaid distribution" - Facebook Marketing , accessed on: 2017-12-18

4.1   Choosing level of automation

Three (out of ten) levels of automation (LOA), proposed by Sheridan and Verplack [42] have been integrated into the design proposal as Modes. The first mode consists of autonomy Level 1 - *Full manual control*, where the human operator performs all tasks and monitoring, The second mode consists of

Level 5 - *Decision Support*, where the computer generate suggestions for action and the human then can choose which of the suggestions the computer should implement. The third mode consists of Level 9 - *Supervisory Control*, where the human mainly monitors the system (and intervenes if necessary) while the computer does everything. These Modes was chosen in collaboration with the Smart video development team to cover the extremes as well as an intermediate LOA within the design proposal.

4.2   Making use of automation

Since the field of using automation in advertising is still being explored, the first proposed iteration of the interface design should in some way provide the opportunity for an administrator to choose the LOA within the system, going from fully manual, to partly automated to as close to full automation as possible. (Level 9 was chosen for the third mode, since level 10 would defeat the purpose of a human centered design, by completely eliminating the human from the process). The design proposal aims to apply the three LOA to the following generic functions within the system:

1. Monitoring - scanning displays to perceive system status

2. Generating - formulating options or strategies for achieving goals

3. Selecting - deciding on a particular option or strategy

4. Implementing - carry out the chosen option

By analyzing the research, the the following opportunities regarding automation in online advertising was identified.

Automation in ad format selection   Knowing what ad formats will performing good or bad can be hard to know. Different ad-formats have the possibility of performing differently, even if the content is more or less the same. Automation could potentially be used to propose or select different ad formats that have performed well for similar ad campaigns in the past.

Automation in Ad targeting   When composing a target audience for an ad campaign, Facebook alongside with other Ad Networks offer marketers a wealth of targeting options that can be combined in seemingly endless of ways. Choosing what parameters settings to use in order to create a successful marketing

campaign might not be an easy task, especially for someone without great experience in online advertising. Having a system that automatically can identify statistically significant trends and use this data when proposing what audiences to use for ad targeting could have the possibility of more accurately reaching a good target audience for the advertisements.

Making use of automation when choosing different target audiences for online advertisements can be a step in the right direction on the pursuit of making online advertising easier and less time consuming. We know that automated processes can be used today when creating target audiences on Facebook, and that the process is based on data, rather than human intuition. If having enough data from previous advertisement campaigns, like what type of video content or products perform well with what type of audience, an intelligent system could potentially have a good idea to what ad format and target audience might perform well for a certain video campaign.

Automation in ad spending Since knowing how to spend a marketing campaign budget wisely is not something that can be completely predicted in advance. A performance driven advertising tool should display relevant information about the ads performance through out an ad campaign. This information can then be used for optimizing the campaign over time, for example by automatically perform A/B testing between ad-formats (meaning two ads are compared against each other). This gives an opportunity to make sure that high performing ads get prioritized, and bad performing ads get paused. This prioritizing could be done either manually or automatically by the system itself. Performance data could be used to recognize trends (manually or automatically) and new audiences for ads could be proposed in order to reallocate the budget towards a more profitable segment. This redistribution of resources could be done completely manual, from suggestions by the system or automatically without involvement from an operator.

4.3 Delimitation

Trying to implement all accessible data parameters made available for ad targeting from multiple DSP:s and Ad networks into an advertisement creation interface would not be an easy task to pull off, and even if it were possible it would take a tremendous amount of time. In the long run, an advertising interface connected to multiple distribution channels would be preferred, but for the case of this study the design proposal is focused towards advertising one particular platform, Facebook. Creating a Facebook account is free of charge, which makes information about facebook advertising, facebook ad formats and services easily accessible and available for exploration.

The proposed system design focus on functionality regarding creating ads from one single video source with a limited set of marketing goals, and does not cover functionality regarding multiple videos, or videos being used in multiple campaigns with different goals.

Chapter 5

The iterative design process

This section explains the iterative design process that lead up to the final design proposal. First a series of user stories were determined in order to summarize the requirements and desired features in the performance driven marketing tool for Smart video. The user stories can be found in *Appendix A*. After the user stories were written the iterative design process followed with the development of a lo fidelity (lo-fi) prototype. The prototype was continuously user tested and improved through out the development process. Based on the result and evaluation of the lo-fi prototype a final hi-fi prototype was created. The hi-fi prototype was then usability tested and the design issues that occurred during the tests were heuristically evaluated.

The lo-fi prototype focuses on features and work flows within the application, rather than design details and aesthetics. The lo-fi prototype's main purpose have been to explore different design opportunities and to identify problems with the proposed design. Feedback, discussions and results from user testing on the prototype resulted in a series of design improvements through out the development process. The prototype was designed using *Balsamiq* [1] and was usability tested several times throughout the development process.

5.1 Creating ads

The first part of the lo-fi design proposal for the marketing tool is of the ad creation work-flow. In the first iteration of the lo-fi prototype, much of the ad creation parameters and options were displayed on one single page, as can be seen in Figure 5.1. The idea for this was that the end user would be able to get a complete overview of the ad creation process. Settings that had been proposed automatically by the system were tagged with a dark symbol of the letter "A" , and manually set parameters were tagged with a lighter symbol of the letter "M".

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[1] `https://balsamiq.com`, Balsamiq prototyping tool, Accessed on 07-10-2017
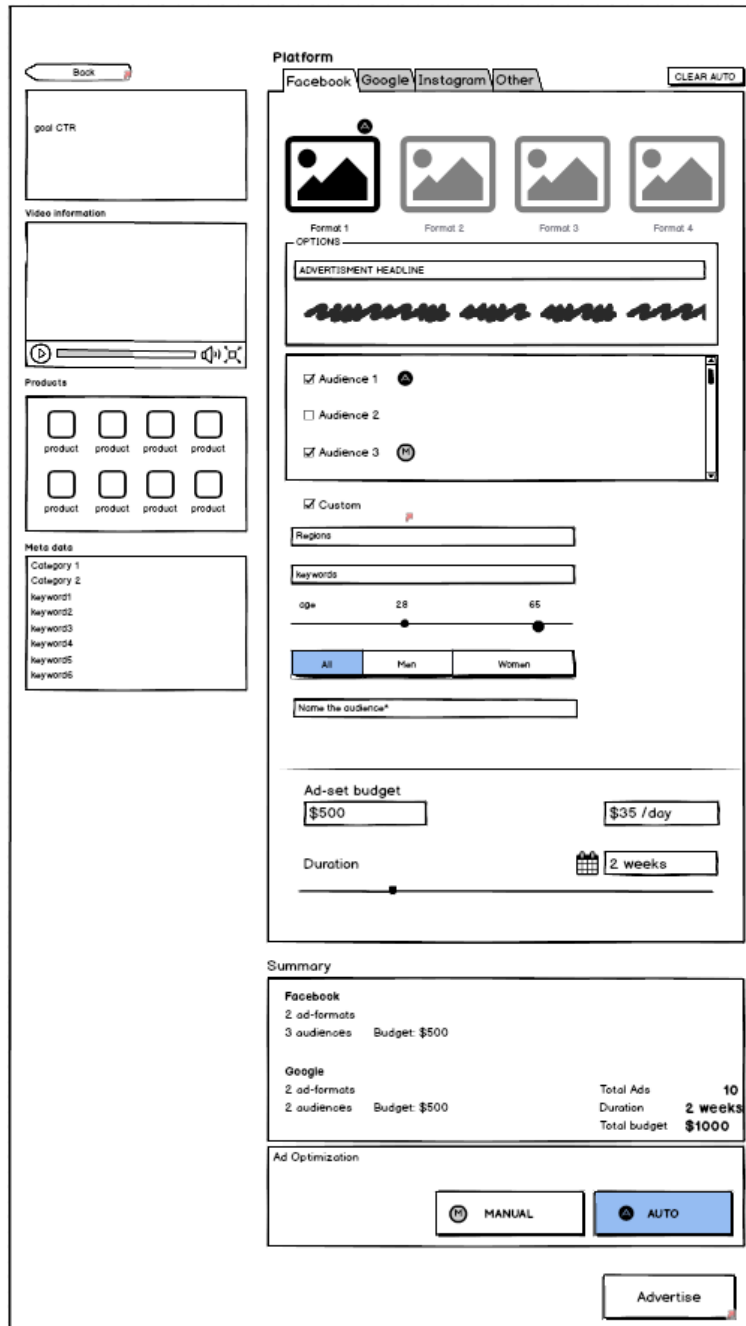
Figure 5.1: The first iteration of the lo-fi: Ad creation page.

Having both manual and automatically suggested parameters alongside each other confused users, and the use of symbols to communicate the Level of automation was not clear. Having too many parameter settings available on the same page, was also described as overwhelming, and many users did not know where to start the ad creation process.

This resulted in a revised step by step design proposal, where the user got to choose some settings before moving on to the next step in the ad creation process.

On the first page shown to users in the new ad creation work-flow, the user get to set the goal for the ad campaign. After the goal is set, the users gets to choose how to setup the ads: Manually, with program assistance or automatic. The proposed lo-fi design of the introduction page to the ad creation work-flow is shown in Figure 5.2

Figure 5.2: The last iteration of the lo-fi - Introduction page - Setup Goal and choose Level Of Automation for ad setup.

Instead of showing all parameter settings from start to the user as seen in Figure 5.1, extended options appear in the interface as the user selects one of the ad formats. This can be seen in Figure 5.3

In the lo-fi design proposal a user can create ads using Facebook ad formats and import predefined Facebook audiences. If a user wants to create a new
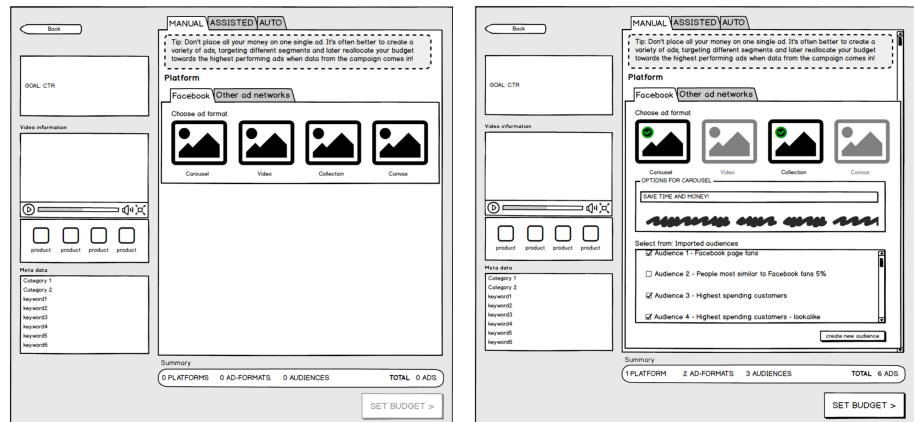
Figure 5.3: The last iteration of the lo-fi ad creation page : Manual mode. The left image shows the interface with no selected parameters, The right image shows the interface expanded with multiple parameter selected.

audience, it can be done with limited amount of target options by clicking the button marked *create new audience* in the lower middle section of the interface. When the button is clicked, a pop-up window with available options is displayed. The pop-up window can be seen in Figure 5.4.
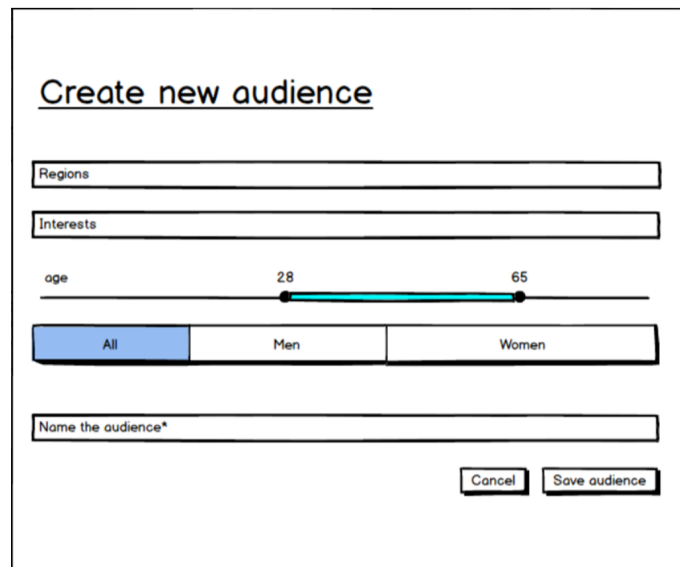

Figure 5.4: Lo-fi prototype of the pop-up window used to create a new simple custom audience.

In the manual mode no suggested parameter settings are shown to the user. But any time during the ad creation process, the user can switch mode to either Manual, Assisted or Auto by using the tabs in the top section. In the Assisted mode, the interface will suggest what settings to use when creating ads, alongside with an explanation why the settings have been proposed. The user can then choose to accept or ignore suggested settings by interacting with the buttons in the list displayed in the top section of the interface. This can be seen in Figure 5.5. Suggested parameter settings are also highlighted in the interface using the color yellow to further clarify to the user what settings are proposed.

Figure 5.5: The last iteration of the lo-fi ad creation page : Assisted mode. The left image shows the interface with no selected parameters, The right image shows the interface expanded where the first suggestion in the list have been accepted.

If the users switches to the Auto tab on the ad creation page, all suggested parameter settings will be pre-selected and highlighted in the interface. The color blue was chosen to represent automation in the lo-fi prototype. The ad creation view in the automated mode can be seen in Figure 5.6.

In the early iteration of the lo-fi prototype, selecting the Automatic mode for ad setup on the first page of the ad creation work flow (Figure 5.2) would take the users to the Auto mode on the ad creation page (Figure 5.6). This confused users, and many did not know what they were looking at, indicating that their Mental model of what the "automatic ad set up" would do did not match what the system did. Instead another approach was to skip the ad-setup page when a user choose to set up the ads automatically. When selecting automatic ad setup the users were directed to the third page of the ad-creation work-flow. This page shows a summary of the ads about to be created. On the budget
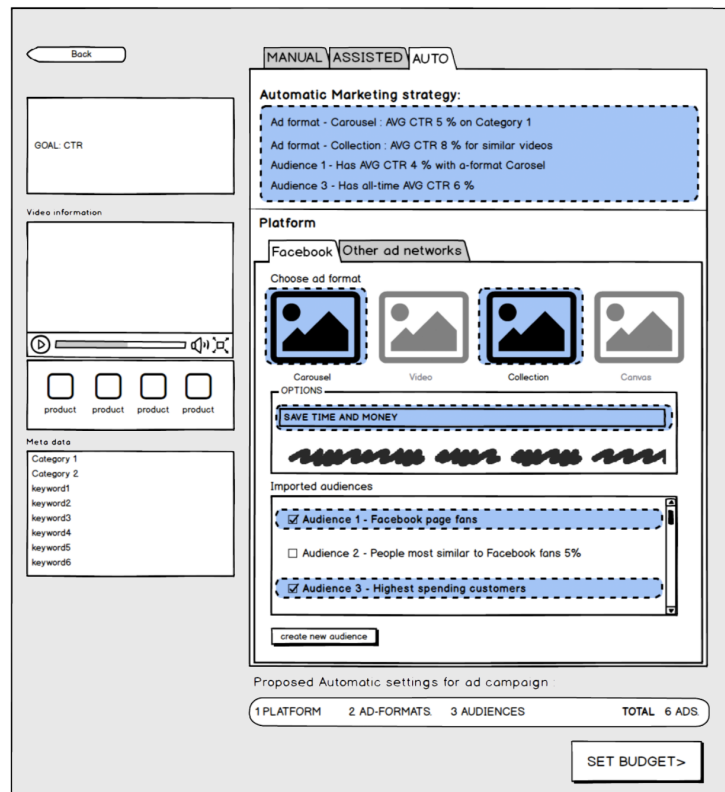
Figure 5.6: The last iteration of the lo-fi ad creation page : Auto mode - shows the automatically selected parameters.

page the user can set the total cost and duration of the campaign, distribute the budget between ads and set how ad optimization should be carried out for each ad individually throughout the campaign. If automatic ad set is chosen on the first page in the work-flow, the budget is evenly allocated and all ads have automatic ad optimization set as default. The page can be seen in Figure 5.7.

Main design changes The main design changes of the lo-fi prototype was: In order to decrease information overload, the advertise workflow was split up in to three main pages (1) Set campaign goal and choose level of automation for ad creation, (2) creating and targeting the ads, (3) set and distribute budget and choose how ads should be optimized over time. In the workflow page 2 can be skipped by selecting *Automatic* ad set up on page 1. Instead of using symbols, the level of automation is color coded where the color yellow is used for an intermediate level of automation showing system proposed settings to the user, and the color blue is used to indicate a higher level of automation.
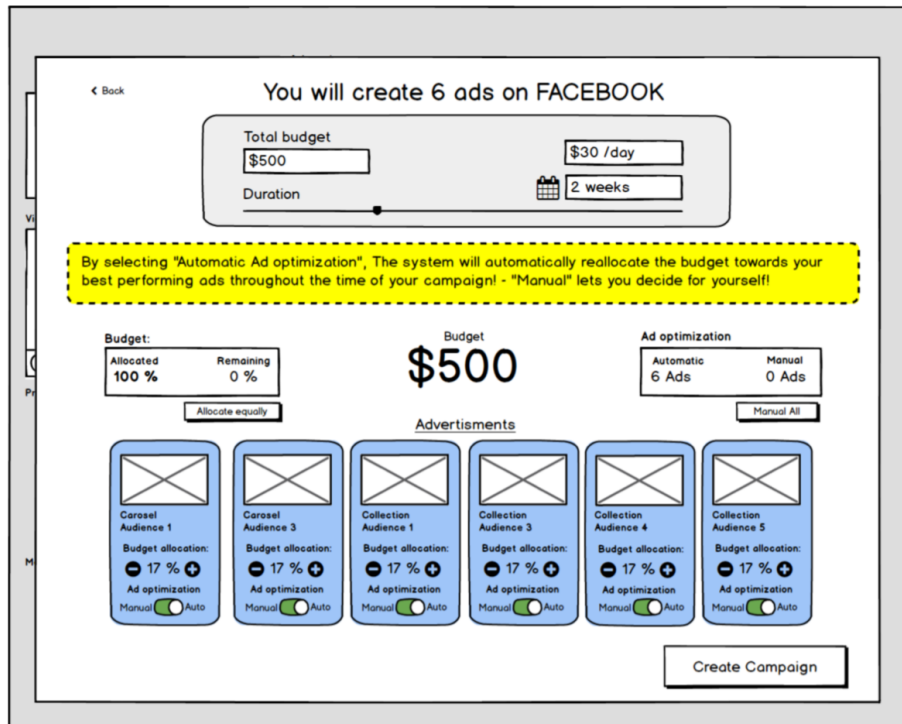
Figure 5.7: The last iteration of the lo-fi prototype - Budget and ad optimization page.

5.2   Managing Ads

The second part of the lo-fi design proposal consists of an ad managing interface. The first page of the ad managing interface is showing an overview of ads within the marketing campaign, what platform is used to host the ads, what video source is used as basis for the ads, statistic data about ad performance and the campaign budget. This page of the lo-fi design proposal can be seen in Figure 5.8

Ads with a blue headline symbolizes ads that have automatic ad optimization, and the yellow list in the top section of the interface shows the proposed market strategy (actions to take for optimizing "Manual ads"). An expanded list of suggestions on ad optimization can be seen in Figure 5.9.

Each ad in the overview can then be further inspected to reveal more information regarding ad settings, performance, suggested actions for optimization and optimization history. By clicking on one of the ads a detailed view of that specific ad is shown to the user. This view can be seen in figure 5.10.
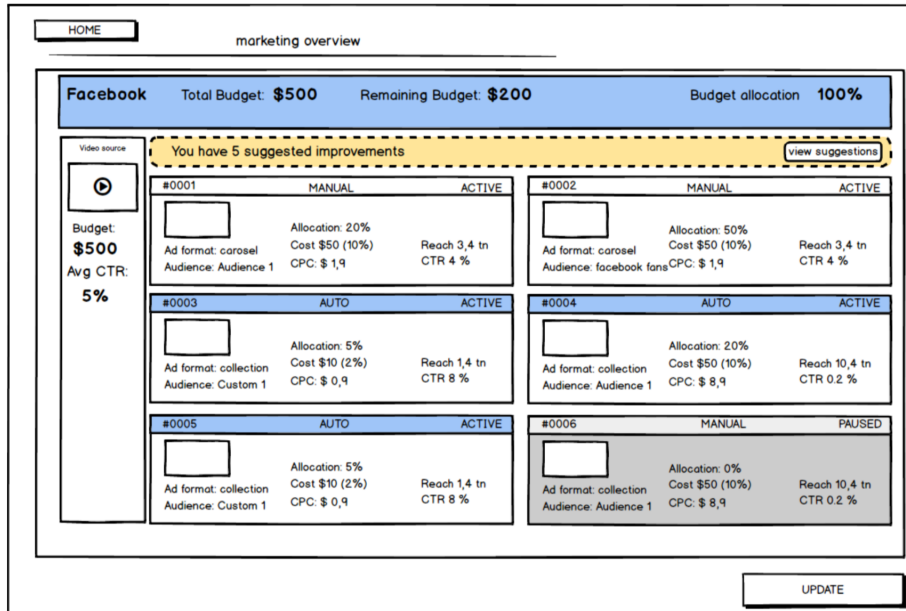
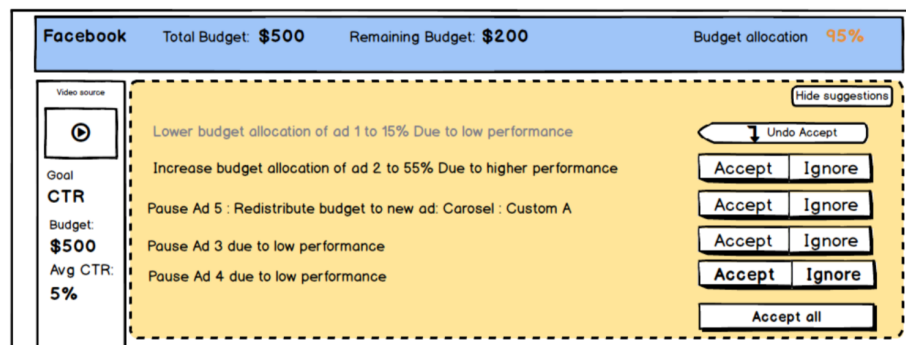Figure 5.8: The last iteration of the lo-fi prototype - Marketing overview.

Figure 5.9: The last iteration of the lo-fi prototype - Expanded list of suggested ad optimization actions.
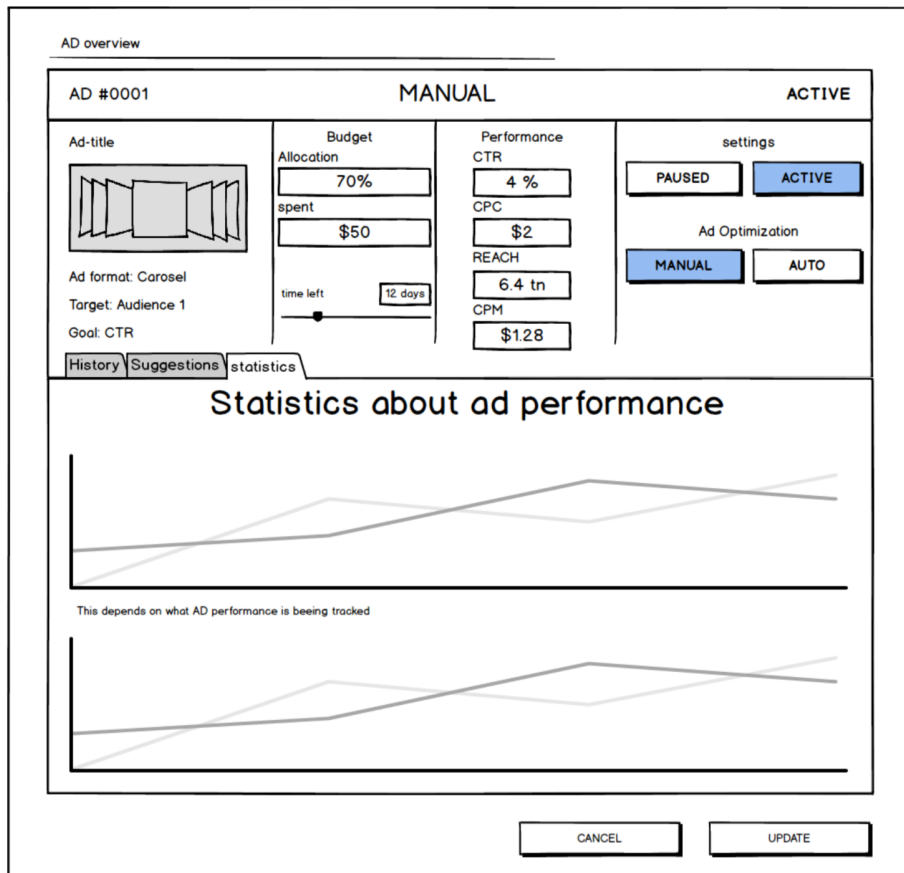
Figure 5.10: The lo-fi prototype - view showing detailed ad information and settings.

Chapter 6

Results

This section presents the final high-fidelity (hi-fi) prototype design proposal of the Smart video marketing tool along with the results from the usability testing and heuristic evaluation. The hi-fi prototype was designed and implemented using Framer [1]

6.1   The Hi-fi prototype

The hi-fi prototype is based on the results from the lo-fi prototype and user its corresponding user evaluation. The layout of the main page of the advertising interface is inspired by the current Smart video admin interface. This view in its whole is shown in figure 6.1. The only part of the view that users can interact with is the button for starting the ad tool. The button is present in the lower right part of the screen.
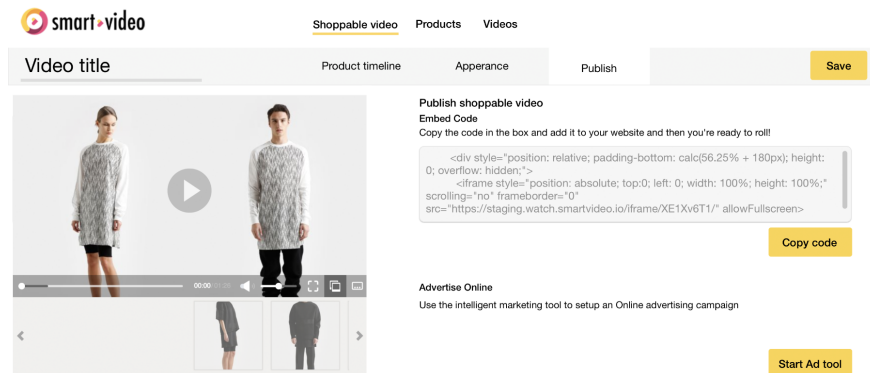

Figure 6.1: The hi-fi prototype - The start page of an advertising sequence.

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[1] `https://framer.com`, Framer - A tool for making interactive prototypes, Accessed on 13-11-2017

Before creating any ads, a Goal for the campaign needs to be set by the user. To have a defined goal for each campaign makes it easier to measure success, at least success corresponding to the goal. The goal also acts as a basis for creating a marketing strategy by the program. Depending on what the goal is, for example if it is to maximize reach or to maximize clicks, different advertising strategies might be necessary. After the goal is set, the user gets to choose from three alternatives of how to set up the ads: *Manual*, *With program assistance* or *Automatic*. Each choice represent different Modes, or LOA, going from full user control to full system control. The view can be seen in Figure 6.2. Depending on what alternative the user choses on how to set up the ads, different views are shown in the next step of the campaign creation workflow. If the option "Automatic" is selected, the user gets to skip some steps in the ad creation workflow. This is further explained later on in this chapter.
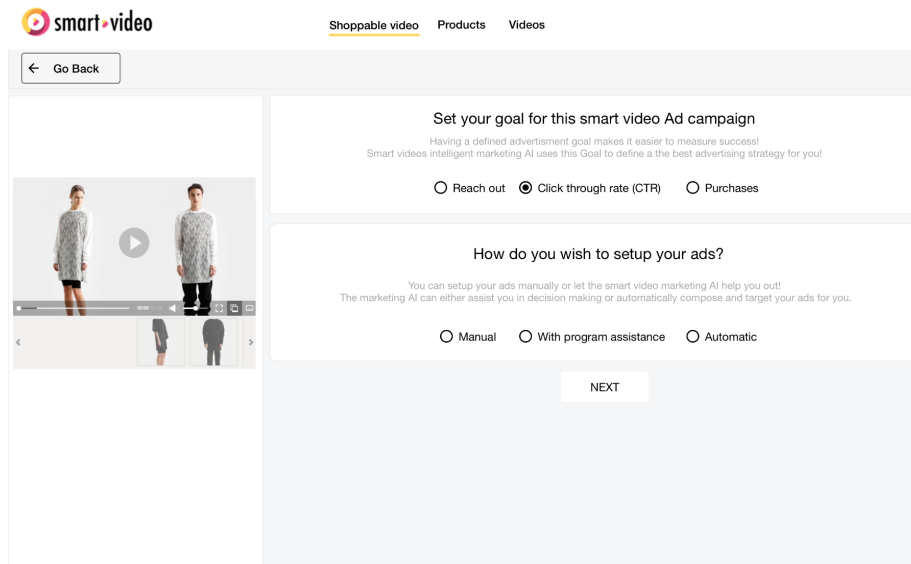
Figure 6.2: The set goal view. Users define their goal for the ad campaign and get to choose from three LOA of how to set up their ads.

If the user selects "Manual" ad setup and clicks the next button, the ad creation view is shown. This view can be seen in Figure 6.3.

At the top of the view is a tab bar showing the different Modes or LOA as can be seen in figure 6.4. Users can at any time during the ad creation process switch between the modes without the need to back track in the workflow.

The left side of the view shows information about the campaign goal, a small preview of the video used for creating the ads along container showing metadata and keywords connected to the video. In the upper region of the ad creation workflow is a container, showing information about the proposed market strategy for each mode used in the ad creation.
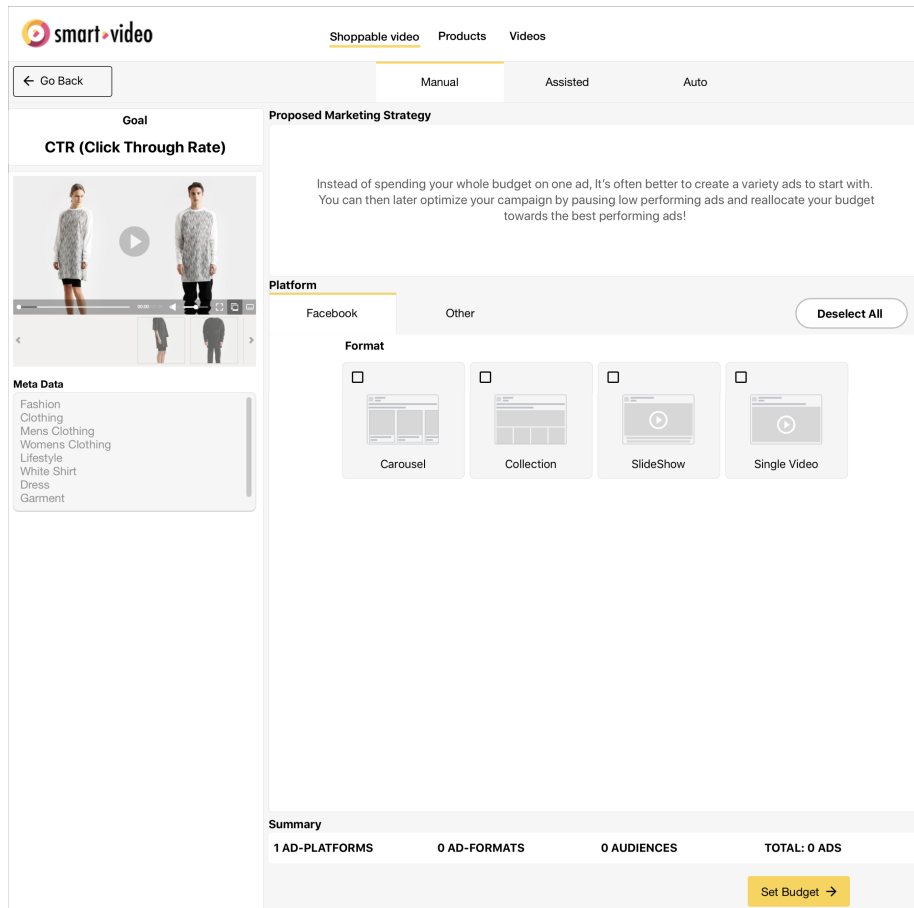
Figure 6.3: The create ads view: Manual mode. Most settings are collapsed until the user interacts with the interface. No parameters are pre-selected.
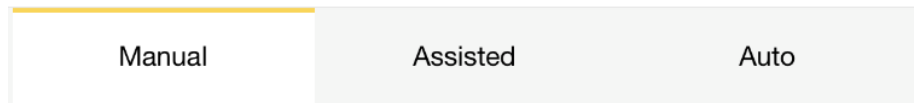
Figure 6.4: The top bar in the create ads view gives the user freedom to switch between different modes without the need to back track in the ad creation workflow.

When a user selects any of the ad Formats by clicking on them, an expanded container of options is made available for that specific ad format. The options regarding "Headline" "Text" and "Website" are based on the options corresponding to that ad format on Facebook. In figure 6.5 the ad format Carousel has been selected. Along with two imported facebook audiences: "Facebook page

fans" and "Lookalike audience (Facebook fans 5%)". Whenever a new choice is
selected the summary panel at the bottom of the view is updated accordingly.

Figure 6.5: The advertisement options are displayed for the ad format *Carousel*
after the format have been clicked and selected. Check boxes represent users
choice. The summary panel at the bottom of the view gets updated whenever
the user checks a new ad format or audience.

The audiences made available for targeting are imported from the platform
that is used to roll out the advertisement campaign, in this case Facebook. If the
user want to create a custom audience in the Smart video ad creation interface a
limited set of options are available for ad targeting. By clicking on the "Create
new Audience" button, a pop-up window is shown to the user. The pop-up
window contains options for creating a new custom audience based on *Regions*,
Interests, *Age* and *Gender*. The pop-up window can be seen in Figure 6.6.

After the user has filled in the available options for a new audience the user
have to name the new audience and press the button "Save" to store it. When
the new custom audience is saved, the list of audiences in the ad creation view
is updated, as can be seen in Figure 6.7.

Figure 6.6: Popup for creating a new custom audience.

Figure 6.7: When a new audience is saved, the list of audiences gets updated.

If the user switches to Assisted mode, either by selecting the option "With program assistance" on the previous page in the work flow (Figure 6.2) or by using the tabs located in the top bar, the view gets updated. The container showing the proposed market strategy gets updated with a list of automatically generated marketing suggestions. Each suggestion has a brief explanation why the choice is suggested, and buttons for either accepting or ignoring the suggestion. Each of the suggestions are also highlighted in yellow in the interface to further clarify what options are suggested to use for advertising. The user can then accept some suggestions, accept all suggestions or manually select options based on personal choice. The view can be seen in Figure 6.8.

| | Manual | Assisted | Auto | |

Proposed Marketing Strategy

Ad-format : Carousel - AVG CTR of 8% on 'Fashion' videos   Accept | Ignore

Audience 'Lookalike audience (Facebook fans 5%)' has AVG CTR with Ad-format: Carousel   Accept | **Ignore**

Audience 'Highest spending customers' has All-time AVG CTR of 6% with Ad-Format : Carousel   **Accept** | Ignore

Ad-format : Collection - AVG CTR of 10 % on vides about 'clothing' & 'fashion'   **Accept** | Ignore

Ad-format: Single Video has AVG CTR of 21 % with Audience: 'Facebook fans'   **Accept** | Ignore

Audience: 'Facebook Page Fans' has AVG CPM of 2 $ - Use Audience for all formats   **Accept** | Ignore

Undo Accept

Platform

Facebook   Other   Deselect All

Format

☑ Carousel   ☑ Collection   ☐ SlideShow   ☑ Single Video

Options Carousel

Headline
The all new spring collection

Text
Our limited edition designer clothes are now out!!

Website:
http://www.fashionOnline.io

Audience for : Carousel
Select your taget audience from : Imported Audiences

☑ Facebook page fans

☐ Lookalike audience (Facebook fans 5 %)

☑ Highest spending customers

☐ Loyal customers

Create new Audience

Summary

| 1 AD-PLATFORMS | 3 AD-FORMATS | 3 AUDIENCES | TOTAL: 5 ADS |

Set Budget →

Figure 6.8: Create Ads - Assisted mode. A list of suggested marketing strategy is present at the top of the view. Each suggestion is highlighted in yellow in the interface.

If the Auto tab is selected in the top bar, the view is updated and only the automatically suggested options are selected as can be seen in Figure 6.9. If the user has any manual selected options before clicking the auto tab, those options

will be deselected and ignored. The information window at the top of the view contains the same information as in the assisted mode, but in the "Auto mode" the user can no longer interact with the list.
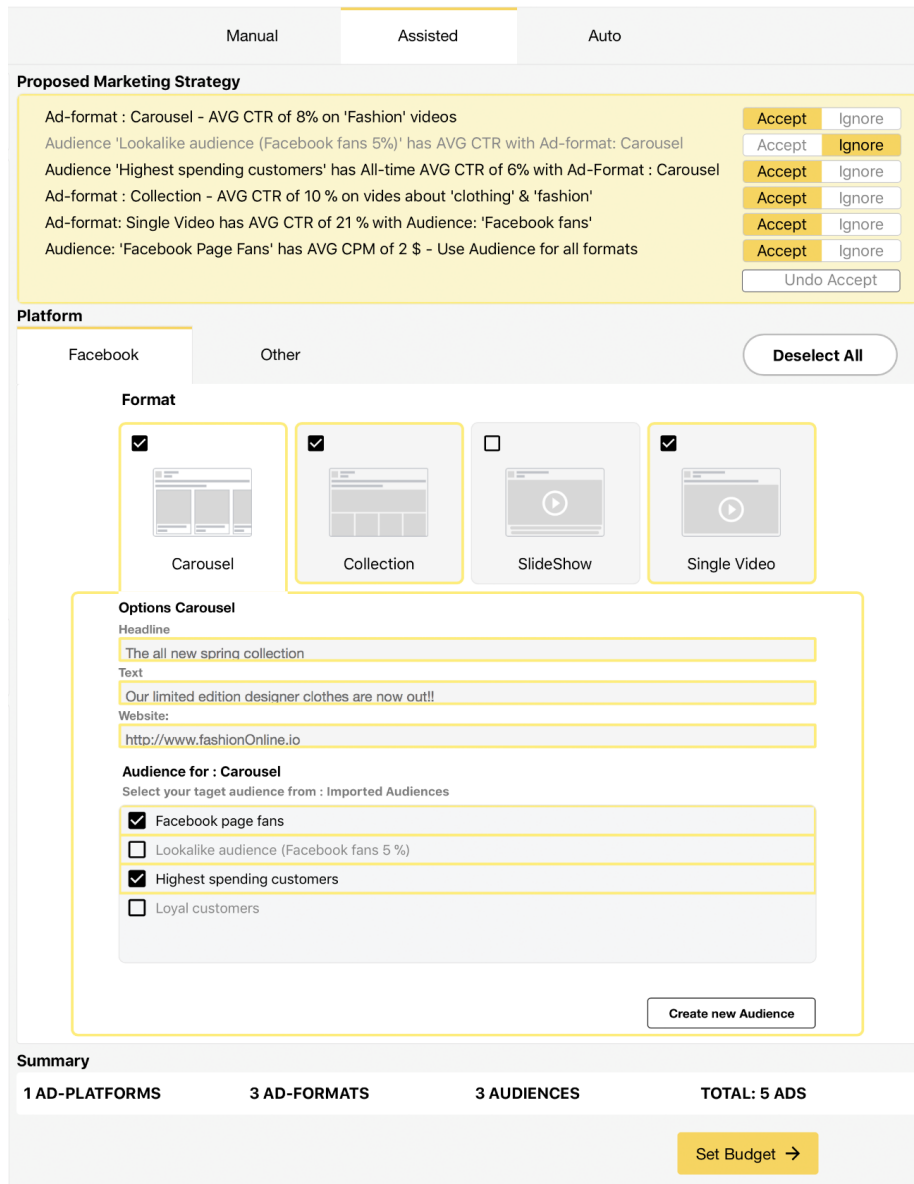

Figure 6.9: Create Ads - Auto mode. The list of suggested marketing strategy is present at the top of the view. Each suggestion is selected and highlighted in blue in the interface.

If the option "Automatic" is selected on the previous page in the workflow (Figure 6.2), users get to skip the ad creation page. In order to give feedback to the user on what settings have been automatically chosen by the system and why, a pop-up window is displayed. The pop-up contains information about what ad formats and audiences have been chosen and the reason for why they were chosen. The pop-up window can be seen in Figure 6.10.
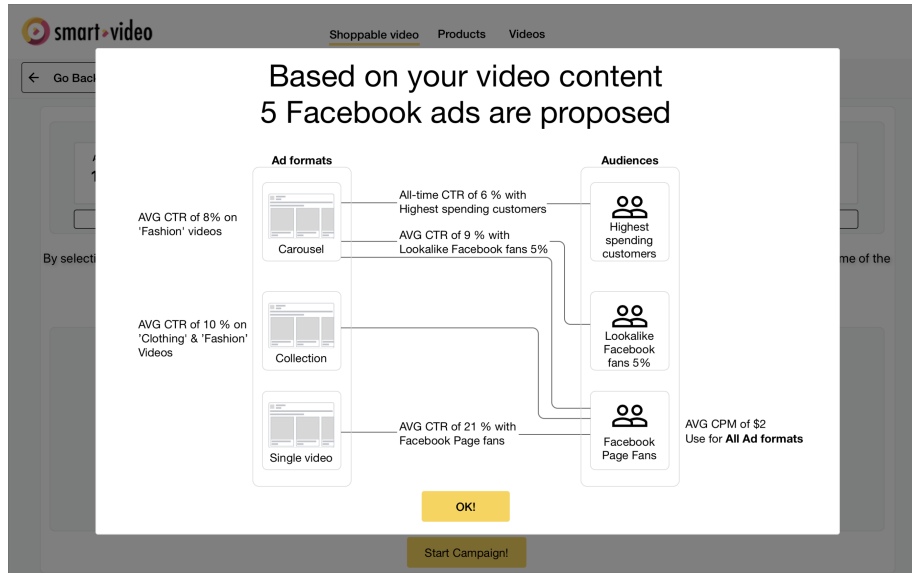
Figure 6.10: Pop-up info window showing information on what automatic market strategy was chosen and why. The pop-up is shown before the budget page only if the user selects the Automatic ad setup option at the beginning of the ad creation work flow.

After the user or the system has selected the ad formats and audience to be used for creating the ads, the final page of the ad creation process is showed. This page can be seen in 6.11. In this view the user gets to specify the budget and how long the campaign should proceed. This can be done in top section of the page. In the same section of the interface there is some brief information about budget allocation and a summary of how the current ad optimization is set up. Two buttons are available for distributing the budget equally, and setting all ads to have either manual or automatic ad optimization. Under the top section is a summary of the ads that are about to be created. Each ad has controllers for budget allocation and ad optimization.

From start the budget is allocated equally between the ads. The user has freedom to allocate the budget individually between the ads using the "+" and "-" buttons in the corresponding ad containers. Each of the ads have options to have either Automatic or Manual ad optimization throughout the campaign. Optimization can be chosen by clicking the buttons at the bottom of each ad
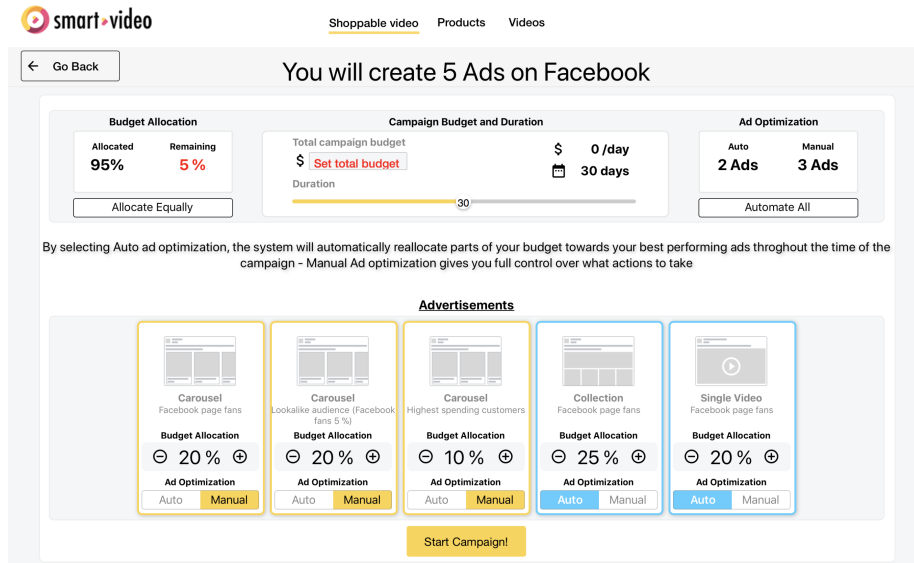
Figure 6.11: The Budget page - the last view in the ad creation work flow

container. The blue color represent automatic ad optimization and the yellow color represent manual ad optimization. An example of two different ads with different budget allocation and different ad optimization settings can be seen in Figure 6.12.

When a user is satisfied with the ad-settings, the budget allocation and the different modes for ad optimization for each ad, the campaign can be started by clicking the "Start campaign!" button at the bottom part of the view.
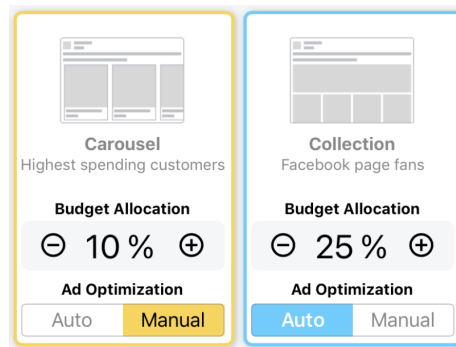
Figure 6.12: Each ad is represented by a box containing information about the ad to be created. Each ad has settings regarding how much of the total budget that is allocated for each ad, and if the ads should have Automatic or Manual ad optimization during the campaign.

6.2 Evaluating the prototype

This section presents the results from the usability testing. The test method used was based on the "Do it yourself usability testing method", established by Krug [23]. All tests were performed at Codemills head office in a calm and secluded conference room. The screen of the computer on which the test were performed was recorded, as well as mirrored to another conference room where people from the staff working with Smart video development could observe and take notes. When all recordings from the user tests had been analyzed the results from the usability testing could be determined. All conclusions about the proposed design are based on participants behaviors and thoughts together with the notes taken during the usability testing.

6.2.1 Participants

The tests were performed on the final prototype with five participants. The participants were all Swedish citizens and employees at Codemills head office. All participants used computers in their daily work routine, and were to be considered to have good or very good computer skills. Two of the participants had great knowledge and experience in marketing while three participants had novice to moderate knowledge about marketing.

6.2.2 Usability testing summary

The test showed that some usability- and design details in the proposed interface can be further improved. Below follows a summary of each page in the ad creation workflow and the main design issues that surfaced during the usability testing. The design issues have been evaluated in relation to the heuristics present in Table 2.1.

Set goal page No participants had any problems on this page, the goals available were all clear and the texts corresponding to the options available were considered to be informative. This is somewhat linked to *Heuristic 8 - Aesthetic and minimalist design*, saying that dialogs should only contain relevant information.

Selecting mode for ad setup All users had similar thoughts on what the options "Manual", "With program assistance" and "Automatic" meant. However two of the participants with greater experience in marketing thought these options also involved automation throughout the time of campaign, and not just regarding ad creation process. This can be linked to *Heuristic 10 - Help and documentation*. The absence of any explanation how the system is meant to be used can lead to first time user having a mental model of the system that does not completely match what the system actually can do.

Create ads Manual mode   All participants understood how the ad creation process worked, and when asked to describe what they saw they described the side panel containing the campaign goal and the video used for advertising, the information container on top and the ad creation container correctly. This can be linked to *Heuristic 6 - Recognition rather than recall*, saying that users shouldn't have to remember this kind of information from previous pages in the workflow.

Some participants did not see right away what platform was chosen to host the ads leading to those participants describing the ad formats available as general ad formats for online advertising, instead of Facebook specific ad formats. Two of the participants expressed that they wanted to have more information regarding the available ad formats and Facebook as an advertising platform, once again linked to *Heuristic 10 - Help and documentation*. A preview of how each ad format would look when published was also a frequently requested feature, something that can be linked to *Heuristic 1 - Visibility of system status*.

Create custom audience   The task for creating a new custom audience was successfully completed by all participants. When adding interests to the audience, the test subjects were told to add interests or keywords they thought would be good to use for advertising the video seen in the left part of the prototype. When doing so three out of the five participants used key words present in the list of *Meta data* linked to the video, while two of the participants wrote down interest they associated with the video, but that were not present in the list of Meta data. One of the participants added as enough interests in the input field so that the text exceeded the space available, hiding some of the inputs. This issues are once again linked to *Heuristic 1 - Visibility of system status*.

Create ads - Assisted mode   When creating ads in assisted mode, the interface is updated with a list of suggestions in the market strategy container, as well as yellow highlights in the interface. When the ad formats are highlighted, the visual cues indicating what ad format is currently selected became slightly harder for the participants to see, linking to *Heuristic 1 - Visibility of system status*.

Suggested market strategy   When creating ads in the assisted mode, all participants immediately noticed the list of the suggestions market strategy in the top section of the page. However some participants did not completely understand what strategy was suggested and why. One participant confused the name of the audience "Lookalike Facebook page fans 5%" with the reason for why it was suggested, something that can be linked to *Heuristic 1 - Visibility of system status*. This indicating that the format of how the suggestions are presented might need more extensive clarification in order to inform the users what is going on. Another design issue that occurred was that some of the participants misinterpreted the yellow highlights in the interface, and though of them as general highlighting on what options needed to be filled out or selected

in order to proceed, linking to *Heuristic 4 - Consistency and standards*. Users are familiar with the idea of highlights, but does not understand how highlights are used in this particular tool. However, interacting with the list of suggestions clarified for confused users that the highlights were connected to the proposed market strategy.

When the participants were told to accept all suggested parameters, two out of the five participants accepted all suggestions individually before discovering the "Accept all" button, located at the bottom of the suggestion list. While the functionality of the "Accept all button" is linked to *Heuristic 7 - Flexibility and efficiency of use*, letting users accelerate the process of accepting all suggestions at once, the placement of the button can be linking to *Heuristic 1 - Visibility of system status*.

Switching between modes Four out of the five participants noticed the tab bar located at the top of the interface, and used this when switching between the modes. One participant did not notice the tab bar at all, and back tracked to the previous page in the work flow when asked to switch between the manual and assisted mode. This issue is linked to *Heuristic 1 - Visibility of system status*.

Info pop-up: Create ads - Auto mode When asked to explain the pop-up window displayed when setting up ads automatically (Figure 6.10), all participants understood that it was an explanation of what ad formats and what audiences had been chosen by the system. However some participants did not see the connections between the ad formats and the audiences right away, this design flaw is linked to *Heuristic 1 - Visibility of system status*, indicating that how the market strategy is presented in an informative image might need further improvement.

Budget page Setting budget and campaign duration was not a problem for any of the participants. When first seeing the budget page, the budget is allocated equally between the ads even if the budget has not yet been set. This first seemed confusing for some users since the budget allocation indicated that ads had some percent of the total budget, even though the budget was 0.

In the hi-fi prototype there is no error prevention regarding the budget, for example if a user would set the budget higher than intended. This issue is linked to *Heuristic 5 - Error prevention* and could potentially be solved using a dialog or some extra step where the user needs to confirm that the budget is correct before the campaign will start.

Info containers for budget and ad optimization The info containers for budget and ad optimization is located in the upper part of the budget page, while the ads about to be created is present in the lower part of the view. Some participants wanted to have a closer relation between the information containers and the ads and did not realize at first that they were connected.

Advertisements   The advertisement containers at the lower part of the interface shows information about the ad format, audience, budget at ad optimization. When asked to distribute the budget between ads, participants had no problem doing so when the task was to lower the budget of ads. When asked to increase budget for a specific ads, this could not be done if the budget allocation was already at 100%. It took some time for participants to realize that they first needed to lower the budget for other ads to free parts of the budget to be reallocated. This flaw is linked to *Heuristic 1 - Visibility of system status*. The system should in some way inform the users that the budget first need to bee lowered for some ads before increased on other ads.

Ad optimization   Four out of the five participants did not completely understand what Ad Optimization meant. The participants thought it had something to do with the previous manual or automatic ad setup, and did not associate it with ad optimization throughout the time of the ad campaign. One participant thought it had to do with budget allocation, and switched the ads to manual before reallocating the budget. These flaws are linked to *Heuristic 10 - Help and documentation* as well as *Heuristic 4 - Consistency and standards*. Documentation of how online advertising works might help users understand the concept of ad optimization over time. By using other terms than auto or manual when talking about ad optimization might also help users understand that the options has something to do with future and not previous settings regarding the ads.

General comments from the participants   The participants with novice knowledge about marketing wanted to have more information about advertising in general as well as more information about the Facebook as advertising platform. A preview of how each of the ads would look when published was a frequently requested feature. Extensive functionality regarding budget allocation was also requested, like the possibility of dragging instead of clicking to increase or decrease the budget or the option to set budget by using the keyboard instead of interacting only with the buttons. Locking the budget for specific ads was also a requested feature. Meaning that the user manually can allocate the budget for an ad and then lock it, so that when pressing the button to allocated the budget equally between the ads, that would only affect those ads that are unlocked, functionality that is linked to *Heuristic 7 - Flexibility and efficiency of use*. The interface was otherwise said to be "easy to use" but that some advertising terms, like "CPC" (Cost Per Click) and "CPM" (Cost Per Mille) was difficult to understand, linking back to *Heuristic 2 - Match between system and the real world*, saying that a system should speak the users language rather than system oriented terms.

Summary   In short, the general problems with the design seemed to be regarding the concept of online advertising. Little to no information about how online advertising works was implemented to the design. Meaning that even though the test subjects had no problem using or understanding the marketing

tool, they did not really know what would happen with their ads once they started the campaign. These problems are further discussed in the following section.

Chapter 7

Discussion

In this chapter the resulting hi-fi design proposal along with its corresponding usability testing is discussed in relation to the stated objective of this master thesis.

General thoughts on marketing. If you type the word "Marketing" into the search field for books on Amazon.com, you will get 338,855 results [1]. This massive amount of books shows that the science surrounding marketing is a fairly large area to explore. Taking the vast majority of aspects regarding marketing in to consideration when designing a marketing tool would be a most challenging, if not impossible, task to pull of. The choice between what functionality should be implemented, how users will interact with the system, what information to visualize and how it should be presented to users does not have a definite answer. What might be the best solution highly depends on the situation, the company developing the product, the people intended to use the tool and their expertise or experience in the area where the tool is meant to be used.

A marketing tool meant to be used by highly educated marketers with years of experience can probably offer more complex functionality than a tool meant to be used by people with novice experience in marketing. However, by leaving a lot of the complex decision making to machines that can calculate the best marketing strategy based on performance data could potentially reduce much of the complexity that human operators, experienced or not, otherwise would have to deal with. Meaning that automation can enable such a tool to have a complex behavior without the need of a complex user interface.

Making use of automation in ad-creation and ad-optimization, has great potential for creating successful advertising campaign while at the same time ease the workload of the marketers using the system.

The design proposal presented in this thesis aims to illustrate how such an intelligent system could make use of data from previous advertisement campaigns

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[1] https://www.amazon.com/, Amazon.com , accessed on: 2017-12-18

when suggesting what market strategy to use when creating ads for a new Smart video ad campaign. By proposing strategies (what ad formats and audiences to use) that are based on performance data, when creating ads has potential of both decreasing the workload of marketers when creating ad campaigns as well as help novice users to decide upon a successful market strategy.

Usability testing was carried out on the hi-fi prototype. All test subjects, novice as well as experienced marketers had no problems to complete the tasks that were handed to them. Even though some participants had never used any type of marketing tool prior to this, the work flow of the prototype seemed easy to understand. Why the design was considered easy to use and to understand might be because of the step by step work flow, as well as the assistance by the system proposing what marketing strategy to use when creating the advertisements.

Displaying the Level Of Automation was in the early iterations of the lo-fi prototype done using different symbols. This way of displaying what parameters has been automatically selected as well as manually selected within the interface was unclear to the majority if the test subjects. Instead the approach of using colors to indicate different LOA was chosen. The color yellow was selected to represent system suggested parameters since it can act as a symbol of sincerity or honesty as the color generally evokes feelings of optimism and friendliness [16, 50]. A user of the system should feel that the system can be trusted and that the proposed settings are not to be seen as a demand but more of a friendly suggestion to help them reach their advertising goal. The color blue was chosen to represent a higher level of system automation within the interface. Blue was chosen since it is often associated with things like intelligence, trust, efficiency and logic [16, 25, 50]. Using colors to represent different LOA within the interface turned out to be a better solution than the usage of symbols that was first proposed in the lo-fi prototype of the design. Judging by the results from the usability testing this approach of color coding automation seemed to prevent **mode confusion** to a greater extent.

In addition to the colors, the tab bar at the top of the ad creation page showed in plain text what mode a user was currently working in. The possibility of switching between modes using the tabs offered users a way to easily control how much automation or program assistance they wanted when creating the advertisements.

During usability testing of the lo-fi prototype some participants who chose to advertise automatically got confused when they were showed the ad creation page in automatic mode. They thought "automatic ad setup" would mean that the ads were to be created by the system. So presenting a view looking like an interface for creating ads did not match the users mental model of what would happen when they continued in the ad creation work flow. Therefor in the hi-fi prototype if automatic ad creation is selected in the beginning of the work flow, the ad setup page is skipped. Users will instead be presented with information about what platform, what ad formats and what audiences have been chosen

by the system to use in the current ad campaign.

Worth noting is that during the usability testing one of the five participants (who had tested the interface in "Manual mode" as well as "Assisted mode" before performing tests the "Auto mode") pointed out that he would rather have reached the ad creation page in auto mode, in order to first confirm that he wanted to use all suggested parameters before moving on to the budget page. This might be because the prior test in manual as well as auto mode affected his mental model of what the system would do when clicking forward in the work flow. When the system then did something that was not expected the mental model of the person testing the interface did not match what was happening on the screen. This shows that there is no definitive answer to what might be an optimal solution, and what is preferred by some users might not be preferred by others.

Presenting feedback   on the system proposed market strategy using a list of options at the top of the ad creation page was both visible and easy to interact with. However, users did not right away see the connection with the proposed marketing strategies and the highlights in the interface and some users had troubles understanding the basis for the choices made by the system. This gives an indication that the informative dialog presenting the automatically suggested marketing strategy can be further improved in order to clarify for a user what strategy have been chosen by the system and why. Some other visual cues than the color coded highlights might also be necessary in order to minimize confusion, and to further clarify the connection between the proposed market strategy and it's corresponding parameter settings in the interface.

Privacy and ethics.   With more and more information available for ad targeting and ad optimization comes issues regarding privacy as well as all the ethical aspects surrounding the area. Imagine a marketing tool that acts solely on the ad performance data that correlates with the campaign goal. The tool would distribute or propose ad settings to allocate a company's campaign budget towards the most profitable audience. Sounds good right? But what if the most profitable audience for an advertisement promoting razor blades are people who's search history indicates that they are suicidal, or what if the most profitable segment for an advertisements promoting alcohol are 13 year old kids? Is the ad performance data in terms of click or purchases then the most important factor to account for when measuring success or do we need to start looking for other things to determine if an ad campaign performed well or not?

Other ethical aspects to consider regarding ad targeting is the possibility advertisers get to influence people regarding politics or other aspects of society.

Eu regulations regarding protection of personal data.   The European Commission have proposed a comprehensive reform of data protection rules to the EU [47]. The regulations were entered into force on 24 May 2016, but shall apply from 25 May 2018. How these regulations will affect how personal

data is gathered, saved and made available for marketing needs to be further investigated. This in order to see what functionality regarding ad targeting, personalization and statistic gathering that legally can be implemented into a performance driven marketing tool for the Smart video platform.

In summary. The design of the final hi-fi prototype is based on the results of the iterative design process regarding the lo-fi prototype. The hi-fi prototype shows how automation can be used to propose a market strategy to use for an online ad campaign. The use of colors to indicate different levels of automation, seemed to avoid mode confusion at a greater extent than the approach of using symbols. The main issues with the proposed design is lack of feedback and information regarding the online advertising in general and how the tool is meant to be used when creating and managing online ad campaigns.

7.1 Limitations

The underlying automation and algorithms that would power the proposed design does not yet exist, meaning that the design is just a concept. Extensive functionality like detailed campaign creation, the use of multiple videos and multiple advertising platforms have not been included in the design proposal. Other things like Smart video compatible ad formats have not been accounted for, since the focus of the design proposal is not the ad formats themselves but the design regarding human centered automation within the interface.

Limitations regarding ad targeting. Instead of letting users create their own audiences to a greater extent directly in the marketing tool, a list of imported Facebook audiences were chosen as the main source for ad targeting. This strategy was chosen since Facebook already have their own powerful tools for creating audiences, and replicating this functionality would not add too much value to the marketing tool besides the risk of making the tool more complex or harder to use. Also it is not unlikely that many marketers are already using Facebook for advertising outside of Smart video. So by letting marketers use their already existing audiences when advertising on Facebook through the Smart video marketing interface could potentially streamline and ease the ad creation process to a greater extent.

Limitations with ad platforms. For the case of this study, no VAST or VPAID compatible ad networks were available for inspection. This limits the design proposal to creating ads on one single platform - Facebook. While Facebook is one of the worlds largest advertising platforms, they do not allow any other ad-formats to be displayed other than their own. This limits the way Smart video can be used for marketing on Facebook, and what might be a good way to advertise Smart video using facebook ad-formats need to be further investigated.

Limitations in the ad managing design proposal. Due to time constraints surrounding the project, only lo-fi mockups of the ad managing interface was made. These mockups illustrate how automation, and systematically suggested actions could potentially be used and visualized in the interface when it comes to optimizing ads within a campaign over time. The design proposal does not account for what type of data might be most valuable to use for ad optimization, or what data should be prioritized and visualized in the interface. If such a proposed system should be built and implemented, the data that is made available to the user and where it should be displayed in the interface needs to be further investigated.

Chapter 8

Conclusion

Feedback and information are two very important aspects in any interface design, especially when it comes to designing for automation. The main issues with the final design proposal of the performance driven marketing tool for Smart video is regarding *Heuristic 1 - Visibility of system status* and *Heuristic 10 - Help and documentation*.

For example while all participants could understand the proposed market strategy, and the basis for the suggestions in the ad creation workflow, only two out of the five participants were familiar with the term "Ad optimization". This meaning that the majority of the test subjects were not familiar with the possibility of first creating a set of ads and the later optimize, pause or remove ads throughout the time of the campaign. This fact seems to have lead to some test subjects believing that "Automatic" or "Manual" ad optimization, when presented to them on the last page of the ad creation workflow (Figure 6.11), had something to do with the way the ad formats had been previously selected and targeted, and not how the ads would be optimized later on.

So while information was available about why certain ad formats and target audiences were suggested by the system, no extensive information about the concept of marketing or online advertising was integrated into the design. This leading to the conclusion, that in order to prevent confusion at a greater extent and help first time users to use the tool more effectively, some extra information should be presented. This information should in some way briefly explain the concept of online advertising, how the marketing tool is meant to be used and how the automation that analyze ad performance data can help users to create successful online advertising campaigns.

Chapter 9

Future Work

There is almost an endless amount of data that could be gathered in relation to online ad performance. It is not just data collected from interaction with the ads themselves, but from multiple other sources as well. This is something that needs to be taken into consideration before designing the underlying algorithms that would power a performance driven marketing tool like the one proposed in this thesis.

For example, an advertisement promoting Christmas trees will most likely perform better the weeks leading up to Christmas, than it would for the rest of the year. Just like ads promoting Sun trips would potentially have better result if they were to be shown to people living in an area that had been having a period of bad weather than they would if they were to be shown to people living in an area that recently had been exposed to a heat wave. This meaning that time, holidays, weather or multiple other factors can impact on how certain ads will perform.

All these different parameters that could or should be taken into consideration when determining ad performance quickly leads up to an overwhelming amount of different strategies to use for advertising. Having tools that could make sense of all this information at grater extent, recognizing statistically significant trends and factors that correlate with ad performance could be very powerful.

More functionality A performance driven marketing tool, like any other tool or software, could be designed to be even more powerful and customizable by implementing more functionality. Some examples regarding more functionality that users proposed during the user tests were: The ability to target a smaller segment of an already existing audience. For example using an existing audience consisting of "Facebook page fans" as a basis, but then narrow that audience down by only targeting the people living in a certain area or those of a certain age. Functionality regarding automatic proposed settings based on the user option selections was also requested. For example if the system have not proposed to use a certain audience for a campaign and the user selects that

audience manually. The system could then suggest the best suited ad-format to use along with that audience, even though it was not proposed in the first place.

Another proposed functionality was to only let the system automate optimization only to a certain extent. For example by letting the program reallocate the budget however it chooses between ads during the time of the campaign, but with a restraint that it can never pause an ad or reallocate the spendings so that an ad gets less than, for example 10 percent of the total campaign budget.

Previews of how the different ads will look on the advertising platform was also a frequently requested feature. These are all examples of functionality that would be nice to have in the final implementation of the system, but something that has not been accounted in this thesis. Functionality like this could potentially make the tool more powerful, but would also make the tool more complex and perhaps harder to use. With this is mind, when looking at other advertisement interfaces and how they have developed over time, it is not that hard to understand why many of these tools have become as complex as they often are.

Chapter 10

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Appendix A

USER STORIES

1. As a user I want to be able to create one ad, with one audience on one platform, so that I can advertise specific.

2. A a user I want to create multiple ads on one platform, with multiple audiences, in order to get a variety of ads that are based on the same video.

3. As a user I want to advertise based on automatically suggested ad-formats and audience-settings, in order to advertise based on performance data.

4. As a user I want to be able to distinguish which parameters have been proposed by the system and what parameters have been set manually, in order to get an overview of the automation within the current ad creation process.

5. As a user I want to be able to reset all automated settings when creating ads, to quickly get full manual control of the ad creation process.

6. As a user I want to see relevant information about the Smart video used when creating the ads, to use as aid when creating and targeting ads.

7. As a user I want to be able to set a campaign goal, in order to have something to measure ad performance against.

8. As a user I want to be able to use proposed as well as manual settings in the same campaign, so that I do not have to choose only one LOA for ad creation.

9. As a user I want to be able to advertise to imported Facebook audience, in order to use the same audience in the Smart video interface as I would in Facebooks own marketing interface.

10. As a user I want to be able to advertise to a custom audience, in order to target an audience that is not imported from the ad platform.

11. As a user I want to be able to advertise to a custom audience, in order to target an audience I think will contribute to reaching the campaign goal.

12. As a user I want to be able to set the budget and duration of the ad campaign in order to have control over marketing costs.

13. As a user I want to be able to set which ads should be automatically optimized and which should be manually optimized in order to control how optimization is carried out through out the campaign.

14. As a user I want to be able to distribute the budget individually between ads in order to get control over the spendings of each ad.